

NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 1

The Part I Practice Tests are representative of the content covered in the Part I Examination. They include question formats found in the actual examination. They also include questions of varying difficulty. A candidate's performance on a Practice Test does not guarantee similar performance on the actual examination.

BASIC SCIENCE EXAMINATION
PRACTICE TEST 1

60 questions

Directions for questions 1-57: These questions are followed by four suggested answers. Select the one answer that is best in each case.

- Which of the following drugs has alpha and beta receptor activity and is the drug of choice for anaphylactic shock?
 - Epinephrine
 - Norepinephrine
 - Isoproterenol
 - Propranolol
- During the life cycle of HIV and other retroviruses, which of the following enzymes catalyzes the conversion of viral RNA to DNA?
 - Viral-encoded integrase
 - Reverse transcriptase
 - DNA polymerase I
 - Host RNA-dependent DNA polymerase III
- Protection against phagocytosis is a major function of bacterial
 - somatic pili
 - endospores
 - flagella
 - capsules
- To which ossicle, if present, does the posterior talocalcaneal ligament attach?
 - Os vesalianum
 - Os tibiale externum
 - Os trigonum
 - Os naviculare
- If a patient is diagnosed as having brain stem disease, a lesion is most likely to be located in the
 - thalamus
 - hypothalamus
 - basal ganglia
 - medulla, pons, or midbrain
- Which of the following drugs promotes reabsorption of potassium ions and may cause hyperkalemia if potassium supplements are administered concomitantly with it?
 - Hydrochlorothiazide
 - Furosemide
 - Spironolactone
 - Acetazolamide
- All of the following affect the absorption of a drug through a membrane EXCEPT
 - passive transfer
 - the rate of diffusion
 - the drug decay curve
 - the lipid solubility of the drug
- Tophi are formed in disturbances of the metabolism of
 - calcium
 - iron
 - purines
 - lipids
- Negri bodies are diagnostic for infection by which of the following viruses?
 - Cytomegalovirus
 - Rabies virus
 - Rubella virus
 - Respiratory syncytial virus
- The glomerular filtration rate can be decreased by
 - increased systemic blood pressure
 - increased renal blood flow
 - hyperglycemia
 - constriction of the afferent arteriole

11. Fat embolism occurs most commonly after traumatic damage to
- (A) the liver
 - (B) the lungs
 - (C) bones
 - (D) soft tissue
12. In comparison to slow-twitch skeletal muscle fibers, fast-twitch fibers
- (A) fatigue more rapidly
 - (B) have a better blood supply
 - (C) are found more in antigravity muscles
 - (D) contain a higher concentration of mitochondria
13. The peptide chains of proteins that are secreted into the blood are synthesized in the
- (A) rough endoplasmic reticulum
 - (B) Golgi apparatus
 - (C) mitochondria
 - (D) secretory vesicles
14. Where is the medial plantar nerve located in the foot?
- (A) Between the first and second muscle layers
 - (B) Between the third and fourth muscle layers
 - (C) Deep to the fourth muscle layer
 - (D) Superficial to the flexor retinaculum
15. Which of the following is an extracapsular ligament of the knee?
- (A) Coronary
 - (B) Transverse
 - (C) Anterior cruciate
 - (D) Fibular collateral
16. Which of the following compounds does NOT have a steroid nucleus?
- (A) Provitamin D
 - (B) Testosterone
 - (C) Estrogen
 - (D) Dihydrofolate
17. Which of the following agents lowers blood pressure by blocking α -adrenergic receptors?
- (A) Prazosin
 - (B) Phenylephrine
 - (C) Phenytoin
 - (D) Pindolol
18. The phrenic nerve originates from which of the following spinal cord levels?
- (A) C1-3
 - (B) C3-5
 - (C) C6-8
 - (D) T1-3
19. Which of the following terms defines a special type of acute tolerance that is manifested with rapid repeated administration of catecholamines or other drugs?
- (A) Tachyphylaxis
 - (B) Cross-dependence
 - (C) Cross-tolerance
 - (D) Behavioral tolerance
20. Multiple myeloma is a malignancy of which of the following cells?
- (A) Macrophages
 - (B) Monocytes
 - (C) T lymphocytes
 - (D) Plasma cells
21. Which of the following is a true statement about the Epstein-Barr virus?
- (A) It infects T lymphocytes only.
 - (B) In the United States, it mainly causes disease in young children.
 - (C) It commonly causes heterophil-negative infections.
 - (D) It spreads by contact with saliva.
22. Pain from the diaphragm is often referred to the
- (A) shoulder
 - (B) sternum
 - (C) manubrium
 - (D) hypogastrium

23. The primary muscle(s) involved in quiet respiration is (are) the
- abdominals
 - diaphragm
 - internal intercostals
 - external intercostals
24. Which of the following structures lies deepest in the dorsum of the foot?
- Arcuate artery
 - Dorsal venous arch
 - Medial dorsal cutaneous nerve
 - Extensor hallucis longus tendon
25. Which of the following muscles originates in part from the lateral surface of the shaft of the tibia?
- Fibularis (peroneus) longus
 - Tibialis anterior
 - Tibialis posterior
 - Extensor digitorum longus
26. During an examination of heart sounds, a murmur is heard in the left fifth intercostal space near the midclavicular line. This finding indicates damage to which of the following valves?
- Tricuspid
 - Mitral
 - Aortic
 - Pulmonic
27. The secondary center of ossification of the first metatarsal is located in the
- base
 - head
 - neck
 - shaft
28. Which of the following statements best explains why muscle glycogen is not a principal source of blood glucose?
- Muscle glycogen cannot be converted to glucose-6-phosphate.
 - Muscle does not contain glucose-6-phosphatase.
 - Glucokinase activity does not occur in muscles.
 - Glycogen debranching activity does not occur in muscles.
29. If all other factors are kept constant, which of the following changes will decrease the blood flow through an arteriole?
- An increase in mean aortic blood pressure
 - A decrease in blood viscosity
 - A decrease in the diameter of the arteriole
 - A decrease in pH in the tissue supplied by the arteriole
30. A patient presents to the emergency department with the chief complaint of a dog bite on the hand. An abscess is observed at the site of pain along with localized cellulitis. The abscess is drained and laboratory studies subsequently reveal the presence of an encapsulated gram-negative coccobacillus that grew as a facultative anaerobe. The most likely causative agent of the patient's hand infection is
- Francisella tularensis*
 - Brucella melitensis*
 - Pasteurella multocida*
 - Yersinia pestis*
31. A 5-year-old patient presents with fever, drowsiness, and right ear pain. Otoscopic examination reveals a bright red, torn tympanic membrane with purulent exudate. A sample of the exudate reveals gram-positive cocci that grow on blood agar (alpha hemolysis), are bile soluble, and fail to grow in the vicinity of an optochin disk. Based on this information, the probable etiologic agent is
- Streptococcus pneumoniae*
 - Streptococcus pyogenes*
 - Moraxella catarrhalis*
 - Haemophilus influenzae*

32. Which of the following muscles has an attachment to the superior border of the greater trochanter?
- (A) Gluteus maximus
 - (B) Gluteus medius
 - (C) Obturator externus
 - (D) Piriformis
33. The beta-pleated sheet structure of a protein can be considered an example of
- (A) an alpha helix
 - (B) the primary structure
 - (C) the secondary structure
 - (D) the tertiary structure
34. Which of the following types of necrosis is most often associated with a myocardial infarction?
- (A) Gangrenous
 - (B) Liquefaction
 - (C) Putrefactive
 - (D) Coagulation
35. Which of the following hormones increases gluconeogenesis?
- (A) Cortisol
 - (B) Somatostatin
 - (C) Calcitonin
 - (D) Insulin
36. All of the following are reabsorbed or secreted by the renal proximal convoluted tubules EXCEPT
- (A) urea
 - (B) inulin
 - (C) glucose
 - (D) *p*-aminohippuric acid (PAH)
37. Which of the following local anesthetics has the longest duration of action?
- (A) Lidocaine
 - (B) Tetracaine
 - (C) Bupivacaine
 - (D) Procaine
38. Cerebrospinal fluid is produced by the
- (A) arachnoid granulations
 - (B) choroid plexus
 - (C) cisterna magna
 - (D) lumbar cistern
39. Which of the following is the most effective inhibitor of gastric acid production?
- (A) Pentagastrin
 - (B) Betazole
 - (C) Chlorpheniramine
 - (D) Ranitidine
40. In the upper third of the leg, the anterior tibial vessels lie between the extensor digitorum longus muscle and the
- (A) fibularis (peroneus) tertius
 - (B) tibialis anterior
 - (C) extensor digitorum brevis
 - (D) extensor hallucis longus
41. A patient is diagnosed with hemolytic anemia. Upon further testing, it is revealed that the patient suffers from glucose-6-phosphate dehydrogenase (G6PD) deficiency. Which of the following is a direct outcome of this enzyme deficiency?
- (A) An increase in five-carbon sugars
 - (B) A deficiency of heme synthesis
 - (C) An inability to excrete bilirubin
 - (D) A decreased synthesis of NADPH
42. Which of the following is a true statement about excess glucocorticoids in the body?
- (A) They are diabetogenic.
 - (B) They stimulate protein synthesis.
 - (C) They promote the inflammatory response.
 - (D) They are produced in Addison's disease.
43. In comparison to skeletal muscle, the amount of energy that smooth muscle requires to maintain continuous contraction is
- (A) less
 - (B) the same
 - (C) twice as much
 - (D) ten times as much

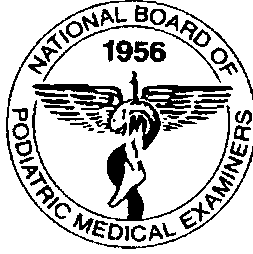
44. Which of the following is a true statement concerning an end-plate potential at the skeletal neuromuscular junction?
- (A) It is usually inhibitory.
 - (B) It can occur in the presynaptic nerve terminal.
 - (C) It results from chloride entering the muscle cell.
 - (D) It results from acetylcholine binding to its receptor.
45. Which of the following is a primary pulmonary mycosis?
- (A) Coccidioidomycosis
 - (B) Chromomycosis
 - (C) Candidiasis
 - (D) Mycetoma
46. Monoclonal antibody to the CD4 surface marker is used to identify
- (A) helper T cells
 - (B) cytotoxic T cells
 - (C) B cells
 - (D) natural killer cells
47. Atrophy in the body may be caused by all of the following EXCEPT
- (A) decreased blood supply
 - (B) increased workload
 - (C) inadequate nutrition
 - (D) loss of innervation
48. Which of the following drugs is indicated for methicillin-resistant *Staphylococcus aureus*?
- (A) Vancomycin
 - (B) Tetracycline
 - (C) Erythromycin
 - (D) Nafcillin
49. Which of the following is a true statement about essential hypertension?
- (A) It results from oral contraceptive use.
 - (B) It is due to high sodium chloride intake.
 - (C) It is secondary to the presence of a pheochromocytoma.
 - (D) It occurs in the absence of any condition known to produce increased blood pressure.
50. Which of the following muscles originates from the tibia and the fibula?
- (A) Tibialis anterior
 - (B) Peroneus tertius
 - (C) Extensor digitorum longus
 - (D) Extensor hallucis longus
51. Two weeks following hip replacement surgery, a 62-year-old patient presents with discomfort and swelling of the right leg. There is no pain on palpation. A venogram reveals deep vein thrombosis of the right leg. The most likely etiology is
- (A) immobilization
 - (B) atrial fibrillation
 - (C) pulmonary embolus
 - (D) turbulence of blood flow
52. Nonsteroidal anti-inflammatory drugs (NSAIDs) are appropriate for all of the following EXCEPT
- (A) symptomatic relief of rheumatoid arthritis
 - (B) symptomatic relief of acute gouty arthritis
 - (C) potentiation of the diuretic effect of thiazides
 - (D) reduction of soft tissue inflammation
53. A 5-year-old child presents with muscle weakness and gait abnormalities. Serum creatine phosphokinase is elevated. Muscle biopsy demonstrates variation in fiber size, degenerating and necrotic muscle fibers, regenerating fibers, and proliferation of endomysial connective tissue. The most likely diagnosis is
- (A) dermatomyositis
 - (B) amyotrophic lateral sclerosis
 - (C) myotonic dystrophy
 - (D) Duchenne type muscular dystrophy
54. Which type of collagen comprises the organic extracellular matrix of osseous tissue?
- (A) I
 - (B) II
 - (C) III
 - (D) IV

55. Which of the following is an accurate description of the lateral facet of the patella?
- (A) It is broad and more concave than the medial facet.
 - (B) It is broad and more convex than the medial facet.
 - (C) It is narrow and more concave than the medial facet.
 - (D) It is narrow and more convex than the medial facet.
56. The medial calcaneal nerve branches from which of the following nerves?
- (A) Sural
 - (B) Tibial
 - (C) Superficial peroneal
 - (D) Deep peroneal
57. A patient presents in the emergency department 24 hours after being shot in the leg. On palpation of the leg, gas is detected in subcutaneous tissue. The most likely etiologic agent is
- (A) *Streptococcus pyogenes*
 - (B) *Clostridium perfringens*
 - (C) *Staphylococcus aureus*
 - (D) *Bacteroides fragilis*
58. In muscle, ATP can be derived anaerobically from which of the following? Select the two that apply.
- (A) ADP
 - (B) AMP
 - (C) NADH
 - (D) Lactate
 - (E) Phosphocreatine
59. Which of the following bones are part of the medial longitudinal arch of the foot? Select the three that apply.
- (A) Talus
 - (B) Cuboid
 - (C) Navicular
 - (D) Calcaneus
 - (E) Fourth metatarsal

60. List the following stages of fracture healing in the order in which they occur (from first to last).

- (A) Hematoma
 - (B) Soft callus
 - (C) Remodeling
 - (D) Hard callus
1. _____
 2. _____
 3. _____
 4. _____

END OF PRACTICE TEST 1



NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 2

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BASIC SCIENCE EXAMINATION
PRACTICE TEST 2

60 questions

Directions for questions 1-57: These questions are followed by four suggested answers. Select the one answer that is best in each case.

1. Bilateral dependent edema of both feet and pretibial areas is most likely due to which of the following?
 - (A) Phlebothrombosis
 - (B) Gouty arthritis
 - (C) Diabetic neuropathy
 - (D) Congestive heart failure
2. The phenomenon of programmed cell death is known as
 - (A) aplasia
 - (B) apoptosis
 - (C) pyknosis
 - (D) hydropic swelling
3. The presence of neutrophils and gram-negative intra-cellular and extra-cellular diplococci in urethral discharge is suggestive of infection by
 - (A) *Trichomonas vaginalis*
 - (B) *Neisseria gonorrhoeae*
 - (C) *Staphylococcus aureus*
 - (D) *Bacteroides fragilis*
4. Which of the following structures contains dopaminergic neurons that project to the neostriatum?
 - (A) Nucleus ambiguus
 - (B) Accessory oculomotor nucleus
 - (C) Red nucleus
 - (D) Substantia nigra
5. The Michaelis-Menten hypothesis is based on the assumption that
 - (A) cofactors are always required for enzyme-substrate reactions
 - (B) the enzyme combines more tightly with inhibitors than with the substrate
 - (C) the enzyme combines reversibly with the substrate
 - (D) the product combines with a second site on the enzyme
6. To enhance the elimination of aspirin in the management of acute aspirin overdose, the most effective drug would be which of the following?
 - (A) Ammonium chloride
 - (B) Sodium bicarbonate
 - (C) Sodium chloride
 - (D) Dimercaprol
7. CREST syndrome is a variant of which of the following disorders?
 - (A) Dermatomyositis
 - (B) Progressive systemic sclerosis (scleroderma)
 - (C) Sjögren's syndrome
 - (D) Systemic lupus erythematosus
8. Soluble antigen-antibody complexes that activate the classical complement pathway in vivo are formed by
 - (A) IgA
 - (B) IgD
 - (C) IgE
 - (D) IgG

9. Living cells are always required for growing
- (A) protozoa
 - (B) viruses
 - (C) fungi
 - (D) bacteria
10. Skeletal muscle fibers that are completely depleted of ATP develop a state of extreme rigidity that is called
- (A) tonus
 - (B) tetanus
 - (C) rigor mortis
 - (D) fibrillation
11. Which of the following muscles flexes both the hip and knee joints?
- (A) Gracilis
 - (B) Pectineus
 - (C) Sartorius
 - (D) Rectus femoris
12. On which surface of the talus is the comma-shaped facet located?
- (A) Posterior
 - (B) Lateral
 - (C) Medial
 - (D) Inferior
13. Which of the following should NOT be given orally with antacids to an adult for a systemic infection?
- (A) Ampicillin
 - (B) Penicillin VK
 - (C) Dicloxacillin
 - (D) Tetracycline
14. Digitalis toxicity is most commonly associated with which of the following conditions?
- (A) Hypokalemia
 - (B) Hypernatremia
 - (C) Hypocalcemia
 - (D) Hypochloremia
15. Which of the following cranial nerves carries taste fibers from the anterior two-thirds of the tongue?
- (A) Facial
 - (B) Glossopharyngeal
 - (C) Hypoglossal
 - (D) Oculomotor
16. Ehlers-Danlos syndrome usually involves which of the following structural proteins?
- (A) Elastin
 - (B) Tubulin
 - (C) Myosin
 - (D) Collagen
17. A *Klebsiella*, isolated from a mixed dermal infection, was found to be susceptible to sulfadiazine by the Bauer-Kirby sensitivity test. All of the following would affect the results of the test EXCEPT the
- (A) concentration of *Klebsiella* in the infected area
 - (B) concentration of *Klebsiella* inoculated into the test medium
 - (C) concentration of sulfadiazine in the disc
 - (D) time of incubation of the test
18. Which of the following muscles is innervated by branches of both the lumbar and sacral plexuses?
- (A) Pectineus
 - (B) Iliopsoas
 - (C) Sartorius
 - (D) Adductor magnus
19. Overall, the pulmonary and systemic circulations have similar
- (A) blood flow rates
 - (B) peripheral resistances
 - (C) diastolic pressures
 - (D) systolic pressures

20. Which of the following enzymes is used in the identification of *Staphylococcus aureus*?
- (A) Alpha hemolysin
 - (B) Staphylokinase
 - (C) Coagulase
 - (D) Hyaluronidase
21. The superficial inguinal ring transmits which of the following nerves?
- (A) Perineal
 - (B) Lateral femoral cutaneous
 - (C) Ilioinguinal
 - (D) Iliohypogastric
22. Which of the following amino acids is the result of modification after the incorporation of its precursor into the polypeptide chain?
- (A) Hydroxyproline
 - (B) Aspartic acid
 - (C) Serine
 - (D) Alanine
23. Which of the following medications can induce hyperkalemia?
- (A) Furosemide
 - (B) Ethacrynic acid
 - (C) Hydrochlorothiazide
 - (D) Amiloride
24. Acetyl-CoA enters the Krebs cycle via condensation with
- (A) citrate
 - (B) succinate
 - (C) oxaloacetate
 - (D) alpha-ketoglutarate
25. Which of the following is true of the deep femoral (profunda femoris) artery?
- (A) It descends in the adductor canal.
 - (B) It passes through the adductor hiatus.
 - (C) It is continuous with the popliteal artery.
 - (D) Its branches supply the three compartments of the thigh.
26. The adjacent sides of the second and third toes on the dorsal surface receive cutaneous innervation from which of the following nerves?
- (A) Medial terminal division of the deep fibular (peroneal)
 - (B) Intermediate dorsal cutaneous
 - (C) Lateral dorsal cutaneous
 - (D) Medial dorsal cutaneous
27. The gastric upset and ulceration commonly associated with high-dose aspirin use may be reduced by concurrent use of which of the following?
- (A) Misoprostol
 - (B) Diflunisal
 - (C) Ketorolac
 - (D) Sulfipyrazone
28. Which of the following is involved with vitamin B₁₂ functioning?
- (A) Biotin
 - (B) Folic acid
 - (C) Lipoic acid
 - (D) Ascorbic acid
29. Which of the following is a true statement about a functional syncytium?
- (A) It is found in cardiac muscle only.
 - (B) It can be excited to contract as a unit because smooth muscle action potentials can be conducted from one cell to adjacent cells through gap junctions.
 - (C) It refers to the functional junction between a smooth muscle fiber and an autonomic nerve ending.
 - (D) It refers to a pair of antagonistic smooth muscles that function together to perform a certain movement of a blood vessel or hollow organ.

30. Pathologic features of rheumatoid arthritis include
- (A) tophi
 - (B) Heberden's nodes
 - (C) fibrillation of the cartilage
 - (D) pannus formation
31. The parasympathetic nervous system affects the general circulation by its influence on
- (A) heart rate
 - (B) cardiac contractility
 - (C) vascular compliance
 - (D) vascular resistance
32. The thick yellowish substance called pus is primarily an accumulation of dead bacteria and
- (A) red blood cells
 - (B) plasma cells
 - (C) lymphocytes
 - (D) neutrophils
33. A 60-year-old male patient with a 20-year history of type 1 diabetes undergoes cardiac catheterization in preparation for balloon angiography following a myocardial infarction. Approximately 20 hours following the procedure, his BUN and creatinine rise and his urine output decreases. Which of the following is most likely true about this patient's condition?
- (A) The condition is irreversible.
 - (B) The patient will need temporary dialysis.
 - (C) The patient will need lifelong dialysis or a renal transplant.
 - (D) The morphologic changes include membranous glomerulonephritis.
34. In the heart, the slowest conduction velocity is found in which of the following?
- (A) Atrial cells
 - (B) Ventricular cells
 - (C) Purkinje's cells
 - (D) The AV node
35. The adductor tubercle is found
- (A) on the medial condyle of the femur
 - (B) on the lateral condyle of the femur
 - (C) in the intercondylar fossa of the femur
 - (D) between the lesser and greater trochanters of the femur
36. Alkalinization of the glomerular filtrate enhances
- (A) reabsorption of weak acids
 - (B) filtration of weak acids
 - (C) secretion of weak acids
 - (D) secretion of weak bases
37. The γ -carboxylation reaction of glutamate involved in several human blood-clotting factors requires
- (A) biotin
 - (B) vitamin K
 - (C) N-10-formyltetrahydrofolate
 - (D) calcium and platelet factor 3
38. Which of the following drugs acts as a calcium channel blocker?
- (A) Verapamil
 - (B) Nitroglycerin
 - (C) Digitoxin
 - (D) Nadolol
39. Thyroid hormones are most likely to be released in the body in response to
- (A) anxiety
 - (B) exposure to cold
 - (C) decreased blood glucose
 - (D) glycogenesis
40. Adrenocorticotrophic hormone (ACTH) primarily stimulates the release of
- (A) cortisol
 - (B) insulin
 - (C) aldosterone
 - (D) somatostatin

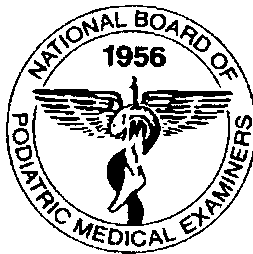
41. The proper digital artery to the dorsomedial aspect of the hallux is a branch of the
- arcuate artery
 - dorsalis pedis artery
 - first dorsal metatarsal artery
 - first plantar metatarsal artery
42. Microscopic identification of fungi is based on
- their staining reaction
 - the type of spores produced and their arrangement on the hyphae
 - their ability to absorb lactophenol-cotton blue
 - their solubility in 10% potassium hydroxide
43. The volume of air remaining in the lungs after a maximum voluntary expiration is referred to as the
- residual volume
 - tidal volume
 - expiratory reserve volume
 - functional residual capacity
44. A hyperpyrexia coma can result from an interaction between meperidine and
- a barbiturate (e.g., phenobarbital)
 - an MAO inhibitor (e.g., phenelzine)
 - a phenothiazine antipsychotic (e.g., chlorpromazine)
 - a selective serotonin reuptake inhibitor (e.g., fluoxetine)
45. Which of the following is (are) the primary source of B cells in adults?
- Spleen
 - Lymph nodes
 - Bone marrow
 - Thymus
46. The preganglionic parasympathetic neurons involved in the pupillary reflex are located in the
- abducens nucleus
 - pretectal nucleus
 - nucleus of the lateral lemniscus
 - accessory oculomotor nucleus
47. Which of the following muscles is innervated by the deep branch of the lateral plantar nerve?
- Adductor hallucis
 - First lumbrical
 - Abductor digiti minimi
 - Flexor digiti minimi brevis
48. Cardiac arrhythmias, myocardial infarction, hyperpyrexia, or seizures may occur in individuals who abuse
- heroin
 - cocaine
 - marijuana
 - acetaminophen
49. The talocalcaneal joint is classified as a
- synovial joint
 - synarthrodial joint
 - syndesmosis
 - synchondrosis
50. Receptor activation will occur in which of the following cases?
- Naloxone combines with an opiate receptor.
 - Epinephrine combines with a beta-adrenoceptor.
 - Diphenhydramine combines with a histamine H₁ receptor.
 - Tetracycline combines with calcium.
51. The primary sensory neurons that mediate pain from the face are located in which ganglion?
- Geniculate
 - Trigeminal
 - Submandibular
 - Otic
52. The last tarsal bone to begin ossification is the
- navicular
 - cuboid
 - lateral cuneiform
 - intermediate cuneiform

53. Which of the following fatty acids is a precursor for prostaglandin synthesis?
- (A) Palmitic acid
 - (B) Linoleic acid
 - (C) Arachidonic acid
 - (D) Oleic acid
54. A green-tinged pus or exudate is usually indicative of infection with which of the following gram-negative bacilli?
- (A) *Escherichia coli*
 - (B) *Serratia marcescens*
 - (C) *Pseudomonas aeruginosa*
 - (D) *Proteus mirabilis*
55. Pulmonary emboli are most frequently associated with
- (A) venous thrombosis
 - (B) atherosclerosis
 - (C) endarteritis
 - (D) Buerger's disease
56. The addition of triamterene to daily hydrochlorothiazide therapy often reduces the excretion rate of
- (A) sodium
 - (B) potassium
 - (C) chloride
 - (D) bicarbonate
57. Which of the following abnormalities is NOT associated with polycythemia vera?
- (A) Splenomegaly
 - (B) Decreased blood volume
 - (C) Increased blood viscosity
 - (D) Thrombosis with infarction
58. Which of the following are examples of cell-mediated immunity? Select the two that apply.
- (A) Asthma
 - (B) Hay fever
 - (C) Graft rejection
 - (D) Contact sensitivities
 - (E) Glomerulonephritis due to serum sickness
59. Which of the following muscles have an origin on the head of the fibula? Select the three that apply.
- (A) Soleus
 - (B) Popliteus
 - (C) Flexor hallucis longus
 - (D) Extensor digitorum longus
 - (E) Fibularis (peroneus) longus

60. List the following developmental events in the order in which they occur (from first to last).

- (A) Lower limb buds appear. 1. _____
- (B) Ossification of the foot begins. 2. _____
- (C) Primitive lumbosacral plexus forms. 3. _____
- (D) Chondrification of the foot begins. 4. _____

END OF PRACTICE TEST 2



NATIONAL BOARD OF PODIATRIC MEDICAL EXAMINERS

PART I Basic Science Examination

PRACTICE TEST 3

The Part I Practice Tests are representative of the content covered in the Part I Examination. They include question formats found in the actual examination. They also include questions of varying difficulty. A candidate's performance on a Practice Test does not guarantee similar performance on the actual examination.

BASIC SCIENCE EXAMINATION
PRACTICE TEST 3

60 questions

Directions for questions 1-57: These questions are followed by four suggested answers. Select the one answer that is best in each case.

1. The tarsal bone that regularly has two centers of ossification is the
 - (A) cuboid
 - (B) lateral cuneiform
 - (C) navicular
 - (D) calcaneus
2. The most common bacterial agent of suppurative infections is
 - (A) *Corynebacterium diphtheriae*
 - (B) *Staphylococcus aureus*
 - (C) *Escherichia coli*
 - (D) *Mycobacterium bovis*
3. Which of the following tendons shares a common synovial sheath with fibularis (peroneus) brevis?
 - (A) Tibialis posterior
 - (B) Fibularis (peroneus) tertius
 - (C) Fibularis (peroneus) longus
 - (D) Tendo calcaneus
4. Which of the following compounds has the ability to reactivate acetylcholinesterase after it has been phosphorylated by an organophosphate insecticide?
 - (A) Dopamine
 - (B) Scopolamine
 - (C) Pralidoxime (2-PAM)
 - (D) Isoproterenol
5. The appearance of hives following ingestion of a food to which a person is allergic involves which of the following?
 - (A) Complement activation
 - (B) IgE mediation
 - (C) Defective IgA synthesis
 - (D) A Type IV hypersensitivity reaction
6. Which of the following is the most common cause of esophageal inflammation?
 - (A) Viral infection
 - (B) Gastric reflux
 - (C) Stricture formation
 - (D) Lower esophageal sphincter tone
7. Removal of lower extremity lymph nodes in the treatment of malignancy increases the risk of which of the following?
 - (A) Tumor metastasis
 - (B) Chronic edema
 - (C) Keloid formation
 - (D) Fat embolism
8. Which of the following diseases of the bone predisposes the patient to osteogenic sarcoma?
 - (A) Osteopetrosis
 - (B) Osteogenesis imperfecta
 - (C) Osteomalacia
 - (D) Paget's disease of the bone
9. Verruca plantaris is caused by which of the following viral groups?
 - (A) Herpesvirus
 - (B) Picornavirus
 - (C) Papovavirus
 - (D) Oncornavirus
10. Cutaneous lesions are most commonly associated with which of the following diseases?
 - (A) Pertussis
 - (B) Shigellosis
 - (C) Legionnaires' disease
 - (D) Secondary syphilis

11. During skeletal muscle contraction, the energy for cross-bridge cycling is provided by
- (A) acetylcholine
 - (B) adenosine triphosphate
 - (C) calcium ions
 - (D) myosin
12. Which of the following vitamins acts as an antioxidant in humans?
- (A) Vitamin B₁
 - (B) Vitamin B₆
 - (C) Vitamin D
 - (D) Vitamin E
13. The metabolism of acetyl-CoA to carbon dioxide via the Krebs cycle takes place in the
- (A) cytosol
 - (B) mitochondria
 - (C) rough endoplasmic reticulum
 - (D) Golgi apparatus
14. The tendon of which of the following muscles inserts into the lateral side of the base of the proximal phalanx of the third toe?
- (A) Second lumbrical
 - (B) First plantar interosseous
 - (C) Second dorsal interosseous
 - (D) Third dorsal interosseous
15. Which of the following are phagocytic cells that line the sinusoids of the liver?
- (A) Hepatocytes
 - (B) Langerhans cells
 - (C) Kupffer's cells
 - (D) Sertoli's cells
16. Vitamin D deficiency in adults results in
- (A) osteosclerosis
 - (B) osteoporosis
 - (C) osteomalacia
 - (D) osteopetrosis
17. Any effective sterilization procedure must assure the complete destruction of
- (A) viral capsids
 - (B) fungal spores
 - (C) bacterial capsules
 - (D) bacterial spores
18. Activation of the vagus nerve to the heart leads to which of the following?
- (A) An increased P-R interval
 - (B) An increased firing rate at the SA node
 - (C) Increased transmission through the ventricular muscle mass
 - (D) Faster conduction through the AV node
19. The nutrient artery of the fibula is a branch of which of the following arteries?
- (A) Anterior tibial
 - (B) Posterior tibial
 - (C) Fibular (peroneal)
 - (D) Popliteal
20. Which of the following bones articulates with three metatarsals?
- (A) Cuboid
 - (B) Navicular
 - (C) Intermediate cuneiform
 - (D) Lateral cuneiform
21. All of the following are generalized actions of nonsteroidal anti-inflammatory drugs (NSAIDs) EXCEPT
- (A) gastric erosion
 - (B) bronchodilation
 - (C) decreased sodium clearance
 - (D) inhibition of platelet aggregation
22. The adrenal medulla primarily secretes
- (A) cortisol
 - (B) epinephrine
 - (C) aldosterone
 - (D) angiotensin II

23. Which of the following is the major pathway for ATP production in red blood cells?
- (A) Krebs cycle
 - (B) Glycolysis
 - (C) Gluconeogenesis
 - (D) Hexose monophosphate shunt
24. A clinical consequence of excessive hyperventilation is
- (A) a rise in body fluid pH
 - (B) excess alveolar oxygenation
 - (C) overstimulation of airway stretch receptors
 - (D) overstimulation of carotid body chemoreceptors
25. Which of the following is a pigmented gram-negative bacterium, previously thought to be nonpathogenic, that has become increasingly important as an opportunistic pathogen?
- (A) *Serratia marcescens*
 - (B) *Salmonella typhi*
 - (C) *Shigella dysenteriae*
 - (D) *Klebsiella pneumoniae*
26. The primary motor area of the brain is located within which of the following cerebral gyri?
- (A) Cingulate
 - (B) Orbital
 - (C) Postcentral
 - (D) Precentral
27. Which of the following muscles flexes both the knee and the hip joints?
- (A) Sartorius
 - (B) Gracilis
 - (C) Semitendinosus
 - (D) Rectus femoris
28. Gallstones are composed primarily of
- (A) bilirubin
 - (B) calcium oxalate
 - (C) bile salts
 - (D) a mixture of phospholipids, bile salts, and cholesterol
29. Which of the following is the Y-shaped ligament of the hip joint?
- (A) Iliofemoral
 - (B) Pubofemoral
 - (C) Inguinal
 - (D) Ischiofemoral
30. When a person assumes a standing posture, which of the following decreases?
- (A) Leg arterial blood pressure
 - (B) Leg venous blood pressure
 - (C) Venous return
 - (D) Heart rate
31. Which of the following is true about lead poisoning?
- (A) Most absorbed lead is taken up by soft tissues.
 - (B) Little volatilized lead is absorbed by the lungs.
 - (C) Iron and calcium deficiencies reduce lead absorption.
 - (D) The absorption rate for ingested lead is higher in children than in adults.
32. Which of the following has an outer layer of keratinized stratified squamous epithelium?
- (A) Skin
 - (B) Pharyngeal tonsil
 - (C) Trachea
 - (D) Lymph node
33. The coupling of excitation and contraction in smooth muscle involves all of the following EXCEPT
- (A) troponin
 - (B) calcium ions
 - (C) calmodulin
 - (D) myosin

34. In the central nervous system, the mechanism of action of the tricyclic antidepressants involves
- (A) enhancing the reuptake of dopamine
 - (B) increasing the metabolism of norepinephrine, therefore decreasing the levels of norepinephrine
 - (C) inhibiting monoamine oxidase, therefore increasing the levels of norepinephrine
 - (D) inhibiting the reuptake of norepinephrine and serotonin
35. Which of the following best describes the shape of the anterior surface of the medial cuneiform?
- (A) Quadrilateral
 - (B) Triangular
 - (C) Comma-shaped
 - (D) Kidney-shaped
36. Major regulation of mammalian cholesterol metabolism takes place at the reaction that
- (A) produces the first steroid intermediate
 - (B) uses beta-hydroxy-beta-methylglutaryl-CoA (HMG CoA)
 - (C) condenses two acetyl-CoA to form acetoacetyl-CoA
 - (D) occurs last and forms cholesterol as the final product
37. Which ligament of the foot is attached to the anterior tubercle of the calcaneus?
- (A) Cervical
 - (B) Bifurcate
 - (C) Long plantar
 - (D) Short plantar
38. An anaerobic gram-positive rod has been isolated from a contaminated wound on the foot. A Gram stain of the isolate also reveals occasional subterminal spores. To what genus does this organism belong?
- (A) *Enterobacter*
 - (B) *Corynebacterium*
 - (C) *Clostridium*
 - (D) *Bacillus*
39. Which of the following structures is located in the lateral compartment of the femoral sheath?
- (A) Femoral nerve
 - (B) Femoral artery
 - (C) Femoral vein
 - (D) Lymphatic vessel
40. Antibiotics are added to Sabouraud dextrose agar in order to
- (A) cause fungi to produce antibiotics
 - (B) prevent fungi in samples from growing
 - (C) provide necessary nutritional components for fungi
 - (D) prevent contaminating bacteria from growing
41. Which of the following is a true statement about the pelvic splanchnic nerves?
- (A) They carry preganglionic parasympathetic fibers to the pelvic viscera.
 - (B) They carry preganglionic sympathetic fibers to the pelvic viscera.
 - (C) They originate from segmental levels L4, L5, and S1.
 - (D) They are associated with the splenic plexus.
42. Which of the following agents may cause cycloplegia?
- (A) Pilocarpine
 - (B) Epinephrine
 - (C) Atropine
 - (D) Physostigmine
43. Immediate hypersensitivity to penicillin is mediated by
- (A) IgE antibodies
 - (B) IgG antibodies
 - (C) IgM antibodies
 - (D) sensitized T cells

44. Which of the following is a true statement about active sodium channels during the action potential in axons?
- They are activated via chemical binding to channel receptors.
 - They are activated via a voltage-dependent mechanism.
 - They are inactivated only after complete repolarization.
 - They are inactivated via a chemical-dependent mechanism.
45. Hepatotoxicity resulting from an overdose of acetaminophen may be minimized by prompt treatment with
- acetoacetic acid
 - acetylcysteine
 - sodium nitrite
 - sodium bicarbonate
46. Which of the following organ system effects would be the most likely to occur following the administration of bethanechol?
- Mydriasis
 - Dry mouth
 - Increased heart rate
 - Increased gastrointestinal and pancreatic secretions
47. A 25-year-old patient with a history of intravenous drug abuse and Kaposi's sarcoma develops a cough and shortness of breath followed by respiratory failure. It is most likely that the patient has which of the following?
- Pneumococcal pneumonia
 - Pneumocystis jiroveci* pneumonia
 - Influenzal pneumonia
 - Legionnaires' disease
48. Bones that bear articular facets on their dorsal surfaces include which of the following?
- Navicular
 - Talus
 - Cuboid
 - Cuneiforms
49. An erythematous eruption often occurring as papules or plaques and usually having a white silvery scale is most likely to be
- leukoplakia
 - lichen simplex chronicus
 - psoriasis
 - seborrheic dermatitis
50. Which of the following vertebral structures is a remnant of the embryonic notochord?
- The vertebral body
 - The spine of the vertebra
 - The annulus fibrosus
 - The nucleus pulposus
51. Polycythemia vera affects the circulatory system by
- decreasing arterial pressure
 - decreasing mean corpuscular volume (MCV)
 - increasing viscosity
 - increasing platelet formation
52. All of the following are needed to produce a normal volume of concentrated urine EXCEPT
- proximity of the early portion of the distal tubule to its own glomerulus
 - a gradient of increasing osmolarity from the corticomedullary junction to the papillary tip
 - effective circulating levels of antidiuretic hormone (ADH)
 - nephrons with loops of Henle that extend into the medulla
53. Norepinephrine is the major neurotransmitter at
- all autonomic ganglia
 - the parasympathetic postganglionic neuron-effector cell synapses
 - the sympathetic postganglionic neuron-effector cell synapses in most tissues
 - the vasodilator sympathetic fibers in skeletal muscle and thermoregulatory sweat glands

54. Which of the following is an orally active anticoagulant?
- (A) Heparin
 - (B) Warfarin
 - (C) Streptokinase
 - (D) Urokinase
55. Renal regulation of extracellular fluid volume is accomplished by regulating the excretion of
- (A) sodium
 - (B) potassium
 - (C) phosphate
 - (D) bicarbonate
56. Which of the following has the LEAST effect on enzyme action in a cell?
- (A) pH
 - (B) Substrate concentration
 - (C) Temperature
 - (D) Pressure
57. In Type I hypersensitivity reactions, chemicals such as histamine, serotonin, and leukotrienes are released from
- (A) eosinophils
 - (B) macrophages
 - (C) mast cells
 - (D) T lymphocytes
58. Which of the following are adverse drug effects of digoxin? Select the three that apply.
- (A) Nausea
 - (B) Bronchodilation
 - (C) Worsening arrhythmias
 - (D) Hepatotoxicity
 - (E) Altered color perception
59. If the lateral plantar nerve is cut, which of the following muscles will be directly affected? Select the three that apply.
- (A) Abductor hallucis
 - (B) Quadratus plantae
 - (C) Second lumbrical
 - (D) Flexor hallucis brevis
 - (E) Plantar interossei
60. Which of the following arteries are branches of the external carotid artery? Select the three that apply.
- (A) Facial
 - (B) Lingual
 - (C) Occipital
 - (D) Subclavian
 - (E) Inferior thyroid

END OF PRACTICE TEST 3

PRACTICE TEST 1
ANSWER KEYS AND RATIONALES

Sequence: Key
1 A

Epinephrine is a potent agonist at both alpha and beta adrenoceptors. Stimulation of alpha₁-adrenoceptors by epinephrine leads to arteriolar vasoconstriction; whereas, stimulation of beta₁-adrenoceptors induces a positive chronotropic and inotropic response. Both of these responses are beneficial in anaphylactic shock.

Sequence: Key
2 B

Transcription is classically defined as making complementary RNA from DNA by using RNA polymerase. For HIV (a single strand, positive sense RNA virus) complementary double-stranded DNA must first be made from viral RNA, thus the viral enzyme responsible for this is called reverse transcriptase.

Sequence: Key
3 D

Bacterial capsules interfere with the interaction between bacterial surface ligands and phagocyte receptors.

Sequence: Key
4 C

The posterior talocalcaneal ligament connects the lateral and medial tubercles of the posterior process of the talus with the superior and medial region of the calcaneus, posterior to the posterior talar facet. When an os trigonum is present, the posterior talocalcaneal ligament attaches to it.

Sequence: Key
5 D

The medulla, pons, and midbrain form the brain stem.

Sequence: Key
6 C

Spironolactone promotes the reabsorption of potassium ions. Patients receiving spironolactone should not receive potassium supplementation or increase their dietary intake of potassium unless they have refractory hypokalemia.

Sequence: Key
7 C

The rate of decay from plasma depends on clearance and distribution processes but not absorption processes.

Sequence: Key
8 C

Uric acid crystals in joints (tophi) result from disturbances in purine metabolism which lead to excessive uric acid production and crystallization.

Sequence: Key
9 B

Along with clinical observations, Negri bodies are pathognomonic for rabies. Negri bodies are well-defined inclusions in nerve cells and are often seen in stained sections of the hippocampus.

Sequence: Key
10 D

Vasoconstriction of the afferent arteriole decreases the glomerular filtration rate by decreasing the diameter of the afferent arteriole, which reduces the blood flow and pressure into the glomerulus and leads to less fluid being filtered.

Sequence: Key
11 C

Fat emboli most often occur with significant bone fractures, which allow fatty marrow to enter the blood circulation.

Sequence: Key
12 A

Fast-twitch skeletal muscle fibers fatigue more rapidly than slow-twitch skeletal muscle fibers.

Sequence: Key
13 A

All of the peptide chains of proteins are synthesized on ribosomes in the rough endoplasmic reticulum.

Sequence: Key
14 A

The medial plantar nerve is located between the first and second muscle layers.

Sequence: Key
15 D

The fibular collateral ligament, a cord-like ligament found on the lateral side of the knee joint, is distinct from the knee joint capsule and not attached to it.

Sequence: Key
16 D

Provitamin D, testosterone, and estrogen all contain the fused ring structure of the steroid nucleus, whereas dihydrofolate does not.

Sequence: Key
17 A

Prazosin is a selective, competitive antagonist at postsynaptic α_1 -adrenoceptors.

Sequence: Key
18 B

The phrenic nerve originates from the C3, C4, and C5 spinal cord levels.

Sequence: Key
19 A

Tachyphylaxis is a medical term describing a rapidly decreasing response (tolerance) to a drug following administration of the initial doses.

Sequence: Key
20 D

Plasma cells, which produce humoral antibodies, are the cells of origin in multiple myeloma.

Sequence: Key
21 D

The Epstein-Barr virus primarily infects B lymphocytes, causing disease usually in teenagers and young adults. It is readily spread through the exchange of saliva, where virus concentration can be high. There is a diagnostic antibody response to virus antigens during disease.

Sequence: Key
22 A

Pain from the diaphragm is usually referred to the shoulder via nerves that carry both motor and sensory fibers from the diaphragm.

Sequence: Key
23 B

The diaphragm is the primary muscle utilized during quiet respiration. When the diaphragm contracts, air flows into the lungs. Exhalation during quiet breathing is a passive process and occurs when the diaphragm relaxes.

Sequence: Key
24 A

The arcuate artery is the deepest structure in the dorsum of the foot.

Sequence: Key
25 B

The tibialis anterior muscle originates in part from the anterior lateral surface of the shaft of the tibia.

Sequence: Key
26 B

The mitral valve is located in the left ventricle where heart sounds emanating from the left ventricle can be heard in the left fifth intercostal space.

Sequence: Key
27 A

Each of the five metatarsals ossifies from a primary and a secondary center. The secondary center of ossification for the first metatarsal is located at its base.

Sequence: Key
28 B

Muscle cells lack the enzyme glucose-6-phosphatase, which is necessary to produce free glucose for release into the blood.

Sequence: Key
29 C

A decrease in vessel radius or diameter will cause the largest decrease in blood flow through an arteriole. Blood flow is determined by the difference in the pressure on the fore and aft sides of a tube and the resistance supplied by that tube. A decrease in the diameter of the tube will increase resistance within the tube and thus decrease fluid flow through the tube.

Sequence: Key
30 C

Pasteurella multocida is the most common bacterial pathogen isolated from dog and cat bite wounds in humans. It is part of the normal flora of the canine and feline oral cavity and upper respiratory tract.

Sequence: Key
31 A

Streptococcus pneumoniae is a common cause of otitis media in young children. It is an organism that fulfills all of the clinical and microbiological criteria listed in the question.

Sequence: Key
32 D

The piriformis muscle has an attachment to the superior border of the greater trochanter.

Sequence: Key
33 C

The beta-pleated sheet structure which forms in some proteins is an example of a secondary structure.

Sequence: Key
34 D

Coagulative necrosis is typical for most solid tissues and those with high protein content.

Sequence: Key
35 A

Cortisol increases gluconeogenesis. Cortisol increases glucose production by increasing protein catabolism and amino acid availability as well as by increasing lipolysis and glycerol availability.

Sequence: Key
36 B

Inulin is neither reabsorbed nor secreted by the proximal convoluted tubule since the renal tubule membrane is not permeable to inulin and there are no inulin transporters located in the membrane.

Sequence: Key
37 C

Bupivacaine is a long-acting local anesthetic of the amide type recommended for local or regional anesthesia. It is significantly longer lasting than other commonly used local anesthetics (usually 3 to 9 hours).

Sequence: Key
38 B

Modified ependymal cells in the choroid plexus produce cerebrospinal fluid.

Sequence: Key
39 D

Ranitidine competitively inhibits the binding of histamine to receptors on gastric parietal cells, thus reducing basal and nocturnal gastric acid secretion.

Sequence: Key
40 B

The anterior tibial vessels lie between the extensor digitorum longus muscle and the tibialis anterior muscle.

Sequence: Key
41 D

Glucose-6-phosphate dehydrogenase (G6PD) is the first enzyme in a pathway that is an important source of NADPH and ribose-5-phosphate. Therefore, a deficiency in G6PD would decrease the synthesis of NADPH.

Sequence: Key
42 A

Glucocorticoids are diabetogenic. After an oral glucose challenge, blood glucose levels are elevated when high amounts of glucocorticoids are present.

Sequence: Key
43 A

Smooth muscles require less energy to maintain continuous contractions compared to skeletal muscle. Smooth muscle can develop tension via two methods. One method requires only a small amount of energy to maintain and is well suited for tonic or sustained development of tension.

Sequence: Key
44 D

An end-plate potential is due to acetylcholine binding to an acetylcholine receptor on the sarcolemma.

Sequence: Key
45 A

Coccidioidomycosis is caused by a fungal pathogen that is both primary (as opposed to opportunistic) and pulmonary. Coccidioidomycosis is caused by *Coccidioides immitis* and is usually acquired by inhaling spores from the soil.

Sequence: Key
46 A

CD4 is a glycoprotein on helper T cells, regulatory T cells, monocytes, macrophages, and dendritic cells. Along with other markers, it is used to identify helper T cells.

Sequence: Key
47 B

Increased workload, particularly of muscle, will cause hypertrophy, not atrophy.

Sequence: Key
48 A

The main indication for parenteral vancomycin is in the treatment of sepsis or endocarditis caused by methicillin-resistant *Staphylococcus aureus*.

Sequence: Key
49 D

Essential or idiopathic hypertension by definition has no known cause.

Sequence: Key
50 C

The extensor digitorum longus originates in part from the lateral condyle of the tibia and the upper two-thirds to three-quarters of the medial surface of the shaft of the fibula.

Sequence: Key
51 A

Immobilization is the most common cause for deep vein thrombosis because the blood is allowed to pool at very low pressures.

Sequence: Key
52 C

Nonsteroidal anti-inflammatory drugs (NSAIDs) can decrease the diuretic, natriuretic, and antihypertensive actions of thiazide diuretics, likely through inhibition of renal prostaglandin synthesis. Concomitant administration of NSAIDs with thiazide diuretics can increase the risk for renal insufficiency secondary to decreased renal blood flow.

Sequence: Key
53 D

Duchenne type muscular dystrophy is the most likely diagnosis based on the findings noted and the age of the child.

Sequence: Key
54 A

Type I collagen is the most common type of collagen and the major constituent of bone.

Sequence: Key
55 A

The patella has an anterior and a posterior surface. The upper four-fifths of the posterior surface is smooth and articular, divided by a vertical ridge into a medial and a lateral facet. The lateral facet is broader and more concave than the medial facet.

Sequence: Key
56 B

The medial calcaneal nerve branches from the tibial nerve.

Sequence: Key
57 B

Clostridium perfringens is present ubiquitously in the environment. It frequently infects deep wounds where oxygen concentration is low and produces gas from local substrates obtained from damaged tissue.

Sequence: Key
58 AE

Because the tricarboxylic acid cycle will not function under anaerobic conditions, the only sources for ATP generation are via phosphotransfer from phosphocreatine or the action of myokinase which converts two molecules of ADP to an ATP molecule and an AMP molecule.

Sequence: Key
59 ACD

Of the bones noted, the calcaneus, talus, and navicular are part of the medial longitudinal arch.

Sequence: Key
60 The order is: ABDC

The sequence of bone healing after a break begins with the initial bleeding into the area (a hematoma) followed by the formation of a soft callus. This callus is then hardened by cells depositing calcium. The final step of those listed is remodeling of the bone.

PRACTICE TEST 2
ANSWER KEYS AND RATIONALES

Sequence: Key
1 D

In congestive heart failure there is a systemic back pressure which is generally most prevalent below the knee.

Sequence: Key
2 B

The term “apoptosis” is specifically defined as programmed cell death.

Sequence: Key
3 B

The presence of neutrophils and macrophages in urethral discharge usually indicates bacterial disease. *Neisseria gonorrhoeae* is the only significant gram-negative diplococcus to cause urethritis.

Sequence: Key
4 D

The substantia nigra is an area of the basal ganglia in which neurons secrete the neurotransmitter dopamine in the brain.

Sequence: Key
5 C

The basis for the Michaelis-Menten model was the observation that as substrate concentrations were increased, the enzyme rate also increased until it reached or approached a limiting value or saturation. Consistent with this was the assumption that the enzyme and substrate formed a specific reversible complex.

Sequence: Key
6 B

Enhanced elimination of aspirin can be facilitated by sodium bicarbonate.

Sequence: Key
7 B

CREST syndrome stands for five conditions that are commonly seen in patients with scleroderma.

Sequence: Key
8 D

In vivo, IgG forms soluble antigen-antibody complexes that activate the classical complement pathway.

Sequence: Key
9 B

Viruses as a group are the only microbes that always require live cells in which to replicate. They require host cell molecular machinery for such things as DNA or RNA replication, transcription, translation, and packaging of the mature virus.

Sequence: Key
10 C

Rigor mortis is the state of rigidity of a skeletal muscle when complete ATP depletion occurs.

Sequence: Key
11 C

The sartorius muscle flexes both the knee and hip joints.

Sequence: Key
12 C

The comma-shaped facet of the talus, located on its medial surface, is widest anteriorly, tapering as it goes posteriorly.

Sequence: Key
13 D

Absorption of tetracycline occurs mainly in the upper small intestine and is impaired by many of the multivalent cations found in antacids.

Sequence: Key
14 A

Digoxin must be used with caution in patients with electrolyte imbalance. Conditions including hypokalemia can increase cardiac sensitivity to digoxin, resulting in toxicity and the potential for proarrhythmias.

Sequence: Key
15 A

Of the nerves that supply taste fibers, the facial nerve supplies taste fibers to the anterior two-thirds of the tongue.

Sequence: Key
16 D

Ehlers-Danlos syndrome is caused by a genetic defect of collagen synthesis.

Sequence: Key
17 A

The number or concentration of bacteria in a wound has no correlation with the antibiotic resistance or susceptibility of the bacteria. Bacteria recovered from a wound must first be isolated and grown in vitro under specific defined laboratory conditions before being used in an in vitro antibiotic sensitivity test, such as the Bauer-Kirby test. Thus, bacteria used in an in vitro test are many steps removed from their numbers in a wound.

Sequence: Key
18 D

The adductor magnus receives innervation from the obturator nerve in the lumbar plexus and from the sciatic nerve in the sacral plexus.

Sequence: Key
19 A

Blood flows are similar between the pulmonary and systemic circulation. Cardiac output of the right heart is equivalent to the cardiac output of the left heart.

Sequence: Key
20 C

Once preliminary microbiology tests have identified *Staphylococcus* species, *Staphylococcus aureus* is identified by its ability to express coagulase.

Sequence: Key
21 C

The ilioinguinal nerve exits the inguinal canal through the superficial inguinal ring in the aponeurosis of the external oblique muscle.

Sequence: Key
22 A

Hydroxyproline is formed from proline following the synthesis of the peptide chain. This is an example of a post-translational modification, and, in this case, is carried out by prolyl hydroxylase.

Sequence: Key
23 D

Amiloride is a potassium-sparing diuretic that inhibits the sodium-potassium ion exchange mechanism in the distal renal tubule. Amiloride-induced hyperkalemia, which can cause life-threatening cardiac arrhythmias, is more likely to occur in geriatric patients or in patients with renal insufficiency or diabetes mellitus.

Sequence: Key
24 C

The Krebs or tricarboxylic acid cycle in the mitochondria begins with the condensation of acetyl-CoA and oxaloacetate to form citric acid.

Sequence: Key
25 D

Branches of the deep femoral (profunda femoris) artery supply each of the three compartments of the thigh.

Sequence: Key
26 D

The medial dorsal cutaneous nerve innervates the adjacent sides of the second and third toes.

Sequence: Key
27 A

Misoprostol is a synthetic oral prostaglandin E₁ analog used for the prevention of gastric and duodenal ulcers secondary to the use of nonsteroidal anti-inflammatory drugs (NSAIDs) such as aspirin.

Sequence: Key
28 B

Vitamin B₁₂ interacts with folic acid as an important part of one-carbon metabolism.

Sequence: Key
29 B

A functional syncytium occurs as an action potential is conducted from one cell to another. The action potentials travel to adjacent cells via gap junctions, which allow low resistance movement of ions and thus current from one cell to another.

Sequence: Key
30 D

The classic gross and histologic appearance of a pannus is the diagnostic feature for rheumatoid arthritis.

Sequence: Key
31 A

The parasympathetic nervous system has its greatest effect on heart rate in the general circulation.

Sequence: Key
32 D

Neutrophils are white blood cells and are the first line of immune defense against foreign invaders such as bacteria; they are the most predominant phagocytic cells in pus.

Sequence: Key
33 B

Patients with type 1 diabetes have concurrent renal disease with their other vascular problems. Any surgical intervention or injury, as seen in this case, will upset the fine balance within the kidney and may cause kidney failure. This is generally temporary, and with temporary dialysis the patient should recover.

Sequence: Key
34 D

The atrioventricular (AV) node has the lowest conduction velocity in the normal heart electrical conduction system.

Sequence: Key
35 A

The adductor tubercle is located on the distal aspect of the medial supracondylar ridge on the medial condyle of the femur.

Sequence: Key
36 C

Alkalinization of the glomerular filtrate enhances hydrogen ion secretion.

Sequence: Key
37 B

Vitamin K is required for the gamma carboxylation of glutamate and is essential to the formation of normal clotting factors which contain gamma carboxyglutamate (a post-translational modification).

Sequence: Key
38 A

Verapamil, a calcium channel blocker, inhibits the influx of extracellular calcium across the myocardial and vascular smooth muscle cell membranes.

Sequence: Key
39 B

Thyroid hormone concentration in the blood increases during cold exposure.

Sequence: Key
40 A

Adrenocorticotrophic hormone (ACTH) stimulates the release of cortisol. ACTH is stimulated by low levels of circulating blood cortisol and inhibited by high levels of blood cortisol.

Sequence: Key
41 C

The first dorsal metatarsal artery gives off the proper digital branch to the dorsomedial aspect of the hallux.

Sequence: Key
42 B

Although there are many ways to distinguish and identify pathogenic fungi, including molecular diagnostics, the classic and often definitive diagnosis is made in conjunction with clinical observations by defining the type and hyphal arrangement of spores.

Sequence: Key
43 A

Residual volume is the amount of air remaining in the lungs after a maximal voluntary expiration.

Sequence: Key
44 B

Meperidine is absolutely contraindicated in patients who are receiving monoamine oxidase inhibitors (MAOIs) or those who have recently received such agents. Severe reactions, possibly resulting in death, can occur with even a single dose of meperidine.

Sequence: Key
45 C

Bone marrow is the primary source of all white blood cells.

Sequence: Key
46 D

The oculomotor nerve carries parasympathetic fibers to the pupillary muscles. When these muscles are stimulated, constriction of the pupils occurs.

Sequence: Key
47 A

The adductor hallucis muscle is innervated by the deep branch of the lateral plantar nerve, which runs deep to the oblique head of the adductor hallucis muscle.

Sequence: Key
48 B

Of the four choices presented, cocaine is the only drug that can cause arrhythmias, myocardial infarction, hyperpyrexia, and seizures.

Sequence: Key
49 A

The talocalcaneal joint consists of two separate anatomical joints, both of which are described as separate synovial joints.

Sequence: Key
50 B

Receptor activation occurs when an agonist combines with a receptor. In this case, it will occur when ephedrine combines with a beta-adrenoceptor.

Sequence: Key
51 B

The trigeminal nerve ganglion in the brain stem supplies most of the sensory innervation to the face and mediates pain from the face.

Sequence: Key
52 A

The primary center of ossification of the navicular usually does not appear until the third year of life, making it the last tarsal bone to begin ossification.

Sequence: Key
53 C

Prostaglandins are derived from omega-3 fatty acids. In this case, arachidonic acid is the only omega-3 fatty acid listed.

Sequence: Key
54 C

Pseudomonas aeruginosa secretes brightly colored pigments, including the blue-green pigments pyoverdine and pyocyanin.

Sequence: Key
55 A

Pulmonary emboli arise from venous thrombosis.

Sequence: Key
56 B

Hydrochlorothiazide and triamterene are diuretics used together in an oral preparation to treat hypertension or edema. Hydrochlorothiazide is a thiazide diuretic while triamterene is a potassium-sparing diuretic which is useful to avoid excessive potassium depletion.

Sequence: Key
57 B

Polycythemia vera increases blood volume by increasing the cell volume.

Sequence: Key
58 CD

Graft rejection and contact sensitivities are both cell-mediated immune responses.

Sequence: Key
59 ADE

The soleus, extensor digitorum longus, and fibularis (peroneus) longus all have origins on the head of the fibula.

Sequence: Key
60 The order is: ACDB

Limb buds appear first, then the primitive lumbosacral plexus forms, next the chondrification centers appear, and lastly ossification begins.

PRACTICE TEST 3
ANSWER KEYS AND RATIONALES

Sequence: Key
1 D

The calcaneus normally ossifies from a primary and a secondary center of ossification.

Sequence: Key
2 B

Staphylococcus aureus has evolved a set of virulence determinants that allow it to grow rapidly, overcome or overpower host innate defenses, and induce significant inflammation and tissue damage, i.e., suppurative infections.

Sequence: Key
3 C

The fibularis (peroneus) longus and fibularis (peroneus) brevis share a common synovial sheath.

Sequence: Key
4 C

Organophosphates inhibit cholinesterase by phosphorylation of the enzyme. Pralidoxime (2-PAM) reactivates the cholinesterase by removing the phosphoryl group that is bound to the serine hydroxyl group in the catalytic site of the enzyme.

Sequence: Key
5 B

Hives develop via IgE mediation within the skin on mast cells around small vessels from either an external or internal antigen source.

Sequence: Key
6 B

Gastric reflux is the most common cause of esophageal inflammation.

Sequence: Key
7 B

Lymph node removal increases the risk of chronic edema due to the obstructed flow of lymph fluid.

Sequence: Key
8 D

Tumors are a potential result of Paget's disease, growing out of the Paget bone; the tumors presumably develop from the same factors that stimulate the proliferation of osteoclasts and osteocytes.

Sequence: Key
9 C

Verruca plantaris (plantar warts) is extremely common, easily transmitted, and is caused by entry of the human papillomavirus (HPV) into skin abrasions of the sole and heel. HPV also causes warts on other parts of the body.

Sequence: Key
10 D

Treponema pallidum, the etiologic agent of syphilis, causes a classic, definitive, and diagnostic rash. This rash, which is teaming with *Treponema pallidum*, can be on any part of the body, including the palms and soles, and is diagnostic for secondary syphilis.

Sequence: Key
11 B

Adenosine triphosphate (ATP) provides the potential energy used in muscle contraction.

Sequence: Key
12 D

Vitamin E is an antioxidant and part of the protection system against oxidative damage in cells.

Sequence: Key
13 B

The Krebs or tricarboxylic acid cycle takes place exclusively in the matrix of the mitochondria.

Sequence: Key
14 D

The central tendon of the third dorsal interosseous muscle attaches to the lateral aspect of the base of the proximal phalanx of the third toe.

Sequence: Key
15 C

Kupffer's cells are phagocytic cells located in the liver sinusoids that are part of the reticuloendothelial system.

Sequence: Key
16 C

Osteomalacia is due to vitamin D deficiency caused by a derangement of absorption or metabolism.

Sequence: Key
17 D

Bacterial spores are the most heat-resistant form of any pathogenic microorganism. If bacterial spores, often *Bacillus* species, are killed by sterilization, then all other microorganisms will also have been killed.

Sequence: Key
18 A

Vagal nerve activation leads to a longer P-R interval.

Sequence: Key
19 C

The nutrient artery of the fibula is a branch of the fibular (peroneal) artery.

Sequence: Key
20 D

The lateral cuneiform articulates with the lateral aspect of the base of the second metatarsal medially, the medial aspect of the base of the fourth metatarsal laterally, and the base of the third metatarsal anteriorly.

Sequence: Key
21 B

Nonsteroidal anti-inflammatory drugs (NSAIDs) do not cause bronchodilation.

Sequence: Key
22 B

The adrenal medulla primarily secretes the hormone epinephrine.

Sequence: Key
23 B

Because mature red blood cells (reticulocytes) have lost their nucleus and mitochondria, their sole source for producing ATP is via anaerobic glycolysis.

Sequence: Key
24 A

Hyperventilation increases blood pH.

Sequence: Key
25 A

Serratia marcescens is found ubiquitously in the environment and grows as strongly pigmented (pink to reddish-orange) colonies on media without indicators. Of the bacteria listed, it is the only bacterium that cannot be considered a primary pathogen.

Sequence: Key
26 D

The precentral gyrus (primary motor area) of the cerebral cortex provides first-order neurons for voluntary motor movements.

Sequence: Key
27 A

The sartorius muscle flexes both the knee and hip joints.

Sequence: Key
28 D

Gallstones are complex precipitates consisting of cholesterol, bile salts, and phospholipids. They frequently form when the balance of bile salts and cholesterol is disrupted.

Sequence: Key
29 A

The iliofemoral ligament is Y-shaped and is the strongest and most superior of the extrinsic ligaments of the hip joint.

Sequence: Key
30 C

During the transition from a supine or prone position to a standing position, venous return decreases. The decrease in venous return is related to a pooling of blood due to the effect of gravity that occurs in the lower limbs.

Sequence: Key
31 D

The absorption rate for ingested lead is higher in children than in adults.

Sequence: Key
32 A

In normal tissues, keratin is only found in the skin. Keratinocytes are the major type of cell found in the epidermis.

Sequence: Key
33 A

Smooth muscle does not utilize troponin for the initiation of cross-bridge cycling.

Sequence: Key
34 D

Tricyclic antidepressants inhibit the reuptake of both serotonin and norepinephrine. This has been implicated as the most important molecular mechanism contributing to their antidepressant actions.

Sequence: Key
35 D

The anterior surface of the medial cuneiform is kidney-shaped with the “hilus” facing laterally.

Sequence: Key
36 B

The regulation of cholesterol biosynthesis occurs primarily at the level of the enzyme HMG CoA reductase.

Sequence: Key
37 D

The short plantar ligament of the foot attaches to the anterior tubercle of the calcaneus.

Sequence: Key
38 C

Clostridium species contaminate or infect wounds, especially dirty wounds like those found on the feet.

Sequence: Key
39 B

The most lateral structure in the femoral sheath is the femoral artery.

Sequence: Key
40 D

Bacteria will grow luxuriously on media prepared for fungi and yeast, such as Sabouraud dextrose agar, unless antibacterial antibiotics are added. Bacteria are usually found in clinical samples where fungi are suspected.

Sequence: Key
41 A

The pelvic splanchnic nerves arise from spinal nerves S2, S3, and S4 and provide parasympathetic innervation.

Sequence: Key
42 C

Atropine can cause pronounced cycloplegia and mydriasis; blurred vision is a common adverse reaction to atropine.

Sequence: Key
43 A

Immediate hypersensitivity to penicillin is mediated primarily by the binding of IgE to tissue mast cells with the subsequent release of active inflammatory mediators.

Sequence: Key
44 B

Sodium channels engaged during neural action potentials are voltage-gated or voltage-dependent.

Sequence: Key
45 B

Acetylcysteine is used to prevent hepatotoxicity after an acute overdose of acetaminophen.

Sequence: Key
46 D

Bethanechol increases the secretory and motor activity of the gut. The salivary and gastric glands are strongly stimulated, and the pancreas is stimulated at higher doses.

Sequence: Key
47 B

Kaposi's sarcoma is a disease most often seen in patients with AIDS; another respiratory complication of AIDS is *Pneumocystis jiroveci* pneumonia.

Sequence: Key
48 B

The dorsal surface of the talus is completely covered with cartilage for its articulation with the inferior surface of the tibia.

Sequence: Key
49 C

Psoriasis is characterized by erythematous eruptions that often occur in papules or plaques and have a white silvery scale.

Sequence: Key
50 D

The nucleus pulposus, which is a remnant of the embryonic notochord, is the jelly-like substance in the middle of a spinal disk.

Sequence: Key
51 C

In polycythemia vera there is an increase in all myeloid components which results in a much higher ratio of cells to plasma and, therefore, a significant increase in viscosity.

Sequence: Key
52 A

Although the close proximity of the early portion of the distal tubule to its own glomerulus aids in communication, such as glomerular-tubule feedback, the distance between the glomerulus and the distal tubule does not directly affect urine concentration.

Sequence: Key
53 C

In most sympathetic postganglionic neurons, norepinephrine is the neurotransmitter that is released into the synapse to act on adrenergic receptors of effector cells.

Sequence: Key
54 B

Warfarin, an orally active anticoagulant, inhibits the synthesis of vitamin K-dependent coagulation factors II, VII, IX, and X and anticoagulant proteins C and S.

Sequence: Key
55 A

The renal regulation of extracellular fluid volume is primarily accomplished by the regulation of sodium.

Sequence: Key
56 D

Biological reactions in a cell occur at or near normal atmospheric pressure. Thus, enzymes in a cell are not exposed to significant changes in pressure. In addition, most protein structures, including enzymes, do not show changes in structure or function even in response to a significant change in pressure.

Sequence: Key
57 C

Tissue mast cells are the primary participants in Type I hypersensitivity. Upon binding of IgE to specific IgE receptors and subsequent ligation of IgE with antigen, mast cells release active and preformed inflammatory mediators, including histamine and serotonin in addition to synthesized mediators such as leukotrienes.

Sequence: Key
58 ACE

The major adverse effects of digoxin are: (1) gastrointestinal, such as nausea, vomiting, and diarrhea (which are the earliest to occur); and (2) cardiovascular, including various types of arrhythmias. There are also CNS effects, such as confusion, hallucinations, and visual aberrations.

Sequence: Key
59 BCE

If the lateral plantar nerve is cut, the quadratus plantae, second lumbrical, and plantar interossei muscles will be directly affected.

Sequence: Key
60 ABC

The facial, lingual, and occipital arteries are branches of the external carotid artery.