MICRO FINAL DR HAN

DEND 215 Exam III
9-11 AM December 2, 2005
NOA260 and 270

DR HISE (mycoplasma)
DR maguire (microbial virulence

Note:

(1) There are a total of 82 questions in this exam, each worth 1 point.

*(2) There are a total of **206** points, combining all 3 exams of this course:*

Exam I	*74*
Exam II	*50*
Exam III	*82*
Total	*206*

*The final grade will be based on the percentage scale using **200** points as 100%.*

A=90% and above
B=80-89%
C=70-79%
D=60-69%

(3) Most questions have only one correct answer. Occasionally a question may have more than one correct answer, in which case you may choose any one of them.

(4) If you would like to make comments about particular questions, please write the question numbers on the top-right corner of the cover page and your comments next to the questions.

1. Biofilms can form on the following surface(s):
   A. Liquid surface
   B. Solid surface
   C. Extracellular and intracelluar surface
   D. B and C
   E. A, B and C

2. Which of the following describes best the composition of biofilm:
   A. 90% bacterial cells, 5% water/nutrient channels, and 5% extracellular polysaccharides (EPS)
   B. 80% bacterial cells, 5% water/nutrient channels, and 15% EPS
   C. 15% bacterial cells, 5% water/nutrient channels, and 80% EPS
   D. 15% bacterial cells, 80% water/nutrient channels, and 5% EPS
   E. 5% bacterial cells, 80% water/nutrient channels, and 15% EPS

3. When microorganisms in a community reach a certain density, specific signal(s) will be triggered leading to expression of different set(s) of genes. This phenomenon is termed:
   A. Quorum sensing
   B. Colonization resistance
   C. Replacement
   D. Homeostasis

4. Bacteria in biofilms are:
    A. More resistant to antibiotics and host defense than plaktonic bacteria
    B. More resistant to antibiotics but are just as susceptible to host immune defense as plaktonic bacteria
    C. Less resistant to antibiotics and more resistant to host immune defense
    D. As susceptible to antibiotics and host defense as plaktonic bacteria
    E. Less resistant to antibiotics and host immune defense

5. Development of periodontal disease requires the following elements:
    A. Susceptible host
    B. Periodontal pathogens
    C. Absence of beneficial species
    D. B and C
    E. A, B and C

6. Dental plaque formed above the gum line is called the supragingival plaque; that formed below the gum line is called the subgingival plaque. Therefore, the supragingival plaque is only responsible for causing caries, whereas the subgingival plaque is responsible for causing gingivitis and periodontitis.
    A. True
    B. False

7. The mature subgingival plaque is dominated by:
    A. Gram-negative cocci
    B. Gram-positive cocci
    C. Gram-negative rods
    D. Gram-positive rods

8. The criteria to identify a microorganism as a periodontal pathogen is:
    A. The microorganism is absent or exists in small numbers in periodontal healthy site, but is found in high numbers in diseased site.
    B. Patients develop high titers of antibody responses to the microorganism.
    C. The microorganism can cause similar disease in an animal model.
    D. The microorganism produces virulence factors in vitro.
    E. All of the above.

Choose from the following organisms to answer questions 9-15:

A. *Streptococcus oralis*
B. *Treponema denticola*
C. *Streptococcus mutans*
D. *Fusobacterium nucleatum*
E. *Actinobacillus actinomycemtemcomitans*

9. Which is a "red complex" organism?
10. Which one belongs to the "orange complex"?
11. Which one has been recognized as a strong etiologic agent of localized juvenile periodontitis?
12. Which one coaggregates with all the other species and plays an important role in plaque formation?
13. Which one causes caries?
14. Which one is motile?
15. Which one is a pioneering species in dental plaque formation?

16. Which of the following species will turn black when grown on blood agar plates?
    A. Porphyromonas gingivalis
    B. Prevotella intermedia
    C. Treponema denticola
    D. A and B
    E. A and C

17. Resident microflora contribute to colonization resistance by:
    A. Competing for nutrients and adhesion sites
    B. Creating micro-environment to prevent the growth of exogenous species
    C. Producing inhibitory factors
    D. A and C
    E. A, B and C

18. Saliva provides nutrients for microorganisms but lacks host defense, whereas gingival crevicular fluid provides both nutrients and host defense.
    A. True
    B. False

19. Factor(s) responsible for breakdown of microbial homeostasis include:
    A. Host immune deficiency
    B. Carbohydrate-rich diet
    C. Antibiotics
    D. A and C
    E. A, B and C

20. Intravenous injection of *F. nucleatum* into pregnant mice results in specific colonization and proliferation of this organism in :
    A. Liver
    B. Spleen
    C. Placenta
    D. All of the above

21. Using a pregnant mouse model, Han et al. showed that *F. nucleatum* caused fetal death in a non-dose-dependent manner.
    A. True
    B. False

22. Two of the most predominant genera associated with acute necrotizing ulcerative gingivitis are:
    A. *Treponema* and *Fusobacterium*
    B. Treponema and *Tannerella*
    C. *Fusobacterium* and *Tannerella*
    D. Porphyromonas and *Tannerella*

23. *Clamydia trachomatis* and *Clamydia pneumonia* are both obligate intracellular pathogens, capable of infecting a wide variety of cell types, thus causing a variety of human infections including genital infections, pneumonia and atherosclerosis.
    A. True
    B. False

24. Which of the following statements about spirochetes is incorrect:
    A. have internal flagella allowing movement in viscous environment
    B. cell wall structure similar to that of Gram-positive bacteria
    C. invade through epithelial cell junctions
    D. most species are uncultivated
    E. All of the above

25. The current data indicates that there are _____ different bacterial species present in human oral cavities.
    A. 300
    B. 400
    C. 500
    D. 600
    E. 700

26. Periodontal disease has been linked to the following systemic disease except:
    A. Cardiovascular disease
    B. Preterm birth
    C. Rheumatoid arthritis
    D. Lyme disease

7. Which of the following is the most appropriate regarding infection control?
    A. Judge a patient's infectious state by his/her appearance
    B. Determine a patient's infectious state through a private interview
    C. Determine infection control measures based on the patient's medical record
    D. Use universal precaution and assume everyone is infected
    E. None of the above

28. The universal infection control will prevent infection from all agents.
    A. True
    B. False

29. Since the dental unit water line uses non-sterile water, there is no need to sterilize the hand piece attached to DUWL.
    A. True
    B. False

30. Infection can be transmitted through:
    A. Direct contact
    B. Inhalation of contaminated droplet nuclei
    C. Contaminated sharps
    D. Improperly sterilized instruments
    E. All of the above

31. There is no need to clean the instruments that will be sterilized.
    A. True
    B. False

32. Shape is an important determinant in bacterial identification. Which of the following has a coccus shape?
    A. Streptococcus
    B. Neisseria
    C. Veillonella
    D. All of the above

33. Which of the following is/are characteristic of *S. aureus*?
    A. Positive coagulase test
    B. Different phages infect different strains
    C. Antiphagocytic due to protein A
    D. A and B
    E. A, B, and C

34. In order to identify the organism(s) causing pulp infection in one of his patients, an endodontist streaks one of the files he used on the patient onto a blood agar plate. Following incubation at 37^0C in air, he finds a predominant colony type on the plate. He then performs Gram stain on that colony type, which turns out to be Gram-positive cocci. Which of the following organism is it most likely to be?
    A. Peptostreptococcus
    B. Enterococcus
    C. Streptococcus
    D. Staphylococcus
    E. None of the above

35. Which of the following organism(s) is capable of causing meningitis?
    A. Group B strep
    B. Streptococcus pneumoniae
    C. Neisseria meningitides
    D. Haemophilus influenzae
    E. All of the above

36. Which of the following is/are characteristic of *S. mutans*?
    A. produces acid
    B. is acid-tolerant
    C. uses glucosyltransferase to synthesize glucan from sucrose
    D. uses glucan as an adhesin to bind to tooth surface
    E. All of the above

37. Individuals who have been infected with gonorrhea can get re-infected. This lack of immunity is in part due to the antigenic variation of:
    A. pili
    B. Opa proteins
    C. A and B
    D. None of the above

38. Veillonella is considered a "good" bug in dental plaque because it
    A. Converts the more acidic lactate produced by *S. mutans* to the less acidic acetate.
    B. Converts the more acidic acetate produced by *S. mutans* to the less acidic lactate.
    C. Converts the less acidic acetate produced by *S. mutans* to the more acidic lactate.
    D. Converts the less acidic lactate produced by *S. mutans* to the more acidic acetate.

39. Lactobaccili play a dual role in microbial ecology: they are "good" bugs in the urogenital tract, but "bad" bugs in the dental plaque.
    A. True
    B. False

40. Which of the following statements is incorrect?
    A. Many exotoxins are AB toxins.
    B. Most AB toxins prevent protein elongation.
    C. All AB toxins are made up of two subunits, with the B subunit serving as the delivery vehicle for the active A subunit.
    D. None of the above

41. *Listeria monocytogenes* spreads from within epithelial cells to the neighboring cells utilizing the following:
    A. ActA
    B. Listeriolysin
    C. Internalin
    D. A and B
    E. A, B, and C

42. A seventy-year old male was put on antibiotic therapy for pneumonia. One week into therapy, he developed diarrhea. His stool sample was sent to the microbiology lab, from which large anaerobic Gram-negative rods were isolated. Which of the following organism is it most likely to be?
    A. Salmonella typhimurium
    B. Escherichia coli
    C. Clostridia perfringens
    D. Clostridia difficile
    E. None of the above

43. The most potent toxin known in nature, with a lethal does of < 1 μg, is produced by:
    A. Bacillus anthracis
    B. Corynebacterium diphtheriae
    C. Clostridium tetanus
    D. Clostridium botulinum
    E. Vibrio cholerae

44. In the name "*E. coli* **O**157:**H**7",
    A. "O" stands for antigen in the lipopolysaccharides and "H" for antigen in the capsule.
    B. "O" stands for antigen in the lipopolysaccharides and "H" for antigen in the flagella.
    C. "O" stands for antigen in the capsule and "H" for antigen in the flagella.
    D. "O" stands for antigen in the capsule and "H" for antigen in the lipopolysaccharides.
    E. "O" stands for antigen in the flagella and "H" for antigen in the capsule.

45. Which of the following possess(es) P pili?
    A. UPEC
    B. EPEC
    C. ETEC
    D. EHEC
    E. EAEC

46. Which of the following causes bloody diarrhea?
    A. EHEC
    B. EIEC
    C. *Shigella*
    D. A and C
    E. A, B, and C

47. Which of the following transcytose(s) across the M cells in the intestine?
    A. *Salmonella*
    B. Shigella
    C. Yersinia
    D. All of the above

48. Since *Shigella* is capable of cell-to-cell spread, it must possess flagella to ensure its motility.
    A. True
    B. False

49. An otherwise healthy individual develops diarrhea after eating raw oysters in a seafood restaurant. The diarrhea clears up after a few days without treatment. The microorganism most likely responsible is:
    A. *Salmonella typhimurium*
    B. Escherichia coli
    C. Vibrio cholerae
    D. Clostridium perfringens
    E. Campylobacter jejuni

50. Which of he following correctly describe(s) a two-component system:
    A. It includes a transmembrane sensor/modulator, which senses the environmental changes and transmits the signal through phosphorylation.
    B. It includes a small DNA binding protein, which, in response to signals transmitted from the sensor, either turns the transcription of a specific set of genes on or off.
    C. The same two-component system can turn on certain genes while turning off other genes simultaneously.
    D. A and B
    E. A, B, and C

51. There are six serotypes of capsulated *Haemophilus influenzae*. The *Heamophilus* vaccine is directed against PRP of which seroptye?
    A. a
    B. b
    C. c
    D. d
    E. e

52. Legionella pneumonia invades macrophages in which of the following manner?
    A. Ruffling
    B. Effacing
    C. Zipping
    D. Coiling
    E. None of the above

53. The most abundant protein produced by *Helicobacter pylori* is urease. It constitutes _____ of the total proteins produced by the organism and is critical for the organism's survival in the acidic environment in the stomach.
    A. 1%
    B. 2%
    C. 3%
    D. 6%
    E. 10%

54. Which of the following is capable of transplacental infection?
    A. *Yersinia enterocolitica*
    B. *Haemophilus influenza*
    C. *Treponema pallidum*
    D. *Borrelia burgdorferi*
    E. *Neisseria gonorrhea*

55. For many enteric bacteria, all of the following are common aspects of the pathogen-host interaction EXCEPT:
    A. Adhesion of pathogen to host cells
    B. Induction of necrotic cell death
    C. Avoidance of host cell generated reactive oxygen species
    D. Induction of apoptosis in the host cell
    E. Invasion and uptake into the host cell's cytosol

56. Many pathogens control their uptake (invasion) into the host cell cytosol. All of the following components of either the bacterial cell or the host cell may be involved in this process EXCEPT:
    A. Changes in fatty acid composition of the host cell
    B. Actin cytoskeleton of the host cell
    C. Type III secretion system of the pathogen
    D. Pili of the pathogen
    E. Adherins, cadherins, and/or integrins of the host cell

57. The various forms of Toll receptors on host cell are able to detect which of the following:
    A. Gram-negative bacteria
    B. Gram-positive bacteria
    C. Lipopolysaccharide
    D. Unmethylated CpG dinucleotides
    E. All of the above

64. The primary immune cell to control growth of *M. tuberculosis* is?
    A. B cell
    B. Epithelial cell
    C. Macrophage
    D. Kupfer cell
    E. NK T cell

65. Treatment of active tuberculosis requires multiple drugs for 6 months. Which drug is <u>not</u> used in the treatment of TB?
    A. Isoniazid
    B. Rifampin
    C. Pyrazinamide
    D. Penicillin
    E. Moxifloxacin

66. What cytokine is essential for successful control of *M. tuberculosis*?
    A. Interferon alpha
    B. IL-10
    C. GM-CSF
    D. Interferon gamma
    E. TGF-beta

67. Which clinical symptom is <u>not</u> suggestive of active tuberculosis?
    A. One week history of cough
    B. Weight loss
    C. Haemoptysis (coughing up blood)
    D. Anorexia (no appetite)
    E. Chest pain

68. Which factors are <u>not</u> driving the worldwide TB epidemic?
    A. HIV
    B. Malnutrition
    C. Drug resistant TB
    D. Vaccine ineffective for adults
    E. Poverty and Crowding

69. Which of the following statements about *M. tuberculosis* and TB are <u>not</u> true?
    A. *M. tuberculosis* is spread by aerosol, highly infectious and infects rapidly
    B. Most persons infected with *M. tuberculosis* develop TB
    C. Infection with aerosolized *M. tuberculosis* generally requires prolonged exposure and close contact
    D. B cells, antibody and complement are essential for control of *M. tuberculosis*
    E. Most tuberculosis is due to progressive primary infection

70. A 30 year old man presents to the emergency room complaining of a non-productive cough for the past week, sore throat, muscle aches, and headache. His temperature is 38°C and his chest examination reveals coarse breath sounds with no focal findings. A chest x-ray was obtained and was interpreted by the on-call radiologist as normal. Which organism is most likely to be the cause of his illness:
    A. Streptococcus pneumoniae
    B. Haemophilus influenzae
    C. Legionella spp.
    D. Mycoplasma pneumoniae
    E. Mycobacterium tuberculosis

71. Which clinical laboratory methodology is best used for the acute diagnosis of *Mycoplasma pneumoniae* in a patient presenting to an emergency room with symptoms of pneumonia.
    A. A 32-fold rise in convalescent-phase serum antibody titers for *Mycoplasma* over acute phase by complement fixation (CF).
    B. Culture of *M. pneumoniae* isolated from nasopharyngeal secretions on culture in special media (beef-heart infusion broth with fresh yeast extract and horse serum), followed by subculture on agar media.
    C. Semi-nested polymerase chain reaction (PCR) assay using the 16S ribosomal DNA (rDNA) as a target and real-time PCR assays targeting the gene for P1 adhesion protein.
    D. No diagnostic test is needed; treat the patient empirically.

72. A male dental student presents to student health with a painful urethral discharge for the past two weeks. He took a 5-day course of Augmentin that his roommate had left over from a recent illness. At this time he should be treated with:
    A. Ceftriaxone (Rocephin®); 125mg IM injection administered immediately.
    B. Clarithromycin (Biaxin®); 500 mg po q12h x 7 days.
    C. Doxycycline (Monodox®, Periostat®, Vibramycin®, Vibra-Tabs®); 400 mg po qday x 7 days.
    D. Amoxicillin/clavulanic acid (Augmentin®); 875mg/125mg po q12H x 10 days.

73. 78 yo female patient is admitted to the MICU with low blood pressure, fevers, and multiple joint pain and swelling. Her family gives a history of a diagnosis of leukemia, which has been treated over the past two weeks with chemotherapy and prednisone. An arthrocentesis is performed and the synovial fluid culture grows *Mycoplasma hominis*. The immune mechanism that most likely predisposed her to this infections is:
    A. A genetic polymorphism in toll-like receptor 9, the innate immune receptor that binds *Mycoplasma*.
    B. Nosocomial infection with the bacteria during her most recent hospitalization for chemotherapy.
    C. Defective adaptive immune response against *Mycoplasma*, due to global immune suppression with prednisone and chemotherapy.
    D. Spread of this intracellular bacteria to the synovial fluid via translocation of hyperactivated polymorphonuclear cells.

81. Penicillin resistance is NOT due to
    A. efflux pumps
    B. modifying enzymes
    C. altered transpeptidase and carboxypeptidase cell wall synthesizing enzymes
    D. modification of the 23S ribosome
    E. loss of porin channels

82. One of the following statements is false. Aminoglycosides
    A. are effective against most gram negative bacteria
    B. are bacteriocidal even though they act on the ribosome
    C. interfere with protein synthesis
    D. interfere with cell wall synthesis
    E. can be used in combination with an extended spectrum cephalosporin to treat Pseudomonas aeruginosa infection