Integrated Final Exam 2003

BioMed 282 Infectious Disease Pathophysiology
BioMed 274 Infectious Disease Pharmacology

(Blank) ID Pathophysiology 53 ques.  Pharmacology 32 ques.

Total 85 Questions

1. Vaccines can induce protective antibody responses in young infants despite the presence of maternal transplacentally acquired antibody. An exception is which one of the following vaccines:
   A. Tetanus toxoid
   B. Hepatitis B vaccine
   C. *Hemophilus influenzae* type b protein conjugate vaccine
   D. Live virus measles vaccine

Case 1 Questions 2-4

An 87 year old woman is brought to the Emergency Room at 9 pm because of lethargy. Her daughter with whom she lives recalls that one day earlier the patient had said she did not feel well and had a headache for which she had taken acetaminophen. On the morning of admission she had a fever to 102.5 F and vomited once. Over the course of the day she had continued to be febrile and seemed confused; since 6 pm she had been lethargic and poorly arousable.

On physical exam, the patient was febrile to 103 F and tachycardic. She was arousable with noxious stimuli and was confused and incoherent responding to questions. She had a stiff neck and a non-focal neurological exam. The remainder of the physical exam was unremarkable except for a harsh systolic murmur consistent with aortic stenosis.

A lumbar puncture was performed yielding cloudy fluid. The CSF contained 450 WBC, 88% of which were neutrophils; the protein was 150 mg/dl (normal up to 45) and the ratio of CSF:serum glucose was .21 (normal >.5). A gram stain and culture have been sent.

2. Which of the following statements describes the epidemiology and pathogenesis of bacterial meningitis:
   A. The bacteria which are the most common causes are not normal inhabitants of the upper respiratory tract.
   B. The route of meningeal invasion is most commonly hematogenous...
C. The age-specific incidence of this infection is highest in the elderly.
D. Household contact is not a risk factor for the major causes of bacterial meningitis.

3. The potential benefit of steroid administration for bacterial meningitis is explained primarily by
   A. Decreased permeability of the blood-brain barrier
   B. Enhanced antimicrobial killing from antibiotic therapy
   C. Inhibition of cytokine production and/or release by microglial cells
   D. Decreased leukocyte response to infection
   E. Decreased fever.

4. Antibacterial agents utilized to combat bacterial meningitis may include the beta-lactam antibiotics. Indicate which of the antibacterial agents below are examples of β-lactam antibiotics.
   A. Erythromycin
   B. Ampicillin
   C. Cefotaxime
   D. A and B
   E. B and C

5. The β-lactam antibiotics owe their antibacterial action to their ability to inhibit:
   A. Bacterial DNA gyrase (topoisomerase) activity
   B. Bacterial transpeptidase activity
   C. Bacterial dihydrofolate reductase activity
   D. Bacterial RNA polymerase activity
   E. Binding of t-RNA to the bacterial ribosome

Case 2 Questions 6-7

You receive a call from a mother concerning her 18 month old child who has had a runny nose for the past 3 days. The toddler has gradually developed a barking cough, hoarseness and difficulty breathing. When the mother holds him next to the phone he has obvious inspiratory stridor. His temperature is 101 F rectally. You see the child in your office. He is alert, able to drink, is not drooling and has good air entry on chest auscultation.

6. This child most likely has which one of the following:
   A. Pharyngitis
   B. Croup
   C. Epiglottitis
   D. Bronchiolitis
7. The most common etiology of this illness is:
   A. Parainfluenza virus
   B. Hemophilus influenzae type b
   C. Respiratory syncytial virus
   D. Influenza A
   E. Influenza B

Case 3 Question 8

A 17 yr old high school athlete is seen at the pediatrician’s office because of difficulty keeping up with school work and cross country track. For 2 wks he has felt extremely tired. He has had a sore throat and intermittent fevers between 100 – 101 F. On physical exam he has moderate tonsillar enlargement with injection (redness) but without exudate. A spleen tip is palpable. You believe the patient has infectious mononucleosis. A monospot test is negative. You try to recall from your medical school lecture some of the causes of infectious mononucleosis other than Ebstein-Barr virus.

8. You recall that cytomegalovirus is a cause of infectious mononucleosis. All of the following statements about CMV are true except:
   A. CMV can be spread by sexual contact.
   B. CMV infections are usually asymptomatic.
   C. CMV is distinct among the herpesviruses in that it does not establish latency.
   D. CMV is the most common herpes group virus to be transmitted in utero.
   E. CMV can cause severe pneumonia in both solid organ as well as bone marrow transplant recipients.

9. Indicate which of the following statements concerning anti-viral therapy are CORRECT:
   - A. Acyclovir is a pro-drug since it needs to be converted into a triphosphate nucleotide in order to achieve anti-viral action
   - B. Foscarnet is a protease inhibitor used in the treatment of cytomegalovirus
   - C. Acyclovir is preferred over ganciclovir for the treatment of cytomegalovirus (CMV)
   D. A and B
   E. B and C

Case 4 Questions 10-11

A 28 yr old man from New York had diarrhea consisting of 4-5 stools per day, abdominal cramps, bloating and nausea while on a business trip to Central America. The symptoms began on the fifth day of the trip, lasted for three days, and were partially relieved by an antimitility agent.
10. The most likely cause of this illness is:
   A. Enteroinvasive E. coli
   B. Enterotoxigenic E. coli
   C. Salmonella enteriditis
   D. Campylobacter jejuni
   E. Shigella sonnei

11. "Traveler's diarrhea" can be treated with ciprofloxacin. The mechanism of the antibacterial action of this drug involves:
   A. Inhibition of bacterial cell wall synthesis
   B. Blockade of mitochondrial electron transport
   C. Inhibition of translocation on the bacterial ribosome
   D. Interference with bacterial topoisomerase (gyrase) enzyme activity
   E. Inhibition of bacterial dihydropteroate synthetase activity

Case 5 Questions 12-13
A 33 year old man comes to your office because of persistent urethral discharge of 10 days duration. He has been heterosexually active and has had several sex partners within the past yr. He denies homosexual activity, needle sharing or any illicit drug use. He had one episode of herpes genitalis 12 yrs ago, but has not ever had any recurrences. On physical examination he has a normal male genital exam without external lesions; there is a thin urethral discharge which tests positive for Chlamydia trachomatis.

12. Which of the following is a correct statement about HIV testing in this patient?
   A. If he refuses HIV testing, a CD4 count should be done to assess HIV status.
   B. An HIV Ab by EIA (enzyme immunoassay) should be done if consent is obtained.
   C. An HIV western blot should be obtained first because it is the definitive test to prove infection.
   D. An HIV p24 Ag (antigen) is the most reliable test to order in this clinical circumstance.
   E. An HIV viral load by PCR is the most definitive test under these circumstances because it will reliably detect HIV before antibody based tests become positive.

You schedule the patient for a follow-up visit in 2 wks. During that visit you have the difficult task of informing him of the positive result of his HIV testing. His CD4 count is subsequently found to be 650.

13. You tell him that the interpretation of his tests is that he has
   A. HIV infection
   B. AIDS
   C. Both
Questions 14-19
Match the lesion or condition with the sexually transmitted pathogen. Each choice may be used once, more than once, or not at all.

A. Chlamydia trachomatis
B. Herpes simplex virus
C. Treponema pallidum
D. Hemophilus ducreyi
E. Human papilloma virus

14. Condyloma acuminate (genital warts) □
15. Recurrent genital blisters □
16. Diffuse maculopapular rash □
17. Chancroid □
18. Mucopurulent cervicitis □
19. Lymphogranuloma venerum □

Case 6 Questions 20-22
A healthy 17 yr old high school athlete developed abrupt onset of shaking chills and fever to 104 F, and was admitted to the hospital. He gave a history of excellent health and the only recent problem had been a paronychial infection a week previously which had not interfered with his basketball practicing. Examination revealed an acutely ill young man who was flushed and breathing at a rate of 30 per minute. A few hemorrhagic lesions on his palms were noted. Except for mental dullness and mild confusion no neurological abnormalities were noted. Heart, lungs and abdomen were normal. On the third hospital day the blood cultures taken on admission were all positive, fever was subsiding on appropriate antibiotic treatment but now an aortic diastolic murmur was clearly heard, a worrisome new finding.

20. The abrupt onset of high fever and chills is most consistent with endocarditis due to which one of the following organisms:
   A. Strep viridans
   B. Staphlococcus epidermidis
   C. Staphylococcus aureus
   D. Haemophilus parainfluenzae

21. Subsequent complications in this case that could have occurred include:
   A. Valve ring abscess
   B. Congestive heart failure
   C. Splenic abscess
   D. All of the above
22. Gentamicin can be one of the drugs used to treat endocarditis. Indicate which of the following statements concerning gentamicin are CORRECT:

A. Ototoxicity potentiated by the diuretic furosemide can be a side effect of treatment
B. It belongs to the general category of antibiotics known as macrolides
C. It inhibits bacterial ATP formation
D. A and B
E. A, B and C

Case 7 Questions 23-27
A 28 year old graduate student one morning coughs up blood in the shower. She is alarmed and goes to the Student Health Services Clinic on campus. She has felt poorly for about 4 mos, with a persistent cough, poor appetite and weight loss of 10 lbs. She has coughed up small amounts of purulent sputum which she attributed to her cigarette smoking. She does not know if she has been febrile. She never had a PPD done at matriculation into graduate school because she assumed her childhood BCG vaccination growing up in India would make her PPD positive. Her physical examination is unremarkable except for an oral temperature of 100 F. A chest film shows a streaky right upper lobe infiltrate.

23. Which of the following will best predict her infectiousness if she has tuberculosis?
   A. Sputum AFB culture
   B. Sputum AFB smear
   C. PPD > 15 mm induration
   D. PPD < 15 mm induration
   E. HIV serology

24. Which of these will have the greatest impact on determining the length of anti-tuberculous therapy?
   A. High-resolution chest CT
   B. HIV serology
   C. Decrease in size of the PPD during the first month of treatment
   D. HLA haplotype

The patient has 8 housemates, 2 of whom are found to have positive PPDs with skin testing. These 2 persons have normal chest X-rays.

25. Which of the following statements about latent tuberculosis is correct?
   A. Within 2 years of exposure, 50% of those latently infected will develop active tuberculosis.
   B. As long as the CXR is negative and the person is less than age 35 yrs, there is virtually no chance of developing active disease.
   C. Overall only 1% of persons with latent infection develop active disease.
   D. Overall only 10% of persons with latent infection will develop active disease.
26. For which anti-tubercular drug treatment is there a risk of vitamin B₆ deficiency, a situation often remedied by concurrent treatment with vitamin B₆?

A. Ethambutol
B.isoniazid
C. Streptomycin
D. Rifampin
E. Pyrazinamide

27. Indicate which of the following drug:property match-ups are CORRECT:

A. Rifabutin: Substitute for rifampin in treatment of Mycobacterium avium
B. Rifampin: Strong inducer of hepatic microsomal (cytochrome P₄₅₀) enzymes
C. Cycloserine: Inhibitor of mycobacterial cell wall synthesis
D. A and B
E. A, B and C

Case 8 Questions 28-30
A 43-year-old male who smoked 1 pack of cigarettes per day for 25 years had a three day history of an upper respiratory illness. Then, he awoke in the middle of the night with shaking chills, cough productive of rusty colored sputum, and right sided pleuritic chest pain. Upon presentation to the Emergency Room his temperature was 103.6 F, pulse 120 per minute, blood pressure normal. On physical examination he had rales at the base of his right lung. Laboratory studies showed an elevated white blood cell count (15,200/mm³) and a lobar infiltrate of the right lower lobe. Gram stain of sputum showed many polymorphonuclear leukocytes and many gram positive lancet shaped diplococci.

28. The mechanism by which the bacteria entered the lung is
A. Inhalation of aerosolized droplets
B. Aspiration of oropharyngeal secretions
C. Hematogenous spread
D. Direct inoculation

29. Which epidemiological risk factor predisposed this man to developing pneumonia?
A. Occupational exposure
B. Impaired epiglottal reflex
C. Altered T-lymphocyte function
D. Hypoventilation
E. Impaired mucociliary transport

30. Erythromycin is sometimes part of anti-pneumonia therapy. Indicate which of the following statements concerning erythromycin are CORRECT:
A. It inhibits bacterial DNA polymerase activity
B. It increases the activity of the cytochrome P₄₅₀ system, thereby increasing the metabolism of many other drugs
C. It has a spectrum of antibacterial activity similar to that possessed by penicillin
D. A and B
E. B and C

Case 9 Question 31
A 72-year-old female who was in her usual state of good health develops pain in her lower back and fever. She had no injury to explain her back pain. She has no weakness or numbness in her lower extremities, no difficulty voiding or moving her bowels. On examination her temperature is 101.3, there is tenderness over the fourth and fifth lumbar vertebrae, and there are no neurological findings. Her white blood cell count is 15,000 and her sedimentation rate is elevated. An MRI of the lumbar spine shows destruction of L₄ and L₅. No abscess is seen. The lumbar disk space is aspirated. Gram stain shows polymorphonuclear leukocytes and gram positive cocci in clusters.

31. The causative bacteria reached the spine by
A. Direct inoculation
B. Hematogenous spread
C. Contiguous spread
D. Vascular insufficiency

Case 10 Questions 32-34
A 26-year-old man living in Missouri was diagnosed with leukemia. Chemotherapy is started. He develops low grade fevers and a sore in his mouth. The lesion is biopsied and cultured. Culture of the ulcer grows *Histoplasma capsulatum*.

32. Which of the following statements is true
A. *Histoplasma capsulatum* is found throughout the entire United States
B. *Histoplasma capsulatum* causes clinical illness in all those who are exposed
C. Meningitis is the most common clinical presentation of infection with *Histoplasma capsulatum*
D. *Histoplasma capsulatum* causes chronic skin infections that usually starts after a puncture wound with a thorn from a rose bush
E. *Histoplasma capsulatum* is found in the environment in soils that are enriched with bird droppings

33. In large outbreaks this organism is spread
A. Person-to-person though close contact
B. By contaminated food
C. By flies and other insects
D. By the airborne route
E. By contaminated water supplies especially non-chlorinated water
34. Which of the antifungal treatments below will significantly inhibit human androgen and adrenal steroid synthesis?

A. Ketoconazole  
B. Amphotericin B  
C. 5-Fluorocytosine  
D. A and B  
E. A, B and C

Case 11 Questions 35-37

A 28-year-old sexually active female developed pain and burning upon urination 9 days ago. She also had urinary frequency and urgency. Today she developed nausea, vomiting, pain in her back, fever (102.8 F) and chills. On physical examination she has costovertebral angle tenderness. A urinalysis is positive for leukocyte esterase and nitrate. Urine culture grew E. coli.

35. Which statement is true

A. The E. coli entered the urinary tract from the bloodstream  
B. Young and middle aged men develop urinary tract infection with this organism more frequently than women  
C. The E. coli strain most likely has a pilus that allows it to adhere to uroepithelium  
D. The E. coli in the urine represents asymptomatic bacteriuria  
E. The patient has cystitis

36. All of the following are risk factors except:

A. Sexual intercourse  
B. Urine stasis  
C. Short urethras in females  
D. Neutrophil dysfunction

37. Indicate which of the following statements concerning the use of sulfamethoxazole for the treatment of urinary tract infections is CORRECT:

A. Hypersensitivity reactions are fairly common with this drug  
B. This drug would be more likely to be combined with trimethoprim compared to being used as a sole treatment  
C. This drug will displace bilirubin from plasma protein binding sites  
D. A and B  
E. A, B and C
Case 12 Questions 38-39
A 25-year-old female with refractory leukemia undergoes bone marrow transplantation. The patient and the donor were CMV positive. 100 days after transplantation she develops fevers and painful swallowing. Endoscopy of the upper gastrointestinal tract shows ulcers involving the esophagus. Biopsies are positive for CMV. Ganciclovir is started. The fevers and pain on swallowing improve. She develops neutropenia. The ganciclovir is continued. She develops a cough. No sputum is produced. The fevers occur more frequently and the height of the fevers increase. A CXR shows bilateral infiltrates. Bronchoscopy is performed. Fungal staining of the bronchial wash fluid shows a fungus with acute angle branching. Cultures grew Aspergillus fumigatus.

38. All of the following are true EXCEPT

- A. CMV reactivation is common during the middle period (early postengraftment phase) of bone marrow transplantation
- B. The ganciclovir induced neutropenia is a risk for the development of aspergillus infection
- C. Prophylactic ganciclovir is routinely given prophylactically and should have been given to this patient
- D. Aspergillus is normal flora in the respiratory track
- E. CMV is a latent virus that persists in lymphocytes

39. All of the following statements concerning amphotericin B anti-fungal treatment are correct EXCEPT:

- A. It can be combined with flucytosine to lower the required dosage of amphotericin B
- B. It shows preferential binding to cell membrane cholesterol compared to cell membrane ergosterol
- C. It can be either fungicidal or fungistatic, depending on the organism and the concentration of the drug
- D. It has a relatively low therapeutic index
- E. It can produce fever and chills

Case 13 Questions 40-42
A 67-year-old male presents with a history of fever, weakness and general malaise seven days after cleaning up some brush in the back of his cottage on Martha's Vineyard. Physical exam reveals a mildly ill appearing man with an oral temperature of 38°C and a single large bulls-eye-like macular skin eruption in his groin area that is approximately 10 cm in diameter. He denies any known tick or mosquito bites. He takes no medications and otherwise has an unremarkable past medical history. A complete blood count reveals a white blood cell count of 12,000 cells/mm³, hemoglobin of 12 gram/dl and a platelet count of 300,000/mm³.
40. The most appropriate management strategy at this point would be:
   A. Lyme disease serology
   B. PCR for *B. burgdorferi* in the blood
   C. Skin biopsy with direct fluorescent antibody testing for *Rickettsia rickettsii*
   D. Begin empiric therapy with doxycycline for a presumptive diagnosis of Lyme Disease
   E. PCR of the blood for human granulocytic erlichiosis.

41. Tetracyclines can be used in the treatment of Lyme disease. Indicate which of the following statements concerning tetracyclines is CORRECT:
   - The absorption of tetracycline from the gastrointestinal tract is significantly increased in the presence of aluminum containing antacids
   - Tetracyclines are often the drug of choice to use in pregnancy (Correct)
   - Tetracyclines compete with binding of t-RNA to the bacterial ribosome
   D. A and B
   E. None of the above

The patient returns for follow-up in two weeks complaining of increasing weakness and shortness of breath on mild exercise. He has a normal body temperature but appears pale. His circular skin lesion in his groin has almost completely cleared. He has no lymphadenitis or additional skin lesions. The only new physical finding is mild splenomegaly. A Lyme serology by ELISA is now positive. His CBC now reveals a white count of 10,000/mm³, a hemoglobin of 7 grams/dl, and a platelet count of 550,000/mm³. His reticulocyte count is 8%; his hematocrit is 25% with an increased RDW. The bilirubin is 2.5 mg/dl, indirect bilirubin is 2.3 mg/dl.

42. The most useful diagnostic test to order at this time would be:
   A. Blood cultures to rule out the possibility of endocarditis
   B. Coombs test for possible tetracycline-induced hemolytic anemia
   C. An examination of the peripheral blood smear for Babesiosis
   D. Susceptibility testing of his blood isolate of *Borrelia burgdorferi* for possible tetracycline resistance
   E. IgM antibody test for parvovirus B19.

Case 14 Questions 43-44
A 22-year-old college student presents with sudden onset fever, chills, marked general malaise. He begins to feel lightheaded at which time he presents to the Emergency Room for further evaluation. He has no significant past medical history and takes no medications. In the emergency room he is found to be acutely ill and obtunded. His blood pressure is 86/50, his pulse is 120, his temperature is 39°C and his respiratory rate is 24. Physical findings include bounding pulses, a soft systolic ejection murmur and scattered petechial lesions found in both lower extremities and his left wrist. His neck is
supple. His laboratory evaluation reveals a white blood cell count of 3000/mm³ with 2000 neutrophils – 50% of which are band forms. He has metabolic acidosis with an elevated lactate level. Blood studies reveal evidence of DIC. His chest x-ray is unremarkable. His electrocardiogram shows signs of tachycardia. A pulmonary artery catheter is placed.

43. The most likely hemodynamic findings would be which of the following:

A. Cardiac output is elevated, end diastolic volume - normal; systemic vascular resistance - low
B. Cardiac output is low, end diastolic volume is normal; systemic vascular resistance is low
C. Cardiac output is low, end diastolic volume is high; systemic vascular resistance is high
D. Cardiac output is high, end diastolic volume is normal; systemic vascular resistance is normal
E. Cardiac output is low, end diastolic volume is low; systemic vascular resistance is high.

The patient is treated with fluid resuscitation, vasopressors, high-dose cefotaxime and vancomycin. His coagulopathy and hypotension worsen and his urine output is very low. He now requires ventilatory support. His blood cultures are positive for Gram-negative diplococci. A continuous infusion of recombinant human activated protein C is administered.

44. Which of the following diagnostic and therapeutic maneuvers would be of most value to this patient at this time?

A. A bone marrow biopsy followed by platelet transfusions
B. A glucose tolerance test followed by insulin infusion
C. Pulmonary arteriography followed by heparin therapy
D. Echocardiogram followed by the addition of gentamicin
E. ACTH stimulation test followed by stress dose corticosteroid therapy.

45. Indicate which of the following statements concerning the use of gentamicin is CORRECT:

A. It inhibits bacterial protein synthesis via binding to the 30S ribosomal subunit
B. It can produce inhibition of cholinergic neuromuscular transmission at skeletal muscle
C. Its antibacterial actions are usually decreased by concurrent administration of antibiotics that inhibit bacterial cell wall synthesis
D. A and B
E. B and C
Case 15 Questions 46-47

One morning, a 65-year-old female scraped her fingers on the driveway while she was picking up a garden hose. That night she noted pain and redness involving two of her fingers. She had chills and felt feverish.

46. All of the following are true EXCEPT
A. Beta-hemolytic streptococci and staphylococci are the most common cause of this infection
B. She has cellulitis
C. *Streptococcus pyogenes* virulence factors include a capsule, cell wall M and T proteins and extracellular enzymes (streptolysins, streptokinase, pyogenic exotoxin, DNAase B)
D. *Staphylococcus aureus* produces catalase, a virulence factor that correlates with pathogenicity
E. Scraping her fingers on the driveway is not significant because she could not see an abrasion on her hand

She decides to take an analgesic for the pain and goes to sleep. The next morning she awakes with severe pain in all her fingers and her hand. She goes to the hospital. Her temperature is 102 F. The skin of her fingers, hand and forearm are dark purple. Her fingertips are black (necrotic). There are hemorrhagic bullae. There is crepitance on palpation. It is painful for her to move her fingers and wrist. An x-ray of the hand and forearm shows air in the soft tissue.

47. Treatment of her necrotizing fasciitis includes
A. Antibiotics
B. Surgical debridement
C. Both
D. Neither

Case 16 Question 48

In August, an 18 year old student attending summer school in Rhode Island develops fever and headache. He has *photophobia* and mild *meningismus*. CSF exam revealed 66 WBC, 78% of which were lymphocytes; glucose and protein were normal. Illness resolves within 3 days. The Health Department Advisory on their web site describes a statewide outbreak of aseptic meningitis due to ECHO virus type 30.

48 If this patient is part of the outbreak, he would have acquired this infection by:
A. Mosquito bite
B. Handling of a dead crow
C. Animal bite
D. Human to human spread
E. Spread to the CNS via the peripheral nerves
Case 17 Question 49
During the current winter, your community hospital is besieged with admissions for influenza and bronchiolitis. There are high rates of absenteeism among the health care workers at your hospital, and among the workers who continue to work, many have colds. As the hospital infection control officer, you are concerned with interrupting transmission and seek to convey a consistent message of prevention while emphasizing a variety of interventions.

49. The single best method for prevention of hospital spread of respiratory viral infection is:
   A. Isolation in a single room
   B. Wearing a mask while caring for a patient
   C. Immunization
   D. Good handwashing
   E. Prophylactic anti-viral medications

Case 18 Question 50
A 2 yr old toddler develops fever, irritability, and a vesicular rash scattered over the trunk with a few lesions on the face. Two weeks later the child's older brother and older sister both develop a similar illness.

50. Which of the following statements is true?
   A. This epidemiologic pattern is consistent with smallpox.
   B. This agent was probably acquired by the toddler kissing an adult with a fever blister.
   C. Reactivation of this virus will have almost the same clinical picture.
   D. Vaccination of the toddler could have prevented this situation.
   E. Asymptomatic transmission with this agent is common.

Case 19 Question 51-52
On the morning of an important medical school exam, several classmates develop vomiting and diarrhea which they ascribe to "nerves". These symptoms continue for 2 more days and one of them feels sick enough to seek medical attention. She has a fever of 101 F and moderate abdominal cramps; fecal gram stain shows many leukocytes. A stool culture yields *Salmonella enteriditis*. The students live in the same house and had eaten a common meal together the night before the exam.

51. Which of the following statements about salmonella infections is true:
   A. They are the most common foodborne illness in the United States.
   B. They are commonly transmitted by shellfish.
   C. Treatment with antibiotics will prolong convalescent fecal excretion.
   D. Their highest incidence is in young adults age 20-30 yrs.
   E. They are frequently transmitted person-to-person as illustrated here.
52. Suppose you start treating one of these patients with amoxicillin, but culture analysis using a disk diffusion method shows amoxicillin resistance. Further analysis reveals the presence of penicillinase enzyme activity associated with the bacteria. Switching your treatment to which of the following drugs would be LEAST likely to produce effective antibiotic action?

A. Oxacillin  
B. Amoxicillin plus clavulanic acid  
C. Vancomycin  
D. Dicloxacillin  
E. Ampicillin

53. Which of the following is a postulated mechanism by which HIV causes CD4 cell death and immune dysfunction:

A. Toxic effects of viral proteins  
B. Intracellular accumulation of nonintegrated viral DNA  
C. Alterations in cell activation  
D. Triggering of programmed cell death  
E. All of the above

54. An anti-HIV (human immunodeficiency) drug that interferes with the functioning of reverse transcriptase activity:

A. Indinavir  
B. Zidovudine  
C. Nelfinavir  
D. A and B  
E. B and C

55. Indicate which of the following statements concerning drug therapy for HIV is CORRECT:

A. Use at least 3 drugs active against the patient's virus  
B. Start and stop the drug treatments all at once  
C. Stavudine is the only reverse transcriptase inhibitor that can be used in combination with protease inhibitors  
D. A and B  
E. B and C
A 43 yr old female with a history of mitral valve prolapse is seen because she had had intermittent fevers for 1 month and headaches for 3 wks. She works as a nurse and had become worried that she might have Hodgkin's disease as her father had died from this 3 years earlier. Two weeks prior to developing symptoms she had undergone a dental cleaning and root canal. Her physical examination is entirely normal except for an oral temperature of 100 F and a soft murmur of mitral regurgitation.

You are called the next day by the Microbiology Lab with the news that 3 of the 4 bottles from her 2 sets of blood cultures are positive for a gram positive coccus in chains.

56. Which of the following organisms is the most likely cause of her infection?
   A. Streptococcus pneumoniae
   B. Staphylococcus aureus
   C. Strep viridans
   D. Enterococcus faecalis
   E. Candida albicans

57. A patient being treated with penicillin G develops an allergic reaction to the penicillin, and is switched to drug X. She also develops an allergic reaction to drug X. The MOST likely identity of drug X:
   A. Erythromycin
   B. Rifampin
   C. Doxycycline
   D. Ciprofloxacin
   E. Cefazolin

58. Indications for pneumococcal vaccination include the following except:
   A. Elderly (greater than 65 years old) ✓
   B. Emphysema and other chronic pulmonary disease ✓
   C. Asplenia (e.g. surgical removal following trauma or rupture) ✓
   D. Household contact with a confirmed case of pneumococcal pneumonia.
   E. Dialysis-dependent chronic renal failure.

Case 21 Questions 59-60
A 67-year-old woman develops the sudden onset of fevers, chills, myalgias, and cough that is not productive of sputum. Her temperature is 103.4 and the rest of her examination is normal. A rapid influenza test is positive. She was told she had the flu. Her condition improved. Then, several days later, she had recurrence of the fever with cough productive of thick sputum. On examination she was febrile (103.2 F), tachycardic
(pulse 120), and her respiratory rate was increased (32 per minute). Pulse oximetry showed decreased saturation (85% saturation). She had bilateral rales. A CXR showed several areas of dense infiltrate with areas of cavitation and a right pleural effusion. Sputum gram stain showed numerous WBC and gram positive cocci in clusters; culture grew *Staphylococcus aureus*. The pleural fluid was aspirated. Purulent fluid was obtained and culture grew *Staphylococcus aureus*.

59. All of the following are true EXCEPT
   A. *Staphylococcus aureus* pneumonia can be a complication of influenza
   B. *Staphylococcus aureus* can cause cavitation of the lung because it causes necrosis of lung tissue
   C. Empyema (infected pleural space) is a complication of influenza
   D. Influenza vaccination may have prevented the influenza infection
   E. *Staphylococcus aureus* can cause nosocomial (hospital acquired) pneumonia

60. For methicillin-resistant *Staphylococcus aureus* the combination of sulfamethoxazole and trimethoprim is sometimes used. Indicate which of the following drug-property match-ups is CORRECT:
   A. Sulfamethoxazole: Shouldn't be given to newborns or pregnant women during the last 2 months of pregnancy
   B. Sulfamethoxazole: Resistance can occur because of increased bacterial production of PABA (p-aminobenzoic acid)
   C. Trimethoprim: The IC$_{50}$ for inhibition of bacterial dihydrofolate reductase (DHFR) is much higher than the IC$_{50}$ for inhibition of the human DHFR
   D. A and B
   E. A, B and C

Case 22 Question 61
A 28-year-old female presents with a painful, swollen, red knee that started several hours ago. She felt warm but did not check her temperature. There is no history of a knee injury. On examination the knee is red, warm, swollen, and painful. Purulent synovial fluid is obtained when the fluid is aspirated.

61. The most likely organism to cause this infection is
   A. *Staphylococcus aureus*
   B. *Streptococcus pyogenes*
   C. *Escherichia coli*
   D. *Salmonella* species
   E. *Neisseria gonorrhoeae*
Case 23 Questions 62-63
A 38-year-old male was recently diagnosed with HIV. His CD4 count is 50. For the past two weeks he has had headaches and felt feverish. On a few occasions he had a fever of 102.2 F. On exam his is alert and oriented, his neck is supple and his neurological exam is normal. A lumbar puncture was performed. The CSF has 46 WBC/mm³, protein 120 mg/dL and glucose 82 mg/dL. An India Ink preparation of the CSF showed the causative organism.

62. The most likely cause of this man’s infection is
   A. Streptococcus pneumoniae 
   B. Neisseria meningitidis 
   C. Histoplasma capsulatum 
   D. Coccedioides immitis 
   E. Cryptococcus neoformans 

63. Which statement is true
   A. The patient developed meningitis with this organism because he is immunocompromised 
   B. The causative organism is found only in desert soil from the Southwestern part of the United States 
   C. The causative organism produces an allergic hypersensitivity pneumonitis when it is in the lungs 
   D. The causative organism is a colonizer of the nasopharynx in healthy persons 
   E. The causative organism causes necrosis by invading blood vessels 

Case 24 Questions 64-65
A 56-year-old male develops urinary urgency and frequency, dysuria and pain at the tip of his penis. He presents to a local walk-in urgent care center. His temperature is 102 F. There is no CVA tenderness. A urinalysis has >100 WBC per high-powered field.

64. All of the following are true EXCEPT
   A. A rectal examination is needed to determine if he has prostatitis 
   B. Obstruction due to prostate enlargement is likely 
   C. The patient has a urinary tract infection (UTI) and no further history, physical exam or work-up is needed 
   D. The urinary tract infection is most likely due to a gram negative rod 
   E. The bacteria causing the urinary tract infection (UTI) most likely originated from the GI tract 

65. Indicate which of the following drug-property match-ups concerning drugs used for urinary tract infections are CORRECT:
   A. Ciprofloxacin: Should be avoided in pregnancy 
   B. Norfloxacin: Can produce photosensitivity requiring the use of sunscreen
C. Methenamine: An inhibitor of bacterial DNA gyrase (topoisomerase)
D. A and B
E. B and C

Case 25 Question 66
66. In clinic you see a healthy 12-month-old child whose mother had become HIV-infected after this child's birth. Which of the following vaccines is contraindicated for the healthy HIV-negative child?

A. Measles/mumps/rubella (MMR)
B. Oral polio vaccine (OPV)
C. Varicella
D. Influenza
E. Hepatitis B

Questions 67-68
Match the pathogen with the immunocompromising condition. The pathogen may be used once, more than once or not at all.

A. Encapsulated organisms such as Streptococcus pneumoniae
B. Staphylococcus aureus
C. Yersinia
D. Zygomycosis (mucor)
E. Pseudomonas aeruginosa and other gram negative organisms

67. Asplenia
68. Neutrophil deficiency

Case 26 Question 69
A 20-year-old college student is bitten on the finger by his cat at 10 P.M. He cleans the bite wound with soap and water. He awakes at 5 A.M. with pain in his hand. There is some redness around the puncture sites where the cat's teeth entered the skin. At 7 A.M. he notes a red line extending from the bite site up to the mid-forearm. Because of the increased pain and red streaking up his arm he seeks medical care. On exam there is diffuse erythema of the finger that was bitten with a red streak extending up his forearm.

69. All of the following are true EXCEPT
A. The bacteria causing this infection originated from the mouth flora of the cat
B. Development of infection less than 24 hours after a cat bite is characteristic of Pasteurella multocida
C. Osteomyelitis can be a complication of a cat bite
D. Septic arthritis can be a complication of a cat bite
E. Human bites compared to cat bites are less likely to become infected
Case 27 Question 70
A 45 yr old bond trader comes to see you for recurrent cold sores. They occur 6-8 times per year and last about 8 days. He uses a variety of over the counter medications to speed healing.

70. Factors known to trigger reactivation of herpetic cold sores include all but which one of the following:
   A. Ultraviolet light
   B. Treatment with antibiotics
   C. Fatigue and stress
   D. Unrelated infection
   E. Pregnancy

71. All of the following anti-viral drugs are analogs of naturally occurring purines or pyrimidines EXCEPT:
   A. Didanosine
   B. Penciclovir
   C. Ritonavir
   D. Ganciclovir
   E. Zidovudine

Case 28 Question 72-73
A 56 year old woman alcoholic develops pneumococcal pneumonia for which she is hospitalized and treated with ceftriaxone. On the sixth hospital day she develops abdominal cramps and diarrhea followed by fever and abdominal tenderness. A test for stool Clostridium difficile toxin is positive.

72. Which one of the following statements about this infection is true:
   A. Alcoholism is a risk factor for Clostridium difficile colitis.
   B. In hospitalized patients, asymptomatic colonization is much less common than symptomatic infection.
   C. This patient could have been prevented from developing this infection by prophylaxis with metronidazole.
   D. Clostridium difficile produces both an enterotoxin and a cytotoxin.
   E. Clostridium difficile is a common cause of diarrhea in outpatients.

73. Vancomycin has been used in the treatment of infection by Clostridium difficile.
   All of the following statements concerning vancomycin are correct EXCEPT:
   A. Oral administration is only used for gastrointestinal antibacterial targeting
   B. A prominent side effect is excessive flushing ("red man syndrome")
Case 29 Question 74
An optional noon lecture with lunch provided is attended by all the second year medical school students. Within three days, the chef at the restaurant which had provided the food is diagnosed with acute hepatitis A.

74. Which of the following statements most correctly assesses the administration of immune serum globulin (ISG) to the med students?

A. Each student’s dose of ISG will protect them through the end of the third year clerkship.
B. Since each student will receive ISG so soon after exposure, protection is expected to be 100%.
C. Sensitization to human proteins is expected to be a significant problem later in life for ISG recipients.
D. ISG administration will produce protective antibody levels faster than primary immunization.
E. For those students who view an intramuscular injection as too painful, ISG may be given intravenously.

75. Indicate which of the following anti-malarial drugs is the most effective against the parasitic form of Plasmodium falciparum residing in the liver:

A. Mefloquine
B. Quinine
C. Pyrimethamine
D. Chloroquine
E. Primaquine

76. An anti-malarial drug that is therapeutic because of its inhibition of the malarial dihydrofolate reductase enzyme:

A. Pyrimethamine
B. Chloroquine
C. Quinine
D. Primaquine
E. Mefloquine
77. In patients deficient in the activity of enzyme X, primaquine can cause significant hemolytic anemia. Enzyme X is:

A. Monoamine oxidase (MAO)
B. Hypoxanthine-guanine phosphoribosyltransferase (HGPRT)
C. Glucose 6-phosphate dehydrogenase (glucose 6-P dehydrogenase)
D. Dihydropteroate synthetase
E. DNA gyrase (topoisomerase)

78. Resistance to the anti-malarial action of chloroquine can occur because of the presence of a membrane protein called P-glycoprotein. The drug resistance conferred by this protein is due to:

A. An increase in parasitic heme polymerase activity
B. An increase in parasitic Phase I metabolism of chloroquine
C. An increase in parasitic Phase II metabolism of chloroquine
D. An increase in efflux of chloroquine from the parasite
E. An alteration in the chloroquine-binding properties of the parasitic heme polymerase

Questions 79-81. Match the following antihelminthic drugs with the most appropriate lettered description:

A. Used for treating hookworm; interferes with worm microtubule synthesis
B. Used for treating river blindness (onchocerciasis); activates worm GABA receptors
C. Used for treating schistosomiasis; increases worm calcium permeability

79. Ivermectin - B
80. Praziquantel - C
81. Mebendazole - A

82. Indicate which of the following antifungal drug:property match-ups are CORRECT:

A. Fluconazole: Inhibition of fungal cytochrome P450 system
B. Caspofungin: Inhibition of fungal glucan synthesis
C. 5-Fluorocytosine (5-FC): Inhibition of fungal dihydrofolate reductase activity
D. A and B
E. B and C
83. Indicate which of the following statements concerning the anti-viral drug interferon-α are CORRECT:

A. It is a nucleoside analog
B. It is used in the treatment of chronic hepatitis B and C
C. Side effects include flu-like symptoms (fever, chills)
D. A and B
E. B and C

84. The term "gray baby" refers to the depressed breathing, cardiovascular collapse and cyanosis produced by antibiotic X treatment of neonates. Antibiotic X is:

A. Clindamycin
B. Vancomycin
C. Chloramphenicol
D. Doxycycline
E. Ciprofloxacin

85. Indicate which of the following statements concerning antibiotics are CORRECT:

A. Penicillin G treatment is appropriate for a patient with an upper respiratory influenza A infection
B. When treating a patient with an antibiotic the peak plasma level of antibiotic should always be above the MIC (minimal inhibitory concentration)
C. Historically, penicillin was the first antibiotic shown to have antibacterial action in animal studies
D. A and B
E. B and C