Winter 2026
Pathogenic Bacteriology

1. Transformation involves:

A. Transfer of DNA via bacteriophages
B. Direct cell-to-cell DNA transfer
C. Uptake of naked DNA from the environment
D. RNA-mediated gene transfer
E. Chromosomal duplication

2. Transduction is mediated by:

A. Plasmids
B. Conjugative pili
C. Bacteriophages
D. Transposons
E. Ribosomes

3. Which mechanism most commonly contributes to the spread of antibiotic resistance among bacteria?

A. Mutation only
B. Binary fission
C. Horizontal gene transfer
D. Sporulation
E. Cell lysis

4. Which structure contributes most to resistance against phagocytosis?

A. Flagella
B. Capsule
C. Peptidoglycan
D. Teichoic acid
E. Ribosome

5. A patient with MRSA bacteremia is treated with vancomycin. The drug works by inhibiting:

A. Protein synthesis at the 50S subunit
B. DNA gyrase
C. Cell wall synthesis
D. RNA polymerase
E. Folate synthesis

6. Beta-hemolysis on blood agar is best described as:

A. Partial hemolysis with green discoloration
B. No hemolysis
C. Complete clearing around colonies
D. Delayed hemolysis only after incubation
E. Double-zone

7. The mechanism of action of TSST-1 is best described as:

A. Direct cytolysis of host cells
B. Inhibition of protein synthesis
C. Superantigen-mediated T-cell activation
D. Blocking phagosome fusion
E. Induction of apoptosis

8. Which virulence factor is most responsible for tissue destruction in *S. aureus* skin infections?

A. Capsule
B. Hyaluronidase
C. Coagulase
D. Protein A
E. DNase

9. *Staphylococcus aureus* typically appears how on blood agar?

A. Non-hemolytic
B. Alpha-hemolytic
C. Beta-hemolytic
D. Gamma-hemolytic
E. Double-zone hemolysis

10. Which population is at highest risk for severe *Listeria monocytogene*s infection?

A. Healthy adolescents
B. Pregnant women
C. Patients with asthma
D. Individuals with hypertension
E. Competitive athletes

11. Which virulence factor allows *Listeria monocytogenes* to escape the phagolysosome?

A. Internalin
B. Actin polymerase
C. Listeriolysin O
D. Capsule
E. Endospore

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

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

13. Which immune response is most important for controlling *Staphylococcus* infections?

A. Humoral immunity only
B. Cell-mediated immunity only
C. Neutrophil-mediated phagocytosis
D. Eosinophil activation
E. Complement-independent lysis

14. Which statement best describes *Staphylococcus* metabolism?

A. Obligate anaerobes
B. Obligate aerobes
C. Facultative anaerobes
D. Microaerophiles
E. Aerotolerant anaerobes

15. A neonate develops widespread blistering and skin desquamation. Cultures grow *Staphylococcus aureus*. Which toxin is responsible for this condition?

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

16. A microbiology student observes gram-positive cocci in clusters that are catalase-positive but coagulase-negative. Which diagnosis is most likely?

A. *Streptococcus pneumoniae*
B. *Enterococcus faecium*
C. Coagulase-negative *Staphylococci*
D. *Micrococcus* species
E. *Bacillus* species

17. A patient with eczema develops widespread *S. aureus* colonization. Which host factor most increases susceptibility?

A. Reduced IgE
B. Skin barrier disruption
C. Reduced complement
D. Reduced CD8+ T cells
E. Increased eosinophils

18. *Streptococcus* species typically appear microscopically as:

A. Gram-negative diplococci
B. Gram-positive rods
C. Gram-positive cocci in chains
D. Gram-positive cocci in clusters
E. Acid-fast cocci

19. Which organism is classified as **Group A *Streptococcus* (GAS)**?

A. *Streptococcus agalactiae*
B. *Streptococcus pneumoniae*
C. *Streptococcus pyogenes*
D. *Enterococcus faecalis*
E. *Streptococcus viridans*

20. The major virulence factor that inhibits phagocytosis in *Streptococcus pyogenes* is:

A. Capsule
B. Streptolysin O
C. M protein
D. Hyaluronidase
E. DNase

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

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

22. *Streptococcus pneumoniae* is best described as:

A. Beta-hemolytic, catalase-positive
B. Alpha-hemolytic, encapsulated diplococcus
C. Non-hemolytic cocci in chains
D. Catalase-positive cocci in clusters
E. Acid-fast diplococcus

23. Which organism is classified as 'Group D *Streptococcus*'?

A. *Streptococcus pyogenes*
B. *Streptococcus agalactiae*
C. *Enterococcus faecalis*
D. *Streptococcus pneumoniae*
E. *Streptococcus mutans*

24. *Enterococcus* species are normal flora of the:

A. Skin
B. Nasopharynx
C. Gastrointestinal tract
D. Respiratory tract
E. Oral cavity

25. Which immune mechanism is primarily responsible for tissue damage in acute rheumatic fever?

A. Direct bacterial invasion
B. Type I hypersensitivity
C. Type II hypersensitivity, Molecular mimicry
D. Endotoxin-mediated shock
E. Type III hypersensitivity, Immune complex deposition

26. Which laboratory safety concern is most important when handling *M. tuberculosis*?

A. Skin exposure
B. Ingestion risk
C. Aerosol transmission
D. Vector contamination
E. Spore formation

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

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

28.Which cell type is most critical for host defense against *Streptococcal* infections?

A. Eosinophils
B. Basophils
C. Neutrophils
D. CD8+ T cells
E. Plasma cells

29. A patient develops acute glomerulonephritis following pharyngitis. Which immune mechanism is responsible?

A. Type II hypersensitivity, Molecular mimicry
B. Type I hypersensitivity
C. Type III hypersensitivity, Immune complex deposition
D. Direct toxin-mediated damage
E. Superantigen activation

30. A patient presents with necrotizing fasciitis. Which streptococcal species is most commonly responsible?

A. *Streptococcus pneumoniae*
B. *Streptococcus agalactiae*
C. *Streptococcus pyogenes*
D. Viridans *streptococci*
E. *Enterococcus* faecalis

31. A child with pharyngitis develops a strawberry tongue and circumoral pallor. Which diagnosis is most consistent?

A. Acute rheumatic fever
B. Scarlet fever
C. Impetigo
D. Toxic shock syndrome
E. Glomerulonephritis

32. Bacillus* species are best described as:

A. Gram-negative rods
B. Gram-positive rods that form endospores
C. Gram-positive cocci in clusters
D. Acid-fast rods
E. Obligate anaerobes

33. Which toxin component of anthrax toxin binds to host cells?

A. Edema factor
B. Lethal factor
C. Protective antigen
D. Alpha toxin
E. Enterotoxin

34. Edema factor functions by:

A. Forming pores in host cell membranes
B. Inhibiting protein synthesis
C. Acting as an adenylate cyclase
D. Blocking phagolysosome fusion
E. Cleaving MAP kinases

35. Lethal factor causes host cell death primarily by:

A. Increasing intracellular cAMP
B. Inhibiting MAP kinase signaling
C. Activating caspases
D. Blocking ribosomes
E. Destroying membranes

36. A painless black eschar with surrounding edema is characteristic of:

A. *Bacillus cereus* food poisoning
B. Cutaneous anthrax
C. Necrotizing fasciitis
D. Tetanus
E. Gas gangrene

37. *Bacillus cereus* is most commonly associated with:

A. Pneumonia
B. Septic arthritis
C. Food poisoning
D. Endocarditis
E. Neonatal meningitis

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

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

39. Which structure allows *Bacillus* species to survive harsh environmental conditions?

A. Capsule
B. Flagella
C. Endospore
D. Peptidoglycan
E. Ribosome

40 Food poisoning caused by *S. aureus* results from ingestion of:

A. Live bacteria
B. Endotoxin
C. Preformed enterotoxin
D. Spores
E. Capsule fragments

41. The primary reservoir for *S. aureus* in humans is:

A. Gastrointestinal tract
B. Skin
C. Oropharynx
D. Anterior nares
E. Genitourinary tract

42. Which virulence factor contributes most to massive edema seen in anthrax?

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

43. Which immune response is most important for protection against anthrax toxin?

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

44. 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

45. Which toxin combination constitutes anthrax toxin?

A. Alpha toxin and beta toxin
B. Edema factor, lethal factor, protective antigen
C. Enterotoxin and cytotoxin
D. Hemolysin and lecithinase
E. Neurotoxin and hemagglutinin

46. *Listeria monocytogenes* is best described as:

A. Acid-fast intracellular rod
B. Gram-positive intracellular rod
C. Gram-positive extracellular coccus
D. Acid-fast bacillus
E. Gram-positive diplococcus

47. *Listeria monocytogenes* is most commonly transmitted through:

A. Respiratory droplets
B. Sexual contact
C. Contaminated food
D. Arthropod vectors
E. Blood transfusion

48. Which *Listeria* virulence factor promotes entry into nonphagocytic cells?

A. Listeriolysin O
B. Internalin
C. ActA
D. Capsule
E. Hemolysin

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

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

50. The diphtheria toxin causes disease by:

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

51. 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*

52. Which treatment is essential in suspected diphtheria cases?

A. High-dose steroids
B. Antitoxin administration
C. Combinatorial antibiotics that include Cephalosporin therapy alone
D. Surgical excision of membrane
E. Vaccination only

53. Which is a feature of *Listeria monocytogenes* but not *Corynebacterium diphtheriae*?

A. Gram-positive cell wall
B. Toxin production
C. Intracellular replication
D. Rod-shaped morphology
E. Ability to cause pharyngitis

54. Which is not a common cause of death from *Corynebacterium diphtheriae*?

A. Secondary infections, like pneumonia
B. Myocarditis (heart muscle damage)
C. Airway obstruction (suffocation)
D. Diaphragm paralysis (stops breathing)
E. Septic Endema

55. *Listeria monocytogenes* requires a high inoculation, IC_{50}, before it will cause disease. Yet, it is a leading cause of food poisoning worldwide. Which property allows it to accomplish this?

A. It grows at cold temperatures
B. It can grow on food at high salt concentrations
C. It grows rapidly once ingested
D. It is part of the normal GI flora and becomes activated by a phage-delivered toxin.
E. It is not killed by heating food to high temperatures

56. A 29-year-old pregnant woman presents with fever, myalgias, and diarrhea after consuming unpasteurized cheese. Blood cultures later grow a small gram-positive rod. Which complication is of greatest concern?

A. Maternal myocarditis
B. Fetal loss or neonatal sepsis
C. Chronic carrier state
D. Pseudomembrane formation
E. Guillain-Barré syndrome

57. Which *streptococcal* factor cleaves complement component C5a?

A. Streptolysin O
B. DNase
C. Hyaluronidase
D. C5a peptidase
E. Streptokinase

58. A neonate develops respiratory distress and sepsis within 24 hours of birth. Maternal screening during pregnancy was not performed. Which organism is most likely responsible?

A. *Streptococcus pyogenes*
B. *Streptococcus pneumoniae*
C. *Streptococcus agalactiae*
D. Viridans *streptococci*
E. *Enterococcus faecium*

59. Which immune defect places a patient at highest risk for invasive *Listeria* infection?

A. IgA deficiency
B. Complement deficiency
C. Impaired cell-mediated immunity
D. Neutropenia only
E. Elevated IgE levels

60. A 6-year-old child presents with sore throat, fever, and a thick gray pharyngeal pseudomembrane that bleeds when scraped. Which organism is most likely responsible?

A. *Streptococcus pyogenes*
B. *Listeria monocytogenes*
C. *Corynebacterium diphtheriae*
D. *Staphylococcus aureus*
E. *Bacillus cerius*

61. A patient with pharyngeal diphtheria develops cardiac arrhythmias. What is the most likely underlying mechanism?

A. Immune complex deposition
B. Hypoxia from airway obstruction
C. Exotoxin-mediated myocardial injury
D. Septic emboli
E. Direct bacterial invasion

62. Which toxin mechanism explains the systemic effects of diphtheria?

A. Increased cAMP
B. Pore formation in membranes
C. Inhibition of protein synthesis
D. Activation of MAP kinases
E. Endotoxin release

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

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

64. Mycobacterium tuberculosis* is best described as:

A. Gram-negative obligate intracellular rod
B. Acid-fast aerobic rod
C. Spore-forming anaerobe
D. Facultative intracellular coccus
E. Encapsulated diplococcus

65.Which symptom most strongly suggests reactivation TB?

A. Acute high fever
B. Upper-lobe cavitation
C. Diarrhea
D. Rash
E. Hypotension

66. Which component of *S. aureus* binds the Fc portion of IgG helping it to avoid opsinization?

A. Capsule
B. Teichoic acid
C. Protein A
D. Lipoteichoic acid
E. Clumping factor

67. Which host response limits TB spread but also causes lung damage?

A. Antibody production
B. Granuloma formation
C. Complement fixation
D. Neutrophil lysis
E. IgE activation