Winter 2026
Pathogenic Bacteriology
Exam III

1. *Mycobacterium leprae* primarily infects:

A. Schwann cells
B. Alveolar macrophages
C. Hepatocytes
D. Endothelial cells
E. Renal tubular cells

2. Which factor contributes to epidemic spread of cholera?

A. Capsule switching
B. Zoonotic fleas
C. Environmental water reservoirs
D. Airborne transmission
E. Bioaerosol formation

3. Which organism produces a capsule contributing to virulence in septicemia?

A. *Vibrio parahaemolyticus*
B. *Vibrio cholerae*, O1
C. *Haemophilus influenzae*, nontypeable
D. *Shigella dysenteriae*
E. *Vibrio vulnificus*

4. The B subunit of cholera toxin binds to:

A. CD4 receptor
B. GM1 ganglioside
C. TLR4
D. Integrins
E. ACE2 receptor

5. Which organism is motile via a polar flagellum?

A. *Haemophilus influenzae*
B. *Shigella*
C. *Klebsiella*
D. *Yersinia pestis*
E. *Vibrio cholerae*

6. Which gene encodes cholera toxin?

A. *ctx*AB
B. *tdh*
C. *hlyA*
D. *toxR*
E. *tcpA*

7. The cholera toxin genes are carried by:

A. Plasmid
B. Bacteriophage
C. Transposon
D. Pathogenicity island only
E. Integron

8. Which organism may cause necrotizing fasciitis?

A. *Vibrio vulnificus*
B. *Vibrio cholerae*
C. *Haemophilus influenzae*
D. *Shigella*
E. *Salmonella* Typi

9. *Mycobacterium leprae* cannot be grown in vitro primarily because:

A. It is anaerobic
B. It lacks a cell wall
C. It grows extremely slowly
D. It requires host cells
E. It forms spores

10. Intrinsic resistance of *P. aeruginosa* is primarily due to:

A. Thick peptidoglycan layer
B. Porin restriction and efflux pumps
C. Spore formation
D. Acid-fast cell wall
E. Capsule absence

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

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Stenotrophomonas maltophilia*
D. *Burkholderia mallei*
E. *Neisseria meningitidis*

12. Which toxin of *P. aeruginosa* damages host cell membranes?

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

13. Which finding supports lepromatous rather than tuberculoid leprosy?

A. Numerous foamy macrophages
B. Weak cell-mediated immunity
C. Disease is limited mainly to skin lesions
D. Diffuse disease
E. Poor prognosis

14. Which organism is weakly acid-fast and forms branching filaments?

A. *Mycobacterium leprae*
B. *Mycobacterium avium*
C. *Corynebacterium diphtheriae*
D. *Actinomyces israelii*
E. *Nocardia asteroides*

15. Which characteristic is shared by Neisseria meningitidis and Neisseria gonorrhoeae?

A. Acid-fast cell wall
B. Glucose and maltose fermentation
C. Gram-negative diplococci
D. Spore formation
E. Endotoxin absence

16. Which virulence factor is most important for attachment of *Neisseria gonorrhoeae* to mucosal epithelial cells?

A. Capsule
B. Pili
C. IgA protease
D. Lipooligosaccharide
E. Porins

17. The F1 capsule of *Yersinia pestis* functions primarily to:

A. Increase motility
B. Promote lactose fermentation
C. Enhance toxin secretion
D. Inhibit phagocytosis
E. Form spores

18. A child presents with bloody diarrhea. Stool culture reveals non-motile, non-lactose fermenting Gram-negative rods. Diagnosis?

A. *EHEC*
B. *Salmonella*
C. *Yersinia*
D. *Proteus*
E. *Shigella*

19. Which immune evasion strategy is shared by both pathogenic *Neisseria* species?

A. Intracellular spore formation
B. Antigenic variation
C. Biofilm formation
D. Superantigen production
E. Acid resistance

20. Which population is at increased risk for *N. meningitidis* disease?

A. Patients with asthma
B. Patients with IgA deficiency
C. Patients with complement (C5–C9) deficiency
D. Patients with neutropenia
E. Patients with diabetes

21. Which complication is associated with untreated gonorrhea in women?

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

22. Which condition is associated with disseminated gonococcal infection?

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

23. A farmer presents with numb skin lesions and peripheral neuropathy. Skin biopsy shows acid-fast bacilli in macrophages. Which organism is responsible?

A. *M. tuberculosis*
B. *M. marinum*
C. *M. leprae*
D. *Nocardia brasiliensis*
E. *Rhodococcus equi*

24. A patient with lepromatous leprosy is most likely to have which immune profile?

A. Strong Th1 response
B. Strong Th2 response
C. High IFN-γ levels
D. Few organisms
E. Localized disease

25. A fisherman develops nodular skin lesions after cleaning aquariums. The organism grows best at 30°C. Which pathogen is most likely?

A. *M. tuberculosis*
B. *M. marinum*
C. *M. kansasii*
D. *M. leprae*
E. *Nocardia*

26. A neonate develops severe conjunctivitis 2 days after birth. Which maternal infection is most likely?

A. *Listeria monocytogenes*
B. *Neisseria gonorrheae*
C. *Neisseria meningitidis*
D. *Haemophilus ducreyi*
E. *Haemophilus influenzeae*

27. A patient with gonorrhea develops migratory arthritis and skin lesions. This represents:

A. Disseminated gonococcal infection
B. Reactive arthritis
C. Toxic shock syndrome
D. Acute rheumatic fever
E. Immune reconstitution syndrome

28. Which *Haemophilus* species causes chancroid?

A. *H. ducreyi*
B. *H. parainfluenzae*
C. *H. influenzae*
D. *H. aegyptius*
E. *H. haemolyticus*

29. A cystic fibrosis patient develops chronic productive cough. Mucoid colonies grow on culture.

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Listeria monocytenes*
D. *Stenotrophomonas maltophilia*
E. *Klebsiella pneumoniae*

30. A burn patient develops greenish wound drainage with fruity odor.

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Salmonella Typhi*
D. *Stenotrophomonas maltophilia*
E. *Yesrina pestis*

31. A hot tub user develops pruritic pustular rash on trunk.

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Salmonella Typhi*
D. *Stenotrophomonas maltophilia*
E. *Yesrina pestis*

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

A. *Yesinia enterocolitis*
B. *Pasteurella multocida*
C. *Haemophilus influenzae*
D. *Moraxella*
E. *Acintobacter baumannii*

33. Which factor allows *H. influenzae* to colonize respiratory mucosa?

A. Endospore formation
B. Superantigen
C. Flagella
D. Capsule switching
E. IgA protease

34. A child presents with recurrent otitis media. Culture grows nontypeable *H. influenzae*. Why are these strains not prevented by the *Haemophilus influenzae* serotype B vaccine?

A. Lack of capsule
B. Capsule mutation
C. Intracellular location
D. Biofilm resistance
E. IgG cleavage

35. A patient develops infective endocarditis 2 months after a dental extraction. Blood cultures are slow-growing Gram-negative rods. Most likely organism?

A. *Aggregatibacter actinomycetemcomitans*
B. *Neisseria meningitidis*
C. *Yersinia pestis*
D. *Vibro vulcinasis*
E. *Haemophilus ducreyi*

36. Which feature distinguishes nontypeable *H. influenzae* from Type b strains?

A. Ability to ferment glucose
B. Requirement for X factor
C. Absence of capsule
D. Gram stain morphology
E. Oxidase positivity

37. Which organism is most likely to cause meningitis in an unvaccinated 2-year-old?

A. *Pasteurella*
B. *Salmonella*
C. *Klebsiela*
D. *Haemophilus influenzae* type b
E. *Aggregatibacter*

38. A 2-year-old presents with acute otitis media. Culture reveals nontypeable *H. influenzae*. Which characteristic explains its ability to cause recurrent mucosal infections?

A. Capsule-mediated immune evasion
B. IgG protease production
C. Biofilm formation and mucosal colonization
D. Intracellular replication
E. Exotoxin production

39. Which virulence factor allows uropathogenic *E. coli* to adhere to uroepithelium?

A. Capsule
B. P fimbriae
C. Endotoxin
D. Type III secretion system
E. Biofilm only

40. Which organism produces Shiga toxin that inhibits the 60S ribosomal subunit?

A. ETEC
B. EPEC
C. EHEC
D. EAEC
E. UPEC

41. Which *Salmonella* serovar causes typhoid fever?

A. *S. enteritidis*
B. *S. typhimurium*
C. *S. typhi*
D. *S. choleraesuis*
E. *S. paratyphi*

42. Which antigenic variation mechanism allows *N. gonorrhoeae* to cause recurrent infections?

A. Phase variation of pili
B. Capsule switching
C. Sporulation
D. Endotoxin modification
E. Biofilm formation

43. Which component of *Neisseria* is responsible for endotoxin activity?

A. Capsule
B. Peptidoglycan
C. Porin A
D. Pili
E. Lipooligosaccharide (LOS)

44. A traveler to Mexico develops watery diarrhea without fever. Most likely pathogen?

A. EHEC
B. ETEC
C. EPEC
D. EIEC
E. EAEC

45. A man develops painful inguinal lymphadenopathy (bubo) and fever after flea exposure. Organism?

A. *Salmonella Typhi*
B. *Shigella*
C. *Yersinia pestis*
D. *Neisseria meningitidis*
E. *Klebsiella*

46. A patient presents with prolonged fever (>2wks), abdominal pain, and rose spots. Organism?

A. *S. typhi*
B. *Shigella*
C. *E. coli*
D. *Yersinia*
E. *Proteus*

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

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

48. The type III secretion system on *Salmonella* pathogenicity islands primarily functions to:

A. Promote capsule synthesis
B. Deliver effector proteins into host cells
C. Facilitate conjugation
D. Increase motility
E. Degrade IgA

49. Mucoid colony morphology on agar suggests production of:

A. Flagella
B. Fimbriae
C. Capsule
D. Hemolysin
E. Enterotoxin

50. Which species is most strongly associated with bubonic plague?

A. *Salmonella Typhi*
B. *Yersinia pseudotuberculosis*
C. *Shigella dysenteriae*
D. *Yersinia pestis*
E. *Yersinia enterocolitica*

51. Hemolytic uremic syndrome develops in a child after bloody diarrhea. Antibiotics worsen condition. Organism?

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

52. Satellite growth around *Staphylococcus aureus* on blood agar is characteristic of:

A. *Pasteurella multocida*
B. *Haemophilus influenzae*
C. *Brucella melitensis*
D. *Francisella tularensis*
E. *Bordetella pertussis*

53. Which condition has dramatically declined due to the *Haemophilus influenzae* serotype B conjugate vaccine?

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

54. Child develops dysentery with low infectious dose exposure. Organism?

A. *Shigella*
B. *Salmonella*
C. *E. coli*
D. *Klebsiella*
E. *Listeria monocytenes*

55. Which species is oxidase-positive?

A. *E. coli*
B. *Shigella*
C. *Vibrio cholerae*
D. *Klebsiella pneumoniae*
E. *Enterobacter cloacae*

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. Which serogroups are primarily associated with epidemic cholera?

A. O1 and O139
B. O157 and O26
C. O4 and O9
D. O111 and O121
E. O2 and O8

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

A. *Shigella dysenteriae*
B. *Neiseria meningitidis*
C. *Vibrio vulnificus*
D. *Pseudomonas aeruginosa*
E. *Vibrio cholerae*

59. Which enzyme allows *Neisseria* to survive on mucosal surfaces?

A. Catalase
B. Superoxide dismutase
C. IgA protease
D. Beta-lactamase
E. Urease

60. Which statement best summarizes *Neisseria* pathogenesis?

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

61. A patient with terminal complement deficiency presents with recurrent episodes of meningitis. Which organism is most likely responsible?

A. *Streptococcus pneumoniae*
B. *Haemophilus influenzae*
C. *Escherichia coli*
D. *Listeria monocytogenes*
E. *Neisseria meningitidis*

62. Severe dehydration with metabolic acidosis develops after 24 hours of rice-water diarrhea. Primary mechanism?

A. Enterotoxin-mediated chloride secretion
B. Cytotoxin-mediated necrosis
C. Invasion of colonocytes
D. Tight junction destruction
E. Hemolysin production

63. A laboratory identifies a curved, comma-shaped oxidase-positive rod from stool. Most likely genus?

A. *Proteus*
B. *Shigella*
C. *Klebsiella*
D. *Vibrio*
E. *Salmonella*

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

A. *Shigella sonnei*
B. *Vibrio cholerae*
C. *Salmonella Typi*
D. *Pseudomonas aeruginosa*
E. *Yersinia pestis*

65. 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

66. Which organism is a non-fermenting (ie. oligate aerobe) Gram-negative rod?

A. *E. coli*
B. *Klebsiella pneumoniae*
C. *Pseudomonas aeruginosa*
D. *Enterobacter cloacae*
E. *Salmonella Typhi*

67. Which organism survives well on dry hospital surfaces?

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Pasteurella*
D. *Shigella*
E. *Vibrio cholerae*

68. Which organism is commonly associated with burn wound infections?

A. *Pseudomonas aeruginosa*
B. *Acinetobacter baumannii*
C. *Listeria monocytenes*
D. *Yersina pestis*
E. *Shigella*

69. Which species is the primary cause of epidemic cholera?

A. *Vibrio parahaemolyticus*
B. *Vibrio vulnificus*
C. *Vibrio cholerae* O1
D. *Aeromonas hydrophila*
E. *Plesiomonas shigelloides*

70. The cholera toxin increases intracellular levels of:

A. cGMP
B. cAMP
C. IP3
D. Calcium
E. DAG

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

A. *Vibrio parahaemolyticus*
B. *Aeromonas hydrophila*
C. *Vibrio alginolyticus*
D. *Vibrio vulnificus*
E. *Plesiomonas shigelloides*