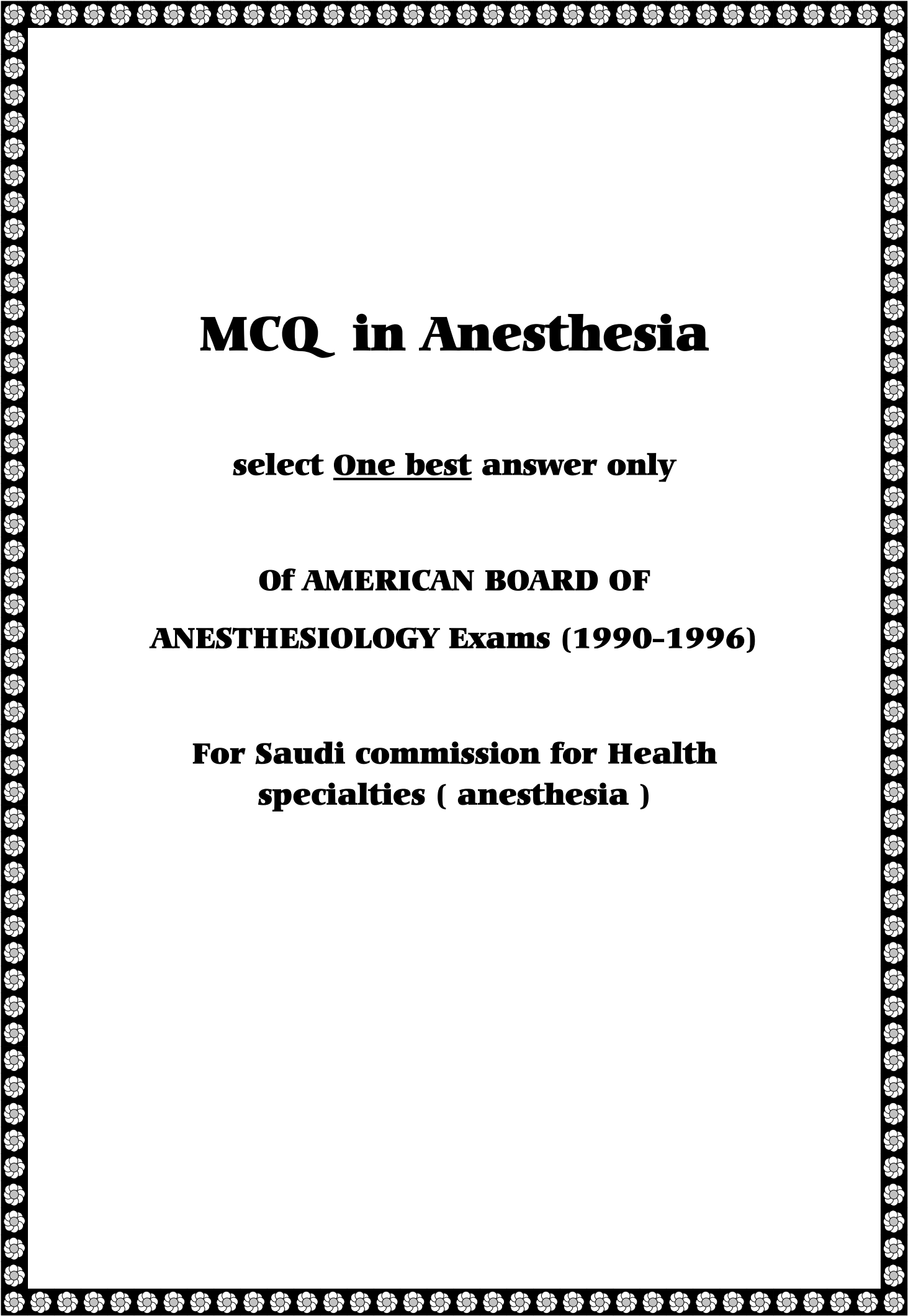




MCQ in Anesthesia

select One best answer only

**Of AMERICAN BOARD OF
ANESTHESIOLOGY Exams (1990-1996)**

**For Saudi commission for Health
specialties (anesthesia)**

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1990

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. A 67-year-old man is undergoing total hip replacement under general anesthesia. He had a permanent endocardial VVI pacemaker placed two years ago for complete heart block, and since arrival in the operating room has been paced continuously. Use of the electrocautery causes the pacemaker to malfunction intermittently.

The most appropriate management is to

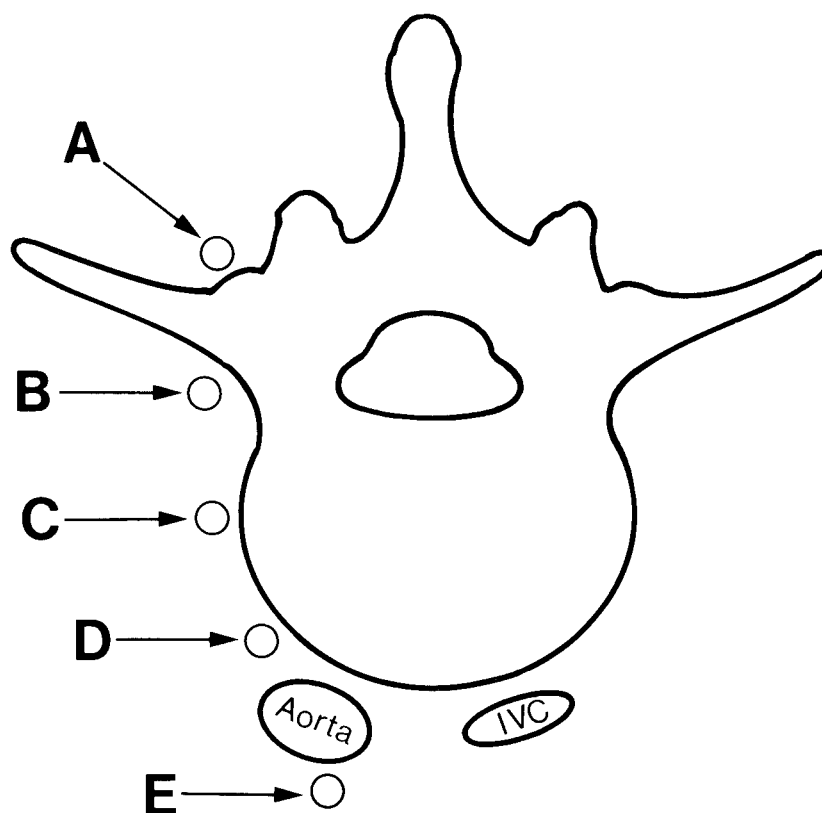
- (A) tape a magnet over the pacemaker generator and convert to asynchronous mode
 - (B) do nothing since the pacemaker is programmed to deal with this circumstance
 - (C) stop the surgeon from using the electrocautery
 - (D) limit the surgeon to 10 sec/min electrocautery bursts
 - (E) place the electrocautery indifferent lead as close as possible to the pacemaker
2. Peak airway pressure increases from 25 to 50 cmH₂O when beginning right endobronchial ventilation with a right double-lumen tube. The most likely explanation for this increase is
- (A) failure to decrease tidal volume
 - (B) inadvertent intubation of the left mainstem bronchus
 - (C) intrinsic resistance of small endobronchial lumina
 - (D) obstruction of the orifice of the right upper lobe
 - (E) overinflation of the bronchial tube cuff
3. During enflurane anesthesia for colectomy in a 75-year-old man with sepsis, urine output decreases to 10 ml/hr. Heart rate is 120 bpm, blood pressure is 100/50 mmHg, central venous pressure is 10 mmHg, and pulmonary artery occlusion pressure is 15 mmHg. The most appropriate management at this time is to
- (A) measure cardiac output
 - (B) increase fluid administration
 - (C) infuse dopamine
 - (D) administer propranolol
 - (E) switch from enflurane to isoflurane
4. Hypothermia to 29°C will decrease
- (A) hematocrit
 - (B) plasma fibrinogen concentration
 - (C) plasma pH
 - (D) plasma protein concentration
 - (E) platelet function

5. A 15-year-old previously healthy boy is scheduled for a celiotomy to relieve an acute intestinal obstruction. A rapid sequence induction is used. Anesthesia is maintained with a balanced technique including nitrous oxide and oxygen (5L:2L), meperidine, and pancuronium. Because of abdominal distention and the high pressure required for inflation of the lungs, a nasogastric tube is inserted. The abdomen remains distended, but compliance improves dramatically. At this time the patient is cyanotic, PaO_2 is 48 mmHg, PaCO_2 is 52 mmHg, and pH is 7.29. Nitrous oxide is discontinued.

The most important therapeutic measure is to

- (A) remove the nasogastric tube
 - (B) insert a chest tube on the right side
 - (C) withdraw the endotracheal tube 1 cm
 - (D) deflate the cuff on the endotracheal tube
 - (E) replace the endotracheal tube with one of larger internal diameter
6. In an unpremedicated, spontaneously breathing patient, an alveolar halothane concentration of 0.74% in oxygen is consistently associated with
- (A) absence of overt response to skin incision
 - (B) constricted pupils
 - (C) flaccidity of abdominal muscles
 - (D) normal glomerular filtration rate
 - (E) normal myocardial contractility
7. Following a vaginal hysterectomy in the lithotomy position under general anesthesia, a patient has numbness of the lateral aspect of the left calf and medial half of the dorsum of the left foot. On physical examination she has footdrop and the toes cannot be extended. Which nerve is most likely to be involved?
- (A) Common peroneal nerve
 - (B) Deep peroneal nerve
 - (C) Posterior tibial nerve
 - (D) Saphenous nerve
 - (E) Sciatic nerve
8. Pulmonary artery diastolic pressure increases acutely from 10 to 20 mmHg in a 28-year-old man undergoing cervical laminectomy in the sitting position. The most appropriate first step in the management of this patient is to
- (A) administer furosemide
 - (B) aspirate from the proximal port of the pulmonary artery catheter
 - (C) inflate the balloon on the pulmonary artery catheter
 - (D) place the patient in the left lateral decubitus position
 - (E) start an infusion of nitroglycerin
9. During the first stage of labor, the pain of uterine contractions and cervical dilatation is transmitted via the spinal cord segments
- (A) T6 to L1
 - (B) T6 to S5
 - (C) T10 to L1
 - (D) T10 to S1
 - (E) T10 to S5

10. During use of the ventilator on an anesthesia machine, positive pressure is noted on the airway pressure gauge during exhalation. Positive end-expiratory pressure has not been purposefully added to the breathing circuit. Which of the following is the most likely cause?
- (A) Closure of the pop-off valve in the circle system
 - (B) Excessive tidal volume settings on the ventilator
 - (C) Obstruction of the pressure relief valve on the scavenging system
 - (D) Overinflation of the endotracheal tube balloon
 - (E) Tension pneumothorax
11. Addition of 20 cmH₂O positive end-expiratory pressure to a patient receiving controlled mechanical ventilation decreases cardiac output and left ventricular function by
- (A) increasing right ventricular preload
 - (B) increasing right ventricular afterload
 - (C) increasing left ventricular preload
 - (D) increasing left ventricular afterload
 - (E) producing myocardial ischemia
12. A 75-year-old man is confused, restless and disoriented two days after an aortic aneurysm repair. Serum sodium concentration is 112 mEq/L, serum osmolality is low, and urine is hypertonic. The most appropriate treatment is
- (A) restriction of fluid intake
 - (B) administration of isotonic saline solution
 - (C) administration of hypertonic (3%) saline solution
 - (D) administration of spironolactone
 - (E) infusion of mannitol 25 g
13. A 65-year-old man with essential hypertension well controlled around 140/90 mmHg with hydrochlorothiazide is scheduled for right colectomy for carcinoma. Preoperative EKG and all laboratory values are normal except for a hematocrit of 29% and serum potassium level of 3.2 mEq/L. Central venous pressure (CVP) measured from an internal jugular catheter inserted before induction of anesthesia is 7 mmHg. Ten minutes after induction with thiopental 200 mg followed by enflurane 3% in nitrous oxide and oxygen (50% each), blood pressure decreases suddenly from 110/70 to 80/50 mmHg with heart rate unchanged at 78 bpm. CVP is now 20 mmHg and the EKG demonstrates a midjunctional rhythm.
- After discontinuing the enflurane, the most appropriate action would be to
- (A) administer furosemide 20 mg intravenously
 - (B) verify proper placement of the CVP catheter
 - (C) administer atropine 0.4 mg intravenously
 - (D) administer packed erythrocytes 1 unit
 - (E) administer potassium 20 mEq in 250 ml of intravenous fluid over 15 minutes
14. Halothane
- (A) has no effect on reflex hypoxic pulmonary vasoconstriction
 - (B) protects the myocardium from beta-adrenergic stimulation
 - (C) has a direct, negative chronotropic effect on the sinoatrial node
 - (D) metabolites decrease renal concentrating ability
 - (E) is unsafe for use with epinephrine-containing local anesthetics



15. In performing a diagnostic left lumbar sympathetic block for lower extremity claudication, the tip of the needle ideally should lie at point

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

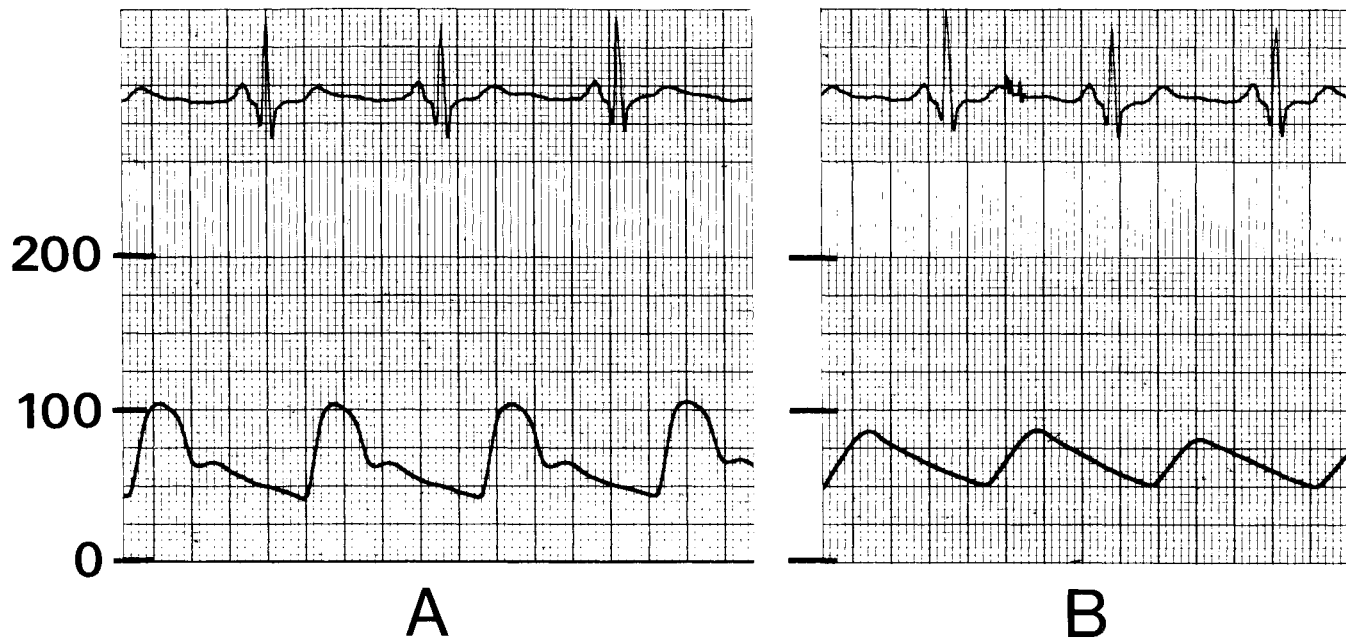
16. A 30-year-old, 70-kg woman with mitral stenosis is scheduled for elective laparoscopic sterilization. Preoperatively she is taking digoxin and an unknown medication for chronic mental depression. The EKG demonstrates atrial fibrillation. Heart rate is 68 bpm. Anesthesia is induced with thiopental followed by nitrous oxide 50%, halothane 0.75%, and a continuous succinylcholine infusion. The ventilator is set to deliver a minute volume of 5 liters through an endotracheal tube. As the carbon dioxide is being insufflated into the abdomen, the blood pressure is noted to be elevated (150/100 mmHg) and ventricular bigeminy is present.

The most appropriate therapy is to

- (A) increase the halothane concentration to 1.25%
- (B) discontinue the succinylcholine infusion
- (C) increase minute ventilation to 7.5 L/min
- (D) administer potassium 5 mEq intravenously over one minute followed by propranolol 0.25 mg
- (E) measure arterial blood gas and serum electrolyte values

17. Intraoperative heat loss in an unclothed, undraped patient is caused primarily by
- (A) conduction to colder objects
 - (B) convective heat loss
 - (C) insensible perspiration
 - (D) radiant heat loss to the environment
 - (E) respiratory tract water loss
18. Intraocular pressure is
- (A) decreased by glycopyrrolate
 - (B) increased by hyperventilation
 - (C) decreased by halothane
 - (D) increased by nondepolarizing muscle relaxants
 - (E) increased by phenylephrine eye drops
19. A single dose of etomidate for induction of anesthesia will cause
- (A) adrenal cortical suppression
 - (B) decreased skeletal muscle tone
 - (C) hypotension
 - (D) increased airway reactivity
 - (E) tachycardia
20. Which of the following is most likely to be effective in the treatment of clinically evident cerebral vasospasm occurring after subarachnoid hemorrhage?
- (A) Administration of nimodipine
 - (B) Administration of thiopental
 - (C) Decreasing cerebral perfusion pressure
 - (D) Hypercarbia
 - (E) Hypocarbica
21. Which of the following is the most appropriate drug to treat hypotension in patients with asymmetric septal hypertrophy (IHSS)?
- (A) Amrinone
 - (B) Calcium chloride
 - (C) Dopamine
 - (D) Ephedrine
 - (E) Phenylephrine
22. The short clinical duration of action of a single dose of fentanyl is a result of its
- (A) small volume of distribution
 - (B) large volume of distribution
 - (C) low lipid solubility
 - (D) rapid redistribution
 - (E) short elimination half-life

23. A woman is undergoing a repeat cesarean delivery at term following a normal pregnancy. Anesthesia consists of thiopental 250 mg, succinylcholine infusion (180 mg in 20 minutes), nitrous oxide and oxygen (7:3 L/min) until delivery. Twenty minutes after the incision a floppy newborn with a 1-minute Apgar score of 5 is delivered. The most likely explanation for the infant's condition is
- (A) high serum thiopental concentration
 - (B) high serum succinylcholine concentration
 - (C) high serum nitrous oxide concentration
 - (D) high serum glucose concentration
 - (E) uterine hypoperfusion
24. A 38-year-old woman with hyperthyroidism is undergoing open reduction and internal fixation of a fractured humerus with isoflurane anesthesia. Intraoperatively her heart rate increases to 120 bpm with occasional premature ventricular contractions. The most appropriate therapy at this time is to
- (A) discontinue isoflurane
 - (B) administer edrophonium
 - (C) administer esmolol
 - (D) administer lidocaine
 - (E) administer propylthiouracil
25. A morbidly obese patient is to undergo gastric stapling during general anesthesia. Following preoxygenation and induction, the oxygen saturation decreases after 40 seconds of laryngoscopy and attempted intubation. The rapid onset of arterial desaturation is most likely due to
- (A) aspiration during induction
 - (B) decreased functional residual capacity
 - (C) increased cardiac output
 - (D) increased oxygen consumption
 - (E) increased ventilatory dead space
26. You are asked to evaluate a 2000-g male infant three hours after vaginal delivery because of a respiratory rate of 50/min, pulse rate of 115 bpm, and the following arterial blood gas values while breathing room air: PaO_2 64 mmHg, PaCO_2 43 mmHg, and pH 7.33. His mother received meperidine 75 mg two hours before delivery. Appropriate management includes
- (A) administration of naloxone 50 μg intramuscularly
 - (B) increasing the FiO_2 to 0.4
 - (C) intubation and mechanical ventilation at an FiO_2 of 0.5
 - (D) administration of oxygen 50% with 5 cmH_2O continuous positive airway pressure
 - (E) observation, with no action at present
27. A man with alcoholic cirrhosis and a hemoglobin concentration of 10 g/dl has an intraoperative PaO_2 of 75 mmHg at an FiO_2 of 0.5. Which of the following is the most likely cause of the low PaO_2 ?
- (A) Anemia
 - (B) Decreased cardiac output
 - (C) Increased dead space
 - (D) Intrahepatic arteriovenous shunts
 - (E) Intrapulmonary arteriovenous shunts



28. A 75-year-old, 60-kg man with moderately disabling heart failure secondary to ischemic heart disease is undergoing a transurethral prostatic resection under halothane-nitrous oxide anesthesia. Resection time is 30 minutes, and fluid replacement has been lactated Ringer's solution 500 ml. Although heart rate is unchanged, the arterial pressure monitor used because of his cardiac condition has changed from A to B over the last 15 minutes.

The most appropriate management is to

- (A) discontinue halothane
 - (B) administer ephedrine 10 mg intravenously
 - (C) administer digoxin one half of his daily dose intravenously
 - (D) administer sodium chloride 100 ml of 3%
 - (E) do none of the above
-
29. At the end of an anesthetic in which a nondepolarizing muscle relaxant was administered, the least number of receptors are blocked
- (A) after administration of neostigmine 5 mg and glycopyrrolate 1 mg
 - (B) if the tetanus is sustained at 30 Hz
 - (C) if the patient can sustain head lift for 5 sec
 - (D) when the ratio of twitch height $T_4:T_1$ is 0.8
 - (E) when tidal volume is normal
30. A healthy, but obese, 110-kg woman is scheduled for gastric stapling. Compared with that required at her ideal weight, the dose of thiopental required for anesthetic induction would likely be increased because of changes in
- (A) blood volume
 - (B) muscle mass
 - (C) circulation time
 - (D) body fat
 - (E) metabolic rate

31. In patients with pregnancy-induced hypertension, magnesium sulfate is most likely to
- (A) decrease maternal heart rate
 - (B) decrease sensitivity to relaxants
 - (C) decrease succinylcholine-induced fasciculations
 - (D) prevent hypokalemia
 - (E) produce fetal bradycardia
32. The most important factor regulating blood flow to ischemic cerebral tissue is
- (A) systolic blood pressure
 - (B) PaO_2
 - (C) cerebral perfusion pressure
 - (D) PaCO_2
 - (E) cerebral oxygen consumption
33. Which of the following is an indication for administration of fresh frozen plasma?
- (A) Antithrombin III deficiency
 - (B) Emergency antagonism of heparin effect
 - (C) Hemophilia A
 - (D) Transfusion of 5 units of homologous erythrocytes
 - (E) Uremic coagulopathy
34. Increasing preload, systemic vascular resistance and heart rate will best maintain hemodynamic stability in patients with
- (A) aortic stenosis
 - (B) asymmetric septal hypertrophy (IHSS)
 - (C) cardiac tamponade
 - (D) mitral regurgitation
 - (E) mitral stenosis
35. A 70-kg man has stable 80% neuromuscular block induced with d-tubocurarine. Compared with neostigmine 3 mg, antagonism with edrophonium 70 mg will
- (A) be of shorter duration
 - (B) be of slower onset
 - (C) be less reliable
 - (D) produce less change in heart rate
 - (E) require more anticholinergic
36. In a patient who is receiving nitroglycerin intravenously after a coronary artery operation, peripheral oxygen saturation is 85% and PaO_2 is 200 mmHg. The most appropriate management is administration of
- (A) exchange transfusion
 - (B) hydroxocobalamin
 - (C) methylene blue
 - (D) pure oxygen at 3 atmospheres
 - (E) thiocyanate

37. During repair for coarctation of the aorta in a healthy 13-year-old patient, right radial artery pressure increases from 100/60 to 105/70 mmHg after the aorta is cross clamped. This most likely indicates that
- (A) collateral blood flow has decreased the hemodynamic consequences of cross-clamping
 - (B) left ventricular hypertrophy has decreased left ventricular compliance
 - (C) spinal cord blood flow is impaired
 - (D) the coarctation has decreased aortic diameter less than 50%
 - (E) the coarctation involves the origin of the right subclavian artery
38. Compared with epidural morphine, intrathecal morphine produces
- (A) better relief of visceral pain
 - (B) greater loss of analgesia after administration of naloxone
 - (C) less pruritus
 - (D) less urinary retention
 - (E) more respiratory depression
39. The human immunodeficiency virus (HIV)
- (A) is inactivated by irradiation
 - (B) is transmitted by cryoprecipitate
 - (C) is transmitted by 5% albumin
 - (D) passes through intact dermis
 - (E) provokes an immediate antibody response
40. During liver transplantation, venovenous bypass from the femoral and portal veins to the axillary vein during cross-clamping of the inferior vena cava
- (A) decreases urine output
 - (B) prevents hypothermia
 - (C) prevents metabolic acidosis
 - (D) requires heparinization
 - (E) supports cardiac output
41. When used with morphine for premedication, which of the following drugs is most likely to cause sedation?
- (A) Atropine
 - (B) Cephalothin
 - (C) Clonidine
 - (D) Metoclopramide
 - (E) Ranitidine
42. During anesthesia with nitrous oxide and isoflurane in a 70-kg, 25-year-old patient, airway resistance would be decreased by
- (A) a decrease in lung volume
 - (B) insertion of a 9-mm endotracheal tube
 - (C) administration of atropine
 - (D) neuromuscular block with d-tubocurarine
 - (E) movement of the patient from the supine to the sitting position

43. The jet ventilation technique using an injector during laryngobronchoscopy relies on
- (A) air entrainment
 - (B) relative density of inhaled gases
 - (C) presence of an endotracheal tube
 - (D) presence of spontaneous ventilation
 - (E) use of helium-oxygen mixtures
44. During anesthesia, the ventilation/perfusion ratios change
- (A) to preferential ventilation of the dependent portion
 - (B) due to cephalad shift of the diaphragm
 - (C) by insignificant amounts from that in the awake state
 - (D) to preferential perfusion of the superior portion
 - (E) from changes in pulmonary compliance
45. Compared with healthy nonhypertensive patients, in patients with untreated hypertension undergoing anesthesia and operation,
- (A) cerebral ischemia may occur at higher blood pressures
 - (B) intravenous fluid should be restricted before induction
 - (C) left ventricular hypertrophy enhances compensation for intraoperative fluid loss
 - (D) responses to sympathetic stimulation are decreased
 - (E) the incidence of intraoperative hypotension is lower
46. Which of the following premedicant drug combinations is most effective in preventing passive regurgitation during anesthesia?
- (A) Cimetidine and glycopyrrolate
 - (B) Metoclopramide and atropine
 - (C) Metoclopramide and ranitidine
 - (D) Metoclopramide, atropine, and ranitidine
 - (E) Metoclopramide and sodium bicarbonate
47. Miosis, incontinence, excess salivation, and convulsions are toxic effects of
- (A) amphetamines
 - (B) phenothiazines
 - (C) cocaine
 - (D) tricyclic antidepressants
 - (E) organophosphate insecticides
48. During anesthesia with nitrous oxide 65% in oxygen, fentanyl, and pancuronium, nitroprusside is administered to decrease arterial pressure to 85/50 mmHg. A decrease in PaO_2 from 120 to 65 mmHg is most likely caused by
- (A) cyanide toxicity
 - (B) depressed cardiac output
 - (C) mild hypercarbia
 - (D) metabolic acidosis
 - (E) pulmonary vasodilation

49. A patient with metastatic carcinoma and chronic renal failure has tremors, fasciculations, mydriasis, and hyperreflexia after several days of therapy with high doses of meperidine for analgesia. Which of the following is most likely to occur if the meperidine is continued?
- (A) Disappearance of the symptoms as tolerance to meperidine develops
 - (B) Pinpoint constriction of pupils
 - (C) Progressive hypothermia
 - (D) Progressive sedation from meperidine toxicity
 - (E) Seizures from normeperidine toxicity
50. After tracheal extubation, a healthy 21-year-old man has a 30-second episode of laryngospasm with marked intercostal and sternal retractions, which are corrected with continuous positive airway pressure administered by mask. He now has dyspnea and tachypnea, and a roentgenogram of the chest shows diffuse bilateral interstitial edema. The most likely cause is increased
- (A) airway reactivity
 - (B) intrapleural pressure
 - (C) left ventricular afterload
 - (D) right ventricular preload
 - (E) transpulmonary vascular pressure
51. A 66-year-old man with aortic regurgitation is brought to the operating room for aortic valve replacement after having received morphine, scopolamine premedication. PO_2 is 40 mmHg in a sample of pulmonary artery blood drawn 10 minutes after the patient started breathing pure oxygen. This finding is compatible with
- (A) wedging of the catheter tip
 - (B) left-to-right intracardiac shunt
 - (C) increased intrapulmonary shunting
 - (D) excessively depressed ventilation
 - (E) normal cardiac output
52. A 26-year-old woman comes to a pain clinic because of pain, swelling and limitation of motion in the right knee for six months following a blow to the knee. Findings on knee arthroscopy and leg roentgenograms are normal. The best trial of therapy is
- (A) right paravertebral lumbar sympathetic nerve block
 - (B) epidural administration of a steroid
 - (C) intrathecal administration of an opioid
 - (D) tricyclic antidepressants for one month
 - (E) a nonsteroidal anti-inflammatory drug for five days
53. Diffuse microvascular bleeding is noted in a patient who has received 25 units of whole blood for a liver resection. Platelet count is 40,000/mm³, prothrombin time is 18 sec, activated partial thromboplastin time is 54 sec, and serum fibrinogen concentration is 60 mg/dl. The most likely cause of the bleeding is
- (A) abnormal platelet function
 - (B) citrate toxicity
 - (C) depressed levels of factors V and VIII
 - (D) dilutional thrombocytopenia
 - (E) disseminated intravascular coagulation

54. During right upper lobectomy and one-lung ventilation with a double-lumen endotracheal tube, the PaO₂ decreases to 40 mmHg. The PaCO₂ is 39 mmHg. Which of the following is most appropriate?
- (A) Confirm position of the tube with bronchoscopy
 - (B) Apply 5 cmH₂O continuous positive airway pressure to the nondependent lung
 - (C) Apply 5 cmH₂O positive end-expiratory pressure to the dependent lung
 - (D) Resume two-lung ventilation
 - (E) Clamp the pulmonary artery of the nondependent lung
55. The most likely cause of a fetal heart rate pattern of variable decelerations to 90 bpm is
- (A) aortocaval compression
 - (B) compression of the fetal head
 - (C) fetal acidosis
 - (D) maternal hypotension
 - (E) umbilical cord compression
56. During transurethral resection of the prostate, intravascular absorption of glycine irrigant most commonly produces
- (A) alkalosis
 - (B) hemolysis
 - (C) hypertension
 - (D) tachycardia
 - (E) wheezing
57. Spinal anesthesia at a T6 sensory level is most likely to improve cardiac output in patients with
- (A) aortic stenosis
 - (B) asymmetric septal hypertrophy (IHSS)
 - (C) chronic constrictive pericarditis
 - (D) cor pulmonale
 - (E) mitral regurgitation
58. A 57-year-old man has back pain, a heart rate of 90 bpm, decreased pulse in the left arm, and blood pressure of 200/110 mmHg. During infusion of nitroprusside, heart rate increases to 115 bpm and blood pressure decreases to 140/80 mmHg. The most appropriate management at this time is administration of
- (A) droperidol
 - (B) nifedipine
 - (C) normal saline solution
 - (D) propranolol
 - (E) verapamil
59. Dantrolene
- (A) antagonizes the effect of nondepolarizing muscle relaxants
 - (B) produces clinically detectable muscle weakness when administered intravenously prior to anesthesia
 - (C) is indicated for neuroleptic malignant syndrome
 - (D) may cause hepatic failure when used prophylactically before anesthesia
 - (E) has increased effectiveness when combined with calcium entry blockers

60. During apneic oxygenation (FiO_2 1.0) through a rigid bronchoscope
- (A) duration of the procedure is limited by the increase in PaCO_2
 - (B) functional residual capacity decreases 5%/min
 - (C) PaO_2 remains unchanged for the first 5 minutes
 - (D) PaCO_2 increases 2 to 6 mmHg/min for 15 minutes and then reaches a plateau
 - (E) PaO_2 and PaCO_2 equilibrate with mixed venous gases at the same rate
61. A 19-year-old woman receives a spinal anesthetic for a repeat cesarean delivery. Two days later she is afebrile but has severe occipital pain that is aggravated by sitting or standing and relieved by lying flat. Associated findings would likely include
- (A) bradycardia
 - (B) difficulty swallowing
 - (C) diplopia
 - (D) facial pain
 - (E) Horner's syndrome
62. If a patient with chronic obstructive pulmonary disease is uncooperative during pulmonary function testing, the most accurate assessment of his disease will be derived from the
- (A) forced expiratory volume in 1 second
 - (B) forced midexpiratory flow
 - (C) forced vital capacity
 - (D) maximal voluntary ventilation
 - (E) peak flow rate
63. An otherwise healthy, 16-year-old girl is undergoing posterior spinal fusion for thoracolumbar scoliosis. During the procedure, the most likely cause of a marked decrease in the amplitude of the somatosensory evoked potentials after stimulation of the posterior tibial nerve is
- (A) administration of fentanyl 30 $\mu\text{g}/\text{kg}$ for induction
 - (B) administration of isoflurane 1.3 MAC for maintenance
 - (C) administration of vecuronium 0.15 mg/kg
 - (D) a decrease in body temperature from 37 to 35°C
 - (E) a decrease in cerebrospinal fluid pressure
64. A radial artery catheter is to be used for blood pressure measurement during a sitting craniotomy. When zeroing the transducer, which of the following describes the best levels for placement of the transducer and opening of the system to air?

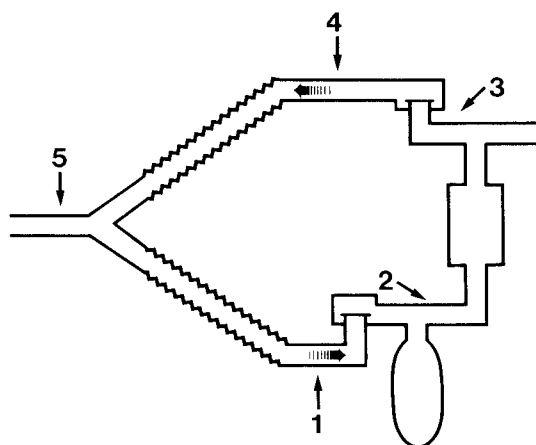
	<u>Transducer</u>	<u>Opening to Air</u>
(A)	Head	Wrist
(B)	Head	Head
(C)	Head	Heart
(D)	Heart	Heart
(E)	Heart	Wrist

65. The best premedication regimen for a known active narcotic addict would include
- (A) secobarbital
 - (B) diazepam
 - (C) nalbuphine
 - (D) morphine
 - (E) droperidol
66. In a 5-kg child, the end-tidal carbon dioxide tension is 35 mmHg during spontaneous ventilation through a Mapleson D system. Which single change is most likely to increase this value?
- (A) Decreasing the fresh gas flow
 - (B) Increasing respiratory minute volume
 - (C) Opening the pressure release valve
 - (D) Removing the reservoir bag
 - (E) Substituting larger bore tubing
67. An elderly man has an acute dissection of the descending thoracic aorta. Which of the following antihypertensive therapies is most likely to extend the dissection?
- (A) Esmolol infusion
 - (B) Nitroglycerin infusion
 - (C) Nitroprusside infusion
 - (D) Nitroprusside infusion combined with a beta-adrenergic blocker
 - (E) Trimethaphan infusion
68. The two E oxygen cylinders on an anesthesia machine have pressure readings of 1100 psi each. At an oxygen flow of 3 L/min, there will be sufficient oxygen for approximately
- (A) 2.5 hours
 - (B) 3.5 hours
 - (C) 5.5 hours
 - (D) 7 hours
 - (E) 8 hours
69. The last muscle to be affected by an interscalene brachial plexus block is the
- (A) brachialis
 - (B) brachioradialis
 - (C) biceps
 - (D) flexor carpi radialis
 - (E) interosseous
70. Which of the following can be used as a sole criterion for brain death?
- (A) Absence of cerebral blood flow
 - (B) Absence of doll's eye movements
 - (C) Fixed, dilated pupils
 - (D) Isoelectric EEG
 - (E) Unresponsiveness to all externally applied stimuli

71. Which of the following findings on the left is most likely to be associated with an increased risk of complications with cannulation of the left internal jugular vein compared with cannulation of the right internal jugular vein?
- (A) Longer recurrent laryngeal nerve
 - (B) Lower location of the cupola of the pleura
 - (C) More acute angle between the internal jugular and innominate veins
 - (D) More anterior location of the phrenic nerve
 - (E) Presence of the thoracic duct
72. During an inguinal hernia repair, a newborn infant will have a larger fluid requirement (in milliliters per kilogram) than an adult because of relatively greater
- (A) insensible water loss
 - (B) lean body mass
 - (C) metabolic rate
 - (D) sodium loss
 - (E) third space losses
73. Cessation of smoking on the day prior to an operation is associated with a perioperative
- (A) decrease in carbon monoxide in blood
 - (B) improvement in ciliary beating in the airways
 - (C) decrease in sputum volume
 - (D) decrease in the need for postoperative ventilatory support
 - (E) decrease in the risk of deep vein thrombosis
74. The carbon dioxide/ventilation response curve
- (A) is primarily a measure of the integrity of the peripheral chemoreceptors
 - (B) shows parallel displacement to the left in the presence of narcotics
 - (C) is linear between a PaCO_2 of 20 and 120 mmHg
 - (D) shows progressive changes in slope with increased doses of halogenated anesthetics
 - (E) is unaffected by a decrease in PaO_2 to 60 mmHg
75. Which of the following is true of both the neonatal and adult airways?
- (A) Epiglottic innervation is primarily vagal
 - (B) Sniffing position requires placement of a pillow under the occiput
 - (C) The cricoid ring is the narrowest part of the airway
 - (D) The epiglottis has a relatively similar size and shape
 - (E) The glottis is located at C3-4
76. Postoperatively a 70-kg patient has a serum sodium value of 130 mEq/L. To increase this value to 140 mEq/L would require the administration of how much sodium in mEq?
- (A) 140
 - (B) 250
 - (C) 420
 - (D) 600
 - (E) 740

77. Oxygen 100 ml/min is bubbled through a vaporizer containing an anesthetic with a vapor pressure of 150 mmHg, and this mixture is added to a fresh gas flow of 5 L/min. The delivered anesthetic concentration is
- (A) 0.25%
 - (B) 0.5%
 - (C) 1%
 - (D) 2.5%
 - (E) 5%
78. Optimal ventilation of a newborn with congenital diaphragmatic hernia should consist of
- (A) PaCO₂ 30 mmHg, low tidal volumes
 - (B) PaCO₂ 30 mmHg, high tidal volumes
 - (C) PaCO₂ 40 mmHg, low tidal volumes
 - (D) PaCO₂ 40 mmHg, high tidal volumes
 - (E) PaCO₂ 45 mmHg, low tidal volumes
79. During axillary brachial plexus anesthesia, motor block frequently precedes sensory block because of
- (A) conduction velocity of motor fibers
 - (B) myelination of motor fibers
 - (C) size of motor fibers
 - (D) presence of septa between motor fibers
 - (E) peripheral location of motor fibers in the nerve bundle
80. A patient is in sinus rhythm but has no pulse during cardiopulmonary resuscitation. There is marked resistance to positive pressure ventilation and breath sounds are difficult to hear bilaterally. The endotracheal tube is clearly in the trachea. The most appropriate next step in management is to
- (A) administer isoetharine by inhalation
 - (B) apply electrical countershock
 - (C) insert needles in the left and right chest
 - (D) order a roentgenogram of the chest
 - (E) start an infusion of aminophylline
81. Epidural block is safer at the L3-L4 interspace than at the T12-L1 interspace because of the location of the
- (A) anterolateral epidural veins
 - (B) inferior border of the cauda equina
 - (C) inferior border of the conus medullaris
 - (D) inferior border of the subarachnoid space
 - (E) blood supply to the anterior spinal cord
82. Which of the following is the primary factor regulating normal coronary blood flow?
- (A) Aortic diastolic pressure
 - (B) Coronary perfusion pressure
 - (C) Heart rate
 - (D) Myocardial oxygen consumption
 - (E) Systolic wall tension

RELIEF VALVE PLACEMENT



83. In this diagram of a circle system, an increase in dead space is most likely to result from placement of the pressure relief valve at location

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5

84. The Bain circuit

- (A) provides nearly identical delivered and inspired anesthetic concentrations
- (B) has the fresh gas flow inlet near the reservoir bag
- (C) is a nonrebreathing circuit at any fresh gas flow rate
- (D) is most efficient during spontaneous ventilation
- (E) has a time constant greater than 1 minute for change in inspired anesthetic concentrations

85. Which of the following statements concerning absorption of irrigation fluid during transurethral resection of the prostate is true?

- (A) Hydrostatic pressure has minimal effect on the amount of fluid absorbed
- (B) Typically 10 to 30 ml of fluid per minute are absorbed
- (C) Use of iso-osmotic solutions decreases the risk of hyponatremia
- (D) CNS complications are independent of the type of fluid used
- (E) Spinal anesthesia to T6 will mask the symptoms of overhydration

86. In a patient with peripheral vascular disease, the most likely result of lumbar sympathetic block is

- (A) increased blood flow to skin and decreased blood flow to muscle
- (B) increased blood flow to skin and unchanged blood flow to muscle
- (C) increased blood flow to skin and muscle
- (D) decreased blood flow to skin and muscle
- (E) decreased blood flow to skin and unchanged blood flow to muscle

87. A 60-kg, 70-year-old man requires open reduction and internal fixation of an intertrochanteric fracture sustained 24 hours ago. Serum creatinine concentration is 1 mg/dl and blood urea nitrogen concentration is 40 mg/dl. The most likely cause of these findings is

- (A) acute tubular necrosis
- (B) chronic renal insufficiency
- (C) dehydration
- (D) obstruction of the bladder outlet
- (E) recent gastrointestinal hemorrhage

88. A 39-year-old patient with insulin-dependent diabetes mellitus receives thiopental 250 mg and succinylcholine 80 mg and is ventilated with 0.75% isoflurane in oxygen. Arterial pressure decreases abruptly from 140/100 to 80/50 mmHg while heart rate remains unchanged at 70 bpm. Failure of heart rate to increase most likely results from

- (A) acute hypoglycemia
- (B) autonomic neuropathy
- (C) depression of sinus node function by thiopental
- (D) depression of the baroreflex response by isoflurane
- (E) ganglionic stimulation by succinylcholine

89. A 60-year-old woman who is taking propranolol for hypertension and is allergic to penicillin is anesthetized with thiopental and halothane for resection of an abdominal aortic aneurysm. Shortly after intubation she is given vancomycin 500 mg intravenously, after which her blood pressure decreases from 140/80 to 70/50 mmHg while her heart rate remains steady at 64 bpm.

The most likely explanation for the decrease in blood pressure is

- (A) cross-sensitivity of penicillin and vancomycin
- (B) interaction of vancomycin and propranolol
- (C) vancomycin-induced anaphylactoid reaction
- (D) interaction of halothane and propranolol
- (E) interaction of halothane and vancomycin

90. Which of the following physiologic changes occurs with immersion in water during extracorporeal shock wave lithotripsy?

- (A) Decreased cardiac output
- (B) Decreased central venous pressure
- (C) Increased expiratory reserve volume
- (D) Increased functional residual capacity
- (E) Increased stroke volume

91. Which of the following will occur if the top of the oxygen flowmeter is cracked and leaking during anesthesia with nitrous oxide and oxygen?

- (A) The back-pressure check valve will protect against a hypoxic gas mixture
- (B) The fail-safe mechanism will protect against a hypoxic gas mixture
- (C) The inspired oxygen concentration will be less than that set by the flowmeters
- (D) The leak will be detected if the circle is pressurized prior to use
- (E) The rotameter will accurately reflect the fresh gas flow to the patient

92. Which of the following statements concerning the pharmacokinetics of local anesthetics is true?

- (A) Decreased molecular weight is associated with decreased incidence of allergic reactions
- (B) Decreased protein binding is associated with decreased systemic toxicity
- (C) Increased ionization is associated with increased placental transfer
- (D) Increased lipid solubility is associated with faster onset
- (E) Presence of an ester linkage is associated with increased duration of action

93. A patient whose trachea is intubated develops partial airway obstruction two hours after induction of fentanyl, nitrous oxide, oxygen anesthesia. The anesthesiologist discontinues the nitrous oxide and controls ventilation, and there is gradual improvement during the next hour. No evidence of a respiratory disorder is found at the conclusion of the anesthetic.

Which of the following is most likely?

- (A) The endotracheal tube was in the right mainstem bronchus
- (B) The patient had an unrecognized air embolism
- (C) The patient had a nitrous oxide pneumothorax
- (D) The endotracheal tube cuff narrowed the airway
- (E) The fentanyl induced chest rigidity

94. One week after sustaining third-degree burns over 40% of his body surface area, a patient requires general anesthesia for debridement and skin grafting. Which of the following responses to neuromuscular blockers is most likely?

- (A) Clinically insignificant increases in serum potassium concentration after administration of succinylcholine 1 mg/kg
- (B) Increased risk of hyperkalemia after administration of succinylcholine 1 mg/kg
- (C) Increased sensitivity to vecuronium
- (D) Laudanosine toxicity after administration of atracurium 0.4 mg/kg
- (E) Normal serum potassium concentration if administration of succinylcholine is preceded by d-tubocurarine 3 mg

95. Massive venous air embolism occurs in a patient who is undergoing craniotomy in the sitting position with nitrous oxide, oxygen, fentanyl anesthesia. Which of the following changes in end-tidal (ET) concentrations of carbon dioxide, nitrogen, and nitrous oxide are most likely in this patient?

	<u>ETCO₂</u>	<u>ETN₂</u>	<u>ETN₂O</u>
(A)	Increased	increased	decreased
(B)	Decreased	decreased	increased
(C)	Decreased	decreased	decreased
(D)	Decreased	increased	decreased
(E)	Increased	decreased	decreased

96. A patient with chronic obstructive pulmonary disease is undergoing spinal anesthesia to a T6 sensory level. The most pronounced effect on pulmonary function will be a decrease in

- (A) minute ventilation
- (B) peak expiratory flow
- (C) physiologic dead space
- (D) tidal volume
- (E) vital capacity

97. A 62-year-old man, who had a myocardial infarction three years ago, complicated by congestive heart failure and renal failure, is undergoing a colectomy. A pulmonary artery catheter demonstrates a cardiac output higher than measurements recorded during a cardiac catheterization two months after the infarction. Which of the following most likely contributes to the increased cardiac output?
- (A) Creation of an arteriovenous fistula
 - (B) Increased hemoglobin concentration from 10 to 12 g/dl
 - (C) Stimulation of carotid body receptors
 - (D) Transcutaneous nitroglycerin
 - (E) Use of a beta-adrenergic blocker to prevent myocardial reinfarction
98. Compared with morphine, a single epidural administration of fentanyl is associated with
- (A) delayed onset of analgesia
 - (B) increased incidence of pruritus
 - (C) increased incidence of respiratory depression
 - (D) longer duration of action
 - (E) more restricted segmental spread
99. Block of each of the following nerves is required for inguinal herniorrhaphy EXCEPT the
- (A) genitofemoral
 - (B) iliohypogastric
 - (C) ilioinguinal
 - (D) obturator
 - (E) twelfth thoracic
100. Unilateral or bilateral diaphragmatic paralysis is a complication of each of the following EXCEPT
- (A) surgical ligation of a patent ductus arteriosus
 - (B) use of pericardial ice-slush for topical cardiac hypothermia
 - (C) stellate ganglion block
 - (D) interscalene brachial plexus block
 - (E) C6 cervical fracture-dislocation
101. Each of the following would be expected in an otherwise healthy 165-kg woman undergoing cholecystectomy EXCEPT
- (A) decreased functional residual capacity
 - (B) decreased ventilatory response to carbon dioxide
 - (C) increased cardiac output
 - (D) increased gastric fluid volume
 - (E) increased metabolism of volatile anesthetics
102. Six hours after coronary artery bypass grafting, a pulmonary artery catheter oximeter shows a mixed venous hemoglobin oxygen saturation of 50%. This value may result from each of the following EXCEPT
- (A) anemia
 - (B) fever
 - (C) hypovolemia
 - (D) respiratory alkalosis
 - (E) shivering

103. Neostigmine administered intravenously without atropine can produce each of the following EXCEPT
- (A) arousal
 - (B) bradycardia
 - (C) bronchoconstriction
 - (D) increased gastric motility
 - (E) increased urinary bladder tone
104. Intraoperatively, the occurrence of prominent “a” waves on the central venous pressure waveform can be explained by each of the following EXCEPT
- (A) acute right ventricular failure
 - (B) atrial flutter
 - (C) complete heart block
 - (D) onset of junctional tachycardia
 - (E) ventricular pacing
105. The use of glycine as irrigating solution during transurethral resection of the prostate could be associated with each of the following EXCEPT
- (A) ammonia toxicity
 - (B) coma
 - (C) hemolysis
 - (D) hyponatremia
 - (E) transient blindness
106. An atrioventricular sequential demand pacemaker is placed in a patient who has abnormal atrioventricular conduction. Each of the following statements about this situation is true EXCEPT:
- (A) Electrocautery could lead to long pauses in the paced rhythm
 - (B) Placing a magnet over the generator will convert it to an asynchronous (fixed rate) unit
 - (C) If complete heart block develops, the paced ventricular rate will be the same as the sinus node rate
 - (D) An atropine-induced increase in the sinus rate will increase the ventricular rate
 - (E) During symptomatic tachyarrhythmia, cardioversion would be contraindicated because it would alter the pacemaker's function
107. In a spontaneously breathing patient, each of the following increases the work of breathing EXCEPT
- (A) an increase in respiratory rate by 10/min
 - (B) a decrease in lung-thorax compliance by 10 cmH₂O
 - (C) an increase in carbon dioxide production by 1 ml/kg/min
 - (D) a decrease in PaO₂ from 80 to 65 mmHg
 - (E) a 0.1 increase in the ratio of dead space to tidal volume
108. Each of the following values is associated with acute tubular necrosis EXCEPT
- (A) urine osmolality of 200 mOsm/L
 - (B) urine sodium concentration of 15 mEq/L
 - (C) urine specific gravity of 1.009
 - (D) urine/serum osmolarity ratio of 1.2
 - (E) fractional excretion of sodium of 4%

109. The newborn infant of an 18-year-old heroin addict has an initial Apgar score of 1. After intubation of the trachea and ventilation with pure oxygen, the Apgar score is 3 at five minutes. Appropriate management at this time would include administration of each of the following EXCEPT
- (A) dextrose 10%
 - (B) epinephrine
 - (C) naloxone
 - (D) normal saline solution
 - (E) sodium bicarbonate
110. A 5-year-old boy is to undergo microlaryngeal carbon dioxide laser vaporization of laryngotracheal papillomas under halothane administered through a small polyvinylchloride (PVC) endotracheal tube. The diluent gas mixture LEAST likely to support laser combustion of the PVC tube is
- (A) oxygen 40%, nitrous oxide 60%
 - (B) oxygen 25%, nitrous oxide 75%
 - (C) oxygen 30%, nitrogen 70%
 - (D) oxygen 30%, helium 70%
 - (E) oxygen 30%, air 70%
111. Which of the following cardiovascular abnormalities is LEAST likely to be present in a patient with end-stage alcoholic cirrhosis?
- (A) Decreased myocardial contractility
 - (B) High cardiac index
 - (C) High mixed venous oxygen saturation
 - (D) Increased peripheral vascular resistance
 - (E) Low blood viscosity

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book B
1990

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. A patient receiving mechanical ventilation with oxygen 60% postoperatively has a PaO_2 of 160 mmHg and a PaCO_2 of 38 mmHg. One hour later, with mechanical ventilation unchanged, the PaO_2 is 150 mmHg and PaCO_2 is 48 mmHg. The most likely cause of these changes is
 - (A) metabolic acidosis
 - (B) pulmonary embolism
 - (C) increased body temperature
 - (D) interstitial pulmonary edema
 - (E) aspiration pneumonia

2. Microatelectasis 48 hours after abdominal surgery is most consistently manifested by
 - (A) decreased PaO_2
 - (B) ground glass infiltrate on a roentgenogram of the chest
 - (C) scattered fine inspiratory rales
 - (D) increased PaCO_2
 - (E) scattered areas of dullness to chest percussion

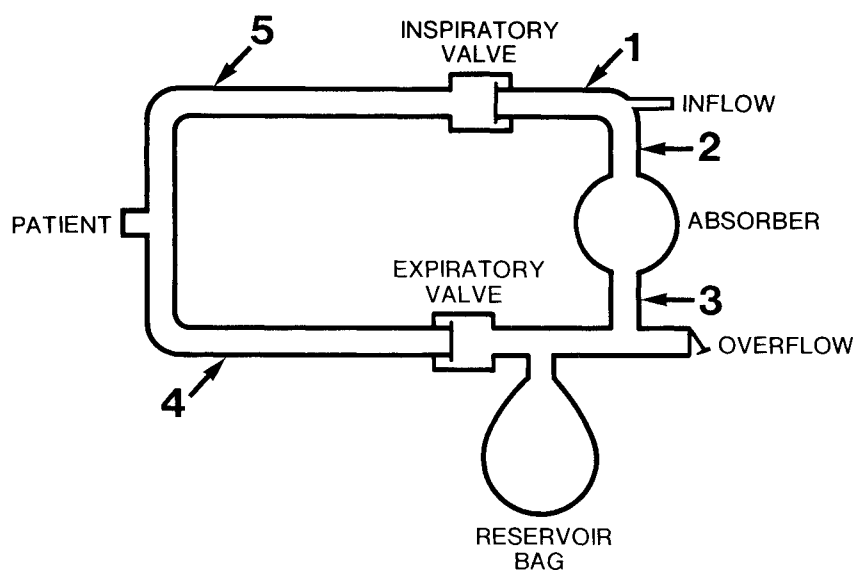
3. A middle-aged, 70-kg man with a brain tumor is scheduled for an elective craniotomy. Preoperatively, he is alert but papilledema is present. Anesthesia is induced with thiopental 300 mg and succinylcholine 100 mg, followed by tracheal intubation. Immediately following intubation vigorous bucking occurs. The best immediate management would be to
 - (A) administer succinylcholine 100 mg intravenously
 - (B) administer fentanyl 500 μg intravenously
 - (C) hyperventilate with isoflurane 2%
 - (D) administer thiopental 400 mg intravenously
 - (E) hyperventilate and administer lidocaine 1 mg/kg intravenously

4. An EKG shows ventricular tachycardia in a patient with a heart rate of 160 bpm and a blood pressure of 90/60 mmHg. The best initial therapeutic maneuver prior to cardioversion is
 - (A) carotid sinus massage
 - (B) intravenous administration of bretylium
 - (C) intravenous administration of lidocaine
 - (D) intravenous administration of propranolol
 - (E) precordial "thump"

5. A 64-year-old, 87-kg woman in good general health is undergoing a right knee arthroplasty while in the supine position with general anesthesia consisting of enflurane 2% and nitrous oxide 50% in oxygen. She is breathing spontaneously through a 7-mm endotracheal tube. During the first 30 minutes of the procedure, the arterial oxygen saturation measured by pulse oximetry decreases from 98% to 92%.

The most likely cause of the desaturation is

- (A) decreased functional residual capacity
 - (B) diffusion hypoxia
 - (C) hypercarbia
 - (D) increased airway resistance produced by the endotracheal tube
 - (E) inhibition of hypoxic pulmonary vasoconstriction
6. A 75-year-old man with a left bundle branch block is undergoing placement of a pulmonary artery catheter through the right internal jugular vein. He becomes pale and his heart rate decreases to 40 bpm when the catheter tip enters the right ventricle. The most likely cause is
- (A) a catheter loop in the right atrium
 - (B) acute myocardial infarction
 - (C) acute pneumothorax
 - (D) carotid sinus reflex
 - (E) complete heart block
7. An obese patient and a lean patient receive halothane for the same duration and at the same inspired tension. Postoperatively, the obese patient would demonstrate
- (A) higher serum creatinine concentration
 - (B) higher serum fluoride concentration
 - (C) lower eosinophil count
 - (D) lower serum alkaline phosphate activity
 - (E) lower serum bromide concentration
8. During induction of anesthesia, a 56-year-old man with small bowel obstruction vomits a large quantity of undigested food particles and presumably aspirates. After instituting ventilation with pure oxygen, the most appropriate management is to
- (A) administer dexamethasone
 - (B) administer penicillin G
 - (C) perform bronchoscopy
 - (D) ventilate with positive end-expiratory pressure 15 cmH₂O
 - (E) proceed with the anesthesia plan if the tracheal pH is greater than 2.5
9. During ligation of a patent ductus arteriosus, a newborn infant receives a total gas flow of 5 L/min through a nonheated Jackson-Rees system. Operating room temperature is maintained at 30°C. The primary cause of a rapid decrease in rectal temperature from 36.8°C to 35°C is
- (A) absence of the central temperature control mechanism
 - (B) conductive heat loss
 - (C) convective heat loss
 - (D) evaporative heat loss
 - (E) radiant heat loss



10. To detect the delivery of a hypoxic gas mixture, the optimal location for an oxygen analyzer in this circle is

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5

11. A 70-kg, 47-year-old man is undergoing a repeat coronary artery bypass graft. Following sternotomy, administration of heparin 300 units/kg for anticoagulation increases the activated coagulation time from a baseline of 135 sec to 210 sec. This finding is compatible with

- (A) antithrombin III deficiency
- (B) heparin-induced thrombocytopenia
- (C) normal response to this dose of heparin
- (D) increased sensitivity to heparin
- (E) von Willebrand's disease

12. A 58-year-old man with a history of angina is undergoing resection of an abdominal aortic aneurysm under morphine, nitrous oxide, d-tubocurarine anesthesia. Just before removal of the aortic cross-clamp, heart rate is 74 bpm, blood pressure is 115/70 mmHg, and pulmonary artery occlusion pressure is 7 mmHg. Immediately after removal of the cross-clamp, heart rate increases to 120 bpm, blood pressure decreases to 80/55 mmHg, and pulmonary artery occlusion pressure decreases to 3 mmHg. The V_5 lead on the EKG demonstrates sudden ST-segment depression and T-wave inversion.

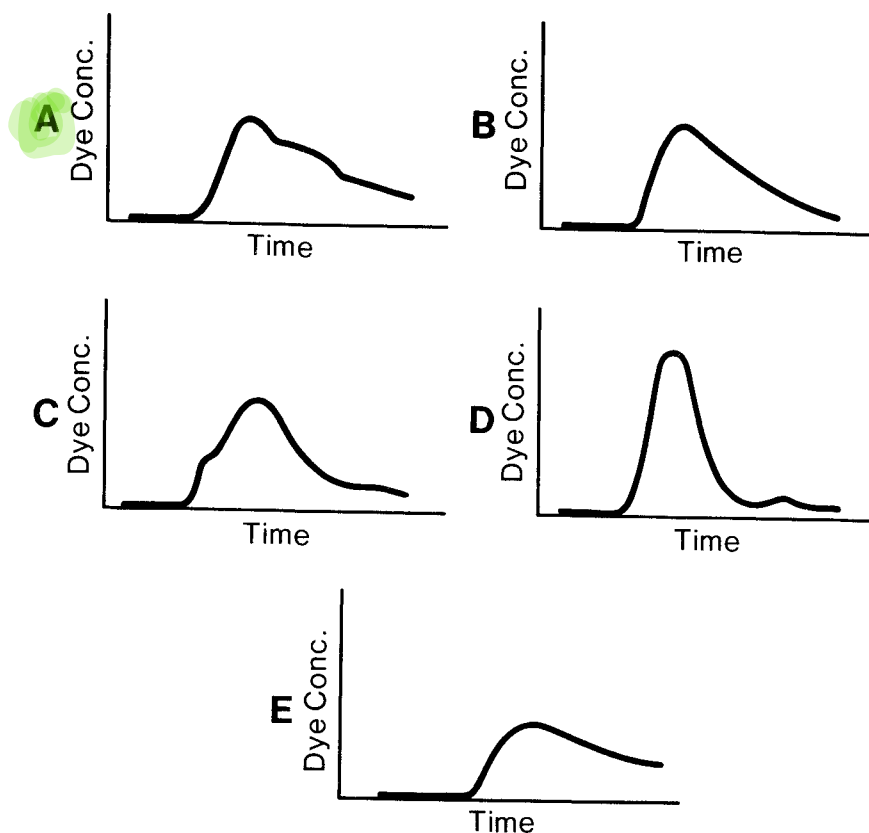
Initial therapy should be

- (A) reapplication of the aortic cross-clamp
- (B) intravenous administration of sodium bicarbonate
- (C) initiation of a phenylephrine infusion
- (D) rapid expansion of blood volume by transfusion
- (E) initiation of a nitroglycerin infusion

13. As part of a preoperative evaluation, a patient had a thallium scan showing a “cold spot” over the left ventricle that occurs with moderate exercise and disappears at rest. This most likely indicates
- (A) moderate-sized aneurysm of the left ventricle
 - (B) acute myocardial ischemia
 - (C) recent myocardial infarction
 - (D) old myocardial infarction
 - (E) Prinzmetal’s variant angina
14. If administered prior to induction of anesthesia, which of the following drugs is most likely to cause tachycardia?
- (A) Fentanyl
 - (B) Meperidine
 - (C) Midazolam
 - (D) Morphine
 - (E) Sufentanil
15. Compared with the response of a normal patient, administration of a bolus dose of pancuronium (0.15 mg/kg) to a patient with cirrhosis and ascites would be associated with
- (A) longer duration
 - (B) more rapid onset
 - (C) more intense block
 - (D) more difficult reversibility
 - (E) similar pharmacokinetics
16. Which of the following is the most likely cause of a decrease in end-tidal carbon dioxide tension during general anesthesia with a constant minute ventilation?
- (A) Administration of sodium bicarbonate
 - (B) Intravenous administration of hypertonic glucose solution
 - (C) Decrease in cardiac output
 - (D) Decrease in fresh gas flow in a Bain circuit
 - (E) Malfunction of the inspiratory valve in a circle system
17. In the treatment of refractory ventricular fibrillation, the advantage of bretylium over lidocaine is
- (A) direct inotropy
 - (B) decreased defibrillation threshold
 - (C) increased fibrillation threshold
 - (D) increased effective refractory period
 - (E) suppression of phase 4 depolarization
18. During extracorporeal shock wave lithotripsy, the shock wave should be synchronized with
- (A) the P wave of the EKG
 - (B) the R wave of the EKG
 - (C) the T wave of the EKG
 - (D) peak inspiration
 - (E) end-expiration

19. A 68-year-old man who is scheduled for outpatient cystoscopy has non-insulin-dependent diabetes mellitus controlled with glipizide (Glucator) 5 mg twice daily. He has had nothing to eat since awakening this morning and has not taken glipizide today. His blood glucose level is 185 mg/dl. Before proceeding, the most appropriate management is to administer
- (A) glipizide 5 mg orally
 - (B) NPH insulin 10 units subcutaneously
 - (C) regular insulin 10 units intravenously
 - (D) dextrose and regular insulin by infusion
 - (E) no additional diabetic medication
20. In a healthy 70-kg adult, which of the following is the most likely effect of intravenous administration of morphine 10 mg on ventilatory responses?
- (A) Increased response to hypoxia and decreased response to hypercarbia
 - (B) Decreased response to hypercarbia and no change in response to hypoxia
 - (C) Decreased response to both hypoxia and hypercarbia
 - (D) No change in response to hypercarbia and decreased response to hypoxia
 - (E) No change in response to hypoxia or hypercarbia
21. A 75-year-old man received an uneventful epidural anesthetic for total knee arthroplasty. Twenty-four hours later he has a painless flaccid paralysis in both legs. This clinical presentation is most consistent with
- (A) adhesive arachnoiditis
 - (B) anterior spinal artery thrombosis
 - (C) epidural abscess
 - (D) epidural hematoma
 - (E) transverse myelitis
22. A patient with low cardiac output following coronary artery bypass grafting is transferred to the intensive care unit where a chest roentgenogram confirms proper placement of the pulmonary artery catheter. Serial pulmonary artery occlusion pressures are then measured. Immediately following inflation of the balloon with 1.5 ml of air in the wedged position, brisk bleeding is noted from the endotracheal tube.
- The most appropriate immediate management is to
- (A) withdraw the pulmonary artery catheter
 - (B) perform endobronchial intubation
 - (C) apply 15 to 20 cmH₂O positive end-expiratory pressure to the airway
 - (D) administer fresh frozen plasma rapidly
 - (E) decrease blood pressure rapidly with nitroprusside
23. A 72-year-old man has massive venous hemorrhage during a radical prostatectomy. Blood pressure decreases from 110/60 to 75/30 mmHg and central venous pressure decreases from 12 to 4 mmHg. End-expiratory carbon dioxide tension decreases from 34 to 24 mmHg during constant minute ventilation. The most appropriate next step should be to
- (A) apply positive end-expiratory pressure to the breathing circuit
 - (B) attempt to aspirate air from the central venous catheter
 - (C) expand intravascular volume
 - (D) place the patient in the Trendelenburg position
 - (E) turn the patient to the left lateral decubitus position

24. Which of the following time concentration curves would be expected in arterial blood following intravenous injection of indocyanine green dye in a 3-year-old child with a small ventricular septal defect?



25. A 64-year-old, 70-kg woman treated with lithium for manic-depressive psychosis is given methohexital 90 mg and succinylcholine 35 mg intravenously for electroconvulsive therapy. Ten minutes later she remains sedated and the peripheral nerve stimulator shows a decreased twitch response. The most likely explanation is

- (A) cerebral hypoxia
- (B) postictal depression
- (C) relative overdose of methohexital
- (D) unrecognized atypical pseudocholinesterase
- (E) residual lithium effects

26. A 7-year-old, obese, 30-kg boy was anesthetized using an adult circle system containing a 3-liter bag and mask. Induction with nitrous oxide (2 liters), oxygen (1 liter), and enflurane 3% was characterized by three minutes of hyperventilation followed by apnea. Forty-five seconds later, the child moved and became difficult to control.

The most likely cause of the movement is

- (A) decreased alveolar concentration of enflurane during the period of apnea
- (B) excessive uptake of enflurane by the child's fat
- (C) higher fresh gas flows required with use of an adult circle system in a child
- (D) convulsions induced by enflurane
- (E) hypoxia developing during the period of apnea

27. The most likely effect of a celiac plexus block for an abdominal operation is
- (A) bowel distention
 - (B) hypotension
 - (C) incisional analgesia
 - (D) muscle relaxation
 - (E) urinary retention
28. Ninety minutes after administration of succinylcholine 1 mg/kg to a 28-year-old woman, the train-of-four shows a $T_4:T_1$ ratio of 25%. This is most consistent with
- (A) dibucaine number of 30
 - (B) hypersensitivity to succinylmonocholine
 - (C) pregnancy
 - (D) pretreatment with pancuronium 2 mg
 - (E) severe cirrhosis
29. The most sensitive means of detecting venous air embolism is
- (A) precordial Doppler stethoscope
 - (B) transesophageal echocardiography
 - (C) end-tidal carbon dioxide measurement
 - (D) pulmonary artery pressure measurement
 - (E) central venous pressure measurement
30. During laser microsurgery of the larynx, a rubber endotracheal tube wrapped with aluminum-foil tape starts to smolder and give off smoke. The first step is to
- (A) suction the endotracheal tube
 - (B) add helium to the inspired gas mixture
 - (C) remove the endotracheal tube
 - (D) turn off the fresh gas flow
 - (E) pack a saline-soaked gauze sponge into the hypopharynx
31. Which of the following pulmonary components is altered the most in a morbidly obese patient?
- (A) Total lung volume
 - (B) Tidal volume
 - (C) Inspiratory reserve volume
 - (D) Expiratory reserve volume
 - (E) Ratio of dead space to tidal volume
32. Compared with adults, caudal anesthesia in children is associated with
- (A) higher risk for subarachnoid puncture
 - (B) more severe hypotension
 - (C) more rapid onset of sensory block
 - (D) smaller volume of anesthetic per kilogram of body weight
 - (E) toxic effects at lower serum levels of bupivacaine

33. A 65-year-old patient receiving long-term clonidine therapy fails to take it one day before surgery. This would most likely
- (A) be beneficial, since clonidine decreases cardiac output
 - (B) be of no consequence due to the long half-life of clonidine
 - (C) produce a lower anesthetic requirement than if the drug had been continued
 - (D) produce rebound hypertension
 - (E) result in seizure activity
34. After two hours of anesthesia with halothane 1.2% and oxygen, nitrous oxide 75% is added to the inspired gas mixture. This addition would
- (A) increase the alveolar halothane and oxygen concentrations above inspired
 - (B) increase the alveolar halothane concentration only
 - (C) cause no change in alveolar gas concentrations compared with inspired
 - (D) decrease alveolar oxygen concentration compared with inspired
 - (E) decrease alveolar oxygen and halothane concentrations below inspired
35. Which of the following statements concerning the use of epidural anesthesia for extracorporeal shock wave lithotripsy is true?
- (A) Adequate anesthesia can be obtained with fentanyl alone
 - (B) Anesthesia decreases the incidence of hypothermia
 - (C) Anesthesia decreases the incidence of ventricular dysrhythmias
 - (D) Anesthesia is unnecessary in paraplegics with absence of sensation below T4
 - (E) "Loss of resistance" should be performed with fluids rather than air
36. The syndrome of inappropriate ADH secretion is characterized by
- (A) ADH secretion unrelated to serum osmolality
 - (B) decreased ADH secretion in response to hypovolemia
 - (C) highly dilute urine
 - (D) hypernatremia
 - (E) negative water balance
37. With an interscalene brachial plexus block
- (A) more local anesthetic drug is required than for axillary block
 - (B) the biceps and brachialis muscles are blocked last
 - (C) the intercostobrachial nerve is usually blocked
 - (D) the lateral antebrachial cutaneous nerve is usually spared
 - (E) the ulnar nerve is most likely to be spared
38. Which of the following findings would be considered normal in the EEG of an adult?
- (A) Decreased frequency during induction with halogenated anesthetics
 - (B) Decreased frequency in frontal areas with administration of nitrous oxide 50%
 - (C) Dominance of beta rhythm at 20 to 30 Hz during the awake relaxed state
 - (D) Electrical silence with administration of isoflurane 2.5 MAC
 - (E) The presence of burst-suppression during natural sleep

39. During cardiopulmonary resuscitation (CPR) in an adult, external chest compression is being performed at the rate of 90/min with 2 inches of sternal depression and a compression-relaxation ratio of 20:80. The most appropriate action is to
- (A) decrease the rate of compression
 - (B) increase the duration of compression
 - (C) increase the duration of relaxation
 - (D) increase the depth of sternal depression
 - (E) continue the original pattern of CPR
40. Depression of cerebral oxygen requirements below the level required to create an isoelectric EEG can be achieved by
- (A) administration of isoflurane
 - (B) administration of nimodipine
 - (C) barbiturate coma
 - (D) hyperventilation
 - (E) hypothermia
41. Which of the following is an effect of nitrous oxide?
- (A) Decreased pulmonary vascular resistance
 - (B) Depression of uterine contractility
 - (C) Inhibition of methionine synthetase
 - (D) Stimulation of lymphocyte chemotaxis
 - (E) Stimulation of myocardial contractility
42. Pain and spasm due to injury of the deltoid muscle is most effectively relieved by
- (A) axillary block
 - (B) cervical sympathetic block
 - (C) interscalene brachial plexus block
 - (D) paravertebral block at C4
 - (E) superficial cervical plexus block
43. After brachial plexus block, a patient has sensation over the inner aspect of the upper arm. Block of which of the following nerves would obtund this sensation?
- (A) Intercostobrachial
 - (B) Median
 - (C) Musculocutaneous
 - (D) Radial
 - (E) Ulnar
44. The increased resistance of severely burned patients to pancuronium is primarily due to
- (A) enhanced urinary excretion of pancuronium
 - (B) decreased number of presynaptic cholinergic receptors
 - (C) increased number of postsynaptic cholinergic receptors
 - (D) increased rate of metabolism of pancuronium
 - (E) increased volume of distribution of pancuronium

45. A 26-year-old patient with multiple trauma is admitted to the intensive care unit postoperatively. The early development of polyuria, hypotension, low urine sodium excretion, high serum osmolality, and normal serum creatinine concentration is best explained by
- (A) adrenal insufficiency
 - (B) fluoride-induced high-output renal failure
 - (C) inappropriate ADH secretion
 - (D) intraoperative fluid overload
 - (E) posterior pituitary insufficiency
46. Compared with the use of epidural bupivacaine 0.25% alone, the addition of fentanyl will result in
- (A) increased vagal activity
 - (B) increased motor block
 - (C) increased sympathetic block
 - (D) more rapid onset of analgesia
 - (E) no change in duration of analgesia
47. Compared with fentanyl, alfentanil is characterized by
- (A) greater volume of distribution
 - (B) greater lipid solubility
 - (C) less protein binding
 - (D) faster redistribution
 - (E) longer terminal elimination phase
48. If both recurrent laryngeal nerves were severed during a difficult thyroidectomy for cancer, the most likely finding would be
- (A) paralysis of the cricothyroid muscles
 - (B) cadaveric positioning of the true vocal cords
 - (C) anesthesia of both sides of the epiglottis
 - (D) bilateral pure adductor vocal cord paralysis
 - (E) stridor
49. A patient is anesthetized using an inhaled anesthetic with a blood/gas partition coefficient of 13.0. Recovery time depends primarily on
- (A) oil/gas solubility of the drug
 - (B) cardiac output
 - (C) tidal volume
 - (D) duration of administration
 - (E) MAC of the drug
50. Nitroprusside therapy for hypertension should be discontinued in the presence of
- (A) acute myocardial infarction
 - (B) increasing metabolic acidosis
 - (C) methemoglobinemia
 - (D) mitral regurgitation
 - (E) renal failure

51. A 72-year-old man has had residual hemiparesis since having a cerebrovascular accident three years ago. Compared with the response of the unaffected limbs to nondepolarizing muscle relaxants, the hemiparetic limbs will show
- (A) the same response
 - (B) greater depression of tetanus
 - (C) greater twitch depression
 - (D) less twitch depression
 - (E) less post-tetanic facilitation
52. The adult oxyhemoglobin dissociation curve will resemble that of the fetus in the presence of
- (A) increased 2,3-diphosphoglycerate concentration
 - (B) chronic anemia
 - (C) hyperthermia
 - (D) metabolic alkalemia
 - (E) hyperkalemia
53. A patient with a fasting blood glucose concentration of 100 mg/dl undergoes a four-hour operation under general anesthesia without intraoperative administration of glucose. On emergence the most likely finding will be
- (A) marked hypoglycemia
 - (B) mild hypoglycemia
 - (C) normoglycemia
 - (D) mild hyperglycemia
 - (E) marked hyperglycemia
54. An isoflurane-specific vaporizer that is 25% full is mistakenly refilled with halothane, and the dial is set at 1.5%. Which of the following statements concerning this situation is true?
- (A) The gas mixture will contain equal partial pressures of halothane and isoflurane
 - (B) The gas mixture will produce a greater depth of anesthesia than 1.5% isoflurane alone
 - (C) The gas mixture will produce a greater depth of anesthesia than 1.5% halothane alone
 - (D) The liquid mixture will have a higher vapor pressure than 1.5% halothane alone
 - (E) The liquid mixture will have a higher vapor pressure if it is placed in a halothane-specific vaporizer
55. When antagonizing neuromuscular block produced by pancuronium, the combination of simultaneously administered anticholinergic and anticholinesterase drugs that is most likely to produce bradycardia is
- (A) glycopyrrolate and pyridostigmine
 - (B) atropine and edrophonium
 - (C) glycopyrrolate and edrophonium
 - (D) atropine and neostigmine
 - (E) glycopyrrolate and neostigmine
56. Compared with thiopental, methohexital is characterized by
- (A) better absorption after rectal administration
 - (B) greater protein binding
 - (C) greater hepatic clearance
 - (D) larger volume of distribution
 - (E) more complete biotransformation

57. Two hours after sustaining extensive burns of the head, neck and chest in a house fire, a patient has stridor and difficulty breathing. The most appropriate management is
- (A) administration of aerosolized epinephrine
 - (B) administration of helium and oxygen
 - (C) endotracheal intubation
 - (D) intravenous injection of dexamethasone
 - (E) tracheostomy
58. Bronchospasm occurring during anesthesia in a patient with an ileal carcinoid is best treated by administration of
- (A) aminophylline
 - (B) dexamethasone
 - (C) halothane
 - (D) ketamine
 - (E) somatostatin
59. After termination of an inhalation anesthetic, patient-controlled analgesia will
- (A) be effective without a loading dose of opioid if started in the immediate postanesthetic period
 - (B) be associated with greater analgesic requirements than conventional intramuscular opioid techniques
 - (C) cause addiction or dependence to opioids if continued for more than 72 hours
 - (D) produce less patient satisfaction than intermittent intravenous administration of opioids
 - (E) show a diurnal variation in analgesic requirement
60. The most medial of the following components in the antecubital fossa is the
- (A) brachial artery
 - (B) brachioradialis muscle
 - (C) cephalic vein
 - (D) median nerve
 - (E) radial nerve
61. A decreased dose of sodium thiopental is administered to patients in hypovolemic shock primarily because
- (A) acidosis increases the fraction of unionized drug
 - (B) delivery of the drug to the brain is increased
 - (C) hepatic clearance is decreased
 - (D) thiopental is a myocardial depressant
 - (E) thiopental is a venous dilator
62. A 62-year-old patient undergoes resection of a descending thoracic aneurysm under anesthesia with morphine, nitrous oxide, oxygen, and pancuronium. In spite of normal somatosensory evoked potentials (SSEP) during the procedure, the patient has paraplegia postoperatively. The factor most likely responsible for failure to note the deficit intraoperatively is
- (A) the effect of nitrous oxide on SSEP
 - (B) the effect of morphine on SSEP
 - (C) failure to test motor pathways
 - (D) hyperventilation to a PaCO₂ of 30 mmHg
 - (E) unintentional hypothermia to 34°C

63. After receiving excessive intraoperative blood replacement, a patient anesthetized with fentanyl, diazepam, and nitrous oxide develops acute pulmonary edema. The drug most likely to help him acutely is
- (A) isoflurane
 - (B) nitroprusside
 - (C) digoxin
 - (D) nitroglycerin
 - (E) furosemide
64. A 33-year-old primigravid woman with myasthenia gravis, well-controlled with pyridostigmine, is in labor with the cervix dilated 7 cm. She has a headache and feels very nervous. Blood pressure is 160/115 mmHg, she has 3+ pitting edema, and urinalysis shows 4+ protein. Appropriate management of her labor should include
- (A) lumbar epidural block with bupivacaine 8 ml of 0.5% solution
 - (B) chlorpromazine 2.5 mg administered intravenously
 - (C) avoidance of narcotics
 - (D) lumbar epidural block with 2-chloroprocaine 8 ml of 3% solution
 - (E) chlorpromazine 10 mg administered intramuscularly
65. When succinylcholine is administered intravenously to infants, intragastric pressure
- (A) is usually unchanged
 - (B) increases to a peak of 30 cmH₂O within two minutes
 - (C) increases because of abdominal muscle fasciculations
 - (D) increases because of an acetylcholine-like effect on the vagus nerve
 - (E) peaks and subsides within five minutes
66. Pancuronium blocks the bradycardic effect of fentanyl by a direct effect on
- (A) beta-adrenergic receptors
 - (B) cardiac muscarinic receptors
 - (C) carotid baroreceptors
 - (D) central vagal nuclei
 - (E) sympathetic ganglia
67. During axillary block of the brachial plexus, which nerve is most likely to be encountered if the needle is inserted through the posterior wall of the artery?
- (A) Intercostobrachial
 - (B) Median
 - (C) Musculocutaneous
 - (D) Radial
 - (E) Ulnar
68. Which of the following is the most likely sequela of interscalene brachial plexus block?
- (A) Cervical epidural block
 - (B) Hemidiaphragmatic paralysis
 - (C) Pneumothorax
 - (D) Seizure
 - (E) Vocal cord paralysis

69. An obese, 70-year-old woman with a long history of tobacco abuse is awake and semirecumbent after uneventful anesthesia with isoflurane for a ventral hernia repair. During the first hour in the recovery room while breathing 50% oxygen by face mask, her arterial oxygen saturation decreases to 90% while other vital signs remain satisfactory. Which of the following is most likely to be effective in the management of this situation?
- (A) Intravenous doxapram
 - (B) Racemic epinephrine by inhalation
 - (C) Continuous positive airway pressure by mask
 - (D) Reintubation of the trachea
 - (E) Coughing
70. A 48-year-old woman with von Willebrand's disease is scheduled for a hysterectomy. The most appropriate initial pre-operative therapy to decrease bleeding is administration of
- (A) cryoprecipitate
 - (B) desmopressin (DDAVP)
 - (C) fresh frozen plasma
 - (D) platelets
 - (E) vitamin K
71. A pulmonary artery catheter is placed in an awake patient breathing room air. Typical right ventricular and pulmonary artery pressure tracings are obtained. With the catheter balloon inflated, blood drawn from the distal port has a PaO_2 of 100 mmHg, while a simultaneous radial artery sample has a PaO_2 of 90 mmHg. These data indicate that the
- (A) shunt fraction is greater than 10%
 - (B) catheter is in the wedged position
 - (C) catheter has entered a pulmonary vein
 - (D) cardiac output is abnormally high
 - (E) oxygen electrode is malfunctioning
72. Which of the following statements about thiopental is true?
- (A) Rapid uptake into maternal tissues limits its transfer to the fetus
 - (B) Its short duration of action is due to its extensive binding to plasma proteins
 - (C) Accumulation in fat leads to acute tolerance
 - (D) Alkalinity of solution causes respiratory depression
 - (E) Uptake into brain is slowed by respiratory acidosis
73. A 16-year-old girl is receiving isoflurane, nitrous oxide, oxygen, and pancuronium for insertion of a Harrington rod. In order to perform a "wake-up test" the muscle relaxant was antagonized with neostigmine 2.5 mg and atropine 1 mg. The patient abruptly moved all extremities and was given thiopental 100 mg and succinylcholine 100 mg rapidly. Forty-five minutes later no twitch could be elicited with a nerve stimulator.
- The most likely explanation is
- (A) a dibucaine number of 20
 - (B) incomplete antagonism of pancuronium
 - (C) prolongation of the action of succinylcholine by neostigmine
 - (D) spinal cord damage caused by the abrupt arousal
 - (E) synergism between succinylcholine and pancuronium

74. The speed of induction of anesthesia with an inhalational agent is increased by
- (A) decreased cardiac output
 - (B) decreased minute ventilation
 - (C) increased functional residual capacity
 - (D) right-to-left intracardiac shunt
 - (E) use of a more soluble agent
75. During anesthesia with nitrous oxide, oxygen, and a relaxant, the patient's lungs are being mechanically ventilated and there is a heated humidifier in the circuit. The most likely cause of an apparent increase in inspired oxygen concentration is
- (A) a hole in the ventilator bellows
 - (B) backflow of fresh gas because of resistance in the humidifier
 - (C) decreased oxygen utilization by the patient
 - (D) heat damage to the oxygen sensor
 - (E) water condensation on the oxygen sensor
76. A 60-kg, 17-year-old girl with severe idiopathic scoliosis is scheduled for Harrington rod fixation. Which of the following respiratory parameters is compatible with this disorder?
- (A) Alveolar-to-arterial oxygen tension difference ($A-aDO_2$) less than 100 mmHg while breathing pure oxygen
 - (B) FEV_1/FVC ratio less than 50%
 - (C) Forced vital capacity less than 2000 ml
 - (D) Intrapulmonary shunt less than 10%
 - (E) Normal pulmonary vascular resistance
77. During laparotomy for a ruptured spleen, unexplained oozing occurs after infusion of 2 liters of crystalloid and 3 units of blood. The most likely cause is
- (A) citrate toxicity
 - (B) dilutional thrombocytopenia
 - (C) hemolytic transfusion reaction
 - (D) labile clotting factor deficiency
 - (E) leukoagglutinin reaction
78. Measurement of mixed expired carbon dioxide concentration is necessary for the determination of
- (A) dead space
 - (B) lung-thorax compliance
 - (C) physiologic shunt fraction
 - (D) diffusing capacity of the lungs
 - (E) ventilatory response to carbon dioxide
79. The effect of succinylcholine is terminated at postsynaptic effector cells by
- (A) binding and uptake by effector cells
 - (B) diffusion into capillaries
 - (C) hydrolysis by junctional cholinesterase
 - (D) hydrolysis by pseudocholinesterase
 - (E) spontaneous degradation to succinylmonocholine

80. Arterial pressure in the radial artery is 155/70 mmHg measured by a correctly calibrated catheter-transducer system. At the same time aortic pressure is 140/75 mmHg using a high-fidelity catheter tip transducer. The most likely cause of this discrepancy is
- (A) a large amount of air in the dome of the radial artery transducer
 - (B) coarctation of the aorta
 - (C) peripheral vascular constriction produced by sympathetic stimulation
 - (D) physiologic amplification of the wave form from the aorta to the radial artery
 - (E) too high a frequency response in the catheter-transducer system
81. A 20-year-old man involved in a motor vehicle accident is brought to the operating room for irrigation and debridement of open fractures of the femur and humerus. Cyanosis, decreased breath sounds on the left, increased peak airway pressure, and hypotension are noted after intubation of the trachea. The most likely cause is
- (A) aspiration
 - (B) fat embolus
 - (C) intubation of the right mainstem bronchus
 - (D) tension pneumothorax
 - (E) unilateral bronchospasm
82. Postoperatively, a patient is being mechanically ventilated by a constant-flow, pressure-cycled ventilator with the following initial settings: inspiratory/expiratory (I/E) ratio of 1:2, peak inspiratory pressure (PIP) of 25 cmH₂O, and rate of 10/min. One hour later, the I/E ratio is 1:4. Which of the following would ensure that the minute ventilation is the same as that initially set?
- (A) Inflate the endotracheal tube cuff to prevent leakage
 - (B) Double the respiratory rate
 - (C) Decrease the expiratory pause until the I/E ratio is 1.0
 - (D) Increase the PIP until the I/E ratio is 1:2
 - (E) Increase the PIP to 50 cmH₂O
83. During isoflurane anesthesia, a 45-year-old patient with chronic asthma has wheezing, prolonged expiration, sinus tachycardia of 120 bpm, and premature ventricular contractions. Preoperative medication included cromolyn and theophylline (serum level 20 µg/ml). The most appropriate treatment is to administer
- (A) albuterol aerosol
 - (B) aminophylline by intravenous infusion
 - (C) cromolyn aerosol
 - (D) halothane
 - (E) hydrocortisone by intravenous bolus
84. An anesthesia machine is set to deliver oxygen 2 L/min, nitrous oxide 2 L/min, and enflurane. After 30 minutes of stable anesthesia, which of the following is the most likely cause of a decrease in the oxygen analyzer reading from 50% to 30%?
- (A) A leak in the ventilator bellows
 - (B) Accumulation of water on the oxygen sensor membrane
 - (C) Calibration at 100% oxygen using less than 100% oxygen
 - (D) Disconnection of the wall oxygen hose
 - (E) Presence of the oxygen analyzer in the expiratory limb

85. Mismatching of ventilation to perfusion in the lung is greatest in which of the following situations?
- (A) Awake patient, spontaneous ventilation, lateral decubitus position
 - (B) Anesthetized patient, controlled ventilation, supine position
 - (C) Anesthetized patient, controlled ventilation, lateral decubitus position
 - (D) Anesthetized patient, controlled ventilation, sitting position
 - (E) Anesthetized patient, spontaneous ventilation, prone position
86. During recovery from halothane anesthesia, an alveolar concentration of 0.1% will have the greatest effect on
- (A) myocardial contractility
 - (B) ventilatory response to hypercarbia
 - (C) atrioventricular conduction
 - (D) ventilatory response to hypoxia
 - (E) neuromuscular transmission
87. A 68-year-old man has signs of a coagulopathy after receiving 10 units of packed erythrocytes during emergency repair of a leaking abdominal aortic aneurysm. The most likely cause is
- (A) depletion of factor V
 - (B) disseminated intravascular coagulation
 - (C) hypothermia
 - (D) platelet dysfunction
 - (E) thrombocytopenia
88. Which of the following is most likely to decrease uterine tone?
- (A) Administration of isoflurane 1%
 - (B) Administration of nitrous oxide 50%
 - (C) Intravascular injection of 5 ml of 0.5% bupivacaine
 - (D) Intravenous administration of ketamine 2 mg/kg
 - (E) Paracervical block with 20 ml of 1% lidocaine
89. Fetal distress is noted after administration of an epidural local anesthetic during labor. Fetal scalp pH is 7.0. Compared with a fetus with a scalp pH of 7.3, in this fetus the local anesthetic is present in
- (A) a higher concentration, with a larger fraction in the ionized form
 - (B) a higher concentration, with a larger fraction in the unionized form
 - (C) the same concentration, with a larger fraction in the ionized form
 - (D) the same concentration, with a larger fraction in the unionized form
 - (E) a lower concentration, with a larger fraction in the ionized form
90. To measure the contribution of intrapulmonary shunting to arterial hypoxemia, which of the following measurements are necessary? (Assume normal cardiac output and anatomy.)
- (A) PaCO_2 and PECO_2
 - (B) PaCO_2 and PEO_2 while breathing pure oxygen
 - (C) PaO_2 and PvO_2 while breathing pure oxygen
 - (D) PaO_2 while breathing both room air and pure oxygen
 - (E) PaO_2 and PaCO_2 while breathing room air

91. A healthy, spontaneously breathing, supine, anesthetized patient has an arterial to end-tidal carbon dioxide tension difference of 3 mmHg. Following institution of mechanical ventilation the value increases to 12 mmHg. The most likely cause of this change is
- (A) cephalad displacement of the diaphragm
 - (B) decreased production of carbon dioxide
 - (C) increased cardiac output
 - (D) increased shunting of blood through dependent lung zones
 - (E) increased ventilation of nondependent lung zones
92. A direct 5-joule shock is unsuccessful in converting ventricular fibrillation occurring after discontinuation of cardiopulmonary bypass. The most appropriate next step is to
- (A) administer calcium chloride
 - (B) administer bretylium
 - (C) administer regular insulin
 - (D) administer sodium bicarbonate
 - (E) increase shock energy
93. An infant is delivered by forceps following labor in which variable decelerations were noted. Amniotic fluid was clear. Initial evaluation shows a cyanotic, limp infant with a heart rate of 80 bpm, poor respiratory efforts, and grimacing in response to suctioning. The most appropriate method of resuscitation for this newborn is
- (A) vigorous tactile stimulation
 - (B) bag and mask ventilation with oxygen
 - (C) immediate endotracheal intubation
 - (D) administration of sodium bicarbonate 1 mEq/kg
 - (E) volume expansion with normal saline solution 10 ml/kg
94. During pulmonary artery catheterization, a 65-year-old man receives morphine 6 mg and scopolamine 0.4 mg intravenously. The pulse oximeter indicates desaturation, which quickly resolves with stimulation. When the drapes are removed, he has unilateral eye pain, decreased visual acuity, and dilated and irregular pupils. These eye symptoms are most likely caused by
- (A) retinal hemorrhage
 - (B) morphine-induced oculogyric crisis
 - (C) corneal abrasion
 - (D) carotid artery embolization
 - (E) angle-closure glaucoma
95. Upon removal of the epidural catheter after uneventful labor and delivery in a 25-year-old primiparous woman, approximately 1.2 cm of the Teflon catheter is left behind in the epidural space. The patient is informed of the complication. The most appropriate management is
- (A) immediate surgical removal
 - (B) prophylactic antibiotics
 - (C) lumbar myelogram
 - (D) monthly neurologic examinations
 - (E) no intervention

96. A patient receiving monoamine oxidase inhibitor therapy for depression undergoes an emergency cholecystectomy. Which of the following is the best means of providing postoperative analgesia in this patient?
- (A) Epidural analgesia using 0.25% bupivacaine
 - (B) Intravenous meperidine
 - (C) Epidural analgesia using meperidine
 - (D) Epidural analgesia using 1% lidocaine with epinephrine
 - (E) Intercostal analgesia using 1% lidocaine with epinephrine
97. A 6-year-old child with severe cerebral palsy is scheduled for general anesthesia. He is at increased risk for each of the following EXCEPT
- (A) gastroesophageal reflux
 - (B) hypersensitivity to central nervous system depressants
 - (C) poor function of laryngeal reflexes
 - (D) postoperative pulmonary complications
 - (E) succinylcholine-induced hyperkalemia
98. Pulsus paradoxus is commonly seen during anesthesia in patients with each of the following conditions EXCEPT
- (A) severe asthma
 - (B) right-sided heart failure
 - (C) hypovolemia
 - (D) atrial septal defect
 - (E) obesity
99. Undesirable muscarinic effects of anticholinesterase agents used for antagonism of muscle relaxants include each of the following EXCEPT
- (A) increased secretions
 - (B) bradycardia
 - (C) increased gastrointestinal motility
 - (D) increased urinary sphincter tone
 - (E) bronchoconstriction
100. Each of the following structures may participate in causing acute bradycardia during strabismus surgery EXCEPT the
- (A) globe
 - (B) rectus muscles
 - (C) optic nerve
 - (D) trigeminal nerve
 - (E) vagus nerve
101. Each of the following is a complication of stellate ganglion block EXCEPT
- (A) brachial plexus block
 - (B) diplopia
 - (C) local anesthetic-induced seizure
 - (D) recurrent laryngeal nerve palsy
 - (E) subarachnoid block

102. Each of the following factors may lead to erroneous readings using pulse oximetry EXCEPT

- (A) electrocautery
- (B) high cardiac output states
- (C) infrared lights near the sensor
- (D) intravenous dyes
- (E) severe hemodilution

103. Static lung compliance is decreased by each of the following EXCEPT

- (A) pulmonary emphysema
- (B) congestive heart failure
- (C) adult respiratory distress syndrome
- (D) pulmonary fibrosis
- (E) inhalation anesthesia

104. Perception of pain from cutaneous sources involves each of the following EXCEPT

- (A) frontal lobe gyri
- (B) lateral spinothalamic tracts
- (C) periaqueductal gray matter
- (D) Rexed's lamina V
- (E) unmyelinated C fibers

105. Each of the following statements about pheochromocytoma is true EXCEPT:

- (A) Preoperative administration of alpha-adrenergic inhibitors will usually reverse EKG changes due to catecholamine myocarditis
- (B) Preoperative administration of alpha-adrenergic inhibitors decreases operative mortality
- (C) Beta-adrenergic inhibitors should be administered preoperatively only in conjunction with alpha-adrenergic inhibitors
- (D) Vasopressor therapy may be necessary postoperatively for treatment of hypotension
- (E) Nasal congestion is a sign of inadequate alpha-adrenergic block

106. Each of the following statements about the blood supply of the spinal cord is true EXCEPT:

- (A) The anterior spinal artery is made up of branches from the vertebral, intercostal, and iliac arteries
- (B) The segmental blood supply of the cord depends upon the location of the arteria radicularis magna (Adamkiewicz)
- (C) The posterior spinal arteries supply most of the spinal cord
- (D) Obstruction of the inferior vena cava increases blood flow through the epidural venous plexus
- (E) The spinal cord is supplied by one anterior spinal artery and two posterior spinal arteries

107. Appropriate anesthetic management of a patient with hypertrophic cardiomyopathy includes each of the following EXCEPT

- (A) maintaining normal or slightly greater than normal preload
- (B) adjusting positive airway pressure to maintain near normal venous return
- (C) preference for volatile agents rather than opiates for anesthesia
- (D) use of beta-adrenergic blocking agents to increase ventricular wall compliance
- (E) decreasing afterload with peripheral vasodilators

108. A 25-year-old man with Wolff-Parkinson-White syndrome has paroxysmal supraventricular tachycardia with a heart rate of 200 bpm during insertion of an intramedullary rod for a femoral fracture. Duration of the QRS complex is 0.12 sec. Each of the following antidysrhythmic agents would be appropriate for use in this patient EXCEPT
- (A) lidocaine
 - (B) metoprolol
 - (C) procainamide
 - (D) propranolol
 - (E) verapamil
109. In a patient receiving an epidural analgesic infusion postoperatively, clear fluid is noted to drip back freely from the epidural catheter. Each of the following findings correctly identifies the associated fluid EXCEPT
- (A) precipitation when mixed with an equal volume of thiopental—local anesthetic
 - (B) pH 7.1—saline solution
 - (C) glucose 55 mg/dl—CSF
 - (D) sodium 150 mEq/L—CSF
 - (E) PCO₂ 51 mmHg—CSF
110. In a patient with sickle cell anemia, which of the following is LEAST likely to trigger sickling?
- (A) Hypothermia
 - (B) Increased systemic vascular resistance
 - (C) Low central venous pressure
 - (D) Low mixed venous PO₂
 - (E) Metabolic alkalosis

**1990 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1990, and is provided for instructional purposes only. The key was verified in 1990 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

The American Board of Anesthesiology Written Examination for Primary Certification is a subset of the ABA/ASA In-Training Examination. Approximately 80% of the questions were included in the grading of the ABA Written Examination, whereas the remainder were graded only for the ABA/ASA In-Training Examination.

1. A	31. C	61. C	91. C	121. B	151. B
2. E	32. C	62. B	92. D	122. C	152. E
3. A	33. A	63. B	93. D	123. A	153. C
4. E	34. C	64. B	94. B	124. A	154. A
5. A	35. D	65. D	95. D	125. E	155. B
6. B	36. C	66. A	96. B	126. A	156. A
7. A	37. A	67. C	97. A	127. A	157. B
8. B	38. E	68. B	98. E	128. A	158. B
9. C	39. B	69. E	99. D	129. B	159. D
10. C	40. E	70. A	100. E	130. A	160. A
11. B	41. C	71. E	101. B	131. E	161. A
12. C	42. C	72. C	102. D	132. B	162. C
13. C	43. A	73. A	103. A	133. D	163. B
14. C	44. B	74. D	104. B	134. C	164. D
15. D	45. A	75. A	105. C	135. D	165. B
16. C	46. C	76. A	106. E	136. D	166. E
17. D	47. E	77. B	107. D	137. B	167. E
18. C	48. E	78. A	108. B	138. B	168. B
19. A	49. E	79. E	109. C	139. D	169. A
20. A	50. E	80. C	110. D	140. E	170. D
21. E	51. E	81. C	111. D	141. A	171. D
22. D	52. A	82. D	112. A	142. E	172. A
23. C	53. E	83. D	113. B	143. D	173. C
24. C	54. D	84. A	114. B	144. D	174. C
25. B	55. E	85. B	115. A	145. D	175. C
26. E	56. C	86. B	116. C	146. D	176. A
27. E	57. E	87. C	117. A	147. A	
28. E	58. D	88. B	118. A	148. D	
29. C	59. B	89. C	119. D	149. C	
30. A	60. A	90. E	120. B	150. C	

**1990 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

This answer key reflects the state of knowledge in 1990, and is provided for instructional purposes only. The key was verified in 1990 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

The American Board of Anesthesiology Written Examination for Primary Certification is a subset of the ABA/ASA In-Training Examination. Approximately 80% of the questions were included in the grading of the ABA Written Examination, whereas the remainder were graded only for the ABA/ASA In-Training Examination.

1. C	31. D	61. E	91. E	121. C	151. D
2. A	32. A	62. C	92. E	122. D	152. B
3. D	33. D	63. D	93. B	123. B	153. D
4. C	34. A	64. A	94. E	124. A	154. B
5. A	35. E	65. A	95. E	125. A	155. A
6. E	36. A	66. B	96. A	126. A	156. B
7. B	37. E	67. D	97. E	127. B	157. A
8. C	38. D	68. B	98. D	128. A	158. C
9. D	39. B	69. E	99. D	129. E	159. B
10. E	40. E	70. B	100. C	130. C	160. C
11. A	41. C	71. B	101. B	131. D	161. B
12. A	42. C	72. A	102. B	132. B	162. E
13. B	43. A	73. C	103. A	133. C	163. C
14. B	44. C	74. A	104. A	134. B	164. C
15. A	45. E	75. A	105. E	135. C	165. B
16. C	46. D	76. C	106. C	136. A	166. A
17. B	47. D	77. C	107. E	137. A	167. E
18. B	48. B	78. A	108. E	138. E	168. E
19. E	49. D	79. B	109. B	139. B	169. D
20. C	50. B	80. D	110. E	140. C	170. A
21. D	51. D	81. D	111. B	141. C	171. D
22. B	52. D	82. D	112. D	142. E	172. B
23. C	53. D	83. A	113. B	143. C	173. B
24. A	54. B	84. B	114. E	144. B	174. D
25. E	55. C	85. C	115. A	145. D	175. B
26. A	56. C	86. D	116. D	146. A	176. D
27. B	57. C	87. E	117. A	147. D	
28. A	58. A	88. A	118. B	148. C	
29. B	59. E	89. A	119. B	149. A	
30. C	60. D	90. C	120. E	150. B	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1991

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. Two days after myocardial infarction involving the left anterior descending coronary artery, a patient's blood pressure decreases acutely from 125/80 to 70/40 mmHg, heart rate increases from 75 to 90 bpm, pulmonary artery pressure increases to 50/30 mmHg, and urine output decreases from 60 to 10 ml/hr. Thermodilution cardiac output has increased from 4 to 7 L/min. The most appropriate action is to
 - (A) compare mixed venous oxygen saturation in the right atrium and pulmonary artery
 - (B) draw blood for culture and start antibiotic therapy
 - (C) start dopamine infusion in low dose
 - (D) administer a fluid challenge
 - (E) monitor peripheral capillary oxygenation by transcutaneous oximetry

2. A 30-year-old primiparous woman delivered a healthy infant by cesarean section during uneventful spinal anesthesia with tetracaine 10 mg in 2 ml of 5% dextrose solution. Twelve hours after delivery she has bilateral loss of pain and temperature sensibility, but not touch, below T8 and paralysis of both legs. The most likely cause of this complication is
 - (A) chemical arachnoiditis
 - (B) injection of tetracaine into the spinal cord
 - (C) demyelination of the posterior tracts
 - (D) thrombosis of the anterior spinal artery
 - (E) cord transection from spondylolisthesis

3. A 70-year-old man who has just undergone an abdominal aortic aneurysm repair under halothane anesthesia develops hypertension, dyspnea, and cyanosis shortly after awakening in the recovery room. Administration of furosemide 20 mg intravenously improves the cyanosis within 10 minutes. This immediate effect of furosemide is best explained by
 - (A) inotropic effect from electrolyte shifts
 - (B) decreased preload through diuresis
 - (C) increased peripheral venous capacitance
 - (D) decreased pulmonary vascular resistance
 - (E) increased coronary blood flow

4. After the first 70 minutes of a transurethral resection of the prostate, a 70-year-old man becomes confused and has tachycardia, hypertension, and shortness of breath. Serum sodium concentration is 116 mEq/L. After informing the surgeon that the procedure should be terminated as soon as possible, the most appropriate next step would be to
 - (A) administer furosemide
 - (B) administer labetalol
 - (C) administer 3% sodium chloride
 - (D) change the irrigating solution to normal saline
 - (E) induce general endotracheal anesthesia

5. A 50-year-old man with severe coronary artery disease undergoes coronary artery bypass grafting. Five minutes after successful termination of cardiopulmonary bypass, ST-segment elevation is noted in lead II of the ECG, and the following findings are noted:

Blood pressure 70/40 mmHg
Pulse 80 bpm
Central venous pressure 16 cmH₂O
Pulmonary artery pressure 25/10 mmHg

Appropriate management is to

- (A) administer propranolol
 - (B) administer nitroglycerin
 - (C) administer dopamine
 - (D) administer crystalloid fluid
 - (E) return the patient to cardiopulmonary bypass
6. A 62-year-old man with severe emphysema was treated for the sixth time with assisted mechanical ventilation (FiO₂ 0.6, peak inspiratory pressure 25 mmHg, rate 22/min, insp/exp 0.3). Arterial blood gas values with this therapy are PaO₂ 73 mmHg, PaCO₂ 48 mmHg, and pH 7.32. During the second day of treatment he suddenly becomes dusky, with increased respiratory rate. Arterial blood gas values are PaO₂ 42 mmHg, PaCO₂ 67 mmHg, and pH 7.25. Tracheal lavage and suction fail to improve his condition.

The therapeutic measure most likely to correct this acute episode is to

- (A) administer heparin
 - (B) increase FiO₂
 - (C) paralyze him with pancuronium
 - (D) add positive end-expiratory pressure 5 to 10 cmH₂O
 - (E) insert a chest tube
7. A 19-year-old college student is brought to the emergency department cyanotic and incoherent. Respiratory rate is 48/min, pulse is 140 bpm, and blood pressure is 140/85 mmHg. The only history obtainable is that he was at a party and suddenly felt sick. Cyanosis persists despite administration of pure oxygen by mask. A venous blood sample is chocolate-brown.

The action most beneficial to the patient is to

- (A) intubate the trachea and control ventilation
 - (B) perform bronchoscopy to treat foreign body aspiration
 - (C) obtain a pulmonary ventilation-perfusion scan
 - (D) administer methylene blue intravenously
 - (E) administer thiosulfate in normal saline solution intravenously
8. After a gastric stapling procedure, a 150-kg woman is extubated and breathing spontaneously in the recovery room at a rate of 26/min and an FiO₂ of 0.5. Arterial blood gas analysis shows PaO₂ 96 mmHg, PaCO₂ 44 mmHg, and pH 7.37. The parameter most closely related to her increased alveolar-arterial oxygen tension gradient is
- (A) decreased expiratory reserve volume
 - (B) decreased minute volume
 - (C) decreased residual volume
 - (D) decreased total lung capacity
 - (E) rapid respiratory rate

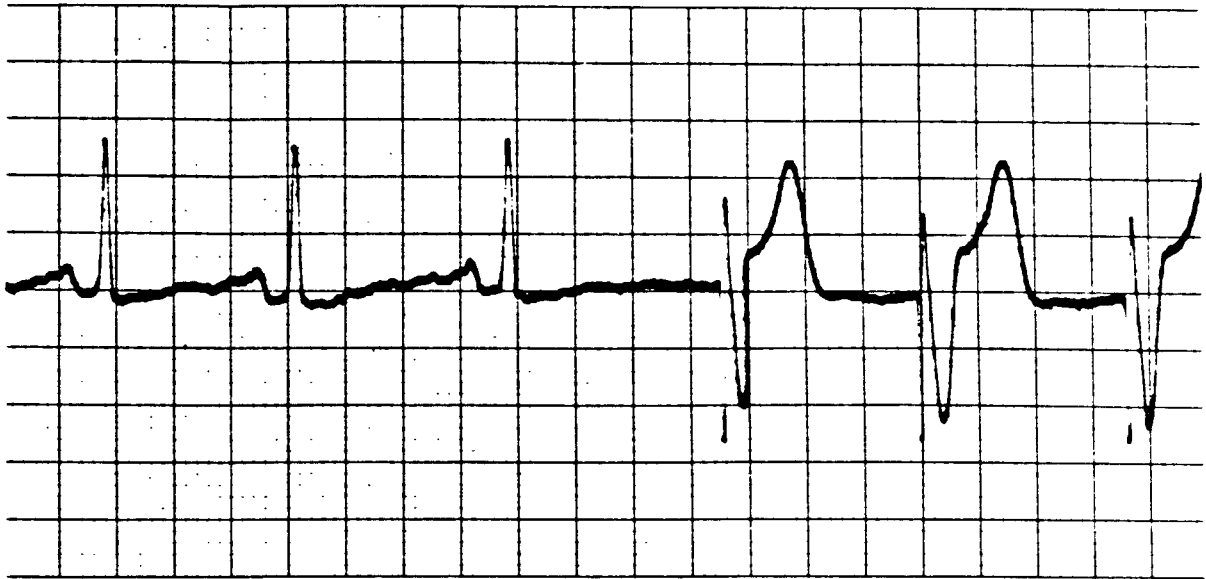
9. At induction, the inspired concentration of a volatile anesthetic agent will approach its dialed concentration most rapidly if
- (A) the anesthetic circuit is made of rubber rather than polyethylene
 - (B) the patient breathes more deeply
 - (C) fresh soda lime is used
 - (D) fresh gas flow rate is increased
 - (E) nitrous oxide is added to the inspired gas mixture
10. In a 5-kg boy with Treacher-Collins syndrome who is to undergo cleft palate repair, endotracheal intubation is best accomplished with
- (A) awake nasal intubation after topical anesthesia
 - (B) halothane anesthesia with spontaneous ventilation
 - (C) light isoflurane anesthesia and a muscle relaxant
 - (D) thiopental and succinylcholine sequence intravenously
 - (E) nasal intubation after administration of ketamine intramuscularly
11. In a normally functioning circle anesthesia system, if the length of the inspiratory and expiratory hose is doubled, the mechanical dead space will be
- (A) halved
 - (B) unchanged
 - (C) doubled
 - (D) quadrupled
 - (E) dependent on compression volume
12. A 31-year-old man received an uneventful epidural anesthetic for arthroscopy of the knee and meniscectomy. Twenty-four hours later he still has painless flaccid paralysis in both legs. This clinical presentation is most consistent with
- (A) adhesive arachnoiditis
 - (B) anterior spinal artery thrombosis
 - (C) epidural abscess
 - (D) epidural hematoma
 - (E) transverse myelitis
13. The following breath sounds are heard after placement of a left-sided double-lumen endobronchial tube:
- | <u>Lumens ventilated</u> | <u>Cuffs inflated</u> | <u>Breath sounds</u> |
|--------------------------|-----------------------|-----------------------|
| Both | Both | Bilateral |
| Bronchial only | Both | Bilateral |
| Tracheal only | Both | Decreased bilaterally |
| Tracheal only | Tracheal cuff only | Bilateral |
- The most likely cause of these findings is
- (A) presence of both lumens in the right mainstem bronchus
 - (B) presence of both lumens in the left mainstem bronchus
 - (C) presence of both lumens in the trachea
 - (D) herniation of the bronchial cuff at the bifurcation of the trachea
 - (E) presence of the bronchial lumen in the right mainstem bronchus

14. Which of the following is most indicative of reflex sympathetic dystrophy?
- (A) Dry skin
 - (B) Dull pain that improves with movement
 - (C) Fasciculations
 - (D) Motor weakness
 - (E) Pallor and cyanosis
15. Prompt control of seizures induced by bupivacaine is necessary because
- (A) cerebral metabolic rate for oxygen increases more than cerebral blood flow
 - (B) cerebral blood flow is increased
 - (C) bupivacaine decreases aerobic cerebral metabolism
 - (D) cardiac failure may occur
 - (E) ventilation may be impaired
16. Block of the superficial cervical plexus is performed at which location?
- (A) At the midposterior border of the sternocleidomastoid muscle
 - (B) In the interscalene groove
 - (C) Over the mastoid process
 - (D) Over the transverse process of C4
 - (E) Over Chassaignac's tubercle
17. Alveolar partial pressure of an inhaled anesthetic rises more rapidly in a parturient at term than in a nonpregnant woman because
- (A) functional residual capacity is decreased
 - (B) PaCO_2 is decreased
 - (C) uptake of inhaled agents by tissues is decreased
 - (D) cardiac output is increased
 - (E) physiologic dead space is increased
18. During general anesthesia, a patient has the acute onset of atrial fibrillation with rapid ventricular response and hypotension to 50 mmHg systolic. The most appropriate treatment is
- (A) cardioversion
 - (B) digoxin
 - (C) esmolol
 - (D) ouabain
 - (E) verapamil
19. A patient spontaneously breathes nitrous oxide 60%, oxygen 40%, and enflurane for one hour. The nitrous oxide is then replaced with oxygen, and the inspired enflurane concentration is increased from 1% to 2%. Over 10 minutes, the end-tidal carbon dioxide tension increases from 30 to 40 mmHg. The most likely cause is
- (A) discontinuation of nitrous oxide
 - (B) decreased alveolar-arterial carbon dioxide tension gradient
 - (C) increased metabolic rate
 - (D) increased physiologic dead space
 - (E) decreased central ventilatory response to carbon dioxide

20. The most beneficial effect of continuous positive airway pressure in a newborn with respiratory distress syndrome is
- (A) increased functional residual capacity
 - (B) decreased airway resistance
 - (C) promotion of surfactant formation
 - (D) increased alveolar PO_2
 - (E) maintenance of functional closure of the foramen ovale
21. Which of the following is the most likely effect of long-term exposure to nitrous oxide at a concentration of 50 ppm?
- (A) Impaired cognitive function
 - (B) Inhibition of vitamin B-12 absorption
 - (C) Megaloblastic changes in bone marrow
 - (D) Teratogenesis
 - (E) Thrombocytopenia
22. During frontal craniotomy for removal of an astrocytoma, the surgeon notes that the brain is "tight." The patient is receiving nitrous oxide 50% in oxygen, isoflurane 0.5%, fentanyl, and pancuronium. Heart rate is 92 bpm, blood pressure is 110/60 mmHg, end-tidal carbon dioxide tension is 31 mmHg, and oxygen saturation is 98%. The most appropriate initial treatment is to
- (A) administer a beta-adrenergic blocker
 - (B) administer thiopental
 - (C) decrease isoflurane concentration
 - (D) decrease mean arterial pressure to 60 mmHg
 - (E) increase alveolar ventilation
23. Which of the following would be most likely to result in neonatal depression when administered to a healthy parturient during an uncomplicated labor and vaginal delivery?
- (A) Nitrous oxide 60% in oxygen supplemented with halothane 0.5% for 10 minutes before delivery
 - (B) Ketamine 20 mg intravenously 30 minutes before delivery
 - (C) Meperidine 100 mg intramuscularly 2 hours before delivery
 - (D) Thiopental 100 mg intravenously 30 minutes before delivery
 - (E) Nitrous oxide 60% in oxygen supplemented with enflurane 0.7% for 10 minutes before delivery
24. Which of the following statements concerning brain stem auditory evoked responses is true?
- (A) They monitor cortical function
 - (B) They are not affected by changes in carbon dioxide tension
 - (C) They are not affected by mild hypothermia (34°C)
 - (D) They are more resistant to anesthetic effects than somatosensory evoked responses
 - (E) They are abolished coincident with flattening of the EEG
25. The most important cause of hypotension that occurs normally at initiation of cardiopulmonary bypass is
- (A) hemodilution
 - (B) acidosis
 - (C) decreased flow rate
 - (D) vasodilation
 - (E) hypothermia

26. A patient receives an emergency transfusion of three units of O, Rh-negative blood for profuse hemorrhaging. If his blood type is AB, Rh-negative, which of the following is most appropriate for continuing transfusion?
- (A) AB, Rh-negative whole blood
 - (B) B, Rh-negative whole blood
 - (C) O, Rh-negative whole blood
 - (D) A, Rh-negative erythrocytes
 - (E) O, Rh-negative erythrocytes
27. Following antagonism of a nondepolarizing muscle relaxant with neostigmine, twitch height is normal. To achieve this effect, the percentage of the acetylcholine receptor pool that must be free of muscle relaxant is
- (A) 10
 - (B) 25
 - (C) 33
 - (D) 50
 - (E) 75
28. Following completion of an ankle block, the patient reports intact sensation on the tips of the toes. Which of the following nerves was blocked inadequately?
- (A) Deep peroneal
 - (B) Posterior tibial
 - (C) Saphenous
 - (D) Superficial peroneal
 - (E) Sural
29. Following enflurane anesthesia, serum free fluoride concentration is most likely to be increased in association with long-term use of
- (A) diazepam
 - (B) ethanol
 - (C) isoniazid
 - (D) phenobarbital
 - (E) phenytoin
30. The concentration of bupivacaine is higher in maternal blood than in fetal blood because
- (A) bupivacaine is metabolized in the placenta
 - (B) maternal blood has a higher pH
 - (C) maternal blood has greater plasma protein binding
 - (D) maternal hemoglobin has a higher affinity for bupivacaine
 - (E) placental transfer of bupivacaine is limited
31. In the supraclavicular region, the brachial plexus
- (A) is anterior to the apex of the pleura
 - (B) is anterior to the subclavian artery
 - (C) is posterior to the medial scalene muscle
 - (D) is enclosed in a sheath with the subclavian vein
 - (E) no longer contains fibers from the T1 nerve root

32. The most common early indication of drug dependence in an anesthesiologist is
- (A) a positive finding on random screening of urine
 - (B) inconsistency between anesthetic and drug control records
 - (C) change in behavior
 - (D) incapacitation due to overdose
 - (E) the presence of needle tracks on the extremities
33. Which of the following is a characteristic of the Bain breathing circuit?
- (A) Condensation of moisture in inspired gases is facilitated by the circuit design
 - (B) Fresh gas flows coaxially around the exhalation limb
 - (C) Fresh gas flows need not exceed minute ventilation
 - (D) The circuit eliminates the possibility of rebreathing
 - (E) The circuit is functionally similar to the Jackson-Rees system
34. Intractable pain due to unresectable pancreatic carcinoma is most effectively treated with
- (A) bilateral neurolytic intercostal blocks at T10-12
 - (B) bilateral sympathetic blocks with phenol
 - (C) celiac plexus block with alcohol
 - (D) epidural block with phenol
 - (E) subarachnoid block with alcohol
35. Which of the following statements concerning cardiovascular physiology in a healthy term neonate is true?
- (A) Heart rate is increased in response to hypoxemia
 - (B) Heart rate increases reflexly in response to hypotension
 - (C) Stroke volume increases in response to decreased systemic vascular resistance
 - (D) Stroke volume increases in response to bradycardia
 - (E) Stroke volume is near-maximal under resting conditions
36. Prior to occlusion of any major pulmonary blood vessels during a thoracotomy, applying positive end-expiratory pressure to ventilation through the dependent lumen of a double-lumen tube and occluding the upper lumen of the tube will
- (A) increase blood flow to the dependent lung
 - (B) increase the alveolar-arterial oxygen tension difference
 - (C) override hypercarbic pulmonary vasoconstriction
 - (D) improve the patient's oxygenation
 - (E) increase the right ventricular dP/dt
37. A 16-year-old child has an arterial catheter inserted prior to a potentially difficult intubation for a craniofacial operation. While awake and breathing room air, arterial blood gas values are: PaO_2 134 mm Hg, $PaCO_2$ 28 mm Hg, and pH 7.45. These values can be explained by
- (A) excess heparin mixed with the arterial sample
 - (B) a patient core temperature of 38°C
 - (C) excess air entrained in the syringe during sampling
 - (D) storing the sample at room temperature for 15 minutes before processing
 - (E) anxiety and hyperventilation



38. The above tracing indicates that the pacemaker generator is

- (A) malfunctioning
- (B) VVT sensing and capturing normally
- (C) VOO sensing and capturing normally
- (D) DVI sensing and capturing normally
- (E) VVI sensing and capturing normally

39. In the operating room

- (A) conductive floors are necessary for electrical safety
- (B) the ECG monitor may be used as a grounding source
- (C) an improperly grounded electrocautery causes ventricular fibrillation
- (D) an isolation transformer offers no protection against microelectrocution
- (E) a line isolation monitor will interrupt power automatically if excessive leakage to ground is detected

40. During spinal anesthesia in a healthy patient, the sensory level rises to C8. The patient will most likely have

- (A) hoarseness due to block of the recurrent laryngeal nerve
- (B) numbness over the clavicles
- (C) impaired resting ventilation
- (D) numbness of the little finger
- (E) inability to raise his arm

41. On routine inspection of an anesthesia machine, the nitrous oxide E cylinder pressure is 360 psi. This indicates that the

- (A) pressure in the cylinder is 16 atm
- (B) cylinder contains no liquid nitrous oxide
- (C) cylinder is half full
- (D) cylinder contains enough nitrous oxide for one hour of anesthesia at a flow rate of 3 L/min
- (E) reducing valve is malfunctioning

42. A patient is undergoing a craniotomy in the sitting position. Mean arterial pressure measures 80 mmHg from a radial artery catheter located 27 cm below the right atrium and a transducer located, zeroed, and calibrated at the level of the right atrium. The circle of Willis is 27 cm above the right atrium. Intracranial pressure is 0 cmH₂O and right atrial pressure is 5 cmH₂O.

The cerebral perfusion pressure in mmHg is

- (A) 75
- (B) 60
- (C) 53
- (D) 48
- (E) 26

43. Twenty minutes after thiopental induction for femoral herniorrhaphy, a 34-year-old woman is breathing spontaneously and receiving nitrous oxide-oxygen (2 liters each) and enflurane 3% by face mask. Pulse is 90 bpm, blood pressure is 80/60 mmHg, end-tidal enflurane concentration is 2%, and end-tidal carbon dioxide tension is 48 mmHg. Which of the following is most likely to occur on skin incision?

- (A) Pupillary dilation
- (B) Laryngeal stridor
- (C) Gross muscular movement
- (D) Increased blood pressure
- (E) No response

44. In a healthy patient receiving an epidural analgesic infusion postoperatively, clear fluid is noted to drip back freely from the epidural catheter. Which of the following findings correctly identifies the associated fluid?

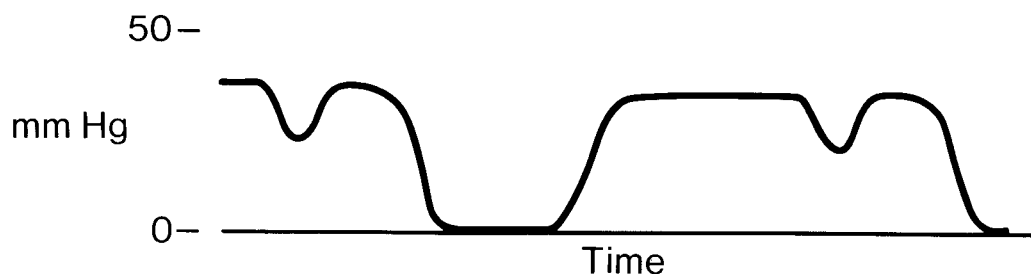
- (A) Precipitation when mixed with an equal volume of pancuronium = local anesthetic
- (B) pH 7.1 = saline solution
- (C) Glucose 120 mg/dl = CSF
- (D) Sodium 130 mEq/L = CSF
- (E) PCO₂ 51 mmHg = CSF

45. In a patient who has undergone cholecystectomy, which of the following is the most likely pulmonary effect of systemically administered opioids?

- (A) Decreased Qs/Qt
- (B) Decreased dead space
- (C) Restored vital capacity
- (D) Restored functional residual capacity
- (E) Shift of the carbon dioxide response curve to the right

46. During exploration of the posterior fossa with the patient in the sitting position, blood pressure decreases from 120/70 to 70/40 mmHg, central venous pressure increases from 6 to 16 mmHg, oxygen saturation decreases to 88%, nitrogen is detected by the mass spectrometer, and premature ventricular contractions appear on the ECG. The most appropriate management is to

- (A) administer lidocaine
- (B) administer fluid rapidly
- (C) apply positive end-expiratory pressure 10 cmH₂O
- (D) aspirate the central venous catheter
- (E) switch to hand ventilation



47. The most likely explanation for the intraoperative capnographic tracing shown is

- (A) cardiac oscillation
- (B) exhaustion of the soda lime
- (C) kinking of the endotracheal tube
- (D) partial recovery from vecuronium
- (E) presence of water droplets in the analyzer

48. With direct arterial blood pressure monitoring

- (A) systolic pressure in the aortic root exceeds that in the radial artery
- (B) mean and diastolic pressures are lower in the dorsalis pedis artery than in the aortic root
- (C) the dicrotic notch is not clearly found on femoral arterial waveforms
- (D) an underdamped waveform is characteristic of bubbles in the system
- (E) longer tubing between artery and transducer artifactually augments systolic pressure

49. At term which of the following would produce the greatest increase in uterine blood flow?

- (A) Increasing PaO_2 to greater than 100 mmHg
- (B) Administering ritodrine intravenously
- (C) Administering halothane to 1 MAC
- (D) Administering magnesium sulfate intravenously
- (E) Increasing PaCO_2 from 35 to 40 mmHg

50. Electrocautery units operate at frequencies between 300 kHz and 2 MHz to

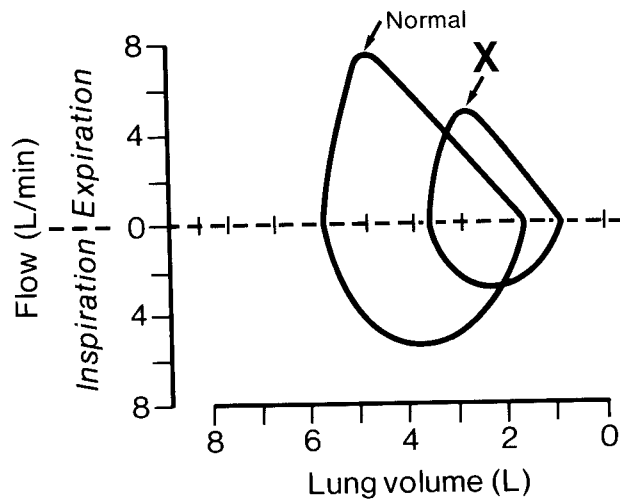
- (A) avoid pacemaker interference
- (B) minimize ECG tracing interference
- (C) minimize the likelihood of ventricular fibrillation
- (D) optimize hemostasis
- (E) provide the best "cutting" current

51. Alveolar dead space is decreased by

- (A) halothane anesthesia
- (B) positive end-expiratory pressure
- (C) deliberate hypotension
- (D) atropine premedication
- (E) decreased tidal volume

52. Two months ago a 68-year-old man with insulin-dependent diabetes mellitus had a transurethral resection of the prostate under spinal anesthesia with tetracaine plus epinephrine. He now has numbness and tingling in both feet and disturbance of gait. Physical examination demonstrates stocking-type hypesthesia of both feet and ankles. The most likely diagnosis is
- (A) anterior spinal artery syndrome
 - (B) diabetic neuropathy
 - (C) adhesive arachnoiditis
 - (D) cauda equina syndrome
 - (E) peripheral nerve injury from the lithotomy position
53. Six months after repair of a lacerated peroneal nerve, a patient has electric-shock-like pain when pressure is applied to the middle of the gastrocnemius muscle. The most appropriate initial management is
- (A) administration of carbamazepine
 - (B) epidural injection of morphine
 - (C) local infiltration with bupivacaine
 - (D) lumbar sympathetic block
 - (E) peroneal nerve block
54. The principal rationale for the use of warmed humidified inspired anesthetic gases in children is to
- (A) decrease postoperative respiratory complications
 - (B) decrease postoperative shivering
 - (C) preserve ciliary function
 - (D) prevent dehydration
 - (E) prevent evaporative heat loss
55. Which of the following drugs increases cerebral blood flow while decreasing cerebral metabolic rate?
- (A) Etomidate
 - (B) Fentanyl
 - (C) Isoflurane
 - (D) Lidocaine
 - (E) Midazolam
56. Systemic hypothermia to 30°C is accompanied by
- (A) a shift to the right of the oxyhemoglobin dissociation curve
 - (B) a decrease in carbon dioxide dissolved in plasma
 - (C) a decrease in the glomerular filtration rate
 - (D) an increase in MAC of volatile inhalation agents
 - (E) low-voltage, high-frequency EEG pattern
57. The action of dantrolene on skeletal muscle
- (A) occurs within the neuromuscular junction
 - (B) alters electrical properties of the muscle membrane
 - (C) does not result in muscle relaxation
 - (D) decreases myoplasmic calcium concentration
 - (E) results from competitive inhibition of caffeine

58. A patient has sudden cardiopulmonary arrest five minutes after retrobulbar block with 0.75% bupivacaine 2 ml with hyaluronidase for ophthalmologic surgery. No premonitory changes were noted on the pulse oximeter. The most likely cause is
- (A) allergic reaction to hyaluronidase
 - (B) direct cardiac toxicity
 - (C) oculocardiac reflex
 - (D) intravenous injection of local anesthetic
 - (E) subarachnoid injection of local anesthetic
59. A 46-year-old patient who abuses intravenous drugs develops acute aortic valvular insufficiency from bacterial endocarditis. Which of the following statements concerning pressures measured through a pulmonary artery catheter is true?
- (A) Pulmonary artery occlusion pressure will underestimate left ventricular end-diastolic pressure
 - (B) Pulmonary artery oxygen saturation will overestimate mixed venous oxygen saturation
 - (C) Thermodilution cardiac output determination will overestimate cardiac output
 - (D) Right ventricular end-diastolic pressure will equal left ventricular end-diastolic pressure
 - (E) The pulmonary artery occlusion pressure trace will most likely have large V waves
60. Which of the following statements concerning the management of diabetes mellitus during pregnancy is true?
- (A) Insulin requirements remain essentially unchanged during pregnancy
 - (B) Maternal blood glucose concentration of 200 mg/dl is optimal
 - (C) Maternal hyperglycemia may cause neonatal acidosis
 - (D) Neonatal hyperglycemia is common
 - (E) Infants delivered under general anesthesia have lower Apgar scores than those delivered under spinal anesthesia
61. Which of the following drugs best facilitates management of cerebral vasospasm after subarachnoid hemorrhage?
- (A) Nifedipine
 - (B) Nimodipine
 - (C) Nitroglycerin
 - (D) Nitroprusside
 - (E) Thiopental
62. In a patient taking a beta-adrenergic blocker, the drug most likely to produce atrioventricular junctional block is
- (A) diltiazem
 - (B) fentanyl
 - (C) halothane
 - (D) nifedipine
 - (E) verapamil
63. The potency of an inhalation anesthetic correlates best with its
- (A) vapor pressure
 - (B) blood/gas partition coefficient
 - (C) molar volume
 - (D) brain/gas partition coefficient
 - (E) oil/gas partition coefficient



64. The flow-volume loop indicated by the "X" is characteristic of

- (A) asthma
- (B) bronchiectasis
- (C) emphysema
- (D) pulmonary fibrosis
- (E) tracheal stenosis

65. A patient is undergoing cholecystectomy with enflurane, nitrous oxide, fentanyl, and oxygen. He takes theophylline and cromolyn sodium for bronchial asthma. During skin incision he has bilateral wheezing; peak inspiratory pressure is 50 cmH₂O, and the ECG shows occasional premature ventricular contractions. The most appropriate management is to

- (A) switch from enflurane to isoflurane
- (B) administer lidocaine intravenously
- (C) administer methylprednisolone intravenously
- (D) administer nebulized cromolyn sodium
- (E) administer nebulized metaproterenol

66. After receiving an axillary block for carpal tunnel release, a patient has pain on incision. Which of the following nerves should be blocked at the level of the elbow to relieve the pain?

- (A) Intercostobrachial
- (B) Median
- (C) Musculocutaneous
- (D) Radial
- (E) Ulnar

67. Which of the following statements about pulmonary function testing is true?

- (A) Forced expiratory volume in one second (FEV₁) is directly related to maximum voluntary ventilation
- (B) FEV₁ is the most reliable indicator of small airways resistance
- (C) Forced vital capacity is markedly decreased in obstructive lung disease with air-trapping
- (D) Maximum mid-expiratory flow is less effort dependent than FEV₁
- (E) Three-second forced expiratory volume is the amount of air exhaled during the third second of exhalation

68. A healthy 18-year-old youth is scheduled for an emergency operation for removal of a steel splinter from his right iris. Anesthesia is induced with thiopental and pancuronium and, following tracheal intubation, is maintained with nitrous oxide 2 liters, oxygen 2 liters, and halothane 1.5%. Conjunctival instillation of phenylephrine solution 10% increases blood pressure from 110/70 to 230/110 mmHg and decreases pulse from 70 to 46 bpm. The ECG shows a bigeminal pattern.

The most appropriate treatment is to

- (A) administer lidocaine
- (B) administer atropine
- (C) administer propranolol
- (D) decrease halothane
- (E) administer nitroprusside

69. A 57-year-old man who weighs 150 kg and is 170 cm (67 in) tall is scheduled for cholecystectomy. He has a 100 pack-year smoking history. Which of the following findings on pulmonary function testing are most likely?

	FVC (liters)	FEV ₁ (liters)
(A)	2.5	1.5
(B)	2.5	2
(C)	2.5	4.5
(D)	6	2
(E)	6	4.6

70. An axillary block is administered to a 60-kg patient using 40 ml of 0.5% bupivacaine. Ten minutes after placement of the block, the patient has a seizure. Which of the following statements is true?

- (A) A low serum albumin concentration could have contributed to the occurrence of the seizure
- (B) CNS hypoperfusion is the most likely cause of the seizure
- (C) The seizure was probably secondary to an allergic reaction to the local anesthetic
- (D) The use of an equipotent dose of lidocaine rather than bupivacaine would have decreased the likelihood of the seizure
- (E) A large amount of the local anesthetic must have been injected intravascularly

71. A patient has seizure activity 30 seconds after injection of 0.25% bupivacaine 2 ml with epinephrine 1:200,000 for stellate ganglion block. The most likely cause is

- (A) reaction to epinephrine in the anesthetic solution
- (B) anaphylactoid reaction to bupivacaine
- (C) subarachnoid injection of bupivacaine
- (D) peridural venous injection of bupivacaine
- (E) vertebral artery injection of bupivacaine

72. Following delivery with pudendal block, a patient requires anesthesia for removal of a retained placenta. The most appropriate anesthetic is

- (A) epidural block
- (B) ketamine analgesia with midazolam for amnesia
- (C) opioid-based general endotracheal anesthetic
- (D) potent inhaled general endotracheal anesthetic
- (E) subarachnoid block

73. Which of the following is an effect of acetazolamide?
- (A) Glucose intolerance
 - (B) Increased minute ventilation
 - (C) Metabolic alkalosis
 - (D) Sinus bradycardia
 - (E) Slowed intravenous anesthetic induction
74. Which of the following statements concerning cystoscopy in a patient with a spinal cord injury is true?
- (A) The risk for autonomic hyperreflexia is lower with injury below T10 than with injury above T10
 - (B) Anesthesia is unnecessary if the injury is above T7
 - (C) Ganglionic blockade is ineffective in preventing autonomic hyperreflexia
 - (D) Spinal anesthesia is contraindicated
 - (E) Bladder irrigation causes tachycardia
75. In a patient who is to undergo clipping of a cerebral aneurysm, an advantage of isoflurane over nitroprusside for induction of hypotension is
- (A) better maintenance of cardiac output
 - (B) better maintenance of cerebral blood flow
 - (C) greater decrease in cerebral oxygen consumption
 - (D) greater decrease in afterload
 - (E) more rapid titration of systemic blood pressure
76. A 2-year-old child is hospitalized for exposure. Rectal temperature is 30°C. The most appropriate method of warming is to
- (A) apply radiant heat
 - (B) increase ambient temperature to 28°C
 - (C) use a heating blanket set at 39°C
 - (D) warm and humidify inspired gases
 - (E) warm intravenous fluids to 37°C
77. Numbness and tingling on the lateral aspect of the thigh 24 hours after uneventful vaginal delivery is most likely a complication of
- (A) forceps delivery
 - (B) lithotomy position
 - (C) pudendal nerve block
 - (D) lumbar epidural anesthesia
 - (E) spinal anesthesia
78. A patient undergoes differential spinal block for evaluation of persistent foot pain. If the pain returns coincident with a decrease in skin temperature, which of the following is the most appropriate conclusion?
- (A) A somatic origin is ruled out
 - (B) The patient has causalgia
 - (C) The patient has peripheral vascular disease
 - (D) The pain is caused by central neuropathy
 - (E) Lumbar sympathetic blocks are indicated

79. Failure of contrast material to enter the duodenum following intraoperative cholangiography is most likely related to administration of
- (A) butorphanol
 - (B) fentanyl
 - (C) halothane
 - (D) nalbuphine
 - (E) naloxone
80. When using apneic oxygenation during endoscopy in a normothermic patient, PaCO_2
- (A) increases at a rate inversely proportional to oxygen flow rate
 - (B) increases at a rate of 8 ± 0.5 mmHg per minute
 - (C) increases at the same rate that PaO_2 decreases
 - (D) equals mixed venous PCO_2 after one minute
 - (E) is increased by airway obstruction
81. A patient who had liver transplantation two years ago now requires general anesthesia for ENT surgery. Minimal rejection has occurred on a regimen of cyclosporine and prednisone. Which of the following is most likely?
- (A) Hypoalbuminemia
 - (B) Hypocalcemia
 - (C) Episodic hypoglycemia
 - (D) Increased serum creatinine concentration
 - (E) Prolonged prothrombin time
82. A healthy 57-year-old man with a ureteral calculus is scheduled for immersion extracorporeal shock wave lithotripsy. Which of the following statements is true?
- (A) Delivery of the shock wave is timed by the R wave of the ECG
 - (B) Continuous epidural anesthesia is contraindicated because of the risk for infection
 - (C) If a regional technique is used, a T10 sensory level is required for adequate anesthesia
 - (D) If general anesthesia is used, high tidal volumes and low respiratory rate are preferred
 - (E) Removal of the patient from the bath is accompanied by an increase in blood pressure
83. Which of the following is an effect of metoclopramide?
- (A) Decreased lower esophageal sphincter tone
 - (B) Decreased MAC for enflurane
 - (C) Extrapyramidal signs
 - (D) Increased gastric pH
 - (E) Relief of intestinal obstruction
84. Which of the following should be included in the preoperative management of a 12-year-old patient with Duchenne muscular dystrophy who is unable to ambulate?
- (A) Determination of serum creatine kinase concentration
 - (B) Determination of serum potassium concentration
 - (C) Liver function profile
 - (D) Echocardiography
 - (E) Dantrolene prophylaxis

85. Which of the following is the most sensitive indicator of impending renal failure following trauma?
- (A) Central venous pressure
 - (B) Creatinine clearance
 - (C) Fractional excretion of sodium
 - (D) Hourly urine output
 - (E) Urine osmolality
86. During emergency laparotomy, a patient who has been taking a monoamine oxidase inhibitor for six months develops hypotension despite adequate fluid therapy. The most appropriate management is administration of
- (A) amrinone
 - (B) ephedrine
 - (C) epinephrine
 - (D) isoproterenol
 - (E) phenylephrine
87. An unvaccinated health care worker is stuck by a needle contaminated with blood from an HBsAg-positive patient. Which of the following statements concerning this situation is true?
- (A) The risk for development of HIV infection is greater than the risk for development of hepatitis
 - (B) Hepatitis immune globulin is indicated if the health care worker is HBcAg positive
 - (C) Hepatitis B vaccine should be administered
 - (D) Hepatitis immune globulin will protect equally against hepatitis B and hepatitis C (non-A, non-B)
 - (E) Hepatitis B vaccine carries a risk for transmission of HIV
88. Ten days after sustaining burns over 40% of his body surface area, a patient requires greater than expected doses of d-tubocurarine for adequate relaxation of skeletal muscle. The primary cause is increased
- (A) plasma protein binding of d-tubocurarine
 - (B) metabolism of d-tubocurarine
 - (C) number of acetylcholine receptors
 - (D) renal clearance of d-tubocurarine
 - (E) blood flow to skeletal muscle
89. Which of the following factors is the major cause of hypotension following release of the infrarenal aortic cross-clamp during aortic reconstruction?
- (A) Abnormal myocardial function
 - (B) Decreased systemic vascular resistance
 - (C) Down-regulation of adrenergic receptors
 - (D) Increased PaCO₂
 - (E) Suppression of the renin-angiotensin system
90. Compared with blood anticoagulated with CPD, blood stored in CPDA-1 has
- (A) better preservation of 2,3-DPG concentration
 - (B) better preservation of ATP concentration in erythrocytes
 - (C) shorter erythrocyte survival
 - (D) shorter shelf life
 - (E) decreased platelet aggregation

91. An 88-kg man is anesthetized with 66% nitrous oxide, 33% oxygen, and 1% isoflurane using a circle system. Following tracheal intubation, the nitrous oxide flow is set at 1 L/min and the oxygen flow is set at 0.5 L/min. After two hours the oxygen monitor indicates a circuit oxygen concentration of only 25% despite the flows noted above. The most likely explanation for this discrepancy is
- (A) decrease of oxygen pipeline pressure to 20 psi
 - (B) increase in the concentration of nitrous oxide in the circuit
 - (C) inaccuracy of flowmeters at low flow rates
 - (D) malfunction of the oxygen monitor
 - (E) progressive hypothermia
92. One hundred children who are to have strabismus surgery are enrolled in a research protocol. Fifty receive a new antiemetic and 50 receive a placebo preoperatively. Fifteen children in the treatment group and 37 children in the control group have nausea and vomiting postoperatively. Which of the following analyses is most appropriate for determining the statistical significance of the group differences?
- (A) Analysis of variance
 - (B) Chi-square analysis
 - (C) Linear regression and correlation coefficient
 - (D) Student's *t*-test
 - (E) Wilcoxon's rank sum test
93. A 36-year-old woman who undergoes peritoneal dialysis for chronic renal failure requires emergency surgical exploration for bowel obstruction. Serum creatinine concentration is 9.8 mg/dl and BUN concentration is 124 mg/dl. The most likely abnormality of coagulation is
- (A) decreased euglobulin lysis time
 - (B) decreased platelet count
 - (C) prolonged activated partial thromboplastin time
 - (D) prolonged bleeding time
 - (E) prolonged prothrombin time
94. A 14-year-old girl with status asthmaticus is receiving oxygen 3 L/min through nasal prongs. Heart rate is 110 bpm. Arterial blood gas values are PaO₂ 90 mmHg, PaCO₂ 32 mmHg, and pH 7.46. If ventilation appears unchanged, which of the following is the most reliable sign of impending respiratory failure?
- (A) PaO₂ of 80 mmHg
 - (B) PaCO₂ of 39 mmHg
 - (C) Heart rate of 140 bpm
 - (D) Increased wheezing
 - (E) Deterioration of mental status
95. At the time of cesarean delivery, thick dark meconium is noted and the newborn is flaccid, apneic, bradycardic, and cyanotic. The most appropriate initial action is
- (A) atropine administration
 - (B) sodium bicarbonate administration
 - (C) naloxone administration
 - (D) controlled ventilation
 - (E) tracheal suctioning

96. Compared with a normal child, which of the following is expected during inhalation induction in a child with a 2:1 left-to-right intracardiac shunt?
- (A) Decreased rate of rise of alveolar anesthetic tension
 - (B) Decreased anesthetic concentration in pulmonary artery blood
 - (C) Decreased cerebral blood flow
 - (D) Increased anesthetic concentration in vena cava blood
 - (E) No difference in time for anesthetic induction
97. Compared with adults, neonates are more likely to become hypoxemic following anesthesia and extubation because of a relatively
- (A) higher rate of oxygen consumption
 - (B) greater sensitivity to neuromuscular blockade
 - (C) larger V_D/V_T ratio
 - (D) lower blood pressure
 - (E) smaller functional residual capacity
98. A 35-year-old woman receiving isoflurane anesthesia suddenly develops tachycardia, hypertension, and multifocal ventricular ectopy during dissection of a pheochromocytoma. Each of the following would be appropriate treatment EXCEPT
- (A) administration of an alpha-adrenergic blocker
 - (B) administration of a beta-adrenergic blocker
 - (C) administration of lidocaine
 - (D) administration of nitroprusside
 - (E) switching from isoflurane to enflurane
99. Each of the following is a complication of celiac plexus block with 0.5% lidocaine 40 ml EXCEPT
- (A) hematuria
 - (B) ileus
 - (C) postural hypotension
 - (D) retroperitoneal hematoma
 - (E) weakness of hip flexors
100. The patient at LEAST risk of pulmonary aspiration of gastric contents during induction of anesthesia is
- (A) markedly obese and NPO for eight hours
 - (B) fed black coffee four hours before elective surgery
 - (C) scheduled for elective cesarean delivery and NPO for 20 hours
 - (D) NPO for four hours after a full meal
 - (E) scheduled for elective repair of a hiatus hernia
101. The condition LEAST likely to be associated with sustained pain relief following a nerve block is
- (A) causalgia
 - (B) myofascial pain
 - (C) diabetic neuropathy
 - (D) acute herpes zoster
 - (E) reflex sympathetic dystrophy

102. If a patient with excessive bleeding during exploratory laparotomy has a normal activated clotting time, the LEAST likely cause of the bleeding is
- (A) antithrombin III deficiency
 - (B) dilutional thrombocytopenia
 - (C) fibrinolysis
 - (D) administration of heparin 5000 units
 - (E) preoperative ingestion of aspirin
103. Which of the following will have the LEAST effect on the shape of the autoregulatory curve for cerebral blood flow?
- (A) Isoflurane
 - (B) Nitroprusside
 - (C) Hypercarbia
 - (D) Essential hypertension
 - (E) Cerebral infarction
104. During surgery with a carbon dioxide laser, which inhaled gas mixture is LEAST likely to promote combustion of the endotracheal tube?
- (A) Oxygen 25%—helium 75%
 - (B) Oxygen 25%—nitrogen 75%
 - (C) Oxygen 25%—nitrous oxide 75%
 - (D) Oxygen 50%—nitrogen 50%
 - (E) Oxygen 50%—nitrous oxide 50%
105. Each of the following indicates a hemolytic transfusion reaction in an anesthetized patient EXCEPT
- (A) bleeding diathesis
 - (B) wheezing
 - (C) hypotension
 - (D) hemoglobinuria
 - (E) decreased serum haptoglobin concentration
106. Each of the following statements about the anatomy of the autonomic nervous system is true EXCEPT:
- (A) Preganglionic cell bodies are located in the central nervous system
 - (B) Postganglionic neurons are located in outlying ganglia
 - (C) The parasympathetic ganglia are located near their target organs
 - (D) The adrenal gland is innervated only by the sympathetic nervous system
 - (E) The parasympathetic nervous system has thoracic and sacral segments
107. A 25-year-old woman is receiving magnesium sulfate for eclampsia at 36 weeks' gestation. Each of the following is a maternal effect of this treatment EXCEPT
- (A) sedation
 - (B) sensitization to depolarizing muscle relaxants
 - (C) sensitization to nondepolarizing muscle relaxants
 - (D) decreased uterine blood flow
 - (E) loss of deep tendon reflexes prior to significant cardiac dysfunction

108. To predict the requirement for isoflurane in milliliters of vapor per minute during closed circuit anesthesia, each of the following is necessary EXCEPT
- (A) cardiac output
 - (B) oxygen consumption
 - (C) MAC of isoflurane
 - (D) duration of administration
 - (E) blood-gas partition coefficient
109. The induction dose of thiopental should be decreased in each of the following situations EXCEPT
- (A) age greater than 70 years
 - (B) cardiogenic shock
 - (C) decreased hepatic blood flow
 - (D) hypoalbuminemia
 - (E) hypothyroidism
110. Each of the following would be expected after preoperative oral administration of clonidine EXCEPT
- (A) bradycardia in the absence of surgical stimulation
 - (B) decreased requirement for inhalational anesthetics
 - (C) decreased requirement for opioid anesthetics
 - (D) decreased response to exogenous epinephrine
 - (E) sedation
111. Each of the following increases cardiac output EXCEPT
- (A) an arteriovenous fistula
 - (B) fever
 - (C) normovolemic anemia
 - (D) shivering
 - (E) carotid sinus stimulation
112. Cerebral blood flow is decreased by each of the following EXCEPT
- (A) etomidate
 - (B) midazolam
 - (C) nitrous oxide
 - (D) increased minute ventilation
 - (E) positive end-expiratory pressure

AMERICAN BOARD OF ANESTHESIOLOGY
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IN-TRAINING EXAMINATION

Book B
1991

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. A 30-year-old woman underwent emergency cesarean delivery under general anesthesia at 36 weeks' gestation because of preeclampsia. Two hours after the operation, she is still intubated and apneic and cannot be aroused. Deep tendon reflexes are 1+. With mechanical ventilation at an FiO_2 of 0.4, PaO_2 is 130 mmHg, PaCO_2 is 32 mmHg, pH is 7.45, and base excess is -0.6 . The most likely cause is
 - (A) hypovolemic shock
 - (B) intracerebral hemorrhage
 - (C) nitroprusside toxicity
 - (D) overdose of magnesium sulfate
 - (E) pituitary necrosis

2. A 55-year-old man requires intravenous lidocaine for multifocal premature ventricular contractions occurring in the first hour after a below-knee amputation. He has alcoholic cirrhosis, portal hypertension, and ascites. Which of the following correctly describes the appropriate modification of the usual loading bolus and maintenance infusion of lidocaine?
 - (A) Larger bolus, faster infusion
 - (B) Larger bolus, slower infusion
 - (C) Smaller bolus, faster infusion
 - (D) Smaller bolus, slower infusion
 - (E) No change necessary

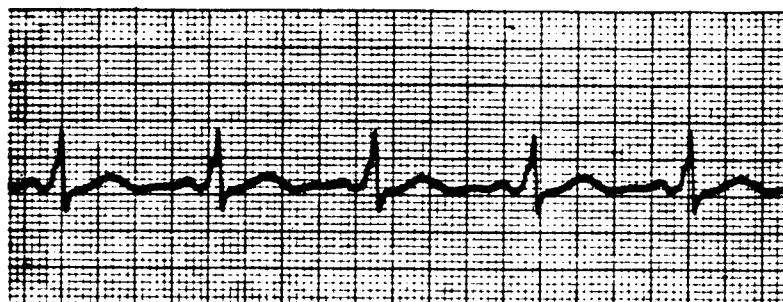
3. A 72-year-old woman with stable angina is undergoing bowel resection. Anesthesia is induced with etomidate. Five minutes after starting isoflurane 1% in nitrous oxide 50%, her blood pressure decreases from 110/84 to 70/40 mmHg. The most likely cause is
 - (A) coronary steal produced by isoflurane
 - (B) direct myocardial depression produced by isoflurane
 - (C) vasodilation produced by isoflurane
 - (D) adrenocortical suppression produced by etomidate
 - (E) myocardial depression produced by etomidate

4. Neurolytic block is most appropriate for
 - (A) abdominal pain secondary to hepatic carcinoma
 - (B) abdominal pain secondary to chronic pancreatitis
 - (C) persistent chest wall pain secondary to intercostal neuralgia following a thoracotomy for trauma
 - (D) reflex sympathetic dystrophy of the upper extremity with an excellent but transient response to a series of stellate ganglion blocks with local anesthetic
 - (E) a diabetic patient scheduled for surgical sympathectomy to relieve unilateral lower extremity pain secondary to severe peripheral vascular disease

5. A 40-year-old woman with Graves' disease is undergoing thyroidectomy with 1% isoflurane, 60% nitrous oxide, and oxygen. During surgical manipulation of the thyroid, temperature increases to 38.5°C, heart rate to 160 bpm, and blood pressure to 150/100 mmHg. The most appropriate initial treatment is to
- (A) administer dantrolene sodium
 - (B) administer potassium iodide
 - (C) administer propranolol
 - (D) administer propylthiouracil
 - (E) increase the concentration of isoflurane
6. A 78-year-old man who is scheduled for an inguinal hernia repair has a preoperative ECG showing left bundle branch block. He has had no symptoms of cardiovascular disease. This ECG finding most likely indicates
- (A) cardiac disease
 - (B) the need for spinal anesthesia
 - (C) an electrolyte disturbance
 - (D) the need for insertion of a temporary pacemaker
 - (E) a normal finding in a patient of this age
7. A patient who is scheduled for emergency laparotomy for bowel obstruction has had oliguria for three hours. She has had hypertension for 10 years. Which of the following laboratory findings would indicate preoperative fluid challenge?
- (A) Urine osmolality: 300 mOsm/L
 - (B) Urine specific gravity: 1.015
 - (C) Urine sodium concentration: 35 mmol/L
 - (D) Fractional excretion of sodium: 0.5
 - (E) Ratio of urine-to-plasma creatinine concentrations: 8
8. Which of the following statements concerning postspinal headache is true?
- (A) Cerebrospinal fluid leukocytosis occurs
 - (B) Intravenous caffeine therapy is more effective than epidural blood patch
 - (C) The incidence decreases with age
 - (D) The incidence is higher in males than in females of all ages
 - (E) The incidence is the same after single or multiple dural punctures
9. The primary mechanism for pharmacologic reduction of intraoperative blood loss is
- (A) decreased blood viscosity
 - (B) decreased cardiac output
 - (C) decreased venous return
 - (D) direct myocardial depression
 - (E) hypotension
10. Maternal hyperventilation produces
- (A) decreased maternal arterial pH
 - (B) increased fetal cerebral blood flow
 - (C) increased fetal arterial pH
 - (D) decreased maternal uterine artery flow
 - (E) increased fetal arterial PO₂

	<u>Before Drug</u>	<u>After Drug</u>
Arterial pressure (mmHg)		
Systolic	80	126
Diastolic	54	78
Mean	62	90
Pulmonary artery pressure (mmHg)		
Systolic	32	44
Diastolic	20	24
Mean	24	30
Pulmonary artery occlusion pressure (mmHg)	18	20
Right atrial pressure (mmHg)	14	15
Cardiac output (L/min)	4.2	4.1
Heart rate (bpm)	94	92

11. The hemodynamic changes shown above would most likely result from infusion of
- (A) dopamine
 - (B) epinephrine
 - (C) dobutamine
 - (D) norepinephrine
 - (E) isoproterenol
12. A patient with chronic paraplegia (T4 level) is undergoing cystoscopy and removal of bladder calculi without anesthesia. After 10 minutes, blood pressure is 240/100 mmHg and pulse is 50 bpm. The most appropriate management is administration of
- (A) spinal anesthesia
 - (B) inhalational anesthesia
 - (C) thiopental intravenously
 - (D) methyldopa intravenously
 - (E) nitroprusside intravenously
13. A 33-year-old woman is scheduled for emergency appendectomy under general anesthesia. She has hypertrophic cardiomyopathy and has had two episodes of syncope in the past year. Which of the following statements concerning anesthetic management is true?
- (A) Spinal anesthesia is preferred to general anesthesia
 - (B) Deep levels of isoflurane anesthesia are appropriate
 - (C) Fluid administration should be restricted
 - (D) Phenylephrine is preferred to ephedrine to treat hypotension
 - (E) Positive end-expiratory pressure will decrease left ventricular outflow obstruction
14. A 65-year-old patient with hypertrophic cardiomyopathy has chest pain prior to induction of anesthesia. Pulse is 80 bpm and blood pressure is 130/80 mmHg. The ECG (V_s) shows sinus rhythm and new ST-segment depression. The most appropriate management is administration of
- (A) furosemide
 - (B) metoprolol
 - (C) morphine
 - (D) nifedipine
 - (E) nitroglycerin



15. The preanesthetic ECG trace (lead II) shown above from a 32-year-old woman suggests

- (A) potential for tachyarrhythmia
- (B) need for preanesthetic atropine
- (C) myocardial ischemia
- (D) left bundle branch block
- (E) right ventricular hypertrophy

16. Four days after mitral valve replacement, a 49-year-old, 70-kg woman who has had oliguric renal failure since the operation requires insertion of a Schriber shunt for hemodialysis. Her BUN concentration is 104 mg/dl, serum creatinine is 9.3 mg/dl, serum sodium is 130 mEq/L, and serum potassium is 6.7 mEq/L. During the operation under local anesthesia, diazepam 7.5 mg and morphine 10 mg are administered intravenously to control agitation. Five minutes later while she is sleeping quietly, unifocal premature ventricular contractions appear at a rate of 10 per minute on the ECG monitor.

The most appropriate therapy is to

- (A) administer calcium gluconate 250 mg intravenously
- (B) augment ventilation with bag and mask
- (C) administer lidocaine 100 mg intravenously
- (D) administer NaHCO_3 50 mEq intravenously
- (E) observe only

17. A patient has a decrease in heart rate from 80 to 50 bpm and a decrease in blood pressure from 140/90 to 60/40 mmHg while in the recovery room after adrenalectomy for pheochromocytoma. The most appropriate treatment is administration of

- (A) atropine
- (B) calcium
- (C) hydrocortisone
- (D) isoproterenol
- (E) norepinephrine

18. The shorter duration of action of alfentanil relative to fentanyl is due to its

- (A) greater lipid solubility
- (B) increased clearance
- (C) increased rate of hepatic metabolism
- (D) lesser protein binding
- (E) smaller volume of distribution

19. One hour after induction of anesthesia for a posterior fossa craniotomy using opioid, relaxant, and nitrous oxide, the brain begins to protrude through the dura. The most effective measure to decrease intracranial pressure is to
- (A) administer additional opioid
 - (B) decrease PaCO_2 from 25 to 15 mmHg
 - (C) drain cerebrospinal fluid
 - (D) discontinue nitrous oxide
 - (E) induce hypotension
20. A patient has decreased lung compliance and hypoxemia after a 30-minute episode of laryngospasm following extubation. The most likely cause is
- (A) allergic reaction to the anesthetic
 - (B) altered alveolar-capillary membrane permeability
 - (C) anesthetic-induced lymphatic dysfunction
 - (D) increased pulmonary capillary pressure
 - (E) negative pulmonary interstitial hydrostatic pressure
21. During an aortic aneurysm repair, end-tidal carbon dioxide tension decreases from 35 to 20 mmHg in three breaths. The most likely cause is
- (A) acute arteriovenous fistula
 - (B) bronchospasm
 - (C) decreased cardiac output
 - (D) increased tidal volume
 - (E) venous air embolism
22. The acute onset of hypotension without a decrease in mixed venous oxygen saturation is most likely associated with the onset of
- (A) hemorrhage
 - (B) myocardial infarction
 - (C) pulmonary edema
 - (D) pulmonary embolus
 - (E) sepsis
23. Which of the following statements concerning air embolism during intracranial operations is true?
- (A) It does not occur in supine patients
 - (B) It is prevented by positive end-expiratory pressure
 - (C) It is confined to the right side of the heart and the pulmonary vasculature
 - (D) It is detectable by measurement of end-tidal nitrogen
 - (E) It is most efficiently treated by aspiration from a pulmonary artery catheter
24. A complication of terbutaline therapy to terminate premature labor is
- (A) bronchoconstriction
 - (B) hypoglycemia
 - (C) fetal bradycardia
 - (D) closure of the fetal ductus arteriosus
 - (E) pulmonary edema

25. A woman with chronic obstructive pulmonary disease is extubated and minimally responsive after halothane anesthesia. She is receiving oxygen 6 L/min through a face mask. Respirations are 10/min, PaO_2 is 68 mmHg, PaCO_2 is 54 mmHg, and pH is 7.28. The most likely cause of the respiratory acidemia is
- (A) blunted sensitivity to low pH in the medullary respiratory center
 - (B) chronic carbon dioxide retention
 - (C) decreased lung volume from supine positioning
 - (D) depression of carotid body chemoreceptors by halothane
 - (E) suppression of hypoxic ventilatory drive by supplemental oxygen
26. A 35-kg child requires mechanical ventilation with pure oxygen at a tidal volume of 350 ml and a rate of 20/min during a severe asthma attack. The most likely cause of severe hypotension after initiating mechanical ventilation is
- (A) hypoxic circulatory depression
 - (B) inadequate expiratory time
 - (C) increased pulmonary vascular resistance
 - (D) respiratory alkalosis
 - (E) tension pneumothorax
27. Which of the following is the most appropriate pharmacologic therapy for trigeminal neuralgia?
- (A) Buprenorphine
 - (B) Carbamazepine
 - (C) Chlorpromazine
 - (D) Pentazocine
 - (E) Phenelzine
28. Maximum current is delivered to the myocardium by a countershock for defibrillation when
- (A) paddle contact pressure is minimal
 - (B) petroleum jelly is used under the paddles
 - (C) previous countershocks of the same power have been attempted
 - (D) the patient is grounded securely
 - (E) the shock is applied at the end of inspiration
29. The duration of action of an induction dose of thiopental is determined primarily by its
- (A) rate of elimination
 - (B) rate of metabolism
 - (C) redistribution from brain to fat
 - (D) redistribution from brain to muscle
 - (E) hepatic extraction
30. A patient with lumbar disk disease requires lumbar epidural injection of a corticosteroid for control of low back pain. Which of the following statements concerning this treatment is true?
- (A) Maximum effect occurs one hour after injection
 - (B) Maximum effect occurs when drug concentration peaks in cerebrospinal fluid
 - (C) Maximum effect occurs during the acute phase of the disease
 - (D) The beneficial effect results primarily from sympathetic neurolysis
 - (E) It is contraindicated if the patient has had prior surgical procedures on the lumbar disks

31. A 45-kg, 80-year-old woman undergoes pin fixation of the right hip in the lateral decubitus position under spinal anesthesia. One day after the operation, she cannot move her left ankle or foot actively. The most likely cause is
- (A) compression of the sciatic nerve
 - (B) compression of the common peroneal nerve
 - (C) injury of the nerve root at L4-5
 - (D) stretching of the femoral nerve
 - (E) stretching of the tibial nerve
32. During postoperative indirect laryngoscopy, the vocal cords appear symmetric during quiet breathing and approximate to the left of midline during phonation. The most likely cause is
- (A) pure abductor paralysis of the left cord
 - (B) pure abductor paralysis of the right cord
 - (C) abductor and adductor paralysis of the left cord
 - (D) abductor and adductor paralysis of the right cord
 - (E) adductor paralysis of both cords
33. While delivering nitrous oxide 1.5 L/min, oxygen 1.5 L/min, and halothane 1%, a leak in the oxygen flowmeter will most likely be detected by the
- (A) low airway pressure alarm
 - (B) "fail-safe" system
 - (C) oxygen analyzer on the expiratory limb
 - (D) oxygen flowmeter reading
 - (E) mass spectrometric analysis of gases
34. Following hypothermic cardiopulmonary bypass, adequacy of total body rewarming is best indicated by normothermia recorded from the
- (A) upper esophagus
 - (B) lower esophagus
 - (C) pulmonary artery
 - (D) rectum
 - (E) great toe
35. The EEG of a patient undergoing anesthesia with high-dose fentanyl would most likely show
- (A) the same pattern seen with enflurane 0.5 MAC
 - (B) cessation of low-frequency activity
 - (C) accentuation of high-frequency activity
 - (D) uniform depression of all frequencies
 - (E) low-frequency, high-amplitude activity
36. The muscular action most likely to remain intact following an axillary brachial plexus block is
- (A) flexion at the elbow
 - (B) extension at the wrist
 - (C) flexion of digits 3, 4, and 5
 - (D) extension of digits 1, 2, and 3
 - (E) extension at the elbow

37. Two hours after a colon resection, a 60-year-old woman with adult-onset diabetes mellitus is somnolent and has a blood glucose concentration of 612 mg/dl. Which of the following findings are most likely?

	Serum Sodium (mEq/L)	Plasma Osmolality (mOsm/L)	Intravascular Volume
(A)	127	280	High
(B)	127	310	High
(C)	127	330	Low
(D)	140	280	Normal
(E)	140	300	Low

38. Which of the following nerves is most likely to be injured by a fracture of the shaft of the humerus?

- (A) Axillary
- (B) Median
- (C) Musculocutaneous
- (D) Radial
- (E) Ulnar

39. Which of the following is most responsible for the duration of action of local anesthetics?

- (A) Concentration
- (B) Metabolism
- (C) Molecular weight
- (D) Tissue protein binding
- (E) Volume injected

40. Diplopia following lumbar puncture with a 25-gauge, 3 1/2-inch needle is the result of

- (A) stretching the abducens nerve
- (B) pressure on the optic nerve
- (C) distortion of the oculomotor nucleus from collapse of the wall of the third ventricle
- (D) the severity of the accompanying headache
- (E) compensatory cerebral swelling

41. The primary mechanism for respiratory arrest following a spinal anesthetic to T2 is

- (A) blockade of carotid chemoreceptors
- (B) direct effect of local anesthetic on the medulla
- (C) ischemia of respiratory centers in the medulla
- (D) paralysis of the diaphragm by neural blockade
- (E) paralysis of intercostal muscles

42. Preoperative evaluation shows a serum sodium concentration of 140 mEq/L, serum chloride concentration of 90 mEq/L, PaCO₂ of 46 mmHg, and arterial pH of 7.50. These findings are most indicative of prior treatment with

- (A) acetazolamide
- (B) enalapril
- (C) furosemide
- (D) mannitol
- (E) spironolactone

43. For 30 minutes, a patient has been receiving oxygen 2 L, nitrous oxide 2 L, and halothane from an agent-specific vaporizer set at 1%. A mass spectrometer sampling gas from the patient's airway shows an end-tidal halothane concentration of 0.7%. The most likely explanation for this difference is
- (A) hyperventilation
 - (B) low cardiac output
 - (C) the second-gas effect
 - (D) tissue solubility of halothane
 - (E) vaporizer temperature less than 19°C
44. Following axillary block for insertion of an arteriovenous fistula in the forearm, a patient has pain on surgical incision. Which of the following nerves should be blocked to relieve this pain?
- (A) Axillary
 - (B) Median
 - (C) Musculocutaneous
 - (D) Radial
 - (E) Ulnar
45. Which of the following complications is more likely to occur during cannulation of the left internal jugular vein than during cannulation of the right internal jugular vein?
- (A) Injury to the thoracic duct
 - (B) Injury to the recurrent laryngeal nerve
 - (C) Injury to the phrenic nerve
 - (D) Perforation of the esophagus
 - (E) Pneumothorax
46. Pulmonary artery diastolic pressure is an unreliable indicator of left ventricular end-diastolic pressure in patients with
- (A) acute cardiogenic pulmonary edema
 - (B) aortic stenosis
 - (C) acute mitral regurgitation
 - (D) myocardial ischemia
 - (E) severe emphysema
47. Bupivacaine is more likely than lidocaine to cause refractory cardiac arrest because bupivacaine
- (A) has a lower rate of plasma clearance
 - (B) has a secondary blocking effect on cardiac β_1 -adrenergic receptors
 - (C) dissociates more slowly from sodium channels in cardiac muscle
 - (D) inhibits spontaneous phase 4 depolarization in pacemaker cells
 - (E) preferentially blocks calcium channels in Purkinje fibers
48. The most effective treatment of severe carbon monoxide poisoning in a 2-year-old child is
- (A) intravenous administration of methylene blue
 - (B) intravenous administration of thiocyanate
 - (C) intravenous administration of thiosulfate
 - (D) exchange transfusion
 - (E) hyperbaric oxygenation

49. The lungs of a 7-kg infant are being ventilated with a volume-cycled ventilator at a rate of 20/min. The anesthetic circuit has a compressible volume of 5 ml/cmH₂O, and the peak inspiratory pressure is 20 cmH₂O. To achieve adequate ventilation, the ventilator tidal volume should be set at
- (A) 50 ml
 - (B) 125 ml
 - (C) 175 ml
 - (D) 225 ml
 - (E) 300 ml
50. In a patient with 20% pulmonary shunt and a PaO₂ of 60 mmHg, cardiac output suddenly decreases from 5 L/min to 3 L/min. Oxygen consumption is unchanged. As a result, the PaO₂ will
- (A) increase slightly because of decreased shunt blood flow
 - (B) decrease slightly because of decreased mixed venous PO₂
 - (C) increase because of decreased affinity of hemoglobin for oxygen
 - (D) decrease because of an increased dead space to tidal volume ratio
 - (E) increase because of increased pulmonary oxygen uptake per milliliter of blood
51. Having received excessive intraoperative blood replacement, a patient anesthetized with fentanyl, diazepam, and nitrous oxide develops acute pulmonary edema. The drug most likely to have an immediate beneficial effect is
- (A) nitroglycerin
 - (B) nitroprusside
 - (C) digoxin
 - (D) isoflurane
 - (E) mannitol
52. During steady-state intraoperative controlled mechanical ventilation, exhaled tidal volume will be increased by
- (A) changing to more compliant tubing in the ventilatory circuit
 - (B) increasing fresh gas flow in the anesthesia machine
 - (C) increasing nitrous oxide concentration in the inspired mixture
 - (D) increasing ventilatory rate
 - (E) moving the volume sensor as far as possible from the patient
53. Assignment of a patient to an ASA physical status category is used to
- (A) facilitate comparisons among different patient groups and institutions
 - (B) guide the choice of anesthetic technique
 - (C) permit accurate determination of charges for professional services
 - (D) predict anesthetic risk
 - (E) predict perioperative mortality
54. In the elderly, scopolamine-induced delirium is
- (A) absent with doses less than 0.4 mg
 - (B) decreased by physostigmine
 - (C) reversible with diazepam
 - (D) reversible with pyridostigmine
 - (E) similar to that produced by glycopyrrolate

55. A patient with jaundice who has a minimally elevated SGOT (AST), markedly elevated alkaline phosphatase, and normal prothrombin time is to receive a muscle relaxant. Which of the following is most likely in this patient?
- (A) Decreased intubating dose of pancuronium
 - (B) Increased intubating dose of atracurium
 - (C) Prolonged duration of succinylcholine effect
 - (D) Prolonged duration of vecuronium effect
 - (E) Shortened duration of d-tubocurarine effect
56. Proper handling of oxygen cylinders includes
- (A) maintenance of storage room temperature above 60°F
 - (B) separate storage rooms for nitrous oxide and oxygen
 - (C) opening the cylinder valve just sufficiently to register tank pressure accurately
 - (D) storage in a room with conductive flooring
 - (E) opening the cylinder valve briefly before attachment to the anesthesia machine
57. Epinephrine is less effective in prolonging epidural anesthesia with bupivacaine than epidural anesthesia with lidocaine because
- (A) peak bupivacaine concentrations are decreased less than peak lidocaine concentrations
 - (B) the acidic pH of epinephrine decreases the concentration of the nonionized bupivacaine
 - (C) bupivacaine produces more vasoconstriction than lidocaine
 - (D) the duration of action of bupivacaine is independent of local blood flow
 - (E) bupivacaine antagonizes the vasoconstrictor activity of epinephrine
58. If minute ventilation remains constant, a decrease in end-expiratory carbon dioxide concentration will occur with
- (A) a decrease in physiologic dead space
 - (B) a decrease in cardiac output
 - (C) a decrease in physiologic shunt fraction
 - (D) the development of metabolic alkalosis
 - (E) an increase in body temperature
59. In normal tissue, which property of drugs has the greatest effect on the speed of onset of a local anesthetic?
- (A) Amide structure
 - (B) Degree of protein binding
 - (C) Intrinsic vasoconstrictor activity
 - (D) pK_a
 - (E) Potency
60. A 60-year-old obese man who has an antithrombin III deficiency is scheduled for radical prostatectomy. Prior to the operation this patient should receive
- (A) fresh frozen plasma
 - (B) vitamin K
 - (C) epsilon-aminocaproic acid
 - (D) heparin
 - (E) none of the above

61. A 45-year-old patient with chronic alcoholism develops jaundice four days after a cholecystectomy under halothane/morphine general anesthesia. Bilirubin and alkaline phosphatase are elevated, but SGPT is only slightly above normal. All values were within normal limits preoperatively. The most likely cause of jaundice is
- (A) opioid-induced spasm of the sphincter of Oddi
 - (B) hepatic dysfunction secondary to halothane exposure
 - (C) worsening of underlying chronic hepatitis
 - (D) extrahepatic biliary obstruction
 - (E) acute viral hepatitis
62. A patient has severe hypotension, bronchospasm, and edema of the upper airway after injection of radiocontrast medium during cerebral angiography. The most appropriate immediate treatment is administration of
- (A) diphenhydramine
 - (B) epinephrine
 - (C) methylprednisolone
 - (D) phenylephrine
 - (E) ranitidine
63. A full-term newborn has marked respiratory distress in the delivery room. Breath sounds are asymmetric and the abdomen is scaphoid. Which of the following maneuvers is most appropriate?
- (A) Hyperventilation with bag and mask
 - (B) Intubation and ventilation with positive end-expiratory pressure
 - (C) Intubation and ventilation with zero end-expiratory pressure
 - (D) Bronchoscopy
 - (E) Insertion of a chest tube
64. Which of the following statements concerning cerebral vasospasm following intracranial hemorrhage is true?
- (A) It is accompanied by paradoxical intracranial hypotension
 - (B) It responds to nitroprusside therapy
 - (C) It persists more than 48 hours after hemorrhage
 - (D) It is exacerbated by intravascular volume expansion
 - (E) It is confirmed by ST-T wave changes in the absence of myocardial ischemia
65. Of the following, the most reliable criterion for adequate clinical reversal of neuromuscular blockade is
- (A) return of twitch height to 90% of normal
 - (B) peak inspiratory force of -20 cmH₂O
 - (C) T₄:T₁ ratio of 0.75 for train of four
 - (D) normal tidal volume
 - (E) disappearance of post-tetanic facilitation
66. At a body temperature of 30°C, resistance to blood flow increases because of
- (A) increased hematocrit
 - (B) increased plasma fibrinogen concentration
 - (C) increased viscosity of blood
 - (D) rouleaux formation of red blood cells
 - (E) sequestration of platelets in portal circulation

67. A patient who is receiving ventilatory support after coronary artery bypass grafting has a PaO_2 of 132 mmHg, a PaCO_2 of 19 mmHg, and a pH of 7.57. Which of the following is most likely to result from this level of hypocarbia?
- (A) Decreased airway resistance
 - (B) Increased myocardial contractility
 - (C) Hyperkalemia
 - (D) Shortened QT interval
 - (E) Cerebral ischemia
68. A 70-year-old man who underwent bilateral carotid endarterectomies two years ago is to undergo anesthesia and surgery. The denervation of the carotid bodies is likely to result in
- (A) chronic respiratory alkalosis
 - (B) decreased ventilatory response to hypoxemia
 - (C) increased ventilatory response to hypercarbia
 - (D) labile hypertension
 - (E) resting bradycardia
69. A 26-year-old woman has weakness on extension of the right knee one day after uneventful vaginal delivery under spinal anesthesia with lidocaine. The most likely cause is
- (A) femoral nerve injury from thigh abduction
 - (B) obturator nerve injury from obstetric forceps
 - (C) peroneal nerve compression from the leg support
 - (D) saphenous nerve injury from the stirrups
 - (E) chemical arachnoiditis following the spinal anesthetic
70. In an adult undergoing laparotomy, which of the following is the most effective means of maintaining body temperature during the first hour of anesthesia?
- (A) Increasing ambient temperature
 - (B) Using a warming blanket
 - (C) Warming inspired gases
 - (D) Warming intravenous fluids
 - (E) Warming irrigating fluids
71. The plasma concentration of equal doses of a local anesthetic is highest when the site of administration is
- (A) axillary brachial plexus
 - (B) caudal
 - (C) intercostal
 - (D) lumbar epidural
 - (E) subcutaneous
72. One full E-cylinder of oxygen at 20°C can deliver 2 L/min of oxygen for at most
- (A) 30 minutes
 - (B) 90 minutes
 - (C) 3 hours
 - (D) 5 hours
 - (E) 12 hours
- Handwritten notes:*
 $680 / \text{Fb} \sim \text{rate}$
 $680 / 2 = 340 \text{ min}$
 $340 / 80 = 4.25$
 $\approx 5 \text{ hours}$
SW

73. Reduction of fire hazards during laser surgery of the airway is best accomplished by use of

- (A) continuous mode laser emissions
- (B) a nitrous oxide/opioid/relaxant anesthetic technique
- (C) a polyvinylchloride endotracheal tube and cuff
- (D) topical lidocaine
- (E) saline-filled sponges over exposed tissues

74. An 8-year-old child with chronic renal failure is scheduled for an operation to create an arteriovenous fistula. Laboratory studies include:

Hemoglobin	6.5 g/dl
Blood gases (breathing air)	
PaO ₂	97 mmHg
PaCO ₂	29 mmHg
pH	7.30
Serum electrolytes	
Sodium	129 mEq/L
Potassium	5.5 mEq/L
Chloride	101 mEq/L
Bicarbonate	15 mEq/L

Before inducing general anesthesia, which of the following abnormalities should be corrected?

- (A) Anemia
- (B) Metabolic acidosis
- (C) Potassium concentration
- (D) Anemia, metabolic acidosis, and potassium concentration
- (E) None of the above

75. An otherwise healthy 70-year-old man receives 12 units of packed red blood cells for persistent diffuse bleeding during suprapubic prostatectomy. Hemoglobin concentration is 11 g/dl, platelet count is 55,000/mm³, plasma fibrinogen concentration is 180 mg/dl, protime is 14 sec, and partial thromboplastin time is 35 sec. The most appropriate therapy is administration of

- (A) cryoprecipitate
- (B) DDAVP
- (C) epsilon-aminocaproic acid
- (D) fresh frozen plasma
- (E) platelets

76. During induction of general anesthesia in a patient with a supraglottic tumor, both intubation and subsequent ventilation via a face mask are impossible. A cricothyroidotomy is performed with a 16-gauge intravenous catheter. Which of the following statements is true?

- (A) Application of pressures greater than 35 cmH₂O to the catheter will increase the risk for pulmonary barotrauma
- (B) PaCO₂ can be maintained at a normal level using a standard circle system attached to the catheter
- (C) PaO₂ greater than 100 mmHg can be maintained indefinitely using transtracheal jet ventilation with pure oxygen through the catheter
- (D) Emergency surgical tracheostomy would have improved the likelihood of survival
- (E) The presence of this tumor contraindicates jet ventilation via cricothyroidotomy

77. A healthy patient is receiving general endotracheal anesthesia with nitrous oxide 4 L/min, oxygen 2 L/min, and isoflurane 1% with spontaneous ventilation. The inspiratory breathing hose becomes disconnected from the inspiratory valve. The earliest alarm will be produced by
- (A) a pulse oximeter with finger probe set to alarm at 60% saturation
 - (B) a mass spectrometer set to alarm when no breath is detected for 30 seconds
 - (C) an oxygen analyzer mounted on the inspiratory valve outlet and set to alarm at 25% oxygen concentration
 - (D) a capnograph sensor at the Y-piece that alarms when end-tidal carbon dioxide tension is greater than 60 mmHg
 - (E) an oxygen analyzer mounted on the expiratory valve inlet and set to alarm at 25% oxygen concentration
78. A patient has tonic movements of the head and neck, nystagmus, and slurred speech after receiving metoclopramide for nausea after nitrous oxide-opioid anesthesia. The most appropriate pharmacologic treatment is
- (A) diphenhydramine
 - (B) midazolam
 - (C) naloxone
 - (D) phenytoin
 - (E) physostigmine
79. Which of the following opioids is vagolytic?
- (A) Morphine
 - (B) Meperidine
 - (C) Sufentanil
 - (D) Nalbuphine
 - (E) Alfentanil
80. Which of the following statements concerning interscalene brachial plexus block is true?
- (A) The three trunks of the plexus are in the same fascial plane as the internal jugular vein
 - (B) Distal spread of anesthetic past the humeral head is accelerated by adduction of the arm
 - (C) Anesthetic solution can spread up the fascial sheaths to involve the stellate ganglion
 - (D) Ipsilateral diaphragmatic paralysis results from epidural spread
 - (E) Rich vascularity in the sheaths promotes rapid vascular uptake of anesthetic
81. When inspired anesthetic gases are humidified
- (A) most particles 1 to 2 microns in size are deposited in the trachea
 - (B) respiratory epithelial cilia become less active
 - (C) alveolar water vapor pressure is unchanged
 - (D) respiratory heat loss is abolished
 - (E) sterilization of breathing apparatus is mandatory
82. Nausea and vomiting in pediatric outpatients are
- (A) directly related to postoperative pain
 - (B) unrelated to the length of the procedure
 - (C) eliminated by preoperative administration of droperidol
 - (D) eliminated by intraoperative nasogastric drainage
 - (E) more frequent than in adults

83. Anesthesia is induced with halothane in a 3-year-old girl. Sixty seconds after administration of succinylcholine 1 mg/kg intravenously, heart rate decreases rapidly from 120 to 60 bpm. The most likely cause is
- (A) acute hyperkalemia
 - (B) failure to pretreat with a nondepolarizing relaxant
 - (C) halothane overdose
 - (D) muscarinic activity
 - (E) sympathetic ganglionic blockade
84. A multigravid woman is receiving oxytocin by infusion for augmentation of labor. Fetal heart rate is 190 bpm with beat-to-beat variability of 6 to 8 bpm. The most appropriate immediate action would be to
- (A) continue observation
 - (B) sample fetal scalp blood
 - (C) discontinue oxytocics
 - (D) administer a beta-adrenergic blocker to the mother
 - (E) deliver the fetus
85. A 14-month-old child has tetralogy of Fallot with dynamic obstruction to right ventricular outflow. Which of the following is most likely to decrease cyanosis in this child?
- (A) Calcium
 - (B) Epinephrine
 - (C) Nitroglycerin
 - (D) Nitroprusside
 - (E) Propranolol
86. Which of the following muscle relaxants in an ED₉₅ dose would have the longest duration of action in a patient with renal failure?
- (A) Atracurium
 - (B) Metocurine
 - (C) Pancuronium
 - (D) d-Tubocurarine
 - (E) Vecuronium
87. The rate of induction with inhalational agents is more rapid in neonates than adults because of a relatively increased
- (A) cardiac output
 - (B) cerebral blood flow
 - (C) functional residual capacity
 - (D) metabolic rate
 - (E) minute ventilation
88. Compared with midazolam, diazepam has which of the following characteristics?
- (A) Greater solubility in water
 - (B) Shorter beta half-life
 - (C) More potent ventilatory depressant effect
 - (D) Lower risk for thrombophlebitis
 - (E) A pharmacologically active metabolite

89. In a patient with ventricular fibrillation refractory to repeated attempts at defibrillation and lidocaine administration, the most appropriate management is administration of
- (A) bretylium
 - (B) procainamide
 - (C) propranolol
 - (D) quinidine
 - (E) verapamil
90. A 65-kg man is scheduled for wrist surgery with intravenous regional anesthesia with 0.5% lidocaine 50 ml. Which of the following statements is true?
- (A) This anesthetic is contraindicated if the patient has sickle cell disease
 - (B) Mottling of the skin after injection dictates abandonment of the technique
 - (C) Tourniquet discomfort is an indication to inject more local anesthetic
 - (D) Bupivacaine 0.5% could be substituted to prolong anesthesia
 - (E) Epinephrine (1:400,000) should be added to prolong anesthesia
91. Five hours after intramuscular administration of morphine 15 mg to a healthy 80-kg man, residual effects are best demonstrated by measuring the
- (A) resting tidal volume
 - (B) resting PaCO_2
 - (C) functional residual capacity
 - (D) ventilatory response to rebreathing
 - (E) alveolar ventilation
92. A 10-week-old infant born at 28 weeks' gestation is scheduled for elective repair of bilateral inguinal hernias. It is most appropriate to
- (A) delay the operation until the infant is 6 months old
 - (B) transfuse blood preoperatively if hemoglobin concentration is 9 g/dl
 - (C) avoid tracheal intubation
 - (D) limit inspired oxygen concentration to less than 50%
 - (E) monitor for apnea for 24 hours postoperatively
93. Which of the following statements concerning resuscitation after a witnessed cardiac arrest in an adult is true?
- (A) Bretylium is contraindicated for refractory malignant ventricular arrhythmias
 - (B) Bretylium causes complete heart block after previous administration of a loading dose of lidocaine
 - (C) A bolus loading dose of procainamide suppresses premature ventricular contractions
 - (D) Routine administration of calcium salts is not indicated
 - (E) Sodium bicarbonate should be administered at initiation of resuscitation
94. Nitrous oxide is contraindicated during
- (A) injection of sulfur hexafluoride for retinal tamponade
 - (B) repair of open eye injury
 - (C) scleral buckling with synthetic bands
 - (D) strabismus surgery
 - (E) trabeculectomy for glaucoma

95. A 27-month-old, 14-kg infant with intestinal obstruction is anesthetized with nitrous oxide at 1 L/min, oxygen at 0.4 L/min, and halothane at 0.8% using a Bain circuit. Ventilation is controlled at a rate of 30/min. The child's temperature is 39°C, and the PaCO₂ is 65 mmHg.

Which of the following is most likely?

- (A) Malignant hyperthermia
- (B) Low gas inflow rate
- (C) Low respiratory rate
- (D) Pulmonary aspiration of gastric contents
- (E) Inaccurate flowmeters

96. The most common transfusion-related infection is

- (A) bacterial sepsis
- (B) cytomegalovirus infection
- (C) hepatitis B
- (D) hepatitis C (non-A, non-B)
- (E) human immunodeficiency virus infection

97. Anesthesia for vaginal delivery is provided by block of spinal segments

- (A) T10-11
- (B) T8-12
- (C) L1-2
- (D) S2-4
- (E) L5-S1

98. Which of the following is most likely to occur during mediastinoscopy?

- (A) Chylothorax
- (B) Compression of the innominate artery
- (C) Injury to the superior laryngeal nerve
- (D) Tracheal tear
- (E) Venous air embolism

99. The central anticholinergic syndrome is LEAST likely to occur after administration of

- (A) atropine
- (B) chlorpromazine
- (C) diphenhydramine
- (D) glycopyrrolate
- (E) scopolamine

100. If minute ventilation is held constant, which of the following is LEAST likely to alter PaCO₂?

- (A) General anesthesia
- (B) Hypothermia
- (C) Increased dead space
- (D) Increased pulmonary shunt
- (E) Induced hypotension

101. A 69-year-old woman with mitral stenosis and atrial fibrillation is scheduled for mitral valve replacement and removal of a left atrial thrombus. After administration of pancuronium, heart rate increases to 140 bpm and blood pressure decreases to 70/40 mmHg. Which of the following is the LEAST appropriate treatment?
- (A) Cardioversion
 - (B) Edrophonium
 - (C) Esmolol
 - (D) Phenylephrine
 - (E) Verapamil
102. A multiparous 24-year-old woman sustains an amniotic fluid embolism during general anesthesia. The LEAST likely clinical finding is
- (A) increased end-tidal carbon dioxide tension
 - (B) increased uterine bleeding
 - (C) jugular venous distention
 - (D) ST and T wave abnormalities on ECG
 - (E) wheezing
103. Preoperative parenteral administration of vitamin K is LEAST likely to decrease a prolonged prothrombin time in a patient with
- (A) end-stage hepatocellular disease
 - (B) malabsorption associated with ulcerative colitis
 - (C) obstructive jaundice
 - (D) long-term antibiotic therapy
 - (E) warfarin-induced prothrombin deficiency
104. Each of the following is consistent with exposure to organophosphates EXCEPT
- (A) bronchodilation
 - (B) muscle weakness
 - (C) salivation
 - (D) sweating
 - (E) urinary retention
105. Each of the following is a physiologic effect of intra-aortic balloon pump therapy EXCEPT
- (A) decreased peak systolic pressure
 - (B) increased cardiac output
 - (C) increased coronary perfusion
 - (D) increased diastolic pressure
 - (E) increased total peripheral resistance
106. Each of the following statements about muscle rigidity induced by opioids is true EXCEPT:
- (A) The degree of rigidity is related to the rate of opioid administration
 - (B) It is more apparent during the administration of nitrous oxide
 - (C) Muscles of the trunk are affected more than muscles of the extremities
 - (D) It results from a direct effect of the opioid on skeletal muscles
 - (E) It can be produced by large doses of morphine

107. Each of the following drugs increases the duration of succinylcholine action EXCEPT

- (A) echothiophate
- (B) gentamicin
- (C) magnesium sulfate
- (D) pyridostigmine
- (E) trimethaphan

108. Each of the following is a recognized complication during a transurethral resection for which glycine is used as an irrigant EXCEPT

- (A) disseminated intravascular coagulopathy
- (B) hemolysis
- (C) hyperammonemia
- (D) shoulder pain
- (E) transient blindness

109. At extubation performed one week after nasotracheal intubation, each of the following is likely to occur EXCEPT

- (A) upper airway obstruction
- (B) aspiration after extubation
- (C) ulceration of vocal cords
- (D) tracheal stenosis
- (E) sinusitis

110. Each of the following would slow induction with a volatile anesthetic agent EXCEPT

- (A) hypoalbuminemia
- (B) hyperlipemia
- (C) clean rubber tubing in the circle system
- (D) fresh soda lime
- (E) obesity

111. A 70-kg man with ischemic heart disease is undergoing abdominal aortic aneurysm resection. At the time of infrarenal cross-clamping, 0.2-mV ST-segment depression appears on lead V₅ of the ECG. Hemodynamic changes occurring at the same time are shown below.

	<u>Pre-clamp</u>	<u>Clamp on</u>
Systemic blood pressure (mmHg)	90/50	150/90
Heart rate (bpm)	80	95
Pulmonary artery pressure (mmHg)	20/10	45/24
Mean pulmonary artery		
occlusion pressure (mmHg)	10	23
Cardiac output (L/min)	4.5	3.2

Ischemia would be decreased by restoring the pre-clamp level of each of the following EXCEPT

- (A) blood pressure
- (B) heart rate
- (C) pulmonary artery pressure
- (D) pulmonary artery occlusion pressure
- (E) cardiac output

112. A healthy, 18-year-old, 65-kg woman undergoing diagnostic laparoscopy is being monitored with a properly functioning and calibrated capnograph. The end-tidal carbon dioxide concentration is 6%, and the inspired carbon dioxide concentration is 1%. This may be caused by each of the following EXCEPT
- (A) malfunction of the expiratory valve in a circle system
 - (B) low gas inflow with a Bain circuit
 - (C) exhausted soda lime within a circle system
 - (D) absorption of carbon dioxide from carbon dioxide laparoscopy
 - (E) carbon dioxide in the fresh gas flow

**1991 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1991, and is provided for instructional purposes only. The key was verified in 1991 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

The American Board of Anesthesiology Written Examination for Primary Certification is a subset of the ABA/ASA In-Training Examination. Approximately 80% of the questions were included in the grading of the ABA Written Examination, whereas the remainder were graded only for the ABA/ASA In-Training Examination.

1. A	31. A	61. B	91. B	121. D	151. A
2. D	32. C	62. E	92. B	122. A	152. E
3. C	33. E	63. E	93. D	123. D	153. C
4. A	34. C	64. D	94. B	124. E	154. B
5. E	35. E	65. E	95. E	125. D	155. B
6. E	36. B	66. B	96. E	126. A	156. A
7. D	37. C	67. D	97. A	127. A	157. B
8. A	38. E	68. E	98. E	128. D	158. B
9. D	39. D	69. A	99. B	129. C	159. A
10. B	40. D	70. A	100. B	130. C	160. D
11. B	41. B	71. E	101. C	131. B	161. B
12. D	42. B	72. D	102. D	132. D	162. C
13. C	43. D	73. B	103. D	133. A	163. B
14. E	44. D	74. A	104. A	134. D	164. A
15. E	45. E	75. C	105. B	135. A	165. B
16. A	46. D	76. D	106. E	136. C	166. B
17. A	47. D	77. B	107. D	137. C	167. E
18. A	48. E	78. E	108. B	138. B	168. C
19. E	49. C	79. B	109. C	139. D	169. A
20. A	50. C	80. D	110. D	140. B	170. D
21. C	51. E	81. D	111. E	141. B	171. D
22. E	52. B	82. A	112. C	142. B	172. B
23. C	53. C	83. C	113. D	143. E	173. B
24. D	54. E	84. D	114. B	144. D	174. C
25. A	55. C	85. B	115. D	145. C	175. D
26. E	56. C	86. E	116. B	146. A	
27. B	57. D	87. C	117. E	147. A	
28. B	58. E	88. C	118. C	148. A	
29. C	59. A	89. B	119. B	149. C	
30. C	60. C	90. B	120. D	150. B	

**1991 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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1. B	31. A	61. D	91. D	121. D	151. B
2. B	32. C	62. B	92. E	122. B	152. B
3. C	33. E	63. C	93. D	123. E	153. B
4. A	34. E	64. C	94. A	124. C	154. A
5. C	35. E	65. C	95. B	125. B	155. B
6. A	36. A	66. C	96. D	126. B	156. E
7. D	37. C	67. E	97. D	127. D	157. B
8. C	38. D	68. B	98. B	128. B	158. E
9. E	39. D	69. A	99. D	129. A	159. B
10. D	40. A	70. A	100. D	130. B	160. D
11. D	41. C	71. C	101. A	131. D	161. A
12. E	42. C	72. D	102. A	132. B	162. C
13. D	43. D	73. E	103. A	133. C	163. E
14. B	44. C	74. E	104. A	134. A	164. B
15. A	45. A	75. E	105. E	135. D	165. B
16. B	46. E	76. C	106. D	136. B	166. D
17. E	47. C	77. E	107. B	137. A	167. B
18. E	48. E	78. A	108. B	138. E	168. A
19. C	49. C	79. B	109. D	139. E	169. B
20. E	50. B	80. C	110. A	140. A	170. C
21. C	51. A	81. C	111. E	141. C	171. C
22. E	52. B	82. A	112. D	142. A	172. A
23. D	53. A	83. D	113. D	143. D	173. D
24. E	54. B	84. A	114. B	144. B	174. A
25. A	55. D	85. E	115. A	145. A	175. C
26. B	56. E	86. B	116. D	146. C	
27. B	57. D	87. E	117. A	147. B	
28. C	58. B	88. E	118. A	148. C	
29. D	59. D	89. A	119. B	149. A	
30. C	60. E	90. A	120. B	150. B	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1992

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

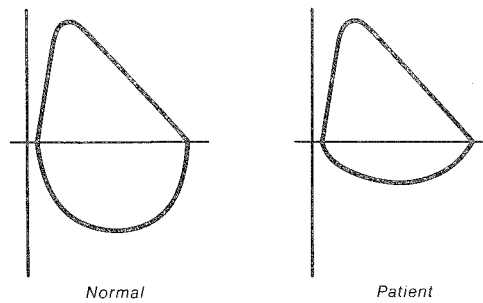
1. A previously healthy 28-year-old woman scheduled for laparoscopic tubal ligation becomes agitated and refuses to undergo the procedure after being brought to the operating room. This behavior most likely resulted from preoperative administration of
 - (A) droperidol
 - (B) cimetidine
 - (C) atropine
 - (D) meperidine
 - (E) midazolam

2. Following a right lower lobectomy, a patient develops a bronchopleural fistula and becomes hypoxic. He is orally intubated and mechanically ventilated with pure oxygen. PaO_2 is 65 mmHg, PaCO_2 is 70 mmHg, and pH is 7.25. Which of the following will produce the most favorable change in the blood gases?
 - (A) Increasing ventilatory frequency
 - (B) Increasing suction on the chest tube
 - (C) Applying 10 cmH₂O positive end-expiratory pressure
 - (D) Using a double-lumen tube for differential ventilation
 - (E) Starting negative-pressure ventilation

3. A 70-year-old man with stable angina is scheduled for cataract removal with a retrobulbar block. After injection of 5 ml of 0.75% bupivacaine, heart rate decreases from 90 to 55 bpm, and frequent premature ventricular contractions are noted on the EKG. These changes are most likely caused by
 - (A) intravascular injection of bupivacaine
 - (B) subarachnoid injection of bupivacaine
 - (C) myocardial ischemia
 - (D) oculocardiac reflex
 - (E) retrobulbar hemorrhage

4. A 35-year-old woman who takes a diuretic daily for chronic hypertension has a serum potassium concentration of 3.1 mEq/L on the morning of an elective hysterectomy. An EKG shows left ventricular hypertrophy. The most appropriate management is to
 - (A) consult with a cardiologist before proceeding
 - (B) initiate oral potassium replacement and proceed with the operation when potassium concentration is normal
 - (C) initiate intravenous potassium replacement and proceed with the operation
 - (D) initiate intravenous potassium replacement and proceed with the operation when potassium concentration is 4.0 mEq/L
 - (E) proceed with the operation without intervention

5. During therapy for eclampsia, toxic blood levels of magnesium sulfate can be distinguished from therapeutic levels by the presence of
- (A) diminished knee jerk reflex
 - (B) a widened QRS complex on EKG
 - (C) fetal tachycardia
 - (D) maternal drowsiness
 - (E) uterine rigidity
6. Following the administration of 4 MAC hours of enflurane, peak serum concentrations of inorganic fluoride are highest in patients who
- (A) are physically dependent on barbiturates
 - (B) are taking isoniazid chronically to suppress tuberculosis
 - (C) are epileptics taking phenytoin chronically
 - (D) are obese
 - (E) consume alcohol regularly
7. Which of the following is the most likely finding in the affected extremity during the acute stage of reflex sympathetic dystrophy?
- (A) Dermatomal distribution of pain
 - (B) Hypesthesia
 - (C) Increased growth of hair and nails
 - (D) Localized edema
 - (E) Radiographic evidence of osteoporosis
8. DC shocks of 200 joules applied directly to the heart are likely to
- (A) worsen coronary perfusion
 - (B) prevent postshock arrhythmias
 - (C) produce myocardial contractile abnormalities
 - (D) increase myocardial impedance
 - (E) decrease myocardial temperature
9. Compared with a semiclosed circle system, a closed system
- (A) decreases the risk for anesthetic overdose
 - (B) decreases the risk for rebreathing carbon dioxide
 - (C) has lower resistance to gas flow
 - (D) permits calculation of oxygen consumption
 - (E) permits more rapid changes in anesthetic depth
10. A conscious patient has an acute subdural hematoma that will require surgical evacuation. Which of the following interventions to be carried out in the emergency department is most likely to decrease intracranial pressure?
- (A) Having the patient hyperventilate
 - (B) Intravenous administration of an opioid
 - (C) Intravenous administration of a corticosteroid
 - (D) Intravenous administration of nitroprusside
 - (E) Intravenous administration of furosemide



11. The patient whose flow-volume loop is shown above on the right most likely has

- (A) bronchial asthma
- (B) a fixed midtracheal tumor
- (C) nasal polyps
- (D) restrictive lung disease
- (E) vocal cord paralysis

12. When PaO_2 is increased to 300 mmHg in a healthy parturient at term, the umbilical vein PO_2 will

- (A) not change
- (B) increase slightly
- (C) decrease slightly
- (D) nearly triple
- (E) approach maternal PaO_2

13. Which of the following statements concerning diazepam is true?

- (A) Absorption is more predictable after intramuscular administration than after oral administration
- (B) It produces a shift to the left of the carbon dioxide ventilatory response curve
- (C) Rebound drowsiness is caused by a metabolite
- (D) The degree of CNS depression is independent of serum albumin concentration
- (E) The extent of amnesia is proportional to the degree of sedation

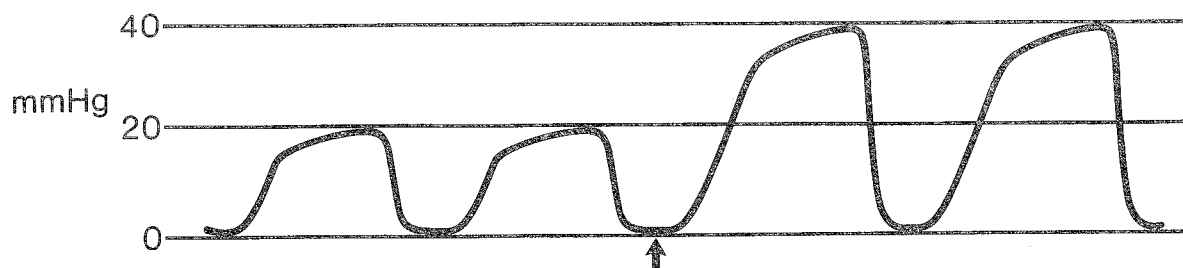
14. Nonsteroidal analgesics such as aspirin decrease pain by

- (A) decreasing axonal transmission of pain stimuli through a local anesthetic mechanism
- (B) directly competing with substance P for receptor occupancy
- (C) inhibiting enzymatic breakdown of met-enkephalin
- (D) inhibiting production of prostaglandin E_2
- (E) potentiating the action of endorphin in the substantia gelatinosa of the spinal cord

15. The pin index system

- (A) is not used in central pipeline connections
- (B) requires aligning four pins with four holes
- (C) is used on all sizes of medical gas cylinders
- (D) has been replaced by color coding of gas cylinders
- (E) prevents overfilling of gas cylinders

16. What is the expected mixed venous oxygen tension, in mmHg, in a normal adult after breathing pure oxygen for 10 minutes?
- (A) 573
 - (B) 563
 - (C) 150
 - (D) 95
 - (E) 45
17. A parturient received 1000 ml of dextrose 5% in lactated Ringer's solution 20 minutes prior to delivery. Ten minutes later her blood glucose concentration is 580 mg/dl. In this situation
- (A) the risk for fetal intraventricular hemorrhage is increased
 - (B) the risk for neonatal hypoglycemia is increased
 - (C) placental glucose transport is insulin dependent
 - (D) the neonate should be given dextrose 50% in water if depressed at delivery
 - (E) the mother should be given insulin prior to delivery
18. The fail-safe mechanism on an anesthesia machine is activated by
- (A) a wall-oxygen pressure of less than 25 psi
 - (B) a disconnection between the endotracheal tube and the machine
 - (C) a nitrous oxide concentration in excess of 85%
 - (D) an incompetent expiratory valve
 - (E) no oxygen flow
19. Which of the following is characteristic of the pharmacokinetics of alfentanil?
- (A) Clearance is greater than that of fentanyl
 - (B) Elimination half-life is normal in patients with hepatic insufficiency
 - (C) Protein binding is minimal
 - (D) The majority of alfentanil in plasma is ionized
 - (E) Volume of distribution is smaller than that of fentanyl
20. Leakage current and microshock hazards are eliminated by
- (A) an isolation transformer
 - (B) conductive flooring
 - (C) a three-wire grounding system
 - (D) a line-isolation monitor
 - (E) none of the above
21. A 70-kg, 20-year-old athlete receives nitrous oxide and oxygen, thiopental, and fentanyl 1.25 mg (25 ml) during a knee reconstruction procedure lasting three hours. Postoperatively, he does not awaken or resume spontaneous breathing for three hours. The most likely explanation for the prolonged effect of fentanyl is
- (A) dose-dependent elimination half-life
 - (B) genetically slow biotransformation
 - (C) large volume of distribution
 - (D) presence of an active metabolite in high concentration
 - (E) time required for hepatic elimination



22. A 2-year-old child has cardiac arrest during an inguinal herniorrhaphy under general anesthesia administered using a Jackson-Rees system. The graph above shows end-tidal PCO_2 monitored from the tip of the endotracheal tube during cardiopulmonary resuscitation; minute ventilation is unchanged.

Which of the following is the most likely cause of the change beginning at the arrow?

- (A) Decreased fresh gas flow
- (B) Inadequate chest compression
- (C) Increased dead space
- (D) Restoration of cardiac output
- (E) Sampling artifact

23. Which of the following is most likely to occur during deliberate hypotension with trimethaphan?

- (A) Bronchoconstriction
- (B) Cerebral vasodilation
- (C) Increased heart rate
- (D) Potentiation of pancuronium
- (E) Pupillary constriction

24. A 60-year-old man undergoes transurethral resection of a bladder tumor in the lithotomy position with spinal anesthesia. During the procedure the surgeon reports that the patient's right leg is "jumping." This movement is most likely caused by stimulation of which of the following nerves?

- (A) Femoral
- (B) Lateral femoral cutaneous
- (C) Obturator
- (D) Pudendal
- (E) Sciatic

25. A 45-year-old woman undergoes aortic valve replacement for aortic stenosis. Two minutes after removal of the venous cannulae, air is noted in the arterial inflow cannula. Heart rate is 80 bpm, blood pressure is 95/60 mmHg, and cardiac index is 1.5 L/min/m^2 . ST-segment elevation is noted in EKG leads II, III, and aVF. The most appropriate next step is to

- (A) administer thiopental
- (B) decrease left ventricular afterload
- (C) increase arterial blood pressure
- (D) replace the left ventricular vent
- (E) resume cardiopulmonary bypass

26. A patient with end-stage renal disease has prolonged ventilatory depression after administration of morphine. The most likely cause is increased
- (A) serum concentration of morphine-6-glucuronide
 - (B) elimination half-life of morphine
 - (C) opioid receptors
 - (D) receptor affinity
 - (E) volume of distribution
27. In a patient with adult respiratory distress syndrome who is being mechanically ventilated, which of the following findings indicates the most severe disease?
- (A) Decreased functional residual capacity
 - (B) Decreased lung compliance
 - (C) Hypercarbia
 - (D) Hypoxemia
 - (E) Increased dead space
28. Which of the following additives accelerates the onset of lidocaine axillary block without shortening duration?
- (A) Carbon dioxide
 - (B) Dextran
 - (C) Dextrose
 - (D) Epinephrine
 - (E) Hyaluronidase
29. The primary determinant of the duration of an intravenous regional block sufficient to provide surgical anesthesia of an upper extremity is
- (A) duration of tourniquet inflation
 - (B) capacitance of the venous system of the extremity
 - (C) local anesthetic agent injected
 - (D) volume of anesthetic solution injected
 - (E) method of exsanguinating the arm
30. The decrease in hematocrit that accompanies acute major blood loss results from
- (A) decreased capillary hydrostatic pressure
 - (B) increased capillary oncotic pressure
 - (C) decreased interstitial fluid oncotic pressure
 - (D) increased interstitial fluid hydrostatic pressure
 - (E) decreased viscosity of the flowing blood
31. Thirty-six hours after transection of the spinal cord at C6, a patient is given thiopental, succinylcholine, nitrous oxide, and halothane anesthesia for an emergency procedure. You should anticipate the development of
- (A) muscle spasms
 - (B) autonomic hyperreflexia
 - (C) gastrointestinal bleeding
 - (D) hyperkalemia
 - (E) hypotension

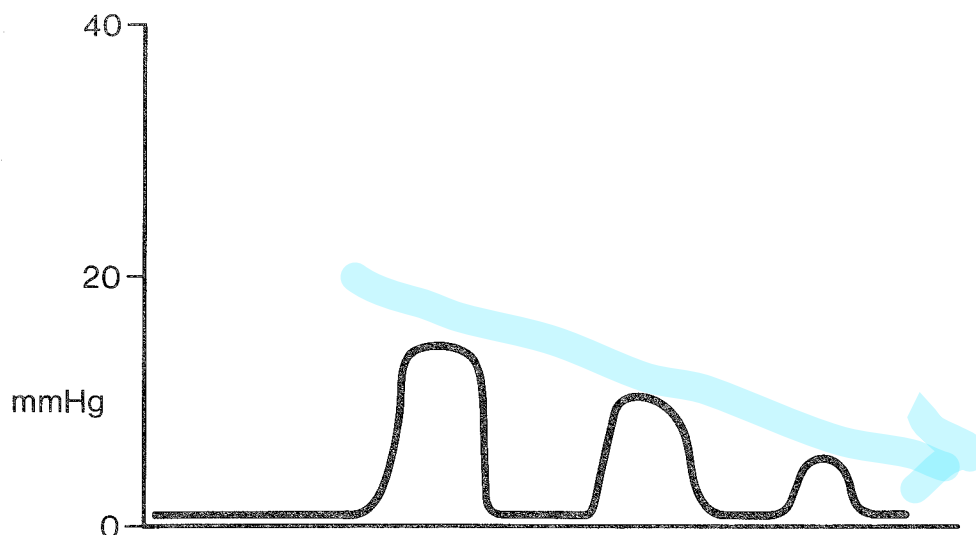
32. A 70-kg, 77-year-old man is undergoing left nephrectomy with nitrous oxide, oxygen, fentanyl, and midazolam anesthesia. He has a 90 pack-year history of cigarette smoking and has chronic obstructive pulmonary disease. One hour after incision, expiratory wheezing occurs and peak inspiratory pressure increases from 35 to 65 cmH₂O; end-tidal PCO₂ is unchanged, but SpO₂ decreases from 97% to 88%. The most likely cause is
- (A) endobronchial intubation
 - (B) overinflation of the endotracheal tube cuff
 - (C) pneumothorax
 - (D) pulmonary edema
 - (E) pulmonary embolism
33. The anesthetic concentration necessary to suppress responses to intubation without muscle relaxation is
- (A) increased in pregnancy
 - (B) increased by premedication with scopolamine
 - (C) higher than the concentration required for skin incision
 - (D) lower at high altitudes than at low altitudes
 - (E) the same as that required for electrocautery of gut
34. Recommendations for maximal allowable trace anesthesia gases are based on
- (A) achievable levels with modern scavenging systems
 - (B) data from animal studies
 - (C) data on methionine synthetase levels in anesthesiologists
 - (D) evidence for an association with malignancy in anesthesiologists
 - (E) evidence for an association with spontaneous abortion in operating room personnel
35. The physiologic function most likely to be spared when a local anesthetic differential nerve block is administered is
- (A) sweating
 - (B) temperature sensation
 - (C) proprioception
 - (D) touch sensation
 - (E) pain sensation
36. In pregnant patients, which of the following is an effect of the long-term use of cocaine?
- (A) Decreased uterine tone
 - (B) Decreased thiopental requirement
 - (C) Increased isoflurane MAC
 - (D) Increased sensitivity to ephedrine
 - (E) Lower than expected level of block with tetracaine spinal analgesia
37. A 50-year-old patient undergoes subtotal thyroidectomy for Graves' disease. In the immediate postoperative period, he has marked hoarseness but no stridor. The most likely cause of the hoarseness is trauma to the
- (A) external branch of the superior laryngeal nerve
 - (B) internal branch of the superior laryngeal nerve
 - (C) recurrent laryngeal nerve
 - (D) glossopharyngeal nerve
 - (E) vocal cords

38. A patient has palpitations, flushing, and light-headedness after gingival injection of a local anesthetic. This reaction is most likely caused by
- (A) epinephrine in the local anesthetic
 - (B) local anesthetic allergy
 - (C) para-aminobenzoic acid allergy
 - (D) methylparaben reaction
 - (E) vasovagal reaction
39. A 28-year-old woman receives a lumbar epidural anesthetic for uncomplicated labor and delivery. During removal of the catheter, 1 cm breaks off and remains in her back. After informing the patient, the most appropriate management is
- (A) no intervention unless symptoms occur
 - (B) prophylactic antibiotics
 - (C) epidural corticosteroids
 - (D) dye contrast study of the epidural space
 - (E) neurosurgical exploration
40. Which of the following statements concerning opioid dependence in anesthesiologists is true?
- (A) Mortality rate is high
 - (B) Deterioration of professional performance is an early sign
 - (C) Nalbuphine suppresses signs of withdrawal
 - (D) Naltrexone prevents relapse
 - (E) Sufentanil is detected by urine screening
41. Which of the following statements concerning use of amitriptyline to treat chronic pain is true?
- (A) It acts primarily via opioid receptors
 - (B) It increases serotonin levels in the brain
 - (C) It is rarely effective for postherpetic neuralgia
 - (D) Onset of action occurs after four to six weeks of treatment
 - (E) Response depends on reversal of depression
42. Compared with adults, neonatal respiratory function is characterized by
- (A) a lower ratio of dead space to tidal volume
 - (B) a more compliant chest wall
 - (C) a more positive intrapleural pressure at end-expiration
 - (D) less susceptibility to atelectasis
 - (E) the same oxygen requirement per kilogram of body weight
43. A child has tachypnea immediately after reintubation for intractable laryngospasm. Oxygen saturation is 78% at an FiO_2 of 1.0. A radiograph of the chest taken 15 minutes later is most likely to show
- (A) bilateral pleural effusions
 - (B) diffuse homogenous pulmonary infiltrates
 - (C) patchy central infiltrates of the right upper lobe
 - (D) pneumothorax
 - (E) segmental atelectasis at both lung bases

44. A 55-year-old patient with hypertrophic cardiomyopathy (IHSS) is undergoing bladder suspension with enflurane 1%, nitrous oxide 50%, and oxygen 50%. Junctional tachycardia and hypotension develop suddenly immediately after skin incision. The most appropriate management is to
- (A) decrease enflurane concentration
 - (B) administer an intravenous fluid bolus
 - (C) administer intravenous esmolol
 - (D) administer intravenous phenylephrine
 - (E) begin nitroglycerin infusion
45. Following a thyroidectomy, a patient develops severe dyspnea, inspiratory stridor, and cyanosis in the recovery room. On physical examination, the neck appears full. Attempts at bag-mask ventilation are unsuccessful. Immediate therapy is to
- (A) administer calcium chloride
 - (B) perform an emergency tracheostomy
 - (C) open the wound and institute bag-mask ventilation
 - (D) return the patient to the operating room
 - (E) perform endotracheal intubation
46. Early deceleration of fetal heart rate
- (A) correlates with high concentrations of local anesthetic in maternal blood
 - (B) frequently occurs with fetal scalp pH greater than 7.25
 - (C) indicates need for immediate cesarean delivery
 - (D) indicates subclinical uteroplacental insufficiency
 - (E) predicts low Apgar scores at delivery
47. Which of the following statements concerning neuroleptic malignant syndrome is true?
- (A) It does not respond to dantrolene therapy
 - (B) It is inherited as an autosomal trait
 - (C) It is not triggered by succinylcholine
 - (D) It occurs after long-term use of L-dopa
 - (E) The halothane-caffeine contracture test is negative in susceptible patients
48. To eliminate all pain during the second stage of labor, a lumbar epidural block must extend from
- (A) T6 to L1
 - (B) T10 to L1
 - (C) T10 to S1
 - (D) T10 to S4
 - (E) L1 to S5
49. The correlation between anesthetic potency and lipid solubility
- (A) suggests that the number of molecules dissolved at the site of action causes anesthesia
 - (B) applies to anesthetic agents dissolved in olive oil
 - (C) suggests that the type of molecule causes anesthesia
 - (D) is consistent with the synergistic effect of anesthetics
 - (E) is not consistent with a unitary molecular site of action of anesthetics

50. In a patient with aortic stenosis, myocardial ischemia following endotracheal intubation is most likely to result if there is an increase in
- (A) heart rate
 - (B) left ventricular end-diastolic pressure
 - (C) myocardial contractility
 - (D) pulmonary vascular resistance
 - (E) systemic vascular resistance
51. Following extubation after nasotracheal intubation for seven days, a 35-year-old man has fever, facial pain, nasal stuffiness, and purulent nasal secretions. The most likely cause is
- (A) eustachian tube obstruction
 - (B) frontal sinusitis
 - (C) maxillary sinusitis
 - (D) parotiditis
 - (E) retropharyngeal abscess
52. Which of the following statements concerning monitoring of neuromuscular function during general anesthesia is true?
- (A) Facial nerve electrodes underestimate recovery from block, compared with ulnar nerve electrodes
 - (B) More current is required to depolarize a nerve beneath the negative electrode than beneath the positive electrode
 - (C) Needle electrodes should be electrically grounded
 - (D) Supramaximal voltage is 10% higher than the voltage required to elicit pain in the awake patient
 - (E) The amount of neuromuscular block is underestimated if electrodes are placed on a paretic limb
53. Meperidine has a more rapid onset of action than morphine following intravenous injection because of its
- (A) lesser ionization
 - (B) greater lipid solubility
 - (C) lesser protein binding
 - (D) smaller volume of distribution
 - (E) slower rate of hepatic clearance
54. One day after a vaginal hysterectomy under epidural anesthesia, a patient has numbness and inability to dorsiflex the right foot. Her legs were placed in leg holders during the operation. The most likely cause is
- (A) epidural hematoma
 - (B) common peroneal nerve injury
 - (C) sacral nerve root injury
 - (D) sacral plexus injury
 - (E) sciatic nerve injury
55. Blind nasotracheal intubation is contraindicated in the presence of
- (A) a basilar skull fracture
 - (B) a comminuted mandibular fracture
 - (C) an orbital blow-out fracture
 - (D) an unstable cervical spine fracture
 - (E) a zygomatic arch fracture

56. Compared with morphine 5 mg administered epidurally at T12, morphine 5 mg administered intravenously is associated with
- (A) greater incidence of urinary retention
 - (B) less intense analgesia
 - (C) less nausea and vomiting
 - (D) longer duration of analgesia
 - (E) longer time to maximum analgesia
57. Which of the following is the most frequent cause of hemorrhagic diathesis after administration of 20 units of CPD-stored blood over six hours?
- (A) Disseminated intravascular coagulation
 - (B) Hypofibrinogenemia
 - (C) Low plasma concentrations of factors V and VIII
 - (D) Primary fibrinolysis
 - (E) Thrombocytopenia
58. Which of the following is most effective for maintaining core body temperature in an adult during general anesthesia for foot surgery?
- (A) Heating inspired gas to 28°C
 - (B) Warming intravenous fluids to 30°C
 - (C) Increasing ambient temperature to 28°C
 - (D) Placing a warming blanket beneath the patient
 - (E) Placing four 200-watt warming bulbs within 76 cm of the wound
59. In patients with renal failure, which of the following muscle relaxants has the most prolonged elimination half-life?
- (A) Atracurium
 - (B) Pancuronium
 - (C) Succinylcholine
 - (D) d-Tubocurarine
 - (E) Vecuronium
60. Percutaneous cordotomy is being considered for a patient with severe pain that has persisted for three months after amputation of the arm for osteogenic sarcoma. Which of the following statements is true?
- (A) An effective cordotomy will produce motor block
 - (B) A series of stellate ganglion blocks will provide permanent relief
 - (C) Cordotomy must be performed with the patient awake
 - (D) Cordotomy will effectively relieve phantom limb pain
 - (E) Spinal opioids are an alternative treatment of this pain
61. Which of the following is the most likely cause of rapid oxygen desaturation during laryngoscopy in a pregnant woman?
- (A) Airway edema
 - (B) Anemia
 - (C) Decreased functional residual capacity
 - (D) Fetal oxygen consumption
 - (E) Increased cardiac output



62. The most likely cause of this capnographic tracing obtained just after laryngoscopy and intubation is

- (A) esophageal intubation
- (B) partial obstruction of the endotracheal tube
- (C) pulmonary embolus
- (D) insertion of an endotracheal nasogastric tube
- (E) mild bronchospasm

63. An advantage of CPDA-1 over CPD for storage of packed red blood cells is

- (A) greater enhancement of red cell survival
- (B) lesser increase in plasma hemoglobin concentration
- (C) lesser increase in PCO_2 of stored blood
- (D) better maintenance of blood pH
- (E) better maintenance of 2,3-diphosphoglycerate concentration

64. Which of the effects of epidural morphine is most resistant to intravenous naloxone?

- (A) Analgesia
- (B) Nausea
- (C) Pruritus
- (D) Respiratory depression
- (E) Urinary retention

65. A healthy, 60-kg, 52-year-old woman undergoing reduction mammoplasty is anesthetized with isoflurane and oxygen, and deliberate hypotension to 80/40 mmHg is induced with nitroprusside. Urine output through an indwelling urethral catheter has been 10 ml during the past hour. You should now

- (A) administer furosemide 40 mg intravenously
- (B) infuse normal saline solution until urine output reaches 35 ml/hr
- (C) administer dopamine at $3 \mu\text{g/kg/min}$
- (D) expect normal urine flow with restoration of normal blood pressure
- (E) discontinue nitroprusside administration

66. The following hemodynamic values are obtained two hours after coronary artery bypass surgery:

Cardiac index	1.7 L/min/m ²
Pulmonary artery occlusion pressure	22 mmHg
Mean arterial pressure	60 mmHg
Urine volume	0.2 ml/kg/hr

The most appropriate management is

- (A) dopamine infusion
- (B) nitroprusside infusion
- (C) norepinephrine infusion
- (D) volume expansion
- (E) observation without intervention

67. A patient becomes flushed, dyspneic, and hypotensive during transfusion of 1 unit of packed red blood cells in the PACU. After discontinuing the transfusion, the most appropriate next step is administration of

- (A) aminophylline
- (B) cimetidine
- (C) diphenhydramine
- (D) epinephrine
- (E) hydrocortisone

68. Compared with the adult airway, the airway of an infant is characterized by

- (A) greater narrowing at the cricoid ring
- (B) a less rigid epiglottis
- (C) a more caudad laryngeal opening
- (D) a relatively smaller tongue
- (E) relatively larger tonsils

69. Halothane anesthesia is usually associated with an increase in

- (A) cardiac contractility
- (B) venous capacitance
- (C) arterial pressure
- (D) venous return
- (E) heart rate

70. A 76-year-old man has a leaking abdominal aortic aneurysm. His blood pressure and pulse have remained stable for 15 minutes at 90/60 mmHg and 130 bpm, respectively. His hemoglobin concentration is 11 g/dl, and the EKG shows a left bundle branch block. Induction of anesthesia should proceed

- (A) after a pulmonary artery catheter has been inserted and the pulmonary artery occlusion pressure is greater than 7 mmHg
- (B) when the pulse has decreased below 130 bpm from the rapid transfusion of blood
- (C) when systolic blood pressure has increased to more than 120 mmHg from the rapid infusion of lactated Ringer's solution
- (D) immediately on arrival in the operating room
- (E) when circulatory signs deteriorate or cease to improve with rapid volume expansion

71. In an infant, spinal anesthesia to a sensory level of T8 is achieved with tetracaine administered at the L2-3 interspace. Compared with spinal anesthesia to the same sensory level in an adult, this anesthetic is associated with a
- (A) higher risk for neurotoxicity
 - (B) higher risk for systemic toxicity
 - (C) lower risk for spinal cord injury
 - (D) more significant decrease in blood pressure
 - (E) shorter duration of action
72. Volume-cycled flow generators are preferred over pressure-cycled ventilators in critical care units because they
- (A) have a lower compression volume
 - (B) limit peak airway pressure
 - (C) maintain constant ventilatory volume with changes in lung compliance
 - (D) more readily compensate for gas leaks
 - (E) permit more accurate measurement of the patient's minute volume
73. A 65-kg, 57-year-old man has an initial activated clotting time (ACT) of 122 seconds prior to elective cardiopulmonary bypass. Five minutes after administration of heparin 200 mg, ACT increases to 154 seconds. After two additional doses of 200 mg each from different lots, ACT increases to 240 seconds. The most appropriate next step is to
- (A) administer additional heparin 400 mg
 - (B) administer fresh frozen plasma 2 units
 - (C) initiate cardiopulmonary bypass
 - (D) measure the plasma heparin concentration
 - (E) start an infusion of desmopressin
74. An 18-year-old patient with hemophilia A is scheduled for inguinal hernia repair. Preoperatively, factor VIII concentration is 60% of normal. The most appropriate management is administration of
- (A) fresh frozen plasma
 - (B) cryoprecipitate
 - (C) factor VIII concentrate
 - (D) vitamin K
 - (E) none of the above
75. The following changes occur during posterior cervical fusion in the prone position under halothane and nitrous oxide anesthesia with mechanical ventilation:

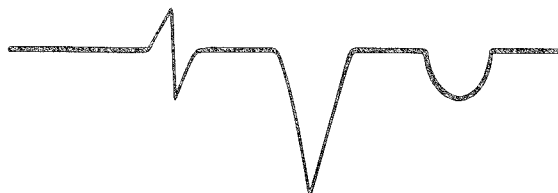
	<u>Initial</u>	<u>Present</u>
Heart rate	78 bpm	84 bpm, frequent PVCs
Blood pressure	110/70 mmHg	90/50 mmHg
End-tidal carbon dioxide	4.5%	2.0%
End-tidal nitrogen	0.12%	4.0%

The most appropriate next step is to

- (A) administer lidocaine intravenously
- (B) decrease ventilatory rate
- (C) discontinue halothane
- (D) lower the patient's head
- (E) inspect the ventilator bellows

76. Syringe A contains 100 ml of normal blood with a PO_2 of 2 mmHg, and syringe B contains 100 ml of normal blood with a PO_2 of 98 mmHg. The contents of the two syringes are mixed anaerobically to equilibrium. The PO_2 of the resultant mixture is
- (A) 27 mmHg
 - (B) 50 mmHg
 - (C) 63 mmHg
 - (D) 96 mmHg
 - (E) 100 mmHg
77. A 40-year-old man is scheduled for emergency laparotomy for bowel obstruction. He is nauseated but has not vomited. Which of the following drugs administered intravenously preoperatively will decrease the risk for pulmonary aspiration?
- (A) Atropine
 - (B) Droperidol
 - (C) Metoclopramide
 - (D) Ranitidine
 - (E) None of the above
78. Which of the following perioperative interventions decreases the risk for renal insufficiency in patients undergoing aortic aneurysm repair?
- (A) Administration of furosemide
 - (B) Administration of mannitol
 - (C) Administration of renal-dose dopamine
 - (D) Epidural anesthesia
 - (E) Preoperative volume expansion
79. A 20-kg, 5-year-old boy under treatment for five days for a cerebral contusion not requiring an operation is still unconscious. After three days of mechanical ventilation, humidified oxygen 40% via T-tube is started. Arterial blood gas analysis shows PaO_2 120 mmHg, $PaCO_2$ 44 mmHg, pH 7.48, and base excess +6. A nasogastric tube is in place and draining to gravity. Daily fluid therapy has been 5% dextrose in 0.5 normal saline solution 500 ml and 5% dextrose in lactated Ringer's solution 500 ml. Serum electrolyte concentrations are sodium 140, potassium 3.2, and chloride 91 mEq/L. Serum osmolality is 300 mOsm/L. Urine output averages 15 ml/hour. Dexamethasone 8 mg/day has been the only drug therapy.
- This patient most likely requires
- (A) additional intravenous fluids
 - (B) furosemide diuresis
 - (C) administration of ammonium chloride
 - (D) reinstitution of mechanical ventilation
 - (E) administration of potassium chloride
80. Following paravertebral blocks of the second through fifth intercostal nerves, numbness is noted on the medial aspect of the ipsilateral arm. The most likely cause is
- (A) anesthesia of the intercostobrachial nerve
 - (B) anxiety-induced hyperventilation
 - (C) injection into a dural cuff
 - (D) intravascular injection of local anesthetic
 - (E) partial block of the brachial plexus

81. During total cardiopulmonary bypass, metabolic acidosis and decreasing mixed venous oxygen saturation are noted. The most likely cause is
- (A) hypothermia
 - (B) hypoperfusion
 - (C) hypocarbia
 - (D) rewarming
 - (E) light anesthesia
82. Which of the following is most reliable for treatment of cerebral artery vasospasm associated with subarachnoid hemorrhage?
- (A) Antifibrinolytic therapy
 - (B) Hyperventilation
 - (C) Mannitol infusion
 - (D) Nitroprusside infusion
 - (E) Volume expansion
83. Which of the following will most closely mimic the effects of stellate ganglion block?
- (A) Axillary plevascular block with 25 ml of 1.5% lidocaine
 - (B) Cervical nerve block at C2-C5 with 2 ml of 1.5% lidocaine
 - (C) Supraclavicular block at the level of the first rib with 25 ml of 1.5% lidocaine
 - (D) Block of the median, radial, ulnar, musculocutaneous, and intercostobrachial nerves
 - (E) Excision of thoracic sympathetic ganglia T1-T4
84. Which of the following decreases dead space in an anesthetic circle system?
- (A) Larger surface area of the expiratory unidirectional valve
 - (B) Placing a septum in the Y-piece
 - (C) Shorter expiratory limb tubing
 - (D) Smaller carbon dioxide absorber
 - (E) Smaller reservoir bag
85. During an otherwise uneventful nitrous oxide-enflurane anesthetic in a spontaneously breathing patient, 85% nitrous oxide is accidentally administered, resulting in a PO_2 of 48 mmHg. Which of the following would be expected?
- (A) Tachycardia
 - (B) Sweating
 - (C) Tachypnea
 - (D) Hyperactive EEG
 - (E) None of the above
86. An 18-month-old child with tetralogy of Fallot is anesthetized with halothane and nitrous oxide. Following intubation, oxygen saturation decreases abruptly from 85% to 45%. The most effective treatment is
- (A) discontinuation of halothane
 - (B) hyperventilation
 - (C) intravenous epinephrine
 - (D) intravenous phenylephrine
 - (E) positive end-expiratory pressure



87. A multi-orificed right heart catheter is being positioned by EKG control prior to sitting craniotomy. The EKG tracing above is obtained between the distal tip of the catheter and the right arm lead. The most appropriate next step is to

- (A) leave the catheter in place
 - (B) advance the catheter 2 to 3 cm
 - (C) withdraw the catheter 2 to 3 cm
 - (D) remove the catheter completely
 - (E) change polarity of the EKG
-

88. A 70-kg, 46-year-old man is undergoing clipping of a cerebral aneurysm with nitrous oxide, opioid, relaxant anesthesia. He is otherwise healthy. As the surgeons are about to enter the dura, the brain is noted to be tense and bulging. Heart rate is 100 bpm and mean arterial pressure is 90 mmHg. PaO_2 is 120 mmHg, PaCO_2 is 23 mmHg, and pH is 7.50.

Which of the following should be done immediately?

- (A) Hyperventilation to a PaCO_2 of 15 to 20 mmHg
- (B) Administration of furosemide 20 mg intravenously
- (C) Administration of mannitol 0.5 g/kg
- (D) Administration of thiopental 250 mg in increments
- (E) Addition of halothane 1% to deepen anesthesia

89. An 8-kg, 5-month-old infant undergoes craniotomy for an arteriovenous malformation. During the procedure, severe hemorrhaging occurs and packed red blood cells 3 units are transfused rapidly. During infusion of the third unit, hypotension, nodal bigeminy, and prolongation of the QT interval are noted. The most appropriate management includes administration of

- (A) bicarbonate
- (B) calcium
- (C) ephedrine
- (D) lidocaine
- (E) potassium

90. An endobronchial Robertshaw tube is inserted for resection of a midesophageal tumor under isoflurane, oxygen, pancuronium anesthesia. Forty minutes into a planned two-hour resection, arterial blood gas values are reported as PO_2 45 mmHg, PCO_2 45 mmHg, and pH 7.33. Ten minutes earlier, the values were PO_2 210 mmHg, PCO_2 41 mmHg, and pH 7.39. The first action should be to

- (A) reposition the Robertshaw tube
- (B) apply positive end-expiratory pressure to the ventilated lung
- (C) reinflate and ventilate the nonventilated lung
- (D) increase minute ventilation
- (E) repeat the arterial blood gas analysis

91. Which of the following statements concerning autonomic hyperreflexia after spinal cord transection is true?
- (A) It occurs within 24 hours after the injury
 - (B) It occurs with lesions below T10
 - (C) It is caused by a reflex increase in parasympathetic outflow
 - (D) It is characterized by paroxysmal hypotension and tachycardia
 - (E) It is prevented by blocking afferent visceral pathways
92. A 45-year-old man is scheduled for exploratory laparotomy. Six months ago, he received doxorubicin (Adriamycin) therapy for testicular cancer. This patient is at increased risk for
- (A) abnormal liver function
 - (B) bone marrow depression
 - (C) heart failure
 - (D) chronic renal failure
 - (E) pulmonary fibrosis
93. An asymptomatic 38-year-old woman is scheduled for elective cesarean delivery. The preoperative EKG shows left axis deviation that was not present one year ago. The most appropriate next step is to
- (A) postpone the procedure and consult a cardiologist
 - (B) postpone the procedure and obtain an echocardiogram
 - (C) proceed with the procedure after administration of digitalis
 - (D) proceed with the procedure but avoid inhalational agents
 - (E) proceed without intervention since this is a normal finding
94. A 157 cm (5 ft 2 in), 180-kg, 40-year-old woman has a PaO_2 of 65 mmHg, a PaCO_2 of 38 mmHg, and a pH of 7.43 while breathing room air preoperatively. The most likely cause of these values is
- (A) decreased hypoxic ventilatory drive
 - (B) higher than normal oxygen extraction from blood
 - (C) lower than normal cardiac output
 - (D) lower than normal functional residual capacity
 - (E) polycythemia
95. The concentration effect is greater with nitrous oxide than with the volatile anesthetics because nitrous oxide
- (A) has a lower blood-gas partition coefficient
 - (B) has less effect on cardiac output
 - (C) has lower lipid solubility
 - (D) is affected less by ventilation-perfusion mismatch
 - (E) is used in much higher concentrations
96. Ten minutes after induction of anesthesia with thiopental and isoflurane but before incision, a patient's nasopharyngeal temperature has decreased to 35.4°C. Which of the following contributed most to this decrease in temperature?
- (A) Anesthesia-induced block of nonshivering thermogenesis
 - (B) Failure to use a warming blanket
 - (C) Infusion of room-temperature crystalloid
 - (D) Inhalation of room-temperature gases
 - (E) Mixing of peripheral and central blood

97. After removing the electrocautery pad from the thigh, a burn is noted at that site. Which of the following most likely contributed to this injury?

- (A) A line-isolation monitor fault
- (B) Current leak from the EKG module
- (C) Defective grounding of the electrocautery unit
- (D) Dried gel on the electrocautery pad
- (E) Excessive current setting for cutting mode

98. A blood sample is taken from a patient whose body temperature is 30°C. In which direction will the pH, PCO₂, and PO₂ change when measured in the blood gas machine at 37°C?

	pH	PCO ₂	PO ₂
(A)	Increase	Decrease	Decrease
(B)	Decrease	Increase	Increase
(C)	Decrease	Increase	No change
(D)	No change	Increase	Increase
(E)	No change	No change	Increase

99. A 31-year-old man underwent uneventful epidural anesthesia for arthroscopy of the knee and meniscectomy. Twenty-four hours later, he still has flaccid paralysis in both legs and pain in the lower back. The most likely cause is

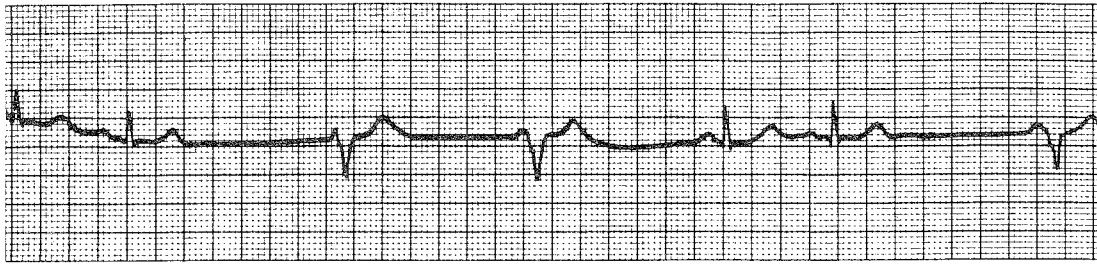
- (A) adhesive arachnoiditis
- (B) anterior spinal artery thrombosis
- (C) epidural abscess
- (D) epidural hematoma
- (E) transverse myelitis

100. A Fluotec vaporizer is set to administer halothane 4% using a fresh gas flow of 4 L/min. If the diluent gas flow is increased to 8 L/min, and at the same time the room temperature increases from 20 to 25°C, the approximate concentration of halothane delivered to the patient would be

- (A) 2%
- (B) 2.5%
- (C) 3%
- (D) 4%
- (E) 5%

101. Four and one-half hours after initiation of general anesthesia for a radical hysterectomy, a 65-kg patient has a heart rate of 90 bpm, blood pressure of 100/70 mmHg, pulmonary artery occlusion pressure of 9 mmHg, and cardiac output of 2.8 L/min. Urine output has been 20 ml over the last two hours. The most appropriate next step is

- (A) administration of furosemide
- (B) administration of indigo carmine
- (C) administration of mannitol
- (D) bolus infusion of normal saline solution
- (E) infusion of dopamine in renal dose



102. The EKG rhythm shown above developed during cholecystectomy in a 62-year-old man who had a myocardial infarction and is taking atenolol. The drug of choice for treating this arrhythmia is
- (A) atropine
 - (B) bretylium
 - (C) isoproterenol
 - (D) lidocaine
 - (E) procainamide
-
103. Which surface area of the upper extremity is most likely to be unanesthetized by an interscalene brachial plexus block?
- (A) Hypothenar eminence
 - (B) Thenar eminence
 - (C) Dorsolateral surface of the hand
 - (D) Lateral aspect of the forearm
 - (E) Lateral surface of the upper arm
104. You see a flash of fire from the endotracheal tube of a patient undergoing carbon dioxide laser excision of laryngeal polyps. The immediate response should be to
- (A) discontinue the fresh gas flow
 - (B) increase the nitrous oxide concentration
 - (C) spray water down the endoscope
 - (D) insert wet pads into the pharynx
 - (E) remove the endotracheal tube
105. Which of the following would be most likely to increase the duration of seizures during electroconvulsive therapy using a barbiturate and succinylcholine for general anesthesia?
- (A) Administration of atropine prior to therapy
 - (B) Changing to a benzodiazepine for induction
 - (C) Changing to etomidate for induction
 - (D) Adding phenytoin to preoperative medications
 - (E) Decreasing the dose of barbiturate used for induction

106. An obese, 75-year-old woman is scheduled for open reduction of a left forearm fracture. Thirty minutes after successful interscalene block using 20 ml of 2% lidocaine, she becomes dyspneic. The dyspnea is most likely related to
- (A) cervical epidural block
 - (B) cervical sympathetic block with bronchospasm
 - (C) chylothorax
 - (D) elevation of the left hemidiaphragm
 - (E) recurrent laryngeal nerve block
107. During prolonged labor, a fetal scalp blood sample shows a PO_2 of 21 mmHg, a PCO_2 of 46 mmHg, and a pH of 7.35. These findings suggest
- (A) fetal hypoxemia
 - (B) maternal hypoventilation
 - (C) sampling of venous blood
 - (D) miscalibration of the oxygen electrode
 - (E) no abnormality
108. Phase II neuromuscular block is characterized by
- (A) depressed twitch height, sustained tetanus, post-tetanic potentiation
 - (B) depressed twitch height, tetanic fade, post-tetanic potentiation
 - (C) depressed twitch height, tetanic fade, no post-tetanic potentiation
 - (D) normal twitch height, tetanic fade, post-tetanic potentiation
 - (E) normal twitch height, tetanic fade, no post-tetanic potentiation
109. Preoperative evaluation of a patient who has marked malnutrition will demonstrate each of the following EXCEPT
- (A) decreased respiratory muscle function
 - (B) decreased serum albumin concentration
 - (C) decreased metabolic rate
 - (D) suppressed immune function
 - (E) decreased extracellular fluid volume
110. Each of the following decreases hepatic blood flow EXCEPT
- (A) isoflurane anesthesia
 - (B) spinal anesthesia
 - (C) hypercarbia
 - (D) mechanical ventilation
 - (E) positive end-expiratory pressure
111. A patient who is scheduled for emergency debridement of an infected wound on the sole has trismus, rigidity of facial muscles, and spasms of the intercostal muscles, diaphragm, and extremities. During anesthesia, this patient is at increased risk for each of the following EXCEPT
- (A) hypotension
 - (B) hypertension
 - (C) tachycardia
 - (D) diaphoresis
 - (E) hypothermia

112. Each of the following is an effect of acute preoperative oral administration of clonidine EXCEPT
- (A) sedation
 - (B) respiratory depression
 - (C) decreased intraoperative plasma catecholamine concentrations
 - (D) decreased MAC of inhalational anesthetics
 - (E) decreased perioperative opioid requirement
113. When used for irrigation during transurethral resection of the prostate, glycine 1.5% is associated with each of the following EXCEPT
- (A) hemolysis
 - (B) hyperammonemia
 - (C) cerebral edema
 - (D) hypofibrinogenemia
 - (E) visual disturbances
114. A patient with cirrhosis presenting for liver transplantation is likely to exhibit each of the following EXCEPT
- (A) decreased cardiac output
 - (B) decreased serum glucose concentration
 - (C) decreased serum sodium concentration
 - (D) decreased systemic vascular resistance
 - (E) increased alveolar-arterial oxygen tension difference
115. Each of the following increases arterial to end-tidal carbon dioxide tension difference EXCEPT
- (A) addition of positive-end expiratory pressure
 - (B) deliberate hypotension
 - (C) endobronchial intubation
 - (D) hypovolemia
 - (E) pulmonary embolism
116. Each of the following parameters of cerebral perfusion and metabolism is approximately equal to 50 EXCEPT
- (A) cerebral oxygen consumption in ml O_2 /min for a normal adult
 - (B) lower limit of mean arterial pressure for cerebral autoregulation in mmHg
 - (C) normal cerebral blood flow in ml/100 g tissue/min
 - (D) PaO_2 at which cerebral blood flow increases
 - (E) $PaCO_2$ at which cerebral blood flow doubles
117. Pulmonary artery occlusion pressure is NOT a reliable estimate of left ventricular end-diastolic pressure when
- (A) junctional cardiac rhythm is present
 - (B) mitral insufficiency is present
 - (C) pulmonary compliance is decreased
 - (D) pulmonary hypertension is present
 - (E) the catheter tip is in zone 1 of the lung

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IN-TRAINING EXAMINATION

Book B
1992

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. The test dose of local anesthetic administered through an epidural needle or catheter should be sufficient to produce

- (A) bradycardia
- (B) seizure activity
- (C) hypotension
- (D) segmental analgesia
- (E) spinal anesthesia

2. The most important anesthetic consideration in Pierre Robin syndrome is

- (A) anterior tilt of the larynx
- (B) hyperplasia of the internal surface of the maxilla
- (C) mandibular hypoplasia
- (D) hypertrophy of the epiglottis
- (E) tracheomalacia

3. A 70-kg, 22-year-old man who is unconscious after a closed head injury is to undergo emergency splenectomy. He is anesthetized with thiopental, given pancuronium for paralysis, and started on nitrous oxide and oxygen 50% each with controlled ventilation (tidal volume 700 ml, rate 10/min). Pulse is 70 bpm, blood pressure is 160/100 mmHg, PaO_2 is 65 mmHg, PaCO_2 is 45 mmHg, and pH is 7.30.

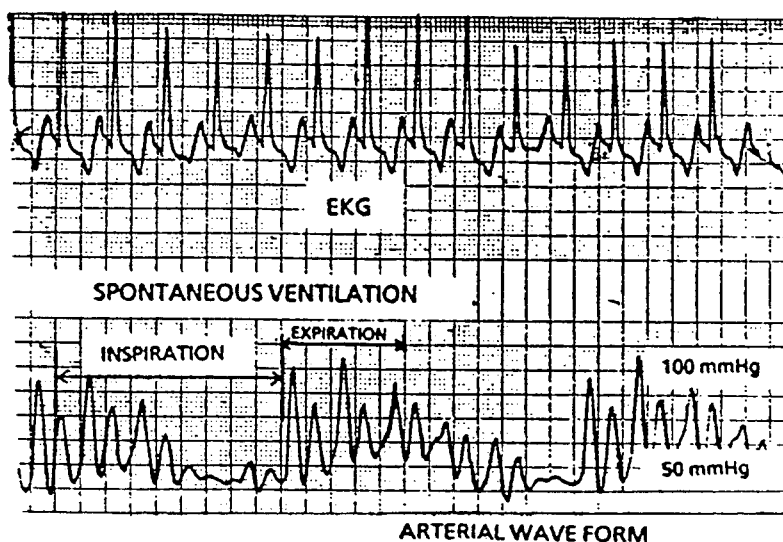
In adjusting the ventilator at this time, which of the following is most appropriate?

- (A) Add 10 cmH₂O positive end-expiratory pressure (PEEP), increase respiratory rate to 14/min
- (B) Add sufficient PEEP to increase PaO_2 to 80 mmHg
- (C) Add 10 cmH₂O PEEP, increase FiO_2 to 1.0
- (D) Increase tidal volume to 1000 ml, increase FiO_2 to 1.0
- (E) Increase tidal volume to 1200 ml, decrease respiratory rate to 8/min

4. A patient who is scheduled for a gastrectomy had abnormal liver function tests for four days following a prior cholecystectomy. In your consultation note, you should

- (A) recommend enflurane anesthesia since abnormal postoperative liver function tests are unlikely with this drug
- (B) recommend subarachnoid anesthesia since changes in hepatic blood flow would be less than with general anesthesia
- (C) indicate that abnormal liver function tests are likely to follow this operation regardless of the anesthetic drugs used
- (D) require preoperative screening for hepatitis B antigen and antibodies
- (E) recommend avoiding halothane since it is more likely to produce hepatitis in patients who had previous upper abdominal surgery

5. Spontaneously breathing enflurane at 1 MAC causes increased
- (A) airway resistance
 - (B) diaphragm function
 - (C) carbon dioxide production
 - (D) intercostal muscle function
 - (E) physiologic dead space
6. Which of the following statements concerning use of a Bain circuit is true?
- (A) Fresh gas flow can be as low as the patient's minute ventilation
 - (B) Heat conservation is better than with a circle system
 - (C) Lower flows can be used with controlled ventilation than with spontaneous ventilation
 - (D) Lower fresh gas flows can be used than with a Jackson-Rees system
 - (E) The concentration of inspired vapors can be changed rapidly
7. A 32-year-old man who is addicted to opioids complains of pain in the PACU one hour after fixation of a mandibular fracture. He has received intravenous morphine 30 mg during the past hour. The most appropriate management is
- (A) continued intravenous administration of morphine until the pain resolves
 - (B) intravenous administration of nalbuphine in 5-mg increments until the pain resolves
 - (C) intramuscular administration of hydroxyzine 75 mg
 - (D) evaluation for entrapment of the mandibular nerve
 - (E) evaluation for drug-seeking behavior
8. Which of the following spirometric tests is most likely to be accurate in a patient with severe pain?
- (A) Forced expiratory volume in one second
 - (B) Peak expiratory flow rate
 - (C) Maximum midexpiratory flow
 - (D) Maximum breathing capacity
 - (E) Negative inspiratory pressure
9. In the PACU after resection of an occipital astrocytoma, a patient has a urine output greater than 300 ml/hr, serum osmolality of 310 mOsm/L, and a hematocrit of 40% (equal to the preoperative value). Intraoperative blood loss was estimated to be 750 ml; furosemide and mannitol were administered during the procedure. The most appropriate next step is
- (A) restriction of free water
 - (B) administration of 0.9% saline solution
 - (C) administration of desmopressin
 - (D) administration of dexamethasone
 - (E) CT scan of the brain
10. Metoclopramide acts to
- (A) block dopamine receptors
 - (B) decrease gastric acid production
 - (C) decrease lower esophageal sphincter tone
 - (D) delay gastric emptying
 - (E) facilitate central cholinergic stimulation



11. The arterial waveform and EKG shown above are from a 60-year-old man with uremia who is in the PACU after hip surgery under general anesthesia. The patient is drowsy, extubated, and breathing easily. The most likely diagnosis is

- (A) hypovolemia
- (B) myocardial ischemia
- (C) nontension pneumothorax
- (D) pericardial tamponade
- (E) pulmonary embolus

12. An obese, 35-year-old man had an episode of coughing followed by vomiting during induction of anesthesia for arthroscopy of the left knee. Intense wheezing developed bilaterally over five minutes. PaO_2 is 60 mmHg, PaCO_2 is 42 mmHg, and pH is 7.35. Optimal management following intubation of the trachea includes

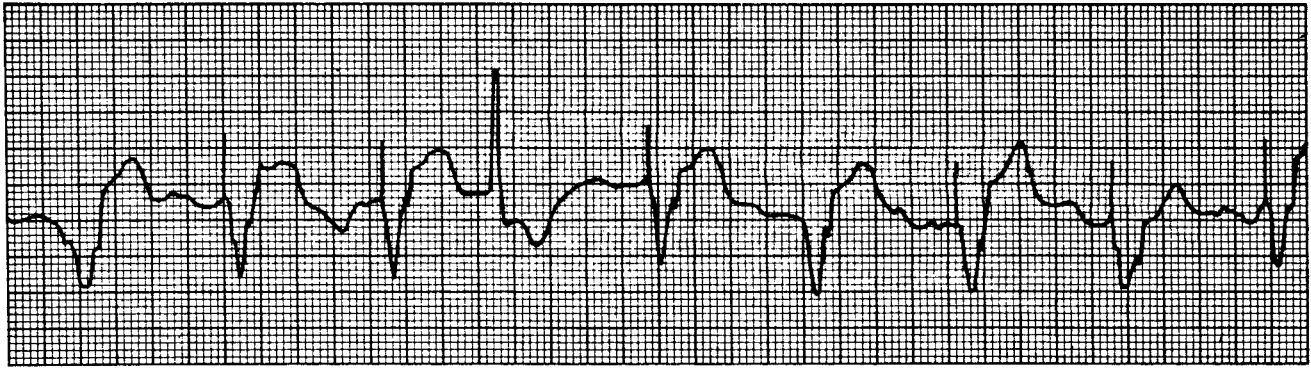
- (A) mechanical ventilation with positive end-expiratory pressure (PEEP), cancellation of surgery, and transfer to the intensive care unit
- (B) saline lavage and continuation of surgery using halothane anesthesia
- (C) cancellation of surgery and administration of corticosteroids and antibiotics
- (D) thorough suctioning and proceeding with halothane anesthesia
- (E) cancellation of surgery, vigorous mechanical ventilation, thorough suctioning, and administration of aminophylline

13. A 20-year-old woman with poorly controlled diabetes mellitus is scheduled for urgent drainage of an abdominal abscess. She received an initial dose of regular insulin 10 units followed by regular insulin 5 units/hr for the past five hours. Laboratory studies show serum sodium concentration 128 mEq/L, potassium 5.4 mEq/L, chloride 80 mEq/L, and glucose 750 mg/dl.

The most appropriate perioperative management is

- (A) addition of subcutaneous NPH insulin
- (B) administration of sodium bicarbonate to correct metabolic acidosis
- (C) administration of normal saline solution to correct the presumed hypovolemia
- (D) administration of furosemide to correct hyponatremia
- (E) infusion of 5% dextrose in 0.2% saline solution to prevent hypoglycemia

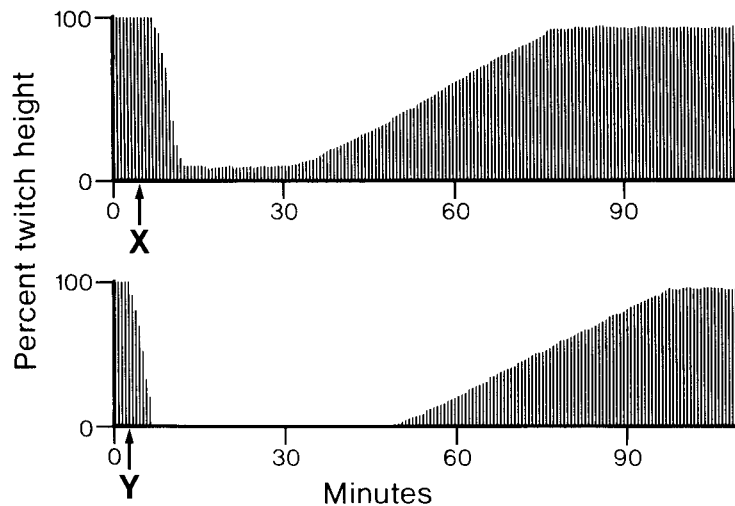
14. A 15-kg, 3-year-old child is anesthetized for an inguinal hernia repair with halothane and nitrous oxide. The trachea is intubated after administration of succinylcholine 30 mg. At the conclusion of the 45-minute procedure, the child is not breathing; a peripheral nerve twitch monitor indicates no response to a train-of-four stimulus. Further investigation is most likely to show
- (A) abnormal response to nondepolarizing muscle relaxants
 - (B) a low dibucaine number
 - (C) a low plasma cholinesterase concentration
 - (D) an underlying myopathy
 - (E) a positive halothane-caffeine contracture test
15. Maternal hyperventilation will result in
- (A) increased umbilical blood flow
 - (B) decreased affinity of maternal hemoglobin for oxygen
 - (C) decreased maternal and fetal cardiac output
 - (D) increased placental transfer of oxygen
 - (E) increased fetal cerebral blood flow
16. Measurement of blood pressure with a Doppler device involves
- (A) reflection of ultrasound waves off blood elements
 - (B) detection of oscillations in cuff pressure
 - (C) amplification of Korotkoff sounds with a miniature microphone
 - (D) transillumination with a near infrared light
 - (E) detection of variations in blood vessel diameter
17. The vapor pressure of a volatile anesthetic depends on
- (A) temperature only
 - (B) ambient pressure only
 - (C) temperature and ambient pressure
 - (D) pressure and volume of the system
 - (E) none of the above
18. An anesthetized patient in the sitting position has a mean arterial pressure of 80 mmHg measured with a transducer placed at the level of the heart. Mean cerebral arterial pressure 20 cm above the transducer is
- (A) 100 mmHg
 - (B) 80 mmHg
 - (C) 65 mmHg
 - (D) 60 mmHg
 - (E) 50 mmHg
19. Succinylcholine can be administered safely to a patient with
- (A) amyotrophic lateral sclerosis
 - (B) cerebral palsy
 - (C) a pelvic crush injury sustained two weeks ago
 - (D) a 20% body surface area burn sustained 10 days ago
 - (E) hemiparesis one month after a cerebrovascular accident



20. A 64-year-old man is scheduled to have an elective right colon resection under nitrous oxide, oxygen, enflurane anesthesia. Following a myocardial infarction two years ago, a programmable VVI pacemaker was inserted for complete heart block. A preinduction rhythm strip is shown above. Based on this EKG finding, the most appropriate action is to
- (A) proceed with induction of anesthesia
 - (B) convert the pacemaker to the fixed rate mode
 - (C) reprogram the pacemaker to increase R-wave sensitivity
 - (D) increase the pacemaker current output
 - (E) insert a temporary atrioventricular sequential pacemaker
-
21. A patient receiving propranolol and nifedipine is scheduled for elective coronary artery bypass surgery. During induction with fentanyl and oxygen, heart rate decreases from 52 to 36 bpm and blood pressure decreases from 130/85 to 80/50 mmHg. Administration of atropine 2 mg intravenously has no effect. The most appropriate treatment at this time is administration of
- (A) epinephrine
 - (B) pancuronium
 - (C) naloxone
 - (D) phenylephrine
 - (E) calcium chloride
22. Which of the following statements concerning absorption of carbon dioxide by soda lime in an anesthetic circuit is correct?
- (A) A warm canister indicates reserve absorption capability
 - (B) Fresh soda lime includes calcium carbonate
 - (C) Intergranular volume of the canister should exceed the patient's tidal volume
 - (D) The color indicator is methylene blue
 - (E) The reaction removes water
23. Which of the following statements concerning use of temperature-corrected blood gas measurement (pH-stat) during hypothermic cardiopulmonary bypass is true?
- (A) Blood gas analysis is performed at the patient's temperature
 - (B) Carbon dioxide should not be added to the bypass circuit
 - (C) The carbon dioxide content of the patient's blood is greater than it would be without temperature correction
 - (D) The incidence of postoperative neurologic deficits is increased compared with the alpha-stat method
 - (E) The patient's temperature should be maintained above 25°C

24. Compared with labetalol for induction of hypotension, nitroprusside is associated with
- (A) greater cerebral vasodilation
 - (B) greater dependence on hepatic metabolism
 - (C) less activation of the renin-angiotensin system
 - (D) less intrapulmonary shunt
 - (E) less venodilation
25. A woman has weakness of the right quadriceps and a decreased knee jerk reflex on the right one day after forceps delivery under epidural anesthesia. The most likely cause is
- (A) epidural hematoma
 - (B) intrapelvic nerve trauma
 - (C) lithotomy positioning
 - (D) reaction to the preservative in the anesthetic solution
 - (E) trauma from the epidural needle
26. A bilateral superior laryngeal nerve block performed to facilitate fiberoptic intubation will provide anesthesia of the
- (A) base of the tongue
 - (B) larynx above the vocal cords
 - (C) superior surface of the epiglottis
 - (D) tonsillar pillars
 - (E) upper trachea
27. To eliminate involuntary expulsive effort with contraction in the second stage of labor, a nerve block must include at least
- (A) T6-T12
 - (B) T4-S5
 - (C) T8-L2
 - (D) L1-S2
 - (E) S2-S4
28. Ventricular arrhythmias may be transiently worsened by the administration of
- (A) verapamil
 - (B) bretylium
 - (C) procainamide
 - (D) phenytoin
 - (E) propranolol
29. A 26-year-old woman is hospitalized in early labor at 38 weeks' gestation. Vaginal bleeding occurred prior to admission. Systemic blood pressure remains 140/80 mmHg during intravenous infusion of fluids. Which of the following factors would contraindicate epidural anesthesia for labor at this time?
- (A) Early fetal heart rate decelerations
 - (B) Hematocrit of 29%
 - (C) Blood pressure of 110/75 mmHg when sitting
 - (D) Platelet count of 100,000/mm³
 - (E) Increased respiratory rate

30. Bupivacaine 30 ml injected into the inguinal perivascular space will usually block the
- (A) femoral, lateral femoral cutaneous, and obturator nerves
 - (B) ilioinguinal, femoral, and sciatic nerves
 - (C) femoral, sciatic, and obturator nerves
 - (D) ilioinguinal, iliohypogastric, and pudendal nerves
 - (E) sciatic, femoral, and posterior femoral cutaneous nerves
31. A patient is undergoing exploration of a stab wound to the left side of the neck. On awake laryngoscopy, the left vocal cord is in midposition and the right vocal cord is abducted during inspiration. The most likely cause of these findings is trauma to which of the following structures on the left?
- (A) C7-8 nerve root
 - (B) Stellate ganglion
 - (C) Glossopharyngeal nerve
 - (D) Superior laryngeal nerve
 - (E) Vagus nerve
32. Compared with epidural administration of hydrophilic opioids, epidural administration of lipophilic opioids is associated with
- (A) earlier onset of pruritus
 - (B) greater motor block when combined with local anesthetics
 - (C) higher incidence of delayed respiratory depression
 - (D) lesser sensitivity to reversal of analgesia by naloxone
 - (E) slower onset of analgesia
33. Which of the following is the most likely beneficial effect of hyperbaric oxygen therapy in a 24-year-old scuba diver with decompression sickness?
- (A) Decreased production of carbon dioxide
 - (B) Decreased size of gas bubbles
 - (C) Increased functional residual capacity
 - (D) Reversal of membrane pressure effects
 - (E) Shift of the oxyhemoglobin dissociation curve to the left
34. Cerebral blood flow is decreased by
- (A) chronic respiratory acidosis
 - (B) hypoxia
 - (C) hypoglycemia
 - (D) polycythemia
 - (E) the postictal state
35. Which of the following statements concerning diabetes mellitus in pregnancy is true?
- (A) Beta-mimetic tocolytics cause maternal hypoglycemia
 - (B) Epidural anesthesia produces hyperglycemia
 - (C) Fetal insulin secretion is suppressed
 - (D) Maternal insulin does not cross the placenta
 - (E) Maternal insulin resistance develops abruptly after delivery



36. The twitch responses shown above are from a healthy 80-kg patient anesthetized with fentanyl and nitrous oxide. Relaxant drugs X and Y are most likely

- | <u>X</u> | <u>Y</u> |
|----------------------|------------------|
| (A) atracurium 30 mg | vecuronium 4 mg |
| (B) atracurium 30 mg | vecuronium 8 mg |
| (C) pancuronium 4 mg | pancuronium 8 mg |
| (D) vecuronium 4 mg | atracurium 30 mg |
| (E) vecuronium 4 mg | pancuronium 8 mg |

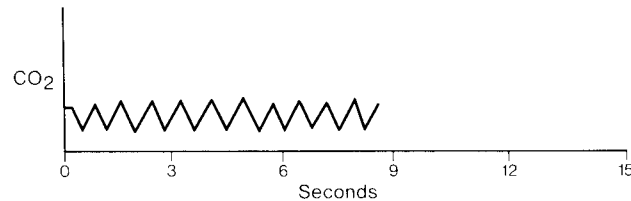
37. A 5-year-old child is brought to the emergency department in considerable respiratory distress. He is sitting leaning forward and drooling. He was well until four hours ago, when temperature increased to 38.9°C and he complained of a sore throat. The most appropriate initial management is to

- (A) administer nebulized racemic epinephrine
- (B) gently examine the airway with a tongue blade
- (C) obtain a lateral radiograph of the neck
- (D) perform a rapid induction-intubation sequence
- (E) perform inhalation induction without cricoid pressure

38. Five minutes after a stellate ganglion block is performed, a patient becomes restless, then apneic. The most likely cause is

- (A) paratracheal hematoma
- (B) phrenic nerve block
- (C) recurrent laryngeal nerve block
- (D) subarachnoid injection
- (E) vertebral artery injection

	Inspired	Expired
CO ₂	0.74%	2.19%
O ₂	94.0%	92.5%
N ₂	1.7%	1.6%
N ₂ O	1.1%	1.3%
Enf	0.00	0.00
Iso	0.00	0.00
Hal	1.03%	0.98%



39. The capnographic tracing above is from a 2-month-old infant anesthetized using a pediatric circle system and mask at a fresh gas flow of 4 L/min. The sampling port is in the elbow connector. This tracing indicates

- (A) adequate alveolar ventilation
- (B) exhausted soda lime
- (C) expired halothane concentrations representative of alveolar concentrations
- (D) mixing of inspired and expired gases
- (E) the need to change to a Mapleson D circuit

40. The mortality rate of patients given drug A is 12% (8 of 66) and the mortality rate of patients given drug B is 15% (10 of 66). Which of the following tests is most appropriate to compare these mortality rates?

- (A) *t*-Test for paired data
- (B) *t*-Test for unpaired data
- (C) Wilcoxon rank test
- (D) Chi-square test
- (E) Analysis of covariance

41. Which of the following is the most likely effect of infrarenal cross clamping of the aorta without pharmacologic manipulation?

- (A) Decreased cardiac output
- (B) Decreased pulmonary artery occlusion pressure
- (C) Increased left ventricular stroke volume
- (D) Increased renal blood flow
- (E) Improved myocardial oxygen supply-demand ratio

42. During Harrington rod instrumentation for scoliosis, monitoring somatosensory evoked potentials

- (A) is unreliable if halothane is used
- (B) eliminates the need for a wake-up test
- (C) accurately assesses proprioceptive integrity
- (D) accurately assesses motor function integrity
- (E) is unreliable if nondepolarizing muscle relaxants are used

43. A previously healthy 26-year-old man sustains massive soft tissue injury in a motor vehicle accident. He appears to be well for 48 hours after initial resuscitation, then develops marked tachypnea. Arterial blood gas analysis would be most likely to show which of the following values?

	<u>pH</u>	<u>PaCO₂</u>	<u>PaO₂</u>	<u>FiO₂</u>
(A)	7.53	60	75	.21
(B)	7.12	25	110	.30
(C)	7.09	60	90	.40
(D)	7.53	25	55	.80
(E)	7.28	40	195	.80

44. When performed with identical doses, which of the following types of regional block is associated with the highest plasma concentration of the drug?

- (A) Brachial plexus
- (B) Caudal
- (C) Intercostal
- (D) Subcutaneous infiltration
- (E) Thoracic epidural

45. During carotid endarterectomy, blood pressure suddenly decreases from 140/90 to 80/50 mmHg. The EKG shows a heart rate of 42 bpm, with normal sinus rhythm and occasional premature ventricular contractions. The most appropriate therapy is intravenous administration of

- (A) atropine
- (B) epinephrine
- (C) isoproterenol
- (D) lidocaine
- (E) phenylephrine

46. An otherwise healthy 42-year-old woman is referred for management of pain associated with adenocarcinoma of the breast and metastasis to the anterior body of L3. She perceives the pain as moderate and currently takes no pain medication. Her oncologist estimates her life expectancy to be 18 months. The most appropriate initial management is

- (A) a benzodiazepine as needed and at bedtime
- (B) an oxycodone preparation as needed and a tricyclic antidepressant at bedtime
- (C) intravenous patient-controlled analgesia
- (D) morphine infusion via an implanted epidural catheter
- (E) parenteral meperidine

47. A patient has fever and chills in the recovery room following an abdominal hysterectomy that required the intraoperative administration of whole blood 1 unit. A blood sample drawn in the recovery room shows no free hemoglobin. Subsequently, packed red blood cells 1 unit and fresh frozen plasma 1 unit are administered, and the fever and chills recur.

The most likely cause of the fever and chills is

- (A) an allergic-type transfusion reaction
- (B) a hemolytic transfusion reaction to untested antibodies
- (C) bacterial contamination of blood
- (D) a reaction to leukocytes contained in the plasma
- (E) the presence of cold agglutinins in the patient

48. Which of the following is characteristic of low back pain associated with myofascial pain syndrome but not of pain associated with a herniated lumbar disk?
- (A) Loss of reflexes in the lower extremities
 - (B) Pain along the distribution of nerve roots
 - (C) Responsiveness to epidural corticosteroids
 - (D) Sensitivity to injection at trigger points
 - (E) Trophic alteration in the sympathetic nervous system
49. Alveolar stability at varying lung volumes is maintained by
- (A) constant surface tension
 - (B) increased surface tension at low lung volume
 - (C) decreased surface tension at high lung volume
 - (D) decreased surface tension at low lung volume
 - (E) none of the above
50. In calculating the fluid requirements for a newborn undergoing repair of an omphalocele, the third-space loss should be replaced by
- (A) 0.9% saline solution
 - (B) 2.5% dextrose in 0.45% saline solution
 - (C) 5% dextrose in lactated Ringer's solution
 - (D) 5% dextrose in water
 - (E) 5% dextrose in 0.25% saline solution
51. A patient with hypokalemic familial periodic paralysis develops weakness of skeletal muscles at the end of an emergency appendectomy under spinal anesthesia. If the weakness is a result of the familial periodic paralysis, which of the following statements is true?
- (A) Bicarbonate therapy is indicated
 - (B) Cardiac dysrhythmias are unlikely
 - (C) Initial treatment is intravenous edrophonium
 - (D) Potassium infusion is contraindicated
 - (E) The paralysis spares the diaphragm
52. Which of the following statements concerning the use of epidural opioids during labor is true?
- (A) Fentanyl decreases the concentration of epidural bupivacaine required for satisfactory analgesia
 - (B) Fentanyl is an effective analgesic for the second stage of labor
 - (C) Sufentanil is an unsatisfactory analgesic for labor
 - (D) The addition of epinephrine to morphine prolongs the duration of analgesia
 - (E) The duration of analgesia with fentanyl is six to ten hours
53. Which of the following is the most likely cause of postural headache following spinal anesthesia?
- (A) Meningeal traction
 - (B) Parasympathetic (vagal) block
 - (C) Sympathetic block-induced hypotension
 - (D) Transtentorial cerebral herniation
 - (E) Vasopressin-induced vasoconstriction

54. Brain death following prolonged barbiturate coma is best confirmed by
- (A) electroencephalography
 - (B) cerebral angiography
 - (C) neurologic examination
 - (D) physostigmine trial
 - (E) measurement of cortical evoked potentials
55. Which of the following is a characteristic of VVI pacemakers?
- (A) They are inhibited by the R wave
 - (B) They are triggered by the P wave
 - (C) They are more likely to precipitate ventricular fibrillation than fixed-rate pacemakers
 - (D) They are unaffected by unipolar electrocautery
 - (E) They sense both atrial and ventricular depolarization
56. A 70-kg patient experiences pain on incision of a thigh abscess. The area around the abscess had been infiltrated with 30 ml of 1% lidocaine in 1:200,000 epinephrine. The local anesthetic was most likely ineffective because of
- (A) acidosis at the site of the injection
 - (B) epinephrine-induced limitation of drug diffusion
 - (C) insufficient dose
 - (D) low ionization of lidocaine
 - (E) protein binding of lidocaine
57. With acute carbon monoxide poisoning
- (A) P_{50} is decreased
 - (B) PaO_2 is decreased
 - (C) arterial oxygen saturation is increased
 - (D) oxygen-carrying capacity of blood is normal
 - (E) 2,3-diphosphoglycerate concentration in erythrocytes is increased
58. During controlled ventilation, which of the following will cause an increase in end-tidal carbon dioxide tension with a normal waveform on the capnograph?
- (A) Bronchospasm
 - (B) Rapid blood loss
 - (C) Ventricular fibrillation
 - (D) Endobronchial migration of the endotracheal tube
 - (E) Release of a thigh tourniquet
59. A healthy 30-year-old woman is undergoing laparoscopy with carbon dioxide insufflation under nitrous oxide 50% in oxygen, isoflurane 0.5%, fentanyl 150 μ g, and controlled ventilation. During the first 15 minutes of the procedure, blood pressure decreases 30%. The most likely cause is
- (A) anesthetic overdose
 - (B) compression of the vena cava
 - (C) gas embolization
 - (D) hypercarbia
 - (E) hypoxemia

60. After an uncomplicated cesarean delivery, a full-term neonate has intermittent cyanosis. Diaphragmatic effort is vigorous and respiratory distress is relieved while crying. The most likely diagnosis is
- (A) amniotic fluid aspiration
 - (B) choanal atresia
 - (C) diaphragmatic hernia
 - (D) tetralogy of Fallot
 - (E) tracheoesophageal fistula
61. An infant with congenital lobar emphysema is scheduled for thoracotomy. Which of the following should be included in the anesthetic management of this infant?
- (A) Helium-oxygen inspired gas mixture
 - (B) Nitrous oxide administration
 - (C) Positive pressure ventilation
 - (D) Prophylactic placement of a chest tube
 - (E) Spontaneous ventilation until the chest is opened
62. Long-term use of cimetidine is associated with
- (A) delayed emergence after thiopental induction
 - (B) increased hypotension after morphine
 - (C) increased risk for isoflurane-induced nephrotoxicity
 - (D) prolonged action of succinylcholine
 - (E) prolonged sedation with diazepam
63. The most common clinical viral infection following homologous blood transfusion is caused by
- (A) cytomegalovirus
 - (B) Epstein-Barr virus
 - (C) hepatitis B virus
 - (D) human immunodeficiency virus
 - (E) non-A, non-B hepatitis virus
64. The risk for airway fire during laser resection of a tracheal tumor is decreased by use of
- (A) a CO₂ laser rather than a YAG laser
 - (B) an inspired helium concentration greater than 60%
 - (C) an inspired nitrous oxide concentration greater than 60%
 - (D) a polyvinylchloride endotracheal tube
 - (E) halothane in the inspired mixture
65. During induction of anesthesia in a 70-year-old man with aortic stenosis, the blood pressure decreases from 140/80 to 70/45 mmHg as the cardiac rhythm changes from normal sinus at 70 bpm to junctional at 120 bpm. The most appropriate initial therapy would be
- (A) cardioversion
 - (B) esmolol
 - (C) fluid bolus
 - (D) phenylephrine
 - (E) verapamil

66. Immediately after a retrobulbar block for cataract surgery, the eye grossly protrudes and the patient has the sensation of pressure in the eye. The most appropriate initial intervention is
- (A) hyperventilation
 - (B) surgical drainage of a hematoma
 - (C) manual compression of the globe
 - (D) administration of atropine intravenously
 - (E) administration of mannitol intravenously
67. A healthy 10-kg child is flushed and restless after premedication with meperidine 15 mg and scopolamine 0.2 mg intramuscularly. His skin is warm and dry; temperature is 38°C, pulse is 130 bpm, and blood pressure is 90/60 mmHg. The most likely cause is
- (A) dehydration
 - (B) idiosyncratic reaction to meperidine
 - (C) malignant hyperthermia
 - (D) neuroleptic malignant syndrome
 - (E) scopolamine
68. Intrabiliary pressure will be increased to the greatest extent by intravenous administration of
- (A) atropine
 - (B) glucagon
 - (C) naloxone
 - (D) fentanyl
 - (E) butorphanol
69. Which of the following is the most reliable indicator of antagonism of nondepolarizing neuromuscular block sufficient for airway protection?
- (A) Clinically assessed ulnar nerve train-of-four ratio of 0.75
 - (B) Peak negative pressure of 25 cmH₂O
 - (C) End-tidal PCO₂ of 40 mmHg during spontaneous ventilation
 - (D) Sustained head lift for 5 seconds
 - (E) Vital capacity of 15 ml/kg
70. Physiologically, coronary blood flow relates most directly to
- (A) cardiac work
 - (B) systolic blood pressure
 - (C) myocardial oxygen consumption
 - (D) heart rate
 - (E) mean arterial pressure
71. The best indication that a patient is ready for discharge from an outpatient facility after spinal anesthesia is return of
- (A) pinprick sensation to the S4-5 dermatome
 - (B) micturition
 - (C) plantar flexion
 - (D) proprioception of the big toe
 - (E) knee extension

72. A 50-year-old man with an 80 pack-year history of cigarette smoking has a forced expiratory volume in one second of 1.5 L and a forced vital capacity of 3.5 L. Which of the following statements concerning intraoperative anesthetic management is true?

- (A) An I:E ratio of 1:1 will improve carbon dioxide removal more than an I:E ratio of 1:2.5
- (B) Antagonism of neuromuscular block will most likely trigger acute bronchospasm
- (C) Functional residual capacity will increase during an acute exacerbation of bronchospasm
- (D) Induction with ketamine will increase airway resistance
- (E) Nitrous oxide is contraindicated

73. An infant becomes cyanotic and hypotensive after ventilatory pressures increase to 45 cmH₂O during closure of the abdominal wall at the end of a gastroschisis repair. The most appropriate next step is to

- (A) administer a muscle relaxant
- (B) administer 5% dextrose in lactated Ringer's solution 10 ml/kg
- (C) change the endotracheal tube
- (D) ask the surgeon to insert a chest tube
- (E) ask the surgeon to reopen the abdomen

74. A 3.3-kg neonate is brought to the operating room for repair of a left diaphragmatic hernia. A 3-mm endotracheal tube is placed to a depth of 9 cm. Initial arterial blood gas values from a right radial catheter while spontaneously breathing oxygen 50% are PaO₂ 82 mmHg, PaCO₂ 41 mmHg, pH 7.33, and base excess -5. After reduction of the hernia (during closure of the abdomen), vigorous attempts to expand the atelectatic lung are unsuccessful. The infant rapidly becomes very dusky, heart rate is 60 bpm, breath sounds are distant and squeaky bilaterally, and pulmonary compliance is decreased.

Which of the following should be done first?

- (A) Obtain a radiograph of the chest
- (B) Place a chest tube on the left side
- (C) Place a chest tube on the right side
- (D) Withdraw the endotracheal tube 1 cm and suction
- (E) Reopen the abdomen

75. Cardiac output measured by thermodilution with a pulmonary artery catheter most accurately reflects systemic blood flow in a patient with

- (A) aortic regurgitation
- (B) atrial septal defect
- (C) patent ductus arteriosus
- (D) tricuspid insufficiency
- (E) ventricular septal defect

76. During general anesthesia using a modern anesthesia machine, a patient's spontaneous ventilation is manually assisted with a fresh gas flow of 5 L/min. A sudden malfunction of the pressure-relief (pop-off) valve of the circle absorption system occurs, and the valve cannot be opened. The most appropriate next step is to

- (A) change to a smaller reservoir bag
- (B) increase total fresh gas flow
- (C) open the scavenger valve
- (D) control ventilation manually
- (E) switch to mechanical ventilatory mode

77. After brachial plexus block via an axillary approach, a patient has sensation on the dorsum of the second and third digits and is able to extend the distal phalanx of the thumb. To block the unaffected nerve, anesthetic should be injected at which of the following sites?
- (A) 2 Cm lateral to the biceps tendon at the level of the elbow
 - (B) At the radial border of the palmaris longus tendon
 - (C) Between the medial epicondyle and the olecranon
 - (D) Between the radial artery and the styloid process
 - (E) Just medial to the brachial artery at the elbow
78. Which of the following vaporizer filling errors is most likely to result in inadvertent anesthetic overdose?
- (A) Enflurane in a halothane vaporizer
 - (B) Enflurane in an isoflurane vaporizer
 - (C) Halothane in an enflurane vaporizer
 - (D) Halothane in an isoflurane vaporizer
 - (E) Isoflurane in an enflurane vaporizer
79. Which of the following antihypertensive drugs is most likely to cause bradycardia?
- (A) Captopril
 - (B) Clonidine
 - (C) Hydralazine
 - (D) Nifedipine
 - (E) Phenoxybenzamine
80. The EEG begins to flatten during carotid endarterectomy when regional cerebral blood flow (in ml/min/100 g brain) decreases to
- (A) 55
 - (B) 45
 - (C) 30
 - (D) 20
 - (E) 10
81. In a patient with a history of grand mal seizures, which of the following is most useful in distinguishing a seizure from normal anesthetic emergence?
- (A) Mydriasis
 - (B) Myoclonic activity
 - (C) Nystagmus
 - (D) Positive Babinski sign
 - (E) None of the above
82. Compared with lidocaine, bupivacaine is more likely to cause dysrhythmias because it
- (A) enhances potassium-hydrogen ion exchange
 - (B) is less soluble in lipids
 - (C) produces more prolonged block of sodium channels
 - (D) sensitizes the myocardium to catecholamines
 - (E) sustains calcium channels open

83. A successful celiac plexus block can be expected to
- (A) block parasympathetic fibers to the adrenal medulla
 - (B) block sympathetic fibers to the sigmoid colon
 - (C) block somatic fibers to the pancreas
 - (D) enhance peristalsis
 - (E) inhibit ejaculation
84. Which of the following must be considered during perioperative management of a patient on long-term lithium therapy?
- (A) Intravenous fluids should include sodium
 - (B) Therapy should be discontinued for 14 days prior to anesthesia
 - (C) The requirement for succinylcholine is increased
 - (D) The requirement for volatile anesthetics is increased
 - (E) Urine output should be maintained with furosemide
85. A 4-year-old child has just undergone a one-hour tonsillectomy with a volatile anesthetic, nitrous oxide, and oxygen. Which of the following will result in the most rapid emergence?
- (A) Decreased PaCO_2
 - (B) Increased cardiac output
 - (C) Increased fresh gas flow
 - (D) Increased solubility of the volatile agent
 - (E) Presence of a ventricular septal defect
86. Compared with an induction dose of thiopental (4 mg/kg), an induction dose of propofol (2.5 mg/kg) produces
- (A) better maintenance of cerebral perfusion pressure
 - (B) greater inhibition of glucocorticoid production
 - (C) higher incidence of myoclonus
 - (D) less severe hypotension
 - (E) less severe respiratory depression
87. Which of the following laboratory studies is most reliable in differentiating prerenal azotemia from acute tubular necrosis?
- (A) Creatinine clearance
 - (B) Fractional excretion of sodium
 - (C) Urine/plasma urea ratio
 - (D) Urine sodium content
 - (E) Urine specific gravity
88. A 5-month-old infant with tetralogy of Fallot is scheduled for elective inguinal herniorrhaphy. Which of the following would require the operation to be postponed?
- (A) Current propranolol therapy
 - (B) Hematocrit of 65%
 - (C) History of "tet spells"
 - (D) Patent ductus arteriosus
 - (E) Room air oxygen saturation of 82%

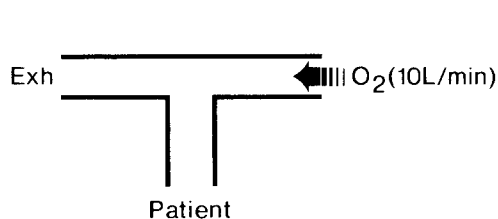


Figure 1

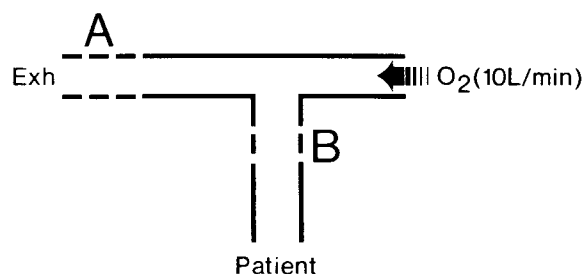


Figure 2

89. An intubated patient is breathing spontaneously through the T-piece shown in Figure 1. Addition of tubing at A and B as shown in Figure 2 without an increase in minute ventilation will result in
- (A) unchanged FiO_2 and increased PaCO_2
 - (B) unchanged FiO_2 and unchanged PaCO_2
 - (C) increased FiO_2 and increased PaCO_2
 - (D) increased FiO_2 and unchanged PaCO_2
 - (E) decreased FiO_2 and increased PaCO_2
-
90. A moderately obese 38-year-old woman is using patient-controlled morphine analgesia one day after open cholecystectomy. While breathing room air, oxygen saturation is 85%, PaO_2 is 48 mmHg, PaCO_2 is 42 mmHg, and pH is 7.36. In addition to administration of oxygen, the most effective management is to
- (A) decrease the dosage of opioids
 - (B) change to epidural morphine
 - (C) administer an inhaled bronchodilator
 - (D) initiate 4 cm of nasal continuous positive airway pressure
 - (E) initiate incentive spirometry therapy
91. Which of the following statements is true concerning administration of 70% nitrous oxide to a patient with an unrecognized pneumothorax?
- (A) Expansion of the pneumothorax by nitrous oxide occurs at a greater rate than expansion of bowel gas
 - (B) Expansion of the pneumothorax by nitrous oxide occurs at a linear rate
 - (C) The maximum expansion of a closed space occurs within 15 minutes
 - (D) The maximum concentration of nitrous oxide achievable within the pneumothorax is 35%
 - (E) The maximum increase in a closed gas-containing space is 100%
92. Which of the following is the best method of pacing to improve cardiac output in a patient with third-degree heart block?
- (A) VOO
 - (B) AOO
 - (C) VVI
 - (D) DVI
 - (E) Transcutaneous

93. A 27-year-old man with chronic renal failure is to undergo revision of an arteriovenous graft. He insists on general anesthesia. Hemodialysis was completed two hours ago, and serum potassium concentration is now 5 mEq/L. Which of the following statements concerning anesthetic management of this patient is true?

- (A) Enflurane is contraindicated
- (B) Succinylcholine is contraindicated
- (C) Neostigmine will be required in larger than usual dosage
- (D) The duration of action of atracurium will be prolonged
- (E) The duration of action of propofol will be unchanged

94. Compared with dopamine, dobutamine

- (A) is more useful in patients taking monoamine oxidase inhibitors because it depends on the release of norepinephrine for its effect
- (B) is more useful in patients in right heart failure because it does not increase pulmonary vascular resistance
- (C) has no positive chronotropic response
- (D) induces diuresis without increasing cardiac output
- (E) in doses greater than 10 $\mu\text{g/kg/min}$ increases systemic vascular resistance more than similar doses of dopamine

95. A patient with moderate hypothyroidism and unstable angina requires urgent coronary artery bypass grafting. Which of the following is most appropriate before proceeding with the operation?

- (A) Initiation of epinephrine infusion
- (B) Intramuscular administration of a barbiturate
- (C) Intravenous administration of triiodothyronine (T_3)
- (D) Intravenous administration of thyroxine (T_4)
- (E) Treatment of myocardial ischemia

96. A 48-year-old woman underwent a posterior fossa craniotomy in the sitting position. Monitoring included precordial Doppler, arterial blood pressure, central venous pressure (CVP), and urine output. Furosemide was used intraoperatively for cerebral decompression, and the operation was uneventful. In the recovery room, she was awake with stable vital signs when the CVP suddenly increased from 6 to 25 mmHg without any change in blood pressure. Shortly thereafter, premature ventricular contractions are noted.

After administering lidocaine 1 mg/kg intravenously, the most appropriate action is to

- (A) position the patient head down, right side up and aspirate the CVP catheter
- (B) withdraw the CVP catheter 5 cm
- (C) infuse potassium chloride rapidly
- (D) administer furosemide
- (E) ask the neurosurgeon to reevaluate the patient immediately

97. Failure to block the musculocutaneous nerve adequately during the axillary approach to brachial plexus block will result in inadequate anesthesia of the

- (A) thumb and index finger
- (B) dorsum of the wrist
- (C) lateral aspect of the forearm
- (D) lateral aspect of the elbow
- (E) medial aspect of the upper arm

98. After inflation of both the tracheal and endobronchial cuffs of a left-sided double-lumen tube, the following are noted on auscultation of the chest:

Left lumen clamped	Breath sounds absent bilaterally
Right lumen clamped	Breath sounds present on left only
Both lumens open	Breath sounds present on left only

The most appropriate action is to

- (A) decrease the endobronchial cuff volume
- (B) decrease the tracheal cuff volume
- (C) reinsert the tube, rotating it 180 degrees to the right
- (D) suction both lumens
- (E) withdraw the tube slightly and repeat the auscultatory maneuvers

99. Ketamine decreases

- (A) bronchomotor tone
- (B) intracranial pressure
- (C) intraocular pressure
- (D) salivation
- (E) seizure threshold

100. Maternal hyperventilation to a PaCO_2 of 20 mmHg during labor can result in

- (A) decreased fetal trapping of local anesthetics
- (B) fetal metabolic acidosis
- (C) fetal respiratory acidosis
- (D) increased oxygen release at the placenta
- (E) uterine vasodilation

101. A 40-year-old woman is undergoing a posterior fossa craniotomy in the sitting position for clipping of a basilar artery aneurysm. Nitroprusside is being used to maintain mean arterial pressure at 50 mmHg, measured at head level. During dissection, over the course of one minute, the mean blood pressure decreases to 30 mmHg. Simultaneously, end-tidal carbon dioxide and pulmonary artery pressures decrease and heart rate increases.

The most likely cause of these changes is

- (A) progressive hypoxemia
- (B) nitroprusside bolus
- (C) junctional rhythm
- (D) brain stem manipulation
- (E) venous air embolism

102. An anesthetized, paralyzed patient is placed in the lateral position and mechanically ventilated. End-tidal PCO_2 is 34 mmHg and PaCO_2 is 43 mmHg. This gradient

- (A) increases during spontaneous breathing
- (B) indicates increased dead space ventilation
- (C) is caused by increased intrapulmonary shunt
- (D) reflects inhibition of hypoxic pulmonary vasoconstriction
- (E) results from increased cardiac output

103. A patient suddenly makes a respiratory effort during craniotomy for clipping of a cerebral aneurysm in a 15-degree head-up position with controlled ventilation. The most likely cause is
- (A) air embolism
 - (B) cerebral hypoxia
 - (C) direct stimulation of the respiratory center
 - (D) intraventricular hemorrhage
 - (E) stimulation of the motor cortex
104. During an operation with cardiopulmonary bypass using a bubble oxygenator, the risk for systemic gas embolization increases when
- (A) a filter greater than 20 microns is used in the arterial infusion tubing
 - (B) gas flow to the oxygenator is decreased below 3 L/min
 - (C) the operation is a mitral valve replacement
 - (D) the blood level in the oxygenator reservoir exceeds 1 liter
 - (E) ventricular fibrillation occurs
105. Which of the following attenuates the most common cardiovascular side effect of protamine administration?
- (A) Pretreatment with a diuretic
 - (B) Pretreatment with a prostaglandin inhibitor
 - (C) Pretreatment with a pulmonary vasodilator
 - (D) Injection via the distal lumen of the pulmonary artery catheter
 - (E) Slow peripheral intravenous injection
106. Prilocaine is NOT recommended for obstetric regional anesthesia because it
- (A) causes fetal methemoglobinemia
 - (B) has a very short duration of action
 - (C) is not metabolized by the newborn
 - (D) is the most toxic of the amide local anesthetics
 - (E) produces a longer motor block than sensory block
107. Infants with untreated pyloric stenosis are at increased risk for each of the following EXCEPT
- (A) congenital heart disease
 - (B) dehydration
 - (C) hypokalemia
 - (D) increased gastric acidity
 - (E) metabolic alkalosis
108. A sensory level of T2 is achieved after administration of spinal anesthesia. Which of the following lung volumes is LEAST likely to be affected?
- (A) Expiratory reserve volume
 - (B) Inspiratory reserve volume
 - (C) Inspiratory capacity
 - (D) Tidal volume
 - (E) Vital capacity

109. Which of the following is the LEAST likely cause of a prolonged prothrombin time?
- (A) Chronic warfarin therapy
 - (B) Disseminated intravascular coagulation
 - (C) Hemophilia A
 - (D) Systemic heparinization
 - (E) Vitamin K deficiency
110. Each of the following affects the induction dose of thiopental EXCEPT
- (A) acute ethanol intoxication
 - (B) chronic use of barbiturates
 - (C) intravascular volume
 - (D) rate of hepatic extraction of thiopental
 - (E) serum albumin concentration
111. Fresh frozen plasma is indicated in each of the following situations EXCEPT
- (A) after rapid transfusion of 1.5 L CPD-stored red blood cells
 - (B) antithrombin III deficiency
 - (C) replacement of factor VIII
 - (D) reversal of warfarin effect
 - (E) thrombotic thrombocytopenic purpura
112. A subarachnoid block to a sensory level of the second thoracic dermatome is associated with each of the following EXCEPT
- (A) total sympathetic block
 - (B) decreased gastrointestinal smooth muscle tone
 - (C) bradycardia
 - (D) relaxation of gastrointestinal sphincters
 - (E) decreased renal blood flow
113. Each of the following is an adverse effect of intranasal administration of cocaine prior to nasotracheal intubation EXCEPT
- (A) complete heart block
 - (B) hypertension
 - (C) myocardial ischemia
 - (D) seizures
 - (E) ventricular tachycardia
114. Each of the following improves coagulation in patients with uremia EXCEPT
- (A) conjugated estrogens
 - (B) desmopressin
 - (C) dialysis
 - (D) epsilon-aminocaproic acid
 - (E) platelet transfusion

115. Each of the following is an adverse effect of ritodrine used for suppression of labor EXCEPT
- (A) dysrhythmias
 - (B) hyperglycemia
 - (C) hyperkalemia
 - (D) hypotension
 - (E) pulmonary edema
116. Positive end-expiratory pressure is effective for treatment of hypoxia resulting from each of the following EXCEPT
- (A) cardiogenic pulmonary edema
 - (B) intraoperative Trendelenburg position
 - (C) lateral position during total hip replacement
 - (D) lung contusion
 - (E) status asthmaticus
117. Each of the following is associated with an increased alveolar-arterial oxygen tension difference EXCEPT
- (A) advanced age
 - (B) atelectasis
 - (C) decreased cardiac output
 - (D) decreased FiO_2
 - (E) right-to-left intracardiac shunt
118. Each of the following statements concerning norepinephrine is true EXCEPT:
- (A) Extraneuronal uptake is important in the termination of its activity
 - (B) It is formed from dopamine
 - (C) Its release is facilitated by ephedrine
 - (D) Its uptake is affected by cocaine
 - (E) It has minimal β_2 -adrenergic activity

**1992 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1992, and is provided for instructional purposes only. The key was verified in 1992 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

The American Board of Anesthesiology Written Examination for Primary Certification is a subset of the ABA/ASA In-Training Examination. Approximately 80% of the questions were included in the grading of the ABA Written Examination, whereas the remainder were graded only for the ABA/ASA In-Training Examination.

1. A	31. E	61. C	91. E	121. B	151. C
2. D	32. C	62. A	92. C	122. B	152. A
3. D	33. C	63. A	93. E	123. A	153. A
4. E	34. A	64. A	94. D	124. D	154. B
5. B	35. C	65. D	95. E	125. D	155. B
6. B	36. C	66. A	96. E	126. A	156. C
7. D	37. C	67. D	97. D	127. B	157. B
8. C	38. A	68. A	98. B	128. B	158. C
9. D	39. A	69. B	99. D	129. D	159. B
10. E	40. A	70. D	100. D	130. D	160. B
11. E	41. B	71. E	101. D	131. A	161. A
12. B	42. B	72. C	102. A	132. D	162. A
13. C	43. B	73. B	103. A	133. B	163. A
14. D	44. C	74. E	104. E	134. D	164. E
15. A	45. C	75. D	105. E	135. C	165. B
16. E	46. B	76. A	106. D	136. E	166. D
17. B	47. C	77. E	107. E	137. D	167. B
18. A	48. D	78. E	108. B	138. B	168. D
19. E	49. A	79. E	109. E	139. A	169. A
20. E	50. A	80. A	110. C	140. E	170. C
21. E	51. C	81. B	111. E	141. A	171. A
22. D	52. E	82. E	112. B	142. C	172. B
23. C	53. B	83. E	113. A	143. C	173. E
24. C	54. B	84. B	114. A	144. B	174. C
25. C	55. A	85. E	115. C	145. B	175. A
26. A	56. B	86. D	116. E	146. A	
27. C	57. E	87. C	117. E	147. D	
28. A	58. C	88. D	118. B	148. B	
29. A	59. B	89. B	119. B	149. A	
30. A	60. E	90. C	120. A	150. B	

**1992 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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1. E	31. E	61. E	91. A	121. A	151. C
2. C	32. A	62. E	92. D	122. B	152. E
3. D	33. B	63. E	93. E	123. B	153. A
4. C	34. D	64. B	94. B	124. B	154. A
5. E	35. D	65. D	95. E	125. D	155. B
6. E	36. C	66. B	96. B	126. C	156. D
7. A	37. E	67. E	97. C	127. D	157. B
8. C	38. D	68. D	98. E	128. E	158. A
9. B	39. D	69. D	99. A	129. B	159. A
10. A	40. D	70. C	100. B	130. A	160. B
11. D	41. A	71. B	101. B	131. E	161. A
12. A	42. C	72. C	102. B	132. A	162. A
13. C	43. D	73. E	103. A	133. D	163. B
14. B	44. C	74. C	104. C	134. A	164. B
15. C	45. A	75. A	105. E	135. B	165. A
16. A	46. B	76. E	106. A	136. D	166. D
17. A	47. D	77. A	107. A	137. D	167. C
18. C	48. D	78. C	108. D	138. E	168. C
19. B	49. D	79. B	109. C	139. C	169. B
20. A	50. A	80. D	110. D	140. A	170. B
21. A	51. E	81. E	111. A	141. A	171. A
22. C	52. A	82. C	112. B	142. B	172. E
23. C	53. A	83. D	113. A	143. B	173. B
24. A	54. B	84. A	114. D	144. E	174. D
25. B	55. A	85. C	115. C	145. B	175. A
26. B	56. A	86. C	116. E	146. E	
27. E	57. A	87. B	117. D	147. B	
28. B	58. E	88. B	118. A	148. A	
29. C	59. B	89. C	119. C	149. C	
30. A	60. B	90. E	120. D	150. A	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1993

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is **BEST** in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. Left ventricular subendocardial perfusion pressure is best estimated by the difference between
 - (A) mean arterial and central venous pressures
 - (B) diastolic arterial and pulmonary artery occlusion pressures
 - (C) mean arterial and pulmonary artery occlusion pressures
 - (D) systolic arterial and pulmonary artery occlusion pressures
 - (E) diastolic arterial and central venous pressures

2. Oxygen 100 ml/min is bubbled through a vaporizer containing an anesthetic with a vapor pressure of 150 mmHg, and this mixture is added to a fresh gas flow of 5 L/min. The delivered anesthetic concentration is
 - (A) 0.25%
 - (B) 0.5%
 - (C) 1%
 - (D) 2.5%
 - (E) 5%

3. In children with preoperative upper respiratory tract infection, which of the following is associated with the greatest risk for postoperative airway obstruction?
 - (A) Age less than 1 year
 - (B) Endotracheal intubation
 - (C) Head and neck surgery
 - (D) Inadequate airway humidification
 - (E) Surgery for more than two hours

4. An 8-kg, 1-year-old child has a measured blood loss of 50 ml during the first two hours of a rectal pull-through operation. Preoperative hematocrit was 31%. Balanced saline solution 150 ml has been administered for replacement. Urine output has been 2 ml for the last hour, heart rate is 160 bpm, and blood pressure is 40/15 mmHg.

The most appropriate fluid therapy is

- (A) 25% albumin
- (B) balanced salt solution
- (C) balanced salt solution and mannitol
- (D) 5% dextrose in 0.45% saline solution
- (E) packed red blood cells

5. A 24-year-old man who sustained multiple rib fractures in a motor vehicle accident has air leaks through bilateral chest tubes. Which of the following is most likely following initiation of high-frequency jet ventilation?
- (A) Airway pressure will be measured most reliably at the proximal (external) end of the endotracheal tube
 - (B) Atelectatic areas of the lungs will re-expand
 - (C) Changes in end-tidal carbon dioxide tension measured at the tip of the endotracheal tube will match changes in PaCO_2
 - (D) Hypercarbia will develop
 - (E) The air leaks will be proportional to peak airway pressure
6. A 35-year-old man has acute onset of low back pain, lower extremity weakness, and bladder dysfunction. He had a lumbar laminectomy two years ago. A myelogram shows disk herniation at L4-5. The most appropriate management is
- (A) bed rest
 - (B) administration of a nonsteroidal anti-inflammatory agent
 - (C) epidural administration of a corticosteroid
 - (D) epidural administration of a local anesthetic
 - (E) surgical decompression
7. Which of the following is more likely to occur with use of trimethaphan to induce hypotension than with use of nitroprusside?
- (A) A predictable decrease in mean arterial pressure
 - (B) Increased mixed venous PO_2
 - (C) Increased serum lactate concentration
 - (D) Mydriasis
 - (E) Reflex tachycardia
8. An increased initial dose and a decreased maintenance dose of pancuronium are required in patients with
- (A) advanced age
 - (B) burns
 - (C) cirrhosis
 - (D) chronic renal failure
 - (E) fever
9. Which of the following statements concerning variable decelerations of fetal heart rate is true?
- (A) It indicates compression of the umbilical cord
 - (B) It indicates compression of the fetal head
 - (C) It indicates prematurity
 - (D) It is obliterated by atropine
 - (E) It occurs normally following epidural anesthesia
10. Which of the following is a complication of glycine used for irrigation during transurethral resection of the prostate?
- (A) Epileptiform activity on EEG
 - (B) Peripheral neuropathy
 - (C) Tachycardia
 - (D) Transient blindness
 - (E) Transient deafness

11. While checking an anesthesia machine, opening the oxygen flow-control valve yields no oxygen flow, although the wall-mounted oxygen pipeline supply gauge reads 50 psig. Opening the backup oxygen cylinder results in normal oxygen flow. The most likely cause is
- (A) failure of the oxygen pipeline supply
 - (B) failure of the second-stage oxygen pressure regulator
 - (C) a malfunctioning check valve in the oxygen pipeline supply inlet
 - (D) a malfunctioning fail-safe valve
 - (E) a malfunctioning oxygen flow-control valve
12. Which of the following statements concerning banked blood is true?
- (A) Red blood cells preserved with CPDA-1 have a shelf life of approximately 21 days
 - (B) Packed red blood cells deliver oxygen normally immediately after administration
 - (C) Packed red blood cells contain most of the leukocytes present in the donated unit
 - (D) Citrate is used as a source of energy for whole blood
 - (E) Stored whole blood contains all coagulation factors except II and VIII
13. With long-term administration, which of the following drugs produces the most prolonged sedative effect of diazepam?
- (A) Cimetidine
 - (B) Famotidine
 - (C) Metoclopramide
 - (D) Ranitidine
 - (E) Warfarin
14. The effect of neomycin at the neuromuscular junction is
- (A) decreased by depolarizing relaxants
 - (B) partially reversed by calcium
 - (C) potentiated by anticholinesterases
 - (D) prevented by pretreatment with magnesium
 - (E) primarily prejunctional
15. Compared with diazepam, midazolam
- (A) is more lipid soluble
 - (B) has a longer elimination half-life
 - (C) has a larger volume of distribution
 - (D) has a greater clearance
 - (E) undergoes slower hepatic metabolism
16. A 73-year-old woman with a preoperative serum creatinine concentration of 2.1 mg/dl develops oliguria during enflurane anesthesia. Urine sodium concentration is 10 mEq/L and urine osmolality is 450 mOsm/L. The most likely cause of these findings is
- (A) acute renal failure
 - (B) chronic renal insufficiency
 - (C) decreased renal perfusion
 - (D) fluoride nephrotoxicity
 - (E) intraoperative administration of furosemide

17. The odor of isoflurane is noted during isoflurane anesthesia with an endotracheal tube and mechanical ventilation. Mean airway pressure is unchanged. A scavenging system with an open interface and an active disposal system is being used. The most likely cause of the isoflurane odor is
- (A) a leak in the inspiratory limb of the anesthesia circuit
 - (B) application of excessive negative pressure to the scavenging interface
 - (C) malfunction of the pop-off valve of the anesthesia machine
 - (D) obstruction of the gas disposal tubing leading from the scavenging interface
 - (E) obstruction of the transfer tubing to the scavenging interface
18. During active labor, 10 ml of bupivacaine 0.5% with epinephrine 1:200,000 is administered epidurally. Fifteen minutes later, maternal blood pressure is 70/50 mmHg and heart rate is 70 bpm; fetal heart rate is 90 bpm for 45 seconds, with loss of beat-to-beat variability. The most likely explanation for the fetal vital signs is
- (A) fetal bupivacaine cardiotoxicity
 - (B) maternal bupivacaine cardiotoxicity
 - (C) maternal hypotension
 - (D) uterine artery vasoconstriction
 - (E) umbilical cord compression
19. A 2500-g, 12-hour-old infant is tracheally intubated and mechanically ventilated at a rate of 20/min with an FiO_2 of 0.4 and peak inspiratory pressure of 25 cmH_2O . At birth, amniotic fluid was meconium stained and Apgar scores were 2 and 7. The most recent arterial blood gas levels are PaO_2 50 mmHg, PaCO_2 55 mmHg, and pH 7.20. The most appropriate management is to
- (A) administer sodium bicarbonate
 - (B) begin intravenous infusion of prostaglandin E_1
 - (C) increase FiO_2
 - (D) increase ventilation
 - (E) perform bronchial lavage
20. During insufflation of the peritoneal cavity with carbon dioxide at the start of laparoscopy, heart rate increases to 140 bpm, blood pressure decreases to 70/40 mmHg, and a loud murmur is heard through the esophageal stethoscope. The most appropriate immediate step is to
- (A) administer a vasoconstrictor
 - (B) infuse crystalloid solution rapidly
 - (C) discontinue the inhaled anesthetic
 - (D) insert a central venous catheter
 - (E) deflate the abdomen
21. Thirty-six hours after primary repair of meningocele, a term newborn has frequent periods of apnea lasting 25 seconds and associated with oxygen desaturation to 80%. The most likely explanation is
- (A) hyperglycemia
 - (B) loss of cerebrospinal fluid
 - (C) obstructive hydrocephalus
 - (D) residual anesthetic effect
 - (E) normal postoperative events

22. The hemodynamic profile below is from a 62-year-old man in the ICU after coronary artery bypass grafting.

	<u>Entering ICU</u>	<u>+ 30 Minutes</u>
Heart rate (bpm)	90	120
Blood pressure (mmHg)	125/75	80/30
PADP (mmHg)	12	25
PAOP (mmHg)	10	25
CVP (mmHg)	6	8

Which of the following is the most likely cause of the changes occurring after 30 minutes?

- (A) Anaphylactic reaction
- (B) Left ventricular ischemia
- (C) Pericardial tamponade
- (D) Pulmonary embolism
- (E) Septic shock

23. Myofascial pain is an example of

- (A) a central pain state
- (B) neuropathic pain
- (C) psychogenic pain
- (D) somatic pain
- (E) visceral pain

24. A 50-year-old man who takes aspirin and nifedipine is scheduled for thoracotomy with one-lung ventilation. Which of the following is associated with the greatest risk for intraoperative hypoxemia?

- (A) Preoperative withdrawal of nifedipine therapy
- (B) Intraoperative mild respiratory acidosis
- (C) Intraoperative administration of isoflurane
- (D) Intraoperative administration of nitroglycerin
- (E) Intraoperative thoracic epidural morphine

25. A 30-year-old woman has difficulty talking 15 minutes after initiation of interscalene block for closed reduction of a dislocated shoulder. The most likely cause is

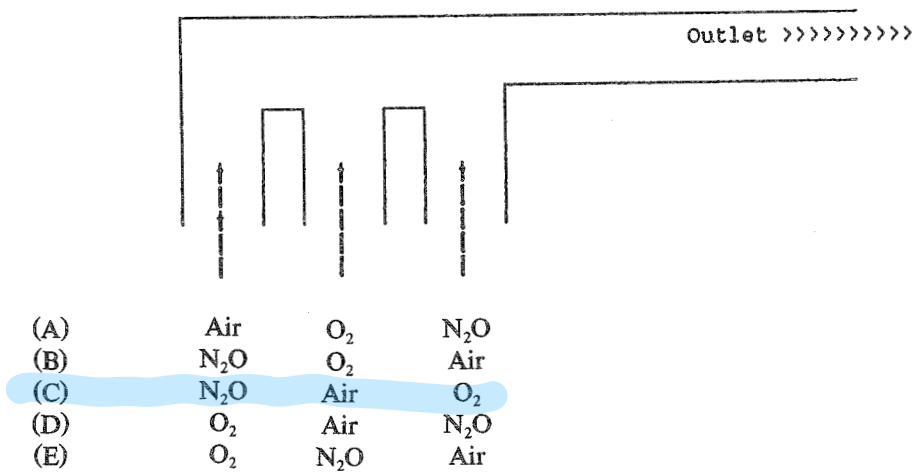
- (A) cervical sympathetic block
- (B) delayed systemic toxic reaction
- (C) phrenic nerve paralysis
- (D) pneumothorax
- (E) recurrent laryngeal nerve block

26. A patient is bleeding excessively after routine transurethral resection of the prostate. Re-exploration discloses diffuse oozing. The most appropriate management is administration of

- (A) platelets
- (B) fresh frozen plasma
- (C) desmopressin
- (D) epsilon-aminocaproic acid
- (E) cryoprecipitate

27. Which of the following is indicated by an alarm condition in the line-isolation monitor?
- (A) An electrical shock to the patient
 - (B) A power surge in the main hospital power supply
 - (C) Disconnection of the patient from an electrocautery grounding pad
 - (D) Overload of the operating room circuits
 - (E) The presence of a current leak between an operating room electrical device and ground
28. Which of the following statements concerning functional residual capacity is true?
- (A) It decreases linearly during a three-hour anesthetic
 - (B) It decreases in pregnancy primarily because of a decrease in the expiratory reserve volume
 - (C) It increases in patients with a history of heavy smoking
 - (D) It increases with pulmonary contusions
 - (E) It is smaller (ml/kg) in children than in adults
29. An acutely ill 65-year-old man with sepsis has severe hypophosphatemia. Which of the following is most likely to result from this electrolyte disorder?
- (A) Bronchospasm
 - (B) Diarrhea
 - (C) Muscle weakness
 - (D) Seizures
 - (E) Ventricular ectopy
30. During a right lower lobe resection, SpO₂ decreases from 99% to 70% after institution of one-lung ventilation. FiO₂ is 1.0. The most appropriate management is to
- (A) administer an inhaled bronchodilator
 - (B) apply continuous positive airway pressure to the right lung
 - (C) apply positive end-expiratory pressure to the left lung
 - (D) increase tidal volume
 - (E) reinflate the right lung
31. Carbon dioxide retention first occurs when the ratio of forced expiratory volume in 1 second to vital capacity (FEV₁/VC) decreases below
- (A) 15%
 - (B) 35%
 - (C) 50%
 - (D) 65%
 - (E) 75%
32. Which of the following statements concerning pipecuronium is true?
- (A) It has a faster onset than pancuronium
 - (B) It increases systemic vascular resistance
 - (C) It induces tachycardia
 - (D) It is eliminated by the kidney
 - (E) It induces histamine release

33. In the event of a leak in the air flowmeter, which flowmeter arrangement produces the lowest risk for delivering hypoxic gas mixtures?



34. Which of the following statements concerning propofol is true?

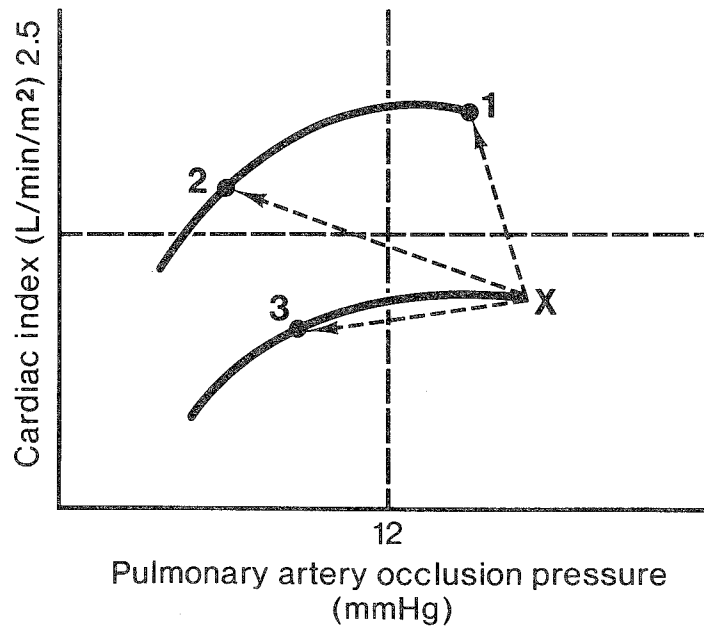
- (A) Active metabolites can produce residual postoperative sedation
- (B) It causes less cardiovascular depression than an equivalent induction dose of thiopental
- (C) It causes less respiratory depression than an equivalent induction dose of thiopental
- (D) It has analgesic properties
- (E) The vehicle emulsion is associated with hypersensitivity reactions

35. Arterial pressure in the radial artery is 155/70 mmHg measured by a correctly calibrated catheter-transducer system. At the same time, aortic pressure is 140/75 mmHg using a high-fidelity catheter tip transducer. The most likely cause of this discrepancy is

- (A) a large amount of air in the dome of the radial artery transducer
- (B) coarctation of the aorta
- (C) peripheral vascular constriction produced by sympathetic stimulation
- (D) physiologic amplification of the waveform from the aorta to the radial artery
- (E) too high a frequency response in the catheter-transducer system

36. One hour after an open cholecystectomy, a 42-year-old patient is hemodynamically stable and breathing spontaneously (rate 10/min and regular) at an FIO₂ of 0.4. Fentanyl, isoflurane, nitrous oxide, and pancuronium were used during the procedure. Analysis of arterial blood gases is most likely to show:

	pH	PCO ₂ (mmHg)	PO ₂ (mmHg)
(A)	7.18	40	100
(B)	7.18	60	140
(C)	7.28	50	85
(D)	7.40	26	220
(E)	7.40	40	40



37. In the diagram above, point "X" represents a patient with severe left ventricular dysfunction. The points labeled 1, 2, and 3 each represent the results of a different therapeutic intervention. Which of the following represents the most likely intervention at each point?

	<u>Point 1</u>	<u>Point 2</u>	<u>Point 3</u>
(A)	Dopamine	Furosemide	Nitroprusside
(B)	Dopamine	Nitroprusside	Furosemide
(C)	Furosemide	Dopamine	Nitroprusside
(D)	Nitroprusside	Dopamine	Furosemide
(E)	Nitroprusside	Furosemide	Dopamine

38. Following pneumonectomy, a paralyzed patient being mechanically ventilated has the following arterial blood gas values: PaO_2 71 mmHg, PaCO_2 55 mmHg, pH 7.29. SvO_2 is 45%. The most likely explanation for this SvO_2 is

- (A) decreased red cell mass
- (B) high cardiac output
- (C) hypothermia
- (D) peripheral left-to-right arteriovenous shunt
- (E) ventilation/perfusion mismatch

39. A 6-year-old child with asthma begins wheezing during anesthesia with halothane and nitrous oxide in oxygen. A loading dose of aminophylline is administered followed by continuous infusion. Premature ventricular contractions appear on the ECG. The most appropriate management is to

- (A) administer fentanyl
- (B) discontinue aminophylline
- (C) increase exhalation time
- (D) increase the inspired concentration of halothane
- (E) switch the inhalational agent to isoflurane

40. A 60-year-old woman who is taking propranolol for hypertension and is allergic to penicillin is anesthetized with thio-pental and halothane for resection of an abdominal aortic aneurysm. Shortly after intubation she is given vancomycin 500 mg intravenously, after which her blood pressure decreases from 140/80 to 70/50 mmHg while her heart rate remains steady at 64 bpm.

The most likely explanation for the decrease in blood pressure is

- (A) cross-sensitivity of penicillin and vancomycin
- (B) interaction of vancomycin and propranolol
- (C) vancomycin-induced anaphylactoid reaction
- (D) interaction of halothane and propranolol
- (E) interaction of halothane and vancomycin

41. During uncomplicated mask induction with halothane and 50% nitrous oxide in oxygen in a 6-month-old infant with a large ventricular septal defect and valvular pulmonic stenosis, SpO_2 decreases from 85% (room air) to 60%; heart rate is 100 bpm and blood pressure is 62/40 mmHg. The most appropriate management is to

- (A) administer atropine
- (B) administer phenylephrine
- (C) administer propranolol
- (D) increase anesthetic depth
- (E) intubate the trachea

42. Which of the following complications of caudal anesthesia with 0.25% bupivacaine is more likely in children than in adults?

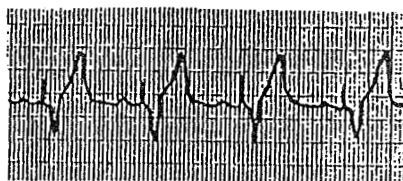
- (A) Intravascular injection
- (B) Neurotoxicity
- (C) Profound motor block
- (D) Systemic toxicity
- (E) Total spinal block

43. A 100-kg, 42-year-old woman received enflurane and oxygen for clipping of an intracranial aneurysm lasting eight hours. In the first two postoperative hours, urine output is 2 liters. Serum sodium concentration is 152 mEq/L. Urine osmolality and central venous pressure are low. Which of the following is best used to establish the diagnosis?

- (A) Pulmonary artery occlusion pressure
- (B) Serum fluoride concentration
- (C) Serum osmolality
- (D) Response to antidiuretic hormone
- (E) Response to fluid restriction

44. During enflurane anesthesia for colectomy in a 75-year-old man with sepsis, urine output decreases to 10 ml/hr. Heart rate is 120 bpm, blood pressure is 100/50 mmHg, central venous pressure is 10 mmHg, and pulmonary artery occlusion pressure is 15 mmHg. The most appropriate management at this time is to

- (A) measure cardiac output
- (B) increase fluid administration
- (C) infuse dopamine
- (D) administer propranolol
- (E) switch from enflurane to isoflurane



45. The ECG strip shown above is recorded as a patient with a permanent transvenous DDD pacemaker enters the operating room. These changes indicate that the pacemaker is

- (A) sensing the T waves
- (B) sensing the retrograde P waves
- (C) triggering off the intrinsic atrial activity
- (D) malfunctioning in the atrial pacing mechanism
- (E) prematurely stimulating the ventricle

46. Surgery is cancelled 10 minutes after initiation of intravenous regional anesthesia with 50 ml of lidocaine 0.5%. To terminate anesthesia safely, what is the most appropriate timing for deflating the tourniquet?

- (A) Immediately if benzodiazepines have been administered
- (B) Immediately after intravenous administration of ephedrine 10 mg
- (C) Immediately, followed by repeated reinflation and deflation
- (D) In no less than 20 minutes after initial injection
- (E) In no less than 45 minutes after initial injection

47. A 76-year-old patient is restless and hallucinating in the preoperative holding area. He received morphine 5 mg and scopolamine 0.4 mg intramuscularly as premedication and is now breathing oxygen 2 L/min through nasal prongs. SpO₂ is 98%. Which of the following is the most appropriate next step?

- (A) Administration of naloxone
- (B) Administration of physostigmine
- (C) Induction of general anesthesia
- (D) Determination of serum electrolyte concentrations
- (E) CT scan of the head

48. Eight hours after abdominal surgery, a 51-year-old patient becomes increasingly somnolent. Epidural morphine 5 mg was administered immediately following the procedure. Postoperatively, respiratory rate has not decreased below 12/min and SpO₂ has remained greater than 92%. Arterial blood gas analysis shows PaO₂ 80 mmHg, PaCO₂ 82 mmHg, and pH 7.1.

Which of the following is the most appropriate conclusion?

- (A) Analysis of the blood sample was delayed
- (B) The blood sample was venous rather than arterial
- (C) The patient is receiving supplemental oxygen
- (D) The pulse oximeter readings are falsely high
- (E) No treatment is required at this time

49. A patient with chronic obstructive pulmonary disease is undergoing spinal anesthesia to a T6 sensory level. The most pronounced effect on pulmonary function will be a decrease in
- (A) minute ventilation
 - (B) peak expiratory flow
 - (C) physiologic dead space
 - (D) tidal volume
 - (E) vital capacity
50. During halothane anesthesia with spontaneous ventilation, the most reliable sign of malignant hyperthermia is
- (A) hypertension
 - (B) increased temperature
 - (C) increased minute ventilation
 - (D) muscle rigidity
 - (E) tachycardia
51. Local anesthetics block nerve conduction by
- (A) closing calcium channels
 - (B) decreasing intracellular calcium concentration
 - (C) decreasing potassium conductance
 - (D) causing extrusion of intracellular potassium
 - (E) inhibiting cellular influx of sodium
52. A 36-year-old woman develops acute airway obstruction 24 hours after total thyroidectomy. The most likely cause is
- (A) bilateral recurrent laryngeal nerve injury
 - (B) unilateral recurrent laryngeal nerve injury
 - (C) hypocalcemia
 - (D) subglottic edema
 - (E) tracheomalacia
53. During insertion of a Harrington rod with deliberate hypotension for correction of spinal scoliosis, accurate interpretation of somatosensory evoked potentials requires
- (A) core temperature greater than 35°C
 - (B) hematocrit of at least 25%
 - (C) mean arterial pressure greater than 70 mmHg
 - (D) PO₂ of at least 80 mmHg
 - (E) reversal of neuromuscular block
54. Left ventricular end-diastolic volume is most likely to be underestimated by pulmonary artery occlusion pressure in patients with
- (A) acute myocardial ischemia
 - (B) aortic insufficiency
 - (C) mitral stenosis
 - (D) primary pulmonary hypertension
 - (E) tricuspid stenosis



55. The ECG tracing above shows

- (A) aberrant intraventricular conduction
- (B) acceleration of phase 4 depolarization of the sinus node
- (C) a compensatory pause
- (D) initiation of re-entrant supraventricular tachycardia
- (E) paroxysmal atrial fibrillation

56. Which of the following is the most likely sequela of interscalene brachial plexus block?

- (A) Cervical epidural block
- (B) Hemidiaphragmatic paralysis
- (C) Pneumothorax
- (D) Seizure
- (E) Vocal cord paralysis

57. Which the following findings is most hazardous in premature infants?

- (A) Hematocrit of 55%
- (B) Rectal temperature of 35°C
- (C) Umbilical arterial blood PO₂ of 50 mmHg
- (D) Umbilical arterial blood PCO₂ of 45 mmHg
- (E) Umbilical arterial systolic pressure of 60 mmHg

58. Which of the following statements concerning the risk of acquiring hepatitis from a blood transfusion is true?

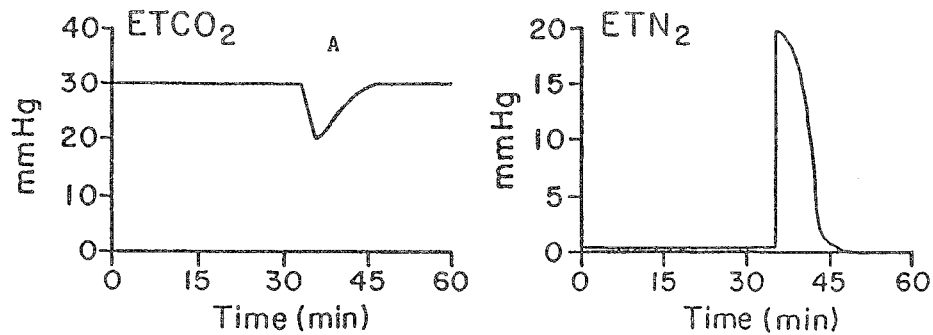
- (A) Most patients with post-transfusion hepatitis become clinically jaundiced
- (B) Most cases of post-transfusion hepatitis are caused by the hepatitis B virus
- (C) The risk for hepatitis is less than the risk for AIDS
- (D) The risk for post-transfusion hepatitis is less than 1% per unit transfused
- (E) The incidence of post-transfusion hepatitis has remained unchanged over the past decade

59. Which of the following findings differentiates the pickwickian syndrome from morbid obesity?

- (A) Carbon dioxide retention
- (B) Upper airway obstruction
- (C) Decreased forced expiratory volume
- (D) Increased shunt fraction
- (E) Increased functional residual capacity

60. A 35-year-old woman with severe myasthenia gravis is scheduled for thymectomy. Which of the following preoperative pulmonary function tests is most likely to be normal?
- (A) Forced expiratory volume in 1 second (FEV_1)
 - (B) Forced vital capacity (FVC)
 - (C) FEV_1/FVC
 - (D) Maximum voluntary ventilation
 - (E) Peak inspiratory force
61. For any given FiO_2 and $PaCO_2$, the PaO_2 is lower in a healthy paralyzed patient anesthetized with isoflurane than in the same patient unanesthetized and breathing spontaneously. The primary cause of this difference is
- (A) controlled ventilation
 - (B) increased airway resistance
 - (C) inhibition of hypoxic pulmonary vasoconstriction
 - (D) intraoperative hypothermia
 - (E) preferential ventilation of nondependent lung
62. During nitrous oxide anesthesia, which of the following expands most rapidly?
- (A) Air bubble in the blood
 - (B) Air in the intestine
 - (C) Endotracheal tube cuff
 - (D) Pneumothorax
 - (E) Sulfafluoride bubble in the vitreal cavity
63. A 66-year-old man with aortic regurgitation is brought to the operating room for aortic valve replacement after having received morphine, scopolamine premedication. PO_2 is 40 mmHg in a sample of pulmonary artery blood drawn 10 minutes after the patient started breathing pure oxygen. This finding is compatible with
- (A) wedging of the catheter tip
 - (B) left-to-right intracardiac shunting
 - (C) increased intrapulmonary shunting
 - (D) excessively depressed ventilation
 - (E) normal cardiac output
64. Which of the following statements concerning metoclopramide is true?
- (A) It is antagonized by concomitant administration of atropine
 - (B) It decreases gastrointestinal motility
 - (C) It decreases gastric secretion
 - (D) It lacks antiemetic properties
 - (E) It stimulates dopamine receptors
65. Which of the following is the most reliable indicator of adequate reversal of neuromuscular block?
- (A) Inspiratory force equal to -30 cmH₂O
 - (B) Sustained head lift for 5 seconds
 - (C) Train-of-four ratio of 0.7
 - (D) Twitch height at 100% of control
 - (E) Vital capacity of 15 ml/kg

66. A 70-year-old patient is shivering and has chest pain in the PACU following a cholecystectomy. Heart rate is 120 bpm, and blood pressure is 220/120 mmHg. SpO₂ is 97% at an FiO₂ of 0.4. An ECG shows ST-T wave changes, which are not affected by intravenous administration of nitroglycerin. Which of the following is the most appropriate next step?
- (A) Administration of esmolol
 - (B) Administration of hydralazine
 - (C) Administration of nitroprusside
 - (D) Application of a warming blanket
 - (E) Increasing FiO₂
67. Which of the following is the most appropriate action after an anesthetic vaporizer is tipped?
- (A) Return to the manufacturer for recalibration
 - (B) Flush the vaporizer with oxygen at 5 L/min for 24 hours
 - (C) Store the vaporizer for 24 hours at room temperature
 - (D) Set the vaporizer at low concentration and flush with oxygen at 10 L/min for 30 minutes
 - (E) Verify the vaporizer output with mass spectrography
68. Mismatching of ventilation to perfusion in the lung is greatest in which of the following situations?
- (A) Awake patient, spontaneous ventilation, lateral decubitus position
 - (B) Anesthetized patient, controlled ventilation, supine position
 - (C) Anesthetized patient, controlled ventilation, lateral decubitus position
 - (D) Anesthetized patient, controlled ventilation, sitting position
 - (E) Anesthetized patient, spontaneous ventilation, prone position
69. A 40-year-old patient has pain following injection of 8 ml of thiopental 2.5% through a right radial artery catheter. His hand remains pink. Which of the following is the most appropriate next step?
- (A) Injection of lidocaine through the catheter
 - (B) Injection of nitroglycerin through the catheter
 - (C) Injection of papaverine through the catheter
 - (D) Right stellate ganglion block
 - (E) No intervention
70. After an axillary brachial plexus block, the patient feels pain when the surgeon clips the skin over the thenar eminence. The most likely cause is inadequate anesthesia in the distribution of the
- (A) intercostobrachial nerve
 - (B) median nerve
 - (C) musculocutaneous nerve
 - (D) radial nerve
 - (E) ulnar nerve
71. Which of the following is a sign of cyclosporine toxicity?
- (A) Abnormal hepatic enzyme activity
 - (B) Decreased hemoglobin concentration
 - (C) Increased serum creatinine concentration
 - (D) Nodular density on radiograph of the chest
 - (E) ST-T wave changes on ECG



72. The trend plot above shows end-tidal gases measured during a radical neck dissection. The event occurring at A is most likely
- (A) acute hypotension
 - (B) endobronchial intubation
 - (C) kinking of the endotracheal tube
 - (D) rupture of the endotracheal tube cuff
 - (E) venous air embolism
-
73. In an anesthetized patient being mechanically ventilated, end-expired carbon dioxide is 58 mmHg and peak inspiratory airway pressure is 15 cmH₂O. Ventilator settings indicate a delivered tidal volume of 800 ml, but the expiratory flow-meter shows a tidal volume of 360 ml. Which of the following is the most likely cause of this discrepancy?
- (A) Fresh gas flow of 0.5 L/min
 - (B) Incompetence of the pressure-relief valve
 - (C) Low ventilatory rate
 - (D) Presence of a hole in the ventilator bellows
 - (E) Prolongation of the inspiratory phase
74. The drug that causes dose-dependent EEG evidence of both central nervous system excitation and depression is
- (A) lidocaine
 - (B) halothane
 - (C) thiopental
 - (D) nitrous oxide
 - (E) midazolam
75. During a reoperative total hip arthroplasty requiring transfusion of 8 units of packed red blood cells, blood begins to ooze from the operative field and intravenous catheter sites. Urine is pink. The most likely cause is
- (A) citrate intoxication
 - (B) factor V and VIII deficiencies
 - (C) rhabdomyolysis
 - (D) thrombocytopenia
 - (E) transfusion reaction

76. During recovery from halothane anesthesia, an alveolar concentration of 0.1% will have the greatest effect on
- (A) myocardial contractility
 - (B) ventilatory response to hypercarbia
 - (C) atrioventricular conduction
 - (D) ventilatory response to hypoxia
 - (E) neuromuscular transmission
77. Which of the following statements concerning pulmonary function in patients with pulmonary fibrosis is true?
- (A) Diffusion capacity is decreased
 - (B) Pulmonary artery diastolic-to-occlusion pressure gradients are normal
 - (C) Ventilation-perfusion relationships are normal
 - (D) Static pulmonary compliance is unchanged
 - (E) Mechanical ventilation with slow rate and large tidal volume is optimal
78. Which of the following statements concerning ketorolac is true?
- (A) It binds to opioid receptors
 - (B) It causes dose-related thrombocytopenia
 - (C) It decreases heart rate during isoflurane anesthesia
 - (D) It is eliminated unchanged in urine
 - (E) It reversibly inhibits cyclooxygenase
79. Postoperatively, a patient is being mechanically ventilated by a constant-flow, pressure-cycled ventilator with the following initial settings: inspiratory/expiratory (I/E) ratio of 1:2, peak inspiratory pressure (PIP) of 25 cmH₂O, and rate of 10/min. One hour later, the I/E ratio is 1:4. Which of the following would ensure that the minute ventilation is the same as that initially set?
- (A) Inflate the endotracheal tube cuff to prevent leakage
 - (B) Double the respiratory rate
 - (C) Decrease the expiratory pause until the I/E ratio is 1.0
 - (D) Increase the PIP until the I/E ratio is 1:2
 - (E) Increase the PIP to 50 cmH₂O
80. A 29-year-old man who has been nasotracheally intubated for two weeks following a motor vehicle accident has a fever (39°C) and a constant headache. Leukocyte count is 18,000/mm³. The most likely cause is
- (A) fractured nasal septum
 - (B) retropharyngeal abscess
 - (C) maxillary sinusitis
 - (D) meningitis
 - (E) rhinovirus infection
81. Characteristics of postdural puncture headache include
- (A) incidence unrelated to the timing of ambulation
 - (B) increased severity with addition of vasoconstrictors to the anesthetic
 - (C) less frequent occurrence if the needle bevel is perpendicular to the direction of dural fibers
 - (D) more frequent occurrence in men
 - (E) prevention by prophylactic epidural blood patch

82. Which of the following statements concerning the cardiovascular effects of intravenous bupivacaine is true?
- (A) Bretylium is effective in treating bupivacaine-induced ventricular arrhythmias
 - (B) Cardiovascular toxicity is decreased during pregnancy
 - (C) Cardiovascular toxicity occurs at lower blood levels than central nervous system toxicity
 - (D) Systemic vascular resistance is unchanged
 - (E) The rate of impulse conduction through the heart is increased
83. Acute epiglottitis usually
- (A) requires a lateral radiograph of the neck for diagnosis
 - (B) occurs in children 2 to 4 years of age
 - (C) is treated effectively with racemic epinephrine
 - (D) has a viral etiology
 - (E) requires immediate awake intubation by direct laryngoscopy in the emergency department
84. After two hours of anesthesia with halothane 1.2% and oxygen, nitrous oxide 75% is added to the inspired gas mixture. This addition would
- (A) increase the alveolar halothane and oxygen concentrations above inspired
 - (B) increase the alveolar halothane concentration only
 - (C) cause no change in alveolar gas concentrations compared with inspired
 - (D) decrease alveolar oxygen concentration compared with inspired
 - (E) decrease alveolar oxygen and halothane concentrations below inspired
85. Which of the following statements concerning the superior laryngeal nerve is true?
- (A) It provides sensory innervation to the subglottic surface of the vocal cord
 - (B) It provides sensory innervation to the inferior surface of the epiglottis
 - (C) It is a branch of the glossopharyngeal nerve
 - (D) It is blocked by injection of anesthetic near the lateral portion of the cricothyroid membrane
 - (E) It is the most commonly injured nerve during thyroid surgery
86. A 25-year-old man requires exploratory laparotomy following a motor vehicle accident. He is acutely intoxicated with alcohol. Which of the following is the most likely result of the alcohol ingestion?
- (A) Hyperdynamic circulation
 - (B) Hyperglycemia
 - (C) Hyperthermia
 - (D) Increased respiratory depression from opioids
 - (E) Increased sensitivity to neuromuscular blocking drugs
87. Normal pseudocholinesterase
- (A) is highly concentrated at the motor end-plate
 - (B) hydrolyzes succinylcholine by Hofmann elimination
 - (C) is produced primarily at nerve terminals
 - (D) is antagonized by acetylcholinesterase inhibitors
 - (E) resists dibucaine inhibition more than its atypical variant

88. Which of the following statements concerning the volume of distribution of a drug is true?
- (A) It is equal to the sum of the volumes of the tissue spaces into which it diffuses
 - (B) It is equal to the volume to which it is distributed outside the plasma volume
 - (C) It is unaltered by the amount bound to red blood cells and plasma proteins
 - (D) It depends on elimination from plasma
 - (E) It relates the total amount of the drug in the body to the plasma concentration
89. Inhalation induction of anesthesia is more rapid in a 6-month-old infant than in an adult because infants have
- (A) greater ratio of alveolar ventilation to functional residual capacity
 - (B) greater ratio of blood volume to body weight
 - (C) greater solubility of anesthetic in blood
 - (D) lower anesthetic requirement
 - (E) lower distribution of cardiac output to vessel-rich organs
90. In patients homozygous for atypical pseudocholinesterase, which of the following best explains the prolonged action of succinylcholine?
- (A) An increased proportion of the dose reaches the neuromuscular junction
 - (B) Diffusion away from the neuromuscular junction is slowed
 - (C) Hepatic clearance of succinylcholine is decreased
 - (D) Prejunctional activity is unopposed
 - (E) Succinylmonocholine induces neuromuscular block
91. The decreased duration of action of an intravenous dose of fentanyl compared with an intravenous dose of morphine is best explained by
- (A) greater lipid solubility
 - (B) increased hepatic metabolism
 - (C) less protein binding
 - (D) shorter elimination half-life
 - (E) smaller volume of distribution
92. Which of the following drugs decreases lower esophageal sphincter tone?
- (A) Edrophonium
 - (B) Glycopyrrolate
 - (C) Metoclopramide
 - (D) Prochlorperazine
 - (E) Succinylcholine
93. A jaundiced patient requires general anesthesia for portocaval shunt. He has a long history of alcohol abuse and is cirrhotic with ascites. Special considerations relevant to induction of anesthesia for this patient include each of the following EXCEPT:
- (A) Denitrogenation by mask may be more rapid than expected
 - (B) The risk of aspiration is increased
 - (C) The dose of thiopental necessary for induction will be predictably reduced
 - (D) The duration of succinylcholine action may be prolonged
 - (E) Alfentanil would be an appropriate supplement

94. Recognized side effects of magnesium sulfate used for the treatment of preeclampsia that would be of anesthetic concern include each of the following EXCEPT
- (A) maternal pulmonary edema
 - (B) neonatal hypotonia
 - (C) increased maternal sensitivity to succinylcholine
 - (D) increased maternal sensitivity to vecuronium
 - (E) maternal hypokalemia
95. Inhibition of labor by terbutaline causes each of the following maternal side effects EXCEPT
- (A) hyperkalemia
 - (B) hypotension
 - (C) ventricular dysrhythmias
 - (D) hyperglycemia
 - (E) pulmonary edema
96. A comatose 40-year-old man is to undergo evacuation of an acute subdural hematoma. His left pupil is dilated and blood is present behind the left tympanic membrane. Each of the following is an acceptable intervention EXCEPT
- (A) application of 5 cmH₂O positive end-expiratory pressure
 - (B) blind nasotracheal intubation
 - (C) use of isoflurane
 - (D) use of nitrous oxide
 - (E) use of succinylcholine
97. A successful ankle block for transmetatarsal amputation of the first and second toes should include each of the following nerves EXCEPT the
- (A) saphenous
 - (B) deep peroneal
 - (C) superficial peroneal
 - (D) sural
 - (E) tibial
98. A patient being mechanically ventilated in the ICU requires wound debridement twice daily. Each of the following agents would be appropriate for induction of brief general anesthesia EXCEPT
- (A) nitrous oxide
 - (B) etomidate
 - (C) ketamine
 - (D) methohexital
 - (E) midazolam
99. Each of the following contributes to hypotension following induction of anesthesia with propofol EXCEPT
- (A) central vagal stimulation
 - (B) decreased central sympathetic tone
 - (C) direct myocardial depression
 - (D) resetting of arterial baroreceptors
 - (E) systemic vasodilation

100. A computer program for hemodynamic calculations has the following input values: body surface area, arterial blood pressure, heart rate, pulmonary artery occlusion pressure, pulmonary artery pressure, and cardiac output. Each of the following values can be derived with this program EXCEPT

- (A) cardiac index
- (B) stroke volume index
- (C) systemic vascular resistance
- (D) pulmonary vascular resistance
- (E) left ventricular stroke work index

101. A 66-year-old man with chronic obstructive pulmonary disease who underwent colectomy 12 hours ago has been receiving an epidural infusion of fentanyl at a rate of 100 $\mu\text{g/hr}$. Which of the following is LEAST likely to develop?

- (A) Hypotension
- (B) Nausea
- (C) Pruritus
- (D) Respiratory depression
- (E) Urinary retention

102. A 70-year-old man sustains injuries to both carotid bodies during bilateral carotid endarterectomies performed four days apart. Two hours after the second procedure, the patient is breathing room air in the PACU. Which of the following sets of arterial blood gas values is LEAST likely?

	pH	PCO ₂ (mmHg)	PO ₂ (mmHg)
(A)	7.3	50	58
(B)	7.3	50	86
(C)	7.4	40	86
(D)	7.4	42	58
(E)	7.5	32	58

103. A 65-year-old man is disoriented and has a headache and nausea in the recovery room 30 minutes after transurethral resection of the prostate with glycine irrigation performed under spinal anesthesia. Heart rate is 50 bpm and blood pressure is 180/110 mmHg. Which of the following is LEAST likely?

- (A) Decreased serum osmolality
- (B) Serum sodium concentration 132 mEq/L
- (C) Increased serum ammonia concentration
- (D) Bibasilar rales
- (E) Jugular venous distention

AMERICAN BOARD OF ANESTHESIOLOGY
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IN-TRAINING EXAMINATION

Book B
1993

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. The need for increased doses of nondepolarizing muscle relaxants in patients with extensive burns is best explained by
 - (A) increased protein binding
 - (B) hypermetabolism
 - (C) increased glomerular filtration rate
 - (D) proliferation of receptors on burned muscle
 - (E) decreased volume of distribution

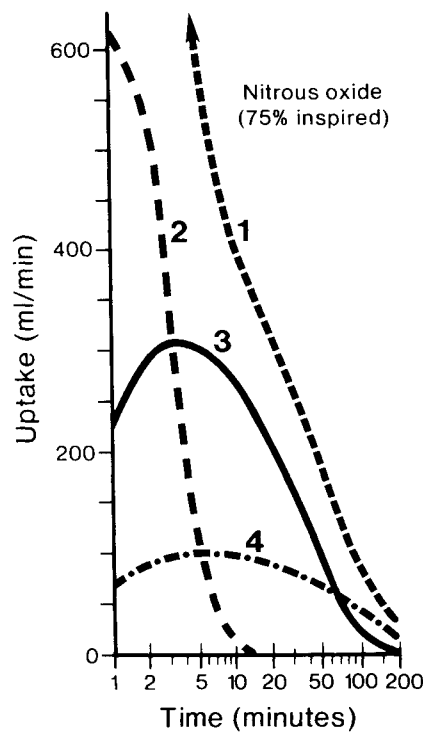
2. Which of the following parts of the infant's airway determines the appropriate diameter of a nasotracheal tube?
 - (A) Nares
 - (B) Glottis
 - (C) Vocal cords
 - (D) Cricoid cartilage
 - (E) Third tracheal ring

3. Administration of 200 mEq of sodium bicarbonate during cardiopulmonary resuscitation is associated with
 - (A) CSF alkalosis
 - (B) hypercalcemia
 - (C) hypercarbia
 - (D) hyperkalemia
 - (E) shift of the oxyhemoglobin dissociation curve to the right

4. When compared with diazepam, midazolam
 - (A) metabolites contribute more significantly to the sedative effect
 - (B) elimination is less dependent on hepatic metabolism
 - (C) has more predictable action after intramuscular administration
 - (D) produces less respiratory depression
 - (E) produces less hypotension during induction of anesthesia with opioids

5. Which of the following statements concerning a patient who has been receiving nitroprusside for several days is true?
 - (A) Biotransformation of cyanide requires a sulfur donor
 - (B) Formation of methemoglobin increases cyanide toxicity
 - (C) Increased serum thiocyanate concentrations are innocuous
 - (D) Mixed venous PO₂ decreases as cyanide toxicity develops
 - (E) Serum thiocyanate concentrations reflect the degree of cyanide toxicity

6. Which of the following increases the cephalad spread of hyperbaric intrathecal local anesthetics?
- (A) Cephalad-directed needle bevel
 - (B) Coughing
 - (C) Lithotomy position
 - (D) Obesity
 - (E) Rapid injection
7. Compared with a patient without liver disease, a patient with cirrhosis will have
- (A) greater accumulation of vecuronium with infusion
 - (B) increased unbound plasma vecuronium concentration
 - (C) more frequent occurrence of phase II block after succinylcholine administration
 - (D) prolonged elimination half-life of atracurium
 - (E) unchanged volume of distribution for pancuronium
8. Intrathecally administered opioids exert their analgesic effects primarily in the
- (A) brain stem
 - (B) fourth ventricle
 - (C) spinal nerve roots
 - (D) spinothalamic tracts
 - (E) substantia gelatinosa
9. During laser excision of vocal cord polyps in a 5-year-old boy, dark smoke suddenly appears in the surgical field. The trachea is intubated and anesthesia is being maintained with halothane, nitrous oxide, and oxygen. The most appropriate initial step is to
- (A) change from oxygen and nitrous oxide to air
 - (B) fill the oropharynx with water
 - (C) instill water into the endotracheal tube
 - (D) remove the endotracheal tube
 - (E) ventilate with carbon dioxide
10. During craniotomy in the sitting position, end-tidal carbon dioxide tension suddenly decreases. Ventilatory excursion of the chest is normal. Further evaluation is most likely to show a decrease in
- (A) alveolar-to-arterial oxygen tension difference
 - (B) alveolar-to-arterial carbon dioxide tension difference
 - (C) dead space ventilation
 - (D) pulmonary artery pressure
 - (E) pulmonary artery occlusion pressure
11. Which of the following is a cardiorespiratory effect of epidural block to a T4 sensory level?
- (A) Decreased expiratory reserve volume
 - (B) Decreased tidal volume
 - (C) Increased circulating catecholamine concentrations
 - (D) Increased heart rate
 - (E) Unchanged vital capacity



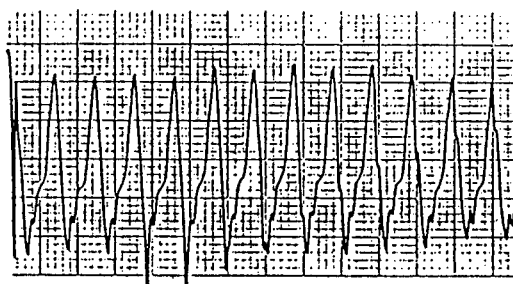
12. The figure above describes the uptake of nitrous oxide 75% by individual tissue groups (VRG=vessel-rich group, MG=muscle group, FG=fat group) and their sum (total uptake, TU). Which set of labels accurately describes the curves?

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
(A)	MG	FG	VRG	TU
(B)	VRG	MG	FG	TU
(C)	FG	MG	TU	VRG
(D)	TU	FG	MG	VRG
(E)	TU	VRG	MG	FG

13. A 67-year-old man undergoes spinal anesthesia with hyperbaric tetracaine 10 mg for transurethral resection of the prostate. At the end of the 50-minute procedure, the level of anesthesia is T6 and blood pressure is 120/70 mmHg. Within two minutes after transfer to a stretcher, the patient has nausea and blood pressure decreases to 76/42 mmHg. Which of the following is the most likely cause of the acute hypotension?

- (A) Acute congestive heart failure
- (B) Decreased venous return
- (C) Dilutional hyponatremia
- (D) Progression of sympathetic block
- (E) Unrecognized bladder perforation

14. A 26-year-old woman has persistent uterine bleeding following a normal spontaneous delivery without anesthesia. The uterus is firm on manual examination. Which of the following anesthetics is most appropriate for manual extraction of the placenta?
- (A) Halothane
 - (B) Pudendal block with lidocaine
 - (C) Subarachnoid tetracaine
 - (D) Thiopental
 - (E) Vecuronium
15. Compared with intermittent positive pressure ventilation (IPPV), intermittent mandatory ventilation (IMV)
- (A) better maintains cardiac output
 - (B) provides less than full mechanical ventilatory support
 - (C) requires a greater level of sedation
 - (D) requires a higher FiO_2
 - (E) requires a lower inspiratory flow rate
16. Which of the following findings would be considered normal in the EEG of an adult?
- (A) Decreased frequency during induction with halogenated anesthetics
 - (B) Decreased frequency in frontal areas with administration of nitrous oxide 50%
 - (C) Dominance of beta rhythm at 20 to 30 Hz during the awake relaxed state
 - (D) Electrical silence with administration of isoflurane 2.5 MAC
 - (E) The presence of burst-suppression during natural sleep
17. Proper zeroing of an arterial pressure transducer attached to a supine anesthetized patient is best accomplished by
- (A) continuous flow of fluid through the intravascular catheter
 - (B) opening the system to air at heart level
 - (C) placement of the transducer diaphragm at heart level
 - (D) proper damping of the transducer system
 - (E) zeroing the transducer during the expiration phase of mechanical ventilation
18. A 1-month-old infant becomes hypoxemic faster during apnea than an adult. Which of the following is the primary cause of this difference?
- (A) Functional residual capacity in an infant is half that of an adult
 - (B) Metabolic rate in an infant is twice that of an adult
 - (C) Resting PaO_2 in an infant is lower than that in an adult
 - (D) The number of alveoli in an infant is 12% the number in an adult
 - (E) The hemoglobin dissociation curve in an infant is shifted to the right
19. During extracorporeal shock wave lithotripsy, the shock wave should be synchronized with
- (A) the P wave of the ECG
 - (B) the R wave of the ECG
 - (C) the T wave of the ECG
 - (D) peak inspiration
 - (E) end-expiration



20. The cardiac rhythm illustrated above appeared suddenly in an anesthetized patient. The most appropriate management is

- (A) administration of adenosine
- (B) administration of digoxin
- (C) administration of epinephrine
- (D) overdrive pacing
- (E) synchronous cardioversion

21. Which of the following statements concerning hyperkalemia after succinylcholine administration to a patient with a spinal cord injury is true?

- (A) It is unlikely to occur if the lesion is located below T6
- (B) It is unlikely to occur within 24 hours of the injury
- (C) It is unlikely to occur more than 60 days after the initial injury
- (D) It is prevented by pretreatment with small doses of a nondepolarizing agent
- (E) It is decreased in magnitude by pretreatment with calcium chloride

22. The severity of chronic bronchitis is best assessed by measuring

- (A) tidal volume
- (B) carbon dioxide diffusion capacity
- (C) sputum production over 24 hours
- (D) forced vital capacity
- (E) arterial blood gases

23. An 8-kg, 1-year-old boy is scheduled for a bilateral inguinal hernia repair. If regional anesthesia is to be used for post-operative analgesia, which of the following statements is true?

- (A) Caudal administration of 0.25% bupivacaine will provide analgesia without evidence of motor block
- (B) Caudal administration of 0.125% bupivacaine is as effective as caudal administration of 0.25% bupivacaine
- (C) Caudal analgesia is more difficult to achieve in young children than in adults
- (D) The recommended volume of local anesthetic used for caudal analgesia in children is 3 ml per year of age
- (E) The volume of 0.25% bupivacaine required for bilateral ilioinguinal and iliohypogastric nerve blocks would be too large

24. After inserting a left-sided double-lumen endotracheal tube, both cuffs are inflated. When the right (tracheal) lumen is clamped, breath sounds are heard only in the lower right lung field. When the left (bronchial) lumen is clamped, breath sounds are heard over the entire left lung field. Where is the tube positioned?
- (A) Tracheal orifice above the carina and bronchial limb in the right bronchus
 - (B) Tracheal orifice above the carina and bronchial limb in the left bronchus
 - (C) Tracheal orifice and bronchial limb both above the carina
 - (D) Tracheal cuff and bronchial limb both in the right bronchus
 - (E) Tracheal orifice and bronchial limb both in the left bronchus
25. A 27-year-old man with type I von Willebrand's disease requires internal fixation of an open fracture of the femur. Prothrombin time, partial thromboplastin time, and platelet count are normal. During surgery, there is significant oozing from the wound and the surgeon notes poor clot quality. The most appropriate therapy at this time is administration of
- (A) cryoprecipitate
 - (B) desmopressin
 - (C) fresh frozen plasma
 - (D) lyophilized factor VII concentrate
 - (E) platelets
26. A 30-year-old man is brought to the emergency department after being rescued from a house fire. With the trachea intubated and FiO_2 at 1.0, arterial blood gas values are PaO_2 495 mmHg, PaCO_2 28 mmHg, and pH 7.28. Hemoglobin saturation measured by co-oximeter is 50%. The most appropriate next step is to
- (A) add positive end-expiratory pressure
 - (B) add *n*-acetylcysteine to the inhaled gases
 - (C) administer sodium bicarbonate intravenously
 - (D) transfuse 2 units of packed red blood cells
 - (E) transfer to a hyperbaric chamber
27. A 60-kg, 45-year-old woman who takes digoxin for atrial fibrillation receives furosemide 40 mg and mannitol 60 g during resection of a supratentorial meningioma. After initiation of hyperventilation to decrease PaCO_2 from 35 to 20 mmHg, multifocal premature ventricular contractions are noted on the ECG. The most likely cause is
- (A) acute hypokalemia
 - (B) cerebral ischemia
 - (C) impending herniation of the brain stem
 - (D) paradoxical air embolism
 - (E) surgical manipulation of the meningioma
28. A 50-year-old woman with subarachnoid hemorrhage and left hemiparesis undergoes clipping of a right cerebral aneurysm. On the second postoperative day, mental status deteriorates. Blood pressure is 110/70 mmHg. A cerebral angiogram shows vasospasm. The most appropriate management is to
- (A) administer dexamethasone
 - (B) administer mannitol
 - (C) administer phentolamine
 - (D) expand intravascular volume
 - (E) intubate and hyperventilate to a PaCO_2 of 28 mmHg

29. Which of the following statements concerning cerebral blood flow (CBF) during anesthesia is true?
- (A) CBF changes minimally when PaCO_2 increases from 30 to 40 mmHg
 - (B) CBF changes minimally when PO_2 decreases from 160 to 100 mmHg
 - (C) CBF is autoregulated when mean arterial pressure is 40 mmHg
 - (D) CBF is coupled to cerebral metabolism during isoflurane anesthesia
 - (E) CBF is unaffected by 1.2% isoflurane at a PaCO_2 of 40 mmHg
30. Which of the following drugs is contraindicated in patients with Parkinson's disease?
- (A) Atropine
 - (B) Dopamine
 - (C) Droperidol
 - (D) Fentanyl
 - (E) Isoflurane
31. A 70-kg patient with no acute bleeding has a preoperative platelet count of 40,000/mm³. Following preoperative transfusion of platelets 10 units, the predicted platelet count would be
- (A) 50,000/mm³
 - (B) 80,000/mm³
 - (C) 90,000/mm³
 - (D) 140,000/mm³
 - (E) 190,000/mm³
32. Two hours after coronary artery bypass grafting, a 60-year-old man has a heart rate of 140 bpm and blood pressure of 80/60 mmHg. Cardiac index is 1.5 L/min/m². Central venous pressure is 23 mmHg with large a-waves in the right atrial pressure tracing. A pulsus paradoxus of 6 mmHg is noted. Which of the following is the most likely diagnosis?
- (A) Atrial flutter
 - (B) Cardiac tamponade
 - (C) Hypovolemia
 - (D) Junctional tachycardia
 - (E) Tension pneumothorax
33. Which of the following is the strongest indication for one-lung ventilation?
- (A) Descending thoracic aortic aneurysm
 - (B) Esophageal resection
 - (C) Lobectomy for lung abscess
 - (D) Lobectomy for tumor
 - (E) Pneumonectomy for tumor
34. In a 65-year-old man, which of the following findings on preoperative pulmonary function testing is associated with the highest risk for respiratory insufficiency following pneumonectomy?
- (A) Maximum voluntary ventilation at 65% of predicted
 - (B) Mean pulmonary artery pressure of 28 mmHg
 - (C) Predicted postoperative forced expiratory volume in one second (FEV_1) of 800 ml
 - (D) Residual volume to total lung capacity (RV/TLC) ratio of 0.35
 - (E) Vital capacity of 3 liters

35. During transurethral resection of the prostate, intravascular absorption of glycine irrigant most commonly produces
- (A) alkalosis
 - (B) hemolysis
 - (C) hypertension
 - (D) tachycardia
 - (E) wheezing
36. A 2.2-kg, 6-hour-old neonate is to undergo gastrostomy followed by repair of a tracheoesophageal fistula. During induction with halothane, air, and oxygen, the abdomen becomes distended. Appropriate management is to
- (A) intubate and assist spontaneous ventilation
 - (B) intubate and control ventilation
 - (C) insert an orogastric tube
 - (D) allow the patient to breathe spontaneously by mask until gastrostomy
 - (E) control ventilation by mask until gastrostomy
37. Which of the following is an advantage of a circle system over a Mapleson D system?
- (A) Better anesthetic conservation
 - (B) Lower dead space
 - (C) Lower circuit resistance
 - (D) More efficient scavenging
 - (E) More rapid changes in inspired gas concentration
38. A 27-year-old man with a one-month history of quadriplegia at a C6 level is given general anesthesia for cystoscopy. During the cystoscopy, blood pressure suddenly increases to 220/120 mmHg. Further evaluation is most likely to show
- (A) atrial fibrillation (ventricular rate 100 bpm)
 - (B) paroxysmal atrial tachycardia (150 bpm)
 - (C) sinus bradycardia
 - (D) piloerection above the level of C6
 - (E) sweating above the level of C6
39. Which of the following is the primary factor regulating normal coronary blood flow?
- (A) Aortic diastolic pressure
 - (B) Coronary perfusion pressure
 - (C) Heart rate
 - (D) Myocardial oxygen consumption
 - (E) Systolic wall tension
40. Which of the following statements concerning pressure support ventilation is true?
- (A) Continuous positive airway pressure is provided during inspiration and expiration
 - (B) Delivered tidal volume remains the same with decreasing lung compliance
 - (C) Inspiratory effort less than -2 cmH₂O is not assisted
 - (D) The overall work of breathing decreases when weaning from mechanical ventilation
 - (E) The patient will need more sedation than during intermittent mandatory ventilation

41. If administered epidurally in equipotent doses, which of the following opioids will produce analgesia over the greatest number of dermatomes?
- (A) Fentanyl
 - (B) Hydromorphone
 - (C) Meperidine
 - (D) Morphine
 - (E) Sufentanil
42. Which of the following is decreased by alkalization of a 1.5% lidocaine solution?
- (A) Concentration of free base
 - (B) Dose required for anesthesia
 - (C) Duration of anesthesia
 - (D) Intracellular concentration of ionized lidocaine
 - (E) Time to onset of anesthesia
43. Cyanide toxicity from nitroprusside is unlikely in patients with renal dysfunction because
- (A) renal excretion of thiosulfate is decreased
 - (B) metabolic acidosis inactivates cyanide
 - (C) anemia inhibits breakdown of nitroprusside by oxyhemoglobin
 - (D) thiocyanate is formed in the liver
 - (E) the dose of nitroprusside necessary to lower blood pressure is greatly decreased
44. Twelve hours after an uneventful hysterectomy with lidocaine epidural anesthesia, a 70-year-old woman has partial paralysis of the lower extremities. She is receiving morphine 0.5 mg/hr through an epidural catheter and is pain free. On examination, definite motor loss is noted in the lower extremities, but no other deficits are apparent. The most appropriate action at this time is to
- (A) administer naloxone
 - (B) substitute fentanyl for morphine infusion
 - (C) remove the epidural catheter
 - (D) obtain an MRI of the lumbar spine
 - (E) reassure the patient
45. Equipment that is attached to a patient should have leakage current no greater than
- (A) 10 microamps
 - (B) 100 microamps
 - (C) 1 milliamp
 - (D) 10 milliamps
 - (E) 100 milliamps
46. When the inspired gas is changed from air to 20% oxygen and 80% nitrous oxide, PaO_2 increases because
- (A) increased pulmonary artery pressure perfuses alveoli that previously enhanced dead space
 - (B) nitrous oxide stimulates the respiratory center
 - (C) rapid absorption of nitrous oxide increases alveolar oxygen concentration
 - (D) replacement of nitrogen by nitrous oxide expands atelectatic alveoli
 - (E) respiratory depression from nitrous oxide shifts the oxyhemoglobin dissociation curve

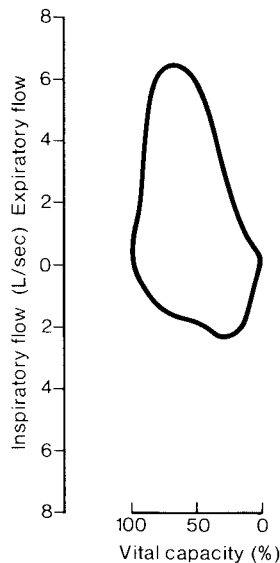
47. Which of the following characteristics of local anesthetics is associated with long duration of action?
- (A) High degree of lipid solubility
 - (B) High degree of protein binding
 - (C) High molecular weight
 - (D) High pK_a
 - (E) Presence of ester linkage
48. Which of the following drugs used to produce or reverse muscle relaxation has the greatest prolongation of action in a patient with end-stage renal disease?
- (A) Atracurium
 - (B) Neostigmine
 - (C) Pancuronium
 - (D) Succinylcholine
 - (E) Vecuronium
49. In a patient with chronic congestive heart failure, the safest pharmacologic approach to brain swelling during a craniotomy is
- (A) dexamethasone
 - (B) furosemide
 - (C) mannitol
 - (D) thiopental
 - (E) urea
50. In clinical anesthesia practice, the term "informed consent" is best described as a legal concept in which patients
- (A) agree to anesthesia care based on full disclosure of facts needed to make the decision intelligently
 - (B) are told of all possible risks of anesthesia and anesthetic procedures
 - (C) delegate all decisions regarding anesthesia care to the anesthesiologist
 - (D) release the physicians from liability
 - (E) sign global consent forms for surgical procedures that cover the administration of anesthesia care
51. The low fetal/maternal plasma ratio of bupivacaine compared with lidocaine is due to
- (A) fetal tissue binding
 - (B) fetal plasma protein binding
 - (C) maternal plasma protein binding
 - (D) ionization in maternal blood
 - (E) ionization in fetal blood
52. A previously healthy 28-year-old man is admitted to the emergency department with a probable opioid overdose. Arterial blood gas values are: PaO_2 49 mmHg, $PaCO_2$ 76 mmHg, and pH 7.12 while breathing room air. Which of the following statements is true?
- (A) Aspiration of gastric contents must have occurred
 - (B) Hypoventilation alone can explain the acidosis and hypoxemia
 - (C) The hypoxemia is probably due to noncardiogenic pulmonary edema
 - (D) Naloxone should be administered only if the patient is normothermic
 - (E) Pure oxygen is contraindicated

53. In which of the following clinical circumstances does down-regulation of beta-adrenergic receptors occur?
- (A) Chronic congestive heart failure
 - (B) Hypothyroidism
 - (C) Long-term clonidine administration
 - (D) Long-term metoprolol administration
 - (E) Stable angina
54. Which of the following is the most likely cause of apnea occurring after a retrobulbar block?
- (A) Epidural injection
 - (B) Increased intracranial pressure
 - (C) Oculopontine reflex
 - (D) Ophthalmic artery injection
 - (E) Subarachnoid injection
55. A 40-year-old man is undergoing open reduction and internal fixation of a fractured femur. During anesthesia with fentanyl, enflurane, and oxygen, heart rate decreases to 20 bpm and 6 premature ventricular contractions per minute are noted. No pulse is detected. The most appropriate next step is to
- (A) administer atropine
 - (B) administer epinephrine
 - (C) administer lidocaine
 - (D) apply a transthoracic pacemaker
 - (E) start cardiopulmonary resuscitation
56. A 35-year-old woman with systemic lupus erythematosus is admitted to the critical care unit following sudden onset of severe chest pain. Examination shows tachycardia, hypotension, pulmonary edema, and a blowing systolic murmur in the left parasternal region. The most appropriate management is
- (A) aerosol administration of terbutaline
 - (B) intravenous infusion of phenylephrine and nitroglycerin
 - (C) intravenous infusion of esmolol
 - (D) intravenous infusion of epinephrine and nitroprusside
 - (E) volume loading with lactated Ringer's solution
57. The table below shows the pharmacokinetic effects of a new neuromuscular blocker.

	<u>Normal</u>	<u>Renal Failure</u>
Volume of distribution	15 L	21 L
Clearance	200 ml/min	100 ml/min

In a patient with renal failure, which of the following will result in a response to this drug most similar to that of a normal individual?

- (A) Increased loading dose
- (B) The same maintenance dose
- (C) Decreased maintenance dose interval
- (D) Avoidance of continuous infusion
- (E) Increased dose of anticholinesterase for reversal



58. The flow-volume loop shown above is most likely from a patient with which of the following?

- (A) Bilateral vocal cord paralysis
- (B) Chronic bronchitis
- (C) Tracheal stenosis six months after a previous tracheostomy
- (D) Tumor of the lower trachea
- (E) Normal respiratory status

59. A 66-year-old patient with aortic stenosis is scheduled for aortic valve replacement. Examination shows blood pressure of 110/60 mmHg and sinus rhythm at a rate of 75 bpm. Pulmonary artery occlusion pressure (PAOP) is 20 mmHg with a prominent a-wave on the tracing. Which of the following is the most appropriate management?

- (A) Increasing myocardial contractility
- (B) Maintaining PAOP below 20 mmHg
- (C) Maintaining sinus rhythm
- (D) Promoting mild tachycardia
- (E) Decreasing peripheral resistance

60. During rapid-sequence induction prior to an emergency surgical procedure, a 20-year-old patient vomits gastric contents containing particulate matter. An endotracheal tube is easily inserted and ventilation with pure oxygen is initiated. Despite the presence of bilateral breath sounds, SpO₂ is 90%. Which of the following is the most appropriate next step?

- (A) Administration of broad-spectrum antibiotics
- (B) Intravenous administration of high-dose methylprednisolone
- (C) Bronchial lavage with normal saline solution
- (D) Bronchoscopy to remove particulate matter
- (E) Cancellation of the surgical procedure

61. A radial artery catheter is to be used for blood pressure measurement during a sitting craniotomy. When zeroing the transducer, which of the following describes the best levels for placement of the transducer and opening of the system to air?

	<u>Transducer</u>	<u>Opening to Air</u>
(A)	Head	Wrist
(B)	Head	Head
(C)	Head	Heart
(D)	Heart	Heart
(E)	Heart	Wrist

62. The gauge pressure on a cylinder of nitrous oxide

- (A) varies with the size of the cylinder
- (B) is the same for full and half-full cylinders
- (C) is the same as that of a full cylinder of oxygen if both are full
- (D) is independent of the temperature of the cylinder
- (E) reliably indicates the amount of nitrous oxide in the cylinder

63. Immediately after sustaining severe head injury, a 20-year-old man has a blood pressure of 150/90 mmHg and an intracranial pressure of 35 mmHg. After one hour of thiopental infusion, blood pressure is 105/60 mmHg, intracranial pressure is 20 mmHg, central venous pressure is 5 mmHg, and temperature is 36°C. The EEG shows slow-wave activity. The most appropriate next step is administration of

- (A) additional thiopental
- (B) a corticosteroid
- (C) furosemide
- (D) nimodipine
- (E) phenylephrine

64. Following induction of anesthesia with sufentanil and pancuronium, a patient with left main coronary artery disease has a decrease in blood pressure from 110/70 to 60/40 mmHg. There is no change in heart rate or ECG. The most appropriate management of the hypotension is administration of

- (A) calcium chloride
- (B) ephedrine
- (C) epinephrine
- (D) isoproterenol
- (E) phenylephrine

65. In a 35-year-old patient, which of the following is associated with an increased duration of clinical narcosis following infusion of a total dose of 10 mg/kg thiopental over three hours?

- (A) Alcoholism in remission
- (B) Asthma
- (C) Fever
- (D) Obesity
- (E) Use of appetite suppressants

66. A previously healthy, 60-kg, 17-year-old boy is undergoing emergency surgery for a gunshot wound involving the iliac vein. Ventilation is controlled with a tidal volume of 700 ml/breath, rate of 10/min, and peak inspiratory pressure of 30 cmH₂O. Body temperature is normal. The most likely cause of an end-tidal carbon dioxide partial pressure of 16 mmHg is
- (A) endobronchial intubation
 - (B) excessive expiratory time
 - (C) excessive tidal volume
 - (D) low cardiac output
 - (E) pulmonary aspiration
67. Which of the following statements concerning anesthetic management for MRIs is true?
- (A) ECG wires are associated with patient burns
 - (B) Mechanical ventilation of the lungs is not feasible
 - (C) Monitors with ferromagnetic components may be used
 - (D) Oxygen analysis of inspired gas is inaccurate
 - (E) Pulse oximetry is not reliable near the MR scanner
68. Intraocular pressure is
- (A) decreased by glycopyrrolate
 - (B) increased by hyperventilation
 - (C) decreased by halothane
 - (D) increased by nondepolarizing muscle relaxants
 - (E) increased by phenylephrine eye drops
69. Compared with adult hemoglobin, which of the following is a characteristic of fetal hemoglobin?
- (A) It has a greater oxygen-carrying capacity
 - (B) It has a lower P₅₀
 - (C) It is more likely to cause an artifactual increase in SpO₂
 - (D) It is more likely to sickle
 - (E) It unloads oxygen more readily at the tissues
70. Which of the following is most effective in decontaminating an anesthesia machine that was splattered with HIV-contaminated blood?
- (A) Bleach
 - (B) De-ionized water
 - (C) Ethylene oxide
 - (D) Hydrogen peroxide
 - (E) Isopropyl alcohol
71. Which of the following is greater in an obese patient than in a nonobese patient of equal height?
- (A) Milliliters of local anesthetic required for epidural block
 - (B) Milligrams of succinylcholine required for intubation
 - (C) Clearance of diazepam
 - (D) Clearance of fentanyl
 - (E) Oxygen consumption per body surface area

72. The best premedication regimen for a known active narcotic addict would include

- (A) secobarbital
- (B) diazepam
- (C) nalbuphine
- (D) morphine
- (E) droperidol

73. During cardiopulmonary bypass at a nasopharyngeal temperature of 28°C and a hematocrit of 20%, temperature-corrected PaCO₂ is 50 mmHg and uncorrected PaCO₂ is 60 mmHg. The most appropriate management is to

- (A) administer additional opioid
- (B) administer packed red blood cells to increase hematocrit to 25%
- (C) further decrease the patient's temperature
- (D) increase fresh gas flow to the oxygenator
- (E) institute mechanical ventilation

74. Two days after coronary artery bypass grafting, a 62-year-old man remains sedated, tracheally intubated, and mechanically ventilated with full neuromuscular block. Over the next three hours, PaO₂ decreases from 90 to 70 mmHg at an FiO₂ of 0.7, peak inspiratory pressure measured proximally in the ventilatory circuit increases from 40 to 66 cmH₂O, and plateau pressure remains unchanged at 30 cmH₂O.

Which of the following is the most likely cause of these changes?

- (A) Adult respiratory distress syndrome
- (B) Bronchial mucus plugging
- (C) Left ventricular failure
- (D) Lobar pneumonia
- (E) Tension pneumothorax

75. A combined epidural and general anesthetic is used for aortofemoral bypass surgery. Just prior to extubation, the patient received morphine 5 mg through the epidural catheter. Eleven hours later, he is unresponsive while breathing 40% oxygen from a face mask. Respiratory rate is 6/min and SpO₂ is 92%. Arterial blood gas analysis shows PaO₂ 80 mmHg, PaCO₂ 84 mmHg, and pH 7.16.

Which of the following statements concerning this patient is true?

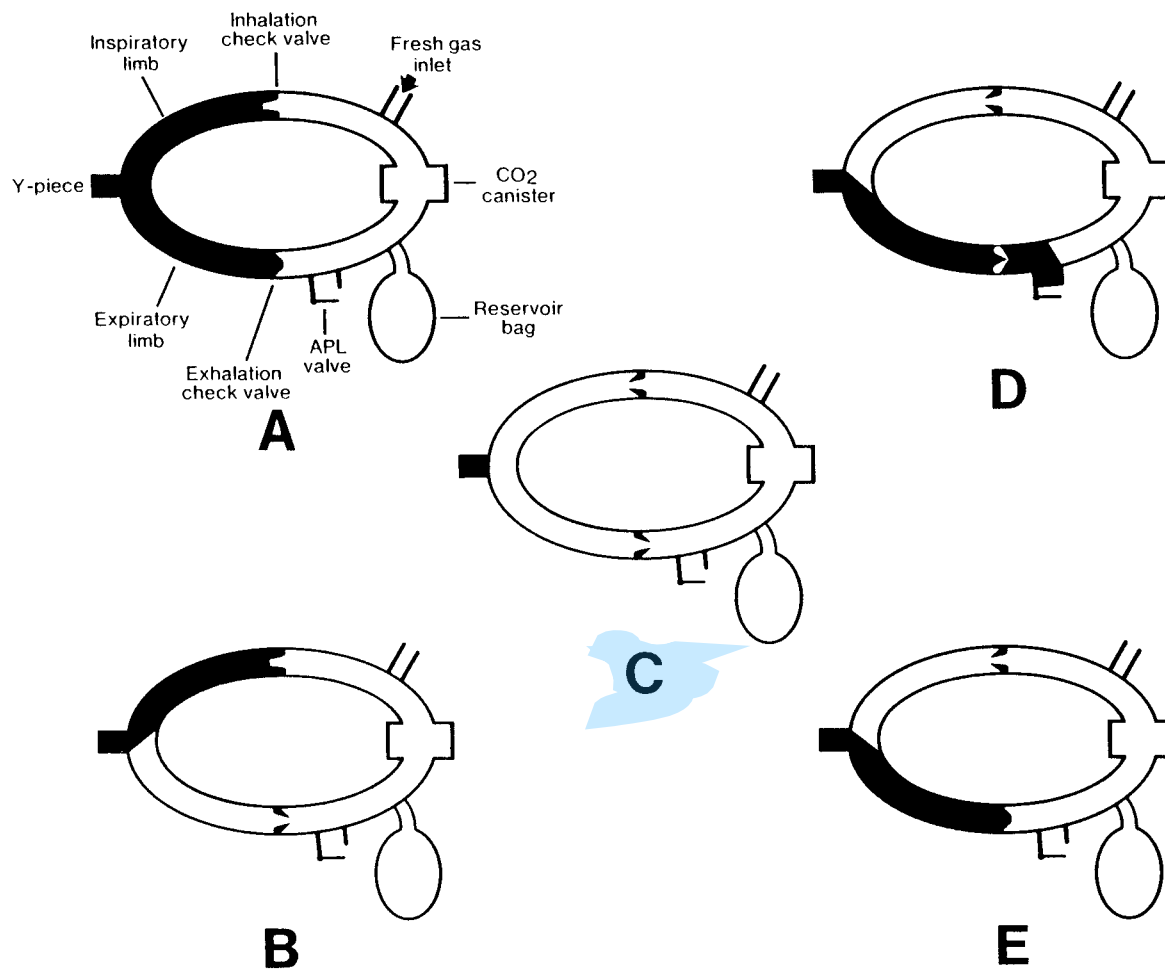
- (A) Hypercarbia is contributing to the decreased level of consciousness
- (B) Naloxone is ineffective for reversing the respiratory depression
- (C) The oxygen saturation is higher than expected because of the pH
- (D) The risk for respiratory depression would have been lower with subarachnoid administration of 0.5 mg morphine
- (E) Residual local anesthetic is contributing to the respiratory depression

76. A rapid shallow ventilatory pattern is most energy efficient for a patient who

- (A) has a low ratio of forced expiratory volume in one second to vital capacity (FEV₁/VC)
- (B) has a high ratio of tidal volume to vital capacity, and diminished vital capacity
- (C) has increased pulmonary compliance
- (D) is using the accessory muscles of respiration
- (E) has increased airway resistance

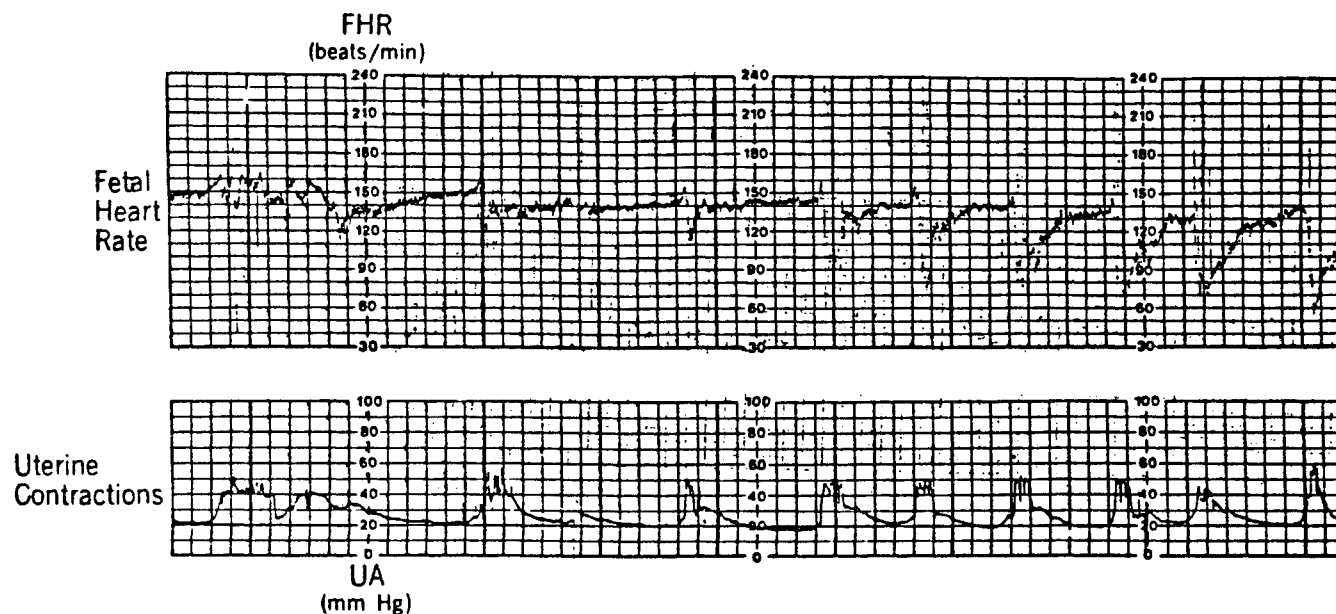
77. A 70-year-old patient has absence of the left radial pulse one month after repair of an aortic aneurysm. Arterial pressure was monitored perioperatively with a 20-gauge left radial artery catheter. Which of the following statements concerning this complication is true?
- (A) A preoperative Allen's test would have predicted this complication
 - (B) Stellate ganglion block should be performed
 - (C) This complication would have been less likely with an 18-gauge catheter
 - (D) This patient has poor collateral circulation in the hand
 - (E) The pulse will likely return
78. Five minutes after intrathecal administration of tetracaine 12 mg in hyperbaric solution, a 60-year-old man has a weak hand grasp. Respirations are normal, heart rate has decreased from 80 to 45 bpm, and blood pressure has decreased from 150/80 to 90/50 mmHg. The most appropriate management at this time is
- (A) administration of atropine
 - (B) administration of ephedrine
 - (C) administration of phenylephrine
 - (D) placement of the patient in the head-down position
 - (E) observation
79. A burn is found at the site of the electrocautery pad. Which of the following is most likely?
- (A) The electrosurgical unit was in the bipolar mode
 - (B) The electrocautery pad became partially detached
 - (C) The electrosurgical unit ground wire was severed
 - (D) The line-isolation monitor alarmed
 - (E) The patient became grounded
80. Which property of oxygen is detected by the fail-safe device on the anesthesia machine?
- (A) Concentration
 - (B) Flow
 - (C) Pressure
 - (D) Partial pressure
 - (E) Reserve volume
81. Which of the following nerves should be blocked for an operation at the medial aspect of the lower leg?
- (A) Femoral
 - (B) Sciatic
 - (C) Obturator
 - (D) Common peroneal
 - (E) Tibial
82. Which of the following is most effective in preventing intraoperative hypothermia in adults?
- (A) Heating and humidifying inspired gases
 - (B) Maintaining a warm operating room
 - (C) Using a circulating warm-water mattress
 - (D) Using reflective coverings
 - (E) Warming intravenous fluids

83. Which of the following shaded areas most accurately represents the dead space of a properly functioning circle system?



84. The effect of succinylcholine is terminated at postsynaptic effector cells by

- (A) binding and uptake by effector cells
- (B) diffusion into capillaries
- (C) hydrolysis by junctional cholinesterase
- (D) hydrolysis by pseudocholinesterase
- (E) spontaneous degradation to succinylmonocholine



85. The fetal heart rate and uterine contraction tracings shown above are most consistent with

- (A) fetal acidosis
- (B) fetal cerebral hemorrhage
- (C) fetal head compression
- (D) fetal hypoxia
- (E) uteroplacental insufficiency

86. The cardiovascular effects of an inhalational anesthetic are evaluated in 10 normal volunteers in the awake resting state and after 15 minutes of constant inspired concentration. Results were analyzed by *t*-test for paired data and are presented below as mean $\pm$ standard deviation.

	Mean Arterial Pressure (mmHg)	Heart Rate (bpm)	Cardiac Output (L/min)
Awake	94 ± 5	82 ± 2	4.2 ± 0.5
Anesthetized	83 ± 9	$90 \pm 2^*$	3.9 ± 0.7

* $p < 0.05$

Based on these data, which of the following conclusions is most valid?

- (A) A decrease in cardiac output would have been evident if more subjects were included in the study
- (B) The anesthetic decreases mean arterial pressure
- (C) The anesthetic does not cause cardiac depression
- (D) The anesthetic is unsafe for patients with coronary artery disease
- (E) There is a 95% to 100% chance that the anesthetic increases heart rate

87. A patient with alcoholic cirrhosis, ascites, and gastrointestinal bleeding receives 4 units of red blood cells prior to anesthesia with isoflurane in oxygen for emergency exploratory laparotomy. After the peritoneum is opened and the fluid is drained, blood pressure decreases to 60/40 mmHg and SpO₂ decreases to 90%. The most likely cause of the hypoxemia is

- (A) acute myocardial ischemia
- (B) decreased 2,3-diphosphoglycerate in transfused blood
- (C) increased intrapulmonary shunting
- (D) relative hypovolemia
- (E) venous air embolism

88. Which of the following statements concerning barbiturate protection from cerebral ischemia is true?

- (A) It may be achieved with dosages low enough to avoid cardiovascular effects
- (B) It is linearly dose-related
- (C) It improves neurologic outcome following cardiac arrest
- (D) It is most useful in patients with focal ischemia
- (E) It is unrelated to EEG activity

89. A 77-year-old woman is still intubated and breathing spontaneously following a total hip replacement. The muscle relaxant has been reversed. Tidal volume is 400 ml, end-tidal carbon dioxide tension is 45 mmHg, and SpO₂ is 98% at an FiO₂ of 1.0. On transfer from the operating table to the gurney, heart rate increases from 65 to 100 bpm and blood pressure decreases from 130/80 to 80/50 mmHg. End-tidal carbon dioxide tension is 30 mmHg and SpO₂ is 94%.

The most likely diagnosis is

- (A) anaphylactic reaction
- (B) bronchospasm
- (C) myocardial infarction
- (D) pulmonary embolism
- (E) unreplaced blood loss

90. A 40-year-old woman has continuous nondermatomal burning pain of the distal foot four weeks after sustaining a metatarsal fracture. On examination, the foot is mildly swollen, tender, and cool. Which of the following statements concerning this condition is true?

- (A) A radiograph of the distal bones of the painful foot will show severe osteoporosis
- (B) A technetium scan of the distal joints of the painful foot will show decreased uptake
- (C) Early use of opioid analgesia will prevent progression of the symptoms
- (D) Intravenous phentolamine will relieve the pain
- (E) The chance of spontaneous recovery within eight weeks is greater than 80%

91. Evaluation of a postoperative neurologic deficit discloses inability to oppose the thumb and little finger, weakness of abduction of the thumb, and loss of flexion of the distal phalanx of the index finger. This problem is most likely related to

- (A) paresthesia occurring during an interscalene brachial plexus block
- (B) attempted radial artery cannulation at the wrist
- (C) inadequate padding under the elbow
- (D) attempted venipuncture in the antecubital fossa
- (E) abduction of the upper humerus against an "ether screen"

92. Arterial oxyhemoglobin desaturation develops more rapidly following apnea in a pregnant patient at term than in a nonpregnant patient with a large intra-abdominal tumor. Which of the following findings in pregnancy is the most likely cause?
- (A) Higher cardiac output
 - (B) Higher oxygen consumption
 - (C) Larger anatomic dead space
 - (D) Smaller blood volume
 - (E) Smaller functional residual capacity
93. Which of the following best describes the relationship between cerebral perfusion pressure and cerebral blood flow in a patient with untreated chronic hypertension?
- (A) It is constant at mean blood pressures between 50 and 150 mmHg
 - (B) It is linear for all blood pressures
 - (C) Flow versus pressure curve is hyperbolic
 - (D) Flow versus pressure curve is shifted to the right
 - (E) Flow versus pressure curve is shifted to the left
94. The accuracy of oxyhemoglobin saturation determined by digital pulse oximetry is affected significantly by each of the following EXCEPT
- (A) movement of the patient
 - (B) isovolemic hemodilution to a hematocrit of 23%
 - (C) position of the operating room light
 - (D) intravenous administration of methylene blue
 - (E) infusion of phenylephrine
95. The use of droperidol as a preanesthetic medication has been associated with each of the following EXCEPT
- (A) acute anxiety
 - (B) anterograde amnesia
 - (C) hypotension
 - (D) extrapyramidal signs
 - (E) catalepsy
96. Each of the following changes is expected with deliberate hypothermia EXCEPT
- (A) decreased unloading of oxygen from hemoglobin
 - (B) a 5% decrease in MAC for each 1°C decrease in temperature
 - (C) increased arterial oxygen and carbon dioxide contents
 - (D) a 50% decrease in cerebral metabolic rate at 28°C
 - (E) spike and dome EEG activity at temperatures below 30°C
97. Each of the following drugs is a cause of central anticholinergic syndrome EXCEPT
- (A) amitriptyline
 - (B) atropine
 - (C) diphenhydramine
 - (D) promethazine
 - (E) ranitidine

98. A 24-year-old woman requires anesthesia for emergency repair of open fractures of the tibia and fibula. She used cocaine two hours ago. Blood pressure is 170/110 mmHg. Each of the following is useful in managing the hypertension EXCEPT
- (A) hydralazine
 - (B) labetalol
 - (C) nitroprusside
 - (D) phentolamine
 - (E) propranolol
99. Carbon monoxide poisoning with a carboxyhemoglobin concentration of 20% is characterized by each of the following EXCEPT
- (A) decreased oxygen-carrying capacity of hemoglobin
 - (B) decreased PaO_2
 - (C) shift of the oxyhemoglobin dissociation curve to the left
 - (D) normal minute volume of ventilation
 - (E) headache and nausea
100. A 40-year-old woman receives alfentanil 75 $\mu\text{g}/\text{kg}$ followed by an infusion of 1.5 $\mu\text{g}/\text{kg}/\text{min}$ for a one-hour cholecystectomy and cholangiogram. This regimen could be associated with each of the following EXCEPT
- (A) muscle rigidity
 - (B) increased biliary tract pressure
 - (C) inadequate anesthesia
 - (D) postoperative respiratory depression
 - (E) two to four hours of postoperative analgesia
101. Monitoring sensory evoked potentials may be useful in detecting functional derangement of each of the following EXCEPT
- (A) cranial nerve pathways during posterior fossa operations
 - (B) motor pathways during anterior cervical discectomy
 - (C) dorsal column pathways during operations for spinal tumors
 - (D) visual pathways during operations on the sphenoid wing
 - (E) cortical pathways during carotid artery operations
102. Which of the following drugs is LEAST likely to cross the placenta?
- (A) Lidocaine
 - (B) Meperidine
 - (C) Midazolam
 - (D) Thiopental
 - (E) Vecuronium

**1993 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1993, and is provided for instructional purposes only. The key was verified in 1993 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

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1. B	31. B	61. E	91. A	121. B	151. A
2. B	32. D	62. A	92. B	122. D	152. A
3. A	33. C	63. E	93. C	123. D	153. B
4. B	34. E	64. A	94. E	124. A	154. A
5. E	35. D	65. B	95. A	125. C	155. B
6. E	36. C	66. A	96. B	126. E	156. B
7. D	37. B	67. D	97. D	127. B	157. A
8. C	38. A	68. C	98. B	128. E	158. D
9. A	39. E	69. E	99. A	129. A	159. E
10. D	40. C	70. B	100. C	130. B	160. B
11. C	41. B	71. C	101. A	131. B	161. B
12. C	42. E	72. E	102. E	132. A	162. A
13. A	43. D	73. B	103. B	133. A	163. C
14. B	44. A	74. A	104. B	134. D	164. C
15. D	45. C	75. E	105. C	135. E	165. D
16. C	46. D	76. D	106. A	136. B	166. D
17. D	47. B	77. A	107. C	137. A	167. C
18. C	48. C	78. E	108. A	138. C	168. D
19. D	49. B	79. D	109. B	139. A	169. B
20. E	50. C	80. C	110. A	140. C	170. E
21. C	51. E	81. A	111. D	141. A	171. A
22. B	52. C	82. A	112. A	142. B	172. D
23. D	53. A	83. B	113. C	143. D	173. D
24. D	54. B	84. A	114. C	144. B	174. A
25. E	55. D	85. B	115. C	145. B	175. B
26. D	56. B	86. D	116. C	146. D	
27. E	57. B	87. D	117. A	147. A	
28. B	58. D	88. E	118. A	148. D	
29. C	59. A	89. A	119. A	149. C	
30. E	60. C	90. A	120. C	150. B	

**1993 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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2. D	32. D	62. B	92. B	122. D	152. B
3. C	33. C	63. A	93. D	123. C	153. C
4. C	34. C	64. E	94. B	124. C	154. A
5. A	35. C	65. D	95. B	125. B	155. A
6. D	36. A	66. D	96. E	126. E	156. B
7. A	37. A	67. A	97. E	127. D	157. A
8. E	38. C	68. C	98. E	128. A	158. A
9. D	39. D	69. B	99. B	129. D	159. B
10. E	40. D	70. A	100. E	130. D	160. B
11. A	41. D	71. B	101. B	131. B	161. B
12. E	42. E	72. D	102. E	132. A	162. D
13. B	43. A	73. D	103. D	133. C	163. D
14. A	44. D	74. B	104. A	134. B	164. C
15. A	45. A	75. A	105. A	135. A	165. B
16. D	46. C	76. B	106. D	136. B	166. A
17. B	47. B	77. E	107. E	137. C	167. A
18. B	48. B	78. A	108. B	138. C	168. C
19. B	49. B	79. B	109. A	139. B	169. D
20. E	50. A	80. C	110. E	140. A	170. A
21. B	51. C	81. A	111. E	141. A	171. E
22. E	52. B	82. B	112. C	142. C	172. B
23. B	53. A	83. C	113. C	143. A	173. A
24. A	54. E	84. B	114. A	144. C	174. E
25. B	55. E	85. C	115. B	145. A	
26. E	56. D	86. E	116. B	146. A	
27. A	57. A	87. D	117. B	147. B	
28. D	58. A	88. D	118. D	148. A	
29. B	59. C	89. E	119. C	149. D	
30. C	60. D	90. D	120. D	150. C	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1994

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. Which of the following can be used as a sole criterion for brain death?
 - (A) Absence of cerebral blood flow
 - (B) Absence of doll's eye movements
 - (C) Fixed, dilated pupils
 - (D) Isoelectric EEG
 - (E) Unresponsiveness to all externally applied stimuli

2. A 62-year-old man is scheduled for coronary artery bypass grafting. During induction of anesthesia with fentanyl, high peak inspiratory pressures occur with manual ventilation, and peripheral oxygen saturation decreases from 100% to 94%. The most appropriate management is administration of
 - (A) albuterol
 - (B) isoflurane
 - (C) midazolam
 - (D) nitroglycerin
 - (E) succinylcholine

3. Statistical analysis of 20 patients shows a mean cardiac output (CO) of 5 L/min with a standard deviation of 1 L/min. The distribution pattern in the sample population is normal. Which of the following is the most appropriate conclusion?
 - (A) Approximately 33% of the sample population would be expected to have a CO between 4 and 6 L/min
 - (B) Approximately 95% of the sample population would be expected to have a CO between 3 and 7 L/min
 - (C) Ten of the sample patients have a cardiac output greater than 5 L/min
 - (D) The mean and the median are both at the 50th percentile
 - (E) The median and the mode are the same in the sample population

4. A 67-kg, 52-year-old man is undergoing heart transplantation. After implantation of the donor heart and discontinuation of cardiopulmonary bypass, isoproterenol is administered intravenously to maintain heart rate greater than 100 bpm. During the next 10 minutes, blood pressure decreases from 105/55 mmHg to 75/40 mmHg. Heart rate is 102 bpm and cardiac output is 5.8 L/min.

The most appropriate management is administration of
 - (A) amrinone
 - (B) digoxin
 - (C) dopamine
 - (D) epinephrine
 - (E) norepinephrine

5. At equipotent doses, which of the following opioids is most likely to migrate cephalad in cerebrospinal fluid after epidural administration?
- (A) Fentanyl
 - (B) Hydromorphone
 - (C) Meperidine
 - (D) Morphine
 - (E) Sufentanil
6. A patient sustains cardiac arrest while being mechanically ventilated. Which of the following is the most likely effect on PETCO₂?
- (A) Gradual increase with the duration of asystole
 - (B) Maintenance of the prearrest value
 - (C) Abrupt decrease below the prearrest value
 - (D) Decrease when thoracic compression is started
 - (E) Gradual decrease independent of the ventilator cycle
7. Which of the following statements concerning caudal anesthesia in children is true?
- (A) The dural sac extends further caudad than in adults
 - (B) Delay of postoperative micturition occurs in most patients
 - (C) The sensory level of analgesia is poorly correlated with the dose of local anesthetic
 - (D) It is technically difficult because of poorly defined sacral anatomy
 - (E) It is contraindicated in infants younger than 1 year of age
8. Which of the following decreases the clearance of atracurium?
- (A) Administration of cimetidine
 - (B) Cholinesterase deficiency
 - (C) Hepatic insufficiency
 - (D) Hypothermia
 - (E) Renal insufficiency
9. Which of the following interventions is most effective in preventing neurologic injury resulting from global cerebral ischemia?
- (A) Induction of barbiturate coma prior to ischemia
 - (B) Maintenance of serum glucose concentration greater than 200 mg/dl prior to ischemia
 - (C) Induction of hypothermia to a core temperature of 15°C prior to ischemia
 - (D) Maintenance of PaCO₂ less than 25 mmHg following ischemia
 - (E) Prevention of systemic hypertension following ischemia
10. After administration of a single dose of vecuronium, function returns last to which of the following muscles?
- (A) Adductor pollicis
 - (B) Diaphragm
 - (C) Laryngeal muscles
 - (D) Orbicularis oculi
 - (E) Rectus abdominis

11. A patient is scheduled for right pneumonectomy. A left-sided double-lumen endobronchial tube is inserted. After the endobronchial side is clamped and both cuffs are inflated, breath sounds are heard only on the left. Which of the following is the most likely cause?
- (A) Herniation of the endobronchial cuff over the carina
 - (B) Occlusion of the right upper lobe bronchus
 - (C) Placement of the endobronchial lumen in the left mainstem bronchus
 - (D) Placement of the endobronchial lumen in the right mainstem bronchus
 - (E) Placement of the endobronchial lumen in the trachea
12. A 68-year-old man with severe depression is scheduled for electroconvulsive therapy. He had a myocardial infarction two years ago and continues to have angina on exertion. Pretreatment with which of the following drugs is most likely to maintain hemodynamic stability during the procedure?
- (A) Esmolol
 - (B) Fentanyl
 - (C) Hydralazine
 - (D) Lidocaine
 - (E) Midazolam
13. A patient has pain in the left thoracic wall associated with metastatic rib lesions. An intrathecal neurolytic block with 6% phenol in glycerin is planned for pain relief. Prior to performing the block, the patient should be placed in which of the following positions?
- (A) Left lateral semisupine
 - (B) Right lateral semisupine
 - (C) Left lateral semiprone
 - (D) Right lateral semiprone
 - (E) Prone
14. If the oxygen supply pressure of an anesthesia machine exceeds a set value, which of the following safety devices maintains a constant oxygen flowmeter output?
- (A) Cylinder pressure regulator
 - (B) Fail-safe valve
 - (C) Flow-control valve
 - (D) Pipeline inlet check valve
 - (E) Second-stage regulator
15. A 30-year-old woman develops urticaria immediately after administration of 2% 2-chloroprocaine for removal of a nevus on the chest wall. This reaction resolves with administration of diphenhydramine and the surgery is rescheduled. During the second procedure, a field block is performed using 10 ml of 1% lidocaine from a multidose vial. Within 10 minutes the patient develops urticaria and wheezing and has difficulty breathing. These symptoms resolve with administration of epinephrine.

Which of the following substances is the most likely cause of these reactions?

- (A) A paraben derivative
- (B) Povidone-iodine
- (C) Ethylenediaminetetraacetic acid (EDTA)
- (D) Propylene glycol
- (E) Sodium bisulfite

16. The carbon dioxide/ventilation response curve
- (A) is primarily a measure of the integrity of the peripheral chemoreceptors
 - (B) shows parallel displacement to the left in the presence of opioids
 - (C) is linear between a PaCO_2 of 20 and 120 mmHg
 - (D) shows progressive changes in slope with increased doses of halogenated anesthetics
 - (E) is unaffected by a decrease in PaO_2 to 60 mmHg
17. Which of the following pre-existing conditions predisposes to new-onset third-degree heart block during pulmonary artery catheterization?
- (A) First-degree heart block
 - (B) Left bundle branch block
 - (C) Sick sinus syndrome
 - (D) Sinus bradycardia
 - (E) Wenckebach second-degree heart block
18. Mepivacaine 40 ml of a 1% solution with epinephrine 1:200,000 is injected into the brachial plexus sheath at the axilla after eliciting a paresthesia in the ulnar nerve distribution. Which of the following is most likely to remain intact?
- (A) Adduction of the thumb
 - (B) Flexion at the wrist
 - (C) Sensation of the lateral forearm
 - (D) Sensation on the palmar surface of the lateral three and one half fingers
 - (E) Sensation on the palmar surface of the medial one and one half fingers
19. Which of the following statements concerning intercostal nerve block for postoperative pain is true?
- (A) Block at the midaxillary line provides analgesia for the anterior and lateral abdominal walls
 - (B) Blood levels of local anesthetic are higher than after an axillary block
 - (C) Intravascular injection is unlikely
 - (D) Loss of resistance assures proper needle placement
 - (E) Paravertebral spread is prevented by adding epinephrine to the local anesthetic solution
20. A 26-year-old patient with multiple trauma is admitted to the intensive care unit postoperatively. The early development of polyuria, hypotension, low urine sodium excretion, high serum osmolality, and normal serum creatinine concentration is best explained by
- (A) adrenal insufficiency
 - (B) fluoride-induced high-output renal failure
 - (C) inappropriate ADH secretion
 - (D) intraoperative fluid overload
 - (E) posterior pituitary insufficiency
21. Which of the following limits the use of nalbuphine for relief of postoperative pain?
- (A) High incidence of nausea and vomiting
 - (B) High incidence of delayed respiratory depression
 - (C) Potential for inducing seizures with repeated doses
 - (D) Relatively low maximal analgesic effect
 - (E) Short duration of action

22. A 13-year-old African American boy has severe abdominal pain after debridement of an open fracture of the lower extremity. His hemoglobin concentration is 10 g/dl and a peripheral blood smear shows elongated crescent-shaped erythrocytes. The most appropriate initial therapy is
- (A) sodium bicarbonate administration
 - (B) dopamine infusion
 - (C) blood transfusion
 - (D) volume loading with crystalloid
 - (E) high-dose corticosteroid administration
23. A tourniquet with dual bladders is being used for intravenous regional anesthesia of the upper extremity. At what point in the procedure should the distal tourniquet be inflated?
- (A) During injection of the local anesthetic
 - (B) After the patient complains of tourniquet pain
 - (C) Coincident with inflation of the proximal tourniquet
 - (D) After the proximal tourniquet is deflated
 - (E) Prior to exsanguination of the limb
24. A 65-year-old man undergoes prostatectomy in the lithotomy position under spinal anesthesia using bupivacaine 12 mg. Ten hours later, he reports that his left foot is numb. Examination shows decreased pinprick sensation over the lateral dorsal aspect of the left foot; dorsiflexion is limited. Which of the following is the most likely cause?
- (A) Cauda equina syndrome
 - (B) Compression of the common peroneal nerve
 - (C) Compression of the posterior tibial nerve
 - (D) L5 nerve root damage
 - (E) Stretching of the sciatic nerve
25. If the low-pressure alarm of an anesthesia circuit is broken, which of the following monitors will provide the earliest indication of a disconnected ventilator hose?
- (A) Fail-safe system
 - (B) Infrared capnograph
 - (C) Nitrogen analyzer
 - (D) Oxygen analyzer
 - (E) Pulse oximeter
26. An 80-kg, 70-year-old woman is scheduled for a mastectomy. She has a history of congestive heart failure treated with digoxin 0.25 mg daily. Preoperative examination shows a sinus rhythm at 80 bpm and blood pressure of 110/70 mmHg. Laboratory studies show a serum potassium concentration of 4.2 mEq/L and a serum digoxin concentration of 1.5 µg/ml. Five minutes after induction of general anesthesia, ventricular bigeminy is noted; blood pressure is 85/65 mmHg, SpO₂ is 97%, and PETCO₂ is 20 mmHg.

Which of the following is the most appropriate management?

- (A) Administration of calcium chloride
- (B) Administration of ephedrine
- (C) Administration of lidocaine
- (D) Administration of potassium chloride
- (E) Decrease in ventilation

27. During laparotomy for a ruptured spleen, unexplained oozing occurs after infusion of 2 liters of crystalloid and 3 units of blood. The most likely cause is
- (A) citrate toxicity
 - (B) dilutional thrombocytopenia
 - (C) hemolytic transfusion reaction
 - (D) labile clotting factor deficiency
 - (E) leukoagglutinin reaction
28. Hemodilution is used during profound hypothermic cardiopulmonary bypass primarily because it
- (A) decreases cold-induced coagulopathy
 - (B) decreases edema formation
 - (C) increases oxygen-carrying capacity of plasma
 - (D) increases oxygen dissociation from hemoglobin
 - (E) limits the cold-induced increase in blood viscosity
29. After weaning from cardiopulmonary bypass following mitral valve replacement, a patient's cardiac output is reported to be 3.7 L/min measured by thermodilution technique using 5% dextrose in water 10 ml at room temperature as injectate. This value could be falsely high if
- (A) normal saline solution were mistakenly used
 - (B) the patient's hematocrit were still 25%
 - (C) only 9.0 ml of injectate were used
 - (D) atrial fibrillation were present
 - (E) the room were excessively cold
30. A 95-kg, 65-year-old woman receives enflurane and pancuronium during a laparoscopic cholecystectomy. Three minutes after administration of neostigmine 5 mg and atropine 1.2 mg, the twitch height returns to normal. Spontaneous tidal volume is 500 ml when the endotracheal tube is removed. In the PAR she reports dyspnea and appears distressed.

Which of the following is the most likely cause of the respiratory distress?

- (A) Atelectasis
 - (B) Cholinergic crisis
 - (C) Pain
 - (D) Residual enflurane
 - (E) Residual muscle paralysis
31. A 4-year-old child with myelomeningocele and a ventriculoperitoneal shunt is scheduled for bladder augmentation. One year ago, hypotension and bronchospasm occurred during laparotomy for placement of a feeding gastrostomy and responded to fluids and epinephrine. At that time, anesthesia was induced with thiopental, the trachea was intubated with a polyvinyl tracheal tube following administration of succinylcholine, and anesthesia was maintained with halothane and nitrous oxide. No diagnostic tests were performed after that incident.

Which of the following should be avoided during the bladder augmentation?

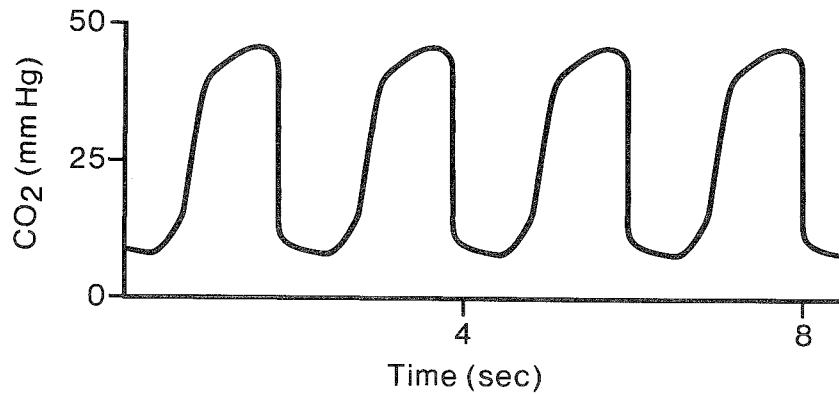
- (A) Latex gloves
- (B) Polyvinyl tracheal tubes
- (C) Halothane
- (D) Succinylcholine
- (E) Thiopental



32. A 68-year-old man with stable angina treated with propranolol and nifedipine is scheduled for coronary artery bypass grafting. After induction with fentanyl and tracheal intubation, heart rate decreases to 40 bpm and blood pressure decreases to 70/40 mmHg. The ECG is shown above. Which of the following is the most appropriate first step in management?
- (A) Infusion of isoproterenol
 - (B) Administration of phenylephrine
 - (C) Closed chest cardiopulmonary resuscitation
 - (D) Defibrillation
 - (E) Synchronized cardioversion
-
33. Increasing preload, systemic vascular resistance, and heart rate will best maintain hemodynamic stability in patients with
- (A) aortic stenosis
 - (B) asymmetric septal hypertrophy (IHSS)
 - (C) cardiac tamponade
 - (D) mitral regurgitation
 - (E) mitral stenosis
34. Which of the following best describes cardiomyopathy following therapy with doxorubicin (Adriamycin)?
- (A) The initial presentation is concentric hypertrophy
 - (B) The diagnosis is confirmed by a shortened QT interval
 - (C) It is exacerbated by hyperoxia
 - (D) It is resistant to inotropic agents
 - (E) It may persist for years after therapy is discontinued
35. The recommended agent for decontamination of anesthetic equipment splattered with blood containing HIV is
- (A) household bleach
 - (B) hydrogen peroxide
 - (C) iodine solution
 - (D) isopropyl alcohol
 - (E) Lysol solution
36. A patient has an anterior neck injury, hoarseness, labored respirations, subcutaneous emphysema, and laryngeal crepitus following a motor vehicle accident. Which of the following is the best method of securing the airway in this situation?
- (A) Blind nasotracheal intubation
 - (B) Lightwand intubation
 - (C) Retrograde wire-guided intubation
 - (D) Tracheostomy
 - (E) Transtracheal jet ventilation

37. A 20-year-old patient undergoes a thoracic vertebral stabilization procedure six hours after sustaining an acute transection of the spinal cord at T4. The risks of general anesthesia are greater in this patient than in a patient with an intact spinal cord because of
- (A) autonomic hyperreflexia
 - (B) increased sensitivity to vasoconstrictor agents
 - (C) increased venous capacitance
 - (D) interruption of cardiac sympathetic reflexes
 - (E) hyperkalemia induced by succinylcholine
38. A 35-year-old patient with asymmetric septal hypertrophy (IHSS) is undergoing bladder suspension with enflurane 1%, nitrous oxide 50%, and oxygen 50%. Immediately after skin incision, blood pressure decreases to 90/60 mmHg and junctional tachycardia of 150 bpm is noted on the ECG. Which of the following is the most appropriate management?
- (A) Decreasing enflurane concentration
 - (B) Infusion of nitroglycerin
 - (C) Intravenous administration of a fluid bolus
 - (D) Intravenous administration of esmolol
 - (E) Intravenous administration of phenylephrine
39. An arterial blood sample is obtained from a patient undergoing hypothermic cardiopulmonary bypass at 28°C. Analysis at 37°C shows a pH of 7.40 and PaCO₂ of 40 mmHg. Which of the following values are most likely if the analysis is corrected to 28°C?
- (A) pH 7.40; PaCO₂ 40
 - (B) pH > 7.40; PaCO₂ < 40
 - (C) pH > 7.40; PaCO₂ > 40
 - (D) pH < 7.40; PaCO₂ < 40
 - (E) pH < 7.40; PaCO₂ > 40
40. A 1150-g, 10-day-old infant is undergoing a bowel resection for necrotizing enterocolitis. Heart rate is 200 bpm and blood pressure measured through a femoral artery catheter is 45/24 mmHg. The most appropriate next step is administration of
- (A) calcium gluconate
 - (B) epinephrine
 - (C) esmolol
 - (D) fentanyl
 - (E) normal saline solution
41. A 1100-g, 10-day-old infant is to undergo ligation of a patent ductus arteriosus after unsuccessful medical treatment. Within three minutes of intravenous administration of atropine 20 µg, fentanyl 20 µg, and pancuronium 0.1 mg, systemic blood pressure decreases from 80 to 30 mmHg, heart rate from 180 to 140 bpm, and arterial oxygen saturation from 90% to 80%.
- The most appropriate management is to
- (A) increase FiO₂
 - (B) administer additional atropine
 - (C) infuse crystalloid
 - (D) infuse prostaglandin E₁
 - (E) administer phenylephrine

42. Which of the following is the most common cause of coagulopathy occurring during massive blood transfusion?
- (A) Decreased serum fibrinogen concentration
 - (B) Decreased serum ionized calcium concentration
 - (C) Dilutional thrombocytopenia
 - (D) Disseminated intravascular coagulation
 - (E) Hypothermia
43. Which of the following is the most likely cause of the increased incidence of right ventricular failure in patients with morbid obesity?
- (A) Chronic hypoxia
 - (B) Chronic silent pulmonary aspiration
 - (C) Chronic silent subendocardial ischemia
 - (D) Decreased vital capacity
 - (E) Increased pulmonary blood flow
44. Which of the following statements concerning the pharmacokinetics of nondepolarizing muscle relaxants is true?
- (A) Drugs with a longer duration of action depend on the liver for excretion
 - (B) Drugs with a shorter duration of action depend primarily on redistribution for recovery
 - (C) Onset of action is independent of dose
 - (D) Recovery rate parallels the decrease in plasma relaxant concentration
 - (E) The shorter the duration of action, the faster the onset
45. A patient develops urticaria and pruritus while receiving a blood transfusion in the PACU. Blood pressure and heart rate are unchanged from pretransfusion values. The most appropriate action is administration of
- (A) diphenhydramine
 - (B) epinephrine
 - (C) furosemide
 - (D) hydrocortisone
 - (E) mannitol
46. During direct intra-arterial measurement of blood pressure
- (A) the mean arterial pressure will be unaffected by small air bubbles in the system
 - (B) an underdamped system will overestimate the mean arterial pressure
 - (C) an underdamped system will overestimate the diastolic pressure
 - (D) long tubing from the catheter to the transducer will tend to decrease resonance in the system
 - (E) calibration of the transducer by opening a stopcock to air at the sternal angle will overestimate the mean arterial pressure
47. An ECG shows ventricular tachycardia in a patient with a heart rate of 160 bpm and a blood pressure of 90/60 mmHg. The best initial therapeutic maneuver prior to cardioversion is
- (A) carotid sinus massage
 - (B) intravenous administration of bretylium
 - (C) intravenous administration of lidocaine
 - (D) intravenous administration of propranolol
 - (E) precordial "thump"



48. A 40-year-old woman with chronic renal failure is undergoing revision of an arteriovenous shunt with general anesthesia. The capnographic waveform above was obtained during spontaneous ventilation 20 minutes after administration of succinylcholine and tracheal intubation. Which of the following is the most likely cause of these findings?
- (A) Leaking endotracheal tube cuff
 - (B) Channeling of soda lime
 - (C) Light anesthesia
 - (D) Metabolic acidosis
 - (E) Residual neuromuscular block
-
49. Optimal positioning of a left-sided double-lumen endobronchial tube is easier than positioning of a right-sided endobronchial tube because the
- (A) angle between the trachea and bronchus is wider on the left
 - (B) diameter of the left mainstem bronchus is larger
 - (C) diameter of the left upper lobe bronchus is larger
 - (D) distance between the left upper lobe bronchus and the carina is greater
 - (E) left mainstem bronchus is more rigid
50. A patient who had liver transplantation two years ago now requires general anesthesia for ENT surgery. Minimal rejection has occurred on a regimen of cyclosporine and prednisone. Which of the following is most likely?
- (A) Hypoalbuminemia
 - (B) Hypocalcemia
 - (C) Episodic hypoglycemia
 - (D) Increased serum creatinine concentration
 - (E) Prolonged prothrombin time
51. Which of the following phenomena is primarily responsible for the decrease in core body temperature that commonly occurs during the first hour of general anesthesia?
- (A) Convective heat loss from cutaneous vasodilation
 - (B) Decreased heat production
 - (C) Evaporative heat loss during skin preparation
 - (D) Heat loss from the respiratory tract
 - (E) Redistribution of core body heat to the periphery

52. You are called to a witnessed cardiac arrest where cardiopulmonary resuscitation is being performed. After successful intubation, arterial blood gas values are PaO₂ 86 mmHg, PaCO₂ 63 mmHg, and pH 7.25 at an FiO₂ of 1.0. The most appropriate management at this time is to
- (A) repeat arterial blood gas analysis using a new specimen
 - (B) administer sodium bicarbonate
 - (C) administer fluid challenge with 500 ml of normal saline solution
 - (D) hyperventilate the patient
 - (E) add positive end-expiratory pressure
53. Which of the following is the most likely cause of dyspnea during spinal anesthesia to a T3 sensory level?
- (A) Decreased abdominal muscle tone
 - (B) Decreased afferent input from the thoracic wall
 - (C) Increased dead space ventilation
 - (D) Increased intrapulmonary shunting
 - (E) Partial diaphragmatic paralysis
54. Halothane
- (A) has no effect on reflex hypoxic pulmonary vasoconstriction
 - (B) protects the myocardium from beta-adrenergic stimulation
 - (C) has a direct, negative chronotropic effect on the sinoatrial node
 - (D) metabolites decrease renal concentrating ability
 - (E) is unsafe for use with epinephrine-containing local anesthetics
55. A patient is scheduled for amputation of the third metatarsal. A tourniquet will not be used during the procedure. The most effective anesthesia will be provided by block of which of the following nerves?
- (A) Femoral
 - (B) Common peroneal and tibial
 - (C) Sural and deep peroneal
 - (D) Sural and tibial
 - (E) Tibial, saphenous, and deep peroneal
56. In a 5-kg boy with Treacher Collins syndrome who is to undergo cleft palate repair, endotracheal intubation is best accomplished with
- (A) awake nasal intubation after topical anesthesia
 - (B) halothane anesthesia with spontaneous ventilation
 - (C) light isoflurane anesthesia and a muscle relaxant
 - (D) thiopental and succinylcholine sequence intravenously
 - (E) nasal intubation after administration of ketamine intramuscularly
57. In the majority of cases, fetal heart rate decelerations in a variable pattern are associated with
- (A) decreased uteroplacental perfusion
 - (B) fetal head compression during contractions
 - (C) umbilical cord compression
 - (D) low Apgar scores at birth
 - (E) low neurobehavioral scores eight hours post partum

58. A 75-year-old woman with significant carotid artery stenosis is scheduled for general anesthesia for repair of a fractured hip. Which of the following is the greatest disadvantage of using propofol as an induction agent in this patient?
- (A) Decreased arterial blood pressure
 - (B) Pain during intravenous injection
 - (C) Prolonged apnea after induction
 - (D) Prolonged awakening
 - (E) Prolonged elimination half-life
59. The last muscle to be affected by an interscalene brachial plexus block is the
- (A) brachialis
 - (B) brachioradialis
 - (C) biceps
 - (D) flexor carpi radialis
 - (E) interosseous
60. Which of the following will result in the largest change in oxygen content?
- (A) Increased hemoglobin (Hgb) concentration from 10 to 15 g/dl
 - (B) Increased PaO₂ from 40 to 50 mmHg (Hgb 15 g/dl)
 - (C) Increased PaO₂ from 60 to 70 mmHg (Hgb 15 g/dl)
 - (D) Increased P50 of Hgb from 27 to 37 mmHg (Hgb 15 g/dl)
 - (E) Increased pH from 7.20 to 7.40
61. A patient who has severe pain from unresectable cancer of the base of the tongue is referred for a neurolytic block. A block of which of the following will be effective?
- (A) Gasserian ganglion
 - (B) Glossopharyngeal nerve
 - (C) Hypoglossal nerve
 - (D) Mandibular nerve
 - (E) Vagus nerve
62. Preoperative administration of an alpha-adrenergic blocker for 10 days to patients with pheochromocytoma will decrease
- (A) episodic tachycardia
 - (B) hyperglycemia
 - (C) hypovolemia
 - (D) nasal stuffiness
 - (E) postural hypotension
63. Which of the following statements best describes the decrease in cerebral metabolic rate that occurs with administration of volatile anesthetics?
- (A) It is independent of anesthetic dose
 - (B) It is maximal when the EEG is isoelectric
 - (C) It is more profound with halothane than isoflurane at equipotent doses
 - (D) It is not affected by enflurane-induced EEG hyperactivity
 - (E) It parallels changes in cerebral blood flow at mean arterial pressures of 50 to 150 mmHg

64. Compared with the demand-flow intermittent mandatory ventilation (IMV) system, the continuous-flow IMV system has which of the following characteristics?
- (A) It cannot be used with positive end-expiratory pressure
 - (B) It permits monitoring of exhaled tidal volume
 - (C) It decreases waste of medical gases
 - (D) It decreases the work of breathing
 - (E) It synchronizes mechanical and spontaneous breaths
65. Which of the following results in the greatest increase in right-to-left shunting in an infant with cyanotic heart disease?
- (A) Decreased pulmonary vascular resistance
 - (B) Decreased systemic vascular resistance
 - (C) Hemodilution
 - (D) Increased heart rate
 - (E) Myocardial depression
66. An apneic adult is receiving an oxygen flow of 4 L/min through a rigid bronchoscope. After five minutes of apnea, which of the following findings is most likely?
- (A) A decrease in cardiac output
 - (B) A decrease in pulmonary vascular resistance
 - (C) A decrease in SpO₂ from 99% to 89%
 - (D) An increase in PaCO₂ of 18 mmHg
 - (E) Serum bicarbonate concentration of 30 mEq/L
67. Which of the following statements concerning the ventilatory effects of inhalational anesthesia is true?
- (A) Assisted ventilation is not an effective technique to achieve normocarbida
 - (B) Surgical stimulation does not affect ventilation
 - (C) Combined doses of nitrous oxide and isoflurane depress ventilation the same as an equipotent dose of isoflurane alone
 - (D) The ventilatory response to increasing carbon dioxide concentration is normal
 - (E) The ventilatory response to hypoxemia is preserved
68. Which of the following fluids will restore circulating blood volume with the smallest infused volume?
- (A) Albumin 25%
 - (B) Dextrose 5% in saline solution 0.45%
 - (C) Hydroxyethyl starch 6%
 - (D) Lactated Ringer's solution
 - (E) Type-specific whole blood
69. A 50-year-old woman notes loss of sensation in the medial lower leg 24 hours after vaginal hysterectomy in the lithotomy position. Which of the following nerves is most likely to be injured?
- (A) Lateral femoral cutaneous
 - (B) Obturator
 - (C) Peroneal
 - (D) Saphenous
 - (E) Tibial

70. Twenty minutes after an axillary block, the patient reports feeling over the "back of the hand." Examination shows normal sensation over the lateral aspect of the dorsum of the hand and the dorsal base of the thumb and index finger. Supplementary anesthesia of this area can be provided by blocking which of the following nerves?
- (A) Ulnar
 - (B) Musculocutaneous
 - (C) Median
 - (D) Radial
 - (E) Intercostobrachial
71. A 45-year-old woman with mitral stenosis is scheduled for elective mitral valve replacement. Two minutes after tracheal intubation, she develops atrial fibrillation with a ventricular response rate of 150 bpm and a decrease in blood pressure to 75/45 mmHg. Which of the following is the most appropriate first step in management?
- (A) Increasing the concentration of enflurane
 - (B) Increasing the infusion rate of lactated Ringer's solution
 - (C) Intravenous administration of digoxin
 - (D) Intravenous administration of propranolol
 - (E) Electrical cardioversion
72. A 35-year-old woman undergoes a one-hour abdominal liposuction procedure under general anesthesia. During the procedure, 2000 ml of crystalloid is administered and 800 ml of fatty tissue is extracted. Thirty minutes postoperatively, blood pressure is 75/40 mmHg and heart rate is 100 bpm; SpO₂ is 94% on room air. Which of the following is the most likely cause of these findings?
- (A) Acute systemic vasodilation
 - (B) Circulating free fatty acids
 - (C) Hypocalcemia
 - (D) Inadequate intravascular volume replacement
 - (E) Venous fat embolism
73. After termination of cardiopulmonary bypass, a patient who is chronically digitalized receives digoxin 0.5 mg in error. An ECG shows sinus bradycardia with intermittent sinus arrest; blood pressure is 90/60 mmHg. Which of the following drugs is contraindicated in this patient?
- (A) Atropine
 - (B) Calcium chloride
 - (C) Ephedrine
 - (D) Magnesium sulfate
 - (E) Phenylephrine
74. During protamine administration following separation from cardiopulmonary bypass, blood pressure decreases from 100/70 to 60/30 mmHg and peak inspiratory pressure increases from 26 to 60 cmH₂O. The most appropriate next step in management is administration of
- (A) diphenhydramine
 - (B) dopamine
 - (C) epinephrine
 - (D) methylprednisolone
 - (E) terbutaline

75. A 90-kg, 59-year-old man with chronic obstructive pulmonary disease is undergoing laparotomy. Mechanical ventilation is being carried out with a fresh gas flow of 2 L/min at a rate of 16/min and tidal volume of 900 ml; I:E ratio is 1:2.5. PaCO₂ remains greater than 50 mmHg. Preoperative PaCO₂ was normal.

Which of the following is the most appropriate next step?

- (A) Adding 10 cmH₂O of positive end-expiratory pressure
- (B) Converting to spontaneous ventilation
- (C) Decreasing inspiratory flow rate
- (D) Increasing exhalation time
- (E) Increasing fresh gas flow

76. Which of the following statements concerning the choice of nitroprusside or nitroglycerin to induce deliberate hypotension is true?

- (A) Nitroglycerin is more potent
- (B) Nitroglycerin produces hypotension by acting on both arterial and venous capacitance vessels
- (C) Nitroprusside produces less rebound hypertension on discontinuation
- (D) The toxic effects of nitroprusside are independent of dose
- (E) The therapeutic effects of nitroprusside may persist on discontinuation

77. A 56-year-old woman with pulmonary fibrosis is scheduled for pneumonectomy. Which of the following parameters best predicts potential postoperative functional impairment?

- (A) Exercise tolerance
- (B) Flow-volume loop
- (C) Resting arterial blood gas values
- (D) Unilateral pulmonary artery occlusion pressure
- (E) Vital capacity and FEV₁

78. A 30-year-old woman undergoes thyroidectomy under general endotracheal anesthesia. Immediately after extubation while breathing spontaneously, she has laryngospasm that resolves after 60 seconds of continuous positive airway pressure applied by face mask. In the PACU, she develops shortness of breath, tachypnea, hypoxemia, and rales. Which of the following is the most likely diagnosis?

- (A) Gastric acid aspiration
- (B) Myocardial infarction
- (C) Pulmonary edema
- (D) Pulmonary embolism
- (E) Vocal cord paralysis

79. A child undergoing general anesthesia is breathing spontaneously using the Jackson-Rees modification of the Ayres T-piece. Respiratory rate is 20/min and tidal volume is 75 ml. What is the minimum fresh gas flow required to prevent rebreathing?

- (A) 750 ml/min
- (B) 1500 ml/min
- (C) 2250 ml/min
- (D) 4500 ml/min
- (E) 6000 ml/min

80. A 43-year-old man has been hoarse for two weeks since undergoing anterior cervical fusion at C7-8 for treatment of a herniated disk. Laryngoscopy shows paralysis of the right vocal cord. Which of the following is the most likely cause?
- (A) Damage to the glossopharyngeal nerve during surgery
 - (B) Damage to the superior laryngeal nerve during surgery
 - (C) Nerve root compression by the herniated disk
 - (D) Stretching of the recurrent laryngeal nerve during surgery
 - (E) Trauma to the vocal cords during intubation
81. A patient who is paraplegic secondary to spinal cord transection at T3 develops bradycardia and facial flushing during a nephrectomy under general anesthesia with nitrous oxide, fentanyl, and atracurium. The most likely cause of this response is
- (A) release of histamine
 - (B) stimulation of the carotid sinus
 - (C) release of prostaglandins
 - (D) vagal response to peritoneal traction
 - (E) release of epinephrine
82. A 65-year-old man has a history of alcohol abuse. Which of the following preoperative serum concentrations would provide the best assessment of synthetic hepatic function?
- (A) Albumin
 - (B) Alkaline phosphatase
 - (C) Bilirubin
 - (D) Globulin
 - (E) Transaminases
83. The primary mechanism for respiratory arrest following a spinal anesthetic to T2 is
- (A) block of carotid chemoreceptors
 - (B) direct effect of local anesthetic on the medulla
 - (C) ischemia of respiratory centers in the medulla
 - (D) paralysis of the diaphragm by neural block
 - (E) paralysis of intercostal muscles
84. Which of the following laboratory studies is the best indicator of reversal of the effects of warfarin?
- (A) Activated clotting time
 - (B) Activated partial thromboplastin time
 - (C) Bleeding time
 - (D) Plasma fibrinogen concentration
 - (E) Prothrombin time
85. Which of the following is a sign of cyanide toxicity during nitroprusside therapy?
- (A) Decreased SpO_2
 - (B) Increased PaCO_2
 - (C) Increased arteriovenous oxygen tension difference
 - (D) Increased mixed venous pH
 - (E) Increased mixed venous PO_2

86. A woman at 39 weeks' gestation has been in labor for 12 hours. She has had nausea and vomiting for the past eight hours. Maternal arterial blood gas values are PaO_2 85 mmHg, PaCO_2 31 mmHg, and pH 7.50. Which of the following is the most likely cause of fetal distress occurring at this time?
- (A) Hypocarbica-induced placental ischemia
 - (B) Impaired fetal oxyhemoglobin dissociation
 - (C) Shift to the left of the maternal oxyhemoglobin dissociation curve
 - (D) Maternal hypovolemia
 - (E) Maternal hypoxemia
87. During induction of anesthesia, a patient is breathing isoflurane from a semiclosed circle absorber system. The temperature-compensated vaporizer is set to deliver isoflurane 1.5%. Which of the following will result in the lowest inspired concentration of isoflurane?
- (A) Doubling the length of circle system hoses
 - (B) Decreasing the barometric pressure
 - (C) Changing from rubber to plastic breathing hoses
 - (D) Decreasing fresh gas flow
 - (E) Exhaustion of the soda lime
88. An air/oxygen blender with E-size cylinders is supplying gas to a Mapleson D circuit being used to ventilate a neonate during transport. The air tank is full (psi=1900/625 L) and flow is 4 L/min. The oxygen tank flow is 5 L/min and the pressure gauge indicates 500 psi. If the flow rates remain unchanged, which of the following statements is correct?
- (A) The air tank will be empty in 90 minutes
 - (B) The oxygen tank will be empty in 30 minutes
 - (C) The concentration of oxygen in the circuit is 60%
 - (D) The oxygen tank will fill with air when the pressure gauge falls below 50 psi
 - (E) The volume of oxygen remaining can be determined only by weighing the tank
89. In the absence of coronary artery disease, isoflurane-induced vasodilation and tachycardia are beneficial hemodynamic goals for which of the following cardiac diseases?
- (A) Aortic regurgitation
 - (B) Aortic stenosis
 - (C) Asymmetric septal hypertrophy (IHSS)
 - (D) Mitral stenosis
 - (E) Pulmonary regurgitation
90. Which of the following statements concerning the cerebral effects of barbiturates is true?
- (A) Barbiturate coma produces greater cerebral protection than hypothermia to 17°C
 - (B) Barbiturate-induced reduction in cerebral blood flow is greater at normocarbica than at hypocarbica
 - (C) Barbiturates decrease the cerebral metabolic rate for oxygen by decreasing cerebral blood flow
 - (D) Somatosensory evoked potentials and the EEG are equally sensitive to suppression by barbiturates
 - (E) When administered in doses sufficient to produce an isoelectric EEG, barbiturates decrease the cerebral metabolic rate for oxygen by 50%

91. Which of the following will occur if the top of the oxygen flowmeter is cracked and leaking during anesthesia with nitrous oxide and oxygen?
- (A) The back-pressure check valve will protect against a hypoxic gas mixture
 - (B) The fail-safe mechanism will protect against a hypoxic gas mixture
 - (C) The inspired oxygen concentration will be less than that set by the flowmeters
 - (D) The leak will be detected if the circle is pressurized prior to use
 - (E) The rotameter will accurately reflect the fresh gas flow to the patient
92. A 54-year-old man is scheduled for open reduction of a fracture sustained when he jumped from a burning building. The carboxyhemoglobin concentration is 25%. Which of the following is the most reliable indicator of adequate oxygenation during general anesthesia?
- (A) PaO_2 of 300 mmHg
 - (B) pH of 7.38 with a PaCO_2 of 41 mmHg
 - (C) Mixed venous PO_2 of 45 mmHg
 - (D) Oxyhemoglobin saturation of 100% measured by co-oximeter
 - (E) SpO_2 of 100% measured by pulse oximeter
93. During anesthesia using the Bain circuit
- (A) PaCO_2 is independent of minute volume if fresh gas flow is greater than 17 ml/kg
 - (B) PaCO_2 is independent of fresh gas flow if minute volume is greater than 100 ml/kg
 - (C) PaCO_2 may be normal in the presence of rebreathing
 - (D) carbon dioxide removal is more efficient during spontaneous ventilation than during controlled ventilation
 - (E) less body heat is lost than with a circle system
94. In a patient with asthma, which of the following drugs used to treat supraventricular tachycardia is LEAST likely to induce bronchospasm?
- (A) Adenosine
 - (B) Edrophonium
 - (C) Esmolol
 - (D) Propranolol
 - (E) Verapamil
95. Which of the following is LEAST likely to decrease myocardial oxygen supply?
- (A) Administration of enflurane
 - (B) Epidural anesthesia to a sensory level of T6
 - (C) Increased pulmonary artery occlusion pressure
 - (D) Hypocarbica (PaCO_2 25 mmHg)
 - (E) Metabolic acidosis (pH 7.20)
96. Transcutaneous electrical nerve stimulation is LEAST likely to be effective in which of the following pain syndromes?
- (A) Acute postoperative pain
 - (B) Chronic pancreatitis
 - (C) Myofascial syndrome
 - (D) Phantom limb pain
 - (E) Reflex sympathetic dystrophy

97. A 4-month-old child undergoing a craniectomy for craniosynostosis is anesthetized with nitrous oxide and halothane. Suddenly the systolic blood pressure decreases from 75 to 30 mmHg, and the PETCO₂ decreases from 35 to 6 mmHg. Which of the following maneuvers is LEAST likely to have a beneficial effect?
- (A) Administration of a fluid bolus
 - (B) Administration of a vasopressor
 - (C) Application of positive end-expiratory pressure
 - (D) Discontinuation of nitrous oxide
 - (E) Flooding the surgical wound with saline solution
98. Which of the following factors is LEAST likely to affect serum ionized calcium concentration following blood transfusion?
- (A) Age of blood transfused
 - (B) Amount of blood transfused
 - (C) Body temperature
 - (D) Serum pH
 - (E) Rate of transfusion
99. In a patient who is breathing spontaneously, the work of breathing increases with each of the following EXCEPT
- (A) decreased compliance
 - (B) decreased vital capacity
 - (C) increased carbon dioxide production
 - (D) increased respiratory rate
 - (E) increased dead space
100. The sudden onset of pulmonary edema can be caused by each of the following EXCEPT
- (A) rapid re-expansion of the lungs following pneumothorax
 - (B) upper airway obstruction
 - (C) oxygen toxicity
 - (D) rupture of mitral papillary muscle
 - (E) severe preeclampsia
101. Trimethaphan causes each of the following EXCEPT
- (A) cerebral vasodilation
 - (B) urinary retention
 - (C) pupillary cycloplegia
 - (D) histamine release
 - (E) potentiation of succinylcholine block
102. Each of the following is a complication of stellate ganglion block EXCEPT
- (A) brachial plexus block
 - (B) diplopia
 - (C) local anesthetic-induced seizure
 - (D) recurrent laryngeal nerve palsy
 - (E) subarachnoid block

103. A celiac plexus block provides effective relief of pain associated with primary cancers at each of the following locations EXCEPT the
- (A) adrenal gland
 - (B) liver
 - (C) pancreas
 - (D) sigmoid colon
 - (E) stomach
104. Intraoperatively, the occurrence of prominent “a” waves on the central venous pressure waveform can be explained by each of the following EXCEPT
- (A) acute right ventricular failure
 - (B) atrial flutter
 - (C) complete heart block
 - (D) onset of junctional tachycardia
 - (E) ventricular pacing
105. A 6-year-old child with severe cerebral palsy is scheduled for general anesthesia. He is at increased risk for each of the following EXCEPT
- (A) gastroesophageal reflux
 - (B) hypersensitivity to central nervous system depressants
 - (C) poor function of laryngeal reflexes
 - (D) postoperative pulmonary complications
 - (E) succinylcholine-induced hyperkalemia
106. Each of the following is a characteristic of prostaglandin E_1 (alprostadil) pharmacology in an infant EXCEPT:
- (A) It is effective in the treatment of large left-to-right shunts
 - (B) It is a cause of apnea
 - (C) It is a potent vasodilator
 - (D) It prevents closure of the ductus arteriosus
 - (E) It is metabolized rapidly
107. Normal pregnancy is associated with a decrease in each of the following EXCEPT
- (A) expiratory reserve volume
 - (B) FEV_1/FVC ratio
 - (C) functional residual capacity
 - (D) thoracic compliance
 - (E) vital capacity
108. Each of the following can produce adequate analgesia for the first stage of labor EXCEPT
- (A) subarachnoid morphine
 - (B) epidural bupivacaine
 - (C) pudendal block with lidocaine
 - (D) paracervical block with lidocaine
 - (E) lumbar sympathetic block with lidocaine

109. The newborn infant of an 18-year-old heroin addict has an initial Apgar score of 1. After intubation of the trachea and ventilation with 100% oxygen, the Apgar score is 3 at five minutes. Appropriate management at this time would include administration of each of the following EXCEPT

- (A) dextrose 10%
- (B) epinephrine
- (C) naloxone
- (D) normal saline solution
- (E) sodium bicarbonate

110. A 70-kg man with ischemic heart disease is undergoing abdominal aortic aneurysm resection. At the time of infrarenal cross-clamping, 0.2-mV ST-segment depression appears on lead V₅ of the ECG. Hemodynamic changes occurring at the same time are shown below.

	<u>Preclamp</u>	<u>Clamp on</u>
Systemic blood pressure (mmHg)	90/50	150/90
Heart rate (bpm)	80	95
Pulmonary artery pressure (mmHg)	20/10	45/24
Mean pulmonary artery occlusion pressure (mmHg)	10	23
Cardiac output (L/min)	4.5	3.2

Ischemia would be decreased by restoring the preclamp level of each of the following EXCEPT

- (A) blood pressure
- (B) heart rate
- (C) pulmonary artery pressure
- (D) pulmonary artery occlusion pressure
- (E) cardiac output

111. A patient receives 1.5% bupivacaine 40 ml and epinephrine 1:200,000 for axillary brachial plexus block for reduction of a forearm fracture. The tourniquet is inflated to 300 mmHg; 45 minutes later, the patient has pain that radiates to the posteromedial elbow. Which of the following nerves is NOT adequately blocked?

- (A) Intercostobrachial
- (B) Median
- (C) Musculocutaneous
- (D) Ulnar
- (E) Radial

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book B
1994

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is **BEST** in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. During axillary block of the brachial plexus, which nerve is most likely to be encountered if the needle is inserted through the posterior wall of the artery?
 - (A) Intercostobrachial
 - (B) Median
 - (C) Musculocutaneous
 - (D) Radial
 - (E) Ulnar

2. A 24-year-old man is undergoing induction of general anesthesia prior to appendectomy. During laryngoscopy, he regurgitates a large amount of bilious material. An endotracheal tube is inserted; aspiration shows bile-stained fluid. Which of the following is the most appropriate next step in management?
 - (A) Infusion of a loading dose of aminophylline
 - (B) Intravenous administration of broad-spectrum antibiotics
 - (C) Lavage of the tracheobronchial tree with saline solution
 - (D) Radiograph of the chest
 - (E) Proceeding with the operation

3. A 75-kg, 45-year-old patient with quadriplegia at the level of C6 is scheduled for elective cholecystectomy. Pulmonary function tests show an FVC of 2.4 L and an FEV₁ of 1.2 L. Which of the following is the most appropriate conclusion based on these findings?
 - (A) Intercostal muscle function is normal
 - (B) SpO₂ will be 80% or less while breathing room air
 - (C) Total lung capacity is normal
 - (D) The patient has chronic obstructive pulmonary disease
 - (E) These findings are expected in this patient

4. Two days after total abdominal hysterectomy, a 54-year-old woman develops lethargy followed by seizures and coma. Laboratory studies show a serum sodium concentration of 108 mEq/L and serum osmolality of 225 mOsm/kg. The most appropriate next step in management is administration of which of the following?
 - (A) Desmopressin
 - (B) Furosemide only
 - (C) Saline solution 0.9% only
 - (D) Furosemide and saline solution 0.9%
 - (E) Furosemide and saline solution 3%

5. Prolonged respiratory depression following administration of morphine is more likely in patients with chronic renal failure than in patients with normal kidney function because of
- (A) decreased biotransformation
 - (B) decreased protein binding
 - (C) decreased volume of distribution
 - (D) delayed excretion of morphine metabolites
 - (E) the effect of acidosis on morphine ionization
6. An oxygen-driven anesthesia ventilator with a bellows that ascends during exhalation develops a small hole in the bellows. Which of the following is the most likely effect?
- (A) Alveolar hyperinflation
 - (B) Decreased inspiratory flow rate
 - (C) Decreased inspired oxygen concentration
 - (D) Increased concentration of inhalational agent
 - (E) Rebreathing of exhaled gases
7. Compared with thiopental, etomidate causes
- (A) greater histamine release
 - (B) greater myocardial depression
 - (C) greater myoclonic activity
 - (D) increased seizure threshold
 - (E) less nausea
8. Which of the following is the correct sequence of anatomic structures encountered when using a paramedian approach for lumbar spinal anesthesia?
- (A) Ligamentum flavum → dura mater → arachnoid mater
 - (B) Interspinous ligament → ligamentum flavum → dura mater → arachnoid mater
 - (C) Posterior longitudinal ligament → ligamentum flavum → dura mater → arachnoid mater
 - (D) Anterior longitudinal ligament → ligamentum flavum → dura mater → arachnoid mater
 - (E) Ligamentum flavum → dura mater → pia mater → arachnoid mater
9. When evaluating a screening test, which of the following is the most appropriate term for the proportion of patients with a disease who have a positive test result?
- (A) Accuracy
 - (B) Incidence
 - (C) Selectivity
 - (D) Sensitivity
 - (E) Specificity
10. During carotid endarterectomy, which of the following EEG patterns is most suggestive of cerebral ischemia?
- (A) Ipsilateral spike-and-wave activity
 - (B) Bilateral change from beta to alpha rhythm
 - (C) Ipsilateral increase in beta activity
 - (D) Ipsilateral decrease in the spectral edge frequency from 10 to 4 Hz
 - (E) Bilateral increase in the spectral edge frequency from 8 to 15 Hz

11. Which of the following results in decreased mixed venous oxygen saturation?
- (A) Cardiogenic shock
 - (B) Decreased metabolic rate
 - (C) Increased cardiac output
 - (D) Left-to-right intracardiac shunt
 - (E) Pulmonary vasodilation
12. Which of the following is the most likely cause of the rapid onset of local anesthesia when sodium bicarbonate is added to lidocaine?
- (A) Decreased extracellular calcium ion concentration
 - (B) Increased extracellular pH
 - (C) Increased intracellular pH
 - (D) Increased ionized lidocaine diffusion
 - (E) Increased nonionized lidocaine concentration
13. A patient with uremia is scheduled for emergency surgery. Bleeding time is 18 minutes. The most appropriate initial treatment is
- (A) cryoprecipitate
 - (B) desmopressin
 - (C) fresh frozen plasma
 - (D) platelets
 - (E) vitamin K
14. A 70-year-old man with mild hypertension and aortoiliac occlusive disease is undergoing aortofemoral bypass grafting. Which of the following interventions is most effective in maintaining renal perfusion during infrarenal aortic clamping?
- (A) Infusion of dopamine at 2 $\mu\text{g}/\text{kg}/\text{min}$
 - (B) Infusion of sodium nitroprusside
 - (C) Intravenous administration of furosemide
 - (D) Intravenous administration of mannitol
 - (E) Volume loading with crystalloid
15. Which of the following statements best describes "screening" when blood is ordered for type and screen?
- (A) Red blood cells are mixed with serum containing known antigens
 - (B) Red blood cells are mixed with serum from the pool of potential donors
 - (C) Red blood cells are mixed with red blood cells from the pool of potential donors
 - (D) Serum is mixed with red blood cells that contain known antigens
 - (E) Serum is mixed with red blood cells from the pool of potential donors
16. A 20-year-old man with a history of substance abuse is undergoing preoperative evaluation. Which of the following findings suggests current use of cocaine?
- (A) Absence of deep tendon reflexes
 - (B) Bradycardia
 - (C) Hypertension
 - (D) Hypothermia
 - (E) Pinpoint pupils

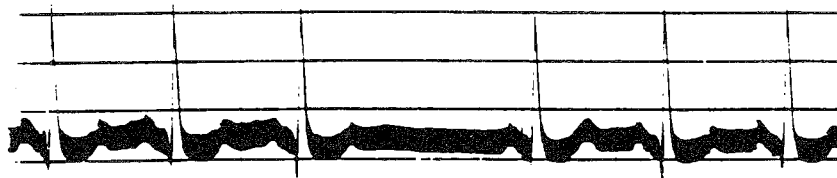
17. Which of the following is the most appropriate treatment of methemoglobinemia prior to emergency surgery?
- (A) Hydroxocobalamin
 - (B) Methylene blue
 - (C) Oxygen by face mask
 - (D) Packed red blood cells
 - (E) Thiosulfate
18. When using a Venturi face mask with a reservoir bag
- (A) a known constant FiO_2 is delivered
 - (B) the reservoir bag ensures predictable FiO_2 while conserving fresh gas flow
 - (C) low fresh gas flows will not decrease FiO_2
 - (D) the system prevents hypocarbia during tachypnea
 - (E) the system increases anatomic dead space
19. Following transfusion of packed red blood cells during general anesthesia, the patient's blood pressure decreases, heart rate and temperature increase, and hemoglobinuria and diffuse oozing are observed. Which of the following is the most appropriate first step in management?
- (A) Administration of hydrocortisone
 - (B) Administration of fresh frozen plasma
 - (C) Administration of epsilon-aminocaproic acid
 - (D) Rapid infusion of crystalloid
 - (E) Transfusion of platelet concentrates
20. Compared with general anesthesia, epidural anesthesia for hip arthroplasty is associated with
- (A) decreased incidence of perioperative myocardial ischemia
 - (B) decreased intraoperative blood loss
 - (C) decreased risk for acute renal failure
 - (D) increased risk for stress-induced hyperglycemia
 - (E) increased thromboembolic complications
21. Which of the following abnormalities in serum is most likely to result from intraoperative discontinuation of parenteral hyperalimentation?
- (A) Hypocalcemia
 - (B) Hypocarbia
 - (C) Hypoglycemia
 - (D) Hypokalemia
 - (E) Hyponatremia
22. An unvaccinated health care worker is stuck by a needle contaminated with blood from an HBsAg-positive patient. Which of the following statements concerning this situation is true?
- (A) The risk for development of HIV infection is greater than the risk for development of hepatitis
 - (B) Hepatitis immune globulin is indicated if the health care worker is HBcAg positive
 - (C) Hepatitis B vaccine should be administered
 - (D) Hepatitis immune globulin will protect equally against hepatitis B and hepatitis C (non-A, non-B)
 - (E) Hepatitis B vaccine carries a risk for transmission of HIV

23. A 19-year-old man is undergoing inguinal herniorrhaphy. He is anesthetized with a spinal block supplemented with midazolam and fentanyl. During the procedure, he has sudden loss of consciousness, profound hypotension, and bradycardia; systolic pressure is 40 mmHg and heart rate is 30 bpm. Cardiopulmonary resuscitation is started.

The most appropriate next step is administration of

- (A) atropine
 - (B) ephedrine
 - (C) epinephrine
 - (D) flumazenil
 - (E) naloxone
24. A 60-kg, 38-year-old woman undergoes laparoscopic tubal ligation. Paralysis is maintained for one hour with infusion of succinylcholine at a rate of 10 mg/min. At the end of the procedure, respirations are shallow and tetanic fade is noted on neuromuscular stimulation. In addition to continued mechanical ventilation, which of the following is the most appropriate next step in management?
- (A) Observe until the patient recovers spontaneously
 - (B) Monitor until PETCO₂ reaches 50 mmHg
 - (C) Determine dibucaine number
 - (D) Administer fresh frozen plasma
 - (E) Administer glycopyrrolate and neostigmine
25. A patient has sudden cardiopulmonary arrest five minutes after retrobulbar block with 0.75% bupivacaine 2 ml with hyaluronidase for ophthalmologic surgery. No premonitory changes were noted on the pulse oximeter. The most likely cause is
- (A) allergic reaction to hyaluronidase
 - (B) direct cardiac toxicity
 - (C) oculocardiac reflex
 - (D) intravenous injection of local anesthetic
 - (E) subarachnoid injection of local anesthetic
26. A pulmonary artery catheter is placed in an awake patient breathing room air. Typical right ventricular and pulmonary artery pressure tracings are obtained. With the catheter balloon inflated, blood drawn from the distal port has a PaO₂ of 100 mmHg, while a simultaneous radial artery sample has a PaO₂ of 90 mmHg. These data indicate that the
- (A) shunt fraction is greater than 10%
 - (B) catheter is in the wedge position
 - (C) catheter has entered a pulmonary vein
 - (D) cardiac output is abnormally high
 - (E) oxygen electrode is malfunctioning
27. A 3-day-old infant is comatose 18 hours after surgical correction of transposition of the great vessels. Tracheal suctioning produces only a tachycardic response. Anesthesia included midazolam 0.5 mg/kg, fentanyl 60 µg/kg, and pancuronium 0.3 mg/kg. Which of the following is the most appropriate first step in evaluation of this infant?
- (A) Administration of flumazenil
 - (B) Administration of naloxone
 - (C) Train-of-four assessment
 - (D) CT scan of the head
 - (E) EEG

28. During a cardiac arrest with effective chest compression and positive-pressure ventilation, 50 mEq of sodium bicarbonate is administered. Which of the following is the most likely result?
- (A) Decreased mixed venous pH
 - (B) Decreased SpO_2
 - (C) Increased PETCO_2
 - (D) Increased plasma lactate concentration
 - (E) Increased serum potassium concentration
29. A newly developed inhalational anesthetic has a blood-gas partition coefficient of 0.2. Which of the following statements best describes this drug compared with isoflurane?
- (A) MAC is lower
 - (B) The difference between FA and FI during maintenance of anesthesia is greater
 - (C) Time to emergence is shorter
 - (D) Rapid induction requires greater overpressure
 - (E) Equilibrium in a circle system with the same flow of fresh gas is slower
30. Which of the following statements concerning isolated mitral stenosis is true?
- (A) Afterload reduction increases cardiac output
 - (B) Pulmonary artery occlusion pressure overestimates left ventricular filling pressure
 - (C) Pulmonary hypertension is irreversible
 - (D) Tachycardia decreases the mitral transvalvular gradient
 - (E) Thermodilution cardiac output measurements are unreliable
31. Which of the following drugs exerts a vasoconstrictor effect by blocking the reuptake of norepinephrine at the neuronal synapse?
- (A) Cocaine
 - (B) Dopamine
 - (C) Ephedrine
 - (D) Metaraminol
 - (E) Phenylephrine
32. In a patient with hypovolemic shock, which of the following factors is the best measure of the overall balance between oxygen supply and demand?
- (A) Arterial oxygen content
 - (B) PETO_2
 - (C) Mixed venous oxygen saturation
 - (D) PaO_2
 - (E) Transcutaneous oxygen tension
33. Which of the following neural functions demonstrates the highest segmental block after spinal anesthesia?
- (A) Afferent sympathetic activity
 - (B) Proprioception
 - (C) Sharp pain perception
 - (D) Temperature sensation
 - (E) Touch sensation



34. A 45-year-old man is scheduled for appendectomy under general anesthesia. He reports that for many years he has occasionally felt his heart "skip a beat." The ECG tracing shown above was obtained one hour ago. Which of the following is the most appropriate next step?
- (A) Proceeding with induction of anesthesia
 - (B) Administration of a loading dose of digoxin
 - (C) Carotid sinus massage
 - (D) Intravenous administration of atropine
 - (E) Placement of a temporary pacemaker
-
35. A 45-year-old man with chronic liver failure is scheduled for liver transplantation. Which of the following preoperative findings is most likely?
- (A) Hypoxemia
 - (B) Increased platelet count
 - (C) Increased systemic vascular resistance
 - (D) Increased serum factor VIII concentration
 - (E) Metabolic alkalosis
36. Which of the following is the most effective treatment of shivering following general anesthesia?
- (A) Administration of droperidol
 - (B) Administration of morphine
 - (C) Administration of midazolam
 - (D) Administration of warm intravenous fluids
 - (E) Skin-surface warming
37. During open reduction of a tibial fracture, a tourniquet cuff is applied around the proximal thigh and inflated to 300 mmHg. Which of the following is most likely to prevent pain and hypertension caused by the tourniquet?
- (A) Intravenous administration of fentanyl during subarachnoid block
 - (B) Lumbar sympathetic block
 - (C) Spinal anesthesia to a T6 sensory level
 - (D) Obturator nerve block
 - (E) General anesthesia
38. With respect to mechanical ventilation, which of the following statements concerning the portion of tidal volume known as compression volume is true?
- (A) It is calculated by dividing the volume of gas delivered to the patient by the peak pressure
 - (B) It does not contribute to the volume of gas entering the patient
 - (C) It is not included in the volume measured by a spirometer on the inspiratory limb
 - (D) It decreases with the addition of a humidifier to the breathing circuit
 - (E) It decreases with the addition of one-way valves at the Y connector of the breathing circuit

39. A 2600-g neonate is to undergo surgical repair of a small gastroschisis. The infant is preoxygenated with 100% oxygen. Arterial hemoglobin desaturation is noted during laryngoscopy after a rapid-sequence induction. Which of the following is the most likely cause?
- (A) High fetal hemoglobin concentration
 - (B) High ratio of oxygen consumption to functional residual capacity
 - (C) Low functional residual capacity in milliliters per kilogram
 - (D) Poor thoracic compliance
 - (E) Patent ductus arteriosus
40. A waste-gas scavenger has an active disposal system. Which of the following safety features is necessary to prevent removal of excess gas from the breathing circuit?
- (A) Positive-pressure relief mechanism
 - (B) Negative-pressure relief mechanism
 - (C) Low-volume scavenging reservoir
 - (D) High-volume scavenging reservoir
 - (E) Maximum vacuum flow rate of 5 L/min
41. Which of the following findings is most likely in a 3-year-old child who has a secundum-type atrial septal defect with a 2:1 left-to-right shunt?
- (A) Pulmonary blood flow twice that of systemic blood flow
 - (B) Pulmonary vascular resistance twice normal
 - (C) Mean pulmonary artery pressure twice normal
 - (D) Right atrial pressure twice normal
 - (E) Hypoxemia while breathing room air
42. Pain and spasm due to injury of the deltoid muscle is most effectively relieved by
- (A) axillary block
 - (B) cervical sympathetic block
 - (C) interscalene brachial plexus block
 - (D) paravertebral block at C4
 - (E) superficial cervical plexus block
43. The potency of an inhalational anesthetic correlates best with its
- (A) vapor pressure
 - (B) blood/gas partition coefficient
 - (C) molar volume
 - (D) brain/gas partition coefficient
 - (E) oil/gas partition coefficient
44. Intraoperative heat loss in an unclothed, undraped patient is caused primarily by
- (A) conduction to colder objects
 - (B) convective heat loss
 - (C) insensible perspiration
 - (D) radiant heat loss to the environment
 - (E) respiratory tract water loss

45. Which of the following statements concerning flumazenil is true?
- (A) Hepatic clearance is low
 - (B) It binds irreversibly with the benzodiazepine receptor
 - (C) It causes hypertension and tachycardia
 - (D) It has a shorter duration of action than midazolam
 - (E) It reverses opioid-induced respiratory depression
46. During acute normovolemic hemodilution in an adult, which of the following compensatory mechanisms is most important in maintaining tissue oxygenation?
- (A) Increased cardiac output
 - (B) Increased oxygen extraction
 - (C) Increased synthesis of erythropoietin
 - (D) Redistribution of regional blood flow
 - (E) Shift of the oxyhemoglobin dissociation curve
47. A newborn is in respiratory distress. Examination shows a scaphoid abdomen, cyanosis while breathing oxygen by mask, and heart sounds in the right hemithorax. Which of the following is the most appropriate next step?
- (A) Assisted ventilation with a bag and face mask
 - (B) Insertion of a chest tube on the left side
 - (C) Insertion of a nasogastric tube
 - (D) Tracheal intubation and assisted ventilation
 - (E) Tracheal intubation and expansion of the left lung
48. A 46-year-old man is scheduled for repair of an inguinal hernia. Six years ago, he had an episode of malignant hyperthermia during cholecystectomy. Which of the following is the most appropriate perioperative management?
- (A) Administration of a regional anesthetic
 - (B) Administration of dantrolene orally for two days prior to surgery
 - (C) Avoidance of all inhalational anesthetics except isoflurane
 - (D) Avoidance of ester local anesthetics
 - (E) Flushing the anesthesia machine with oxygen 10 L/min for a minimum of 12 hours
49. A 64-year-old man with a large pancreatic tumor has severe abdominal pain that radiates to the low back. Which of the following is the most appropriate management?
- (A) Bilateral L1 rhizotomy
 - (B) Dorsal column stimulation
 - (C) Hypogastric plexus block
 - (D) Neurolytic celiac plexus block
 - (E) Patient-controlled analgesia
50. Which of the following conditions is a contraindication to the use of succinylcholine?
- (A) Burns of 50% body surface area occurring 12 hours ago
 - (B) Cirrhosis
 - (C) Myotonic dystrophy
 - (D) Seizure disorder
 - (E) Spinal cord transection within the past six hours

51. Forty-eight hours after thoracotomy, a patient's T6-7 epidural catheter is removed and the distal 2 cm is noted to be missing. The patient felt no pain during removal and neurologic examination shows no abnormalities. After informing the patient, which of the following is the most appropriate next step in management?
- (A) Observation
 - (B) Culture of cerebrospinal fluid
 - (C) MRI of the thoracic spine
 - (D) Myelography
 - (E) Surgical removal of the catheter
52. A 63-year-old man with a history of congestive heart failure and left ventricular dilation is scheduled for carotid endarterectomy. During carotid cross-clamping, the surgeon requests that systolic blood pressure be increased from 100 to 160 mmHg. Compared with an identical patient with normal left ventricular size, what is the effect of this change in blood pressure on this patient's myocardial oxygen consumption?
- (A) Equal decrease
 - (B) Greater decrease
 - (C) Lesser increase
 - (D) Equal increase
 - (E) Greater increase
53. A 55-year-old man requires intravenous lidocaine for multifocal premature ventricular contractions occurring in the first hour after a below-knee amputation. He has alcoholic cirrhosis, portal hypertension, and ascites. Which of the following correctly describes the appropriate modification of the usual loading bolus and maintenance infusion of lidocaine?
- (A) Larger bolus, faster infusion
 - (B) Larger bolus, slower infusion
 - (C) Smaller bolus, faster infusion
 - (D) Smaller bolus, slower infusion
 - (E) No change necessary
54. A 65-year-old patient with compensated congestive heart failure undergoes resection of a large tumor of the temporal lobe. During the procedure, the brain is noted to protrude through the surgical incision. After increasing minute ventilation, which of the following is the most appropriate next step in management?
- (A) Administration of dexamethasone
 - (B) Administration of furosemide
 - (C) Administration of mannitol
 - (D) Induction of barbiturate coma
 - (E) Induction of deliberate hypotension
55. A 72-year-old woman is somnolent one day after left carotid endarterectomy. She has smoked 1 $\frac{1}{2}$ packs of cigarettes daily for 50 years. Six weeks ago, she underwent right carotid endarterectomy. At this time, arterial blood gases while breathing room air are PO₂ 45 mmHg, PCO₂ 60 mmHg, and pH 7.30. Which of the following is the most likely cause of the increased PCO₂?
- (A) Bilateral vocal cord paralysis
 - (B) Cerebral infarction
 - (C) Congestive heart failure
 - (D) Denervation of the carotid bodies
 - (E) Phrenic nerve injury

56. During attempted cannulation of the right internal jugular vein, the exploring needle goes lateral to the vein. Which of the following structures is most likely to be encountered?
- (A) Carotid artery
 - (B) Vagus nerve
 - (C) Thoracic duct
 - (D) Phrenic nerve
 - (E) Long thoracic nerve
57. Which of the following provides the earliest indication of myocardial ischemia during general anesthesia?
- (A) Cardiac index
 - (B) Mixed venous oxygen saturation
 - (C) Pulmonary artery occlusion pressure
 - (D) Regional ventricular wall motion
 - (E) ST-segment depression on ECG
58. A newborn infant is undergoing repair of gastroschisis. During closure of the abdominal wall, ventilatory pressures and central venous pressure increase markedly. The most appropriate management is to
- (A) administer a bronchodilator
 - (B) decrease tidal volume and increase ventilatory rate
 - (C) increase the neuromuscular block
 - (D) increase the depth of anesthesia
 - (E) ask the surgeon to reopen the abdomen
59. Which of the following is most likely to result in oxygen desaturation in a patient with Eisenmenger's syndrome who is scheduled for cesarean delivery?
- (A) Breathing room air
 - (B) Epidural administration of lidocaine
 - (C) Intravenous administration of ketamine
 - (D) Intravenous administration of ephedrine
 - (E) Mild hypocarbia
60. A 32-year-old woman is anesthetized for suboccipital craniotomy. During positioning, the capnograph shows an abrupt decrease in the slope of the expiratory upstroke. Which of the following is the most likely cause?
- (A) Air embolism
 - (B) Incompetent expiratory valve
 - (C) Incomplete neuromuscular block
 - (D) Kinked endotracheal tube
 - (E) Tracheal extubation
61. Brain stem auditory evoked potentials are most likely to be absent during which of the following?
- (A) Anesthesia with 1.5 MAC isoflurane
 - (B) Barbiturate coma
 - (C) Hypotension to a mean arterial pressure of 50 mmHg
 - (D) Surgical retraction of the temporal lobe
 - (E) Surgical traction on the pons

62. Which of the following is an effect of ritodrine?
- (A) Anisocoria
 - (B) Hypocalcemia
 - (C) Hypoglycemia
 - (D) Hypokalemia
 - (E) Urinary retention
63. A patient is hyperventilated to a PaCO_2 of 20 mmHg. Which of the following physiologic parameters is most likely to be increased?
- (A) Airway resistance
 - (B) Myocardial contractility
 - (C) Oxygen delivery to tissues
 - (D) Pulmonary vascular resistance
 - (E) Serum ionized calcium concentration
64. Which of the following is a respiratory effect of 1 MAC halothane?
- (A) Decreased contribution of abdominal muscles to exhalation
 - (B) Decreased contribution of the chest wall to ventilation
 - (C) Decreased respiratory rate
 - (D) Decreased ratio of dead space to tidal volume
 - (E) Increased tidal volume
65. A patient has a seizure within seconds after receiving a retrobulbar injection of 0.5% bupivacaine with epinephrine 1:200,000. Which of the following is the most likely cause?
- (A) Air embolism
 - (B) Oculocardiac reflex
 - (C) Ophthalmic artery injection
 - (D) Retrobulbar hemorrhage
 - (E) Subdural injection
66. An elderly man has an acute dissection of the descending thoracic aorta. Which of the following antihypertensive therapies is most likely to extend the dissection?
- (A) Esmolol infusion
 - (B) Nitroglycerin infusion
 - (C) Nitroprusside infusion
 - (D) Nitroprusside infusion combined with a beta-adrenergic blocker
 - (E) Trimethaphan infusion
67. Which of the following best explains the decreased effect of hyperventilation on cerebral blood flow when PaCO_2 decreases below 20 mmHg?
- (A) Maximal constriction of cerebral vessels
 - (B) Decreased cerebral perfusion pressure
 - (C) Decreased cerebral metabolic rate for oxygen
 - (D) Increased cardiac output
 - (E) Increased cerebrospinal fluid pressure

68. A 67-year-old man undergoes a perineal procedure under epidural anesthesia in the lithotomy position with extreme flexion of the thigh at the hip. No sedatives are used, and the surgery is uneventful. Forty-eight hours later, the patient cannot flex his left knee. Which of the following is the most likely cause?
- (A) Epidural hematoma
 - (B) L5 nerve root injury
 - (C) Obturator nerve injury
 - (D) Peroneal nerve injury
 - (E) Sciatic nerve injury
69. An 86-kg, 67-year-old man is undergoing a second coronary artery bypass operation. Five minutes after administration of protamine, blood pressure is 69/40 mmHg, pulmonary artery pressure is 65/42 mmHg, and the cardiac output measured by thermodilution is 2.3 L/min. Which of the following is the most likely cause of these findings?
- (A) Allergy to fish
 - (B) Increased plasma thromboxane concentration
 - (C) Increased plasma histamine concentration
 - (D) Insulin-dependent diabetes mellitus
 - (E) IgE antibodies to protamine
70. A newly developed volatile anesthetic has a MAC of 10% in oxygen for adults. Which of the following statements concerning this anesthetic is true?
- (A) The expected MAC of this drug in combination with 60% nitrous oxide is 7.5%
 - (B) The dose of this drug required to anesthetize a patient with acute amphetamine intoxication is less than the dose required for a normal patient
 - (C) The potency of this drug is 25% of a drug with a MAC of 2.5%
 - (D) The dose of this drug required to suppress the hormonal response to surgical incision is less than the MAC value
 - (E) The MAC of this drug is decreased by metabolic alkalosis
71. A 70-kg, 50-year-old man is scheduled for muscle flap closure of a decubitus ulcer over the sacrum. He has been quadriplegic at the level of C6-7 for six years. Which of the following is most likely to result from subarachnoid anesthesia with tetracaine 10 mg for this procedure?
- (A) Atrioventricular block
 - (B) Decreased risk for autonomic dysreflexia
 - (C) Impaired expiratory muscle function
 - (D) Impaired inspiratory muscle function
 - (E) Inadequate block of spastic movements
72. Compared with a person of normal weight, which of the following findings are most likely on pulmonary function testing of a patient with morbid obesity?

	<u>FVC</u>	<u>FEV₁/FVC</u>	<u>FRC</u>	<u>A-aDO₂</u>
(A)	Decreased	Normal	Decreased	Normal
(B)	Decreased	Normal	Decreased	Increased
(C)	Decreased	Normal	Normal	Increased
(D)	Increased	Decreased	Normal	Increased
(E)	Increased	Decreased	Decreased	Increased

73. During induction of general anesthesia in a patient with a supraglottic tumor, both intubation and subsequent ventilation via a face mask are impossible. A cricothyroidotomy is performed with a 16-gauge intravenous catheter. Which of the following statements is true?

- (A) Application of pressures greater than 35 cmH₂O to the catheter will increase the risk for pulmonary barotrauma
- (B) PaCO₂ can be maintained at a normal level using a standard circle system attached to the catheter
- (C) PaO₂ greater than 100 mmHg can be maintained indefinitely using transtracheal jet ventilation with 100% oxygen through the catheter
- (D) Emergency surgical tracheostomy would have improved the likelihood of survival
- (E) The presence of this tumor contraindicates jet ventilation via cricothyroidotomy

74. Which of the following statements concerning naloxone is true?

- (A) Elimination half-life is longer than that of the majority of mu-receptor opioids
- (B) It does not cross the placenta
- (C) It has mixed agonist-antagonist effects
- (D) It increases the MAC of inhaled anesthetic drugs
- (E) It relieves opioid-induced spasm of the sphincter of Oddi

75. A woman is in labor at 40 weeks' gestation and the fetus is in breech presentation. Which of the following will provide adequate uterine relaxation for vaginal delivery?

- (A) Spinal anesthesia
- (B) Epidural anesthesia
- (C) Halothane anesthesia
- (D) Pudendal nerve block
- (E) Magnesium sulfate

76. Monitoring of a patient with a closed head injury shows the following pressures:

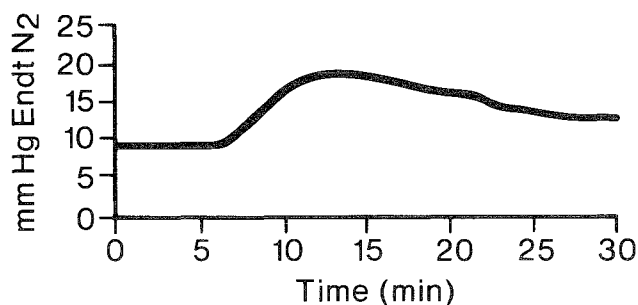
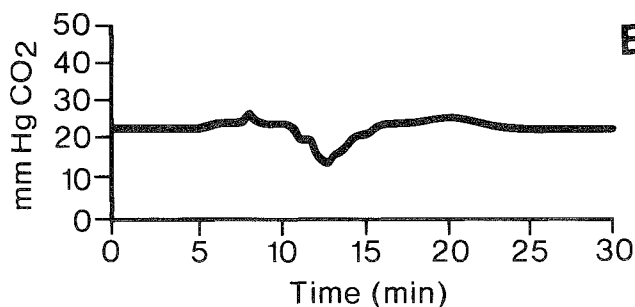
Intracranial pressure	30 mmHg
Central venous pressure	5 mmHg
Mean arterial pressure	65 mmHg
Peak airway pressure	25 cmH ₂ O

The cerebral perfusion pressure is

- (A) 30 mmHg
- (B) 35 mmHg
- (C) 40 mmHg
- (D) 60 mmHg
- (E) 65 mmHg

77. Deliberate hypothermia and circulatory arrest is planned for clipping of a giant basilar artery aneurysm. Which of the following statements is true?

- (A) Administration of a muscle relaxant slows the cooling process
- (B) Anesthesia is not required if body temperature is below 31°C
- (C) Decreasing body temperature below the level at which the EEG is isoelectric further decreases cerebral metabolic rate for oxygen
- (D) Sinus bradycardia during cooling results from increased intracranial pressure
- (E) T-wave inversion during cooling indicates myocardial ischemia



78. A normal adult is receiving general anesthesia via a standard circle system and controlled ventilation. Mass spectrometer data are shown above. Which event is most compatible with these data?

- (A) Endobronchial intubation
- (B) Hemorrhagic shock
- (C) Incompetent expiratory valve
- (D) Substantial decrease in fresh gas flow
- (E) Venous air embolism

79. A 20-kg, 6-year-old boy is undergoing strabismus surgery under anesthesia with halothane, nitrous oxide, and oxygen. The heart rate suddenly decreases from 85 to 40 bpm. Which of the following is the most appropriate first step in management?

- (A) Decrease the depth of anesthesia
- (B) Increase the depth of anesthesia
- (C) Hyperventilate the patient
- (D) Administer atropine
- (E) Stop the surgical procedure

80. A 70-kg patient is anesthetized for a craniotomy in the sitting position. Minute ventilation through a circle system is 15 L/min; PETCO₂ is 65 mmHg. Which of the following is the most likely cause of the increased PETCO₂?

- (A) Inadequate flow of fresh gas
- (B) Incompetent expiratory valve
- (C) Intubation of the right mainstem bronchus
- (D) Light anesthesia
- (E) Venous air embolism

81. A 30-year-old woman is undergoing laparoscopic tubal ligation. Thirty minutes after induction of general anesthesia, arterial oxygen saturation has decreased to 89%. Arterial blood gases at an FiO₂ of 1.0 are PaO₂ 63 mmHg and PaCO₂ 40 mmHg; PETCO₂ is 32 mmHg. Which of the following is the most likely cause?

- (A) Carbon dioxide embolus
- (B) Endobronchial intubation
- (C) Hypoventilation
- (D) Inadvertent application of high levels of positive end-expiratory pressure
- (E) Leak in the capnography sampling catheter

82. A sedative/hypnotic drug is administered prior to electroconvulsive therapy to do which of the following?
- (A) Potentiate the effect of succinylcholine
 - (B) Provide amnesia for the electrical stimulus
 - (C) Decrease the current required to produce a grand mal seizure
 - (D) Increase seizure duration
 - (E) Control postictal sympathetic response
83. Which of the following statements best describes the decrease in functional residual capacity that accompanies the induction of general anesthesia?
- (A) It does not change compliance
 - (B) It is greater with spontaneous ventilation than with controlled ventilation
 - (C) It is independent of body position
 - (D) It is not corrected by application of positive end-expiratory pressure
 - (E) It occurs within the first 10 minutes of anesthesia
84. Which of the following is a known effect of propofol?
- (A) Decreased amplitude of somatosensory evoked potentials
 - (B) Induction of malignant hyperthermia
 - (C) Inhibition of cytochrome P450
 - (D) Initiation of porphyria
 - (E) Suppression of adrenocortical function
85. The most likely cause of bilateral fixed and dilated pupils after clipping of a basilar artery aneurysm is
- (A) preoperative administration of atropine
 - (B) intraoperative infusion of trimethaphan
 - (C) naloxone antagonism of opioid
 - (D) persistent hypothermia
 - (E) brain stem ischemia
86. During laser excision of a vocal cord polyp, the tracheal tube ignites. Which of the following is the most appropriate next step?
- (A) Continue ventilation with air
 - (B) Ensure patency of the endotracheal tube
 - (C) Extubate the trachea
 - (D) Flood the surgical field with saline solution
 - (E) Increase the concentration of nitrous oxide
87. A 68-year-old man has a permanent DVI pacemaker that has been functioning appropriately. Which of the following is most likely to cause conversion to VOO pacing?
- (A) Electroconvulsive therapy
 - (B) Insertion of a pulmonary artery catheter
 - (C) Placement of a magnet over the pulse generator
 - (D) Use of electrocautery near the pacemaker
 - (E) Shivering

88. Which of the following statements concerning absorption of irrigation fluid during transurethral resection of the prostate is true?
- (A) Hydrostatic pressure has minimal effect on the amount of fluid absorbed
 - (B) Typically 10 to 30 ml of fluid per minute are absorbed
 - (C) Use of iso-osmotic solutions decreases the risk for hyponatremia
 - (D) CNS complications are independent of the type of fluid used
 - (E) Spinal anesthesia to T6 will mask the symptoms of overhydration
89. After receiving excessive intraoperative blood replacement, a patient anesthetized with fentanyl, diazepam, and nitrous oxide develops acute pulmonary edema. The drug most likely to help him acutely is
- (A) isoflurane
 - (B) nitroprusside
 - (C) digoxin
 - (D) nitroglycerin
 - (E) furosemide
90. With an interscalene brachial plexus block
- (A) more local anesthetic drug is required than for axillary block
 - (B) the biceps and brachialis muscles are blocked last
 - (C) the intercostobrachial nerve is usually blocked
 - (D) the lateral antebrachial cutaneous nerve is usually spared
 - (E) the ulnar nerve is most likely to be spared
91. A 55-kg, 70-year-old woman with mild chronic renal failure is unresponsive 20 hours after an uneventful coronary artery bypass grafting procedure. Anesthetic drugs included fentanyl 3000 μ g, diazepam 35 mg, and pancuronium 20 mg. Which of the following is the most appropriate next step in management?
- (A) Administration of edrophonium
 - (B) Administration of flumazenil
 - (C) Administration of naloxone
 - (D) CT scan of the head
 - (E) Measurement of core body temperature
92. The portion of the infant airway with the smallest cross-sectional area occurs at the level of the
- (A) cricoid cartilage
 - (B) false vocal cords
 - (C) thoracic inlet
 - (D) tonsillar pillars
 - (E) true vocal cords
93. Properly performed local anesthetic block of the celiac plexus
- (A) requires that the needle tip be positioned anterior to the vertebral body of L1
 - (B) preserves efferent parasympathetic outflow
 - (C) produces urinary retention
 - (D) is not associated with hypotension
 - (E) produces truncal cutaneous hypesthesia

94. A healthy 24-year-old woman is undergoing knee arthroscopy with spinal anesthesia to a level of T4. Which of the following findings is LEAST likely?
- (A) Decreased heart rate
 - (B) Decreased hepatic blood flow
 - (C) Decreased mean arterial pressure
 - (D) Decreased tidal volume
 - (E) Hyperperistalsis
95. Which of the following factors is the LEAST important determinant of postdural puncture headache?
- (A) Age of the patient
 - (B) Gauge of the spinal needle
 - (C) Gender of the patient
 - (D) Pregnancy
 - (E) Time until ambulation
96. Which of the following factors is LEAST predictive of postoperative cardiac complications?
- (A) Congestive heart failure
 - (B) Major vascular surgery
 - (C) Premature ventricular contractions
 - (D) Preoperative hypertension
 - (E) Recent myocardial infarction
97. In treating arterial hypertension in a patient with a head injury, the agent LEAST likely to increase intracranial pressure is
- (A) hydralazine
 - (B) nitroprusside
 - (C) nitroglycerin
 - (D) trimethaphan
 - (E) halothane
98. Which of the following cardiovascular abnormalities is LEAST likely to be present in a patient with end-stage alcoholic cirrhosis?
- (A) Decreased myocardial contractility
 - (B) High cardiac index
 - (C) High mixed venous oxygen saturation
 - (D) Increased peripheral vascular resistance
 - (E) Low blood viscosity
99. Static lung compliance is decreased by each of the following EXCEPT
- (A) pulmonary emphysema
 - (B) congestive heart failure
 - (C) adult respiratory distress syndrome
 - (D) pulmonary fibrosis
 - (E) inhalational anesthesia

100. Each of the following would be expected after preoperative oral administration of clonidine EXCEPT
- (A) bradycardia in the absence of surgical stimulation
 - (B) decreased requirement for inhalational anesthetics
 - (C) decreased requirement for opioid anesthetics
 - (D) decreased response to exogenous epinephrine
 - (E) sedation
101. Neostigmine administered intravenously without atropine can produce each of the following EXCEPT
- (A) arousal
 - (B) bradycardia
 - (C) bronchoconstriction
 - (D) increased gastric motility
 - (E) increased urinary bladder tone
102. A programmable DVI pacemaker can be inhibited or inactivated by each of the following EXCEPT
- (A) myopotentials from shivering
 - (B) succinylcholine-induced fasciculations
 - (C) the ventricular R wave
 - (D) the atrial P wave
 - (E) placement of a magnet over it
103. During one-lung ventilation, each of the following affects hypoxic pulmonary vasoconstriction in the nonventilated lung EXCEPT
- (A) application of continuous positive airway pressure to the nonventilated lung
 - (B) high alveolar PO_2 in the ventilated lung
 - (C) infusion of isoproterenol
 - (D) low mixed venous PO_2
 - (E) pulmonary hypertension
104. Following blunt trauma to the chest, a patient has tachycardia, hypotension, and markedly distended neck veins. Each of the following is expected EXCEPT
- (A) cardiac output of 2.1 L/min
 - (B) mixed venous oxygen saturation of 75%
 - (C) pulmonary artery occlusion pressure of 25 mmHg
 - (D) pulmonary artery diastolic pressure of 25 mmHg
 - (E) right atrial pressure of 25 mmHg
105. Hyperkalemia in response to the administration of an intubating dose of succinylcholine is associated with each of the following disorders EXCEPT
- (A) poliomyelitis
 - (B) multiple sclerosis
 - (C) hemiplegia
 - (D) acute cervical cord transection
 - (E) familial periodic paralysis

106. Each of the following values is associated with acute tubular necrosis EXCEPT
- (A) urine osmolality of 200 mOsm/kg
 - (B) urine sodium concentration of 15 mEq/L
 - (C) urine specific gravity of 1.009
 - (D) urine/serum osmolality ratio of 1.2
 - (E) fractional excretion of sodium of 4%
107. A delay in surgery for 24 to 48 hours for preoperative stabilization and preparation is acceptable in each of the following neonatal conditions EXCEPT
- (A) biliary atresia
 - (B) diaphragmatic hernia
 - (C) meningomyelocele
 - (D) pyloric stenosis
 - (E) tracheoesophageal fistula
108. Each of the following factors decreases uterine blood flow EXCEPT
- (A) aortocaval compression
 - (B) hypocarbia
 - (C) hypoxia
 - (D) sympathetic block
 - (E) uterine contractions
109. Administration of magnesium sulfate for treatment of preeclampsia results in a decreased dose requirement for each of the following drugs EXCEPT
- (A) bupivacaine
 - (B) halothane
 - (C) midazolam
 - (D) succinylcholine
 - (E) vecuronium
110. When methylmethacrylate is inserted into the femur, each of the following may occur EXCEPT
- (A) monomer metabolic breakdown
 - (B) vasodilation
 - (C) hypercarbia
 - (D) hypoxia
 - (E) increased intramedullary pressure
111. Each of the following is an effect of intravascular radiographic contrast media EXCEPT
- (A) altered protein binding of anesthetic drugs
 - (B) bronchospasm
 - (C) increased systemic vascular resistance
 - (D) pulmonary edema
 - (E) seizures

**1994 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1994, and is provided for instructional purposes only. The key was verified in 1994 through validation studies. A small number of questions were not graded for a variety of reasons, such as unexpected ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

The American Board of Anesthesiology Written Examination for Primary Certification is a subset of the ABA/ASA In-Training Examination. Approximately 80% of the questions were included in the grading of the ABA Written Examination, whereas the remainder were graded only for the ABA/ASA In-Training Examination.

1. A	31. A	61. B	91. C	121. A	151. A
2. E	32. A	62. C	92. C	122. A	152. B
3. B	33. C	63. B	93. C	123. A	153. E
4. E	34. E	64. D	94. E	124. B	154. C
5. D	35. A	65. B	95. E	125. A	155. C
6. C	36. D	66. D	96. B	126. C	156. D
7. A	37. C	67. A	97. C	127. B	157. A
8. D	38. D	68. A	98. A	128. B	158. E
9. C	39. B	69. D	99. B	129. D	159. A
10. A	40. E	70. D	100. C	130. C	160. C
11. D	41. E	71. E	101. A	131. B	161. A
12. A	42. C	72. D	102. B	132. B	162. C
13. A	43. A	73. B	103. D	133. A	163. E
14. E	44. D	74. C	104. B	134. C	164. D
15. A	45. A	75. D	105. E	135. D	165. A
16. D	46. A	76. B	106. A	136. A	166. E
17. B	47. C	77. D	107. B	137. D	167. B
18. C	48. B	78. C	108. C	138. A	168. C
19. B	49. D	79. D	109. C	139. A	169. E
20. E	50. D	80. D	110. E	140. A	170. E
21. D	51. E	81. B	111. A	141. C	171. A
22. D	52. D	82. A	112. A	142. B	172. B
23. B	53. B	83. C	113. C	143. A	173. B
24. B	54. C	84. E	114. A	144. B	174. C
25. B	55. B	85. E	115. A	145. B	175. B
26. E	56. B	86. D	116. B	146. D	
27. C	57. C	87. D	117. D	147. A	
28. E	58. A	88. B	118. A	148. C	
29. C	59. E	89. A	119. A	149. B	
30. E	60. A	90. E	120. B	150. B	

**1994 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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1. D	31. A	61. E	91. B	121. C	151. A
2. E	32. C	62. D	92. A	122. A	152. C
3. D	33. A	63. A	93. A	123. E	153. E
4. E	34. A	64. B	94. D	124. A	154. D
5. D	35. A	65. C	95. E	125. A	155. E
6. A	36. E	66. C	96. D	126. A	156. A
7. C	37. C	67. A	97. D	127. A	157. C
8. A	38. B	68. E	98. D	128. B	158. C
9. D	39. B	69. B	99. A	129. D	159. C
10. D	40. B	70. C	100. D	130. A	160. C
11. A	41. A	71. B	101. A	131. C	161. B
12. E	42. C	72. B	102. D	132. D	162. C
13. B	43. E	73. C	103. B	133. C	163. B
14. E	44. D	74. E	104. B	134. A	164. B
15. D	45. D	75. C	105. D	135. B	165. A
16. C	46. A	76. B	106. B	136. B	166. D
17. B	47. D	77. C	107. C	137. B	167. B
18. B	48. A	78. E	108. C	138. B	168. A
19. D	49. D	79. E	109. A	139. B	169. B
20. B	50. C	80. B	110. C	140. B	170. C
21. C	51. A	81. B	111. C	141. A	171. B
22. C	52. E	82. B	112. D	142. A	172. A
23. C	53. B	83. E	113. D	143. B	173. D
24. A	54. B	84. A	114. D	144. E	174. A
25. E	55. D	85. B	115. B	145. C	175. C
26. B	56. D	86. C	116. A	146. B	
27. C	57. D	87. C	117. B	147. C	
28. C	58. E	88. B	118. A	148. B	
29. C	59. B	89. D	119. A	149. D	
30. B	60. D	90. E	120. A	150. A	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1995

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. As part of a preoperative evaluation, a patient had a thallium scan showing a "cold spot" over the left ventricle that occurs with moderate exercise and disappears at rest. This most likely indicates
 - (A) moderate-sized aneurysm of the left ventricle
 - (B) acute myocardial ischemia
 - (C) recent myocardial infarction
 - (D) old myocardial infarction
 - (E) Prinzmetal's variant angina

2. A 40-year-old man requires brief surgical relaxation after administration of neostigmine and glycopyrrolate for reversal of vecuronium-induced neuromuscular blockade. Succinylcholine 1 mg/kg is administered intravenously. Compared with a patient who has not had prior reversal of neuromuscular blockade, which of the following characterizes the succinylcholine blockade in this patient?
 - (A) Greater antagonism with calcium chloride
 - (B) Slower onset
 - (C) Less profound
 - (D) Less likelihood of phase II neuromuscular blockade
 - (E) Prolonged duration

3. A 62-year-old man is undergoing elective coronary artery bypass grafting and aortic valve replacement for three-vessel coronary artery disease and aortic stenosis. Shortly after intubation, heart rate increases from 75 to 100 bpm and blood pressure decreases from 130/70 to 70/40 mmHg with acute, severe ST-segment depression in lead V₅. Which of the following is the most appropriate management?
 - (A) Crystalloid
 - (B) Ephedrine
 - (C) Esmolol
 - (D) Nitroglycerin
 - (E) Phenylephrine

4. A 54-year-old man receives 25 ml of a 50% alcohol and 0.25% bupivacaine solution for celiac plexus block. During the next 20 minutes, blood pressure decreases from 130/75 mmHg to 85/55 mmHg. Which of the following is the most likely cause?
 - (A) Intravascular injection
 - (B) Retroperitoneal hemorrhage
 - (C) Splanchnic vasodilation
 - (D) Subarachnoid blockade
 - (E) Tension pneumothorax

5. A 70-kg 22-year-old patient with head trauma and multiple fractures of the long bones is scheduled for fixation of bilateral femoral fractures. Preoperative laboratory studies show a serum sodium concentration of 150 mEq/L, a serum potassium concentration of 3.1 mEq/L, and a urine output greater than 500 ml/hr. Which of the following agents will decrease urine output?

- (A) 3% Saline solution
- (B) 5% Dextrose solution
- (C) Glucagon
- (D) Hydrocortisone
- (E) Vasopressin

6. Following cardiopulmonary bypass, right ventricular distention is noted after infusion of protamine 40 mg. Pulmonary artery pressure has increased from 25/18 to 50/30 mmHg and systemic arterial pressure has decreased from 110/65 to 50/30 mmHg. Which of the following is the most appropriate treatment?

- (A) Administration of amrinone
- (B) Administration of nitroglycerin
- (C) Administration of phenylephrine
- (D) Initiation of intra-aortic balloon pump assist
- (E) Reheparinization and resumption of cardiopulmonary bypass

7. If minute ventilation remains constant, which of the following changes in $PETCO_2$ and $PaCO_2$ will result from a decrease in cardiac output?

	<u>$PETCO_2$</u>	<u>$PaCO_2$</u>
(A)	Decreased	Decreased
(B)	Increased	Increased
(C)	Unchanged	Unchanged
(D)	Decreased	Increased
(E)	Increased	Decreased

8. A 55-year-old man is undergoing craniotomy in the sitting position. Mean arterial pressure is 75 mmHg; arterial blood gas values are $PaCO_2$ 41 mmHg and pH 7.37. End-tidal CO_2 is 7 mmHg. Which of the following is the most likely cause of the increased $PaCO_2$ to $PETCO_2$ gradient?

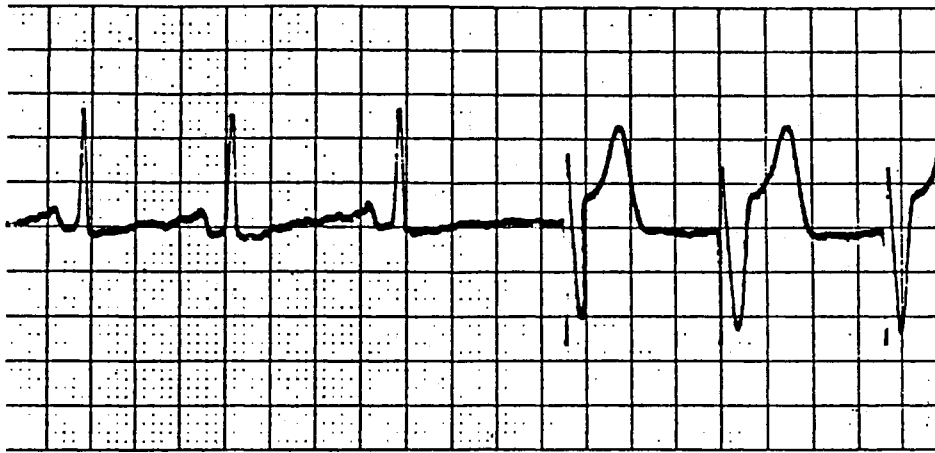
- (A) Decreased cardiac output
- (B) Endobronchial intubation
- (C) Hyperinflation of the lungs
- (D) Partial disconnect of the capnograph sample tubing
- (E) Venous air embolism

9. A 26-year-old woman has headache, nausea, and photophobia 36 hours after cesarean delivery for chorioamnionitis using subarachnoid block. Temperature is 38.8°C and leukocyte count is 14,200/mm³. Which of the following is the most appropriate next step in management?

- (A) Oral ibuprofen
- (B) Intravenous caffeine sodium benzoate
- (C) Intravenous hydration
- (D) Epidural blood patch
- (E) Diagnostic lumbar puncture

10. The second gas effect refers to
- (A) acceleration of rise in alveolar concentration of a gas caused by concomitantly administered nitrous oxide
 - (B) change in volatile anesthetic vaporizer output with the addition of nitrous oxide to the carrier gas mixture
 - (C) decrease in MAC of a volatile anesthetic by addition of nitrous oxide
 - (D) expansion of gas-containing spaces by addition of nitrous oxide
 - (E) rapid diffusion of nitrous oxide from pulmonary capillary blood into alveolar gas at the termination of anesthesia
11. Which of the following statements concerning relationships among alveolar pressure, volume, and surface tension is true?
- (A) Surface tension of surfactant decreases as alveolar volume decreases
 - (B) Surface tensions of water and of surfactant behave similarly as volume decreases
 - (C) Changes in alveolar surface tension with volume are the same during expansion as during contraction
 - (D) Pressure in the alveolus is inversely related to surface tension
 - (E) Pressure in the alveolus is directly related to alveolar radius
12. A full-term neonate has physical findings suggestive of congenital diaphragmatic hernia. Initial Apgar score is 2. Which of the following is the most appropriate initial management?
- (A) Placement of an orogastric tube
 - (B) Insertion of a chest tube
 - (C) Controlled ventilation by face mask
 - (D) Controlled ventilation through an endotracheal tube
 - (E) Spontaneous ventilation through an endotracheal tube
13. During cardiopulmonary bypass, the perfusionist notes that the mixed venous oxygen saturation has decreased from 75% to 55%. Which of the following is the most likely cause?
- (A) Administration of a nitroprusside bolus
 - (B) Administration of a thiopental bolus
 - (C) Decrease in rectal temperature from 34°C to 28°C
 - (D) Inadequate muscle relaxation
 - (E) Increase in pump flow
14. Which of the following increases during infusion of epinephrine?
- (A) Glycogen synthesis
 - (B) Intracellular glucose concentration
 - (C) Intracellular potassium concentration
 - (D) Lipogenesis
 - (E) Protein synthesis
15. Which of the following is an effect of clonidine?
- (A) Agitation
 - (B) Salivation
 - (C) Tachycardia
 - (D) Tachypnea
 - (E) Vasodilation

16. The shorter duration of action of alfentanil relative to fentanyl is due to its
- (A) greater lipid solubility
 - (B) increased clearance
 - (C) increased rate of hepatic metabolism
 - (D) lesser protein binding
 - (E) smaller volume of distribution
17. A 25-year-old woman is undergoing emergency appendectomy at 36 weeks' gestation. Following subarachnoid injection of hyperbaric bupivacaine and placement in the supine position, the patient has nausea; heart rate is 105 bpm and blood pressure is 90/60 mmHg. Which of the following is the most appropriate management?
- (A) Displacement of the uterus to the left
 - (B) Immediate tracheal intubation
 - (C) Intramuscular administration of ephedrine
 - (D) Placement of the operating table in the reverse Trendelenburg position
 - (E) Ventilation by mask with 100% oxygen
18. Which of the following statements concerning awareness (recall) during opioid anesthesia is true?
- (A) It is usually not associated with pain
 - (B) It correlates well with intact auditory evoked responses
 - (C) It is prevented if the dose of opioid blocks the hemodynamic response to stimuli
 - (D) It is prevented if the dose of opioid is adequate to prevent movement without muscle relaxants
 - (E) It is predicted by a specific EEG pattern
19. The acute onset of hypotension without a decrease in mixed venous oxygen saturation is most likely associated with the onset of
- (A) hemorrhage
 - (B) myocardial infarction
 - (C) pulmonary edema
 - (D) pulmonary embolus
 - (E) sepsis
20. Which of the following complications is the primary cause of neurologic deficit following carotid endarterectomy?
- (A) Global hypoperfusion
 - (B) Hypertension
 - (C) Hypotension
 - (D) Improper shunt insertion
 - (E) Thromboembolism
21. When treating reflex sympathetic dystrophy of an arm, which of the following is the best indicator of a successful sympathetic blockade?
- (A) A pinprick sensory deficit in the distribution of C6
 - (B) A 5°C increase in the temperature of the skin of the hand
 - (C) An accentuated psychogalvanometric response in the forearm
 - (D) An ipsilateral positive Horner's syndrome
 - (E) Decreased temperature sensation in the hand



22. The above tracing indicates that the pacemaker generator is

- (A) malfunctioning
- (B) VVT sensing and capturing normally
- (C) VOO sensing and capturing normally
- (D) DVI sensing and capturing normally
- (E) VVI sensing and capturing normally

23. A patient with end-stage renal disease has prolonged ventilatory depression after administration of morphine. The most likely cause is increased

- (A) serum concentration of morphine-6-glucuronide
- (B) elimination half-life of morphine
- (C) opioid receptors
- (D) receptor affinity
- (E) volume of distribution

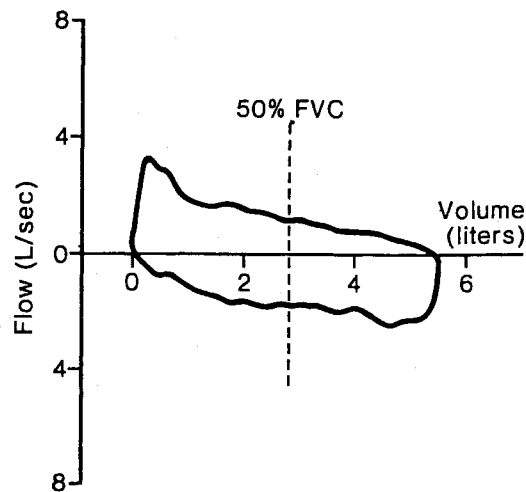
24. A 46-year-old patient is undergoing resection of a posterior fossa tumor with the head elevated 10 cm above the level of the heart. During the procedure, the following changes in vital signs are observed.

Time	10:00 AM	10:05 AM
Blood pressure (mmHg)	110/70	95/60
Heart rate (bpm)	80	38
PETCO ₂ (mmHg)	32	31
SpO ₂ (%)	99	98

Which of the following is the most likely cause of the change in heart rate?

- (A) Brain stem compression
- (B) Increased intracranial pressure
- (C) Myocardial ischemia
- (D) Trigeminal nerve retraction
- (E) Venous air embolism

25. Which of the following situations is most likely related to paraplegia following repair of a descending thoracic aortic aneurysm?
- (A) Decreased cerebrospinal fluid pressure
 - (B) Epidural hematoma
 - (C) Hypertension proximal to the aortic cross clamp
 - (D) Improper placement of surgical retractors
 - (E) Prolonged aortic cross-clamp time
26. A meconium-stained, full-term infant has an initial Apgar score of 2. The oropharynx is suctioned and the infant is placed on a heated table. Which of the following is the most appropriate next step in management of the airway?
- (A) If the oropharynx is clear, observation for respiratory effort
 - (B) Placement of an oxygen mask and application of positive pressure to clear the airway
 - (C) Nasotracheal suctioning
 - (D) Tracheal suctioning using the endotracheal tube
 - (E) Intubation and ventilation with 100% oxygen
27. Which of the following is a side effect of beta-adrenergic blockade?
- (A) Cerebral vasodilation
 - (B) Decreased left ventricular filling pressures
 - (C) Hypokalemia
 - (D) Increased airway resistance
 - (E) Uterine relaxation
28. Which of the following is characteristic of soda lime and Baralyme carbon dioxide absorption canisters used in circle systems?
- (A) Calcium carbonate is a major end product
 - (B) Carbon dioxide absorption cools the anesthetic gases
 - (C) Flushing the canister with oxygen for six hours will regenerate 50% of the spent Baralyme
 - (D) Gases lose water vapor as they pass through the canisters
 - (E) Soda lime and Baralyme depend on silica as a binding agent
29. Six months after repair of a lacerated peroneal nerve, a patient has electric-shock-like pain when pressure is applied to the middle of the gastrocnemius muscle. The most appropriate initial management is
- (A) administration of carbamazepine
 - (B) epidural injection of morphine
 - (C) local infiltration with bupivacaine
 - (D) lumbar sympathetic blockade
 - (E) peroneal nerve blockade
30. Which of the following is the most common cause of peroneal nerve damage?
- (A) Crossed legs in the supine position
 - (B) Lateral decubitus position
 - (C) Prone position
 - (D) Reverse Trendelenburg position
 - (E) Improper placement of a pelvic retractor



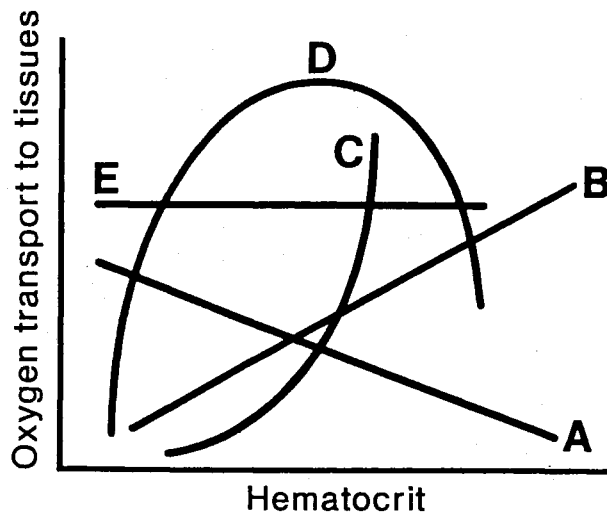
31. This flow-volume loop from a 57-year-old man is most consistent with which of the following conditions?
- (A) Bronchospasm
 - (B) Decreased vital capacity
 - (C) Myasthenia gravis
 - (D) Narrowing of the upper airway
 - (E) Pneumothorax
-
32. Which of the following statements concerning carbon monoxide poisoning is true?
- (A) Diagnosis is excluded if the PaO_2 is greater than 300 mmHg while breathing 100% oxygen
 - (B) Increased inspired oxygen concentration accelerates displacement of carbon monoxide from hemoglobin
 - (C) Methylene blue decreases binding of carbon monoxide to hemoglobin
 - (D) Pulse oximetry accurately reflects hemoglobin oxygen saturation
 - (E) Tissue oxygen delivery is normal
33. Preoperative evaluation shows a serum sodium concentration of 140 mEq/L, serum chloride concentration of 90 mEq/L, PaCO_2 of 46 mmHg, and arterial pH of 7.50. These findings are most indicative of prior treatment with
- (A) acetazolamide
 - (B) enalapril
 - (C) furosemide
 - (D) mannitol
 - (E) spironolactone
34. Severe nausea and vomiting in the PACU is most effectively treated with a drug that acts as an antagonist at which of the following receptors?
- (A) Alpha-adrenergic
 - (B) Beta-adrenergic
 - (C) Dopamine
 - (D) GABA
 - (E) Glutamate

35. A 38-year-old woman with a large goiter has undergone subtotal thyroidectomy. Airway obstruction is noted immediately after extubation despite normal vocal cord function on laryngoscopy. Which of the following is the most likely explanation?
- (A) Arytenoid dislocation
 - (B) Hematoma
 - (C) Hypocalcemia
 - (D) Recurrent laryngeal nerve injury
 - (E) Tracheomalacia
36. Which of the following statements concerning postherpetic neuralgia is true?
- (A) It is effectively treated with neurolytic surgery
 - (B) It is effectively treated with sympathetic nerve blocks
 - (C) Duration is three to four weeks
 - (D) Hyperesthesia occurs in the affected area
 - (E) It occurs predominantly in adolescents
37. Spinal anesthesia at a T6 sensory level is most likely to improve cardiac output in patients with
- (A) aortic stenosis
 - (B) idiopathic hypertrophic subaortic stenosis (IHSS)
 - (C) chronic constrictive pericarditis
 - (D) cor pulmonale
 - (E) mitral regurgitation
38. The most important cause of hypotension that occurs normally at initiation of cardiopulmonary bypass is
- (A) hemodilution
 - (B) acidosis
 - (C) decreased flow rate
 - (D) vasodilation
 - (E) hypothermia
39. Compared with a patient who is breathing spontaneously, a patient in the supine position receiving controlled positive-pressure ventilation will most likely have which of the following findings?
- (A) Decreased pulmonary vascular resistance
 - (B) Decreased ratio of dead space to tidal volume
 - (C) Increased ventilation of nondependent alveoli
 - (D) Increased perfusion of nondependent alveoli
 - (E) Improved matching of ventilation to perfusion
40. After receiving an axillary block for carpal tunnel release, a patient has pain on incision. Which of the following nerves should be blocked at the level of the elbow to relieve the pain?
- (A) Intercostobrachial
 - (B) Median
 - (C) Musculocutaneous
 - (D) Radial
 - (E) Ulnar

41. Which of the following differentiates midazolam from diazepam administered intravenously in equipotent doses?
- (A) Greater hemodynamic stability
 - (B) Lack of active metabolites
 - (C) Less respiratory depression
 - (D) Longer duration of action
 - (E) More rapid onset
42. A 68-year-old patient is undergoing total hip replacement during general anesthesia using positive pressure ventilation and neuromuscular blockade. Intraoperative monitoring shows a gradual decrease in end-tidal CO_2 , an increase in exhaled tidal volume, and an increase in measured FiO_2 . Which of the following is the most likely cause of these changes?
- (A) Air entrainment around a deflated endotracheal tube cuff
 - (B) Channeling of the exhaled air through the carbon dioxide canister
 - (C) Fat embolism
 - (D) Inadequate muscle relaxation with spontaneous patient ventilation
 - (E) A small hole in the ventilator bellows
43. A 25-year-old man with known rheumatic heart disease is being evaluated in the critical care unit. Despite decreasing cardiac output, mixed venous blood from a pulmonary artery catheter shows an increase in SvO_2 . Which of the following is the most likely cause?
- (A) Decreasing hematocrit
 - (B) Hypothermia to 35°C
 - (C) Metabolic alkalosis
 - (D) Mitral regurgitation
 - (E) Wedging of the catheter
44. A 69-year-old man is confused and agitated one hour after preoperative intramuscular administration of scopolamine 0.4 mg for awake fiberoptic laryngoscopy. SpO_2 measured by pulse oximetry is 97%. Which of the following drugs is most appropriate for treatment of the change in mental status?
- (A) Fentanyl
 - (B) Flumazenil
 - (C) Midazolam
 - (D) Neostigmine
 - (E) Physostigmine
45. A 72-year-old patient who takes levodopa and carbidopa is undergoing colon resection. Metoclopramide is administered preoperatively and anesthesia is maintained with thiopental, fentanyl, and nitrous oxide, with vecuronium for muscle relaxation. Fifteen minutes after reversal of muscle relaxation with neostigmine and atropine and tracheal extubation, the patient has dyspnea and muscular rigidity.

Which of the following is the most likely cause?

- (A) Central anticholinergic syndrome
- (B) Fentanyl-induced rigidity
- (C) Inhibition of methionine synthetase by nitrous oxide
- (D) Metoclopramide-induced dopamine antagonism
- (E) Peripheral conversion of levodopa to dopamine



46. Which of the lines shown in the above graph illustrates the relationship of hematocrit and oxygen transport?

- (A) Line A
- (B) Line B
- (C) Line C
- (D) Line D
- (E) Line E

47. Which of the following conditions decreases right-to-left shunt through a patent ductus arteriosus in a neonate?

- (A) Arterial hypotension
- (B) Arterial hypoxemia
- (C) Metabolic acidemia
- (D) Positive end-expiratory pressure
- (E) Respiratory alkalemia

48. Which of the following is an effect of hypothermia in neonates?

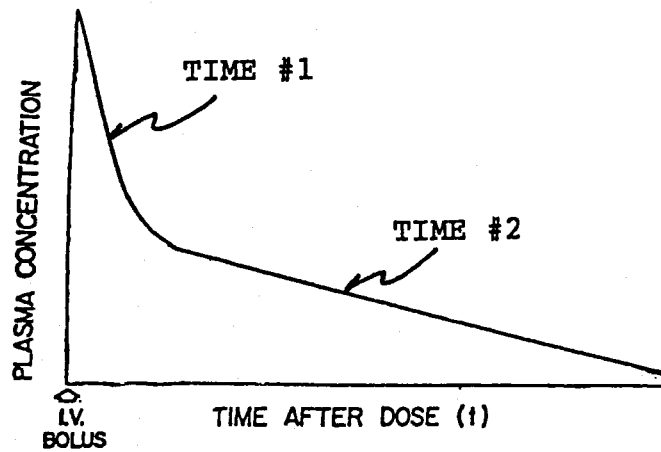
- (A) Decreased duration of neuromuscular blockade
- (B) Increased narcotic requirements
- (C) Increased pulmonary vascular resistance
- (D) Metabolic alkalosis
- (E) Shivering

49. A 75-year-old man is confused, restless, and disoriented two days after an aortic aneurysm repair. Serum sodium concentration is 112 mEq/L, serum osmolality is low, and urine is hypertonic. The most appropriate treatment is

- (A) restriction of fluid intake
- (B) administration of isotonic saline solution
- (C) administration of hypertonic (3%) saline solution
- (D) administration of spironolactone
- (E) infusion of mannitol 25 g

50. Hypomagnesemia is associated with
- (A) decreased risk for digitalis toxicity
 - (B) dysrhythmias sensitive to bretylium
 - (C) hypercalcemia
 - (D) prolonged succinylcholine blockade
 - (E) surgery requiring cardiopulmonary bypass
51. A 28-year-old patient has severe laryngospasm after extubation of the trachea following general anesthesia. Administration of 100% oxygen using continuous positive airway pressure does not improve symptoms. SpO₂ is 75%. Which of the following is the most appropriate immediate management?
- (A) Laryngeal mask airway
 - (B) Lidocaine
 - (C) Racemic epinephrine
 - (D) Succinylcholine
 - (E) Cricothyroidotomy
52. A 48-year-old woman with von Willebrand's disease is scheduled for a hysterectomy. The most appropriate initial pre-operative therapy to decrease bleeding is administration of
- (A) cryoprecipitate
 - (B) desmopressin (DDAVP)
 - (C) fresh frozen plasma
 - (D) platelets
 - (E) vitamin K
53. Which of the following is increased in patients with chronic anemia?
- (A) Mixed venous oxygen content
 - (B) P₅₀
 - (C) Pulmonary vascular resistance
 - (D) Systemic vascular resistance
 - (E) Blood viscosity
54. Which of the following best reflects findings of inadequate cerebral perfusion during carotid cross clamping?
- (A) Decreased frequency on EEG
 - (B) Increased latency of brain stem auditory evoked potentials
 - (C) Increased spectral edge frequency
 - (D) Jugular bulb oxygen tension of 27 mmHg
 - (E) Stump pressure of 50 mmHg
55. Which of the following procedures is most specific for diagnosing reflex sympathetic dystrophy in a patient with pain of the lower extremity?
- (A) Caudal epidural local anesthetic block
 - (B) Differential spinal anesthesia
 - (C) Intravenous regional administration of bretylium
 - (D) Lumbar epidural administration of a corticosteroid
 - (E) Paramedian L1-L5 facet injections of lidocaine

56. A 50-year-old patient is undergoing craniotomy for clipping of a cerebral aneurysm with isoflurane, nitrous oxide, and fentanyl anesthesia. At the time of aneurysm exposure, the EEG shows burst suppression. Which of the following is the most likely cause?
- (A) Cerebral ischemia
 - (B) Cerebral vasospasm
 - (C) Fentanyl effect
 - (D) Isoflurane effect
 - (E) Petit mal seizure activity
57. During a craniotomy for a supratentorial tumor, a 28-year-old man receives isoflurane 0.75% in nitrous oxide 70% and oxygen. Ventilation is controlled to maintain PaCO_2 at 25 mmHg. Nasopharyngeal temperature is 35.8°C. While the dura mater is open, the surgeon complains that the brain is bulging. The most appropriate management at this time is to
- (A) decrease the inspired isoflurane concentration to 0.5%
 - (B) hyperventilate further to decrease PaCO_2 to 20 mmHg
 - (C) discontinue nitrous oxide
 - (D) administer thiopental
 - (E) administer additional muscle relaxants
58. Compared with normal adults, which of the following characteristics of neonates best explains the more rapid inhalation induction in neonates?
- (A) Greater cardiac index
 - (B) Greater metabolic rate
 - (C) Greater perfusion of vessel-rich tissues
 - (D) Greater ratio of alveolar ventilation to functional residual capacity
 - (E) Less lean body mass
59. An 87-kg 64-year-old woman in good general health is undergoing a right knee arthroplasty while in the supine position with general anesthesia consisting of enflurane 2% and nitrous oxide 50% in oxygen. She is breathing spontaneously through a 7-mm endotracheal tube. During the first 30 minutes of the procedure, the arterial oxygen saturation measured by pulse oximetry decreases from 98% to 92%.
- The most likely cause of the desaturation is
- (A) decreased functional residual capacity
 - (B) diffusion hypoxia
 - (C) hypercarbia
 - (D) increased airway resistance produced by the endotracheal tube
 - (E) inhibition of hypoxic pulmonary vasoconstriction
60. A 5-year-old child undergoes strabismus correction during spontaneous ventilation with halothane 1.5%, nitrous oxide 50%, and oxygen 50%. Intravenous atropine 0.2 mg is administered after inhalation induction. Ten minutes after incision, heart rate decreases from 110 bpm to 40 bpm. Which of the following is the most likely cause?
- (A) Administration of phenylephrine eyedrops
 - (B) Inadvertent external pressure on the carotid sinus
 - (C) Paradoxical response to a small dose of atropine
 - (D) Sinoatrial nodal depression by halothane
 - (E) Traction on an extraocular muscle



61. The plasma concentration of an intravenously administered drug follows the two-compartment kinetic model shown in the above graph. Which of the following events is illustrated by the decline in plasma concentration shown at Time #2?

- (A) Decreasing activity of the drug at its receptor site
- (B) Distribution from plasma to tissue
- (C) Elimination of the drug from plasma
- (D) Increasing volume of distribution
- (E) Redistribution from vessel-rich groups to vessel-poor groups

62. You are called to anesthetize a patient for an emergency pericardial window for a large pericardial effusion. Which of the following drugs is most appropriate for initiation of anesthesia?

- (A) Alfentanil
- (B) Ketamine
- (C) Midazolam
- (D) Propofol
- (E) Thiopental

63. Following maternal epidural injection, fetal exposure to chloroprocaine is lower than fetal exposure to bupivacaine for which of the following reasons?

- (A) Chloroprocaine is metabolized by plasma cholinesterase
- (B) Chloroprocaine is more protein bound
- (C) Chloroprocaine is not readily absorbed from the epidural space
- (D) The ionized fraction of chloroprocaine in the fetal circulation is smaller
- (E) The pKa of chloroprocaine is less than that of bupivacaine

64. Which of the following is the most appropriate management of decreased cardiac output in patients with isolated aortic insufficiency?

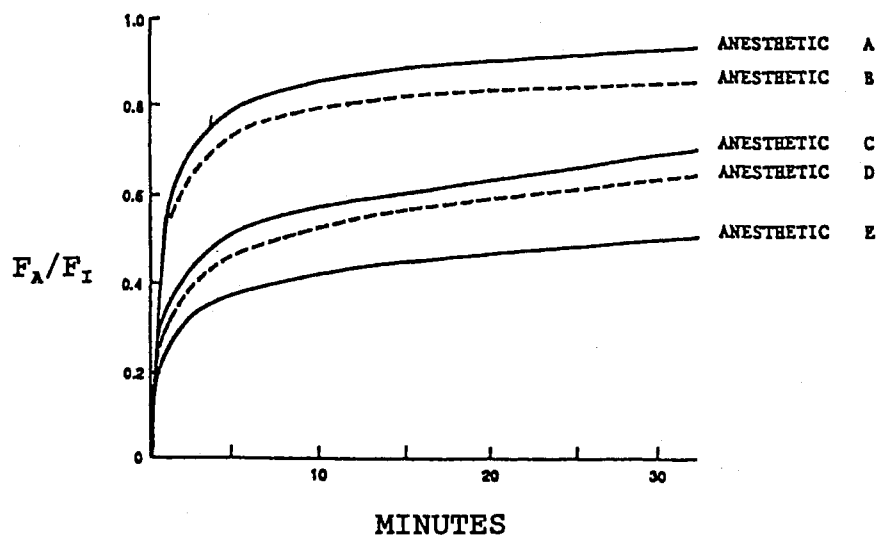
- (A) Dobutamine
- (B) Esmolol
- (C) Intra-aortic balloon counterpulsation
- (D) Norepinephrine
- (E) Positive pressure ventilation

65. A 25-year-old woman undergoes a difficult open cholecystectomy during anesthesia with isoflurane, nitrous oxide, fentanyl, and vecuronium. Five units of blood are administered intraoperatively. Two days later, the patient has mildly increased serum transaminase concentrations and markedly increased alkaline phosphatase and direct bilirubin concentrations. Which of the following is the most likely cause?
- (A) Acute viral hepatitis
 - (B) Hemolysis
 - (C) Isoflurane-induced liver dysfunction
 - (D) Retained common duct stone
 - (E) Sepsis
66. Which of the following is the primary physiologic response in a neonate exposed to a hypothermic environment?
- (A) Hyperventilation
 - (B) Increased 2,3-DPG concentration in erythrocytes
 - (C) Metabolism of brown fat
 - (D) Shivering
 - (E) Vasoconstriction
67. Which of the following chemotherapeutic drugs is a cause of pulmonary fibrosis?
- (A) Bleomycin
 - (B) Cisplatin
 - (C) Cyclosporine
 - (D) Daunorubicin
 - (E) Vincristine
68. During application of continuous positive airway pressure, lung compliance increases because of
- (A) decreased airway resistance
 - (B) decreased lung water
 - (C) decreased venous return
 - (D) increased intercostal muscle tone
 - (E) increased resting lung volume
69. In a patient with surgically significant aortic insufficiency, cardiac output measured by thermodilution will
- (A) be greater than right ventricular output
 - (B) be less than left ventricular output
 - (C) be less than cardiac output measured by the Fick method
 - (D) be inaccurate because of decreased signal-to-noise ratio
 - (E) underestimate net systemic arterial blood flow
70. A 6-year-old boy with spina bifida and a chronic indwelling urinary catheter has severe hypotension and hypoxemia during augmentation cystoplasty. Which of the following is the most likely cause?
- (A) Autonomic neuropathy
 - (B) Disseminated intravascular coagulation
 - (C) Latex allergy
 - (D) Urinary sepsis
 - (E) Venous air embolism

71. A 55-year-old man has quadriplegia after undergoing suboccipital craniotomy in the sitting position for treatment of acoustic neuroma. Which of the following is the most likely cause?
- (A) Air embolism with the presence of a probe-patent foramen ovale
 - (B) Compression of the cervical cord related to neck flexion
 - (C) Jugular venous obstruction
 - (D) Postoperative tension pneumocephalus
 - (E) Sustained elevation of cerebral perfusion pressure
72. A 32-year-old patient with end-stage renal failure has irreversible neuromuscular blockade two hours after tracheal intubation with a muscle relaxant. Which of the following is the most likely cause?
- (A) Atracurium
 - (B) Doxacurium
 - (C) Mivacurium
 - (D) Pancuronium
 - (E) Vecuronium
73. In a patient taking a beta-adrenergic blocker, the drug most likely to produce atrioventricular junctional block is
- (A) diltiazem
 - (B) fentanyl
 - (C) halothane
 - (D) nifedipine
 - (E) verapamil
74. Compared with other volatile inhalation anesthetics, desflurane has which of the following characteristics?
- (A) Equipotency to isoflurane
 - (B) Greater extent of biotransformation than enflurane
 - (C) Less airway irritation than halothane
 - (D) Lower blood gas solubility coefficient than enflurane
 - (E) Lower vapor pressure than isoflurane
75. A 28-year-old woman undergoes total thyroidectomy. The left recurrent laryngeal nerve is transected during the procedure. Which of the following findings is most likely postoperatively?
- (A) Normal voice
 - (B) Aphonia
 - (C) Hoarseness
 - (D) Expiratory stridor
 - (E) Inspiratory stridor
76. In a patient with adult respiratory distress syndrome who is being mechanically ventilated, which of the following findings indicates the most severe disease?
- (A) Decreased functional residual capacity
 - (B) Decreased lung compliance
 - (C) Hypercarbia
 - (D) Hypoxemia
 - (E) Increased dead space

77. A 52-year-old man develops oliguria 24 hours after left hemicolectomy. Urinalysis shows a specific gravity of 1.028, an osmolality of 650 mOsm/L, and a sodium concentration of 10 mEq/L. Which of the following is the most likely diagnosis?
- (A) Acute tubular necrosis
 - (B) Hypoaldosteronism
 - (C) Hypovolemia
 - (D) Interstitial renal disease
 - (E) Obstructive uropathy
78. An 18-year-old woman has knee pain during arthroscopy performed with femoral and sciatic nerve blocks for repair of a torn medial meniscus. The most appropriate management is addition of which of the following nerve blocks?
- (A) Deep peroneal
 - (B) Obturator
 - (C) Popliteal
 - (D) Saphenous
 - (E) Superficial peroneal
79. A 2.3-kg 1-day-old term infant requires repair of a gastroschisis. Which of the following combinations is most appropriate for intraoperative fluid management?
- (A) Dextrose 5% in water for maintenance and lactated Ringer's solution for replacement of third space losses
 - (B) Dextrose 10% in water for maintenance and lactated Ringer's solution for replacement of third space losses
 - (C) Lactated Ringer's solution for maintenance and replacement of third space losses
 - (D) Lactated Ringer's solution for maintenance and albumin 5% for replacement of third space losses
 - (E) Normal saline solution for maintenance and lactated Ringer's solution for replacement of third space losses
80. When inspired anesthetic gases are humidified
- (A) most particles 1 to 2 microns in size are deposited in the trachea
 - (B) respiratory epithelial cilia become less active
 - (C) alveolar water vapor pressure is unchanged
 - (D) respiratory heat loss is abolished
 - (E) sterilization of breathing apparatus is mandatory
81. Which of the following statements concerning the metabolism of atracurium is true?
- (A) It is related to cardiac output
 - (B) It is decreased by hyperthermia
 - (C) It is unaffected by increasing age
 - (D) It is decreased by low plasma cholinesterase activity
 - (E) It is decreased in renal failure
82. Which of the following statements concerning nalbuphine is true?
- (A) It causes partial reversal of morphine-induced ventilatory depression
 - (B) Analgesia is partially mediated by delta receptor agonism
 - (C) Its antagonist effects are mediated at kappa receptors
 - (D) Duration of action is significantly shorter than that of morphine
 - (E) Ventilatory drive is not depressed

83. A 75-year-old man in the PACU complains of severe pain following thoracotomy. Respiratory rate is 30/min; arterial blood gas values are PaO_2 70 mmHg, PaCO_2 56 mmHg, and pH 7.28 at an FiO_2 of 0.6. The patient has a thoracic epidural catheter and received epidural morphine 2 mg 45 minutes earlier. Which of the following is the most appropriate immediate management?
- (A) Intravenous administration of naloxone
 - (B) Epidural administration of additional morphine
 - (C) Epidural administration of 0.125% bupivacaine
 - (D) Epidural administration of fentanyl
 - (E) Intubation of the trachea
84. A 64-year-old patient with chronic obstructive pulmonary disease sustained fractures of ribs 4 through 8 on the left one hour ago. Examination shows agitation, heart rate of 120 bpm, respiratory rate of 30/min, and blood pressure of 180/100 mmHg. PaO_2 is 70 mmHg and PaCO_2 is 35 mmHg on room air. Radiographs of the chest show no abnormalities.
- Which of the following is the most appropriate immediate management?
- (A) Continuous epidural analgesia using local anesthetics
 - (B) Mechanical ventilation
 - (C) Infusion of midazolam
 - (D) Patient-controlled analgesia with morphine sulfate
 - (E) Surgical stabilization of rib fractures
85. A previously healthy 46-year-old woman has severe substernal chest pain one hour after receiving morphine sulfate 10 mg intramuscularly for an elective cholecystectomy. Vital signs, SpO_2 , and findings on a five-lead ECG on the operating room monitor are within normal limits. Which of the following is the most appropriate next step?
- (A) Sublingual administration of nitroglycerin
 - (B) Intravenous administration of butorphanol
 - (C) Intravenous administration of naloxone
 - (D) Cardiology consultation
 - (E) Cancellation of surgery
86. Compared with the response of a normal patient, administration of a bolus dose of pancuronium (0.15 mg/kg) to a patient with cirrhosis and ascites would be associated with
- (A) longer duration
 - (B) more rapid onset
 - (C) more intense block
 - (D) more difficult reversibility
 - (E) similar pharmacokinetics
87. A 72-year-old man has had residual hemiparesis since having a cerebrovascular accident three years ago. Compared with the response of the unaffected limbs to nondepolarizing muscle relaxants, the hemiparetic limbs will show
- (A) the same response
 - (B) greater depression of tetanus
 - (C) greater twitch depression
 - (D) less twitch depression
 - (E) less post-tetanic facilitation



88. The five curves shown above represent the uptake of enflurane, desflurane, halothane, isoflurane, and nitrous oxide. Which uptake curve best depicts desflurane?

- (A) Curve A
- (B) Curve B
- (C) Curve C
- (D) Curve D
- (E) Curve E

89. A 54-year-old woman who is scheduled to undergo emergency exploratory laparotomy takes warfarin sodium for anti-coagulation. Prothrombin time is 19 sec (control 12 sec). Which of the following agents is most appropriate to reverse the effects of warfarin?

- (A) Cryoprecipitate
- (B) Desmopressin (DDAVP)
- (C) Factor IX concentrate
- (D) Fresh frozen plasma
- (E) Pooled factor VIII

90. A 25-year-old woman is admitted to the hospital in the early stages of labor at term. Initial hematocrit is 33%. Which of the following is the most likely cause of the hematocrit value?

- (A) Decreased erythropoietin activity
- (B) Destruction of erythrocytes by the placenta
- (C) Early placental abruption
- (D) Increased plasma volume
- (E) Iron deficiency

91. Which of the following malfunctions causes the line isolation monitor to alarm?
- (A) Discharge of static electricity
 - (B) Flow of current to ground in the isolated circuit
 - (C) Interruption of current to electrical outlets caused by a circuit breaker
 - (D) Surge of current in the main power supply
 - (E) Total electrical current exceeding circuit capacity
92. A patient is placed in the prone jackknife position for lumbar subarachnoid injection of tetracaine 10 mg in 10 ml of preservative-free sterile water. Which of the following results is most likely?
- (A) Respiratory insufficiency
 - (B) Sensory and motor block at T4-S1
 - (C) Sensory and motor block at L1-S5
 - (D) Sensory loss without motor block at L1-S5
 - (E) Sensory and motor block at S3-S5
93. Which of the following combinations of anesthetic and incorrect vaporizer results in the smallest error in delivered concentration?
- (A) Enflurane in a halothane vaporizer
 - (B) Enflurane in an isoflurane vaporizer
 - (C) Halothane in a desflurane vaporizer
 - (D) Isoflurane in a halothane vaporizer
 - (E) Sevoflurane in a desflurane vaporizer
94. Compared with a normal child, which of the following is expected during inhalation induction in a child with a 2:1 left-to-right intracardiac shunt?
- (A) Decreased rate of rise of alveolar anesthetic tension
 - (B) Decreased anesthetic concentration in pulmonary artery blood
 - (C) Decreased cerebral blood flow
 - (D) Increased anesthetic concentration in vena cava blood
 - (E) No difference in time for anesthetic induction
95. A parturient receives ketamine 2 mg/kg and succinylcholine 1.5 mg/kg for induction prior to elective cesarean delivery. Which of the following is most likely to be present in the newborn infant?
- (A) Normal muscle tone
 - (B) Bradycardia
 - (C) Opisthotonos
 - (D) Respiratory depression
 - (E) Seizures
96. Which of the following statements concerning successful blockade of the femoral nerve is true?
- (A) It requires that a paresthesia be elicited prior to injection
 - (B) It provides motor blockade below the knee
 - (C) It is accomplished with an injection medial to the femoral artery
 - (D) It permits surgery for entrapment of the lateral femoral cutaneous nerve
 - (E) It provides anesthesia to the anterior thigh

97. Which of the following correctly describes the anatomic location of the stellate ganglion?
- (A) Anterior to the transverse process of C5
 - (B) Anterior to the transverse process of C7
 - (C) Posterior to the prevertebral fascia
 - (D) Posterior to the vertebral artery
 - (E) Lateral to the carotid artery
98. Which of the following is the greatest disadvantage of pressure-cycled ventilation?
- (A) Increased I:E ratio
 - (B) Increased mechanical dead space
 - (C) Increased risk for barotrauma
 - (D) Variable respiratory rates
 - (E) Variable tidal volumes
99. A 52-year-old woman undergoes facial surgery during general endotracheal anesthesia. The ventilator is set to deliver a tidal volume of 600 ml and a respiratory rate of 10/min at an FiO_2 of 1.0. SpO_2 is 100%, peak inspiratory pressure is 18 cmH_2O , and PETCO_2 is 40 mmHg. The surgeon flexes the patient's head so the chin touches the chest. Which of the following findings indicates that endobronchial intubation has NOT occurred?
- (A) Fluctuating capnographic waveform
 - (B) Greater expiratory volume than inspiratory volume
 - (C) Unchanged SpO_2
 - (D) Unchanged PETCO_2
 - (E) Unchanged peak inspiratory pressure
100. Initiation of positive pressure mechanical ventilation is LEAST likely to decrease cardiac output in patients with which of the following conditions?
- (A) Abdominal distention with decreased lung volume
 - (B) Acute cardiogenic pulmonary edema
 - (C) Chronic obstructive pulmonary disease
 - (D) Flail chest following an automobile accident
 - (E) 20% Right pneumothorax
101. Preoperative evaluation of a patient who has marked malnutrition will demonstrate each of the following EXCEPT
- (A) decreased respiratory muscle function
 - (B) decreased serum albumin concentration
 - (C) decreased metabolic rate
 - (D) suppressed immune function
 - (E) decreased extracellular fluid volume
102. High positive end-expiratory pressure can result in each of the following EXCEPT
- (A) decreased venous return
 - (B) increased functional residual capacity
 - (C) a left-to-right shift of the ventricular septum
 - (D) decreased PaO_2
 - (E) pulmonary barotrauma

103. Each of the following conditions is a cause of agitation in a patient following transurethral resection of the prostate EXCEPT
- (A) bladder distention
 - (B) glycine absorption
 - (C) inadequate analgesia
 - (D) serum sodium concentration of 127 mEq/L
 - (E) systolic pressure of 60 mmHg
104. Each of the following statements concerning the activated clotting time (ACT) is true EXCEPT:
- (A) The ACT is more sensitive than the activated partial thromboplastin time (APTT) to blood heparin concentration
 - (B) The ACT is prolonged if the specimen is not warmed during the assay
 - (C) The ACT should be greater than 300 sec before initiating cardiopulmonary bypass
 - (D) Hypofibrinogenemia may prolong the ACT after cardiopulmonary bypass
 - (E) Whole blood is used for measurement of the ACT
105. Pulsus paradoxus is commonly seen during anesthesia in patients with each of the following conditions EXCEPT
- (A) severe asthma
 - (B) right-sided heart failure
 - (C) hypovolemia
 - (D) atrial septal defect
 - (E) obesity
106. Each of the following landmarks is used in performing wrist block to remove a cystic mass on the fourth digit EXCEPT the
- (A) extensor pollicis longus tendon
 - (B) ulnar artery
 - (C) palmaris longus tendon
 - (D) flexor carpi radialis tendon
 - (E) flexor carpi ulnaris tendon
107. Each of the following findings is characteristic of restrictive lung disease EXCEPT
- (A) decreased elasticity of the lungs
 - (B) decreased FEV₁/FVC ratio
 - (C) decreased inspiratory reserve volume
 - (D) increased work of breathing
 - (E) normal anatomic dead space
108. Each of the following statements about muscle rigidity induced by opioids is true EXCEPT:
- (A) The degree of rigidity is related to the rate of opioid administration
 - (B) It is more apparent during the administration of nitrous oxide
 - (C) Muscles of the trunk are affected more than muscles of the extremities
 - (D) It results from a direct effect of the opioid on skeletal muscles
 - (E) It can be produced by large doses of morphine

109. Perception of pain from cutaneous sources involves each of the following EXCEPT

- (A) frontal lobe gyri
- (B) lateral spinothalamic tracts
- (C) periaqueductal gray matter
- (D) spinal dorsal horn lamina V
- (E) unmyelinated C fibers

110. Each of the following is an effect of rapid infusion of mannitol EXCEPT

- (A) depletion of electrolytes
- (B) impaired platelet adhesiveness
- (C) increased intracranial pressure
- (D) increased intravascular fluid volume
- (E) increased renal blood flow

111. Undesirable muscarinic effects of anticholinesterase agents used for antagonism of muscle relaxants include each of the following EXCEPT

- (A) increased secretions
- (B) bradycardia
- (C) increased gastrointestinal motility
- (D) increased urinary sphincter tone
- (E) bronchoconstriction

112. Block of each of the following nerves is required for inguinal herniorrhaphy EXCEPT the

- (A) genitofemoral
- (B) iliohypogastric
- (C) ilioinguinal
- (D) obturator
- (E) twelfth thoracic

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book B
1995

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS : Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. The jet ventilation technique using an injector during laryngobronchoscopy relies on
 - (A) air entrainment
 - (B) relative density of inhaled gases
 - (C) presence of an endotracheal tube
 - (D) presence of spontaneous ventilation
 - (E) use of helium-oxygen mixtures

2. Which of the following postoperative treatments decreases the risk for deep venous thrombosis?
 - (A) Blood transfusion
 - (B) Epidural anesthesia
 - (C) Etomidate
 - (D) Ketorolac
 - (E) Patient-controlled analgesia

3. Three hours after total thyroidectomy, a 33-year-old man develops inspiratory stridor. The most likely cause is
 - (A) hematoma formation
 - (B) tracheomalacia
 - (C) tetany
 - (D) recurrent laryngeal nerve injury
 - (E) superior laryngeal nerve injury

4. Which of the following is suggestive of epiglottitis rather than croup?
 - (A) A 2-year-old child with a harsh, barking cough
 - (B) A 4-year-old child who insists on sitting up and leaning forward
 - (C) Leukocyte count of 10,000/mm³ with marked lymphocytosis
 - (D) Rectal temperature of 38.5°C
 - (E) Subglottic narrowing (steep sign) on lateral neck radiograph

5. Following protamine administration, profound pulmonary hypertension is most likely initiated by release of
 - (A) epinephrine
 - (B) histamine
 - (C) leukotriene
 - (D) norepinephrine
 - (E) thromboxane

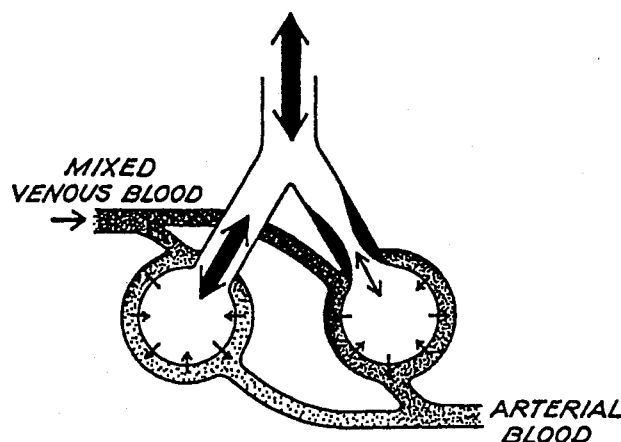
6. Epidural administration of corticosteroids is most effective in relieving pain in patients with which of the following conditions?
- (A) Back pain caused by metastatic cancer
 - (B) Postherpetic neuralgia
 - (C) Postlaminectomy syndrome
 - (D) Postural low back pain
 - (E) Radiculopathy following disk herniation
7. A 2.8-kg 8-hour-old infant undergoes laparotomy for a ruptured omphalocele. Following primary closure of the abdominal wall, arterial blood gases are PaO_2 40 mmHg (FiO_2 0.6), PaCO_2 55 mmHg, and pH 7.1. Blood pressure is 30/20 mmHg. After increasing the FiO_2 , the most appropriate action would be to
- (A) obtain a radiograph of the chest immediately
 - (B) withdraw the endotracheal tube 1 cm
 - (C) assess the patient for coexisting congenital heart disease
 - (D) administer lactated Ringer's solution 15 ml/kg
 - (E) ask the surgeon to reopen the wound
8. A patient is undergoing thoracotomy in the lateral position. Five minutes after initiation of one-lung ventilation using a double-lumen tube and 100% oxygen, SpO_2 decreases from 100% to 65%. Which of the following is the most appropriate initial step in management?
- (A) Adding continuous positive airway pressure to the nondependent lung
 - (B) Adding positive end-expiratory pressure to the dependent lung
 - (C) Increasing the tidal volume to the dependent lung
 - (D) Resuming two-lung ventilation
 - (E) Verifying the position of the double-lumen tube
9. Which of the following combinations of hemoglobin, blood gases, and cardiac output provides the greatest delivery of oxygen to tissue?

	<u>Hgb (g/dL)</u>	<u>PaO_2 (mmHg)</u>	<u>SaO_2 (%)</u>	<u>CO (L/min)</u>
(A)	7.0	85	95	7.0
(B)	8.0	290	100	8.0
(C)	9.9	61	90	9.8
(D)	12.0	140	100	4.5
(E)	16.0	40	75	5.8

10. A 50-year-old patient is undergoing middle ear exploration with isoflurane, nitrous oxide, and oxygen anesthesia. Ventilation is controlled; PETCO_2 is 35 mmHg, heart rate is 90 bpm, and blood pressure is 120/70 mmHg. Assistance is needed to minimize bleeding in the surgical field.

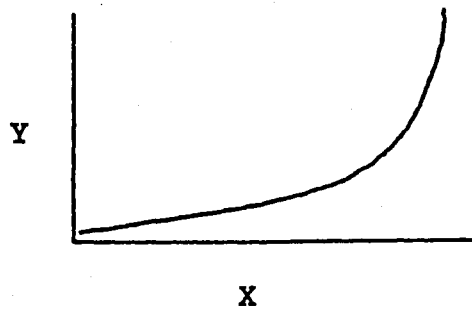
Which of the following is the most appropriate next step in management?

- (A) Addition of 5 cmH_2O positive end-expiratory pressure
- (B) Changing the anesthetic agent to halothane
- (C) Hyperventilation to a PETCO_2 of 20 mmHg
- (D) Placing the patient in reverse Trendelenburg position
- (E) Titration of nitroprusside to a mean arterial pressure of 55 mmHg



11. Which of the following changes is most likely in the patient whose pulmonary pathology is schematically illustrated above?
- (A) Decreased diffusing capacity
 - (B) Decreased PaO_2
 - (C) Decreased pH
 - (D) Increased PaCO_2
 - (E) Increased V_D/V_T
-
12. Which of the following EEG findings is expected during maintenance anesthesia with high-dose fentanyl (50 $\mu\text{g}/\text{kg}$), nitrous oxide, and oxygen?
- (A) Low-frequency high-voltage activity
 - (B) Nondominant hemispheric slowing
 - (C) Predominant alpha activity
 - (D) Prominent beta activity
 - (E) Spindle-shaped bursts
13. During attempted awake intubation, the patient gags when the laryngoscope presses on the base of the tongue. Which of the following cranial nerves is responsible for the afferent limb of this reflex?
- (A) Trigeminal
 - (B) Facial
 - (C) Glossopharyngeal
 - (D) Vagus
 - (E) Hypoglossal
14. A 70-kg 24-year-old man with bilateral pneumonia whose lungs are being mechanically ventilated has the following measured parameters: tidal volume 750 ml; FiO_2 0.7; rate 12/min; positive end-expiratory pressure 10 cmH_2O ; PaO_2 75 mmHg; PaCO_2 55 mmHg; pH 7.30. Which of the following alterations should be made in the ventilatory settings?
- (A) Decreasing positive end-expiratory pressure
 - (B) Decreasing respiratory rate
 - (C) Increasing fresh gas flow rate
 - (D) Increasing FiO_2
 - (E) Increasing tidal volume

15. Mivacurium-induced neuromuscular blockade is prolonged for the greatest period of time in patients who have which of the following conditions?
- (A) Ethanol-induced hepatitis
 - (B) Hemiplegia
 - (C) Pseudocholinesterase deficiency
 - (D) Renal insufficiency
 - (E) Thermal burns
16. If minute ventilation remains constant, a decrease in end-expiratory carbon dioxide concentration will occur with
- (A) a decrease in physiologic dead space
 - (B) a decrease in cardiac output
 - (C) a decrease in physiologic shunt fraction
 - (D) the development of metabolic alkalosis
 - (E) an increase in body temperature
17. A patient with lumbar disk disease requires lumbar epidural injection of a corticosteroid for control of low back pain. Which of the following statements concerning this treatment is true?
- (A) Maximum effect occurs one hour after injection
 - (B) Maximum effect occurs when drug concentration peaks in cerebrospinal fluid
 - (C) Maximum effect occurs during the acute phase of the disease
 - (D) The beneficial effect results primarily from sympathetic neurolysis
 - (E) It is contraindicated if the patient has had prior surgical procedures on the lumbar disks
18. Which of the following statements concerning the innervation of the larynx is true?
- (A) The glossopharyngeal nerve provides motor innervation to the vocal cords
 - (B) The recurrent laryngeal nerve provides sensory innervation to the mucosa of the larynx above the vocal cords
 - (C) The hypoglossal nerve provides sensory innervation to the aryepiglottic folds
 - (D) Unilateral recurrent laryngeal nerve injury results in an abducted vocal cord on the injured side
 - (E) The vagus nerve provides innervation to all structures below the vocal cords
19. Which of the following is most likely to increase hepatic blood flow during general anesthesia?
- (A) Addition of positive end-expiratory pressure
 - (B) Discontinuation of isoflurane and administration of enflurane
 - (C) Increased PaCO_2
 - (D) Moderate controlled hypotension
 - (E) Subarachnoid administration of morphine
20. Which of the following should be included in the preoperative management of a 12-year-old patient with Duchenne's muscular dystrophy who is unable to ambulate?
- (A) Determination of serum creatine kinase concentration
 - (B) Determination of serum potassium concentration
 - (C) Liver function profile
 - (D) Echocardiography
 - (E) Dantrolene prophylaxis



21. Which of the following relationships is indicated by the curve illustrated in the graph shown above?

- (A) Intracranial blood volume (X) and intracranial pressure (Y)
- (B) PaCO_2 (X) and minute ventilation (Y)
- (C) PaO_2 (X) and hemoglobin saturation (Y)
- (D) Preload (X) and stroke volume (Y)
- (E) Systemic arterial pressure (X) and cerebral blood flow (Y)

22. A 68-year-old woman is scheduled for a mastectomy. She has not taken prescription medications for 24 hours. Preoperative examination shows a heart rate of 104 bpm and blood pressure of 200/105 mmHg. The most likely cause of these findings is omission of which of the following drugs?

- (A) Amiodarone
- (B) Clonidine
- (C) Enalapril
- (D) Hydralazine
- (E) Nifedipine

23. A 72-year-old man has massive venous hemorrhage during a radical prostatectomy. Blood pressure decreases from 110/60 to 75/30 mmHg and central venous pressure decreases from 12 to 4 mmHg. PETCO_2 decreases from 34 to 24 mmHg during constant minute ventilation. The most appropriate next step should be to

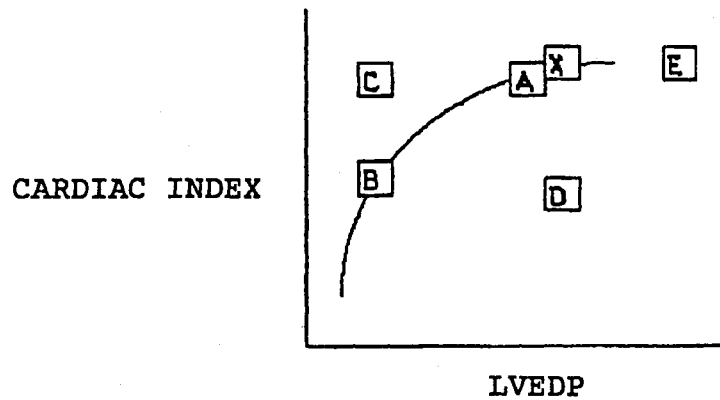
- (A) apply positive end-expiratory pressure to the breathing circuit
- (B) attempt to aspirate air from the central venous catheter
- (C) expand intravascular volume
- (D) place the patient in the Trendelenburg position
- (E) turn the patient to the left lateral decubitus position

24. Following induction of general anesthesia, mask ventilation and the initial attempt at intubation is unsuccessful. Which of the following procedures is most appropriate?

- (A) Administration of additional muscle relaxant
- (B) Repeat attempt at intubation
- (C) Fiberoptic intubation
- (D) Retrograde intubation
- (E) Cricothyroidotomy

25. Which of the following correctly describes the anatomic location of the brachial plexus?
- (A) Adjacent to the subclavian vein as it passes between the scalene muscles
 - (B) Between the middle and posterior scalene muscles
 - (C) Posterior to the first rib
 - (D) Posterior to the subclavian artery
 - (E) Posterior to the vertebral artery
26. Which of the following is described by the standard deviation during analysis of the results of a clinical study?
- (A) Central tendency of the study results
 - (B) Distribution of the results of the study group
 - (C) Range of the results of the study group
 - (D) Regression analysis of the study group
 - (E) Statistical significance of the difference between the study groups
27. A 34-year-old man is undergoing appendectomy during spinal anesthesia with T2 sensory blockade. Approximately 15 minutes after the injection of bupivacaine 15 mg, heart rate decreases to 34 bpm and blood pressure decreases to 70/40 mmHg. Which of the following is the most likely cause?
- (A) Baroreceptor stimulation
 - (B) Bupivacaine cardiotoxicity
 - (C) Hypovolemia
 - (D) Thoracic sympathetic blockade
 - (E) Vasovagal reflex
28. Which of the following statements concerning brain stem auditory evoked responses is true?
- (A) They monitor cortical function
 - (B) They are not affected by changes in PaCO_2
 - (C) They are not affected by mild hypothermia (34°C)
 - (D) They are more resistant to anesthetic effects than somatosensory evoked responses
 - (E) They are abolished coincident with flattening of the EEG
29. Addition of 20 cmH₂O positive end-expiratory pressure to a patient receiving controlled mechanical ventilation decreases cardiac output and left ventricular function by
- (A) increasing right ventricular preload
 - (B) increasing right ventricular afterload
 - (C) increasing left ventricular preload
 - (D) increasing left ventricular afterload
 - (E) producing myocardial ischemia
30. If administered prior to induction of anesthesia, which of the following drugs is most likely to cause tachycardia?
- (A) Fentanyl
 - (B) Meperidine
 - (C) Midazolam
 - (D) Morphine
 - (E) Sufentanil

31. A 32-year-old man is scheduled for hernia repair. He underwent heart transplantation for cardiomyopathy five years ago. Which of the following findings is most likely?
- (A) Absence of coronary atherosclerosis
 - (B) Biventricular hypokinesis on echocardiography
 - (C) Down-regulation of cardiac beta-adrenergic receptors
 - (D) Increased heart rate at rest
 - (E) Right ventricular hypertrophy
32. Which of the following decreases the risk for burns during electrocauterization?
- (A) Conductive flooring
 - (B) Grounding of the patient to the operating table
 - (C) Increased resistance at the return electrode
 - (D) Isolation of the current output of the electrosurgical unit
 - (E) Placement of the return electrode at a distance from the surgical site
33. Which of the following best explains why neonates are at greater risk than adults for hypothermia during surgical procedures?
- (A) Greater body surface area relative to body mass
 - (B) Greater cutaneous vasodilation at equal MAC concentrations of volatile anesthetics
 - (C) Greater dependence on shivering to produce heat
 - (D) Inability to increase metabolic rate
 - (E) Less insulation by adipose tissue
34. Two opened oxygen cylinders, one full and one empty, are attached to an anesthesia machine. The check valve to the empty cylinder fails. This is expected to result in
- (A) activation of the fail-safe device
 - (B) cessation of oxygen flow to the anesthesia circuit
 - (C) filling of the empty cylinder with a mixture of all gases supplied to the anesthesia machine
 - (D) increase in the temperature of the empty cylinder
 - (E) interruption of gas delivery from the central oxygen source
35. Which of the following statements concerning myasthenia gravis is true?
- (A) Neostigmine is inappropriate for antagonism of neuromuscular blockade
 - (B) The number of acetylcholine receptors is decreased
 - (C) Plasma cholinesterase concentration is decreased
 - (D) The risk for malignant hyperthermia is increased
 - (E) Succinylcholine is contraindicated
36. Which of the following statements concerning anesthesia machine flowmeters is true?
- (A) At high gas flows, viscosity is the predominant determinant of flow rate
 - (B) At low flow rates, gas density is the predominant determinant of flow rate
 - (C) Flowmeters should be upstream from the oxygen fail-safe device
 - (D) The oxygen flowmeter should be upstream from other flowmeters
 - (E) Tapered flow tubes allow a constant decrease in pressure across the float



37. The above left ventricular function curve is from a young, healthy patient. If X represents the patient's myocardial function prior to anesthesia, the effect of 1 MAC of isoflurane at normocarbida is best represented by which of the following positions?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

38. Which of the following statements concerning the check valve of the common gas outlet on an anesthesia gas machine is true?

- (A) It prevents backflow into vaporizers
- (B) It prevents delivery of a hypoxic mixture
- (C) It prevents rebreathing
- (D) It is located downstream from the oxygen flush valve
- (E) It is required for proper functioning of the proportioning system

39. Phantom limb pain is an example of which of the following types of pain?

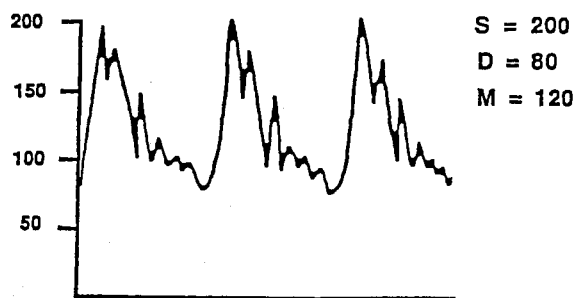
- (A) Central pain
- (B) Nociceptive pain
- (C) Psychosomatic pain
- (D) Sympathetically mediated pain
- (E) Vasospastic pain

40. Which of the following is the most appropriate first intervention after instituting basic cardiopulmonary resuscitation for an unwitnessed cardiac arrest with ventricular fibrillation?

- (A) Administration of sodium bicarbonate
- (B) Intravenous administration of epinephrine
- (C) Administration of a precordial "thump"
- (D) Defibrillation using 200 joules
- (E) Defibrillation using 360 joules

41. In an unpremedicated, spontaneously breathing patient, an alveolar halothane concentration of 0.74% in oxygen is consistently associated with
- (A) absence of overt response to skin incision
 - (B) constricted pupils
 - (C) flaccidity of abdominal muscles
 - (D) normal glomerular filtration rate
 - (E) normal myocardial contractility
42. Which of the following findings is an early indication of cyanide toxicity?
- (A) Bronchospasm
 - (B) Cardiac dysrhythmias
 - (C) Decreased mixed venous PO_2
 - (D) Increased intracranial pressure
 - (E) Metabolic acidosis
43. Which of the following findings is most likely in patients receiving intravenous amrinone?
- (A) Decreased left ventricular afterload
 - (B) Decreased myocardial oxygen consumption
 - (C) Increased atrioventricular conduction
 - (D) Increased right ventricular preload
 - (E) Stimulation of β_1 -adrenergic receptors
44. Depression of cerebral oxygen requirements below the level required to create an isoelectric EEG can be achieved by
- (A) administration of isoflurane
 - (B) administration of nimodipine
 - (C) barbiturate coma
 - (D) hyperventilation
 - (E) hypothermia
45. A 68-year-old woman who is receiving urokinase for deep venous thrombosis and pulmonary emboli requires emergency laparotomy for a bleeding gastric ulcer. Which of the following agents is most appropriate to reverse the effects of urokinase?
- (A) Cryoprecipitate
 - (B) Factor VIII concentrate
 - (C) Fresh frozen plasma
 - (D) Platelets
 - (E) Vitamin K
46. The concentration of bupivacaine is higher in maternal blood than in fetal blood because
- (A) bupivacaine is metabolized in the placenta
 - (B) maternal blood has a higher pH
 - (C) maternal blood has greater plasma protein binding
 - (D) maternal hemoglobin has a higher affinity for bupivacaine
 - (E) placental transfer of bupivacaine is limited

47. Which of the following is most likely to decrease in the affected area following a paravertebral lumbar sympathetic block?
- (A) Cutaneous blood flow
 - (B) Pinprick sensation
 - (C) Sweating
 - (D) Temperature sensation
 - (E) Venous capacitance
48. A patient who is scheduled for emergency laparotomy for bowel obstruction has had oliguria for three hours. She has had hypertension for 10 years. Which of the following laboratory findings would indicate preoperative fluid challenge?
- (A) Urine osmolality: 300 mOsm/L
 - (B) Urine specific gravity: 1.015
 - (C) Urine sodium concentration: 35 mEq/L
 - (D) Fractional excretion of sodium: 0.5
 - (E) Ratio of urine-to-plasma creatinine concentrations: 8
49. Which of the following is the most important function of temperature compensation in anesthetic vaporizers?
- (A) Compensation for changes in the specific heat of the anesthetic during vaporization
 - (B) Delivery of diluent gas at a constant temperature regardless of flow rate
 - (C) Increase of bypass flow when the vaporizer is cooled by high fresh gas flow
 - (D) Maintenance of constant anesthetic vapor output over a range of vaporizer temperatures
 - (E) Maintenance of constant vapor concentrations at low flow rates
50. Which of the following is the most likely cause of the coronary steal phenomenon?
- (A) Idiopathic hypertrophic subaortic stenosis (IHSS)
 - (B) Decreased cardiac contractility
 - (C) Dilation of coronary arterioles
 - (D) Dilation of epicardial coronary arteries
 - (E) Increased systemic vascular resistance
51. Which of the following is the most likely effect of intramuscular ketamine used for induction of anesthesia in a 2-year-old child undergoing elective surgery?
- (A) Bronchoconstriction
 - (B) Decreased heart rate
 - (C) Decreased intracranial pressure
 - (D) Increased salivation
 - (E) Respiratory depression
52. Which of the following is the most common infection transmitted through transfusion of blood products?
- (A) Epstein-Barr virus
 - (B) Hepatitis B
 - (C) Hepatitis C
 - (D) Human immunodeficiency virus
 - (E) Toxoplasmosis



53. The tracing shown above is from a femoral artery catheter. Which of the following is the most likely explanation?
- (A) An air bubble greater than 1 ml is in the tubing
 - (B) The diastolic pressure is factitiously high
 - (C) Mean blood pressure is inaccurate
 - (D) The monitoring system is underdamped
 - (E) Systolic pressure in the aortic arch exceeds 200 mmHg
-
54. A 19-year-old woman has severe nausea and vomiting following laparoscopy. After intramuscular administration of prochlorperazine 10 mg, she has muscle spasms in the face, neck, and tongue. Which of the following is the most appropriate management?
- (A) Baclofen
 - (B) Diphenhydramine
 - (C) Epinephrine
 - (D) Hydrocortisone
 - (E) Naloxone
55. A 70-year-old man undergoes cross clamping of the aorta for repair of an abdominal aneurysm. Which of the following methods is most appropriate for decreasing hypotension associated with removal of the cross clamp?
- (A) Administration of a phenylephrine bolus when the cross clamp is removed
 - (B) Correction of any base deficit with sodium bicarbonate during clamping
 - (C) Decrease of anesthetic to allow blood pressure to increase to 20% above preclamp levels
 - (D) Volume loading to increase pulmonary artery occlusion pressure prior to removal
 - (E) Infusion of dopamine 10 minutes prior to removal
56. A 57-year-old man with hepatocellular disease is scheduled to undergo a colectomy for colon cancer. Preoperative laboratory studies show a plasma albumin concentration of 2.4 g/dl (normal=3.5 to 5.5 g/dl); prothrombin time is 16 sec (control 12 sec). Which of the following statements concerning the anesthetic management of this patient is true?
- (A) Atracurium will have a prolonged duration of action
 - (B) The risk for perioperative hyperglycemia is increased
 - (C) Mivacurium will have a shortened duration of action
 - (D) The unbound fraction of thiopental will be increased
 - (E) Vitamin K injection will normalize the prothrombin time

57. A patient has a decrease in heart rate from 80 to 50 bpm and a decrease in blood pressure from 140/90 to 60/40 mmHg while in the recovery room after adrenalectomy for pheochromocytoma. The most appropriate treatment is administration of
- (A) atropine
 - (B) calcium
 - (C) hydrocortisone
 - (D) isoproterenol
 - (E) norepinephrine
58. A 20-year-old man is scheduled for emergency laparotomy for an abdominal stab wound. Ten minutes after induction with oxygen, thiopental, and succinylcholine, blood pressure is 220/120 mmHg and esophageal temperature is 39°C. ST-segment depression of 4 mm is noted in ECG lead V₅. Which of the following is the most likely cause?
- (A) Adrenal laceration
 - (B) Cocaine intoxication
 - (C) Inadequate anesthesia
 - (D) Malignant hyperthermia
 - (E) Small cardiac puncture
59. A 23-year-old man who is receiving his first anesthetic has not resumed spontaneous ventilation two hours after receiving succinylcholine. The train-of-four monitor shows no twitch response. Which of the following is the most likely cholinesterase genotype in this patient?
- (A) Atypical:atypical
 - (B) Fluoride-resistant:fluoride-resistant
 - (C) Fluoride-resistant:silent
 - (D) Normal:normal
 - (E) Normal:silent
60. A 62-year-old man is in the intensive care unit after successful craniotomy for excision of a meningioma. Blood volume is normal; laboratory studies show serum sodium concentration of 120 mEq/L, serum osmolality of 260 mOsm/L, urine sodium concentration of 50 mEq/L, and urine osmolality of 820 mOsm/L.
- Which of the following is the most likely explanation?
- (A) Fluid overload with 5% dextrose in water
 - (B) Inappropriate secretion of antidiuretic hormone
 - (C) Increased free water clearance
 - (D) Nephrogenic diabetes insipidus
 - (E) Neurogenic diabetes insipidus
61. A 70-year-old man has a pacemaker set at VOO mode at 70 bpm with temporary atrial and ventricular wires placed prior to separation from cardiopulmonary bypass. Fifteen minutes after separation, he develops atrial fibrillation with a ventricular response of 80 to 100 bpm. Which of the following ECG findings is most likely?
- (A) Irregular atrial and ventricular complexes with loss of pacer artifacts
 - (B) Irregular ventricular complexes with preserved ventricular pacer artifacts at 70 bpm
 - (C) Occasional pacer artifacts when intrinsic ventricular rate is slower than 70 bpm
 - (D) Regular ventricular complexes at 70 bpm
 - (E) Ventricular complexes with preserved atrial and ventricular pacer artifacts at 70 bpm

62. Which of the following statements concerning the retinopathy of prematurity is true?
- (A) The initial lesion is dilation of retinal capillaries
 - (B) It can be prevented by maintaining FiO_2 below 0.4
 - (C) It is less likely to develop if PaO_2 is maintained below 70 mmHg
 - (D) The incidence is unrelated to birth weight
 - (E) Infants whose postconceptual age has reached 40 weeks are no longer at risk
63. A 62-year-old woman with obesity and type II diabetes mellitus is scheduled to undergo vitrectomy of the right eye. Five minutes after retrobulbar injection with 0.75% bupivacaine 4 ml and intravenous administration of fentanyl 50 μ g and midazolam 1 mg, she is apneic and unresponsive. Which of the following is the most likely cause?
- (A) Fentanyl-midazolam interaction
 - (B) Hypoglycemia
 - (C) Intravenous bupivacaine
 - (D) Retrobulbar hematoma
 - (E) Subarachnoid bupivacaine
64. A 50-year-old man is scheduled to undergo emergency craniotomy for evacuation of an epidural hematoma. His Glasgow Coma Scale score is 6; heart rate is 54 bpm, and blood pressure is 190/110 mmHg. The most appropriate initial management is administration of which of the following agents?
- (A) Atropine
 - (B) Mannitol
 - (C) Nimodipine
 - (D) Sodium nitroprusside
 - (E) Thiopental
65. Which of the following effects of catecholamine results in the greatest increase in preload?
- (A) Augmented contractility
 - (B) Decreased afterload
 - (C) Decreased venous capacitance
 - (D) Improved chronotropism
 - (E) Increased cardiac output
66. Which of the following statements concerning fetal hemoglobin is true?
- (A) It makes up less than 50% of the total hemoglobin in the neonate
 - (B) It has less affinity for oxygen than adult hemoglobin
 - (C) It binds with greater affinity to 2,3-DPG than adult hemoglobin
 - (D) It shifts the oxyhemoglobin dissociation curve to the left
 - (E) It has a P_{50} of 27 mmHg
67. Which of the following produces falsely high SpO_2 ?
- (A) Carboxyhemoglobin
 - (B) Fetal hemoglobin
 - (C) Hematocrit less than 20%
 - (D) Indigo carmine
 - (E) Methylene blue

68. Block of the superficial cervical plexus is performed at which location?
- (A) At the midposterior border of the sternocleidomastoid muscle
 - (B) In the interscalene groove
 - (C) Over the mastoid process
 - (D) Over the transverse process of C4
 - (E) Over Chassaignac's tubercle
69. Which of the following is a characteristic of phase II neuromuscular block?
- (A) It is diagnosed by the intravenous administration of calcium
 - (B) It is potentiated by edrophonium
 - (C) It produces nondepolarizing train-of-four characteristics
 - (D) It requires evaluation for pseudocholinesterase deficiency
 - (E) It requires less succinylcholine than a phase I block
70. Tingling in the fifth finger during spinal anesthesia is associated with anesthesia at which of the following dermatomes?
- (A) C4
 - (B) C6
 - (C) C8
 - (D) T2
 - (E) T4
71. A patient who is scheduled for a parathyroidectomy for a parathyroid adenoma has a preoperative serum calcium concentration of 13.5 mg/dl. The ECG shows no acute changes. The most appropriate preoperative management is administration of
- (A) calcitonin
 - (B) hydrocortisone
 - (C) intravenous saline solution
 - (D) mannitol
 - (E) potassium phosphate
72. Which of the following increases blood flow to the lower lobe of the right lung?
- (A) Collapsing the right lung during anesthesia
 - (B) The expiratory phase of spontaneous ventilation
 - (C) The inspiratory phase of mechanical ventilation
 - (D) Moving from the supine to the upright position
 - (E) Moving from the supine to the left lateral decubitus position
73. Which of the following processes is primarily responsible for the decrease in core body temperature that occurs during the first hour of general anesthesia?
- (A) Decreased production of heat
 - (B) Convective heat loss caused by cutaneous vasodilation
 - (C) Evaporative heat loss during skin preparation
 - (D) Heat loss from the respiratory tract
 - (E) Redistribution of core body heat to the periphery

74. During laser microsurgery of the larynx, a rubber endotracheal tube wrapped with aluminum-foil tape starts to smolder and give off smoke. The first step is to
- (A) suction the endotracheal tube
 - (B) add helium to the inspired gas mixture
 - (C) remove the endotracheal tube
 - (D) turn off the fresh gas flow
 - (E) pack a saline-soaked gauze sponge into the hypopharynx
75. Three hours prior to induction of anesthesia for elective laparotomy, a 40-kg 8-year-old boy is anxious and clings to his parents. Which of the following preanesthetic medications is most appropriate?
- (A) Oral ketamine
 - (B) Oral midazolam
 - (C) Rectal methohexital
 - (D) Intramuscular droperidol
 - (E) Intramuscular promethazine
76. The best indication that a patient is ready for discharge from an outpatient facility after spinal anesthesia is return of
- (A) pinprick sensation to the S4-5 dermatome
 - (B) micturition
 - (C) plantar flexion
 - (D) proprioception of the big toe
 - (E) knee extension
77. Which of the following findings is most likely in patients with acute transection of the spinal cord at the level of C6?
- (A) Autonomic hyperreflexia
 - (B) Hyperkalemia with administration of succinylcholine
 - (C) Hypotension
 - (D) Increased pulmonary blood flow
 - (E) Tachycardia
78. Administration of succinylcholine 1 mg/kg to a pregnant woman rarely causes fetal neuromuscular blockade. Which characteristic of succinylcholine best explains this phenomenon?
- (A) High protein binding
 - (B) Ionization
 - (C) Lack of passive placental diffusion
 - (D) Lipid solubility
 - (E) Metabolism in the fetal liver
79. Which of the following is an effect of magnesium sulfate at the neuromuscular junction?
- (A) Augmentation of acetylcholine reuptake
 - (B) Decrease in acetylcholine binding
 - (C) Decrease in acetylcholine metabolism
 - (D) Decrease in the presynaptic release of acetylcholine
 - (E) Potentiation of the effects of ionized calcium

80. A neurologically intact 48-year-old woman is scheduled for removal of a parietal lobe arteriovenous malformation. The relative risk for complete resection is to be determined by a test occlusion of the feeding artery. Which of the following intraoperative monitoring techniques is most appropriate for this test?

- (A) Brain stem auditory evoked potentials
- (B) Cerebral blood flow using radioactive xenon
- (C) EEG
- (D) Evoked potentials elicited by stimulating the posterior tibial nerve
- (E) Transcranial Doppler

81. A 35-year-old patient, who is ASA physical status 1, is scheduled for open cholecystectomy under general anesthesia. Which of the following end-tidal concentrations would most likely block the adrenergic response to skin incision?

- (A) Enflurane 1.7%, oxygen
- (B) Isoflurane 1.2%, oxygen
- (C) Enflurane 0.6%, nitrous oxide 70%, oxygen
- (D) Halothane 0.4%, nitrous oxide 70%, oxygen
- (E) Isoflurane 1.0%, nitrous oxide 70%, oxygen

82. A 22-year-old woman with severe preeclampsia vaginally delivers a 3-kg infant after 12 hours of treatment with magnesium sulfate and continuous epidural infusion of bupivacaine 0.0625% and fentanyl 1 μ g/ml at 10 ml/hr. The infant is pink and hypotonic; heart rate is 110 bpm and blood pressure is 35/25 mmHg.

Which of the following is the most appropriate initial management of the infant?

- (A) 10% Dextrose in water
- (B) Calcium gluconate
- (C) Epinephrine
- (D) Naloxone
- (E) Intubation and ventilation

83. A 60-year-old man with type II diabetes mellitus requires emergency incision and drainage of a perirectal abscess. Laboratory studies show a serum glucose concentration of 850 mg/dl and a pH_a of 7.30. The most appropriate management is administration of regular insulin and which of the following infusions?

- (A) 5% Dextrose in water
- (B) 5% Dextrose in 0.45% saline solution with potassium chloride
- (C) 5% Dextrose in 0.45% saline solution with potassium chloride and mannitol
- (D) Normal saline solution
- (E) Normal saline solution and sodium bicarbonate

84. A 70-kg 61-year-old patient undergoes a four-hour resection of an abdominal aortic aneurysm during anesthesia with fentanyl and enflurane. Infraarenal clamping is required during the procedure. Twelve hours after the procedure, urine output is 15 ml/hr with a fractional sodium excretion of 6%. Which of the following is the most likely cause?

- (A) Enflurane nephrotoxicity
- (B) Hypovolemia
- (C) Intraoperative renal ischemia
- (D) Positive pressure ventilation
- (E) Unilateral ureteral obstruction

85. Which of the following statements concerning pressure support ventilation is true?
- (A) It augments gas inflow in response to spontaneous inspiration
 - (B) It increases inspiratory airway pressure during controlled mandatory ventilation
 - (C) It requires the use of positive end-expiratory pressure
 - (D) It functions independently of airway resistance/lung compliance
 - (E) It correlates linearly with spontaneously achieved tidal volume
86. Retrobulbar block for ophthalmologic surgery can be administered safely to patients with which of the following conditions?
- (A) Agitation
 - (B) Bleeding disorder
 - (C) Frequent coughing spasms
 - (D) Increased intraocular pressure
 - (E) Perforated globe
87. In a normally functioning circle anesthesia system, if the length of the inspiratory and expiratory hose is doubled, the mechanical dead space will be
- (A) halved
 - (B) unchanged
 - (C) doubled
 - (D) quadrupled
 - (E) dependent on compression volume
88. Which of the following is a manifestation of preeclampsia?
- (A) Hypovolemia
 - (B) Increased colloid osmotic pressure
 - (C) Natriuresis
 - (D) Resistance to catecholamines
 - (E) Thrombocytosis
89. Compared with the adult airway, the neonatal airway has which of the following characteristics?
- (A) More cephalad larynx
 - (B) Narrowest diameter at the vocal cords
 - (C) Relatively smaller epiglottis
 - (D) Smaller tongue relative to the size of the oral cavity
 - (E) Vocal cords perpendicular to the trachea
90. Four hours after open cholecystectomy, a patient who is breathing spontaneously has an SpO_2 of 93% in the supine position and an SpO_2 of 98% when placed in the head-up position. The most likely cause of this change is an increase in which of the following?
- (A) Functional residual capacity
 - (B) Minute ventilation
 - (C) Pulmonary blood flow
 - (D) Residual volume
 - (E) Vital capacity

91. A 60-kg 25-year-old woman is undergoing laparoscopy in the Trendelenburg position during general anesthesia. Five minutes after peritoneal inflation, the peak airway pressure required to deliver a tidal volume of 800 ml increases from 25 cmH₂O to 60 cmH₂O. SpO₂ decreases from 100% to 80% and systolic blood pressure increases from 110 mmHg to 140 mmHg.

Which of the following is the most likely cause?

- (A) Acute tension pneumothorax
- (B) Excessively steep Trendelenburg position
- (C) Excessive ventilator tidal volume setting
- (D) Kink in the endotracheal tube
- (E) Massive carbon dioxide embolism

92. A healthy patient is receiving general endotracheal anesthesia with nitrous oxide 4 L/min, oxygen 2 L/min, and isoflurane 1% with spontaneous ventilation. The inspiratory breathing hose becomes disconnected from the inspiratory valve. The earliest alarm will be produced by

- (A) a pulse oximeter with finger probe set to alarm at 60% saturation
- (B) a mass spectrometer set to alarm when no breath is detected for 30 seconds
- (C) an oxygen analyzer mounted on the inspiratory valve outlet and set to alarm at 25% oxygen concentration
- (D) a capnograph sensor at the Y-piece that alarms when end-tidal carbon dioxide tension is greater than 60 mmHg
- (E) an oxygen analyzer mounted on the expiratory valve inlet and set to alarm at 25% oxygen concentration

93. Compared with adults, neonates are more likely to become hypoxemic following anesthesia and extubation because of a relatively

- (A) higher rate of oxygen consumption
- (B) greater sensitivity to neuromuscular blockade
- (C) larger V_D/V_T ratio
- (D) lower blood pressure
- (E) smaller functional residual capacity

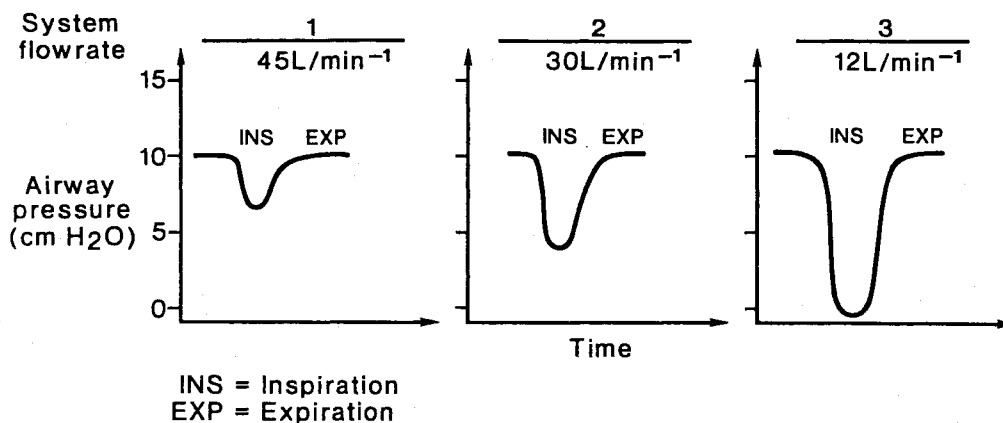
94. Which of the following changes in pulmonary function best explains the more rapid rate of rise of alveolar concentration of volatile anesthetics in pregnant women than in nonpregnant women?

- (A) Decreased functional residual capacity
- (B) Decreased dead space ventilation
- (C) Increased cardiac output
- (D) Increased oxygen consumption
- (E) Increased pulmonary venous admixture

95. A 24-year-old woman with abruptio placentae at 38 weeks' gestation has bleeding at the site of the intravenous catheter. Which of the following is the most likely cause?

- (A) Diffuse vasculitis
- (B) Disseminated intravascular coagulation
- (C) Isolated factor VIII deficiency
- (D) Primary fibrinolysis
- (E) Vitamin K deficiency

96. Which of the following statements concerning the effects of glycopyrrolate is true?
- (A) It decreases gastric pH
 - (B) It causes bronchoconstriction
 - (C) It decreases lower esophageal sphincter tone
 - (D) It does not prevent succinylcholine-induced bradycardia
 - (E) It causes a central anticholinergic syndrome
97. Which of the following is an effect of ketorolac administered after vaginal hysterectomy?
- (A) Euphoria
 - (B) Prolonged prothrombin time
 - (C) Respiratory depression
 - (D) Suppression of inflammation
 - (E) Thrombocytopenia
98. The development of tachycardia is most hazardous in patients with which of the following conditions?
- (A) Aortic insufficiency
 - (B) Cardiac tamponade
 - (C) Mitral insufficiency
 - (D) Mitral stenosis
 - (E) Ventricular septal defect
99. If a patient with excessive bleeding during exploratory laparotomy has a normal activated clotting time, the LEAST likely cause of the bleeding is
- (A) antithrombin III deficiency
 - (B) dilutional thrombocytopenia
 - (C) fibrinolysis
 - (D) administration of heparin 5000 units
 - (E) preoperative ingestion of aspirin
100. A 69-year-old woman with mitral stenosis and atrial fibrillation is scheduled for mitral valve replacement and removal of a left atrial thrombus. After administration of pancuronium, heart rate increases to 140 bpm and blood pressure decreases to 70/40 mmHg. Which of the following is the LEAST appropriate treatment?
- (A) Cardioversion
 - (B) Edrophonium
 - (C) Esmolol
 - (D) Phenylephrine
 - (E) Verapamil
101. The condition LEAST likely to be associated with sustained pain relief following a nerve block is
- (A) causalgia
 - (B) myofascial pain
 - (C) diabetic neuropathy
 - (D) acute herpes zoster
 - (E) reflex sympathetic dystrophy



102. The graphs shown above illustrate various respiratory patterns in a patient who is breathing spontaneously with continuous positive airway pressure. Which of the following patterns is associated with the **LEAST** work of breathing?

- (A) 1
- (B) 2
- (C) 3
- (D) All patterns are associated with equal work
- (E) There is not enough information to answer the question

103. Each of the following conditions is associated with autonomic hyperreflexia in patients with spinal cord injury **EXCEPT**

- (A) bradycardia
- (B) flushing below the level of injury
- (C) headache
- (D) sweating above the level of injury
- (E) systolic hypertension

104. To predict the requirement for isoflurane in milliliters of vapor per minute during closed circuit anesthesia, each of the following is necessary **EXCEPT**

- (A) cardiac output
- (B) oxygen consumption
- (C) MAC of isoflurane
- (D) duration of administration
- (E) blood-gas partition coefficient

105. When used for irrigation during transurethral resection of the prostate, glycine 1.5% is associated with each of the following **EXCEPT**

- (A) hemolysis
- (B) hyperammonemia
- (C) cerebral edema
- (D) hypofibrinogenemia
- (E) visual disturbances

106. Patients with acute alcohol intoxication are at increased risk for each of the following complications of general anesthesia EXCEPT
- (A) aspiration of gastric contents
 - (B) hyperglycemia
 - (C) hypothermia
 - (D) ketoacidosis
 - (E) respiratory depression
107. Each of the following conditions causes resistance to nondepolarizing neuromuscular blockade EXCEPT
- (A) chronic severe infections
 - (B) major burns
 - (C) myotonia congenita
 - (D) prolonged immobilization
 - (E) upper motor neuron injury
108. Each of the following findings is characteristic of chronic reflex sympathetic dystrophy of the extremities EXCEPT
- (A) allodynia
 - (B) bone demineralization
 - (C) edema
 - (D) hyperpathia
 - (E) warm skin
109. Each of the following is a complication of celiac plexus block with 0.5% lidocaine 40 ml EXCEPT
- (A) hematuria
 - (B) ileus
 - (C) postural hypotension
 - (D) retroperitoneal hematoma
 - (E) weakness of hip flexors
110. Each of the following conditions is a complication of mediastinoscopy EXCEPT
- (A) air embolism
 - (B) hemorrhage
 - (C) injury to the left recurrent laryngeal nerve
 - (D) occlusion of the left carotid artery
 - (E) tension pneumothorax
111. Each of the following is an effect of electroconvulsive therapy EXCEPT
- (A) increased intracranial blood volume
 - (B) increased oxygen consumption
 - (C) inhibition of parasympathetic activity
 - (D) retrograde amnesia
 - (E) stimulation of the sympathetic nervous system

112. Each of the following statements concerning pheochromocytoma is true EXCEPT:

- (A) Preoperative administration of alpha-adrenergic inhibitors will usually reverse ECG changes due to catecholamine myocarditis
- (B) Preoperative administration of alpha-adrenergic inhibitors decreases operative mortality
- (C) Beta-adrenergic inhibitors should be administered preoperatively only in conjunction with alpha-adrenergic inhibitors
- (D) Vasopressor therapy may be necessary postoperatively for treatment of hypotension
- (E) Nasal congestion is a sign of inadequate alpha-adrenergic block

113. A 22-year-old woman with preeclampsia has undergone emergency cesarean delivery during general anesthesia. At the completion of the surgery, attempts at reversal of vecuronium are unsuccessful. Each of the following could be a cause of this failure EXCEPT

- (A) hypoalbuminemia
- (B) hypothermia
- (C) perioperative administration of gentamicin
- (D) perioperative administration of magnesium sulfate
- (E) respiratory acidosis

**1995 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

This answer key reflects the state of knowledge in 1995, and is provided for instructional purposes only. The key was verified in 1995 through validation studies. A small number of questions were not graded for a variety of reasons, such as ambiguity or unanticipated presence of more than one potentially correct answer. You should verify the relevance of the questions or the correctness of the answers through your own studies.

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1. B	31. D	61. C	91. B	121. C	151. B
2. E	32. B	62. B	92. C	122. D	152. A
3. E	33. C	63. A	93. D	123. C	153. A
4. C	34. C	64. A	94. E	124. B	154. B
5. E	35. E	65. D	95. A	125. B	155. A
6. E	36. D	66. C	96. E	126. A	156. A
7. D	37. E	67. A	97. B	127. D	157. B
8. D	38. A	68. E	98. E	128. A	158. B
9. E	39. C	69. B	99. E	129. C	159. B
10. A	40. B	70. C	100. B	130. D	160. C
11. A	41. B	71. B	101. E	131. D	161. A
12. D	42. E	72. B	102. C	132. C	162. B
13. D	43. E	73. E	103. D	133. C	163. B
14. C	44. E	74. D	104. A	134. B	164. B
15. E	45. D	75. C	105. D	135. C	165. A
16. E	46. D	76. C	106. A	136. B	166. E
17. A	47. E	77. C	107. B	137. B	167. C
18. A	48. C	78. B	108. D	138. A	168. A
19. E	49. C	79. B	109. A	139. C	169. C
20. E	50. E	80. C	110. B	140. D	170. A
21. B	51. D	81. C	111. D	141. D	171. A
22. E	52. B	82. A	112. D	142. C	172. C
23. A	53. B	83. C	113. A	143. B	173. B
24. A	54. A	84. A	114. B	144. B	174. D
25. E	55. C	85. C	115. A	145. A	175. A
26. D	56. D	86. A	116. B	146. A	
27. D	57. D	87. D	117. C	147. E	
28. A	58. D	88. B	118. A	148. A	
29. C	59. A	89. D	119. B	149. C	
30. B	60. E	90. D	120. D	150. A	

**1995 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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1. A	31. D	61. B	91. D	121. A	151. A
2. B	32. E	62. C	92. E	122. C	152. A
3. A	33. A	63. E	93. A	123. A	153. B
4. B	34. D	64. E	94. A	124. E	154. D
5. E	35. B	65. C	95. B	125. E	155. A
6. E	36. E	66. D	96. C	126. C	156. B
7. E	37. A	67. A	97. D	127. A	157. A
8. D	38. A	68. A	98. D	128. A	158. B
9. C	39. A	69. C	99. D	129. B	159. C
10. D	40. D	70. C	100. A	130. B	160. A
11. B	41. B	71. C	101. C	131. B	161. D
12. A	42. E	72. D	102. A	132. B	162. D
13. C	43. A	73. E	103. B	133. C	163. E
14. E	44. E	74. C	104. B	134. A	164. E
15. C	45. A	75. B	105. A	135. B	165. A
16. B	46. C	76. B	106. B	136. B	166. D
17. C	47. C	77. C	107. C	137. A	167. B
18. E	48. D	78. B	108. E	138. D	168. D
19. C	49. D	79. D	109. B	139. E	169. C
20. D	50. C	80. D	110. D	140. C	170. C
21. A	51. D	81. E	111. C	141. D	171. B
22. B	52. B	82. B	112. E	142. A	172. B
23. C	53. D	83. D	113. A	143. D	173. A
24. B	54. B	84. C	114. C	144. C	174. D
25. D	55. D	85. A	115. B	145. E	175. B
26. B	56. D	86. D	116. B	146. D	
27. D	57. E	87. B	117. E	147. C	
28. D	58. B	88. A	118. A	148. B	
29. B	59. A	89. A	119. B	149. B	
30. B	60. B	90. A	120. D	150. B	

AMERICAN BOARD OF ANESTHESIOLOGY
AMERICAN SOCIETY OF ANESTHESIOLOGISTS

IN-TRAINING EXAMINATION

Book A
1996

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS: Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. Coughing that occurs during awake intubation is prevented by local anesthetic block of which of the following nerves?

- (A) Glossopharyngeal
- (B) Hypoglossal
- (C) Recurrent laryngeal and glossopharyngeal
- (D) Recurrent laryngeal and superior laryngeal
- (E) Superior laryngeal and glossopharyngeal

2. Which of the following is the most common initial manifestation of malignant hyperthermia?

- (A) Hyperkalemia
- (B) Increased distal esophageal temperature
- (C) Increased $P_{ET}CO_2$
- (D) Red discoloration of urine
- (E) Ventricular irritability

3. Which of the following will most closely mimic the effects of stellate ganglion block?

- (A) Axillary perivascular block with 25 mL of 1.5% lidocaine
- (B) Cervical nerve block at C2-5 with 2 mL of 1.5% lidocaine
- (C) Supraclavicular block at the level of the first rib with 25 mL of 1.5% lidocaine
- (D) Block of the median, radial, ulnar, musculocutaneous, and intercostobrachial nerves
- (E) Excision of thoracic sympathetic ganglia T1-4

4. Postdural puncture headache occurs most commonly in which of the following patients?

- (A) Children
- (B) Elderly persons
- (C) Men
- (D) Parturients
- (E) Persons with obesity

5. The highest serum fluoride levels are seen following the administration of which of the following volatile anesthetics?

- (A) Desflurane
- (B) Enflurane
- (C) Halothane
- (D) Isoflurane
- (E) Sevoflurane

6. The initial reduction in core temperature during general anesthesia is caused by

- (A) ablation of thermoregulatory vasoconstriction
- (B) conductive heat loss
- (C) evaporative heat loss in the respiratory tract
- (D) neuromuscular blockade
- (E) redistribution of heat from the core to the periphery

7. In patients with blunt head trauma, cerebral perfusion pressure is determined by the gradient between

- (A) diastolic pressure and central venous pressure
- (B) intracranial pressure and central venous pressure
- (C) mean arterial pressure and central venous pressure
- (D) mean arterial pressure and intracranial pressure
- (E) systolic pressure and intracranial pressure

8. Which of the following muscle relaxants has a prolonged duration of action in a patient who is homozygous for atypical plasma cholinesterase?

- (A) Atracurium
- (B) Doxacurium
- (C) Mivacurium
- (D) Pipecuronium
- (E) Vecuronium

9. Cholinergic receptor blockade

- (A) decreases intraocular pressure
- (B) decreases lower esophageal sphincter tone
- (C) increases gastrointestinal motility
- (D) induces diaphoresis
- (E) produces copious secretions

10. A 37-year-old woman with pregnancy-induced hypertension develops oliguria two hours after cesarean delivery during epidural anesthesia. Despite infusion of 2000 mL of crystalloid solution, urine output remains 10 mL/hr. Which of the following laboratory findings is most suggestive of acute tubular necrosis?

- (A) Blood urea nitrogen level of 30 mg/dL
- (B) Serum creatinine level of 1.2 mg/dL
- (C) Urinary/plasma osmolality of 1:1
- (D) Urinary sodium level of 10 mEq/L
- (E) Urinary specific gravity of 1.024

11. Desflurane at a stable alveolar concentration of 7%

- (A) causes bradycardia
- (B) decreases cerebrovascular resistance
- (C) degrades in soda lime
- (D) increases systemic vascular resistance
- (E) stimulates the respiratory centers

12. Five minutes after initiating one-lung ventilation using a double-lumen endobronchial tube, a 70-year-old patient has a decrease in SpO₂ from 99% to 90%. Tidal volume and respiratory rate are unchanged. Fiberoptic bronchoscopy verifies appropriate positioning of the tube. Which of the following is the most likely cause of the desaturation?

- (A) Blood flow to the nondependent lung
- (B) Failure of hypoxic pulmonary vasoconstriction in the dependent lung
- (C) Inadequate filling of the bronchial cuff
- (D) Inadequate minute ventilation
- (E) Surgical manipulation of the nondependent lung

13. Which of the following statements regarding innervation of the upper extremity is true?

- (A) Blockade of the radial nerve decreases the patient's ability to spread the fingers apart
- (B) The brachial plexus receives preganglionic sympathetic fibers arising from C5 through T2
- (C) Interscalene injection of the brachial plexus at C6 is likely to spare the axillary nerve
- (D) The musculocutaneous nerves receive contributions from C5 and C6
- (E) The vertebral artery lies posterior to the nerve roots of the brachial plexus

14. A patient undergoes thoracotomy in the lateral decubitus position. Which of the following maneuvers is most likely to increase PaO₂ during one-lung ventilation?

- (A) Applying continuous positive airway pressure to the nondependent lung
- (B) Applying positive end-expiratory pressure to the dependent lung
- (C) Increasing inspiratory flow rate
- (D) Increasing the tidal volume
- (E) Increasing the ventilatory rate

15. Which of the following is the most likely adverse effect of prolonged intravenous administration of nitroglycerin?

- (A) Cyanmethemoglobinemia
- (B) Hemolysis
- (C) Methemoglobinemia
- (D) Neutropenia
- (E) Thrombocytopenia

16. A patient has severe pain after total knee arthroplasty. Systemic opioids are most likely to modify the pain through action at which of the following sites?

- (A) Corpus callosum
- (B) Hippocampus
- (C) Substantia gelatinosa
- (D) Substantia nigra
- (E) Ventral horn of the spinal cord

17. Which of the following is characteristic of the pharmacokinetics of alfentanil?

- (A) Clearance is greater than that of fentanyl
- (B) Elimination half-life is normal in patients with hepatic insufficiency
- (C) Protein binding is minimal
- (D) The majority of alfentanil in plasma is ionized
- (E) Volume of distribution is smaller than that of fentanyl

18. A 55-year-old man undergoes abdominal perineal resection in the lithotomy position during combined epidural (bupivacaine 0.5%) and isoflurane anesthesia. The epidural catheter is left in place with an infusion of fentanyl 50 µg/hr. Twelve hours after surgery, the patient has left footdrop. Which of the following is the most likely explanation?

- (A) Epidural hematoma
- (B) Epidural opioid
- (C) Inadequate padding of the knee during surgery
- (D) Nerve injury from the epidural catheter
- (E) Residual effects of the local anesthetic

19. A 66-year-old woman with essential hypertension has a preoperative blood pressure of 160/95 mmHg despite receiving the usual dose of labetalol on the morning of surgery. Following endotracheal intubation, blood pressure increases to 220/120 mmHg. Which of the following is the most likely explanation?

- (A) Decreased arteriolar compliance
- (B) Increased circulating blood volume
- (C) Increased receptor sensitivity to norepinephrine
- (D) Unopposed beta-adrenergic receptor stimulation
- (E) Upregulation of alpha-adrenergic receptors

20. A 60-year-old man undergoing resection of an abdominal aortic aneurysm has an increase in measured mixed venous oxygen saturation from 70% to 90%. Which of the following is the most likely cause?

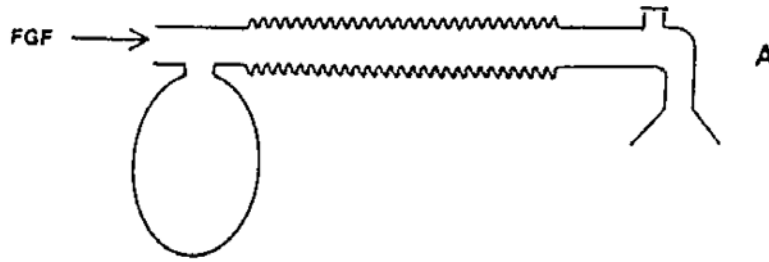
- (A) Decreased cardiac output
- (B) Decreased hematocrit
- (C) Intrapulmonary shunting
- (D) Right to left shunting at the atrial level
- (E) Wedging of the pulmonary artery catheter

21. A 55-year-old woman who is scheduled to undergo carotid endarterectomy has a history of essential hypertension and chronic obstructive pulmonary disease. Over a 30-minute period beginning one hour after induction of general anesthesia, SpO₂ decreases from 99% to 95%. During that time, she has received fentanyl 100 µg., isoflurane 1%, nitrous oxide 49.5%, oxygen 49.5%, and a nitroglycerin infusion to maintain blood pressure at approximately 160/95 mmHg. Which of the following is the most likely cause for the decline in oxygen saturation?

- (A) Decreased cardiac output
- (B) Increased dead space ventilation
- (C) Inhibition of hypoxic pulmonary vasoconstriction
- (D) Mainstem intubation
- (E) Second gas effect

22. A 35-kg child requires mechanical ventilation with 100% oxygen at a tidal volume of 350 mL and a rate of 20/min during a severe asthma attack. The most likely cause of severe hypotension after initiating mechanical ventilation is

- (A) hypoxic circulatory depression
- (B) inadequate expiratory time
- (C) increased pulmonary vascular resistance
- (D) respiratory alkalosis
- (E) tension pneumothorax



23. The Mapleson A system (Magill circuit) illustrated above
- (A) is functionally equivalent to the Bain circuit
 - (B) prevents rebreathing more effectively during controlled ventilation than during spontaneous ventilation
 - (C) provides better humidification than the Mapleson D system
 - (D) requires a fresh gas flow equal to minute ventilation to prevent rebreathing during spontaneous ventilation
 - (E) results in less rebreathing during controlled ventilation than the Mapleson C system
-
24. In a patient with ventricular fibrillation refractory to repeated attempts at defibrillation and lidocaine administration the most appropriate management is administration of
- (A) bretylium
 - (B) procainamide
 - (C) propranolol
 - (D) quinidine
 - (E) verapamil
25. The flow proportioning system on an anesthesia machine
- (A) is regulated primarily by changes in oxygen input pressure
 - (B) limits nitrous oxide flow when oxygen pressure falls below a preset value
 - (C) maintains a minimum ratio of oxygen to nitrous oxide in fresh gas flow
 - (D) precludes the use of a closed system
 - (E) regulates flows of oxygen and nitrous oxide to maintain a fixed FiO_2
26. Which of the following is the best method of pacing to improve cardiac output in a patient with third-degree heart block?
- (A) VOO
 - (B) AOO
 - (C) VVI
 - (D) DVI
 - (E) Transcutaneous
27. Which of the following is a potentially beneficial effect of ketamine used for induction of anesthesia?
- (A) Analgesia
 - (B) Attenuation of respiratory response to carbon dioxide
 - (C) Decreased cerebral metabolic rate
 - (D) Increased stroke volume in patients with hemorrhagic shock
 - (E) Preservation of laryngeal reflexes

28. A 70-kg 78-year-old man undergoing small-bowel resection during anesthesia with isoflurane in oxygen becomes hypotensive and develops frothy pink sputum in the endotracheal tube. Heart rate is 110 bpm, blood pressure is 75/60 mmHg, pulmonary artery occlusion pressure is 22 mmHg, and cardiac output is 1.7 L/min. The most appropriate initial step in management is administration of which of the following?

- (A) Albumin
- (B) Digoxin
- (C) Dopamine
- (D) Esmolol
- (E) Nitroglycerin

29. One hour after induction of anesthesia for a posterior fossa craniotomy using opioid, relaxant, and nitrous oxide, the brain begins to protrude through the dura. The most effective measure to decrease intracranial pressure is to

- (A) administer additional opioid
- (B) decrease PaCO₂ from 25 to 15 mmHg
- (C) drain cerebrospinal fluid
- (D) discontinue nitrous oxide
- (E) induce hypotension

30. When compared with a healthy 30-year-old man, which of the following respiratory parameters is decreased in an otherwise healthy 80-year-old man?

- (A) Alveolar to arterial oxygen gradient
- (B) Lung compliance
- (C) Ratio of functional residual capacity to total lung capacity
- (D) Resting tidal volume
- (E) Ventilatory response to carbon dioxide

31. A 64-year-old man with diabetes mellitus well controlled with NPH insulin undergoes lower extremity revascularization. Following administration of protamine 10 mg, the patient has facial flushing and blood pressure of 60/30 mmHg. The most appropriate initial step in management is administration of which of the following drugs?

- (A) Diphenhydramine
- (B) Epinephrine
- (C) Hydrocortisone
- (D) Norepinephrine
- (E) Phenylephrine

32. A 26-year-old man who sustained multiple trauma undergoes open reduction and internal fixation of bilateral tibial-fibular fractures during anesthesia with isoflurane, nitrous oxide, and oxygen with positive pressure ventilation. During the procedure, the patient has sudden onset of hypotension, jugular venous distention, deviation of the trachea to the right, and decreased ventilatory compliance. Isoflurane is discontinued and 100% oxygen is administered. Which of the following is the most appropriate next step in management?

- (A) Chest x-ray
- (B) Blood transfusion
- (C) Subxiphoid pericardiocentesis
- (D) Fiberoptic bronchoscopy
- (E) Left chest needle thoracostomy

33. The decreased duration of action of an intravenous dose of fentanyl compared with an intravenous dose of morphine is best explained by

- (A) greater lipid solubility
- (B) increased hepatic metabolism
- (C) less protein binding
- (D) shorter elimination half-life
- (E) smaller volume of distribution

34. A patient receives methohexital 30 mg just before retrobulbar block with 0.25% bupivacaine 4 mL. Over the next 10 minutes, he develops apnea and loses consciousness. Which of the following is the most likely explanation?

- (A) Effects of methohexital
- (B) Injection of local anesthetic into cerebrospinal fluid
- (C) Intravascular injection of local anesthetic
- (D) Oculocardiac reflex
- (E) Systemic absorption of local anesthetic

35. Which of the following statements about the standard error of the mean (SE) is true?

- (A) Sample mean $\pm$ SE has approximately a 95% chance of containing the population mean
- (B) The SE describes the precision of the population mean
- (C) The SE describes the range of the sample values
- (D) The SE is greater than the standard deviation
- (E) The SE is obtained by multiplying the sample standard deviation by the square root of the sample size

36. A 62 year-old woman with polycythemia vera is scheduled to undergo total knee arthroplasty using a tourniquet. Pre-operative hematocrit is 60%. Which of the following is the most appropriate action?

- (A) Perform total knee arthroplasty without use of a tourniquet
- (B) Preoperative reduction of the hematocrit to 45% to 50%
- (C) Prophylactic administration of aprotinin during surgery
- (D) Prophylactic administration of epsilon-aminocaproic acid during surgery
- (E) Prophylactic administration of low-dose heparin during surgery

37. Left ventricular end-diastolic volume is most likely to be underestimated by pulmonary artery occlusion pressure in patients with

- (A) acute myocardial ischemia
- (B) aortic insufficiency
- (C) mitral stenosis
- (D) primary pulmonary hypertension
- (E) tricuspid stenosis

38. Immediately following radical prostatectomy, ketorolac administered for analgesia

- (A) aggravates ileus and bladder spasm
- (B) increases platelet adhesion
- (C) is ideally suited for patient-controlled analgesia
- (D) mediates its effects via kappa opioid receptors
- (E) produces cyclooxygenase inhibition

39. During general anesthesia administered through a circle system, the soda lime absorbant is exhausted. No fresh soda lime is available for use. Which of the following is the most appropriate next step to prevent hypercapnia in this patient?

- (A) Decreasing the dead space of the circle system
- (B) Discontinuing nitrous oxide
- (C) Increasing the fresh gas flow**
- (D) Increasing tidal volume
- (E) Switching to spontaneous ventilation

40. A patient undergoes axillary block for placement of an arteriovenous shunt in the forearm. Blockade of the musculocutaneous nerve is not achieved. Injection of a local anesthetic at which of the following sites will provide the required sensory block?

- (A) Between the tendon of the palmaris longus and flexor carpi radialis
- (B) Body of coracobrachialis muscle**
- (C) Medial to the brachial artery at the elbow
- (D) Proximal to the medial epicondyle against the medial surface of the humerus
- (E) Superficial to the pulse of the axillary artery

41. A 2.8-kg newborn undergoes repair of a moderate-sized omphalocele. Intravenous fluid is administered at 14 mL/hr. Forty-five minutes after beginning surgery and before reduction of the omphalocele, arterial blood pressure decreases from 80/40 to 55/30 mmHg. SaO_2 is 98% at an FiO_2 of 0.5. Breath sounds are equal bilaterally. Which of the following is the most likely explanation for the decrease in blood pressure?

- (A) Associated congenital cardiac defect
- (B) Compression of the lungs by the abdominal contents
- (C) Inadequate fluid administration**
- (D) Pneumothorax
- (E) Sepsis

42. A 40-year-old man who is scheduled to undergo repair of a tendon laceration of the left hand has complete anesthesia in the median, radial, and ulnar nerve distributions after supraclavicular block. Two hours of tourniquet inflation are required for completion of the procedure. The most appropriate next step is an additional block of which of the following?

- (A) Axillary nerve
- (B) Intercostobrachial nerve**
- (C) Lateral antebrachial cutaneous nerve
- (D) Musculocutaneous nerve
- (E) Stellate ganglion

43. A patient has hoarseness after undergoing surgery involving the aortic arch. The most likely cause is an injury to which of the following nerves?

- (A) Glossopharyngeal
- (B) Left recurrent laryngeal**
- (C) Right recurrent laryngeal
- (D) Left superior laryngeal
- (E) Right superior laryngeal

44. Awakening after a single dose of thiopental is caused by redistribution from the brain primarily to which of the following sites?
- (A) Fat
 - (B) Heart
 - (C) Liver
 - (D) Lung
 - (E) Skeletal muscle**
45. A patient undergoes differential spinal block for evaluation of persistent foot pain. If the pain returns coincident with a decrease in skin temperature, which of the following is the most appropriate conclusion?
- (A) A somatic origin is ruled out
 - (B) The patient has causalgia
 - (C) The patient has peripheral vascular disease
 - (D) The pain is caused by central neuropathy
 - (E) Lumbar sympathetic blocks are indicated**
46. During general anesthesia with spontaneous ventilation, a patient has a V_D/V_T of 0.5. Which of the following is most likely to decrease the ratio?
- (A) Acute bronchospasm
 - (B) Continuous positive airway pressure
 - (C) Decreased tidal volume
 - (D) Increased cardiac output**
 - (E) Pulmonary embolism
47. An unconscious adult patient is being ventilated through an esophageal obturator airway (EOA) in the emergency department. In the absence of cervical spine injury, which of the following is appropriate?
- (A) Use of the EOA for airway management until the patient regains consciousness
 - (B) Removal of the EOA before insertion of an endotracheal tube
 - (C) Placement of an endotracheal tube before removal of the EOA**
 - (D) Removal of the EOA under fiberoptic endoscopic visualization
 - (E) Cricothyroidotomy
48. Which of the following detects the smallest volume of venous air embolization?
- (A) Changing the precordial Doppler ultrasound signal**
 - (B) Decreasing $PETCO_2$
 - (C) Decreasing SpO_2
 - (D) Increasing central venous pressure
 - (E) Increasing pulmonary artery pressure
49. Which of the following is the most important factor affecting the incidence of postoperative pulmonary complications?
- (A) Age of the patient
 - (B) Anesthetic technique
 - (C) Duration of surgery
 - (D) Obesity
 - (E) Site of the operation**

50. Which of the following remains normal in an otherwise healthy patient with obesity?

- (A) Alveolar PO₂
- (B) Expiratory reserve volume
- (C) Functional residual capacity
- (D) Lung compliance**
- (E) Static lung volumes

51. An obese 70-year-old woman with a long history of tobacco abuse is awake and semirecumbent after uneventful anesthesia with isoflurane for a ventral hernia repair. During the first hour in the recovery room while breathing 50% oxygen by face mask, her SaO₂ decreases to 90% while other vital signs remain satisfactory. Which of the following is most likely to be effective in the management of this situation?

- (A) Intravenous doxapram
- (B) Racemic epinephrine by inhalation
- (C) Continuous positive airway pressure by mask
- (D) Reintubation of the trachea
- (E) Coughing**

52. Three hours after undergoing coronary artery bypass grafting, an elderly man develops severe hypotension after intravenous administration of morphine 4 mg. Pulmonary artery occlusion pressure is 27 mmHg and central venous pressure is 30 mmHg. Transesophageal echocardiography shows decreased end-diastolic ventricular volumes. Which of the following is the most likely diagnosis?

- (A) Anaphylactoid reaction
- (B) Cardiac tamponade**
- (C) Coronary graft occlusion
- (D) Excessive fluid administration
- (E) Pulmonary thromboembolus

53. A 62-year-old man, who had a myocardial infarction three years ago, complicated by congestive heart failure and renal failure, is undergoing a colectomy. A pulmonary artery catheter demonstrates a cardiac output higher than measurements recorded during a cardiac catheterization two months after the infarction. Which of the following most likely contributes to the increased cardiac output?

- (A) Creation of an arteriovenous fistula**
- (B) Increased hemoglobin concentration from 10 to 12 g/dL
- (C) Stimulation of carotid body receptors
- (D) Transcutaneous nitroglycerin
- (E) Use of a beta-adrenergic blocker to prevent myocardial reinfarction

54. Which of the following is characteristic of the airway in a 2-month-old infant when compared with an adult airway?

- (A) Airway is narrowest at the cricoid cartilage**
- (B) Epiglottis is broader
- (C) Laryngeal mucosa is more tightly adherent
- (D) Larynx is positioned lower in the neck
- (E) Vocal cords have a more cephalad anterior attachment

55. A 50-year-old woman has episodes of electric-shock-like pain of one minute in duration affecting the right side of the face. In between episodes of this pain, she is relatively pain free. Which of the following is the most appropriate management?

- (A) Beta-adrenergic blockers
- ☒ (B) Carbamazepine
- (C) Infrared heat therapy
- (D) Nonsteroidal anti-inflammatory drugs
- (E) Stellate ganglion block

56. An anesthesia machine is set to deliver oxygen 2 L/min, nitrous oxide 2 L/min, and enflurane. After 30 minutes of stable anesthesia, which of the following is the most likely cause of a decrease in the oxygen analyzer reading from 50% to 30%?

- (A) A leak in the ventilator bellows
- ☒ (B) Accumulation of water on the oxygen sensor membrane
- (C) Calibration at 100% oxygen using less than 100% oxygen
- (D) Disconnection of the wall oxygen hose
- (E) Presence of the oxygen analyzer in the expiratory limb

57. A normotensive 66-year-old man undergoes total hip arthroplasty. Mean arterial pressure is maintained at 60 mmHg with isoflurane and labetalol; intraoperative F_{iO_2} is 1.0. Eight units of red blood cells are administered intraoperatively because of an injury to the femoral artery. Five days later, the patient develops jaundice. Which of the following is the most likely cause of the jaundice?

- ☒ (A) Delayed hemolysis from transfusion
- (B) Heart failure with hepatic congestion
- (C) Hepatocellular injury from labetalol
- (D) Intraoperative hypotension
- (E) Isoflurane-associated hepatitis

58. A 65-kg 70-year-old man in the PACU is breathing spontaneously at 20/min through an endotracheal tube connected to a T-piece with a fresh gas flow of 5 L/min. He has a tidal volume of 350 mL and an F_{iO_2} of 0.5. SpO_2 decreases from 98% to 84% over one hour, then improves to 92% with an F_{iO_2} of 1.0. Which of the following is the most likely cause of the hypoxemia?

- ☒ (A) Decreased functional residual capacity
- (B) Increased dead space ventilation
- (C) Inhibition of hypoxic pulmonary vasoconstriction
- (D) Room air admixture during inspiration
- (E) Shivering

59. During surgery of the forearm under axillary block, a patient has pain in the lateral aspect of the forearm and responds by flexing the elbow. The most likely cause is inadequate block of which of the following nerves?

- (A) Axillary
- (B) Intercostobrachial
- ☒ (C) Musculocutaneous
- (D) Radial
- (E) Ulnar

60. Nine months after sustaining an injury to the left forearm, a 30-year-old woman has diffuse, burning pain on the anterior aspect of the forearm and posterior aspect of the hand and discoloration of the skin in the affected areas. The patient should be informed that

- ☒ (A) if left untreated, muscle atrophy may develop in the involved limb
- ☐ (B) if left untreated, the pain will remain well localized
- ☐ (C) physical therapy is not indicated
- ☐ (D) the symptoms are directly related to the severity of the initial injury
- ☐ (E) the symptoms are most likely secondary to underlying peripheral vascular disease

61. A 50-year-old woman develops stridor 10 hours after undergoing thyroidectomy. The most appropriate management is administration of which of the following drugs?

- ☐ (A) Albuterol
- ☒ (B) Calcium chloride
- ☐ (C) Ipratropium bromide
- ☐ (D) Racemic epinephrine
- ☐ (E) Triiodothyronine

62. A patient receiving propranolol and nifedipine is scheduled for elective coronary artery bypass surgery. During induction with fentanyl and oxygen, heart rate decreases from 52 to 36 bpm and blood pressure decreases from 130/85 to 80/50 mmHg. Administration of atropine 2 mg intravenously has no effect. The most appropriate treatment at this time is administration of

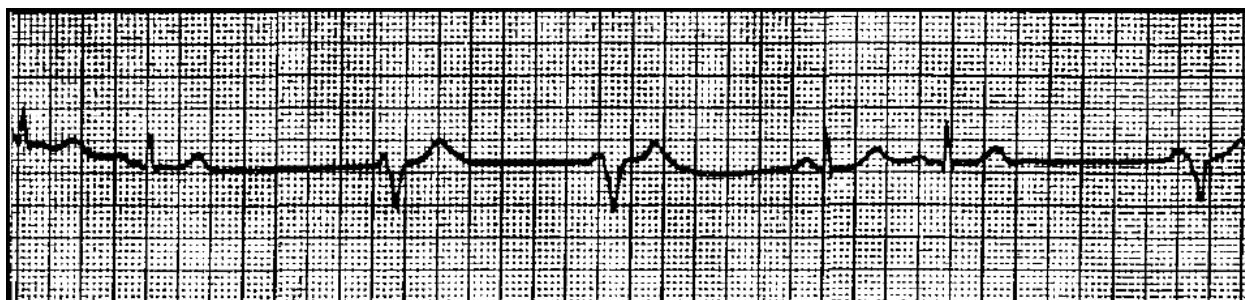
- ☒ (A) epinephrine
- ☐ (B) pancuronium
- ☐ (C) naloxone
- ☐ (D) phenylephrine
- ☐ (E) calcium chloride

63. Neurolytic block is most appropriate for

- ☒ (A) abdominal pain secondary to hepatic carcinoma
- ☐ (B) abdominal pain secondary to chronic pancreatitis
- ☐ (C) persistent chest wall pain secondary to intercostal neuralgia following a thoracotomy for trauma
- ☐ (D) reflex sympathetic dystrophy of the upper extremity with an excellent but transient response to a series of stellate ganglion blocks with local anesthetic
- ☐ (E) a diabetic patient scheduled for surgical sympathectomy to relieve unilateral lower extremity pain secondary to severe peripheral vascular disease

64. A 75-year-old man with aortic stenosis and coronary artery disease has a preinduction heart rate of 68 bpm and blood pressure of 125/70 mmHg. After induction of anesthesia with fentanyl, midazolam, and pancuronium, heart rate is 90 bpm and blood pressure is 85/45 mmHg. ECG shows a new ST-segment elevation in lead II. Which of the following is the most appropriate initial management?

- ☐ (A) Ephedrine
- ☐ (B) Epinephrine
- ☐ (C) Esmolol
- ☐ (D) Nitroglycerin
- ☒ (E) Phenylephrine



65. The ECG rhythm shown above developed during cholecystectomy in a 62-year-old man who had a myocardial infarction and is taking atenolol. The drug of choice for treating this dysrhythmia is

- ☒ (A) atropine
- ☐ (B) bretylium
- ☐ (C) isoproterenol
- ☐ (D) lidocaine
- ☐ (E) procainamide

66. An otherwise healthy 70-year-old man receives 12 units of packed red blood cells for persistent diffuse bleeding during suprapubic prostatectomy. Hemoglobin concentration is 11 g/dL, platelet count is 55,000/mm³, plasma fibrinogen concentration is 180 mg/dL, protime is 14 sec, and partial thromboplastin time is 35 sec. The most appropriate therapy is administration of

- ☐ (A) cryoprecipitate
- ☐ (B) desmopressin (DDAVP)
- ☐ (C) epsilon-aminocaproic acid
- ☐ (D) fresh frozen plasma
- ☒ (E) platelets

67. What is the expected mixed venous oxygen tension, in mmHg, in a normal adult after breathing 100% oxygen for 10 minutes?

- ☐ (A) 573
- ☐ (B) 563
- ☐ (C) 150
- ☐ (D) 95
- ☒ (E) 45

68. During transurethral resection of the prostate under spinal anesthesia with a sensory level to T10, a patient has sudden onset of sharp upper abdominal pain and nausea. Arterial blood pressure increases from 120/80 to 150/90 mmHg; the patient becomes diaphoretic. Which of the following is the most likely diagnosis?

- ☒ (A) Bladder perforation
- ☐ (B) Hemolysis
- ☐ (C) Hypervolemia
- ☐ (D) Hyponatremia
- ☐ (E) Myocardial ischemia

69. A 30-year-old woman has an abrupt change from sinus to nodal rhythm with unchanged heart rate on ECG during induction of halothane anesthesia. Which of the following is the most likely result of this change?
- (A) Decreased jugular venous pulsation
 - (B) Decreased mean arterial pressure**
 - (C) Decreased systemic vascular resistance
 - (D) Increased cardiac output
 - (E) Increased pulse pressure
70. Which of the following drugs has the shortest elimination half-life?
- (A) Diazepam
 - (B) Flumazenil**
 - (C) Flumazepam
 - (D) Lorazepam
 - (E) Midazolam
71. Which of the following findings is characteristic of whole blood preserved in CPD and stored at 4°C for one week?
- (A) Increased potassium concentration**
 - (B) Normal concentrations of factors V and VIII
 - (C) PaCO₂ of 40 mmHg
 - (D) pH of 7.3
 - (E) 50% Viable platelets
72. Alveolar and inspired anesthetic concentrations equilibrate more rapidly with nitrous oxide than with desflurane because nitrous oxide
- (A) has a higher vapor pressure
 - (B) has a lower blood gas solubility
 - (C) has a lower MAC
 - (D) is delivered at a higher inspired concentration**
 - (E) produces a second gas effect
73. Which of the following complications of caudal anesthesia with 0.25% bupivacaine is more likely in children than in adults?
- (A) Intravascular injection
 - (B) Neurotoxicity
 - (C) Profound motor block
 - (D) Systemic toxicity
 - (E) Total spinal block**
74. The primary purpose of denitrogenation prior to anesthetic induction is to
- (A) blunt hypoxic pulmonary vasoconstriction
 - (B) improve ventilation and perfusion matching
 - (C) increase contribution of second gas effect to rate of induction
 - (D) increase oxygen reserve in the functional residual capacity**
 - (E) maximize arterial oxygen content

75. Which of the following is the most sensitive indicator of impending renal failure following trauma?
- (A) Central venous pressure
 - (B) Creatinine clearance**
 - (C) Fractional excretion of sodium
 - (D) Hourly urine output
 - (E) Urine osmolality
76. A 32-year-old woman sustains an injury to the left recurrent laryngeal nerve during thyroidectomy. Which of the following is the most likely postoperative finding?
- (A) Adduction of the left vocal cord at rest**
 - (B) Aphonia
 - (C) Aspiration caused by glottic incompetency
 - (D) Impaired coughing
 - (E) Paralysis of the left cricothyroid muscle
77. Compared with similar use in adults, routine use of succinylcholine in children is hazardous because of the increased risk for which of the following?
- (A) Anaphylactoid reaction
 - (B) Phase II blockade
 - (C) Pseudocholinesterase deficiency
 - (D) Pulmonary aspiration
 - (E) Undiagnosed myopathy**
78. The supine hypotensive syndrome of pregnancy
- (A) begins at 32 weeks' gestation
 - (B) causes fetal distress by aortocaval compression**
 - (C) is corrected by Trendelenburg's position
 - (D) is less likely following subarachnoid block than epidural block
 - (E) occurs in 90% of supine women at 38 to 40 weeks' gestation
79. In a patient undergoing liver transplantation, sodium bicarbonate and calcium chloride are administered immediately before reperfusion of the transplanted liver to counteract
- (A) coagulopathy
 - (B) decreased cardiac output
 - (C) hyperkalemia**
 - (D) hypermagnesemia
 - (E) hypotension
80. Which of the following findings on the left is most likely to be associated with an increased risk of complications with cannulation of the left internal jugular vein compared with cannulation of the right internal jugular vein?
- (A) Longer recurrent laryngeal nerve
 - (B) Lower location of the cupola of the pleura
 - (C) More acute angle between the internal jugular and innominate veins
 - (D) More anterior location of the phrenic nerve
 - (E) Presence of the thoracic duct**

81. Desflurane is delivered using a vaporizer that contains internal heaters because
- (A) heat decreases the drug's viscosity
 - (B) heat reduces thermal loss in the patient
 - (C) heat increases the drug's oil: gas partition coefficient
 - (D) heat prevents fluctuations of vapor pressure**
 - (E) it does not vaporize adequately at room temperature
82. Which of the following is the most likely effect of administration of magnesium sulfate in a patient with preeclampsia?
- (A) Decreased motor end-plate sensitivity to acetylcholine**
 - (B) Decreased uteroplacental blood flow
 - (C) Increased platelet aggregation
 - (D) Increased systemic vascular resistance
 - (E) Inhibited acetylcholinesterase
83. A 65-year-old woman has respiratory distress and loss of consciousness immediately following superficial and deep cervical plexus block for right carotid endarterectomy. Which of the following is the most likely cause?
- (A) Phrenic nerve paralysis
 - (B) Pneumothorax
 - (C) Recurrent laryngeal nerve block
 - (D) Subarachnoid injection**
 - (E) Vertebral artery injection
84. During laser microsurgery of the larynx using an endotracheal tube, a fire occurs in the airway. Which of the following is the most appropriate initial management?
- (A) Increase FiO_2 to 1.0
 - (B) Instill saline into the endotracheal tube
 - (C) Perform cricothyroidotomy
 - (D) Remove the endotracheal tube**
 - (E) Ventilate with air
85. A 32-year-old man with acute aortic regurgitation is scheduled to undergo emergency aortic valve replacement. Heart rate is 110 bpm, blood pressure is 90/35 mmHg, and pulmonary artery occlusion pressure is 14 mmHg. Cardiac index is 2.2 L/min/m^2 . Which of the following is the most appropriate management?
- (A) Administration of esmolol
 - (B) Administration of a fluid bolus before induction
 - (C) Infusion of dobutamine
 - (D) Infusion of phenylephrine
 - (E) Induction of anesthesia**
86. Which of the following drugs administered to a parturient eliminates fetal heart rate variability?
- (A) Atropine**
 - (B) Ephedrine
 - (C) Hydralazine
 - (D) Magnesium sulfate
 - (E) Terbutaline

87. During induced hypotension for clipping of a cerebral aneurysm in a 20-degree head-up position, the arterial pressure transducer should be zero referenced at which level?

- ☒ (A) External auditory meatus
- (B) Midaxillary line at the fifth intercostal space
- (C) Sternal notch
- (D) Thyroid cartilage
- (E) Top of the cranium

88. Uterine blood flow is

- (A) autoregulated in normal unanesthetized parturients
- (B) decreased by the addition of epinephrine 1:200,000 to lidocaine administered epidurally
- (C) decreased by intravenous infusion of ritodrine in unanesthetized parturients
- ☒ (D) increased by administration of magnesium sulfate to patients with preeclampsia
- (E) unchanged after paracervical injection of lidocaine without epinephrine

89. Pulse oximetry accurately reflects SaO_2 in which of the following situations?

- (A) Administration of indocyanine green
- (B) Administration of methylene blue
- (C) Carboxyhemoglobinemia
- ☒ (D) 40% Fetal hemoglobin concentration
- (E) Methemoglobinemia

90. Which of the following findings would be considered normal in the EEG of an adult?

- (A) Decreased frequency during induction with halogenated anesthetics
- (B) Decreased frequency in frontal areas with administration of nitrous oxide 50%
- (C) Dominance of beta rhythm at 20 to 30 Hz during the awake relaxed state
- ☒ (D) Electrical silence with administration of isoflurane 2.5 MAC
- (E) The presence of burst suppression during natural sleep

91. A 22-year-old woman at 33 weeks' gestation has abdominal pain and vaginal bleeding after sustaining blunt trauma to the abdomen. Heart rate is 125 bpm, blood pressure is 98/65 mmHg, and respiratory rate is 20/min. Fetal heart rate is 100 bpm. Which of the following is the most appropriate management?

- (A) Conservative observation and monitoring if fetal immaturity is seen on ultrasound
- (B) Increasing maternal blood pressure with a vasopressor
- (C) Infusion of terbutaline
- (D) Lumbar epidural anesthesia
- ☒ (E) Urgent cesarean delivery

92. A patient with a fasting blood glucose concentration of 100 mg/dL undergoes a four-hour operation under general anesthesia without intraoperative administration of glucose. On emergence the most likely finding will be

- (A) marked hypoglycemia
- (B) mild hypoglycemia
- (C) normoglycemia
- ☒ (D) mild hyperglycemia
- (E) marked hyperglycemia

93. Which of the following drugs increases gastric pH while decreasing gastric volume?

- (A) Glycopyrrolate
- (B) Magnesium trisilicate
- (C) Metoclopramide
- (D) Ranitidine**
- (E) Sodium citrate

94. A 72-year-old man has ST-segment depression of 2 mm in ECG lead II immediately after suprarenal aortic clamping. Which of the following is the most likely cause?

- (A) Decreased left ventricular stroke volume
- (B) Decreased venous return
- (C) Increased left ventricular wall tension**
- (D) Reflex tachycardia
- (E) Release of epinephrine from hypoperfused adrenal medulla

95. Which of the following statements concerning neuroleptic malignant syndrome is true?

- (A) It does not respond to dantrolene therapy
- (B) It is inherited as an autosomal trait
- (C) It is not triggered by succinylcholine**
- (D) It occurs after long-term use of L-dopa
- (E) The halothane-caffeine contracture test is negative in susceptible patients

96. Which of the following anesthetic techniques is most appropriate for a woman in the second stage of labor?

- (A) Epidural opioids
- (B) Local infiltration of the perineum
- (C) Lumbar sympathetic block
- (D) Paracervical nerve block
- (E) Pudendal nerve block**

97. Intravenous administration of mannitol during a craniotomy

- (A) decreases intracranial pressure relative to dosage
- (B) hastens excretion of pancuronium
- (C) induces metabolic alkalosis
- (D) produces a sustained increase in intravascular volume
- (E) requires an intact blood-brain barrier to decrease brain water**

98. A 38-year-old woman with B-positive blood requires immediate blood transfusion during abdominal hysterectomy. No B-positive blood is available; O-negative blood is used. Three minutes after starting transfusion of packed red blood cells, the patient develops tachycardia, bronchospasm, and hypotension. Which of the following is the most likely cause?

- (A) Anaphylactic reaction to donor IgA**
- (B) Bacterial contamination of transfused blood
- (C) Hemolysis resulting from ABO incompatibility
- (D) Hypocalcemia
- (E) IgG-mediated reaction to Rh antigens

99. The use of glycine as irrigating solution during transurethral resection of the prostate could be associated with each of the following EXCEPT

- (A) ammonia toxicity
- (B) coma
- (C) hemolysis
- (D) hyponatremia
- (E) transient blindness

100. A 26-year-old man is in the ICU one hour after sustaining a displaced cervical fracture at the level of C7-8 in a diving accident. Each of the following findings is consistent with this patient's injury EXCEPT

- (A) bilateral paralysis of the vocal cord adductors
- (B) gastric dilatation
- (C) hypotension without tachycardia
- (D) inward movement of the chest with inspiration
- (E) normal tidal volume

101. The induction dose of thiopental should be decreased in each of the following situations EXCEPT

- (A) age greater than 70 years
- (B) cardiogenic shock
- (C) decreased hepatic blood flow
- (D) hypoalbuminemia
- (E) hypothyroidism

102. Each of the following conditions is associated with upregulation of the acetylcholine receptor at the neuromuscular junction EXCEPT

- (A) burn injuries
- (B) myasthenia gravis
- (C) prolonged bed rest
- (D) prolonged use of neuromuscular relaxants
- (E) upper motor neuron injury

103. Four days after subarachnoid hemorrhage and surgical clipping of a cerebral aneurysm, a patient develops cerebral artery vasospasm. Appropriate treatment includes each of the following EXCEPT

- (A) administration of nimodipine
- (B) controlled hypertension
- (C) hemodilution to hematocrit of 33%
- (D) hyperventilation to PaCO₂ of 25 to 30 mmHg
- (E) increasing preload

104. Each of the following conditions can be accurately evaluated with transesophageal echocardiography EXCEPT

- (A) intimal tear at the aortic arch
- (B) intracardiac air
- (C) left atrial thrombus
- (D) patent foramen ovale
- (E) right atrial myxoma

105. A patient being mechanically ventilated in the ICU requires wound debridement twice daily. Each of the following agents would be appropriate for induction of brief general anesthesia EXCEPT

- (A) nitrous oxide
- (B) etomidate**
- (C) ketamine
- (D) methohexital
- (E) midazolam

106. A 62-year-old patient who is undergoing femoral-popliteal arterial bypass grafting during general anesthesia develops supraventricular tachycardia. Heart rate is 165 bpm and blood pressure is 90/50 mmHg. Which of the following is the LEAST appropriate treatment of the tachycardia?

- (A) Adenosine
- (B) Esmolol
- (C) Phenylephrine
- (D) Procainamide**
- (E) Verapamil

107. Which of the following neurophysiologic monitoring modalities is LEAST affected by administration of volatile anesthetic agents?

- (A) Brain stem auditory evoked potentials**
- (B) Electroencephalogram
- (C) Motor evoked potentials
- (D) Somatosensory evoked potentials
- (E) Visual evoked potentials

108. A 35-year-old woman with a grade III subarachnoid hemorrhage is undergoing clipping of a middle cerebral artery aneurysm 48 hours after initial hemorrhage. Which of the following drugs used to induce hypotension is LEAST likely to affect intracranial pressure?

- (A) Esmolol**
- (B) Hydralazine
- (C) Isoflurane
- (D) Nitroglycerin
- (E) Sodium nitroprusside

109. Which of the following will have the LEAST effect on the shape of the autoregulatory curve for cerebral blood flow?

- (A) Isoflurane
- (B) Nitroprusside
- (C) Hypercarbia
- (D) Essential hypertension**
- (E) Cerebral infarction

110. Which of the following treatments is LEAST effective in patients with acute herpes zoster?

- (A) Acyclovir
- ☒ (B) Antidepressants
- (C) Epidural block
- (D) Opioids
- (E) Sympathetic nerve block

AMERICAN BOARD OF ANESTHESIOLOGY
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IN-TRAINING EXAMINATION

Book B
1996

PREPARED IN COOPERATION WITH NATIONAL BOARD OF MEDICAL EXAMINERS®

DIRECTIONS: Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

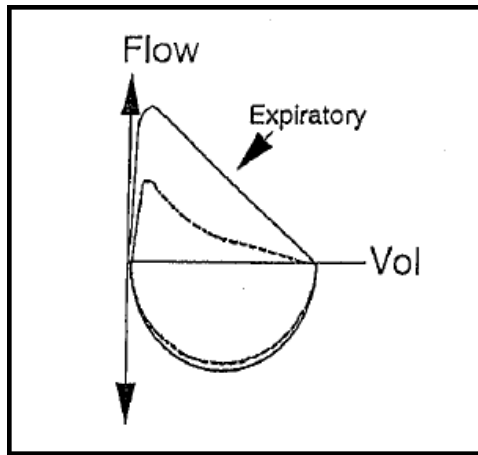
1. A patient has a heart rate of 110 bpm one year after heart transplantation. His tachycardia is most likely the result of
 - (A) altered baroreceptor sensitivity
 - ☒ (B) cardiac denervation
 - (C) compensation for a fixed stroke volume
 - (D) cyclosporine
 - (E) prednisone

2. An otherwise healthy 20-year-old man undergoes laser surgery for vocal cord polyp removal. During jet ventilation with 100% oxygen, arterial blood gas analysis shows PaO_2 90 mmHg, PaCO_2 40 mmHg, and pH_a 7.40. Which of the following is the most likely explanation?
 - (A) Aspiration of gastric contents
 - (B) Atelectasis
 - (C) Pneumothorax
 - (D) Pulmonary embolism
 - ☒ (E) Room air entrainment

3. Which of the following findings necessitates the preoperative insertion of a ventricular pacemaker in a 48-year-old man scheduled to undergo cholecystectomy?
 - (A) Atrial flutter with 3:1 atrioventricular block
 - (B) Bifascicular (right bundle branch block and left anterior hemiblock) block
 - (C) Left bundle branch block with first-degree atrioventricular block
 - (D) Second-degree (Mobitz 1) atrioventricular block
 - ☒ (E) Second-degree (Mobitz II) atrioventricular block

4. A 21-year-old athlete has laryngospasm following extubation after undergoing repair of an inguinal hernia during general anesthesia. Bag and mask ventilation relieves the patient's symptoms. In the PACU 15 minutes later, he has dyspnea; SpO_2 is 85% at an FiO_2 of .40. Which of the following is the most likely cause?
 - (A) Atelectasis
 - (B) Decreased cardiac output
 - ☒ (C) Pulmonary edema
 - (D) Pulmonary embolism
 - (E) Residual paralysis

5. Heparin-induced thrombocytopenia
- (A) does not occur with porcine mucosal heparin
 - (B) is caused by direct suppression of platelet production
 - (C) is immunologically mediated**
 - (D) is diagnosed by peripheral blood smear
 - (E) occurs only with larger intravenous doses of heparin
6. Which of the following factors will slow the induction of anesthesia in patients receiving volatile anesthetics?
- (A) Addition of 70% nitrous oxide
 - (B) Increased cardiac output**
 - (C) Increased minute ventilation
 - (D) Low blood/gas solubility coefficient
 - (E) Previous pneumonectomy
7. A 58-year-old woman with rheumatoid arthritis and hyperactive gag reflex requires awake intubation prior to cervical spine stabilization. Which of the following regional nerve blocks is most appropriate?
- (A) Deep cervical plexus
 - (B) Glossopharyngeal nerve**
 - (C) Hypoglossal nerve
 - (D) Superior laryngeal nerve
 - (E) Trigeminal nerve
8. A 120-kg 56-year-old man undergoing gastrectomy during anesthesia with fentanyl and isoflurane has a PETCO₂ of 35 mmHg and a PaCO₂ of 50 mmHg. His FEV₁/FVC ratio is 80% of predicted. Heart rate is 120 bpm and arterial blood pressure is 80/40 mmHg. Which of the following is the most likely cause of the difference in PaCO₂ and PETCO₂?
- (A) Aspiration pneumonitis
 - (B) Chronic obstructive pulmonary disease
 - (C) Decreased cardiac output**
 - (D) Decreased V_D/V_T ratio
 - (E) Increased Q_S/Q_T ratio
9. Measurement of blood pressure with a Doppler device involves
- (A) reflection of ultrasound waves off blood elements**
 - (B) detection of oscillations in cuff pressure
 - (C) amplification of Korotkoff sounds with a miniature microphone
 - (D) transillumination with a near infrared light
 - (E) detection of variations in blood vessel diameter
10. Which of the following is a sign of cyclosporine toxicity?
- (A) Abnormal hepatic enzyme activity
 - (B) Decreased hemoglobin concentration
 - (C) Increased serum creatinine concentration**
 - (D) Nodular density on chest x-ray
 - (E) ST-T-wave changes on ECG



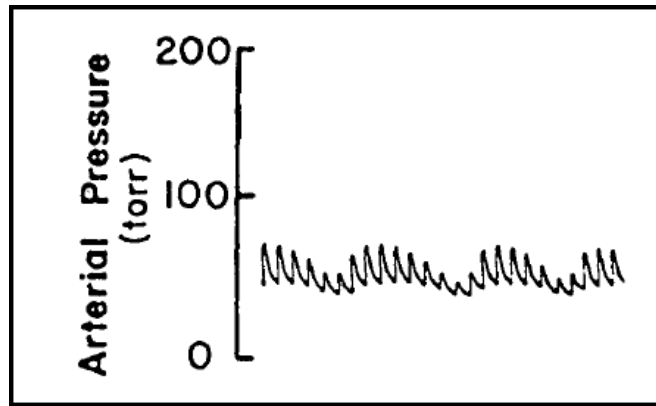
11. The illustration above depicts flow-volume loops for the same person at two different times in his life. Which of the following is indicated by the dotted loop?
- (A) Bronchial tumor
 - (B) Chronic asthmatic bronchitis**
 - (C) Morbid obesity
 - (D) Paralysis of a vocal cord
 - (E) Subglottic stenosis
-
12. A healthy 60-kg 52-year-old woman undergoing reduction mammoplasty is anesthetized with isoflurane and oxygen, and deliberate hypotension to 80/40 mmHg is induced with nitroprusside. Urine output through an indwelling urethral catheter has been to 10 mL during the past hour. You should now
- (A) administer furosemide 40 mg intravenously
 - (B) infuse normal saline solution until urine output reaches 35 mL/hr
 - (C) administer dopamine at 3 $\mu\text{g/kg/min}$
 - (D) expect normal urine flow with restoration of normal blood pressure**
 - (E) discontinue nitroprusside administration
13. Which of the following factors causes a decrease in mixed venous oxygen saturation?
- (A) Arteriovenous fistula
 - (B) Decreased hemoglobin concentration**
 - (C) Decreased oxygen consumption
 - (D) Increased cardiac output
 - (E) Nitroprusside toxicity
14. Metoclopramide
- (A) decreases gastric acid secretion
 - (B) decreases gastroesophageal sphincter tone
 - (C) is contraindicated in patients with Parkinson's disease**
 - (D) is most effective when administered in combination with atropine
 - (E) requires an intact vagus nerve for gastrointestinal effects

15. Which of the following is the primary factor regulating normal coronary blood flow?
- (A) Aortic diastolic pressure
 - (B) Coronary perfusion pressure
 - (C) Heart rate
 - ☒ (D) Myocardial oxygen consumption
 - (E) Systolic wall tension
16. Which of the following is the most common initial sign of hemolytic transfusion reaction during general anesthesia?
- (A) Bronchospasm
 - (B) Diffuse bleeding
 - (C) Fever
 - ☒ (D) Hemoglobinuria
 - (E) Hypotension
17. A patient is undergoing exploration of a stab wound to the left side of the neck. On awake laryngoscopy, the left vocal cord is in midposition and the right vocal cord is abducted during inspiration. The most likely cause of these findings is trauma to which of the following structures on the left?
- (A) C7-8 nerve root
 - (B) Stellate ganglion
 - (C) Glossopharyngeal nerve
 - (D) Superior laryngeal nerve
 - ☒ (E) Vagus nerve
18. Measurement of which of the following provides the most reliable information about the severity of bronchospasm?
- (A) Diffusing capacity
 - (B) Expiratory reserve volume
 - ☒ (C) Forced expiratory volume in 1 second
 - (D) Residual volume
 - (E) Total lung capacity
19. Which of the following provides the most definitive diagnosis in a patient with suspected brain death?
- (A) Absent bilateral somatosensory evoked potentials
 - ☒ (B) Absent cerebral blood flow during four-vessel contrast cerebral arteriography
 - (C) Intracranial pressure greater than mean arterial pressure
 - (D) Score of zero on Glasgow Coma Scale
 - (E) Two isoelectric electroencephalograms
20. A woman has weakness of the right quadriceps and a decreased knee jerk reflex on the right one day after forceps delivery under epidural anesthesia. The most likely cause is
- (A) epidural hematoma
 - ☒ (B) intrapelvic nerve trauma
 - (C) lithotomy positioning
 - (D) reaction to the preservative in the anesthetic solution
 - (E) trauma from the epidural needle

21. The laryngeal mask airway
- (A) causes more hemodynamic stimulation than an oropharyngeal airway
 - (B) is contraindicated in patients with cervical spine instability
 - (C) is more easily inserted when cricoid pressure is applied
 - (D)** may serve as a temporary airway in case of a failed rapid sequence intubation
 - (E) requires administration of a muscle relaxant to avoid laryngospasm during insertion
22. A 45-year-old woman who sustained a subarachnoid hemorrhage 18 hours ago develops a severe headache and becomes unresponsive. Which of the following is the most likely cause of this patient's change in mental status?
- (A) Cerebral edema
 - (B) Cerebral embolism
 - (C) Cerebral vasospasm
 - (D) Hypertensive encephalopathy
 - (E)** Second subarachnoid hemorrhage
23. Which of the following statements regarding latex allergy is true?
- (A) Diphenhydramine is the treatment of choice for latex-induced anaphylactic reaction
 - (B) Hospital workers are at equal risk as the general population
 - (C)** It is more common in patients with frequent urethral catheterizations
 - (D) Latex gloves can be rinsed free of antigens
 - (E) Skin testing should be performed immediately after an acute reaction in the operating room
24. Neuromuscular blockade of the diaphragm is best ensured by monitoring which of the following peripheral muscles?
- (A) Adductor pollicis muscle
 - (B) First dorsal interosseous muscle
 - (C) Flexor hallucis muscle
 - (D) Muscles of the hypothenar eminence
 - (E)** Orbicularis oculi muscle
25. Which of the following statements regarding carbon monoxide poisoning is true?
- (A)** Breathing 100% oxygen at 1 atmosphere reduces the carboxyhemoglobin half-life
 - (B) Effective treatment includes administration of methylene blue
 - (C) It is commonly associated with respiratory acidosis
 - (D) It is incompatible with a normal SpO₂ while breathing room air
 - (E) The oxyhemoglobin dissociation curve is shifted to the right
26. In patients with reflex sympathetic dystrophy affecting the arm, which of the following findings indicates a therapeutic block?
- (A) Bradycardia
 - (B) Contralateral nasal congestion
 - (C) Hoarseness
 - (D)** Increased skin temperature
 - (E) Ipsilateral Horner's syndrome

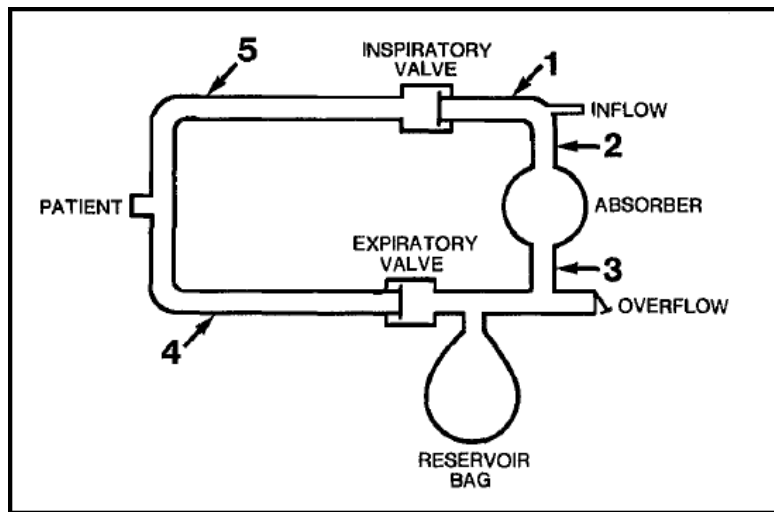
27. A 16-year-old patient who sustained trauma is being resuscitated. In deciding whether to infuse lactated Ringer's solution or albumin, which of the following is true?
- (A) At one hour, both will remain in the intravascular compartment to an equal extent
 - (B) Both have zero risk for hepatitis transmission**
 - (C) Both will decrease ionized calcium levels
 - (D) The glomerular filtration rate will be higher with infusion of albumin
 - (E) Lactated Ringer's solution causes a greater increase in intracranial pressure
28. Which of the following muscle relaxants is most likely to result in histamine release following administration of a bolus dose sufficient to facilitate rapid endotracheal intubation?
- (A) Atracurium**
 - (B) Pancuronium
 - (C) Succinylcholine
 - (D) Rocuronium
 - (E) Vecuronium
29. A 55-year-old man who is scheduled to undergo carotid endarterectomy (CEA) has a persistent myocardial filling defect at three hours on a dipyridamole-thallium scan. Which of the following statements is correct?
- (A) Coronary autoregulation is effective in this segment
 - (B) Coronary revascularization should precede CEA
 - (C) Isoflurane is contraindicated
 - (D) Myocardial infarction is impending
 - (E) There is a segment of nonviable myocardium**
30. To measure the contribution of intrapulmonary shunting to arterial hypoxemia, which of the following measurements are necessary? (Assume normal cardiac output and anatomy.)
- (A) PaCO_2 and PECO_2
 - (B) PaCO_2 and PEO_2 while breathing 100% oxygen
 - (C) PaO_2 and PvO_2 while breathing 100% oxygen**
 - (D) PaO_2 while breathing both room air and 100% oxygen
 - (E) PaO_2 and PaCO_2 while breathing room air
31. In a patient with severe mitral stenosis, induction of anesthesia must include avoidance of increased
- (A) airway pressure
 - (B) heart rate**
 - (C) myocardial contractility
 - (D) right ventricular preload
 - (E) systemic vascular resistance
32. Which of the following is most indicative of reflex sympathetic dystrophy?
- (A) Dry skin
 - (B) Dull pain that improves with movement
 - (C) Fasciculations
 - (D) Motor weakness
 - (E) Pallor and cyanosis**

33. During axillary brachial plexus anesthesia, motor block frequently precedes sensory block because of
- (A) conduction velocity of motor fibers
 - (B) myelination of motor fibers
 - (C) size of motor fibers
 - (D) presence of septa between motor fibers
 - (E) peripheral location of motor fibers in the nerve bundle**
34. In a patient with chronic renal failure, which of the following statements concerning muscle relaxants is true?
- (A) Duration of action of vecuronium is prolonged**
 - (B) The elimination half-life of atracurium is tripled
 - (C) Reversal with neostigmine is contraindicated
 - (D) The onset of action of mivacurium is delayed
 - (E) Succinylcholine is contraindicated
35. Systemic hypothermia to 30°C is accompanied by
- (A) a shift to the right of the oxyhemoglobin dissociation curve
 - (B) a decrease in carbon dioxide dissolved in plasma
 - (C) a decrease in the glomerular filtration rate**
 - (D) an increase in MAC of volatile inhalation agents
 - (E) low-voltage, high-frequency EEG pattern
36. After the first 70 minutes of a transurethral resection of the prostate, a 70-year-old man becomes confused and has tachycardia, hypertension, and shortness of breath. Serum sodium concentration is 116 mEq/L. After informing the surgeon that the procedure should be terminated as soon as possible, the most appropriate next step would be to
- (A) administer furosemide**
 - (B) administer labetalol
 - (C) administer 3% sodium chloride
 - (D) change the irrigating solution to normal saline
 - (E) induce general endotracheal anesthesia
37. A 30-year-old man who is undergoing laparotomy and resection of a large kidney tumor has a decrease in SpO₂ from 100% to 92% and an increase in peak airway pressure from 20 to 35 cmH₂O. Plateau pressure is unchanged at 18 cmH₂O. Which of the following is the most likely cause?
- (A) Abdominal packing
 - (B) Inadequate anesthesia
 - (C) Inadequate muscle relaxation
 - (D) Obstruction of the endotracheal tube**
 - (E) Pneumothorax
38. Gravid uterine blood flow is
- (A) autoregulated
 - (B) decreased by normotensive epidural analgesia
 - (C) decreased by uterine contractions**
 - (D) increased with an increase in maternal PaO₂
 - (E) unaffected by alpha-adrenergic agonists



39. A mechanically ventilated newborn infant is undergoing gastroschisis repair during halothane anesthesia. Based on the right radial artery catheter tracing shown above, which of the following is the most appropriate conclusion?
- (A) The abdomen has not yet been incised
 - (B) The anesthetic should be changed from halothane to isoflurane
 - (C) The ductus arteriosus is still open
 - (D) The infant is hypovolemic**
 - (E) The tidal volume is inadequate
-
40. A 50-year-old man with alcoholism and jaundice is scheduled to undergo umbilical herniorrhaphy. An increase in which of the following best indicates impaired synthetic hepatic function?
- (A) Prothrombin time**
 - (B) Serum alanine aminotransferase concentration
 - (C) Serum albumin / globulin ratio
 - (D) Serum alkaline phosphatase concentration
 - (E) Serum bilirubin concentration
41. A patient develops jaundice one week after undergoing laparoscopic cholecystectomy during halothane anesthesia. Laboratory studies show an increased serum alkaline phosphatase concentration, a mildly increased serum aspartate aminotransferase concentration, and a markedly increased conjugated bilirubin fraction. Which of the following is the most likely diagnosis?
- (A) Biliary obstruction**
 - (B) Gilbert's disease
 - (C) Halothane-associated hepatitis
 - (D) Hematoma resorption
 - (E) Infectious hepatitis
42. Which of the following antihypertensive drugs is most likely to cause bradycardia?
- (A) Captopril
 - (B) Clonidine**
 - (C) Hydralazine
 - (D) Nifedipine
 - (E) Phenoxybenzamine

43. The two E oxygen cylinders on an anesthesia machine have pressure readings of 1100 psi each. At an oxygen flow of 3 L/min, there will be sufficient oxygen for approximately
- (A) 2.5 hours
 - ☒ (B) 3.5 hours
 - (C) 5.5 hours
 - (D) 7 hours
 - (E) 8 hours
44. Which of the following statements concerning use of amitriptyline to treat chronic pain is true?
- (A) It acts primarily via opioid receptors
 - ☒ (B) It increases serotonin levels in the brain
 - (C) It is rarely effective for postherpetic neuralgia
 - (D) Onset of action occurs after four to six weeks of treatment
 - (E) Response depends on reversal of depression
45. Nitrous oxide is contraindicated during
- ☒ (A) injection of sulfur hexafluoride for retinal tamponade
 - (B) repair of open eye injury
 - (C) scleral buckling with synthetic bands
 - (D) strabismus surgery
 - (E) trabeculectomy for glaucoma
46. Which of the following is the best initial treatment of anaphylaxis that occurs during general anesthesia?
- (A) Diphenhydramine
 - (B) Dopamine
 - ☒ (C) Epinephrine
 - (D) Hydrocortisone
 - (E) Ranitidine
47. Which of the following is most likely in a 30-year-old patient with untreated hypothyroidism?
- (A) Cardiac arrhythmias with ketamine administration
 - ☒ (B) Decreased ventilatory response to hypoxia
 - (C) Hypoglycemia
 - (D) Increased MAC of inhalational anesthetics
 - (E) Peripheral vasodilatation
48. A 60-year-old man undergoes transurethral resection of a bladder tumor in the lithotomy position with spinal anesthesia. During the procedure the surgeon reports that the patient's right leg is "jumping." This movement is most likely caused by stimulation of which of the following nerves?
- (A) Femoral
 - (B) Lateral femoral cutaneous
 - ☒ (C) Obturator
 - (D) Pudendal
 - (E) Sciatic



49. To detect the delivery of a hypoxic gas mixture, the optimal location for an oxygen analyzer in this circle is

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5**

50. Compared with halothane, desflurane has which of the following characteristics?

- (A) Greater potency
- (B) A higher boiling point
- (C) Increased blood solubility
- (D) Less airway irritability
- (E) Less biodegradation**

51. Compared with healthy persons, patients with myasthenic (Eaton-Lambert) syndrome have increased

- (A) resistance to vecuronium
- (B) response to neostigmine during reversal of muscle paralysis
- (C) sensitivity to succinylcholine**
- (D) susceptibility to development of malignant hyperthermia
- (E) weakness with repetitive activity

52. Pseudocholinesterase

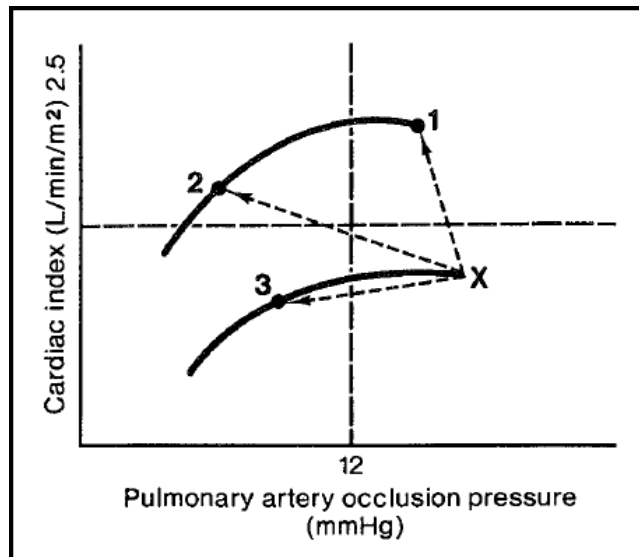
- (A) is increased in patients with myasthenia gravis
- (B) is inhibited by glycopyrrolate
- (C) is inhibited by pilocarpine
- (D) is synthesized by the liver**
- (E) reverses atracurium blockade

53. In patients with head trauma, which of the following factors results in a return of arterial pH toward normal levels after two days of mechanical hyperventilation?
- (A) Decreased renal absorption of hydrogen ions
 - (B) Decreased renal blood flow
 - (C) Increased PaCO₂ with constant minute ventilation
 - (D) Increased renal excretion of bicarbonate ions**
 - (E) Normalized cerebrospinal fluid pH
54. A 31-year-old man received an uneventful epidural anesthetic for arthroscopy of the knee and meniscectomy. Twenty-four hours later he still has painless flaccid paralysis in both legs. This clinical presentation is most consistent with
- (A) adhesive arachnoiditis
 - (B) anterior spinal artery thrombosis
 - (C) epidural abscess
 - (D) epidural hematoma**
 - (E) transverse myelitis
55. Which of the following statements about patient-controlled analgesia using opioids is true?
- (A) It is not associated with respiratory depression
 - (B) It obviates loading doses
 - (C) It requires a background opioid infusion to be effective
 - (D) It requires intravenous administration to be effective
 - (E) It requires less drug than intramuscular dosing for similar analgesia**
56. Compared with thiopental, methohexital is characterized by
- (A) better absorption after rectal administration
 - (B) greater protein binding
 - (C) greater hepatic clearance**
 - (D) larger volume of distribution
 - (E) more complete biotransformation
57. Pulmonary artery occlusion pressure
- (A) does not reliably reflect left ventricular end-diastolic volume when left ventricular compliance is reduced**
 - (B) inaccurately reflects left atrial pressure when left atrial pressure exceeds 15 mmHg
 - (C) is measured at end-inspiration in mechanically ventilated patients
 - (D) overestimates left atrial pressure in patients with poor lung compliance
 - (E) reflects left atrial pressure only if the catheter tip is located in zone II of the lung
58. Which of the following statements regarding fetal heart rate patterns is true?
- (A) Early decelerations suggest umbilical cord compression
 - (B) Fetal heart rates between 160 and 180 bpm are normal
 - (C) Fetal heart rate unaffected by uterine contraction suggests fetal well-being
 - (D) Late decelerations indicate inadequate uteroplacental perfusion**
 - (E) Variable decelerations indicate need for urgent delivery

59. A healthy, spontaneously breathing, supine, anesthetized patient has a PaCO_2 to PETCO_2 difference of 3 mmHg. Following institution of mechanical ventilation the value increases to 12 mmHg. The most likely cause of this change is
- (A) cephalad displacement of the diaphragm
 - (B) decreased production of carbon dioxide
 - (C) increased cardiac output
 - (D) increased shunting of blood through dependent lung zones
 - (E) increased ventilation of nondependent lung zones**
60. A 34-year-old man has hyperkalemia-induced asystole. After initiating cardiopulmonary resuscitation, which of the following is the most appropriate next step in management?
- (A) Administration of atropine
 - (B) Administration of calcium chloride**
 - (C) Administration of sodium bicarbonate
 - (D) Transcutaneous pacing
 - (E) DC countershock at 200 joules
61. A 55-year-old woman receiving chronic dialysis for renal failure comes to the emergency department with a perforated viscus. She has chest pain. Heart rate is 124 bpm, blood pressure is 90/60 mmHg, and respiratory rate is 18/min. Surgery is to be performed within the hour. Which of the following best describes this patient's ASA physical status classification?
- (A) III
 - (B) III E
 - (C) IV
 - (D) IV E**
 - (E) V E
62. During isoflurane anesthesia, a 45-year-old patient with chronic asthma has wheezing, prolonged expiration, sinus tachycardia of 120 bpm, and premature ventricular contractions. Preoperative medication included cromolyn and theophylline (serum level 20 $\mu\text{g/mL}$). The most appropriate treatment is to administer
- (A) albuterol aerosol**
 - (B) aminophylline by intravenous infusion
 - (C) cromolyn aerosol
 - (D) halothane
 - (E) hydrocortisone by intravenous bolus
63. Pulmonary artery diastolic pressure increases acutely from 10 to 20 mmHg in a 28-year-old man undergoing cervical laminectomy in the sitting position. The most appropriate first step in the management of this patient is to
- (A) administer furosemide
 - (B) aspirate from the proximal port of the pulmonary artery catheter**
 - (C) inflate the balloon on the pulmonary artery catheter
 - (D) place the patient in the left lateral decubitus position
 - (E) start an infusion of nitroglycerin

64. Which of the following would be most likely to increase the duration of seizures during electroconvulsive therapy using a barbiturate and succinylcholine for general anesthesia?
- (A) Administration of atropine prior to therapy
 - (B) Changing to a benzodiazepine for induction
 - (C) Changing to etomidate for induction
 - (D) Adding phenytoin to preoperative medications
 - (E) Decreasing the dose of barbiturate used for induction**
65. Compared with isoflurane, desflurane
- (A) causes higher plasma norepinephrine levels**
 - (B) has greater biodegradability
 - (C) has a higher blood/gas partition coefficient
 - (D) has a lower MAC value
 - (E) has a lower vapor pressure
66. A celiac plexus block effectively relieves pain at which of the following sites?
- (A) Abdominal viscera above the pelvis**
 - (B) Parietal peritoneum above the pelvis
 - (C) Pelvic parietal peritoneum
 - (D) Pelvic viscera
 - (E) Visceral pleura
67. In patients who have undergone cardiopulmonary bypass, administration of milrinone is most likely to result in an increase in which of the following?
- (A) Arterial blood pressure
 - (B) Heart rate
 - (C) Pulmonary capillary wedge pressure
 - (D) Stroke volume**
 - (E) Systemic vascular resistance
68. Which of the following is associated with the application of a transdermal fentanyl patch?
- (A) Achievement of a peak plasma level within one hour
 - (B) Continued uptake after patch removal**
 - (C) Dose-independent plasma clearance
 - (D) Tachyphylaxis when used for cancer pain
 - (E) Naloxone-resistant toxicity
69. The MAC of a volatile anesthetic agent is greatest when administered to which of the following groups of healthy patients?
- (A) Neonates
 - (B) Infants**
 - (C) Adolescents
 - (D) Men 30 years of age
 - (E) Parturients

70. Which of the following statements concerning cerebral vasospasm following intracranial hemorrhage is true?
- (A) It is accompanied by paradoxical intracranial hypotension
 - (B) It responds to nitroprusside therapy
 - (C) It persists more than 48 hours after hemorrhage**
 - (D) It is exacerbated by intravascular volume expansion
 - (E) It is confirmed by ST-T-wave changes in the absence of myocardial ischemia
71. Which of the following inhalational anesthetics best relieves left ventricular outflow obstruction in a patient with hypertrophic obstructive cardiomyopathy (IHSS)?
- (A) Desflurane
 - (B) Halothane**
 - (C) Isoflurane
 - (D) Nitrous oxide
 - (E) Sevoflurane
72. The metabolism of which of the following hypotensive agents is most likely to be affected in patients with severe renal disease?
- (A) Esmolol
 - (B) Hydralazine
 - (C) Nitroglycerin
 - (D) Nitroprusside**
 - (E) Trimethaphan
73. In a 45-year-old patient with severe mitral regurgitation, which of the following is the most important hemodynamic condition to avoid during induction of anesthesia?
- (A) Decreased heart rate to less than 60 bpm
 - (B) Increased heart rate to greater than 90 bpm
 - (C) Increased preload
 - (D) Increased afterload**
 - (E) Enhanced myocardial contractility
74. Delirium produced by high doses of atropine can be reversed by intravenous injection of
- (A) diphenhydramine
 - (B) flumazenil
 - (C) naloxone
 - (D) neostigmine
 - (E) physostigmine**
75. Which of the following statements best describes testing for susceptibility to malignant hyperthermia (MH)?
- (A) Live skeletal muscle cells are required for testing**
 - (B) The MH gene is located on the X chromosome
 - (C) Muscle biopsy is appropriate in children younger than 1 year
 - (D) A normal serum creatine phosphokinase concentration eliminates the need for muscle biopsy
 - (E) Succinylcholine is used to stimulate muscle obtained on biopsy for MH



76. In the diagram above, point "X" represents a patient with severe left ventricular dysfunction. The points labeled 1, 2 and 3 each represent the results of a different therapeutic intervention. Which of the following represents the most likely intervention at each point?

<u>Point 1</u>	<u>Point 2</u>	<u>Point 3</u>
(A) Dopamine	Furosemide	Nitroprusside
(B) Dopamine	Nitroprusside	Furosemide
(C) Furosemide	Dopamine	Nitroprusside
(D) Nitroprusside	Dopamine	Furosemide
(E) Nitroprusside	Furosemide	Dopamine

77. A 30-kg patient with asthma is receiving general anesthesia and being mechanically ventilated with a measured tidal volume of 300 mL. Increasing the fresh gas flow from 3 L/min to 9 L/min without changing the ventilatory rate or I:E ratio will result in

- (A) decreased physiologic dead space
- (B) increased delivered tidal volume**
- (C) increased end-expired carbon dioxide
- (D) unchanged delivered minute volume
- (E) unchanged peak inspiratory pressure

78. A 30-year-old man who is breathing spontaneously has a ventilatory pattern of sustained deep inspiration and occasional expiratory gasps during emergence from general anesthesia after posterior fossa craniotomy. Which of the following is the most likely cause?

- (A) Air in the cerebral ventricles
- (B) Expiratory obstruction from subglottic edema
- (C) Injury to the C3-5 nerve roots
- (D) Injury to the pons**
- (E) Residual neuromuscular paralysis

79. Which of the following findings is most likely in an 85-kg 30-year-old man who is breathing spontaneously through a 6-mm endotracheal tube?
- (A) Decreased PETCO₂
 - (B) Decreased SpO₂
 - (C) Increased minute ventilation
 - (D) Increased respiratory rate**
 - (E) Increased tidal volume
80. Which of the following findings best indicates complete resolution of spinal anesthesia?
- (A) Ability to ambulate
 - (B) Ability to urinate**
 - (C) Perianal pinprick sensation
 - (D) Pain at the surgical site
 - (E) Proprioception of the big toe
81. After the bronchial and tracheal cuffs of a right endobronchial tube are inflated, ventilation through the tracheal side is not possible. This finding is most consistent with
- (A) cuff occlusion of the right upper lobe bronchus
 - (B) intubation of the left bronchus
 - (C) left-sided tension pneumothorax
 - (D) overinflation of the bronchial cuff
 - (E) positioning of both cuffs in the trachea**
82. Which of the following statements concerning the management of diabetes mellitus during pregnancy is true?
- (A) Insulin requirements remain essentially unchanged during pregnancy
 - (B) Maternal blood glucose concentration of 200 mg/dL is optimal
 - (C) Maternal hyperglycemia may cause neonatal acidosis**
 - (D) Neonatal hyperglycemia is common
 - (E) Infants delivered under general anesthesia have lower Apgar scores than those delivered under spinal anesthesia
83. Local anesthetics block nerve impulses through which of the following mechanisms of action?
- (A) Decreasing ATP in neuronal cell membranes
 - (B) Decreasing the neuronal resting membrane potential
 - (C) Increasing extracellular calcium concentration
 - (D) Inhibiting sodium ion influx across the neuronal cell membrane**
 - (E) Opening sodium channels at the nodes of Ranvier
84. While delivering nitrous oxide 1.5 L/min, oxygen 1.5 L/min, and halothane 1%, a leak in the oxygen flowmeter will most likely be detected by the
- (A) low airway pressure alarm
 - (B) "fail-safe" system
 - (C) oxygen analyzer on the expiratory limb
 - (D) oxygen flowmeter reading
 - (E) mass spectrometric analysis of gases**

85. Which of the following is the most appropriate initial therapy for acute pulmonary hypertension with right ventricular dysfunction and severe systemic hypotension that occurs during anesthesia?
- (A) Amrinone
 - (B) Epinephrine**
 - (C) Isoflurane
 - (D) Isoproterenol
 - (E) Nitroglycerin
86. An adult patient with atrial fibrillation develops pulseless ventricular tachycardia while undergoing synchronized electrical cardioversion. Which of the following is the most appropriate management?
- (A) Intravenous administration of adenosine
 - (B) Intravenous administration of a bolus of lidocaine followed by electrical cardioversion
 - (C) Immediate repeat synchronized cardioversion at the same energy level
 - (D) Immediate repeat synchronized cardioversion at twice the previous energy level
 - (E) Unsynchronized electrical cardioversion**
87. In an infant, spinal anesthesia to a sensory level of T8 is achieved with tetracaine administered at the L2-3 interspace. Compared with spinal anesthesia to the same sensory level in an adult, this anesthetic is associated with a
- (A) greater decrease in blood pressure
 - (B) higher risk for neurotoxicity
 - (C) higher risk for systemic toxicity
 - (D) lower risk for spinal cord injury
 - (E) shorter duration of action**
88. Fentanyl-induced bradycardia is
- (A) independent of the speed of injection
 - (B) independent of dose
 - (C) caused by direct inhibition of adrenal catecholamine release
 - (D) caused by vagal stimulation**
 - (E) caused by direct SA node depression
89. Which surface area of the upper extremity is most likely to be unanesthetized by an interscalene brachial plexus block?
- (A) Hypothenar eminence**
 - (B) Thenar eminence
 - (C) Dorsolateral surface of the hand
 - (D) Lateral aspect of the forearm
 - (E) Lateral surface of the upper arm
90. An enflurane vaporizer is filled with halothane and the vaporizer dial is set at 1%. Which of the following will occur?
- (A) Less than 1% halothane will be delivered
 - (B) More than 1% halothane will be delivered**
 - (C) Thymol precipitation will prevent vaporization
 - (D) The vaporizer bypass will not open
 - (E) The vaporizer will be damaged

91. During an inguinal hernia repair, a newborn infant will have a larger fluid requirement (in milliliters per kilogram) than an adult because of relatively greater
- (A) insensible water loss
 - (B) lean body mass
 - (C) metabolic rate**
 - (D) sodium loss
 - (E) third space losses
92. In a healthy 70-kg adult, which of the following is the most likely effect of intravenous administration of morphine 10 mg on ventilatory responses?
- (A) Increased response to hypoxia and decreased response to hypercarbia
 - (B) Decreased response to hypercarbia and no change in response to hypoxia
 - (C) Decreased response to both hypoxia and hypercarbia**
 - (D) No change in response to hypercarbia and decreased response to hypoxia
 - (E) No change in response to hypoxia or hypercarbia
93. Which of the following features is characteristic of the airway in a neonate?
- (A) Glottis that is located at the level of the C6 vertebral body
 - (B) Larger tongue relative to the head than in an adult**
 - (C) Laryngeal mucosa that is densely adherent to the cartilages
 - (D) More posterior glottis than that of an adult
 - (E) Narrowest portion of the airway that is located at the arytenoid cartilages
94. During induction of anesthesia for cesarean delivery, pancuronium is inadvertently substituted for succinylcholine. The neonate shows no clinical signs of muscle relaxation because pancuronium is
- (A) highly ionized**
 - (B) highly protein bound
 - (C) a large molecule
 - (D) lipid soluble
 - (E) unaffected by "ion trapping"
95. Which of the following is the most appropriate initial management of a patient with hypotension secondary to sepsis?
- (A) Calcium chloride
 - (B) Corticosteroids
 - (C) Crystalloid infusion**
 - (D) Dopamine
 - (E) Fresh frozen plasma
96. The alveolar concentrations of anesthetics increase more rapidly in children than in adults because of a greater
- (A) blood volume (per kg body mass)
 - (B) cardiac index
 - (C) MAC
 - (D) ratio of alveolar ventilation to functional residual capacity**
 - (E) tidal volume (per kg body mass)

97. A 70-kg 58-year-old man with unstable angina is scheduled to undergo coronary artery bypass grafting. Intravenous heparin and nitroglycerin are administered for four days before surgery. Before initiating cardiopulmonary bypass, 21,000 units of heparin are administered through the central venous catheter; five minutes later, activated clotting time is 280 seconds. Which of the following is the most appropriate next step in management?
- (A) Discontinue nitroglycerin
 - (B) Administer additional heparin**
 - (C) Administer cryoprecipitate
 - (D) Administer fresh frozen plasma
 - (E) Initiate cardiopulmonary bypass
98. A 30-year-old man receives spinal anesthesia to the level of T4. Ten minutes later, heart rate and blood pressure abruptly decrease to 30 bpm and 60/25 mmHg, respectively. The most appropriate management is administration of which of the following drugs?
- (A) Atropine
 - (B) Epinephrine**
 - (C) Isoproterenol
 - (D) Metaraminol
 - (E) Phenylephrine
99. An infant is delivered by forceps following labor in which variable decelerations were noted. Amniotic fluid was clear. Initial evaluation shows a cyanotic, limp infant with a heart rate of 80 bpm, poor respiratory efforts, and grimacing in response to suctioning. The most appropriate method of resuscitation for this newborn is
- (A) vigorous tactile stimulation
 - (B) bag and mask ventilation with oxygen**
 - (C) immediate endotracheal intubation
 - (D) administration of sodium bicarbonate 1 mEq/kg
 - (E) volume expansion with normal saline solution 10 mL/kg
100. A 57-year-old man has back pain, a heart rate of 90 bpm, decreased pulse in the left arm, and blood pressure of 200/110 mmHg. During infusion of nitroprusside, heart rate increases to 115 bpm and blood pressure decreases to 140/80 mmHg. The most appropriate management at this time is administration of
- (A) droperidol
 - (B) nifedipine
 - (C) normal saline solution
 - (D) propranolol**
 - (E) verapamil
101. A multigravid woman is receiving oxytocin by infusion for augmentation of labor. Fetal heart rate is 190 bpm with beat-to-beat variability of 6 to 8 bpm. The most appropriate immediate action would be to
- (A) continue observation**
 - (B) sample fetal scalp blood
 - (C) discontinue oxytocin
 - (D) administer a beta-adrenergic blocker to the mother
 - (E) deliver the fetus

102. A patient who is scheduled for emergency debridement of an infected wound on the sole has trismus, rigidity of facial muscles, and spasms of the intercostal muscles, diaphragm, and extremities. During anesthesia, this patient is at increased risk for each of the following EXCEPT

- (A) hypotension
- (B) hypertension
- (C) tachycardia
- (D) diaphoresis
- (E) hypothermia**

103. A 30-year-old man has had burning pain, allodynia, and edema of the hand for six weeks after sustaining a forearm fracture. Appropriate treatment includes each of the following EXCEPT

- (A) physical therapy, employing stress loading
- (B) oral prazosin
- (C) intravenous regional sympathetic block with guanethidine
- (D) stellate ganglion block with 6% phenol**
- (E) transcutaneous electrical nerve stimulation

104. Each of the following is a complication or side effect of neurolytic celiac plexus blockade EXCEPT

- (A) constipation**
- (B) hematuria
- (C) orthostatic hypotension
- (D) paraplegia
- (E) pneumothorax

105. Fresh frozen plasma is indicated in each of the following situations EXCEPT

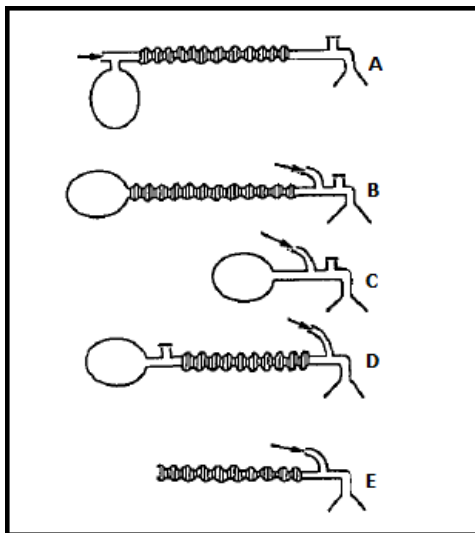
- (A) after rapid transfusion of 1.5 L CPD-stored red blood cells**
- (B) antithrombin III deficiency
- (C) replacement of factor VIII
- (D) reversal of warfarin effect
- (E) thrombotic thrombocytopenic purpura

106. Monitoring sensory evoked potentials may be useful in detecting functional derangement of each of the following EXCEPT

- (A) cranial nerve pathways during posterior fossa operations
- (B) motor pathways during anterior cervical discectomy**
- (C) dorsal column pathways during operations for spinal tumors
- (D) visual pathways during operations on the sphenoid wing
- (E) cortical pathways during carotid artery operations

107. Which of the following is the LEAST likely cause of a prolonged prothrombin time?

- (A) Chronic warfarin therapy
- (B) Disseminated intravascular coagulation
- (C) Hemophilia A**
- (D) Systemic heparinization
- (E) Vitamin K deficiency



108. Which Mapleson breathing circuit shown in the illustration above permits the LEAST amount of fresh gas inflow to prevent rebreathing during spontaneous ventilation?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

109. A 6-year-old boy undergoes craniotomy in the supine position for brain tumor during anesthesia with 1.5% isoflurane in oxygen. PETCO₂ is 38 mmHg, heart rate is 78 bpm, and blood pressure is 130/80 mmHg. After opening the dura, the surgeon notes that the brain is bulging. Which of the following management options is LEAST likely to significantly decrease brain size?

- (A) Decreased isoflurane concentration
- (B) Furosemide
- (C) Hyperventilation to a PaCO₂ of 25 mmHg
- (D) Mannitol
- (E) Nitroprusside

110. A 58-year-old man undergoes repeat coronary artery bypass grafting. Which of the following is LEAST likely to decrease the need for exogenous blood transfusion?

- (A) Cell saver blood collection before and after cardiopulmonary bypass
- (B) Epsilon-aminocaproic acid administered during cardiopulmonary bypass
- (C) High-dose aprotinin administered during cardiopulmonary bypass
- (D) Tranexamic acid infusion during cardiopulmonary bypass
- (E) Desmopressin administered after cardiopulmonary bypass

**1996 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK A**

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1	D	31	B	61	B	91	E	121	A	151	D
2	C	32	E	62	A	92	D	122	B	152	B
3	E	33	A	63	A	93	D	123	C	153	A
4	D	34	B	64	E	94	C	124	A	154	A
5	E	35	B	65	A	95	C	125	D	155	D
6	E	36	B	66	E	96	E	126	C	156	C
7	D	37	B	67	E	97	E	127	D	157	B
8	C	38	E	68	A	98	A	128	A	158	E
9	B	39	C	69	B	99	C	129	B	159	D
10	C	40	B	70	B	100	A	130	D	160	B
11	B	41	C	71	A	101	C	131	D	161	A
12	A	42	B	72	D	102	B	132	A	162	C
13	D	43	B	73	E	103	D	133	B	163	B
14	A	44	E	74	D	104	A	134	C	164	E
15	C	45	E	75	B	105	B	135	B	165	B
16	C	46	D	76	A	106	D	136	E	166	C
17	E	47	C	77	E	107	A	137	D	167	B
18	C	48	A	78	B	108	A	138	E	168	A
19	A	49	E	79	C	109	D	139	A	169	B
20	E	50	D	80	E	110	B	140	E	170	C
21	C	51	E	81	D	111	B	141	B	171	A
22	B	52	B	82	A	112	B	142	B	172	A
23	D	53	A	83	D	113	B	143	C	173	B
24	A	54	A	84	D	114	C	144	E	174	D
25	C	55	B	85	E	115	B	145	B	175	D
26	D	56	B	86	A	116	D	146	B		
27	A	57	A	87	A	117	A	147	B		
28	C	58	A	88	D	118	E	148	D		
29	C	59	C	89	D	119	C	149	E		
30	E	60	A	90	D	120	B	150	A		

**1996 ABA/ASA IN-TRAINING EXAMINATION
ANSWER KEY
BOOK B**

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1	B	31	B	61	D	91	C	121	B	151	B
2	E	32	E	62	A	92	C	122	A	152	B
3	E	33	E	63	B	93	B	123	C	153	B
4	C	34	A	64	E	94	A	124	B	154	E
5	C	35	C	65	A	95	C	125	B	155	B
6	B	36	A	66	A	96	D	126	B	156	A
7	B	37	D	67	D	97	B	127	C	157	C
8	C	38	C	68	B	98	B	128	E	158	B
9	A	39	D	69	B	99	B	129	A	159	B
10	C	40	A	70	C	100	D	130	B	160	B
11	B	41	A	71	B	101	A	131	B	161	C
12	D	42	B	72	D	102	E	132	E	162	B
13	B	43	B	73	D	103	D	133	C	163	D
14	C	44	B	74	E	104	A	134	B	164	A
15	D	45	A	75	A	105	A	135	B	165	C
16	D	46	C	76	B	106	B	136	B	166	B
17	E	47	B	77	B	107	C	137	E	167	C
18	C	48	C	78	D	108	A	138	A	168	A
19	B	49	E	79	D	109	E	139	A	169	B
20	B	50	E	80	B	110	E	140	D	170	B
21	D	51	C	81	E	111	B	141	C	171	B
22	E	52	D	82	C	112	D	142	D	172	B
23	C	53	D	83	D	113	B	143	B	173	E
24	E	54	D	84	E	114	A	144	B	174	A
25	A	55	E	85	B	115	A	145	B	175	B
26	D	56	C	86	E	116	E	146	A		
27	B	57	A	87	E	117	B	147	A		
28	A	58	D	88	D	118	B	148	B		
29	E	59	E	89	A	119	D	149	A		
30	C	60	B	90	B	120	E	150	A		

Item Formats On The ABA Part 1 (Written) Examination

The ABA Part 1 (Written) Examination has three types of item formats: A-type, R-type, and G sets. K-type questions will no longer be on the examination. Examples of all item formats are shown below.

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Sample A-type Items

1. A 50-year-old man who underwent cardiac transplantation one month ago is scheduled to undergo laparoscopic cholecystectomy. He takes prednisone, cyclosporine, and lisinopril. The cardiac action of which of the following drugs is most likely to be decreased in this patient?
 - (A) Atropine
 - (B) Isoproterenol
 - (C) Metoprolol
 - (D) Neostigmine
 - (E) Norepinephrine
2. During acute hemorrhagic shock, release of renin contributes to the immediate control of blood pressure by increasing which of the following?
 - (A) Adrenal glucocorticoid production
 - (B) Angiotensin II production
 - (C) Conversion of thyroxine (T4) to triiodothyronine (T3)
 - (D) Release of norepinephrine
 - (E) Release of vasopressin
3. A 30-year-old parturient with significant mitral stenosis develops atrial fibrillation (ventricular response rate 130) one hour after delivery. Mean arterial pressure is 40 mmHg, and pulmonary capillary wedge pressure is 28 mmHg. Which of the following is the most appropriate initial management?
 - (A) Adenosine
 - (B) Cardioversion
 - (C) Digoxin
 - (D) Furosemide
 - (E) Phenylephrine
4. Which of the following drugs causes vasodilation by producing nitric oxide?
 - (A) Hydralazine
 - (B) Nicardipine
 - (C) Phentolamine
 - (D) Prostaglandin E1
 - (E) Sodium nitroprusside

Sample R-type Items

DIRECTIONS: Each group of items below consists of lettered headings followed by a list of numbered phrases or statements. For each numbered phrase or statement, select the ONE lettered heading or component that is most closely associated with it and fill in the circle containing the corresponding letter on the answer sheet. Each lettered heading or component may be selected once, more than once, or not at all.

- (A) Acute pericarditis
- (B) Cardiogenic shock
- (C) Chronic constrictive pericardiopathy
- (D) Mitral valve disease
- (E) Myocarditis
- (F) Pericardial tamponade
- (G) Pleuritis
- (H) Pulmonary embolism
- (I) Rheumatic fever
- (J) Spontaneous pneumothorax

For each patient with chest pain, select the most likely mechanism causing the symptoms.

5. A previously healthy 18-year-old man comes to the emergency department 12 hours after the onset of chest pain in the area of the trapezius muscle. He has had an upper respiratory tract infection for 9 days. A friction rub is heard over the precordium. An ECG shows elevation of the J point of all leads except aVR and V1. After administration of aspirin, the pain subsides.
6. A 42-year-old woman comes to the emergency department 1 hour after the sudden onset of chest pain, cough, dyspnea, tachypnea, and marked anxiety. Two days ago, she underwent right hemicolectomy for cancer of the ascending colon. An accentuated pulmonary S2 is heard on auscultation. An ECG shows nonspecific ST-segment and T-wave changes. Leukocyte count is 12,000/mm³. An x-ray film of the chest shows no pulmonary infiltrates or pleural effusions. Arterial blood gas analysis on room air shows a PCO₂ of 30 mmHg and a PO₂ of 55 mmHg.

- (A) Acute bronchitis
- (B) Asthma
- (C) Chronic obstructive pulmonary disease
- (D) Congestive heart failure
- (E) Cystic fibrosis
- (F) Metastatic cancer to the lung
- (G) Pneumonia
- (H) Primary lung carcinoma
- (I) Primary pulmonary hypertension
- (J) Pulmonary embolism
- (K) Sarcoidosis
- (L) Sleep apnea
- (M) Spontaneous pneumothorax
- (N) Tuberculosis
- (O) Viral pleurisy

For each patient with a cough, select the most likely diagnosis.

7. A 59-year-old man has had a cough productive of blood-tinged sputum for 8 hours. He has had temperatures to 38.9 C (102 F), malaise, shortness of breath, and a cough productive of yellow phlegm for 2 days. He has smoked two packs of cigarettes daily for 40 years. Rhonchi, wheezes, and egophony are heard over the right hemithorax. An x-ray film of the chest shows a dense lobar infiltrate in the right hemithorax.
8. A 25-year-old man has had a cough productive of blood-streaked sputum for 5 days. Over the past 6 years, he has had similar symptoms once or twice annually that have been successfully treated with antibiotic therapy. He has had a cough for 12 years, recently productive of one to two cups of yellow-green sputum daily. He does not smoke. He takes lipase, protease, and amylase for malabsorption. Coarse rhonchi bilaterally and wheezes are heard. An x-ray film of the chest shows increased interstitial markings bilaterally, nodular lesions, and hyperinflation.

Sample R-type Items (cont)

- (A) Acute bronchitis
- (B) Asthma
- (C) Chronic obstructive pulmonary disease
- (D) Congestive heart failure
- (E) Cystic fibrosis
- (F) Metastatic cancer to the lung
- (G) Pneumonia
- (H) Primary lung carcinoma
- (I) Primary pulmonary hypertension
- (J) Pulmonary embolism
- (K) Sarcoidosis
- (L) Sleep apnea
- (M) Spontaneous pneumothorax
- (N) Tuberculosis
- (O) Viral pleurisy

9. A 47-year-old woman has had a cough productive of scant amounts of yellow phlegm and temperatures to 38.3 C (101 F) for 3 months. On one occasion, the phlegm was blood streaked. She has had a 10-kg (21-lb) weight loss over the past 4 months. She does not smoke. She immigrated from Vietnam 20 years ago, and medical records are unavailable. Coarse upper lobe crackles and rhonchi are heard bilaterally. An x-ray film of the chest shows multiple bilateral upper lobe cavities with surrounding infiltrates in the lungs.

Sample G set

Directions: Use the following scenario to answer questions 10 – 11.

An obese 10-year-old boy with diabetes mellitus is admitted to the hospital because of severe ketoacidosis and cardiovascular collapse. Initial management consists of cardiac monitoring and intravenous administration of fluids, electrolytes, and insulin. Because of difficulty obtaining satisfactory peripheral venous access, the left femoral vein is catheterized percutaneously. Six hours later, his mental status is improved, blood pressure is 120/70 mmHg and serum glucose concentration is 250 mg/dL. Physical examination at this time shows a cold left foot with diminished pulses compared with those of the right foot.

10. Which of the following is the most likely explanation for the diminished pulses?

- (A) Diabetic arteriopathy
- (B) Inadvertent injury of the femoral artery
- (C) Intense arteriolar constriction induced by hyperosmolality
- (D) Paradoxical embolus from the femoral vein
- (E) Thrombosis of the catheterized femoral vein

11. A deficit in which of the following electrolytes is most likely to cause death in this patient?

- (A) Bicarbonate
- (B) Calcium
- (C) Chloride
- (D) Potassium
- (E) Sodium

ITEM FORMATS ON THE PART 1 (WRITTEN) EXAMINATION

Answers to Sample Questions

- 1. A
- 2. B
- 3. B
- 4. E

- 5. A
- 6. H
- 7. G

- 8. E
- 9. N
- 10. B
- 11. D

ABA SAMPLE MOCA QUESTIONS

1. A 72-year-old woman with stable angina is undergoing bowel resection. Anesthesia is induced with etomidate. Five minutes after starting isoflurane 1% in nitrous oxide 50%, her blood pressure decreases from 110/84 mmHg to 70/40 mmHg. Which of the following is the most likely cause?
 - A. Adrenocortical suppression produced by etomidate
 - B. Coronary steal produced by isoflurane
 - C. Direct myocardial depression produced by isoflurane
 - D. Vasodilation produced by isoflurane
2. A 38-year-old woman has a three-month history of intermittent, throbbing headaches in the left hemicranial area with associated nausea and photophobia. Examination shows no abnormalities except for a left lateral gaze palsy. Which of the following is the most appropriate initial diagnostic study?
 - A. Brainstem auditory evoked potentials
 - B. Cerebral angiography
 - C. EEG
 - D. Lumbar puncture
 - E. MRI of the head
3. Cessation of smoking 24 hours preoperatively is associated with which of the following perioperative findings?
 - A. Decreased carbon monoxide in blood
 - B. Decreased need for postoperative ventilatory support
 - C. Decreased sputum volume
 - D. Improved ciliary beating in the airways
4. A patient has seizure activity 15 seconds after receiving an injection of 0.25% bupivacaine 2 mL with epinephrine 1:200,000 for stellate ganglion block. Which of the following is the most likely cause of the seizure?
 - A. Anaphylactoid reaction to bupivacaine
 - B. Injection into the subarachnoid space
 - C. Injection into the vertebral artery
 - D. Intravenous injection
 - E. Reaction to epinephrine
5. A 95-year-old man is brought to the emergency department after falling and striking his forehead. He is awake and alert and is able to walk into the emergency department on his own. Blood pressure is 85/40 mmHg, and heart rate is 58 bpm. Arterial blood gas analysis shows pH is 7.29, PaCO₂ is 39 mmHg, and PaO₂ is 100 mmHg. Physical examination shows severe weakness of both arms. Serum lactate concentration is elevated. Which of the following is the most likely cause of these findings?
 - A. Anterior cord syndrome
 - B. Brown-Séquard (hemisection of cord) syndrome
 - C. Central cord syndrome
 - D. Posterior cord syndrome
 - E. Wernicke-Korsakoff syndrome
6. A patient with chronic renal failure has a serum potassium concentration of 7.5 mEq/L. Which of the following is the most appropriate method for decreasing the serum potassium concentration in this patient?
 - A. CRRT
 - B. Conventional hemodialysis
 - C. Ion-exchange resins
 - D. Loop diuretic
 - E. Slow continuous ultrafiltration

7. During controlled ventilation, which of the following causes an increase in PETCO₂ with a normal waveform on the capnograph?

- A. Bronchospasm
- B. Rapid blood loss
- C. Endobronchial migration of the endotracheal tube
- D. Release of a thigh tourniquet

8. Adenosine is most effective for treatment of which of the following conditions?

- A. Atrial fibrillation
- B. Paroxysmal supraventricular tachycardia
- C. Torsades de pointes
- D. Ventricular tachycardia

9. A 43-year-old man has been in a coma in the ICU since sustaining a closed head injury in a motor vehicle accident two days ago. ICP is increased, and he is receiving mechanical ventilation; diuretic therapy has not been administered. He has been hemodynamically stable with blood pressure of 112/68 mmHg and heart rate of 78 bpm. Over the next 12 hours, the patient's urine output markedly decreases. The following laboratory values are obtained:

Serum osmolality	258 mOsm/kg
Serum sodium	124 mEq/L
Urine osmolality	225 mOsm/kg
Urine sodium	40 mEq/L

Which of the following is the most appropriate next step in management?

- A. Desmopressin (DDAVP)
- B. Lithium
- C. Mithramycin
- D. Infusion of 3% saline
- E. Water restriction

10. A 100-kg, 47-year-old woman with type 1 diabetes mellitus has a painful left foot one month after undergoing vaginal hysterectomy in the lithotomy position during continuous epidural anesthesia. On current physical examination, there is weakness of foot dorsiflexion only. Which of the following is the most likely diagnosis?

- A. Common peroneal neuropathy
- B. Diabetic peripheral neuropathy
- C. Lumbar radiculopathy
- D. Meralgia paresthetica
- E. Spinal stenosis

11. A 48-year-old man has onset of diarrhea while being treated with intravenous antibiotics for pneumonia. He has been receiving continuous enteral tube feeding formula. As assay of stool for *Clostridium difficile* cytotoxin is negative. Which of the following is the most appropriate next step in management?

- A. Add fiber to the tube feeding formula.
- B. Begin intravenous metronidazole
- C. Change to elemental tube feeding formula
- D. Change to parenteral nutrition
- E. Repeat the *C. difficile* cytotoxin assay.

12. In an 11-month-old boy with a large anterior mediastinal mass, the administration of muscle relaxants is associated with an increased risk for

- A. aspiration of gastric contents
- B. hyperkalemic response
- C. tracheobronchial collapse

D. ventricular arrhythmias

13. During a lumbar sympathetic block under fluoroscopic guidance, a bandlike striated pattern is seen after contrast medium has been injected through the needle. Which of the following muscles has most likely been entered?

- A. Erector spinae
- B. Latissimus dorsi
- C. Longus colli
- D. Psoas major
- E. Quadratus lumborum

14. A 22-year-old woman is brought to the emergency department by her husband because of a one-day history of a progressively worsening, persistent headache that has not responded to acetaminophen or ibuprofen. She also has neck stiffness, diplopia, nausea, fever, and confusion. Which of the following is the most likely explanation for these findings?

- A. Acute Lyme disease
- B. Bacterial meningitis
- C. Basilar migraine
- D. Brain tumor
- E. Cluster headache

15. A 4-year old boy is brought to the emergency department because of sudden onset of fever, lethargy, and drooling. He insists on sitting up and leaning forward. Examination shows stridor with intercostal retractions. Which of the following is the most appropriate management?

- A. Examination of the throat with a tongue blade
- B. Direct laryngoscopy with sedation
- C. Direct laryngoscopy during general anesthesia
- D. Emergency tracheostomy with local anesthesia

16. A 44-year-old man has chronic burning pain in the right ankle six months after undergoing fasciotomy for treatment of a crush injury. He has been unable to return to work. Treatment includes administration of progressively increasing doses of sustained-release morphine and nonsteroidal anti-inflammatory drugs. The most appropriate additional treatment is administration of which of the following drugs?

- A. Amitriptyline
- B. Baclofen
- C. Diazepam
- D. Haloperidol
- E. Phenytoin

17. A 45-year-old woman who had a hysterectomy six weeks ago has severe burning pain in her lower abdomen. Palpitation along the right lateral end of the scar exacerbates burning pain and sets off a tingling sensation. Which of the following best describes this kind of pain?

- A. Inflammatory
- B. Myofascial
- C. Neuropathic
- D. Somatic
- E. Visceral

18. An anesthetized and paralyzed patient is mechanically ventilated. The unidirectional valve on the inspiratory limb of the circle system is found to be incompetent, and a replacement is not immediately available. The most appropriate management is to increase the

- A. fresh gas flow rate
- B. I:E ratio
- C. inspired oxygen concentration

D. respiratory rate

19. A 4-year old boy is scheduled to undergo a bone marrow biopsy, and his parents are concerned about how to best prepare him for the procedure. Which of the following is the most appropriate response?

- A. Discuss the procedure only if he asks about what will happen
- B. Do not discuss the procedure with him
- C. Explain to him in detail what will happen
- D. Explain what will happen using terms he uses regularly

20. A 45-year-old woman who sustained a subarachnoid hemorrhage 18 hours ago develops a severe headache and becomes unresponsive. Which of the following is the most likely cause of this patient's change in mental status?

- A. Cerebral edema
- B. Cerebral vasospasm
- C. Hypertensive encephalopathy
- D. Second subarachnoid hemorrhage

Answers

- 1. D
- 2. E
- 3. A
- 4. C
- 5. C
- 6. B
- 7. D
- 8. B
- 9. E
- 10. A
- 11. E
- 12. C
- 13. D
- 14. B
- 15. C
- 16. A
- 17. C
- 18. A
- 19. D
- 20. D