

Winter 2026
Pathogenic Bacteriology
Exam V, Final

1. Which body site is normally sterile in healthy individuals?

- A. Colon
- B. Skin
- C. Upper respiratory tract
- D. Blood
- E. Oropharynx

2. Which physical method is most effective for sterilization of heat-stable materials?

- A. Pasteurization
- B. Filtration
- C. Autoclaving
- D. Ultraviolet radiation
- E. Refrigeration

3. Koch's postulates were developed to establish a relationship between:

- A. Host immunity and disease
- B. Microorganisms and specific diseases
- C. Viruses and cancer
- D. Antibiotics and resistance
- E. Normal flora and infection

4. Which component of innate immunity responds most rapidly to infection?

- A. Antigen-specific antibodies
- B. Memory T cells
- C. Class-switched B cells
- D. Plasma cells
- E. Phagocytic cells

5. Toll-like receptors are primarily involved in:

- A. Innate immune recognition
- B. Antigen presentation
- C. Antibody class switching
- D. T-cell receptor rearrangement
- E. Complement inhibition

6. Which complement component is most directly responsible for opsonization?

- A. C1
- B. C3b
- C. C5a
- D. C9
- E. Factor H

7. Major histocompatibility complex (MHC) class I molecules present antigens to:

- A. CD4⁺ T cells
- B. CD8⁺ T cells
- C. B cells
- D. Natural killer cells
- E. Plasma cells

8. MHC class II molecules are primarily expressed on:

- A. Red blood cells
- B. All nucleated cells
- C. Muscle cells
- D. Neurons
- E. Antigen-presenting cells

9. Gram-positive bacteria differ from gram-negative bacteria by having:

- A. An outer membrane
- B. Lipopolysaccharide
- C. Thin peptidoglycan
- D. Thick peptidoglycan and teichoic acids
- E. Periplasmic space only

10. Which bacterial structure is essential for maintaining cell shape and preventing osmotic lysis?

- A. Capsule
- B. Cytoplasmic membrane
- C. Peptidoglycan cell wall
- D. Ribosomes
- E. Flagella

11. Teichoic acids are found in the cell walls of:

- A. Mycoplasma
- B. Gram-negative bacteria
- C. Gram-positive bacteria
- D. Acid-fast bacteria
- E. Spirochetes

12. Capsules enhance bacterial virulence primarily by:

- A. Inhibiting phagocytosis
- B. Enhancing toxin secretion
- C. Increasing motility
- D. Improving nutrient uptake
- E. Producing endotoxin

13. Which bacterial enzyme facilitates spread through connective tissue by degrading hyaluronic acid?

- A. Coagulase
- B. Hyaluronidase
- C. Catalase
- D. DNase
- E. Lipase

14. Endotoxin refers specifically to which bacterial component?

- A. Lipopolysaccharide from Gram-negative outer membranes
- B. Peptidoglycan
- C. Teichoic acid
- D. Capsule polysaccharide
- E. Secreted exotoxin

15. Superantigens cause disease primarily by:

- A. Blocking antigen presentation
- B. Activating large numbers of T cells nonspecifically
- C. Destroying bacterial ribosomes
- D. Inhibiting antibody production
- E. Degrading host DNA

16. Coagulase contributes to virulence by:

- A. Dissolving clots
- B. Activating complement
- C. Forming fibrin barriers around bacteria
- D. Degrading collagen
- E. Blocking phagocytosis through antibodies

17. Type III secretion systems function primarily to:

- A. Secrete toxins into the bloodstream enzymes
- B. Produce endotoxin
- C. Form bacterial capsules
- D. Transport nutrients
- E. Inject effector proteins directly into host cells

18. Which host immune cells are most important in early defense against bacterial infections?

- A. Neutrophils
- B. B lymphocytes
- C. Plasma cells
- D. Memory T cells
- E. Mast cells

19. Which characteristic best distinguishes *Staphylococcus* species from *Streptococcus* species?

- A. Gram-positive cell wall
- B. Cocci morphology
- C. Catalase production
- D. Facultative anaerobic metabolism
- E. Lack of spores

20. Which disease is **NOT** commonly caused by *Staphylococcus aureus*?

- A. Impetigo
- B. Osteomyelitis
- C. Rheumatic fever
- D. Endocarditis
- E. Abscesses

21. A key feature of staphylococcal food poisoning is that symptoms:

- A. Appear after 3–5 days
- B. Include high fever and bacteremia
- C. Are prevented by reheating food
- D. Occur rapidly after ingestion
- E. Require antibiotic therapy

22. Which disease is a post-streptococcal immune-mediated complication?

- A. Scarlet fever
- B. Necrotizing fasciitis
- C. Acute rheumatic fever
- D. Impetigo
- E. Cellulitis

23. Chronic trachoma results in:

- A. Corneal scarring
- B. Lung fibrosis
- C. Renal failure
- D. Sepsis
- E. Arthritis

24. A 30-year-old man develops unilateral painless genital ulcer followed by painful inguinal nodes. Diagnosis?

- A. Syphilis
- B. Chancroid
- C. Herpes
- D. Gonorrhea
- E. Lymphogranuloma venereum

25. Which streptococcal infection most commonly precedes acute rheumatic fever?

- A. Impetigo
- B. Pneumonia
- C. Pharyngitis
- D. Otitis media
- E. Cellulitis

26. Which virulence factor is essential for anthrax toxin entry into host cells?

- A. Capsule
- B. Lethal factor
- C. Edema factor
- D. Protective antigen
- E. Endospore

27. Which toxin of *Pseudomonas aeruginosa* damages host cell membranes?

- A. Exotoxin A
- B. Hemagglutinin
- C. Phospholipase C
- D. Superantigen
- E. Protein M

28. *Cutibacterium acnes* (*Propionibacterium acnes*) contributes to acne pathogenesis primarily through:

- A. Exotoxin production
- B. Acid-fast cell wall lipids
- C. Spore formation
- D. Inflammation triggered by lipase activity
- E. Capsule-mediated immune evasion

29. A patient with inhalational anthrax develops hypotension and shock. Which toxin primarily contributes to macrophage death and cytokine release?

- A. Protective antigen
- B. Capsule
- C. Lethal factor
- D. Edema factor
- E. Enterotoxin

30. The characteristic intracellular movement of *Listeria monocytogenes* depends on:

- A. Flagellar rotation
- B. Microtubule formation
- C. Pili-mediated motility
- D. Actin polymerization
- E. Chemotaxis

31. Which toxin is responsible for *Staphylococcus aureus* toxic shock syndrome?

- A. Alpha toxin
- B. Beta toxin
- C. Exfoliative toxin
- D. TSST-1
- E. Enterotoxin A

32. Which staphylococcal toxin causes *scalded skin syndrome*?

- A. Alpha toxin
- B. Enterotoxin
- C. Exfoliative toxin
- D. TSST-1
- E. Leukocidin

33. A gray pseudomembrane in the pharynx is characteristic of infection with:

- A. *Listeria monocytogenes*
- B. *Corynebacterium diphtheriae*
- C. *Streptococcus pyogenes*
- D. *Neisseria meningitidis*
- E. *Haemophilus influenzae*

34. Which feature is primarily responsible for acid-fastness in *Mycobacterium* species?

- A. Lipopolysaccharide
- B. Peptidoglycan thickness
- C. Mycolic acids
- D. Teichoic acids
- E. Capsule polysaccharides

35. Which cell type is most important in controlling *M. tuberculosis* infection?

- A. CD4⁺ T lymphocytes
- B. B lymphocytes
- C. Neutrophils
- D. Eosinophils
- E. Mast cells

36. Which immune mechanism is responsible for tissue damage in tuberculosis?

- A. Antibody-mediated cytotoxicity
- B. Immune complex deposition
- C. IgE-mediated reactions
- D. Complement activation
- E. Type IV hypersensitivity

37. Which organism is the most common cause of 'early-onset neonatal sepsis'?

- A. *Staphylococcus aureus*
- B. *Enterococcus faecium*
- C. *Streptococcus agalactiae*
- D. *Pseudomonas aeruginosa*
- E. *Listeria monocytogenes*

38. *Clostridium difficile* infection is strongly associated with:

- A. Recent antibiotic use
- B. Puncture wounds
- C. Raw meat ingestion
- D. Tick exposure
- E. Mosquito bites

39. *Actinomyces israelii* is most commonly associated with:

- A. Toxic shock syndrome
- B. Cervicofacial abscesses with draining sinus tracts
- C. Necrotizing fasciitis
- D. Acute watery diarrhea
- E. Urinary tract infections

40. Which complication is ****NOT**** associated with *Streptococcus pyogenes*?

- A. Scarlet fever
- B. Acute glomerulonephritis
- C. Toxic shock-like syndrome
- D. Rheumatic fever
- E. Hemolytic uremic syndrome

41. Tuberculoid leprosy is associated with:

- A. Weak Th1 response
- B. Strong Th1 response
- C. High antibody titers
- D. Disseminated disease
- E. Poor prognosis

42. Which complication is associated with untreated gonorrhea?

- A. Toxic shock syndrome
- B. Pelvic inflammatory disease
- C. Rheumatic fever
- D. Glomerulonephritis
- E. Endocarditis

43. Which condition is associated with disseminated gonococcal infection?

- A. Septic arthritis
- B. Myocarditis
- C. Pneumonia
- D. Meningitis
- E. Osteomyelitis

44. A 22-year-old woman presents with pelvic pain and purulent cervical discharge. Gram stain shows intracellular gram-negative diplococci. What is the most likely diagnosis?

- A. Syphilis
- B. Chlamydia
- C. Gonorrhea
- D. Staph infection
- E. Chancroid

45. Which statement best summarizes *Neisseria* pathogenesis?

- A. Disease results mainly from toxin production
- B. Host immune response drives much pathology
- C. Organisms survive in anaerobic environments
- D. They form spores for persistence
- E. Infection requires vector transmission

46. Which structure facilitates *N. meningitidis* to cross the blood–brain barrier?

- A. Capsule
- B. Pili
- C. LOS
- D. IgA protease
- E. Peptidoglycan

47. A cat bite infection with rapid cellulitis is most commonly caused by:

- A. *Brucella*
- B. *Pasteurella multocida*
- C. *Haemophilus influenzae*
- D. *Bordetella*
- E. *Francisella*

48. Which condition has dramatically declined due to the *H. influenzae* serotype b (Hib) conjugate vaccine?

- A. Otitis media
- B. Adult pneumonia
- C. Conjunctivitis
- D. Sinusitis
- E. Epiglottitis in children

49. Which clinical feature is characteristic of lepromatous leprosy?

- A. Strong cell-mediated immunity
- B. Few skin lesions
- C. Numerous acid-fast bacilli
- D. Localized nerve damage only
- E. Tuberculoid granulomas

50. Which bacterial species causes chancroid?

- A. *Treponema pallidum*
- B. *Chlamydia trachomatis*
- C. *Haemophilus ducreyi*
- D. *Bacillus anthracis*
- E. *Neisseria gonorrhoeae*

51. The major virulence factor of type b *Haemophilus influenzae* is:

- A. LOS
- B. IgA protease
- C. Polyribosylribitol phosphate capsule
- D. Pili
- E. Biofilm formation

52. Which diarrheagenic *Escherichia coli* causes traveler's diarrhea?

- A. Enterotoxigenic *Escherichia coli* (ETEC)
- B. Enterohemorrhagic *Escherichia coli* (EHEC)
- C. Enteropathogenic *Escherichia coli* (EPEC)
- D. Enteroinvasive *Escherichia coli* (EIEC)
- E. Enteroaggregative *Escherichia coli* (EAEC)

53. Which *Enterobacteriaceae* species produces a heat-stable enterotoxin that increases intracellular cGMP?

- A. Enterotoxigenic *Escherichia coli* (ETEC)
- B. Enterohemorrhagic *Escherichia coli* (EHEC)
- C. Enteropathogenic *Escherichia coli* (EPEC)
- D. Enteroinvasive *Escherichia coli* (EIEC)
- E. Enteroaggregative *Escherichia coli* (EAEC)

54. Hemolytic Uremic Syndrome (HUS) develops in a child after bloody diarrhea. Antibiotics worsen condition. Organism?

- A. *E. coli* O157:H7
- B. *Shigella*
- C. *Salmonella*
- D. *Yersinia*
- E. *Klebsiella*

55. Which organism is strongly associated with rapidly progressive wound infections after seawater exposure?

- A. *Vibrio cholera*
- B. *Vibrio vulnificus*
- C. *Legionella pneumophila*
- D. *Salmonella enterica*
- E. *Bacillus anthracis*

56. The cholera toxin A subunit functions by:

- A. Cleaving 60S ribosomes
- B. Activating adenylate cyclase via ADP-ribosylation
- C. Blocking potassium channels
- D. Inhibiting DNA replication
- E. Degrading tight junctions

57. Rice-water stools are characteristic of infection with:

- A. *Salmonella* Typi
- B. Enteroinvasive *Escherichia coli* (EIEC)
- C. *Bacillus cereus*
- D. *Vibrio cholerae*
- E. *Listeria monocytogenes*

58. Which infection is most associated with ingestion of raw oysters?

- A. Cholera
- B. Listeria
- C. Hemolytic Uremic Syndrome (HUS)
- D. *Vibrio vulnificus* septicemia
- E. Shigellosis

59. A fruity, grape-like odor in culture is characteristic of:

- A. *Acinetobacter baumannii*
- B. *Bacillus anthracis*
- C. *Salmonella enterica*
- D. *Pseudomonas aeruginosa*
- E. *Staphylococcus aureus*

60. Which disease manifestation is LEAST likely caused by *Listeria monocytogenes*?

- A. Meningitis
- B. Sepsis
- C. Gastroenteritis
- D. Pneumonia
- E. Neonatal infection

61. Which virulence system allows *Salmonella* to invade M cells?

- A. Capsule
- B. Type III secretion system
- C. IgA protease
- D. Urease
- E. Pili only

62. A man with flea bites develops painful inguinal lymphadenopathy (bubo). Organism?

- A. *Salmonella*
- B. *Shigella*
- C. *Yersinia pestis*
- D. *Proteus*
- E. *Klebsiella*

63. Which virulence mechanism involves direct injection of effector proteins?

- A. Type I secretion
- B. Type II secretion
- C. Type III secretion
- D. Type IV pili
- E. Capsule synthesis

64. Which red-pigmented organism survives well on dry hospital surfaces?

- A. *Acinetobacter baumannii*
- B. *Escherichia coli*
- C. *Haemophilus influenzae*
- D. *Listeria monocytogenes*
- E. *Vibrio cholerae*

65. Which sequela (complication) is classically associated with *Campylobacter jejuni* infection?

- A. Rheumatic fever
- B. Toxic megacolon
- C. Guillain-Barré syndrome
- D. Hemolytic uremic syndrome
- E. Myocarditis

66. The key virulence factor enabling *Helicobacter pylori* survival in gastric acid is:

- A. Urease
- B. Hemolysin
- C. Capsule
- D. Superantigen
- E. Enterotoxin

67. *Helicobacter pylori* infection is strongly associated with:

- A. Crohn disease
- B. Achalasia
- C. Ulcerative colitis
- D. Barrett esophagus
- E. Gastric adenocarcinoma

68. *Bordetella pertussis* primarily infects:

- A. Neutrophils
- B. Intestinal epithelium
- C. Ciliated respiratory epithelium
- D. Macrophages
- E. Endothelial cells

69. Pertussis toxin acts by:

- A. Collagen degradation
- B. Ribosomal inactivation
- C. DNA crosslinking
- D. Cell membrane pore formation
- E. ADP-ribosylation of Gi proteins

70. Brucellosis classically presents with:

- A. Sudden high fever
- B. Undulating fever pattern
- C. Hemorrhagic rash
- D. Painless ulcer
- E. Acute diarrhea

71. *Legionella* replicates primarily within:

- A. Neutrophils
- B. T cells
- C. Fibroblasts
- D. Epithelial cells
- E. Macrophages

72. A gardener develops a necrotic ulcer on his hand and painful axillary lymphadenopathy after handling a rabbit carcass. Most likely diagnosis?

- A. Cat scratch disease
- B. Tularemia
- C. Rat-bite fever
- D. Legionnaires' disease
- E. Trench fever

73. The tetanus toxin acts by:

- A. Blocking acetylcholine release at neuromuscular junction
- B. Inhibiting GABA and glycine release
- C. Increasing cAMP
- D. Causing demyelination
- E. Activating complement

4. Clostridium botulinum toxin causes paralysis by:

74. A. Blocking inhibitory neurons
B. Destroying myelin
C. Preventing acetylcholine release
D. Increasing muscle contraction
E. Causing sodium channel blockade

75. Gas gangrene is most commonly caused by:

- A. *Clostridium tetani*
- B. *Clostridium difficile*
- C. *Clostridium perfringens*
- D. *Clostridium botulinum*
- E. *Clostridium septicum*

76. Which response is most important for protection against anthrax toxin-mediated disease?

- A. Cytotoxic T lymphocytes
- B. IgE-mediated immunity
- C. Neutralizing antibodies against protective antigen
- D. Complement activation only
- E. Innate immunity alone

77. The diarrheal form of *Bacillus cereus* food poisoning results from:

- A. Preformed toxin ingestion
- B. Bacterial invasion of mucosa
- C. Toxin production in the intestine
- D. Endotoxin release
- E. Immune complex deposition

78. The primary role of *Lactobacillus* in the vaginal microbiota is to:

- A. Produce exotoxins
- B. Increase vaginal pH
- C. Produce lactic acid and maintain low pH
- D. Form biofilms in the uterus
- E. Facilitate yeast colonization

79. The diphtheria toxin causes disease by:

- A. Inhibiting protein synthesis
- B. Blocking phagolysosome fusion
- C. Increasing intracellular cAMP
- D. Destroying cell membranes
- E. Activating complement

80. Which organism is a major cause of ventilator-associated pneumonia?

- A. *Pseudomonas aeruginosa*
- B. *Shigella sonnei*
- C. *Listeria monocytogenes*
- D. *Campylobacter jejuni*
- E. *Yersinia pestis*

81. Which organism is commonly associated with chronic lung colonization in cystic fibrosis?

- A. *Pseudomonas aeruginosa*
- B. *Streptococcus pneumoniae*
- C. *Haemophilus influenzae*
- D. *Mycobacterium tuberculosis*
- E. *Neisseria meningitidis*

82. Relapsing fever is caused by:

- A. *Coxiella burnetii*
- B. *Treponema pallidum*
- C. *Streptococcus pneumoniae*
- D. *Rickettsia rickettsii*
- E. *Borrelia recurrentis*

83. The spiral morphology of spirochetes is maintained by:

- A. External flagella
- B. Endospores
- C. Capsule
- D. Pili
- E. Periplasmic flagella (axial filaments)

84. Which organism causes syphilis?

- A. *Chlamydia trachomatis*
- B. *Neisseria gonorrhoeae*
- C. *Haemophilus ducreyi*
- D. *Leptospira interrogans*
- E. *Treponema pallidum*

85. *Mycoplasma pneumoniae* is best classified as:

- A. Gram-positive coccus
- B. Gram-negative rod
- C. Cell wall-deficient bacterium
- D. Acid-fast bacillus
- E. Spore-forming rod

86. *Mycoplasma pneumoniae* is most associated with:

- A. Meningitis
- B. Atypical "walking" pneumonia
- C. Necrotizing pneumonia
- D. Bacteremia
- E. Tuberculosis

87. The smallest free-living bacteria are:

- A. *Escherichia coli*
- B. *Staphylococcus aureus*
- C. *Mycoplasma* species
- D. *Clostridium* species
- E. *Mycobacterium* species

88. The pathogenesis of *Mycoplasma pneumoniae* pneumonia is primarily:

- A. Toxin-mediated necrosis
- B. Immune-mediated inflammation
- C. Spore germination
- D. Capsule obstruction
- E. Acid-fast damage

89. *Rickettsia rickettsii* primarily infects:

- A. Hepatocytes
- B. Neutrophils
- C. Endothelial cells
- D. Erythrocytes
- E. Lymphocytes

90. Epidemic typhus is associated with:

- A. Rodent bites
- B. Poor sanitation and crowding
- C. Freshwater exposure
- D. Undercooked poultry
- E. Tick Bites

91. A TB granuloma contains multinucleated giant cells derived from:

- A. Macrophages
- B. B cells
- C. Neutrophils
- D. Fibroblasts
- E. Endothelial cells

92. The infectious form of *Coxiella burnetii* that is environmentally stable is:

- A. Large cell variant
- B. Small cell variant
- C. Reticulate body
- D. Spore
- E. Elementary body

93. Endothelial infection in Rocky Mountain Spotted Fever leads to:

- A. Suppurative abscesses
- B. Toxin-mediated diarrhea
- C. Vasculitis
- D. Granuloma formation
- E. Hemolysis

94. The infectious form of *Chlamydia* is the:

- A. Reticulate body
- B. Large cell variant
- C. Endospore
- D. Elementary body
- E. Small colony variant

95. Untreated genital chlamydia can lead to:

- A. Toxic shock
- B. Cholera
- C. Gas gangrene
- D. Tetanus
- E. Pelvic inflammatory disease

96. *Bacteroides fragilis* is most commonly associated with:

- A. Intra-abdominal abscess
- B. Pneumonia
- C. Skin cellulitis
- D. Pharyngitis
- E. Diarrhea