



ANSWERS TO THE AANA JOURNAL COURSE No. 25 EXAMINATION UPDATE FOR NURSE ANESTHETISTS

Here are the correct answers to the examination conducted as part of the *AANA Journal's* 25th course: Update for Nurse Anesthetists. The course consists of a 6-part series, beginning in the April 2005 issue and concluding in the February 2006 issue. The actual examination, which is reprinted here in total to provide readers with a convenient reference and an additional learning tool, was initially published in the April 2006 issue.

For those of you who took the examination, we suggest that you compare your recorded answers with our correct answers to see how you scored. We also suggest that you keep the examination and correct answers for future reference and review.

To have successfully completed the course, you must have had 42 out of the 60 questions correct (80%); a total of 6 CE hours will be awarded for this successful completion. By August 31, 2006, notification will be mailed to those who have passed the examination and thus successfully completed the course. Of these individuals, AANA members automatically have their 6 CE credits recorded for them as do individuals with record-keeping contracts through AANA.

We hope this 25th *Journal* course has been of value to you.

Arrhythmia management devices and electromagnetic interference

1. The concept of atrioventricular delay is:
 1. that it slows the rate of His-Purkinje depolarization
 2. it is present only in pathological myocardial conditions
 3. it tells the sinoatrial node to slow down
 - 4. it helps protect the ventricles from excessive atrial beats
2. In a pacemaker, signals with higher amplitude than threshold voltage are:
 1. interpreted as noise
 2. filtered out by the device
 - 3. interpreted as cardiac in origin
 4. not processed by the sensing circuit
3. The first successful human heart defibrillation occurred in:
 1. Chicago, 1940
 2. Japan, 1940
 3. New York, 1945
 - 4. Cleveland, 1947
4. The capacitor of an implantable cardioverter defibrillator (ICD) does what?
 - 1. augments energy received from the battery to produce enough energy for shocking
 2. acts as a timing circuit for the device
 3. produces spike marks on the electrocardiogram
 4. reduces energy output so the patient is not harmed by the shock
5. ICDs can determine if a shock is indicated:
 1. only when a magnet is in place
 2. only when patients are sleeping
 3. by use of its pacing parameters
 - 4. because they can divide all ventricular activity into nonoverlapping rate zones
6. When electromagnetic interference is misinterpreted as a cardiac signal by a pacemaker:
 1. pacing output is always increased
 2. pacing output is inhibited
 3. pacing output is not interrupted
 4. pacing output occurs every other beat
7. Defibrillators can respond to electromagnetic interference by:
 1. inappropriately reprogramming the device
 2. inappropriately delivering shocks
 3. suspending arrhythmia detection
 - 4. all of the above
8. A magnet placed over a pacemaker during surgery:
 1. causes defibrillation
 - 2. in general, it allows the pacemaker to pace asynchronously
 3. allows all devices to pace at 100 paces per minute
 4. reprograms it to pace at 75 paces per minute
9. A magnet placed over a defibrillator (ICD):
 1. enhances its ability to detect ventricular tachycardia
 2. interprets bradycardia detection
 - 3. suspends detection of tachyarrhythmias
 4. has no effect
10. Safe management practices of patients with implanted arrhythmia management devices include the following:
 1. try to have the device interrogated preoperatively
 2. knowing the location and function of an external pacemaker and defibrillator
 3. transcutaneous defibrillation pads should be placed on the patient preoperatively
 - 4. all of the above
11. Which of the following statements best describes the pathophysiology of multiple sclerosis?
 - 1. characterized by inflammation, demyelination, and axonal damage in the brain and spinal cord with a loss of myelin that covers the axons, followed by the formation of scar tissue or plaques
 2. astrocytes are replaced by scar tissue forming plaques throughout the central nervous system

An overview of multiple sclerosis and implications for anesthesia

3. myelin does not regenerate and symptoms of multiple sclerosis never resolve, even during periods of remission
 4. the exact causes of multiple sclerosis are known, allowing for a cure
12. Which of the following is the most common type of multiple sclerosis, characterized by exacerbations or attacks lasting 1 to 3 months followed by recovery and remission of symptoms?
 1. primary-progressive multiple sclerosis
 - 2. relapsing-remitting multiple sclerosis
 3. benign multiple sclerosis
 4. malignant or fulminant multiple sclerosis
 13. All of the following are symptoms and manifestations of multiple sclerosis EXCEPT:
 1. motor disorders manifesting as gait dysfunction and muscle weakness that may progress to paralysis
 2. sensory disorders manifesting as numbness and paresthesias in the face and extremities
 3. bowel dysfunction manifesting as diarrhea, incontinence, and constipation
 - 4. cardiac dysfunction manifesting as dysrhythmias and left ventricular hypertrophy
 14. Which of the following may exacerbate or trigger symptoms and manifestations of multiple sclerosis?
 1. aspirin
 2. drinking cold water
 - 3. exhaustion or fatigue
 4. barometric pressure changes
 15. All of the following are pharmacologic treatments available to treat multiple sclerosis EXCEPT:
 1. corticosteroids
 2. immunotherapy
 3. atineoplastics
 - 4. antihypertensives
 16. Which of the following is considered to be a principal treatment for relapses of multiple sclerosis through its anti-inflammatory effects that restore the blood-brain barrier, decrease edema, and improve axonal nerve conduction?
 - 1. methylprednisolone (Solu-Medrol)
 2. glatiramer acetate (Copaxone)
 3. azathioprine (Imuran)
 4. cyclophosphamide (Cytosan)
 17. Which of the following is an important consideration in the anesthetic management of patients with multiple sclerosis?
 1. inducing hyperthermia
 2. preoperative use of corticosteroids is not a concern because intravenous supplementation is never required
 - 3. performing a thorough preoperative evaluation, including a neurological and respiratory system assessment
 4. a 4-day course of heparin prophylaxis
 18. Why is it important to perform a thorough preoperative respiratory system assessment in patients with multiple sclerosis?
 1. performing a respiratory system assessment is not important
 2. predictive of inhalational anesthetic dose
 - 3. respiratory insufficiency frequently is a major cause of death and morbidity in the presence of neuromuscular disorders
 4. predictive of the dose of local anesthetic for subarachnoid block
 19. Which of the following statements is true regarding the use of general anesthesia in patients with multiple sclerosis?
 1. use of succinylcholine can result in hypokalemia
 - 2. anesthesia care must be individualized, with a plan of care made based on the extent of the disease process present
 3. resistance to the effects of nondepolarizing muscle relaxants is not possible in patients with multiple sclerosis
 4. evidence supports recommendations for only using either isoflurane or morphine
 20. Which of the following statements is true regarding the use of regional anesthesia in patients with multiple sclerosis?
 1. spinal anesthesia is most often chosen for use with patients who have multiple sclerosis
 2. use of epidural anesthesia results in higher concentrations of local anesthetic in the white matter compared to the use of spinal anesthesia
 - 3. patients should be informed about the possibility of exacerbations of their symptoms resulting from administration of regional anesthesia
 4. never use local anesthetics in patients with multiple sclerosis

Neuroprotective effects of thiopental, propofol, and etomidate

21. If cerebral metabolic rate of oxygen consumption (CMRO₂) decreases, it is likely that:
 - 1. cerebral blood flow will decrease
 2. increased intracranial pressure will occur
 3. autoregulation will be suppressed
 4. neuronal function will increase
22. In patients with cerebral swelling, the goal is to protect the brain without causing neuronal damage. Neuroprotective agents can assist in this goal by:
 1. producing hyperthermia
 2. overriding autoregulation

- 3. increasing arterial blood pressure and cardiac output
 - 4. reducing neuronal activity ultimately resulting in reduced CMRO₂
23. Overall average cerebral blood flow is about:
- 1. 10 mL/100 g tissue
 - 2. 50 mL/100 g tissue
 - 3. 450 mL/100 g tissue
 - 4. 700 mL/100 g tissue
24. Autoregulation implies:
- 1. failure of homeostasis
 - 2. constant blood flow over a range of pressures
 - 3. conscious thought overrides reflex activity
 - 4. mechanical control is overridden
25. The effect of propofol and hypothermia on CMRO₂ was:
- 1. to decrease it
 - 2. to increase it
 - 3. to have unpredictable effect
 - 4. to have no effect on it
26. On 4 mg/kg basis, which of the following is most potent (ie, which requires the lowest dose to achieve the effect desired)?
- 1. etomidate
 - 2. thiopental
 - 3. propofol
 - 4. they are equipotent
27. The half life of etomidate is:
- 1. about 2 minutes
 - 2. about 10 minutes
 - 3. about 2.6 hours
 - 4. about 20 hours
28. In considering patients with stroke cerebral ischemia, the neuroprotective anesthetic of choice would be:
- 1. sodium pentothal because it is less expensive
 - 2. etomidate because it is a potent vasoconstrictor
 - 3. propofol because it seems to have some antioxidant activity
 - 4. an inhalant because it preserves autoregulation
29. Side effects of anesthetics used for/during neurological procedures must be considered in different patient situations. Which of the following is a correct statement?
- 1. postoperative neurological assessment may have to be delayed with the use of propofol as an anesthetic agent
 - 2. propofol has no hemodynamic effects
 - 3. children should never receive sodium pentothal as an anesthetic agent
 - 4. caution should be taken when giving etomidate to multitrauma victims
30. Hemodynamic stability is very important during neurosurgery and is least altered by equivalent doses of which of the following?

- 1. sodium pentothal
- 2. etomidate
- 3. propofol
- 4. inhaled anesthetics

Acupressure and postoperative nausea and vomiting

31. Historically, the pharmacologic treatment of postoperative nausea and vomiting (PONV) has involved the use of all of the following EXCEPT:
- 1. anticholinesterases
 - 2. antihistamines
 - 3. anticholinergics
 - 4. phenothiazines
32. Although rare, potential side effects of acupuncture include all of the following EXCEPT:
- 1. cardiac dysrhythmias
 - 2. pneumothorax
 - 3. nerve damage
 - 4. transmission of infectious disease
33. With acupressure, it is believed that the human body contains _____ imaginary meridians that conduct energy to specific anatomical regions.
- 1. 4
 - 2. 14
 - 3. 18
 - 4. 24
34. In acupressure theory, it is believed that PONV occurs as a result of a meridian _____ that limits or prevents the flow of energy to a specific organ.
- 1. obstruction/interruption
 - 2. overstimulation
 - 3. understimulation
 - 4. misidentification
35. Acupressure applied to certain potent points is postulated to relieve pain through stimulated release of which of the following?
- 1. endorphins
 - 2. enkephalins
 - 3. neuropeptides
 - 4. all of the above
36. The P₆ treatment point is located:
- 1. 2 inches distal to the proximal wrist crease between the palmar aponeurosis and flexor retinaculum
 - 2. medial to the hypothenar muscles and lateral to the pollux tendons
 - 3. 3 inches proximal to the flexor digitorum superficialis at the distal wrist crease
 - 4. 2 inches proximal to the distal wrist crease between the palmaris longus and flexor carpi radialis tendons

37. In an effort to prevent nausea and vomiting, Sea Bands are used to apply acupressure at which of the following treatment points?
1. NK-1
 - 2. P₆
 3. H₇
 4. K-K₉
38. Hand acupressure for prevention of PONV is traditionally performed at which of the following treatment points?
1. NK-1
 2. P₆
 3. H₇
 - 4. K-K₉
39. According to available studies, which of the following acupressure treatment choices are more valuable for preventing PONV?
1. unilateral stimulus applied intraoperatively
 2. bilateral stimulus applied intraoperatively
 3. unilateral stimulus applied postoperatively
 - 4. bilateral stimulus applied preoperatively
40. Which of the following statements regarding acupressure is incorrect?
- 1. although the technique is relatively expensive, there are few known side effects and the cost is covered by most insurance plans
 2. it inhibits the pain signals sent to the brain through stimulation, thus closing the gates of the pain-signaling system
 3. the technique allows for active patient participation in the prevention of PONV
 4. acupressure devices are available for hospital or home use
- Anesthetic considerations for patients with amyloidosis**
41. Stem cell mobilization and transplantation are initiated after high dose chemotherapy in an attempt to rid the body of amyloid fibrils. Stem cell transplantation is the most effective form of treatment option for which type of amyloidosis?
1. familial amyloidosis
 - 2. primary amyloidosis
 3. secondary amyloidosis
 4. tertiary amyloidosis
42. Amyloidosis is a plasma cell dyscrasia. It results from the deposition of _____ in the extracellular spaces of organs and tissues.
1. amyloid cancer cells
 2. soluble amyloid plaque
 - 3. insoluble, fibrous amyloid proteins
 4. none of the above
43. Cardiac involvement is common in both primary and familial amyloidosis. Cardiac signs and symptoms the patient may experience include which of the following responses?
1. cardiomegaly
 2. arrhythmias and conduction defects
 3. ventricular wall thickness causing systolic and diastolic dysfunction
 - 4. all of the above
44. Familial amyloidosis is a hereditary form of amyloidosis that is caused by:
1. immunoglobulin kappa and lambda light chains
 - 2. circulating mutant transthyretin protein
 3. severe liver disease
 4. alcoholism
45. Systolic hypotension is a common manifestation of amyloidosis that may be seen in the operating room due to:
1. autonomic dysfunction
 2. systolic dysfunction
 3. the cardiac depressant effects of anesthetic drugs
 - 4. all of the above
46. Amyloid involvement of the respiratory tract may cause difficulty with maintaining an unprotected airway and with tracheal intubation. What signs and symptoms would warn the anesthesia provider of possible respiratory involvement?
1. dysphagia
 2. hoarseness
 3. macroglossia
 - 4. all of the above
47. The liver produces transthyretin (either normal or abnormal amyloid) almost exclusively; therefore, liver transplantation has been successful in the treatment of:
1. primary amyloidosis
 - 2. familial amyloidosis
 3. secondary amyloidosis
 4. tertiary amyloidosis
48. Which of the following manifestations may occur in patients with amyloidosis?
1. cardiomegaly
 2. delayed gastric emptying
 3. peripheral neuropathy
 - 4. all of the above
49. A study completed by Viana et al compared hemodynamics in patients with familial amyloidosis vs a control group while undergoing liver transplantation. Despite the decreased use of inhalation agents and opioids, and increased use of vasoconstrictors, familial amyloidosis patients have significantly more:
1. arrhythmias
 2. kidney failure

- 3. hypotensive episodes
- 4. coagulopathy

50. What is the most common cause of death in patients with amyloidosis?
- 1. kidney failure
 - 2. respiratory arrest
 - 3. heart failure
 - 4. pulmonary embolism

Migraine development, treatments, research advances, and anesthesia implications

51. All of the following events have been documented to trigger a migraine, EXCEPT:
- 1. surgery
 - 2. genetic predisposition
 - 3. physical activity
 - 4. motion

52. Which of the following has NOT been documented to trigger a migraine?
- 1. flashing lights
 - 2. certain foods
 - 3. traveling motion
 - 4. cortical spreading activation

53. The following are all criteria for the diagnosis of migraine, EXCEPT:
- 1. nausea, vomiting, phonophobia
 - 2. pulsating quality, vomiting, phonophobia
 - 3. visual symptoms, speech disturbances
 - 4. motor weakness, temporomandibular joint (TMJ) syndrome

54. Which of the following is NOT a factor in migraine development?
- 1. electrolyte imbalance
 - 2. trigeminal nerve inactivation
 - 3. neuronal hyperexcitability
 - 4. cortical spreading depression

55. All of the following are *preventive* pharmacological interventions for migraine, EXCEPT:
- 1. beta blockers
 - 2. serotonin agonists
 - 3. tricyclic antidepressants
 - 4. anticonvulsants

56. All of the following are common acute therapy drugs for migraine, EXCEPT:
- 1. nonsteroidal anti-inflammatory drugs
 - 2. opioids
 - 3. oxygen
 - 4. anticonvulsants

57. All of the following are appropriate actions for the anesthesia management of migraine patients, EXCEPT:
- 1. avoid wide variations in blood pressure
 - 2. continue analgesics before surgery
 - 3. discontinue beta blockers
 - 4. document triggering events of migraine

58. All of the following are appropriate anesthesia precautions for tricyclic antidepressants, EXCEPT:
- 1. potentiate neuromuscular blockade
 - 2. increase ephedrine effect by 2- to 10-fold
 - 3. increase cardiac dysrhythmias
 - 4. augment analgesic effect of opioids

59. Which of the following is NOT a mechanism of action of the new pharmacological agent labeled BIBN 4096 BS?
- 1. vasoconstrictor
 - 2. decreases blood flow to brain
 - 3. inhibits neurogenic inflammation
 - 4. inhibits pain transmission at second order neurons

60. The therapeutic use of the calcitonin gene-related peptide antagonist BIBN 4096 BS is likely due to which of the following mechanisms?
- 1. inhibits neurogenic inflammation and decreases pain transmission at second order neurons
 - 2. it causes a rise in erythropoietin
 - 3. it depresses glucagon release
 - 4. it increases blood flow to the brain