



ANSWERS TO THE AANA JOURNAL COURSE No. 26 EXAMINATION UPDATE FOR NURSE ANESTHETISTS

Here are the correct answers to the examination conducted as part of the *AANA Journal's* 26th course: Update for Nurse Anesthetists. The course consists of a 6-part series, beginning in the April 2006 issue and concluding in the February 2007 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 2007 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, 2007, 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 26th *Journal* course has been of value to you.

The neurobiology of the human febrile response

1. Normal temperature variation in healthy humans is best described by:
 - 1. slightly greater than 98°F with nadir in the early morning and peak in the late afternoon
 - 2. slightly less than 98°F with nadir in the early morning and again in the late afternoon
 - 3. slightly less than 98°F with a peak in the early morning and nadir in the late afternoon
 - 4. slightly greater than 99°F with nadir in the early morning and peak in the late afternoon
2. The skin, as the largest “organ” of the body, plays an essential role in thermoregulation primarily due to:
 - 1. an absence of vasculature, functioning independently of the nervous system
 - 2. its capacity to allow heat input and egress without alteration of blood flow
 - 3. its ability to generate large amounts of heat using adenosine substrate
 - 4. its large and diffuse venous plexus allowing it to act as a “radiator”
3. Elevating the “set-point” of the hypothalamus activates neurons in the vasomotor center resulting in:
 - 1. vasodilation, shivering, alertness, and sweating
 - 2. vasoconstriction, shivering, somnolence, and suppression of sweating
 - 3. vasodilation, muscular relaxation, sweating, and enhanced wakefulness
 - 4. vasoconstriction, muscular relaxation, enhanced wakefulness, fluid retention
4. Example of pyrogens include:
 - 1. certain viruses
 - 2. certain bacteria
 - 3. certain cytokines
 - 4. all the above
5. Select the true statement regarding the blood brain barrier (BBB):
 - 1. limits transport of material from blood to brain using physical and metabolic processes
 - 2. all pyrogenic material readily traverses the BBB
 - 3. it is a specialized and diffusely thin network of cancellous bone
 - 4. none of the above are true
6. The circumventricular organ system:
 - 1. has an intrinsic neuronal connection to the hypothalamus
 - 2. has many diverse functions in the body
 - 3. detects the presence of pyrogens that may not cross the BBB
 - 4. all the above
7. Cyclooxygenase (COX) activity is:
 - 1. inhibited by phospholipase A₂
 - 2. inhibited by acetaminophen that has been oxidized by the P-450 system
 - 3. inhibited by arachidonic acid
 - 4. unimportant in mounting a febrile response
8. Corticosteroids may act as antipyretics by which of the following mechanisms?
 - 1. depression of the pineal gland
 - 2. blocking phospholipase A₂ critical to the expression of arachidonic acid
 - 3. alpha blockade promoting vasodilation and heat loss
 - 4. stimulating thirst, thus promoting cool fluid intake
9. Which of the following has *not* been proposed to be a possible value of fever?
 - 1. impaired bacterial and viral replication
 - 2. production of acute phase reactants by the liver
 - 3. exciting the cerebral cortex to a higher level of awareness
 - 4. enhanced immunological response
10. The majority of *early onset* postoperative fevers are probably due to:
 - 1. foreign body reaction
 - 2. trauma causing release of cytokines
 - 3. hepatitis
 - 4. infection

Eisenmenger syndrome: An anesthetic conundrum

11. Eisenmenger syndrome is cured by which of the following:
1. continuous epoprostenol infusion combined with bosentan therapy
 2. closure of the congenital heart defect as soon as possible after the diagnosis
 - 3. heart-lung transplant or bilateral lung transplant with repair of the heart defect
 4. heart transplant
12. Therapeutic phlebotomy:
1. is an ancient, antiquated treatment procedure abandoned in the 1800s
 - 2. must be accompanied by a volume-for-volume fluid replacement
 3. can be easily accomplished through scheduled blood donations
 4. must be scheduled whenever the hematocrit value reaches 50%
13. Decreasing which of the following is most detrimental to an Eisenmenger syndrome patient?
1. hematocrit
 - 2. systemic vascular resistance
 3. pulmonary vascular resistance
 4. intracranial pressure
14. Which of the following monitoring devices is *least* important in managing general anesthesia for the patient with Eisenmenger syndrome?
1. arterial blood pressure
 2. central venous pressure
 - 3. double burst stimulation
 4. heart rate
15. Left-to-right shunting produces which of the following?
- 1. increased right ventricular stroke volume plus shear forces within the pulmonary vasculature
 2. better peripheral tissue oxygenation
 3. reduction in cardiac work index
 4. better central circulation
16. Name the compensatory mechanism the body uses to increase tissue oxygenation:
1. left-to-right shunting
 2. right-to-left shunting
 3. hyperuricemia
 - 4. polycythemia or erythrocytosis
17. Bosentan is a neurohormone that exerts its actions on:
1. coronary arteries
 2. alveoli and bronchioles
 - 3. endothelium and vascular smooth muscle
 4. acetylcholine receptors
18. Which of the following is *not* a pharmacologic action of epoprostenol:
1. direct vasodilatation of pulmonary vascular beds
 - 2. activation of platelet aggregation
 3. direct vasodilatation of systemic arterial vascular beds
 4. bronchodilation
19. Which of the following potentiates the nitric oxide-cyclic guanosine monophosphate (NO-cGMP) pathway?
- 1. sildenafil combined with L-arginine
 2. sildenafil combined with nitric oxide
 3. L-arginine combined with nitric oxide
 4. L-arginine combined with epoprostenol and bosentan
20. Which of the signs and symptoms of Eisenmenger syndrome also is one of its complications?
1. cholelithiasis
 2. gout
 - 3. hemoptysis
 4. fatigue

Aortic stenosis: A review

21. All of the following conditions can contribute to the development of aortic stenosis EXCEPT:
1. advanced age
 - 2. penicillin therapy
 3. calcific tricuspid valve
 4. rheumatic heart disease
22. The leading cause of aortic stenosis in the United States before the development of antibiotics was:
1. cholera
 2. rubella
 - 3. rheumatic heart disease
 4. pneumonia
23. The main compensatory response to aortic stenosis is:
1. increased heart rate
 2. increased sympathetic tone
 3. polycythemia
 - 4. left ventricular hypertrophy
24. The classic triad of symptoms seen in aortic stenosis is:
- 1. angina, dyspnea, and syncope
 2. dyspnea, cyanosis, and lethargy
 3. palpitations, dyspnea, and angina
 4. lethargy, palpitations, and angina
25. A patient with an aortic valve area of 0.6 and a pressure gradient of 74 mm Hg is considered to have:
1. a normal aortic valve
 2. mild aortic stenosis
 3. moderate aortic stenosis
 - 4. severe aortic stenosis

26. During the preoperative assessment of a patient with aortic stenosis, which of the following findings would be the most alarming?
1. a systolic murmur
 2. an aortic valve area of 3.0 cm^2
 - 3. frequent episodes of dyspnea, angina, and syncope
 4. an aortic pressure gradient of 39 mm Hg
27. Patients with significant aortic stenosis presenting for noncardiac surgery are at increased risk for developing which perioperative complication?
1. myocardial infarction
 2. ventricular arrhythmias
 3. heart failure
 - 4. all of the above
28. A patient presenting with severe aortic stenosis and a recent history of dyspnea and syncope presents for elective hip arthroplasty. What is the appropriate course of action?
1. proceed with a general anesthetic
 2. proceed with a spinal anesthetic
 3. postpone the surgery for 2 hours, give lasix, oxygen, and an alpha-adrenergic blocker
 - 4. patient should first be evaluated for aortic valve replacement or preoperative balloon valvuloplasty
29. Anesthetic management of the patient with aortic stenosis includes all of the following EXCEPT:
- 1. maintaining a heart rate of 80 to 120 beats per minute
 2. invasive hemodynamic monitoring
 3. preventing hypotension
 4. optimizing fluid status to maintain stroke volume
30. Some authorities consider severe aortic stenosis to be a contraindication to spinal anesthesia primarily on the basis of:
- 1. risk of hypotension
 2. risk of peripheral nerve injury
 3. risk of resistance to local anesthetics
 4. risk of spinal cord injury
- Itching, the "little" big problem as an orphan symptom**
31. Nerve impulses responsible for pruritus travel along which type of nerve fiber?
1. motor fibers (type A)
 2. autonomic fibers (type B)
 - 3. specialized pain fibers (type C)
 4. none of the above
32. Which of the following is *not* noted to be an endogenous mediator/transmitter for itch?
1. serotonin
 2. cytokines and neuropeptides
 3. histamine
 - 4. epinephrine
33. Neurogenic itch is:
- 1. induced centrally
 2. a result of trauma to an afferent nerve tract
 3. attributed to lower water content in the skin
 4. originates in the skin from inflammation
34. Choose the correct statement:
1. psychogenic itch is commonly found in the elderly due to inducement of pruritogenic mediators
 - 2. neuropathic itch is frequently seen with peripheral nerve lesions or injury
 3. neurogenic itch is a result of a microbial infection
 4. all of the above are true
35. Serotonin:
- 1. releases histamine peripherally
 2. is not pruritogenic
 3. attenuates sympathetically mediated itch
 4. releases cytokines peripherally
36. Which chemical is *not* pruritogenic, but potentiates histamine's pruritogenicity?
1. dopamine
 2. interleukin-2
 3. pseudocholinesterase
 - 4. prostaglandins
37. Intrathecally administered _____ has demonstrated the highest incidence of pruritus.
1. sufentanil
 2. clonidine
 3. fentanyl
 - 4. morphine
38. Facial itching is a result of itch receptor activation along which nerve?
- 1. trigeminal
 2. vagus
 3. oculomotor
 4. optic
39. How does propofol (Diprivan) work in reducing pruritus?
1. blocks serotonin receptors in the subnucleus caudalis
 - 2. depresses posterior horn nerve transmission
 3. prevents histamine release from mast cells
 4. directly inhibits kappa-opioid receptors
40. Choose the correct statement:
1. nonsteroidal anti-inflammatory drugs attenuate prostaglandin enhanced C fiber transmission
 2. antihistamines are beneficial for peripherally mediated itch

- 3. mixed opioid agonist-antagonists block mu receptors while activating kappa receptors
- 4. all of the above are correct statements

Ludwig angina: Forewarned is forearmed

- 41. Ludwig angina (LA) frequently results from which of the following?
 - 1. septicemia
 - 2. vasospasm
 - 3. dental infection
 - 4. hypoxia
- 42. Tissue distortion in which plane accounts for airway compromise in LA?
 - 1. superficial layer of deep cervical fascia
 - 2. inner cortex of the mandible
 - 3. the submandibular space
 - 4. the cervical plexus
- 43. Observation may be a reasonable option for patients with LA under which conditions?
 - 1. the patient exhibits cyanosis and drooling
 - 2. when there is not obvious airway compromise
 - 3. after institution of steroid therapy
 - 4. in the absence of adequate resources
- 44. A patient presenting with a submandibular mass, stridor, and drooling is likely to need which type of treatment?
 - 1. observation only
 - 2. antibiotics pending culture and sensitivity results
 - 3. airway management and antibiotic therapy
 - 4. oxygen therapy
- 45. In patients with LA, which of the following variables can be related to the development of laryngospasm?
 - 1. Fowler's position
 - 2. supine position
 - 3. humidified inspired oxygen
 - 4. heliox
- 46. Preoperative diagnostic data that may be helpful to clinicians caring for LA patients include which of the following?
 - 1. arterial blood gases
 - 2. ventilation-perfusion scans
 - 3. pulmonary function tests
 - 4. imaging studies of the head and neck
- 47. A 47-year-old patient with a history of intravenous drug abuse and dental abscesses presents emergently with marked submandibular swelling and trismus. Which of the following is a defensible plan for airway management?
 - 1. blind nasal intubation
 - 2. rapid sequence induction

- 3. blind oral intubation
 - 4. fiberoptic nasotracheal intubation with surgical standby for possible tracheotomy
- 48. For the patient above, what does current evidence suggest regarding orotracheal intubation?
 - 1. the benefit of this technique is outweighed by any risk
 - 2. administration of an antisialagogue should precede orotracheal intubation
 - 3. disease-related edema makes this approach less desirable
 - 4. the patient should breathe spontaneously when this technique is used
 - 49. The incidence of LA has been affected by which of the following factors?
 - 1. antibiotic therapy and dental hygiene
 - 2. complementary and alternative medicine
 - 3. respiratory therapy
 - 4. early incision and drainage
 - 50. Approximately what percentage of LA cases result from dental or gingival infection?
 - 1. 90%
 - 2. 70%
 - 3. 50%
 - 4. 30%

Perioperative care of patients with cerebral palsy

- 51. Central nervous system maturation begins during embryogenesis and continues until:
 - 1. birth
 - 2. 6 months of age
 - 3. 1 year of age
 - 4. 2 years of age
- 52. Cerebral palsy registries from Australia, The United Kingdom, Sweden, and the United States report the incidence to be:
 - 1. 0.5 to 1.0 per 1,000 live births
 - 2. 1.0 to 1.5 per 1,000 live births
 - 3. 1.5 to 2.0 per 1,000 live births
 - 4. 2.0 to 2.5 per 1,000 live births
- 53. The contemporary literature suggests that perinatal asphyxia is responsible for what percentage of new cerebral palsy cases?
 - 1. 1% to 2%
 - 2. 4% to 5%
 - 3. 6% to 10%
 - 4. 12% to 15%
- 54. Spasticity in the cerebral palsy patient will produce all of the following EXCEPT:
 - 1. joint contractures

- 2. musculoskeletal pain
 - 3. seizures
 - 4. joint subluxation
55. Which of the following oral anti-spasticity agents is associated with hepatotoxicity?
- 1. baclofen
 - 2. tizanidine
 - 3. diazepam
 - 4. clorazepate
56. Which of the following is *not* associated with intrathecal baclofen pump implantation?
- 1. rocephalus
 - 2. fistula formation
 - 3. infection
 - 4. electronic pump malfunction
57. Endotracheal intubation of the cerebral palsy patient may be difficult as a result of:
- 1. laxity of the muscles of the head and neck
 - 2. temporomandibular joint ankylosis
 - 3. dental crowding
 - 4. tongue thrusting
58. The minimum alveolar concentration of inhalation agents in the cerebral palsy patient is:
- 1. increased
 - 2. increased in the quadriplegic patient
 - 3. decreased
 - 4. is equivalent to similar-aged noncerebral palsy patients
59. The cerebral palsy patient is:
- 1. resistant to vecuronium
 - 2. resistant to succinylcholine
 - 3. sensitive to mivacurium
 - 4. sensitive to pancuronium
60. The cerebral palsy patient is sensitive to the effects of sedative/hypnotics because of:
- 1. increased airway tone
 - 2. generalized hypotonia
 - 3. lack of an effective cough
 - 4. uncoordinated fine motor activity