

# THE AMERICAN BOARD OF ANESTHESIOLOGY

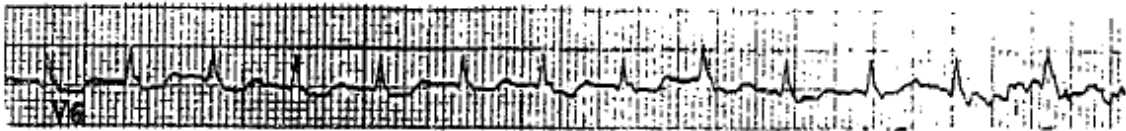
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## SAMPLE ADVANCED EXAMINATION QUESTIONS WITH ANSWER KEY

## ADVANCED EXAMINATION QUESTIONS

1. A 60-year-old man with chronic obstructive pulmonary disease who has been mechanically ventilated for the past two weeks develops persistent, profound weakness during discontinuation of mechanical ventilation. During this time, he has received morphine, cis-atracurium, midazolam, and prednisone. Which of the following is the most likely cause of the weakness?
  - A. Abnormal level of plasma cholinesterase
  - B. Accumulation of laudanosine
  - C. Corticosteroid myopathy
  - D. Muscle atrophy
2. During an aortic aneurysm repair, PETCO<sub>2</sub> 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.

3.

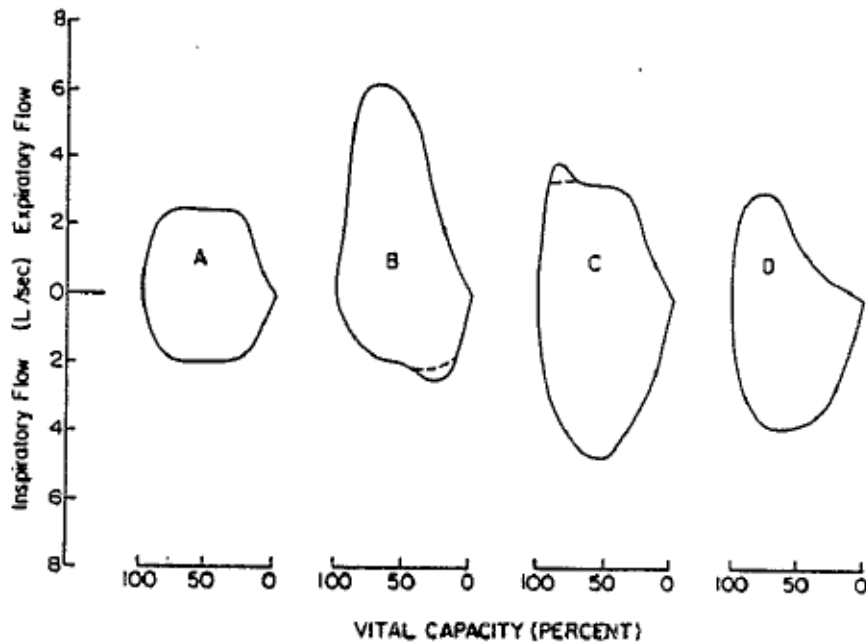


The first ECG rhythm strip (25 mm/sec sweep speed) shown above is from a 62-year-old man who underwent uncomplicated cataract surgery 30 minutes ago. Administration of which of the following medications to this patient is most likely to cause the rhythm shown in the second rhythm strip?

- A. Adenosine
- B. Esmolol
- C. Digoxin
- D. Lidocaine

4. Compared with use of alpha-stat blood gas management in a patient undergoing cardiopulmonary bypass, use of pH stat management is associated with:
- A. Decreased carbon dioxide content in blood.
  - B. Decreased P50.
  - C. Improved myocardial preservation.
  - D. Increased cerebral blood flow.

5.



A 20-year-old man with a fixed intrathoracic obstruction develops dyspnea. Which flow-volume loop shown above best illustrates this patient's condition?

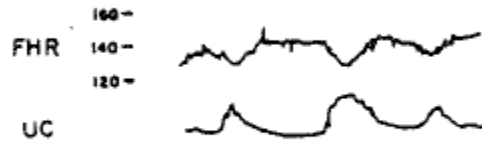
- A. A
  - B. B
  - C. C
  - D. D
6. A 14-year-old girl with status asthmaticus is receiving oxygen 3 L/min through nasal prongs. Heart rate is 110 bpm. Arterial blood gas values are PaO<sub>2</sub> 90 mmHg, PaCO<sub>2</sub> 32 mmHg, and pH 7.46. If ventilation appears unchanged, which of the following is the most reliable sign of impending respiratory failure?
- A. PaO<sub>2</sub> of 80 mmHg
  - B. PaCO<sub>2</sub> of 39 mmHg
  - C. Heart rate of 140 bpm
  - D. Deterioration of mental status

7. A 70-kg 32-year-old man who is scheduled for a small-bowel resection has had an acute exacerbation of ulcerative colitis with profuse diarrhea for the past two days. Which of the following arterial blood gas values are most likely to be seen in this patient?

	<b>pH</b>	<b>PaCO<sub>2</sub> (mmHg)</b>	<b>PaO<sub>2</sub> (mmHg)</b>	<b>HCO<sub>3</sub><sup>-</sup> (mEq/L)</b>
(A)	7.22	38	95	22
(B)	7.23	24	98	16
(C)	7.38	55	59	29
(D)	7.50	46	80	30

- A. (A)  
B. (B)  
C. (C)  
D. (D)
8. Which of the following is the most appropriate pharmacologic therapy for trigeminal neuralgia?
- A. Buprenorphine  
B. Carbamazepine  
C. Chlorpromazine  
D. Pentazocine
9. A patient with Wolff-Parkinson-White syndrome develops atrial fibrillation with a rapid narrow-complex ventricular response. Which of the following drugs will most effectively control the ventricular rate?
- A. Adenosine  
B. Digoxin  
C. Esmolol  
D. Verapamil
10. A 1-month-old infant born at term is scheduled for repair of an umbilical hernia. Induction of anesthesia with sevoflurane is planned. Compared with an adult, induction of anesthesia is more rapid in this patient because of a:
- A. Greater fraction of cardiac output to the vessel-rich organs.  
B. Greater functional residual capacity in relation to weight  
C. Greater MAC.  
D. Higher blood gas solubility.

11.



A 26-year-old primigravid woman at 38 weeks' gestation is receiving an epidural infusion of 0.1% bupivacaine for treatment of pain associated with labor. Based on the fetal heart tracing shown above, which of the following is the most appropriate next step in management?

- A. Continue the present anesthetic management
- B. Discontinue the epidural infusion
- C. Administer intravenous phenylephrine
- D. Adjust the dose of epidural anesthetic for cesarean delivery

12. A 6-week-old infant is scheduled for operative repair of pyloric stenosis. Which of the following laboratory values are most likely to be found at the time of diagnosis?

	<b>Sodium (mEq/L)</b>	<b>Chloride (mEq/L)</b>	<b>Potassium (mEq/L)</b>	<b>Bicarbonate (mEq/L)</b>
(A)	130	83	2.4	33
(B)	130	85	3.0	18
(C)	132	90	5.0	31
(D)	140	98	3.0	18

- A. (A)
- B. (B)
- C. (C)
- D. (D)

13. A 5-day-old neonate is undergoing repair of a left diaphragmatic hernia. Anesthesia is being maintained with oxygen, fentanyl, isoflurane, and vecuronium. Ten minutes after administration of vecuronium with the left thorax open, SpO<sub>2</sub> measured in both the right foot and the right hand decreases from 90% to 60% and the peak inspiratory pressure increases from 20 to 35 cmH<sub>2</sub>O. Which of the following is the most appropriate next step in management?

- A. Chest x-ray
- B. Institution of hyperventilation
- C. Placement of a right-sided chest tube
- D. Rapid expansion of the intravascular volume

14. A 36-year-old woman with regional enteritis who has been receiving hyperalimentation for the past three weeks is scheduled to undergo exploratory laparotomy. Laboratory studies show a prothrombin time of 18 sec (INR = 1.5) and a platelet count of 125,000/mm<sup>3</sup>. The most appropriate management is administration of:
- A. Cryoprecipitate
  - B. Fresh frozen plasma
  - C. Platelets
  - D. Vitamin K
15. In a patient who recently underwent heart transplantation, administration of which of the following agents is most likely to affect heart rate?
- A. Atropine
  - B. Edrophonium
  - C. Isoproterenol
  - D. Sufentanil
16. A 44-week postconceptual age, former preterm neonate has received general anesthesia for an inguinal herniorrhaphy. This neonate should be hospitalized for 24 hours after surgery because of an increased risk for which of the following?
- A. Hypotension
  - B. Laryngospasm
  - C. Postoperative apnea
  - D. Postoperative croup
17. A 9-year-old boy with von Willebrand disease develops excessive bleeding during endoscopic sinus surgery. Which of the following is the most appropriate therapy?
- A. Aminocaproic acid
  - B. Aprotinin
  - C. Cryoprecipitate
  - D. Fresh frozen plasma
18. Adenosine is most effective for treatment of which of the following conditions?
- A. Atrial fibrillation
  - B. Atrial flutter
  - C. Paroxysmal supraventricular tachycardia
  - D. Torsades de pointes

19. Ipratropium:
- A. Antagonizes vagally mediated bronchoconstriction.
  - B. Inhibits phosphodiesterase.
  - C. Inhibits the response of smooth muscle to histamine.
  - D. Inhibits vesicular reuptake of norepinephrine.
20. Which of the following findings is most likely in a patient with carcinoid syndrome?
- A. Bronchospasm
  - B. Chronic constipation
  - C. Mitral valve insufficiency
  - D. Orthostatic hypotension
21. Compared with adults, the increased basal water requirement in infants correlates best with:
- A. Greater glomerular filtration rate.
  - B. Greater insensible water loss.
  - C. Greater metabolic rate.
  - D. Smaller percentage of body water.
22. Which of the following best describes the long-term effectiveness of epidural injection of corticosteroids in the treatment of lumbar radiculopathy?
- A. It is decreased in patients older than 60 years
  - B. It is greatest in patients who have previously undergone lumbar laminectomy
  - C. It is increased when combined with a local anesthetic agent
  - D. It is inversely related to the duration of symptoms
23. 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. Postoperative pulmonary complications.
  - D. Succinylcholine-induced hyperkalemia.
24. A 56-year-old man is anesthetized for pneumonectomy. After initiation of one-lung ventilation, SpO<sub>2</sub> rapidly decreases to 69%. Which of the following is the most appropriate next step in management?
- A. Apply continuous positive airway pressure to the nonventilated lung
  - B. Increase respiratory rate and decrease tidal volume
  - C. Occlude the pulmonary artery supplying the nonventilated lung
  - D. Resume bilateral lung ventilation

25. Use of a laryngeal mask airway during general anesthesia is most appropriate for which of the following patients?
- A. A patient undergoing cesarean delivery who cannot be intubated after induction of anesthesia
  - B. A patient who has a peak inspiratory pressure greater than 30 cmH<sub>2</sub>O
  - C. A patient who has a tracheoesophageal fistula
  - D. A patient who requires emergency appendectomy two hours after eating
26. A therapeutic concentration of inhaled nitric oxide does **NOT** cause systemic hypotension because it:
- A. Has no effect on systemic vessels.
  - B. Is metabolized by pulmonary endothelium.
  - C. Is a mild inotrope.
  - D. Is rapidly inactivated by hemoglobin.
27. An axillary block is performed in a patient undergoing surgery on the distal ventral forearm and lateral aspect of the wrist. No tourniquet is to be used. Which of the following nerves will most likely require supplemental blockade?
- A. Intercostobrachial
  - B. Median
  - C. Musculocutaneous
  - D. Radial
28. Loss of beat-to-beat variability in fetal heart rate is an early sign of:
- A. Fetal head compression.
  - B. Fetal hypoxia.
  - C. Hypermagnesemia.
  - D. Umbilical cord compression.
29. A 60-year-old man who is being monitored in the ICU for an evolving myocardial infarction has the sudden onset of pulseless ventricular tachycardia. Which of the following is the most appropriate initial intervention?
- A. Administration of lidocaine
  - B. Chest compressions
  - C. Defibrillation
  - D. Precordial thump



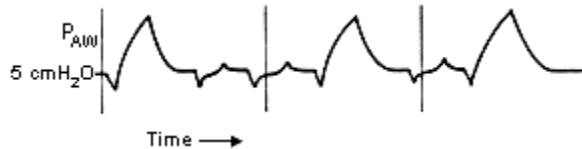
30. A hemodynamically stable 70-kg, 40-year-old man with adult respiratory distress syndrome is being mechanically ventilated with the following settings:

Tidal volume	500 mL
Respiratory rate	12/min
FiO <sub>2</sub>	0.80
I:E ratio	1:2
Positive end-expiratory pressure	5 cmH <sub>2</sub> O

Analysis of arterial blood gases shows PaO<sub>2</sub> 50 mmHg, PaCO<sub>2</sub> 40 mmHg, and pH 7.42. Which of the following changes in ventilator settings is most appropriate?

- A. Increase FiO<sub>2</sub>  
B. Increase positive end-expiratory pressure  
C. Increase tidal volume  
D. Increase ventilatory rate

- 31.



Which of the following ventilatory modes best explains the airway pressure waveform shown in the above illustration?

- A. Airway pressure release ventilation  
B. Pressure-controlled ventilation  
C. Pressure-support ventilation  
D. Synchronized intermittent mandatory ventilation with positive end-expiratory pressure
32. A 33-year-old woman is undergoing emergency laparotomy for acute abdomen. She has had palpitations, night sweats, fever, tremors, and a 20-lb weight loss over the past two months. During the procedure, sinus rhythm increases steadily to 135 bpm; the patient does not have metabolic acidosis. The most appropriate management is intravenous administration of:
- A. Adenosine.  
B. Alfentanil.  
C. Dantrolene.  
D. Esmolol.

33. Which of the following accurately describes the proper timing necessary for use of an intra-aortic balloon pump?

	<u>Inflation</u>	<u>Deflation</u>
(A)	Early diastole	Late diastole
(B)	Early systole	Early diastole
(C)	Late diastole	Early systole
(D)	Late systole	Late diastole

- A. (A)
- B. (B)
- C. (C)
- D. (D)

34. An anesthetized patient has a decrease in his SpO<sub>2</sub> from 100% to 91% after being moved into the lateral decubitus position. His lungs are being mechanically ventilated with isoflurane 1% in oxygen; SpO<sub>2</sub> remains at 91% for several minutes. Which of the following is the most likely cause of the desaturation?

- A. Atelectasis
- B. Endobronchial intubation
- C. Hypoventilation with inadequate minute ventilation
- D. Isoflurane inhibition of hypoxic pulmonary vasoconstriction

35. In a patient receiving general anesthesia, a thigh tourniquet is released after being inflated for 90 minutes. Which of the following will most likely occur one minute after tourniquet release?

- A. Decreased arterial pH
- B. Decreased PaCO<sub>2</sub>
- C. Decreased PETCO<sub>2</sub>
- D. Increased mixed venous oxygen saturation

36. A 20-year-old woman is undergoing resection of laryngeal papillomas with a carbon dioxide laser during anesthesia with oxygen, nitrous oxide, and isoflurane. During the procedure, the surgeon observes a perforation in the endotracheal tube and a fire in the airway. Which of the following is the most appropriate initial management?

- A. Copiously irrigate the airway with saline
- B. Remove the endotracheal tube
- C. Substitute air for nitrous oxide
- D. Substitute air for oxygen

37. A neurologically intact 48-year-old woman is scheduled for removal of an arteriovenous malformation of the right parietal lobe. 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. Evoked potentials elicited by stimulating the left posterior tibial nerve
  - D. Jugular venous oxygen tension
38. A patient who received general anesthesia for a femoropopliteal artery bypass has a blood pressure of 150/90 mmHg in the recovery room. Her urine output has been 20 mL over the past hour. No diuretics have been administered. Urinalysis shows a specific gravity of 1.022 and the urine appears concentrated. Further evaluation is most likely to show:
- A. BUN/creatinine ratio less than 10:1.
  - B. Fractional excretion of sodium less than 1%.
  - C. Serum creatinine concentration of 2.0 mg/dL.
  - D. Urine osmolality of 250 mOsm/L.
39. Hyperbaric oxygen therapy enhances delivery of oxygen to the tissues through which of the following mechanisms?
- A. Enhancing the release of oxygen from hemoglobin
  - B. Improving ventilation/perfusion matching
  - C. Increasing the amount of dissolved oxygen
  - D. Increasing the amount of oxygen bound to hemoglobin
40. During resection of a pontine tumor in the sitting position, a 55-year-old man has an abrupt increase in blood pressure from 110/60 to 170/100 mmHg with a decrease in sinus rate from 80 to 40 bpm. The most appropriate initial intervention is:
- A. Administration of mannitol.
  - B. Aspiration from the central venous catheter.
  - C. Intravenous administration of atropine.
  - D. Discontinuation of surgical manipulation.
41. A 64-year-old woman with chronic obstructive pulmonary disease is scheduled for a thoracotomy. Which of the following findings is most likely to predict postoperative respiratory failure in this patient?
- A. FEV<sub>1</sub> that is 50% of predicted
  - B. FEV<sub>1</sub>/FVC that is 50% of predicted
  - C. PaCO<sub>2</sub> of 50 mmHg
  - D. PaO<sub>2</sub> of 50 mmHg

42. Which of the following is a maternal side effect of ritodrine?

- A. Bradycardia
- B. Hyperglycemia
- C. Hyperkalemia
- D. Hypotension

43. Which of the following is associated with postoperative development of ulnar nerve palsy?

- A. Interscalene block
- B. Preexisting carpal tunnel syndrome
- C. Use of a peripheral nerve stimulator
- D. Use of a sternal retractor

44.



The pulmonary wedge pressure tracing shown above is recorded in a patient who developed significant mitral regurgitation following coronary revascularization. Which of the following points most closely represents the left ventricular end-diastolic pressure?

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

45. Which of the following drugs can exacerbate hypertension that occurs secondary to pheochromocytoma?

- A. Nitroglycerin
- B. Nitroprusside
- C. Phentolamine
- D. Propranolol

46. A patient is undergoing an emergency craniotomy for evacuation of a subdural hematoma. He is normotensive; PaCO<sub>2</sub> is 25 mmHg. The dura is tense. Intravenous administration of which of the following medications will most rapidly reduce cerebral volume?
- A. Dexamethasone 12 mg
  - B. Furosemide 80 mg
  - C. Mannitol 30 g
  - D. Propofol 100 mg
47. A 65-year-old man who has been successfully weaned from cardiopulmonary bypass after undergoing five-vessel coronary artery bypass grafting continues to have bleeding despite adequate heparin reversal with protamine as measured by activated clotting time. Which of the following is the **MOST** appropriate treatment of this patient's coagulopathy?
- A. Aminocaproic acid
  - B. Cryoprecipitate
  - C. Fresh frozen plasma
  - D. Platelets
48. A 42-year-old woman develops jaundice two days after an exploratory laparotomy following blunt trauma to the abdomen. During the four-hour procedure, she was anesthetized with isoflurane and received four units of packed red blood cells. Laboratory evaluation shows an increased total serum bilirubin concentration, normal direct serum bilirubin concentration, and normal serum alanine aminotransferase and aspartate aminotransferase concentrations. There is no bilirubin in the urine. Which of the following is the most likely cause of the jaundice?
- A. Anesthetic-induced hepatic injury
  - B. Bile duct injury
  - C. Hemolysis
  - D. Hepatic ischemia
49. A 70-kg, 65-year-old man with chronic obstructive pulmonary disease has severe pain after undergoing thoracotomy for excision of a tumor in the lung. Which of the following methods is most effective for decreasing pain while improving ventilation?
- A. Application of thoracic TENS (transcutaneous electrical nerve stimulation)
  - B. Continuous lumbar epidural infusion of fentanyl
  - C. Continuous thoracic epidural infusion of morphine and bupivacaine
  - D. Intravenous patient-controlled analgesia with morphine
50. An infant receives spinal anesthesia to a sensory level of T4. Compared with spinal anesthesia to the same sensory level in an adult, this infant is more likely to:
- A. Develop bradycardia
  - B. Develop hypotension
  - C. Manifest a prolonged motor block
  - D. Require more local anesthetic per kg body weight

51. A 27-year-old man is scheduled for an elective resection of a posterior fossa tumor in the sitting position. Which of the following methods is best for monitoring brainstem ischemia?
- A. Auditory evoked potentials
  - B. 16-Channel EEG
  - C. Somatosensory evoked potentials
  - D. Visual evoked potentials
52. A patient receives intravenous sedation for MRI evaluation of low back pain. On removal of the pulse oximeter probe, a third-degree burn is found on the underlying digit. Which of the following is the most likely cause of the burn?
- A. Leakage currents in the pulse oximeter probe
  - B. Magnetic field induction of an electrical current in the pulse oximeter probe
  - C. MRI interference with the light-emitting diode
  - D. Short-circuiting in the pulse oximeter probe
53. A 5-day-old neonate born at 29 weeks' gestation is in the ICU after undergoing laparotomy for necrotizing enterocolitis. Her core temperature is 34.6°C. Which of the following is the most critical consequence of this decrease in temperature?
- A. Decreased plasma norepinephrine concentration
  - B. Hypoglycemia
  - C. Metabolic acidosis
  - D. Tachycardia
54. A 52-year-old man has stridor on admission to the PACU after biopsy of a vocal cord lesion. His stridor is not evident after five minutes, but he develops sternal retractions and a tracheal tug. Which of the following is the **LEAST** appropriate intervention?
- A. Administration of an aerosolized vasoconstrictor
  - B. Intubation
  - C. Oral airway insertion
  - D. Positive airway pressure by mask
55. In a child who is scheduled to receive midazolam, which of the following routes of administration will result in the **LEAST** bioavailability of the drug?
- A. Intramuscular
  - B. Intranasal
  - C. Oral
  - D. Rectal

56. A 7.0-kg, 6-month-old infant is receiving general anesthesia with inhaled isoflurane 0.9% and nitrous oxide 70% in oxygen for cleft palate repair. Assuming a 10-mL volume of local anesthetic is to be injected, which of the following solutions does **NOT** exceed the maximum recommended dose of lidocaine and epinephrine for this patient?
- A. Lidocaine 0.5% with epinephrine 1:100,000
  - B. Lidocaine 0.5% with epinephrine 1:200,000
  - C. Lidocaine 1.0% with epinephrine 1:100,000
  - D. Lidocaine 1.0% with epinephrine 1:200,000
57. A 44-year-old man with metastatic lung carcinoma who has a life expectancy of six months develops severe, intractable pain over ribs 7 and 8 on the left. Intercostal nerve blocks produce sensory anesthesia but provide only mild relief of pain. Treatment with methadone and carbamazepine (Tegretol) results in confusion. His prothrombin time is 20 seconds (INR = 1.5). A neurolytic intercostal block should **NOT** be performed in this patient because:
- A. Aggressive oral therapy was not attempted.
  - B. Bowel and bladder functions are at risk.
  - C. The coagulation status is a contraindication to nerve block.
  - D. The diagnostic block did not provide adequate pain relief.
58. Each of the following factors determines coronary perfusion during anesthesia **EXCEPT**:
- A. Diastolic arterial pressure.
  - B. Diastolic time.
  - C. Left ventricular end-diastolic pressure.
  - D. Systolic time.

## ADVANCED ANSWER KEY

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