

DIRECTIONS (ITEMS 68-88): Each group of items in this section consists of lettered headings followed by a set of numbered words or phrases. For each numbered word or phrase, fill in the circle on the answer sheet containing

- A if the item is associated with (A) *only*
- B if the item is associated with (B) *only*
- C if the item is associated with *both* (A) *and* (B)
- D if the item is associated with *neither* (A) *nor* (B)

Items 68-70

One group of rats, made diabetic by treatment with a drug that destroys the beta cells of the pancreas and being fed a normal diet, is compared with a group of normal rats that are fasted for two days.

- (A) Fasted rats
- (B) Diabetic rats
- (C) Both
- (D) Neither

68. Elevated activity of phosphofructokinase

69. Enhanced gluconeogenesis

70. Enhanced synthesis and utilization of ketone bodies

Items 71-72

- (A) Oxidative deamination of glutamate
- (B) Transamination of glutamate
- (C) Both
- (D) Neither

71. Pyridoxal phosphate required

72. Production of NH_3

Items 73-74

- (A) Nonregulatory enzyme
- (B) Regulatory enzyme
- (C) Both
- (D) Neither

73. Reaction catalyzed is inhibited by a metabolite that may not closely resemble the substrate.

74. Alter(s) the equilibrium constant of the reaction

Items 75-76

In skeletal muscle:

- (A) Actin
- (B) Myosin
- (C) Both
- (D) Neither

75. Interact(s) with tropomyosin

76. Bind(s) calcium

Items 77-78

Residues of:

- (A) Galactose
- (B) Sialic acid
- (C) Both
- (D) Neither

Present in:

77. Phosphatidylcholine (lecithin)

78. Cerebroside

Items 79-80:

- (A) Choline
- (B) Glycerol
- (C) Both
- (D) Neither

Residue(s) present in:

79. Sphingomyelin

80. Phosphatidic acid

Items 81-82

- (A) IgG
- (B) IgM
- (C) Both
- (D) Neither

81. Contain(s) both λ and κ light chains in a single molecule

82. Contain(s) a J segment

Items 83-84

- (A) β -Thalassemia
- (B) Sickle cell disease
- (C) Both
- (D) Neither

83. Multiplicity of mutations

84. Decreased synthesis of an α -globin chain

Items 85-86

- (A) Adenylate cyclase
- (B) Nuclear binding
- (C) Both
- (D) Neither

85. ACTH

86. Thyroxine (T_4)

Items 87-88

Mutations:

- (A) Frameshift
- (B) Nonsense
- (C) Both
- (D) Neither

87. AAGCAA $\rightarrow$ AACAA

88. Single amino acid substitution in protein

DIRECTIONS (ITEMS 89-141): For each of the items in this section, ONE or MORE of the numbered options is correct. On the answer sheet fill in the circle containing

- A if only 1, 2, and 3 are correct,
 B if only 1 and 3 are correct,
 C if only 2 and 4 are correct,
 D if only 4 is correct,
 E if all are correct.

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED

A 1, 2, 3 only	B 1, 3 only	C 2, 4 only	D 4 only	E All are correct
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89. Enzymatic reactions that are involved in gluconeogenesis but are not involved in glycolysis include
- (1) fructose 1,6-bisphosphate $\rightarrow$ fructose 6-phosphate + P_i
 - (2) fructose 6-phosphate + ATP $\rightarrow$ fructose 1,6-bisphosphate + ADP
 - (3) pyruvate + ATP + $CO_2 \rightarrow$ oxaloacetate + ADP + P_i
 - (4) pyruvate + ATP $\rightarrow$ phosphoenolpyruvate + ADP
90. Events occurring in the activation of glycogenolysis by glucagon include:
- (1) Glucagon binds to specific receptors in the plasma membrane
 - (2) Adenylate cyclase is activated
 - (3) A series of protein kinases is activated
 - (4) Glycogen phosphorylase and glycogen synthetase are phosphorylated
91. The transfer of electrons from fatty acyl CoA to O_2 involves
- (1) FAD
 - (2) NAD^+
 - (3) cytochrome c
 - (4) glycerol 1-phosphate
92. Oxaloacetate is a substrate for
- (1) citrate synthetase
 - (2) phosphoenolpyruvate carboxykinase
 - (3) malate dehydrogenase
 - (4) citrate lyase
93. The utilization of glutamate as an energy source requires reactions involving
- (1) lipoic acid
 - (2) pyridoxine (vitamin B_6)
 - (3) niacin
 - (4) cyanocobalamin (vitamin B_{12})
94. Sources of pyruvate in hepatic cells include
- (1) palmitate
 - (2) alanine
 - (3) acetyl CoA
 - (4) glycogen
95. Isocitrate $\rightarrow$ α -ketoglutarate
- α -ketoglutarate $\rightarrow$ succinyl CoA
- The above reactions of the tricarboxylic acid cycle are similar in that both involve
- (1) cleavage of a carbon-carbon bond
 - (2) reduction of NAD^+
 - (3) release of CO_2
 - (4) addition of H_2O

Tissues unable to carry out gluconeogenesis may lack

- (1) pyruvate carboxylase
- (2) fructose 1,6-diphosphatase
- (3) glucose 6-phosphatase
- (4) pyruvate kinase

Reactions involved in the conversion of aspartate to glucose include

- (1) decarboxylation
- (2) dephosphorylation
- (3) aldol condensation
- (4) transamination

Causes of increased synthesis of hepatic cytosolic phosphoenolpyruvate carboxykinase include

- (1) fasting
- (2) glucagon
- (3) diabetes mellitus
- (4) glucocorticoids

When lipolysis is occurring at a high rate, compounds that inhibit the degradation of glucose include

- (1) ketone bodies
- (2) citrate
- (3) malate
- (4) acetyl CoA

The conversion of propionate to succinate in liver requires the participation of enzymatically active forms of

- (1) cyanocobalamin (vitamin B₁₂)
- (2) thiamine (vitamin B₁)
- (3) biotin
- (4) riboflavin (vitamin B₂)

Thiamine pyrophosphate is a required cofactor for the oxidation of

- (1) pyruvate
- (2) isocitrate
- (3) α -ketoglutarate
- (4) succinate

102. Similarities between fatty acid synthesis and fatty acid oxidation include

- (1) utilization of NADPH
- (2) occurrence in the cytosol
- (3) acceleration in diabetes mellitus
- (4) participation of thioesters

103. In the normal human body, high serum concentrations of cholesterol tend to

- (1) stimulate the degradation of cholesterol by the liver
- (2) inhibit the biosynthesis of cholesterol by peripheral tissues
- (3) inhibit the biosynthesis of steroid hormones
- (4) stimulate the synthesis of bile salts in the liver

104. Carbamoyl phosphate is required for the synthesis of

- (1) pyrimidines
- (2) creatine
- (3) urea
- (4) ornithine

105. Enzymes that are components of substrate cycles (formerly called futile cycles) include

- (1) phosphofructokinase
- (2) glucose 6-phosphatase
- (3) fructose 1,6-bisphosphatase
- (4) glucokinase

106. Mammalian liver can fix ammonium ion (NH_4^+) into organic form through the action of

- (1) glutamine synthetase
- (2) glutaminase
- (3) carbamoyl phosphate synthetase
- (4) glutathione reductase

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED

A
1, 2, 3
only

B
1, 3
only

C
2, 4
only

D
4
only

E
All are
correct

107. Galactosemia may result from

- (1) an inability to hydrolyze lactose
- (2) a deficiency of D-galactose 1-phosphate uridyl transferase
- (3) a defect in the conversion of glucose 6-phosphate to galactose 6-phosphate
- (4) a deficiency of galactokinase

108. Characteristics of cartilage proteoglycans include:

- (1) Their charge is caused by sulfate and/or carboxyl groups
- (2) They are predominantly protein in content
- (3) Dilute solutions are quite viscous
- (4) They are largely intracellular

109. In an antibody-producing cell, the conversion of IgM to another immunologic class includes a change in

- (1) specificity
- (2) the variable region of the light chain
- (3) the hinge region
- (4) the constant region of the heavy chain

110. Characteristics of ganglioside metabolism include:

- (1) Biosynthesis and degradation occur in the same organelle
- (2) Glycosyl residues of UDP and CMP derivatives are utilized
- (3) Hydrolases that catalyze degradation are primarily endoglycosidases
- (4) The carbohydrate chain is assembled sequentially

111. Factors that influence the strength and deformability of erythrocyte membranes include

- (1) calcium
- (2) the level of activity of glucose 6-phosphate dehydrogenase
- (3) the mutations in genes for cytoskeletal proteins
- (4) the level of activity of myosin light-chain kinase

112. Attributes of allosteric effectors include

- (1) activation of enzymatic activity
- (2) inactivation of enzymatic activity
- (3) alteration of the apparent K_m for substrate
- (4) competition with substrate for binding at the active site

113. In an enzyme that binds its substrate, acetate, through electrostatic interactions, residues likely to be found within the active site include

- (1) glutamate
- (2) lysine
- (3) cysteine
- (4) arginine

114. Utilization of dietary galactose for energy production requires

- (1) ATP
- (2) uridine diphosphate glucose
- (3) NAD^+
- (4) biotin

115. The lipid bilayer structure of cellular membranes provides for

- (1) insertion of proteins through the lipid bilayer
- (2) rapid "flip-flop" of lipid molecules from one side of the bilayer to the other
- (3) ligand-induced movement of membrane components
- (4) fixed positions for proteins within a fluid-lipid matrix

116. Constituents of normal plasma membrane include

- (1) phospholipids
- (2) proteins
- (3) glycolipids
- (4) cholesterol

117. In the gene for a given protein, a single nucleotide change can result in a

- (1) protein of normal molecular weight with a single amino acid substitution and normal function
- (2) protein of normal molecular weight with normal amino acid composition
- (3) protein of normal molecular weight with a single amino acid substitution and altered function
- (4) polypeptide of low molecular weight

118. A comparison of myoglobin and hemoglobin in the human shows that:

- (1) Myoglobin contains one polypeptide chain; hemoglobin contains 4
- (2) Myoglobin and hemoglobin both circulate in the plasma
- (3) Myoglobin does not exhibit a Bohr effect; hemoglobin does
- (4) The iron in myoglobin is in the ferric form; in hemoglobin it is ferrous

119. Hemolytic anemia caused by a deficiency of erythrocyte glucose 6-phosphate dehydrogenase is characterized by

- (1) increased accumulation of lipid hydroperoxides
- (2) exacerbation by the administration of drugs that are usually harmless
- (3) an increased ratio of oxidized to reduced glutathione
- (4) a reduced ratio of NAD^+ to NADH

120. In humans, primary sources of methyl groups include

- (1) methionine
- (2) methyl tetrahydrofolate
- (3) choline
- (4) N-methyl histidine

121. In adult humans, the dietary absence of any one of the essential amino acids will

- (1) lead to an increased urinary excretion of creatinine
- (2) decrease the flux through the urea cycle
- (3) enhance the incorporation of the other amino acids into tissue protein
- (4) cause negative nitrogen balance

122. Compounds derived from tryptophan include

- (1) 5-hydroxyindoleacetic acid
- (2) serotonin (5-hydroxytryptamine)
- (3) NAD^+
- (4) epinephrine

123. Hartnup disease, a hereditary disturbance of monoamino monocarboxylic amino acid transport, causes abnormal absorption of

- (1) aspartic acid
- (2) tryptophan
- (3) lysine
- (4) histidine

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED

A
1, 2, 3
only

B
1, 3
only

C
2, 4
only

D
4
only

E
All are
correct

124. Surgical removal of the last 16 cm of the small intestine significantly impairs the absorption of

- (1) amino acids
- (2) bile salts
- (3) glucose
- (4) cyanocobalamin (vitamin B₁₂)

128. Causes of single-gene disorders such as thalassemia include

- (1) frame-shift mutation
- (2) deletion
- (3) single-base substitution
- (4) translocation

125. Proteolytic enzymes play an important role in the

- (1) formation of collagen fibers
- (2) formation of elastin cross-links
- (3) coagulation of blood
- (4) degradation of glycogen

129. Characteristics of DNA replication include:

- (1) There is a different mechanism for the synthesis of each strand
- (2) It proceeds in a 3'→5' direction
- (3) A primer is required
- (4) There is conservative synthesis

126. Characteristics of all tRNAs include

- (1) a compact tertiary structure
- (2) proximity of 5' and 3' ends
- (3) interaction with aminoacyl tRNA synthetases, elongation factors and initiation factors
- (4) binding of amino acids at the 5' end

130. Polypeptide chain elongation requires

- (1) initiation factors
- (2) peptidyl transferase
- (3) AUG codon in mRNA
- (4) GTP

127. Total RNA extracted from hepatic cells hybridizes only 5-10% of the DNA sequences present in that cell. Factors that contribute to this include:

- (1) Gene expression is controlled at the level of transcription
- (2) Gene expression is controlled at the level of translation
- (3) Many DNA sequences do not code for proteins
- (4) Some DNA sequence rearrangement occurs in the liver

131. Structural features that serve to identify eukaryotic mRNAs include a

- (1) 3' terminal poly(A) sequence
- (2) high content of modified bases
- (3) 5' terminal 7-methyl guanylate residue
- (4) cloverleaf secondary structure

132. Synthesis of RNA requires

- (1) reverse transcriptase
- (2) a free 3' OH group
- (3) spermidine
- (4) ATP

133. DNA binding proteins that recognize specific nucleotide sequences include
- (1) restriction endonucleases
 - (2) histone H1
 - (3) repressor proteins
 - (4) DNA ligase
134. The mitochondrial oxidations of α -ketoglutarate and of pyruvate both
- (1) are catalyzed by multienzyme complexes
 - (2) involve lipoic acid
 - (3) involve thiamine pyrophosphate
 - (4) involve FAD
135. The synthesis of triacylglycerols by intestinal mucosa cells
- (1) occurs in response to dietary fat
 - (2) includes acylation of 2-acylglycerol
 - (3) precedes the appearance of lymph lipoproteins
 - (4) is decreased by obstruction of the bile duct
136. The de novo synthesis of fatty acids from two-carbon units
- (1) occurs in the mitochondria
 - (2) is activated by long-chain fatty acyl CoA
 - (3) is greatest during periods of starvation
 - (4) requires CO_2
137. Synthesis of ATP in the mitochondria
- (1) involves expulsion of protons coupled to electron transport
 - (2) is carried out by an ATPase specifically oriented in the membrane
 - (3) is inhibited by antimycin
 - (4) accounts for most of the O_2 consumption in humans
138. The condensation of chromatin into chromosomes
- (1) is accompanied by loss of histones on the DNA
 - (2) occurs irreversibly in nondividing cells
 - (3) requires a doubling of the histone content
 - (4) occurs reversibly prior to each cell division
139. Uptake of low-density lipoprotein (LDL) into extrahepatic human cells
- (1) requires binding of LDL to receptors in coated pits
 - (2) occurs without concomitant uptake of cholesterol
 - (3) is normally followed by fusion of LDL vesicles with lysosomes
 - (4) is unaffected by the intracellular concentration of cholesterol
140. D-glucose transport across the luminal plasma membrane of the intestinal cell
- (1) requires a high Na^+ concentration in the cell as compared to that in the lumen
 - (2) is accompanied by the uptake of Ca^{2+}
 - (3) occurs by a similar mechanism across the contraluminal membrane
 - (4) depends on Na^+-K^+ ATPase
141. In mammals, acetyl CoA carboxylase
- (1) catalyzes the committed step in the biosynthesis of fatty acids
 - (2) is allosterically inhibited by citrate
 - (3) requires one molecule of ATP for each molecule of acetyl CoA
 - (4) is essential for the conversion of fatty acids to glucose

PATHOLOGY

DIRECTIONS (ITEMS 1-71): Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the **ONE** lettered answer or completion that is **BEST** in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. Grape-like clusters of avascular, hydropic chorionic villi from the uterine cavity in the fourth month of pregnancy are
 - (A) an indication of bacterial infection in the mother
 - (B) associated with congenital malformations in the fetus
 - (C) associated with karyotypic abnormalities in the fetus
 - (D) associated with maternal choriocarcinoma
 - (E) the most common cause of massive maternal hemorrhage
2. Gonorrheal infection in men is **LEAST** likely to involve the
 - (A) epididymis
 - (B) prostate gland
 - (C) seminal vesicles
 - (D) testes
 - (E) urethra
3. Which of the following features is **LEAST** likely to be expected in the cerebrospinal fluid (CSF) of a patient with acute bacterial meningitis?
 - (A) Decreased glucose concentration
 - (B) Erythrocytes in the first tube of CSF
 - (C) Increased numbers of neutrophils
 - (D) No microorganisms on direct Gram stain of CSF
 - (E) Normal protein concentration
4. Each of the following is a characteristic of the plaques seen in multiple sclerosis **EXCEPT**
 - (A) early complete loss of axons
 - (B) gliosis
 - (C) loss of oligodendroglia
 - (D) mononuclear inflammatory infiltrate
 - (E) preferential paraventricular distribution
5. During the first two months of life, the microorganism most frequently responsible for meningitis is
 - (A) *Escherichia coli*
 - (B) *Hemophilus influenzae*
 - (C) *Neisseria meningitidis*
 - (D) *Staphylococcus aureus*
 - (E) *Streptococcus pneumoniae*
6. Multiple oligoclonal bands of immunoglobulins can be detected electrophoretically in the cerebrospinal fluid of most patients with
 - (A) glioblastoma multiforme
 - (B) Guillain-Barré syndrome
 - (C) herpes zoster
 - (D) multiple sclerosis
 - (E) viral meningoencephalitis
7. Hypercalcemia with an increased plasma concentration of immunoreactive parathyroid hormone is most characteristically associated with
 - (A) excess intake of vitamin D
 - (B) hyperthyroidism
 - (C) malignancy
 - (D) milk-alkali syndrome
 - (E) primary hyperparathyroidism
8. A subdural hematoma is most likely to be associated with a traumatic tear of the
 - (A) bridging cerebral veins
 - (B) middle cerebral artery
 - (C) middle meningeal artery
 - (D) superficial temporal artery
 - (E) superior longitudinal sinus

Carbon monoxide has its most damaging effect on

- (A) astrocytes
- (B) endothelium
- (C) myelin
- (D) neurons
- (E) oligodendroglia

1. The sequence of events in the development of rheumatoid arthritis is

- (A) degeneration of cartilage, depolymerization of polysaccharide, ankylosis
- (B) suppurative exudate, destruction of cartilage, ankylosis
- (C) joint effusion, degeneration of cartilage, ankylosis, pannus formation
- (D) depolymerization of polysaccharide, degeneration of cartilage, marginal lip-ping
- (E) synovitis, lymphoid infiltration, pannus formation, ankylosis

1. The most common neoplasm involving bone is

- (A) giant cell tumor
- (B) metastatic carcinoma
- (C) osteochondroma
- (D) osteosarcoma
- (E) synovial sarcoma

2. Which of the following skin lesions is considered premalignant?

- (A) Fibrous histiocyoma
- (B) Lichen planus
- (C) Psoriasis
- (D) Seborrheic keratosis
- (E) Solar (actinic) keratosis

3. In a normal adult with a plasma concentration of glucose of 100 mg/dL, the cerebrospinal fluid concentration of glucose is approximately

- (A) 20 mg/dL
- (B) 40 mg/dL
- (C) 60 mg/dL
- (D) 100 mg/dL
- (E) 120 mg/dL

14. If the prevalence of human immunodeficiency virus (HIV) in donated blood is 1 in 10,000, and the test for the virus has a 1% false positive rate and a 1% false negative rate, what are the chances that a blood sample that tests positive will contain the virus?

- (A) 1%
- (B) 10%
- (C) 50%
- (D) 90%
- (E) 99%

15. Differences between males and females are most likely seen in laboratory measurements of

- (A) albumin
- (B) chloride
- (C) potassium
- (D) sodium
- (E) uric acid

16. Parathyroid hyperplasia is associated with each of the following EXCEPT

- (A) chronic renal disease with hyperphosphatemia
- (B) enlargement of several parathyroid glands
- (C) an enlarged solitary parathyroid with the other glands small or atrophic
- (D) metabolic bone disease
- (E) primary and secondary hyperparathyroidism

17. The most common cause of viral pneumonia in infants under 6 months is

- (A) ECHO virus
- (B) influenza virus, group A
- (C) rhinovirus
- (D) respiratory syncytial virus
- (E) coronavirus

18. Gonococcal infection is LEAST likely to affect the

- (A) cervix
- (B) fallopian tubes
- (C) prostate and seminal vesicles
- (D) testes
- (E) urethra

19. A 32-year-old Rh-negative woman was delivered of her third child. She had not sought medical care during pregnancy. Upon admission, her saline agglutinin titer for Rh+ cells was 1:4, and indirect antiglobulin (Coombs) test titer was 1:32. The infant had a hemoglobin of 10 g/dL and became severely jaundiced, as her second child had been. The greatest hazard for the infant is
- (A) cardiac failure secondary to anemia
 - (B) hypoglycemia secondary to pancreatic islet hyperplasia
 - (C) jaundice associated with an increased concentration of conjugated (direct) bilirubin
 - (D) kernicterus associated with an increased concentration of unconjugated (indirect) bilirubin
 - (E) renal failure secondary to hemolysis
20. A standardized template bleeding time provides rapid assessment of functional adequacy of
- (A) antihemophilic factor (factor VIII)
 - (B) fibrinogen
 - (C) phytonadione (vitamin K)
 - (D) platelets
 - (E) thrombin
21. Involvement of endothelial cells is most characteristic of infection with
- (A) chlamydiae
 - (B) herpesvirus
 - (C) pasteurellae
 - (D) rickettsiae
 - (E) toxoplasmas
22. Severe cell injury due to ischemia is characterized by
- (A) increased cellular capacity for oxidative phosphorylation
 - (B) a loss of intracellular calcium
 - (C) shrinkage of mitochondria
 - (D) decreased intracellular pH
 - (E) decreased intracellular lactate
23. Coagulation necrosis is most often a result of
- (A) digestion by lipolytic and proteolytic enzymes
 - (B) cellular damage caused by chemical poisons
 - (C) postmortem autolysis
 - (D) infection by mycobacteria (*M. tuberculosis*)
 - (E) local hypoxia caused by loss of blood supply
24. Which of the following pigments will accumulate as the result of peroxidation of cell membranes?
- (A) Bilirubin
 - (B) Lipochrome
 - (C) Melanin
 - (D) Hemosiderin
 - (E) Hemoglobin
25. Cellular regeneration and restoration of normal morphology is possible in each of the following conditions EXCEPT
- (A) diphtheritic myocarditis
 - (B) damage to proximal convoluted renal tubules by mercuric salts
 - (C) acute erosion of gastric mucosa
 - (D) viral hepatitis A
 - (E) squamous metaplasia of the bronchial epithelium
26. Severe cell injury caused by ischemia is characterized by
- (A) a decreased cholesterol:phospholipid ratio in plasma membranes
 - (B) decreased intracellular pH
 - (C) energization of mitochondrial inner membranes
 - (D) loss of intracellular calcium
 - (E) stimulation of membrane $\text{Na}^+ - \text{K}^+$ ATPase

27. Histologic grading systems to classify prostatic carcinoma were evaluated by investigators on two separate occasions. Results were compared between the investigators as well as across occasions for each investigator. The purpose of the multiple measurements was to
- (A) decrease the effects of confounding bias
 - (B) decrease the standard deviations of the measurements
 - (C) establish the accuracy of the grading systems
 - (D) establish the reliability of the grading systems
 - (E) establish the validity of the grading systems
28. The pathogenesis of granulomatous reactions includes each of the following EXCEPT
- (A) activated macrophages
 - (B) antibodies
 - (C) bacterial lipids
 - (D) insoluble materials
 - (E) T lymphocytes
29. Development of tensile strength in a healing wound parallels the
- (A) appearance of mucopolysaccharides
 - (B) ingrowth of fibroblasts
 - (C) appearance of reticulin fibers
 - (D) appearance of collagen
 - (E) contraction of the scar
30. The gross and microscopic characteristics used to differentiate benign from malignant neoplasms have been proved by testing them for correlation with
- (A) electron microscopic features of the neoplasms
 - (B) chemical analyses of neoplasms for DNA content
 - (C) analyses of chromosome number and configuration
 - (D) growth of neoplastic cells in tissue culture
 - (E) behavior of neoplasms in human subjects
31. Visceral malignancy is associated with
- (A) acanthosis nigricans
 - (B) lentigo
 - (C) solar keratosis
 - (D) Spitz nevus
 - (E) vitiligo
32. The chance of finding a complete human leukocyte antigen (HLA) match between fraternal siblings is
- (A) 1:1
 - (B) 1:2
 - (C) 1:4
 - (D) 1:8
 - (E) 1:16
33. Splenectomy increases the risk for
- (A) Hodgkin disease
 - (B) idiopathic thrombocytopenic purpura
 - (C) myeloid metaplasia
 - (D) pneumococcal infection
 - (E) polycythemia vera
34. *Staphylococcus aureus* causes infection in children with chronic granulomatous disease because it is
- (A) α -toxin producing
 - (B) anaerobic
 - (C) catalase-positive
 - (D) coagulase-positive
 - (E) gram-positive
35. Factors that contribute to the pathogenesis of amyloidosis include each of the following EXCEPT
- (A) chronic infection
 - (B) deficiency of amylase
 - (C) inherited susceptibility
 - (D) malignant plasma cells
 - (E) rheumatoid arthritis

36. Which of the following is most likely to be found in hypogammaglobulinemia (Bruton disease)?

- (A) A familial history of similar diseases in females
- (B) Thymic agenesis
- (C) Infections with *Hemophilus influenzae*
- (D) Inflammatory bowel disease
- (E) Leukopenia

41. Which of the following is more likely due to a staphylococcus than a streptococcus?

- (A) Abscess
- (B) Erysipelas
- (C) Impetigo contagiosa
- (D) Lymphangitis
- (E) Scarlet fever

42. Female pseudohermaphroditism is most closely associated with

- (A) 46,XY karyotype
- (B) absence of a uterus and fallopian tubes
- (C) adrenocortical hypoplasia
- (D) ambiguous external genitalia
- (E) presence of ovarian and testicular tissue

43. Males with an XYY karyotype are usually susceptible to

- (A) depression
- (B) growth retardation
- (C) palpitations
- (D) priapism
- (E) severe acne

44. The child of two dark-complexioned parents has blond hair, unusually fair skin and blue eyes. Apparently normal at birth, the child develops seizures during the first three months, has a musty odor and becomes severely retarded. The likely cause is

- (A) galactosemia
- (B) maple syrup urine disease
- (C) phenylketonuria
- (D) progressive multifocal dystrophy
- (E) Tay-Sachs disease

45. An increased frequency of acute leukemia is most characteristic in patients with

- (A) cystic fibrosis
- (B) Down syndrome
- (C) Klinefelter syndrome
- (D) Tay-Sachs disease
- (E) Turner syndrome

37. An important metabolic disturbance in shock is

- (A) a decrease in the production of lactate and pyruvate
- (B) a shift from aerobic to anaerobic metabolism
- (C) systemic metabolic alkalosis
- (D) respiratory acidosis
- (E) free radical production

38. Complement is involved in the pathogenesis of each of the following EXCEPT

- (A) Arthus reaction
- (B) contact dermatitis
- (C) erythroblastosis fetalis
- (D) hemolytic transfusion ABO reaction
- (E) serum sickness

39. Atherosclerotic plaques are LEAST likely to contain

- (A) collagen
- (B) cholesterol
- (C) macrophages
- (D) neutrophils
- (E) smooth muscle cells

40. In acute meningococcal infection, the initial lesion or process is

- (A) meningitis
- (B) otitis media
- (C) septicemia
- (D) petechiae in the skin
- (E) colonization of the nasopharynx

typical cutaneous entrance wound resulting from bullet fired from a distance (10 meters) is characterized by

- (A) a stellate, lacerated defect larger than the bullet
- (B) burning of the skin around the wound
- (C) powder residue blasted into the tissue
- (D) a round defect, smaller than the bullet, with abraded edges
- (E) little or no bleeding

Dense fibrocalcific parietal plaques of the pleura are suggestive of

- (A) asbestosis
- (B) berylliosis
- (C) coal miner's pneumoconiosis
- (D) lead poisoning
- (E) silicosis

Subcutaneous hemorrhages are characteristically associated with dietary deficiencies of

- (A) cyanocobalamin (vitamin B₁₂)
- (B) folic acid
- (C) thiamine (vitamin B₁)
- (D) vitamin C
- (E) vitamin E

A hypertensive patient with high renin activity and low potassium concentration in the serum probably has

- (A) chronic renal failure
- (B) essential hypertension
- (C) primary hyperaldosteronism
- (D) renal artery stenosis
- (E) sodium overload

Cor pulmonale is a result of

- (A) a healed myocardial infarct
- (B) aortic stenosis
- (C) emphysema
- (D) rheumatic fever
- (E) systemic hypertension

51. In an adult patient, which of the following diseases would most frequently be associated with a smaller than normal spleen?

- (A) Myelofibrosis
- (B) Sickle cell anemia
- (C) Infectious mononucleosis
- (D) Chronic myelocytic leukemia
- (E) Thalassemia major

52. In a 16-year-old boy with jaundice, laboratory studies show no increase in liver enzymes in the serum, a negative direct antiglobulin (Coombs) test, an increase in mean corpuscular hemoglobin concentration, and an increase in osmotic fragility of erythrocytes. On a peripheral blood film, the erythrocytes are most likely to be

- (A) ovalocytes
- (B) spherocytes
- (C) tear drop cells
- (D) target cells
- (E) schistocytes

53. Each of the following assays would help distinguish hemolytic anemia from iron deficiency anemia EXCEPT

- (A) Coombs test
- (B) hematocrit
- (C) reticulocyte count
- (D) serum concentration of bilirubin
- (E) serum concentration of haptoglobin

54. Inflammation of the interstitium of all lobes of both lungs, with little or no alveolar exudate, is characteristic of infection by

- (A) *Candida albicans*
- (B) *Mycoplasma pneumoniae*
- (C) *Mycobacterium tuberculosis*
- (D) *Pneumocystis carinii*
- (E) *Streptococcus pneumoniae*

55. Farmer's lung is caused by the inhalation of

- (A) dander
- (B) inorganic dust
- (C) pesticides
- (D) plant fibers
- (E) spores

56. The histologic finding most characteristic of chronic bronchitis is
- (A) atrophy of smooth muscle
 - (B) degeneration of ganglion cells
 - (C) enlargement of mucous glands
 - (D) metaplasia of cartilage
 - (E) thickening of the basement membrane
57. Pulmonary infarcts are characterized by each of the following EXCEPT
- (A) subpleural location
 - (B) increased frequency in patients with heart failure
 - (C) pale color
 - (D) wedge shape
 - (E) becoming abscesses when infected
58. Surgical therapy is LEAST likely to cure
- (A) bronchogenic adenocarcinoma
 - (B) carcinoid
 - (C) hamartoma
 - (D) small-cell (oat-cell) carcinoma
 - (E) squamous cell carcinoma
59. Pulmonary involvement in systemic lupus erythematosus is characterized by
- (A) alveolar proteinosis
 - (B) bronchiectasis
 - (C) diffuse interstitial fibrosis
 - (D) emphysema
 - (E) hyaline membranes
60. For each of the following pairs of gastrointestinal diseases, in which is the first more likely to be fatal than the second?
- (A) Carcinoma of the colon - carcinoma of the stomach
 - (B) Embolus to the superior mesenteric artery - embolus to the inferior mesenteric artery
 - (C) Hepatitis A - hepatitis B
 - (D) Staphylococcal food poisoning - pseudomembranous enterocolitis
 - (E) Treated celiac disease - treated cystic fibrosis
61. Of the following gastrointestinal lesions, which LEAST likely to be precancerous?
- (A) A peptic ulcer of the duodenum
 - (B) Atrophic gastritis
 - (C) Barrett esophagus
 - (D) Ulcerative colitis
 - (E) Villous adenoma of the colon
62. Squamous cell carcinoma of the mouth and tongue is related to the synergistic effects of tobacco use and
- (A) a diet of spicy foods
 - (B) alcohol ingestion
 - (C) Epstein-Barr virus
 - (D) herpes simplex virus
 - (E) periodontal disease
63. Which of the following is the most common sequelae of chronic duodenal ulcer?
- (A) Achlorhydria
 - (B) Carcinoma
 - (C) Melena
 - (D) Obstruction of the bile duct
 - (E) Peritonitis
64. A 62-year-old woman has a 3-month history of weight loss, abdominal pain radiating to the back and jaundice. The causal lesion will show
- (A) atrophy
 - (B) calcification
 - (C) infarction
 - (D) necrosis
 - (E) neoplasia
65. An epidural hematoma is most likely to be associated with a traumatic tear of the
- (A) bridging cerebral veins
 - (B) middle cerebral artery
 - (C) middle meningeal artery
 - (D) superficial temporal artery
 - (E) superior longitudinal sinus

mastectomy is done on an 82-year-old woman who has incidental pruritus vulvae. Six hours postoperatively, she becomes deeply comatose. Physical examination shows rapid, deep respirations, soft, closed eyeballs, a facial skin blush and generally hyporeactive tendon reflexes.

Laboratory studies show:

Leukocyte count	18,000/mm ³ (lymphocytes 15%, neutrophils 85% with 12 immature forms)
-----------------	--

Serum bicarbonate concentration	8 mEq/L
------------------------------------	---------

This complication could have been anticipated by preoperative performance or measurement of which of the following?

- (A) Serum transaminase activity
- (B) An electroencephalogram
- (C) Serum concentration of iron and total iron-binding capacity
- (D) Urinalysis and blood glucose concentrations on fasting and 2-hour postprandial samples
- (E) Creatinine clearance

Which of the following findings would be most helpful in distinguishing primary from secondary adrenal insufficiency?

- (A) Decreased concentrations of 17-ketosteroids in the urine
- (B) Decreased plasma concentrations of cortisol
- (C) Hyperpigmentation of the skin
- (D) Increased concentrations of free cortisol in the urine
- (E) Muscle weakness

Among the following, transitional cell carcinoma of the urinary bladder most often is associated with

- (A) metastases to bone
- (B) metastases to the kidneys
- (C) metastases to the lungs
- (D) metastases to the central nervous system
- (E) local extension to surrounding tissues

69. The following diseases have both renal and systemic manifestations. In determining an overall prognosis, the severity of the renal glomerular lesions is LEAST important in which of the following?

- (A) Amyloidosis
- (B) Diabetes mellitus
- (C) Goodpasture syndrome
- (D) Shock
- (E) Systemic lupus erythematosus

70. Histologic evaluation of a testicular tumor should always include multiple sections because:

- (A) Mixture of benign and malignant neoplastic components is characteristic
- (B) Most testicular tumors vary in differentiation, and prognosis is based on the most differentiated component
- (C) Most testicular tumors are derived from two germ layers with a different prognosis for each
- (D) Mixture of tumor types is rare but, when present, indicates a good prognosis
- (E) Mixture of tumor types is common and affects treatment and prognosis

71. A patient with hepatitis B died 9 days after the onset of symptoms. Microscopically, his liver would most likely show

- (A) diffuse fatty vacuolization with minimal necrosis
- (B) diffuse fibrosis with nodularity
- (C) limited peripheral zonal necrosis
- (D) widespread hepatocellular necrosis
- (E) widespread neutrophilic infiltration in lobules

DIRECTIONS (ITEMS 72-85): Each group of items in this section consists of lettered options followed by a set of numbered items. For each item, select the ONE lettered option that is most closely associated with it and fill in the circle containing the corresponding letter on the answer sheet. Each lettered option may be selected once, more than once, or not at all.

Items 72-73

Sequence of events in sterile surgical wound:

- (A) 2-5 minutes
- (B) 1-24 hours
- (C) 3-10 days
- (D) 15-30 days
- (E) 2-12 months

72. Fibroblastic proliferation

73. Neutrophilic exudation

Items 74-75

- (A) Primary carcinoma of the liver
- (B) Seminoma
- (C) Carcinoma of the colon
- (D) Carcinoma of the lung
- (E) Carcinoma of the prostate gland

74. Carcinoembryonic antigen (CEA)

75. α -Fetoprotein

Items 76-77

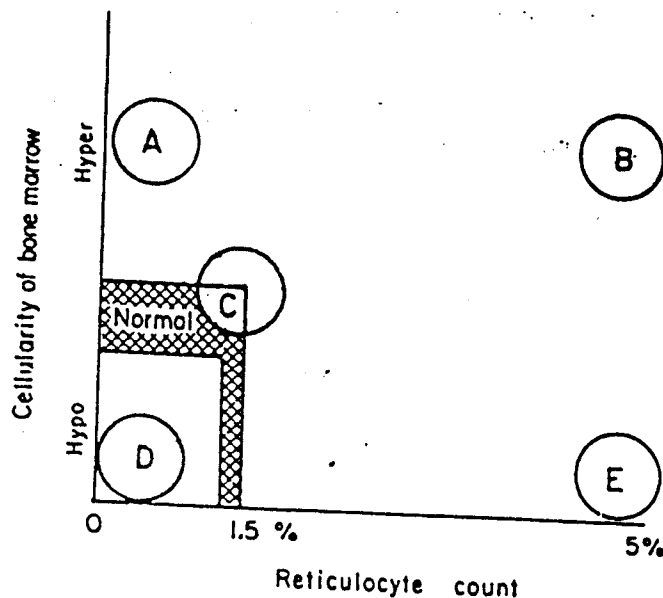
Types of hypersensitivity:

- (A) Anaphylactic
- (B) Cytotoxic
- (C) Immune complex
- (D) Cell-mediated
- (E) None of the above

76. Poison ivy

77. Hay fever

Items 78-79



From the figure shown, select the lettered area that most closely approximates the expected relationship between reticulocyte count and bone marrow cellularity in a patient with:

78. Chronic lymphocytic leukemia

79. Chronic hemolytic anemia

Items 80-81

- (A) Acetylcholine receptor antibodies
- (B) Brain stem dopaminergic neurons
- (C) Mamillary body
- (D) Nucleus basalis of Meynert
- (E) Serum creatine kinase

80. Primary degenerative dementia, Alzheimer type

81. Duchenne muscular dystrophy

Items 82-83

- (A) Crohn disease
- (B) Ulcerative colitis
- (C) Peptic ulcer
- (D) Whipple disease
- (E) Hirschsprung disease

2. Most frequently predisposes to adenocarcinoma

3. Lesions are associated with the presence of bacillary forms in macrophages

Items 84-85

- (A) Asymptomatic generalized lymphadenopathy
- (B) Cutaneous infiltrates
- (C) Hemorrhagic and infectious complications
- (D) Mediastinal mass
- (E) Thrombocytosis

84. Acute myeloid leukemia

85. Mycosis fungoides

DIRECTIONS (ITEMS 86-91): Each group of items in this section consists of lettered headings followed by a set of numbered words or phrases. For each numbered word or phrase, fill in the circle on the answer sheet containing:

- A if the item is associated with (A) *only*
- B if the item is associated with (B) *only*
- C if the item is associated with *both* (A) *and* (B)
- D if the item is associated with *neither* (A) *nor* (B)

Items 86-87

- (A) von Hippel-Lindau disease
- (B) von Recklinghausen disease
- (C) Both
- (D) Neither

86. Hemangioblastomas

87. Pigmented skin lesions

Items 88-89

- (A) Hematuria
- (B) Red cell casts
- (C) Both
- (D) Neither

88. Acute cystitis

89. Acute poststreptococcal glomerulonephritis

Items 90-91

Serum concentration of:

- (A) Potassium
- (B) Sodium
- (C) Both
- (D) Neither

Erroneous values are associated with:

90. Hemolysis of the original specimen

91. Storage under refrigeration

DIRECTIONS (ITEMS 92-142): For each of the items in this section, ONE or MORE of the numbered options is correct. On the answer sheet fill in the circle containing

- A if only 1, 2, and 3 are correct,
 B if only 1 and 3 are correct,
 C if only 2 and 4 are correct,
 D if only 4 is correct,
 E if all are correct.

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED				
A	B	C	D	E
1, 2, 3 only	1, 3 only	2, 4 only	4 only	All are correct

92. Between the time of cell death and healing, expected responses to a myocardial infarction would include

- (1) proliferation of fibroblasts and capillary endothelial cells
- (2) an influx of mononuclear phagocytic cells
- (3) an accumulation of neutrophils
- (4) infiltration of large numbers of lymphocytes and plasma cells

93. Types of degeneration or change affecting hepatic cells include

- (1) accumulation of lipofuscin
- (2) fatty metamorphosis
- (3) storage of excess glycogen
- (4) Mallory bodies

94. Multinucleated giant cells are a histologic feature of

- (1) secondary (post-primary) tuberculosis
- (2) sarcoidosis
- (3) foreign body reaction
- (4) leprosy

95. Causes of acute renal tubular necrosis include

- (1) postpartum hemorrhage
- (2) gram-negative sepsis
- (3) multiple crush injuries
- (4) poisoning with mercuric chloride

96. Fluid removed from the left pleural space of a 48-year-old man with chills, fever, shortness of breath, cough and left pleuritic chest pain for one week would characteristically

- (1) have a protein content of less than 3 g/dL
- (2) have a specific gravity greater than 1.016
- (3) be pale yellow and clear
- (4) contain numerous neutrophils and erythrocytes

97. Conditions likely to result in defective or deficient acute inflammatory responses include

- (1) diabetes mellitus
- (2) acute granulocytic (myeloblastic) leukemia
- (3) Chédiak-Higashi syndrome
- (4) hereditary deficiencies of complement

98. Amyloid deposition has been associated with

- (1) advanced age
- (2) hereditary conditions
- (3) chronic inflammation
- (4) malignant neoplasms

99. Histologic identification of granulation tissue requires the presence of

- (1) plasma cells
- (2) fibroblasts
- (3) collagen
- (4) capillary buds

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED

A
1, 2, 3
only

B
1, 3
only

C
2, 4
only

D
4
only

E
All are
correct

100. Fibroblasts are capable of forming

- (1) fibronectin
- (2) proteoglycans
- (3) elastic fibers
- (4) collagen

101. Precancerous conditions include

- (1) solar keratosis
- (2) hypertrophic leukoplakia of the oral cavity
- (3) familial multiple polyposis
- (4) chronic atrophic gastritis of pernicious anemia

102. Groups at high risk for colorectal carcinoma include those with

- (1) colorectal villous adenomas
- (2) ulcerative colitis
- (3) familial multiple polyposis
- (4) diverticulosis

103. A lymph node biopsy shows a malignant neoplasm composed of keratin-forming cells. Likely primary sites of the tumor include the

- (1) liver
- (2) uterine cervix
- (3) colon
- (4) esophagus

104. Cellular immune deficiency manifested by lack of reactivity to tuberculin is often found in patients with

- (1) sarcoidosis
- (2) asbestosis
- (3) Hodgkin disease
- (4) polyarteritis nodosa

105. Peripheral eosinophilia is characteristic of

- (1) parasitic infections
- (2) treatment with corticosteroids
- (3) drug allergy
- (4) typhoid fever

106. Patients with T lymphocyte immunodeficiencies have an increased risk for infection with

- (1) *Mycobacterium tuberculosis*
- (2) cytomegalovirus
- (3) *Pneumocystis carinii*
- (4) *Staphylococcus aureus*

107. Platelet aggregation is stimulated by

- (1) collagen
- (2) prostacyclin (PGI₂)
- (3) thromboxane (TXA₂)
- (4) fibrin degradation products

108. An increased risk for thrombosis is associated with

- (1) polycythemia
- (2) congestive heart failure
- (3) sickle cell disease
- (4) visceral cancers

109. Dissemination of organisms from the initial site of infection plays an important role in

- (1) pseudomembranous enterocolitis
- (2) syphilis
- (3) tetanus
- (4) typhoid fever

110. In young children, rapidly developing, life-threatening infections caused by *Hemophilus influenzae* include
- (1) myocarditis
 - (2) epiglottitis
 - (3) gastroenteritis
 - (4) meningitis
11. Biopsy of an enlarged cervical lymph node shows granulomatous inflammation. Possible causes include
- (1) tuberculosis
 - (2) histoplasmosis
 - (3) sarcoidosis
 - (4) cat-scratch disease
12. True hermaphroditism implies the presence of
- (1) at least part of the Y chromosome
 - (2) unambiguous external genitalia
 - (3) both ovarian and testicular tissue
 - (4) excessive androgenic corticosteroids early in gestation
113. Tissues that are highly sensitive to ionizing radiation include
- (1) brain
 - (2) intestinal mucosa
 - (3) liver
 - (4) lymphoid tissue
114. Toxic reactions to the therapeutic use of oxygen include
- (1) hyaline membranes in the lung
 - (2) renal tubular necrosis
 - (3) retrolental fibroplasia
 - (4) hepatic necrosis
15. Causes of myoglobinuria include
- (1) Coombs-positive hemolytic anemia
 - (2) intense exercise
 - (3) congestive heart failure
 - (4) trauma
116. Men who worked in naval shipyards during World War II are at an increased risk for
- (1) a lung abscess
 - (2) pleural plaques
 - (3) bronchiectasis
 - (4) interstitial fibrosis
117. Late radiation damage to the lung results in
- (1) metaplasia of bronchiolar epithelium
 - (2) septal fibrosis
 - (3) hyaline thickening of blood vessel walls
 - (4) hemosiderosis
118. The cardiac lesions of the first attack of acute rheumatic fever include
- (1) characteristic focal interstitial inflammation in the myocardium
 - (2) large, friable, polypoid vegetations on the proximal aspects of the cusps of valves
 - (3) beadlike, warty (verruccous) nodules along the margins of contact of the mitral or aortic valves
 - (4) fibrous thickening and commissural adhesions with stenosis of the aortic valve
119. Cardiac rupture occurs as a result of
- (1) rheumatic myocarditis
 - (2) adipose infiltration
 - (3) septicemia with miliary abscesses of the myocardium
 - (4) myocardial infarction
120. Complications of infective endocarditis include
- (1) focal necrotizing glomerulitis
 - (2) septic infarcts in the brain
 - (3) rupture of the chordae tendineae
 - (4) a dissecting aortic aneurysm
121. Complications of a transmural myocardial infarct include
- (1) cardiac tamponade
 - (2) arrhythmia
 - (3) a ruptured papillary muscle
 - (4) marantic endocarditis

FOR EACH ITEM FILL IN ONLY ONE CIRCLE ON YOUR ANSWER SHEET

DIRECTIONS SUMMARIZED

A
1, 2, 3
only

B
1, 3
only

C
2, 4
only

D
4
only

E
All are
correct

122. Infections transmitted by blood transfusion typically include

- (1) malaria
- (2) human immunodeficiency virus (HIV) infection
- (3) cytomegalovirus infection
- (4) hepatitis A

123. Erythrocyte indices are valuable indicators of their

- (1) size
- (2) hemoglobin content
- (3) hemoglobin concentration
- (4) osmotic fragility

124. Small-cell (oat-cell) carcinomas of the bronchus

- (1) are usually peripheral
- (2) may contain neurosecretory granules
- (3) metastasize more slowly than other types of bronchogenic carcinoma
- (4) are thought to be of endodermal origin

125. Acromegaly is usually associated with an increased serum concentration of

- (1) thyrotropin
- (2) somatostatin C
- (3) luteinizing hormone
- (4) growth hormone

126. Disease can result from an excessive intake of

- (1) cyanocobalamin (vitamin B₁₂)
- (2) vitamin A
- (3) thiamine (vitamin B₁)
- (4) vitamin D

127. Complications seen in patients maintained on chronic dialysis for renal failure include

- (1) anemia
- (2) peripheral neuropathy
- (3) hypertension
- (4) parathyroid hyperplasia and bone resorption

128. Conditions suggested by the occurrence of necrotizing papillitis include

- (1) diabetes mellitus
- (2) tuberculosis
- (3) excessive use of certain analgesic drugs
- (4) renal vein thrombosis

129. Carcinoma of the urinary bladder is associated with

- (1) the use of oral contraceptives
- (2) cigarette smoking
- (3) a familial pattern
- (4) a high rate of recurrence

130. Epidemiologic variables positively correlated with an increased risk for developing squamous cell carcinoma of the uterine cervix include

- (1) low socioeconomic status
- (2) first intercourse at an early age
- (3) multiple sexual partners
- (4) a history of estrogen therapy

131. Risk factors for carcinoma of the female breast include

- (1) childbearing at an early age
- (2) obesity
- (3) carcinoma of the cervix
- (4) a positive family history

32. Demyelination is found in patients with

- (1) neuromyelitis optica
- (2) acute disseminated encephalomyelitis
(postinfectious and postvaccinal encephalomyelitis)
- (3) acute inflammatory polyradiculoneuropathy (Guillain-Barré syndrome)
- (4) multiple sclerosis

33. Diagnostic specificity of a laboratory test refers to the ability of the test to be

- (1) positive in all patients with the disease
- (2) reproducible
- (3) analytically precise
- (4) negative in all persons without the disease

34. Diagnostic sensitivity refers to the ability of a laboratory test to be

- (1) negative in healthy persons
- (2) accurate
- (3) specific
- (4) positive in patients with a disease

35. In the selection of laboratory tests, the rationale for using predictive value theory includes

- (1) improved economy of use
- (2) avoidance of unnecessary testing and treatment
- (3) limiting of diagnostic errors
- (4) establishment of prevalence data

36. Serum analytes increased by hemolysis include

- (1) potassium
- (2) glucose
- (3) lactate dehydrogenase
- (4) sodium

37. An increase in alkaline phosphatase activity may result from disease of the

- (1) central nervous system
- (2) bone
- (3) heart
- (4) liver

38. Causes of hyperadrenocorticism include

- (1) basophil microadenoma of the pituitary
- (2) adrenal cortical adenoma
- (3) small-cell (oat-cell) carcinoma of the lung
- (4) adrenal cortical hyperplasia

39. A patient dies 2 days after a prolonged episode of hemorrhagic shock. Findings at autopsy that may be attributed to shock include

- (1) patchy mucosal hemorrhage of the colon
- (2) pulmonary edema
- (3) depletion of lipid in the adrenal cortex
- (4) necrosis of the renal tubules

40. Causes of Cushing syndrome include

- (1) adenoma of the adrenal gland
- (2) small-cell (oat-cell) carcinoma of the lung
- (3) adenoma of the pituitary gland
- (4) carcinoma of the adrenal gland

41. Toxic reactions to the therapeutic use of oxygen include

- (1) hyaline membranes in the lung
- (2) peroxy radical formation
- (3) retrolental fibroplasia
- (4) membrane lipoperoxidation

42. A 25-year-old man develops swelling of his face, shortness of breath and urticaria shortly after a meal of shellfish. This condition

- (1) is mediated by antigen-antibody complexes
- (2) is associated with degranulation of mast cells
- (3) requires complement for the initiation of tissue injury
- (4) is likely to be accompanied by eosinophilia in peripheral blood

MICROBIOLOGY

DIRECTIONS (ITEMS 1-42): Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case and fill in the circle containing the corresponding letter on the answer sheet.

1. In evaluating the acid-fast bacilli (AFB) smear as a diagnostic test for pulmonary tuberculosis, smears and cultures were obtained from 6453 subjects. The following data were recorded:

AFB SMEAR	AFB CULTURE		TOTALS
	+	-	
+	82	60	142
-	98	6213	6311
TOTALS	180	6273	6453

From this table, the estimated probability of tuberculosis

- (A) from both smears and cultures is 82/6213
- (B) from cultures only is 82/6453
- (C) from cultures only is 6273/6453
- (D) from smears only is 142/6453
- (E) is characterized by none of the above

2. Serologic typing of group A streptococci generally relies upon the ability to obtain antiserum directed against

- (A) H antigen
- (B) lipopolysaccharide
- (C) M protein
- (D) peptidoglycan
- (E) teichoic acid

3. Bacteria that obtain energy from oxidation of organic compounds are

- (A) autotrophic
- (B) auxotrophic
- (C) heterotrophic
- (D) photosynthetic
- (E) prototrophic

4. If nutrient broth medium is inoculated with 10,000 cells of *Escherichia coli*, and the cells grow exponentially with a generation time of 30 minutes, how many cells will the culture contain after 3 hours?

- (A) 4.0×10^6
- (B) 2.0×10^5
- (C) 6.4×10^5
- (D) 1.2×10^5
- (E) 6.4×10^7

5. In general, the cytoplasmic membrane of gram-positive bacteria appears to be protected from lipophilic compounds (e.g., detergents) by

- (A) an outer membrane
- (B) a protein coat
- (C) composition of the cytoplasmic membrane
- (D) lipopolysaccharides in its wall
- (E) peptidoglycan

6. The chemotherapeutic agent that is most toxic to the host is

- (A) erythromycin
- (B) lincomycin
- (C) mitomycin
- (D) rifamycin
- (E) streptomycin

7. Incorporation of uracil into macromolecules would be rapidly inhibited by the addition of which of the following to a culture of sensitive cells?

- (A) Chloramphenicol
- (B) Penicillin
- (C) Rifampin
- (D) Streptomycin
- (E) Tetracycline