

# THE AMERICAN BOARD OF ANESTHESIOLOGY

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## SAMPLE BASIC EXAMINATION QUESTIONS WITH ANSWER KEY

## BASIC EXAMINATION QUESTIONS

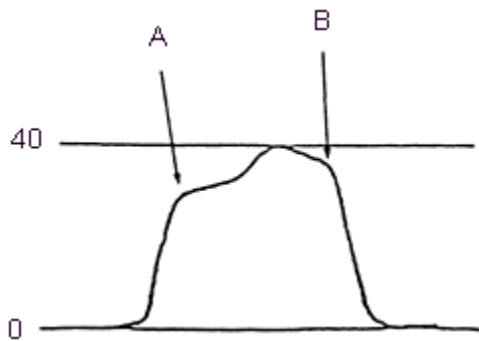
1. Which of the following nerves should be blocked for an operation at the medial aspect of the lower leg?
  - A. Femoral
  - B. Sciatic
  - C. Common peroneal
  - D. Tibial
  
2. A patient is scheduled to undergo laparoscopic cholecystectomy. Thirty minutes after receiving premedication with morphine and midazolam, she suddenly develops right upper quadrant abdominal pain and nausea. Which of the following is the most appropriate therapy for this patient's pain?
  - A. Flumazenil
  - B. Ketorolac
  - C. Naloxone
  - D. Ranitidine
  
3. The relaxant effect of vecuronium on the neuromuscular system is augmented by adding a volatile anesthetic to a nitrous oxide/opioid anesthetic because of a decrease in:
  - A. Muscle blood flow.
  - B. Release of acetylcholine at the motor end-plate.
  - C. Reuptake of acetylcholine at the motor end-plate.
  - D. Sensitivity of the postjunctional membrane to depolarization.
  
4. An 85-kg, 35-year-old woman has persistent somnolence after a prolonged lower extremity orthopedic procedure during spinal anesthesia. During the last two hours of surgery, midazolam 5 mg and fentanyl 150  $\mu\text{g}$  were administered for increasing restlessness and discomfort. Which of the following is most likely to result from administration of flumazenil?
  - A. Grand mal seizure
  - B. Hypertension and tachycardia
  - C. Reversal of somnolence followed by re sedation
  - D. Sudden onset of pulmonary edema

5. A 68-year-old woman with primary hyperparathyroidism is scheduled to undergo parathyroidectomy. Her serum calcium concentration is 15 mg/dL. The most appropriate initial management is intravenous administration of:
- A. Indomethacin
  - B. Magnesium sulfate
  - C. Methylprednisolone
  - D. Normal saline
6. Which of the following tests most reliably predicts the likelihood that a patient will develop malignant hyperthermia?
- A. Calcium uptake assay in skeletal muscle biopsy
  - B. Genetic testing of the ryanodine receptor
  - C. Halothane-caffeine contracture test
  - D. Serum creatine kinase concentration
7. 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%.
8. An adult patient with mild hypothermia is anesthetized with 1 MAC of isoflurane. Which of the following is the most effective physiologic mechanism for maintaining body temperature in this patient?
- A. Nonshivering thermogenesis
  - B. Redistribution of heat from the core to the periphery
  - C. Shivering thermogenesis
  - D. Vasoconstriction
9. A 72-year-old man who has just received midazolam for an endoscopic procedure of the upper gastrointestinal tract. Sedation is easily antagonized by flumazenil. Although the endoscopist asks to send the patient home in one hour, why should this patient remain hospitalized for observation?
- A. Flumazenil has low affinity for benzodiazepine receptors
  - B. Flumazenil has moderate intrinsic agonist activity
  - C. Late onset seizure is likely
  - D. Midazolam has a longer duration of action than flumazenil

10. Which of the following factors exerts the greatest effect on the extent of spread of local anesthetic following subarachnoid block with hyperbaric bupivacaine?
- A. Added epinephrine
  - B. Barbotage
  - C. Patient position
  - D. Total dose of drug
11. A 17-year-old boy develops pulmonary edema after resolution of postoperative laryngospasm. While breathing 100% oxygen, SpO<sub>2</sub> is 80%. Which of the following is the most appropriate management?
- A. Administration of albuterol
  - B. Administration of furosemide
  - C. Infusion of nitroglycerin
  - D. Positive-pressure ventilation
12. An otherwise healthy 61-year-old man receives a spinal anesthetic for transurethral resection of the prostate (TURP). Forty-five minutes after the start of the procedure, he suddenly develops nausea, diaphoresis, and sharp pain in the left shoulder. Which of the following is the most likely cause?
- A. Angina pectoris
  - B. Bladder perforation
  - C. Hyponatremia
  - D. Inadequate spinal sensory level
13. A 36-year-old woman is receiving general anesthesia for a diagnostic laparoscopy in the Trendelenburg position with carbon dioxide insufflation. During a 15-minute period after induction, her SpO<sub>2</sub> decreases from 99% to 90% and PETCO<sub>2</sub> increases from 38 to 43 mmHg. FiO<sub>2</sub> is 0.3; all ventilator settings have been constant. Which of the following is the most likely cause of the decrease in SpO<sub>2</sub>?
- A. Carbon dioxide embolus
  - B. Compression of the vena cava
  - C. Decreased diaphragmatic excursion
  - D. Pneumothorax
14. Two hours after a laparoscopic cholecystectomy, an obese 45-year-old woman is receiving intravenous patient-controlled analgesia with morphine. Her SpO<sub>2</sub> is 92% on room air. Which of the following is the most likely cause?
- A. Absorption of carbon dioxide from the abdomen
  - B. Hypoventilation
  - C. Impaired oxygen diffusion
  - D. Increased dead space

15. In a patient receiving pressure support ventilation, pressure support breaths are triggered by achieving which of the following preset milestones?
- A. A decrease in airway pressure
  - B. An increase in airway pressure
  - C. An inspiratory flow rate
  - D. An inspired volume
16. A healthy 42-year-old man has an increase in heart rate from 60 bpm to 120 bpm during induction of anesthesia. Which of the following factors is most likely to satisfy the increased metabolic demand of the myocardium?
- A. Decreased coronary artery resistance
  - B. Increased coronary perfusion pressure
  - C. Increased oxygen extraction by the myocardium
  - D. Shift to anaerobic metabolism
17. Which of the following laboratory values is most likely to confirm adequate synthetic hepatic function?
- A. Partial thromboplastin time
  - B. Prothrombin time
  - C. Serum alanine aminotransferase concentration
  - D. Total serum bilirubin concentration
18. In a patient undergoing extracorporeal shock wave lithotripsy, ventricular dysrhythmias are best prevented by:
- A. Beta-adrenergic blockade.
  - B. ECG synchronization.
  - C. Epidural blockade to T4.
  - D. General anesthesia.
19. Pressure support ventilation:
- A. Can only be used in a spontaneously breathing patient.
  - B. Cannot be used in conjunction with continuous positive airway pressure.
  - C. Delivers a specified volume regardless of airway pressure.
  - D. Increases the work of breathing.
20. Compared with a semiclosed circle system, the Bain circuit provides:
- A. Better scavenging of expired gases.
  - B. Less rebreathing of carbon dioxide.
  - C. A lower fresh gas flow requirement.
  - D. More rapid change in inspired gas concentration.

21.

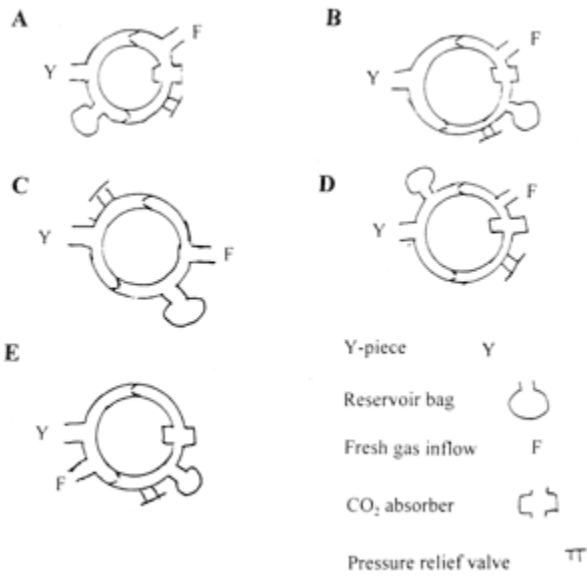


The capnograph waveform shown above was obtained from a patient undergoing hip surgery in the lateral position. Which of the following best explains the findings between point A and point B?

- A. Decreased cardiac output
  - B. Excessive tidal volume
  - C. Incompetent expiratory valve
  - D. Patient position
22. A 67-year-old man who developed a rash with past administration of penicillin is undergoing open reduction of a femur fracture. The surgeon asks if cefazolin can be administered to this patient. Which of the following is the most appropriate action by the anesthesiologist?
- A. Administer cefazolin
  - B. Administer hydrocortisone, followed by cefazolin
  - C. Administer gentamicin instead of cefazolin
  - D. Administer vancomycin instead of cefazolin
23. Which of the following decreases the MAC of isoflurane?
- A. Acute cocaine intoxication
  - B. Chronic ethanol abuse
  - C. Metabolic alkalosis
  - D. Symptomatic hyponatremia
24. The primary toxic effect of bupivacaine on the cardiovascular system is:
- A. Blockade of norepinephrine release.
  - B. Coronary vasoconstriction.
  - C. Delay of ventricular repolarization.
  - D. Increased atrial excitability.

25. Which of the following conditions causes a shift in the oxyhemoglobin dissociation curve to the right?
- A. Alkalosis
  - B. Carboxyhemoglobinemia
  - C. Decreased 2,3-DPG concentration
  - D. Hyperthermia
26. A 65-year-old man with hypothyroidism is undergoing emergency appendectomy. Which of the following findings is most likely in this patient?
- A. Decreased MAC for isoflurane
  - B. Decreased myocardial contractility
  - C. Decreased response to catecholamines
  - D. Increased baroreceptor reflexes
27. Hypotension is **LEAST** likely to occur following induction with which of the following anesthetic agents?
- A. Etomidate
  - B. Methohexital
  - C. Midazolam
  - D. Propofol
28. Each of the following drugs causes enhanced activity of the gamma-aminobutyric acid receptor **EXCEPT**:
- A. Etomidate.
  - B. Ketamine.
  - C. Midazolam.
  - D. Propofol.

29. Which system will prevent rebreathing of carbon dioxide regardless of the mode of ventilation?



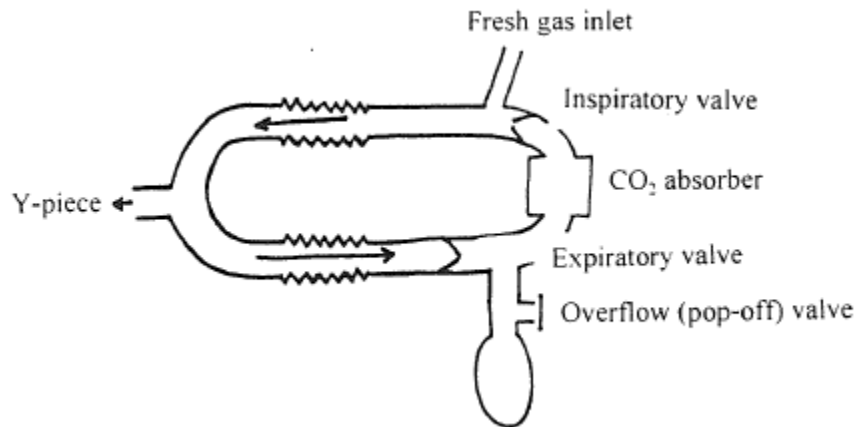
- A. A
- B. B
- C. C
- D. D
- E. E

30. A patient with myotonic dystrophy who receives succinylcholine is at increased risk for which of the following?

- A. Excessive fasciculations
- B. Hyperkalemia
- C. Prolonged neuromuscular blockade
- D. Muscle rigidity



31.



Which of the following components is misplaced in the circle system shown in the above illustration?

- A. Fresh gas inlet
  - B. Carbon dioxide absorber
  - C. Expiratory valve
  - D. Overflow (pop-off) valve
32. A new intravenous anesthetic is found to have a very large volume of distribution. This drug is most likely to have which of the following properties?
- A. Hydrophilic with a high degree of plasma protein binding
  - B. Hydrophilic with a large nonionized fraction
  - C. Hydrophilic with a low degree of tissue protein binding
  - D. Lipophilic with a high degree of tissue protein binding
33. Which of the following is correct concerning anaphylactic and anaphylactoid reactions?
- A. Anaphylactoid reactions are mediated by IgE.
  - B. Anaphylactic reactions occur on the first exposure to the allergen.
  - C. Endogenous histamine release occurs only during an anaphylactoid reaction.
  - D. They are clinically indistinguishable.
34. Which of the following drugs has the longest duration of action in a patient with renal failure?
- A. Neostigmine
  - B. Rocuronium
  - C. Succinylcholine
  - D. Vecuronium

35. A patient with diabetic ketoacidosis is scheduled for an emergent laparotomy. Which of the following best explains the decrease in serum potassium concentration that occurs in this patient following administration of insulin?
- A. Dilutional hypokalemia follows free water retention from decreased osmotic diuresis
  - B. Extracellular potassium is actively transported with glucose into cells
  - C. Insulin enhances renal excretion of potassium
  - D. Intracellular potassium is exchanged for extracellular glucose
36. In an anesthesia machine with a circle system, which of the following findings indicates a leak in the oxygen flowmeter tube above the level of the bobbin?
- A. Activation of the machine fail-safe alarm
  - B. A decrease in the expired tidal volume
  - C. A decrease in  $FiO_2$  when oxygen and nitrous oxide are administered concurrently
  - D. Failure of the oxygen bobbin to rise when turned on
37. Instillation of local anesthetic into the trachea via the cricothyroid membrane mimics the sensory effect seen following blockade of which of the following nerves?
- A. Glossopharyngeal nerve
  - B. Hypoglossal nerve
  - C. Internal branch of the superior laryngeal nerve
  - D. Recurrent laryngeal nerve
38. Which of the following best explains the failure of nondepolarizing neuromuscular blocking agents to produce fasciculation?
- A. Absence of acetylcholine receptor activation
  - B. Binding in the ion channel of the acetylcholine receptor
  - C. Binding to agonist and antagonist sites on the acetylcholine receptor
  - D. Binding to presynaptic and postsynaptic acetylcholine receptors
39. A 40-year-old woman is receiving general anesthesia with nitrous oxide and isoflurane for intraperitoneal insufflation of carbon dioxide for laparoscopic cholecystectomy. Her systolic blood pressure suddenly decreases to 70 mmHg. Which of the following findings does **NOT** indicate a carbon dioxide embolus?
- A. Decreased  $PETCO_2$
  - B. Hemodynamic improvement with hyperventilation
  - C. Hemodynamic improvement with discontinuation of nitrous oxide
  - D. Increased  $PETCO_2$

40. Coughing that occurs during awake intubation is prevented by local anesthetic block of which of the following nerves?
- A. Superior laryngeal and glossopharyngeal
  - B. Superior laryngeal and hypoglossal
  - C. Recurrent laryngeal and glossopharyngeal
  - D. Recurrent laryngeal and superior laryngeal
41. What is the **MOST** likely explanation for the initial reduction in core temperature during general anesthesia?
- A. Ablation of thermoregulatory vasoconstriction
  - B. Conductive heat loss
  - C. Evaporative heat loss in the respiratory tract
  - D. Redistribution of heat from the core to the periphery
42. Which of the following is characteristic of the pharmacokinetics of alfentanil?
- A. Clearance is greater than that of fentanyl
  - B. Protein binding is minimal
  - C. The majority of alfentanil in plasma is ionized
  - D. Volume of distribution is smaller than that of fentanyl
43. 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 and an  $\text{FiO}_2$  of 0.5. His tidal volume is 350 mL. Over one hour, his  $\text{SpO}_2$  decreases from 98% to 84%, and then improves to 92% when  $\text{FiO}_2$  is increased to 1.0. Which of the following is the **MOST** likely cause of his hypoxemia?
- A. Decreased functional residual capacity
  - B. Increased dead space ventilation
  - C. Inhibition of hypoxic pulmonary vasoconstriction
  - D. Room air admixture during inspiration
44. A 40-year-old man who is scheduled for 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 nerves?
- A. Axillary
  - B. Intercostobrachial
  - C. Lateral antebrachial cutaneous
  - D. Musculocutaneous

45. Redistribution from the brain to which of the following sites is **PRIMARYLY** responsible for emergence after a single dose of propofol?
- A. Fat
  - B. Liver
  - C. Lung
  - D. Skeletal muscle
46. An anesthesia machine is set to deliver oxygen 2 L/min, nitrous oxide 2 L/min, and sevoflurane. 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. Disconnection of the wall oxygen hose
  - D. Presence of the oxygen analyzer in the expiratory limb
47. An induction dose of ketamine is **MOST** likely to have which of the following effects?
- A. Analgesia
  - B. Attenuation of respiratory response to carbon dioxide
  - C. Decreased cerebral metabolic rate
  - D. Preservation of laryngeal reflexes
48. As compared to an intravenous dose of morphine, what is the **MOST** likely explanation for the **DECREASED** duration of action of an intravenous dose of fentanyl?
- A. It has a greater lipid solubility
  - B. It has increased hepatic metabolism
  - C. It has less protein binding
  - D. It has a shorter elimination half-life
49. The standard error of the mean (SE) describes which of the following?
- A. The precision of the population mean
  - B. The range of the sample values
  - C. The limits of the 95% confidence interval
  - D. The deviation about the median of the study group
50. Pulse oximetry accurately reflects SaO<sub>2</sub> in which of the following situations?
- A. Administration of indocyanine green
  - B. Carboxyhemoglobinemia
  - C. 40% fetal hemoglobin concentration
  - D. Methemoglobinemia

51. An otherwise healthy patient with a fasting blood glucose of 100 mg/dL is receiving a four-hour general anesthetic for repair of tendon lacerations. What is his expected blood glucose concentration on emergence?
- A. Marked hypoglycemia
  - B. Mild hypoglycemia
  - C. Mild hyperglycemia
  - D. Marked hyperglycemia
52. Which of the following drugs **INCREASES** gastric pH while **DECREASING** gastric volume?
- A. Glycopyrrolate
  - B. Magnesium trisilicate
  - C. Metoclopramide
  - D. Ranitidine
53. Which of the following conditions is **NOT** associated with upregulation of the postjunctional acetylcholine receptors at the neuromuscular junction?
- A. Burn injuries
  - B. Myasthenia gravis
  - C. Prolonged bed rest
  - D. Prolonged use of neuromuscular blocking agents
54. What characteristic of nitrous oxide **MOST** likely explains why its alveolar and inspired concentrations equilibrate more rapidly than those of desflurane?
- A. Higher vapor pressure
  - B. Lower blood gas solubility
  - C. Creation of a second gas effect
  - D. Delivery at a higher inspired concentration
55. What is the **PRIMARY purpose** of denitrogenation prior to anesthetic induction?
- A. Improving matching of ventilation and perfusion
  - B. Increasing contribution of second gas effect to rate of induction
  - C. Increasing oxygen reserve in the functional residual capacity
  - D. Maximizing arterial oxygen content

56. 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
57. What is the **MOST** likely reason that desflurane is delivered using a vaporizer that contains internal heaters?
- A. Heat decreases the drug's viscosity
  - B. Desflurane does not vaporize adequately at room temperature
  - C. Heat increases the drug's oil:gas partition coefficient
  - D. Heat prevents fluctuations of vapor pressure
58. An otherwise healthy 70-year-old man receives 12 units of packed red blood cells for persistent diffuse bleeding during a suprapubic prostatectomy. Hemoglobin concentration is 11 g/dL; platelet count is 55,000/mm<sup>3</sup>; plasma fibrinogen concentration is 180 mg/dL; prothrombin time is 14 sec; and partial thromboplastin time is 35 sec. The **MOST** appropriate therapy is administration of which of the following?
- A. Cryoprecipitate
  - B. Desmopressin (DDAVP)
  - C. Epsilon-aminocaproic acid
  - D. Platelets
59. What is the expected mixed venous oxygen tension, in mmHg, in a normal adult after breathing 100% oxygen for 10 minutes?
- A. 573
  - B. 150
  - C. 95
  - D. 45
60. Which of the following drugs has the **SHORTEST** elimination half-life?
- A. Flumazenil
  - B. Diazepam
  - C. Lorazepam
  - D. Midazolam

## BASIC ANSWER KEY

Question #	Key	Question #	Key
1	A	31	A
2	C	32	D
3	D	33	D
4	C	34	A
5	D	35	B
6	C	36	C
7	B	37	D
8	D	38	A
9	D	39	C
10	C	40	D
11	D	41	D
12	B	42	D
13	C	43	A
14	B	44	B
15	A	45	D
16	A	46	B
17	B	47	A
18	B	48	A
19	A	49	A
20	D	50	C
21	D	51	C
22	A	52	D
23	D	53	B
24	C	54	D
25	D	55	C
26	B	56	A
27	A	57	D
28	B	58	D
29	B	59	D
30	D	60	A