Integrated Final Exam 2004
BioMed 282 Infectious Diseases Pathophysiology
BioMed Infectious Diseases Pharmacology
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Pharmacology 31 questions

Total Questions 85

Case for question 1
A 9-month-old infant has been ill with upper respiratory symptoms for the past 48 hours. Tonight the baby seems to have difficulty breathing with noticeable inspiratory stridor and a harsh brassy sounding cough.

1. Which respiratory syndrome does this child have?
   Bronchiolitis
   Bronchitis
   Croup
   Epiglottitis
   Pneumonia

2. A 40-year-old male who is HIV-positive is started on antiretroviral therapy. After two months of treatment his hemoglobin level drops by 45% and his white blood cell count drops by a similar degree. Of the drugs below, which one is most likely to produce this change in blood values?
   Didanosine (ddl)
   Acyclovir
   Zalcitabine (dideoxycytidine, ddC)
   Zidovudine (AZT)
   Stavudine (d4T)

Case for question 3-4
A 24-year-old college student presents to the Student Health Services on campus due to two months of cough, occasional feverishness, (never took his temperature), and a 5 pound weight loss. He had ascribed his symptoms to bronchitis and stress due to upcoming examinations. His roommate encouraged him to seek attention when he mentioned that his sputum was now streaked with blood. A PPD on matriculation to college had been positive at 18 mm. A chest radiograph by his local physician had been normal; he had been told “nothing is wrong” and had not been offered any treatment at that time. He lived in Southeast Asia during his
adolescent years when his parents were stationed there with the US diplomatic corp. His physical examination was normal, except for a temperature of 100°F. A chest radiograph revealed a cavitary infiltrate in the right upper lobe.

3. Which of the following tests will best predict his infectiousness if he has tuberculosis?
   A. PPD > 15 mm induration
   B. Cavitation on the chest x-ray
   C. Length of symptoms
   D. AFB smear of sputum
   E. AFB culture of sputum

The patient has one roommate and two housemates. On initial screening, the roommate has a PPD of 18 mm. A housemate has a PPD of 6 mm. The third housemate, who received a lung transplant for CF two years ago, has a 0 mm PPD.

4. Which of the following statements about latent tuberculosis are true?
   A. The PPD converts within 48 hours of the person being infected (breathing in the organism)
   B. A negative PPD (0 mm) rules out infection. A person with this PPD size has no risk of developing active disease.
   C. 10% of individuals with latent tuberculosis will develop active disease.
   D. Once a PPD is positive, it is dangerous to repeat the PPD; the site is more likely to vesiculate and become infected.
   E. The housemates have no signs of TB infection and require no further follow-up.

Case for question 5

5. The most likely diagnosis in the patient would be:
   Actinomyces israelii
   Aspergillus fumigatus
   Candida albicans
   Nocardia asteroides
   Cryptococcus neoformans

6. Purified polysaccharide antigens and protein antigens are immunogenic when given as vaccines to young children less than 12 months of age.
   A. TRUE
   B. FALSE
Case for question 7
A 26-year-old female medical student goes to the college health service in January with complaints of fever, chills, myalgias and cough. Her physical examination is entirely normal except for an oral temperature of 102° F and a reddened pharynx.

7. Which of the following organisms is the most likely cause of her infections?
   A. Epstein Barr Virus
   B. Herpes simplex tycp
   C. Influenza A
   D. Streptococcus pneumoniae
   E. Streptococcus pyogenes (Group A)

Case for question 8-10
A 20-year-old college student had unprotected sexual intercourse while traveling abroad. She developed fevers, sore throat, headache and a faint erythematous rash 5 days after returning to the United States. Because of a concern for some exotic infection she presented to her primary care physician. On examination she had some cervical adenopathy. Her throat was slightly erythematous. Her physician suspected acute HIV infection and after counseling obtained an HIV test. One week later results of the HIV test shows that the EIA is positive and the Western Blot is indeterminant. A repeat Western Blot one month later is positive.

8. Which statement is FALSE?
   The majority of women acquire HIV through heterosexual intercourse
   Concomitant STD such as genital ulcers increase the risk of transmission of HIV
   HIV can be transmitted by unprotected receptive oral sex
   Transmission is more likely to occur if the source patient has advanced HIV

9. Without antiretroviral treatment her life expectancy is measured in
   Hours
   Days
   Weeks
   Months
   Years

10. Patients treated with protease inhibitors such as ritonavir should not be administered antiarrhythmics such as quinidine. This is because:
   Ritonavir blocks quinidine binding to heart tissue
   Ritonavir stimulates cardiac cyclic AMP production
   Ritonavir inhibits cardiac sodium channels
   Ritonavir inhibits quinidine metabolism via the cytochrome P450 system
   Ritonavir inhibits cardiac cyclic AMP metabolism
Case for question 11
A 48-year-old female received a kidney transplant 15 months ago. Her only medication is cyclosporin. She is a lifelong resident of Rhode Island. When she was in her early 20's she backpacked in the San Joaquin Valley in California. During the past 2 weeks she has fevers and a nonproductive cough. A chest X-ray shows a cavitary lung lesion in the upper lobe. Special staining of an expectorated sputum shows large fungal elements. Culture grows Coccidioides immitis.

11. Which statement concerning this patient's infection is TRUE
   A. The Microbiology Lab misidentified the organism; the patient has Aspergillus fumigatus.
   B. The Microbiology Lab misidentified the organism; the patient has Mycobacterium tuberculosis.
   C. Coccidioides immitis usually presents during the first month after transplantation.
   D. She has reactivation of a persistent infection due to Coccidioides immitis.

Questions 12-16. Match the following with the sexually transmitted pathogen (A-E). Each choice may be used once, more than once, or not at all.

12. Flagellate protozan
13. Creamy or curdy white discharge
14. Cancer of the cervix
15. Painful ulcers
16. Gram negative diplococcus
   A. Human papillomavirus
   B. Chancroid
   C. Neisseria gonorrhoeae
   D. Vulvovaginal candidiasis
   E. Trichomoniasis

Case for question 17-19
A 48-year-old male with mitral regurgitation has had several episodes of endocarditis. He presents with a 2 week history of low-grade fever and malaise. On examination he has a murmur consistent with mitral regurgitation. Funduscopic examination shows Roth spots. Laboratory studies show that he is anemic and has microscopic hematuria. Blood cultures grew Cardiobacterium hominis.

17. Embolic complications of endocarditis include
   Roth spots
   Splinter hemorrhages
   Stroke
   Janeway lesions
   All of the above
18. Which statement about endocarditis is TRUE?
   - Polymorphonuclear leukocytes readily phagocytose bacteria that are attached to heart valves.
   - The presence of a vegetation on a heart valve, as detected by echocardiography, means the patient has endocarditis.
   - Transient bacteremia colonizes a thrombus that formed because of turbulent blood flow.
   - Production of antibodies against Strep viridans leads to cure of endocarditis.

19. Some pathogens that cause endocarditis are treated with a combination of a penicillin and an aminoglycoside. Aminoglycosides such as gentamicin inhibit bacterial protein synthesis by binding:
   
   A. 30S ribosomal particles
   B. Messenger RNA (mRNA)
   C. Peptidoglycan units in the cell wall
   D. DNA
   E. RNA polymerase

20. A 21-year-old college student spent a semester in Egypt. As part of his fieldwork he waded in the Nile River. On several occasions he went into the Nile barefooted. Upon return to the United States a stool specimen is sent to the lab to look for ova and parasites. The urine specimen contains the eggs of Schistosoma haematobium. Indicate the drug of choice for treating schistosomiasis (produced by trematodes):
   
   A. Praziquantel
   B. Ivermectin
   C. Niclosamide
   D. Mebendazole
   E. Thiabendazole

Case for question 21-22
A 57-year-old male presents with fever to 103°F, cough, chest pain and purulent sputum for 2 days. His sputum is rust colored. He has smoked one pack of cigarettes per day for the past 42 years. On exam, he has rales at the left lung base. His WBC count is 20,000. A chest x-ray shows a lobar infiltrate in the left lower lobe with air bronchograms.

21. What would be the most likely organism to cause pneumonia in this patient?
   
   A. Streptococcus pneumoniae
   B. Normal oropharyngeal flora
   C. Pneumocystis carinii
   D. Mycobacterium tuberculosis
   E. Mycoplasma pneumoniae
22. Which statement is FALSE?
   A. Organisms that commonly cause bacterial pneumonia reach the lower respiratory tract by aspiration
   B. Smoking is a risk factor for the development of pneumonia
   C. Organisms that commonly cause bacterial pneumonia are colonizers of the oropharynx
   D. *Mycobacterium tuberculosis* reaches the alveoli by inhalation of aerosolized droplets
   E. Smokers are more likely to develop pneumonia due to *Pneumocystis carinii*

   **Case for question 23**
   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.

23. Which of the following statements most correctly assesses the administration of immune serum globulin (ISG) to the 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 concentrations faster than primary immunization.
   E. For those students who view an intramuscular injection as too painful, ISG may be given intravenously.

   **Case for question 24**
   A 21-year-old bisexual male presents to his primary care physician with a painless ulcer on his penis. He is concerned because about 3 weeks ago he was at a party and had unprotected insertive anal and vaginal sex with several others at the party. You consider syphilis in the differential diagnosis and order an RPRCT (Rapid Plasma Reagin Card Test). The RPRCT (Rapid Plasma Reagin Card Test) is positive.

24. Which statement is TRUE?
   A. The RPRCT is a screening test and should be confirmed with a FTA-Abs (Fluorescent Treponemal Antibody-Absorbed)
   B. Genital ulcers such as those caused by syphilis do not facilitate transmission of HIV
   C. Syphilis is never treated with penicillin
   D. Syphilis is caused by *Neisseria gonorrhoeae*
Case for question 25
A 23-year-old female completed a chemotherapy treatment for acute leukemia 12 days ago. She calls you because of a fever to 38.8°C and shaking chills. You instruct her to go to the Emergency Room immediately. She is evaluated by the ER resident and attending physician. Her physical examination is normal except for a temperature of 38.3°C. Her WBC count is 120/mm³, polymorphonuclear cells 73%, bands 15%, lymphocytes 8% and blasts 4%. You calculate her absolute neutrophil count.

25. Which organism is NOT likely to be causing infection in this patient?
   A. Eikenella corrodens
   B. Pseudomonas aeruginosa
   C. Escherichia coli
   D. Enterobacter cloacae
   E. Klebsiella pneumoniae

26. Among organisms isolated from blood culture, Candida is the fourth most commonly isolated and has the highest fatality rate.
   A. True
   B. False

Case for question 27
An 18-year-old college freshman developed fever, headache, and photophobia that became progressively worse over a few hours. He felt weak, stayed in his bed and fell asleep. An hour later his roommate found him and had a hard time waking him. Rescue was called. In the Emergency Department his temperature was 102.8°F and he was lethargic. His neck was stiff. Other than lethargy, his neurological exam was normal. Skin examination showed a few purpura. A lumbar puncture was performed. The CSF had 1,240 WBC/mm³, protein 240 mg/dL and glucose 5 mg/dL. Gram stain showed gram-negative diplococci. Culture of the CSF (cerebrospinal fluid) grew Neisseria meningitidis.

27. Which statement is FALSE?
   A. Neisseria meningitidis is never found in the nasopharynx of healthy people
   B. Neisseria meningitidis was transported to the central nervous system via the bloodstream
   C. In order to cause meningitis, Neisseria meningitidis has to cross the blood brain barrier
   D. Neisseria meningitidis is a common cause of meningitis in young adults
   E. Neisseria meningitidis is spread person-to-person via droplets (close contact)

28. In older adults the most common cause of meningitis is
   A. Neisseria meningitidis
   B. Streptococcus pneumoniae
   C. Haemophilus influenzae type b
   D. E. coli
   E. Listeria
29. A 38-year-old patient with AIDS and disseminated cryptococcosis is treated with standard doses of amphotericin B and 5-fluorocytosine with improvement in his symptoms. He subsequently develops fever, chills and bacteremia with *Pseudomonas aeruginosa*. His serum creatinine is 3.5 mg/dl (about 3.5x normal value), his neutrophil count is 300 cells/mm³ (about 12% of low normal). The most likely explanation for this patient’s neutropenia is:

A. Amphotericin-induced bone marrow toxicity
B. HIV-associated neutropenia
C. Idiopathic aplastic anemia
D. Elevated 5-fluorocytosine levels
E. Cryptococcal involvement of the bone marrow

30. Which of the following factors best predicts adherence with treatment for tuberculosis?
   A. Duration of symptoms
   B. Presence or absence of hemoptysis
   C. Education level (college student – able to read and understand written instructions)
   D. Length of therapy (short course therapy will result in a better adherence rate than a prolonged treatment plan)
   E. None of the above

Case for question 31
A 25-year-old female presents for evaluation of non-bloody diarrhea of three weeks duration. This developed after she returned from a hiking trip in the tropics. She is also a teacher in a day care center.

31. Which of the following is a likely causative agent for her diarrhea
   A. Enterotoxigenic *Escherichia coli* (ETEC)
   B. Rotavirus
   C. *Giardia lamblia*
   D. *Shigella sonnei*
   E. *Yersinia enterocolitica*

Case for question 32-34
A 21-year-old female student was seen for recurrent urinary tract infections. She has had five symptomatic episodes during the past 12 months. Each episode was treated with a three day course of trimethoprim/sulfamethoxazole (TMP/SMX) with prompt resolution of her symptoms. She has no history of diabetes, neurological or urological disorder. Currently she is asymptomatic.

32. What would you recommend?
   A. If she develops another UTI treat with a three-day course of TMP/SMX
B. If she develops another UTI treat with a three-day course of ciprofloxacin
C. If she develops another UTI treat with a two week course of TMP/SMX
D. Start prophylaxis with daily TMP/SMX.
E. If she develops another UTI treat with a three-day course of doxycycline

33. Which statement is TRUE?
A. Recurrent urinary tract infections suggests that she has a congenital immune deficiency
B. The bacteria that caused this infection usually colonize the periurethral mucosa
C. The bacterium that commonly causes this infection is *Staphylococcus aureus*
D. 21-year-old males have urinary tract infections more frequently than 21-year-old females
E. Urination increases the risk of infection by allowing bacteria entry into the urinary tract

34. Sulfamethoxazole has antibiotic activity by virtue of its ability to inhibit bacterial:
A. Dihydrofolate reductase activity
B. RNA polymerase activity
C. Dihydropteroate synthetase activity
D. DNA gyrase (topoisomerase II) activity
E. Cell wall synthesis

Case for question 35
A 16-year-old boy presents to your office with a swollen left knee. He is a soccer player but can't remember any specific trauma recently but did have several injuries to the knee when he was in a summer outdoor soccer camp in Maryland 3 months ago. The knee is swollen and hot to touch but only slightly painful. X-ray of the knee is negative for fractures. You perform an arthrocentesis and find 10,000 WBC/mm³ but the Gram stain is negative for bacteria. The cultures are negative. He is treated with an oral first generation cephalosporin but two months later he comes back with similar condition in the knee.

35. Your next step would be to do which of the following:
A. Apply hot packs and start non-steroidal anti-inflammatory agents
B. Re-aspirate the knee and await cultures
C. Begin nafcillin to cover for *Staphylococci* and streptococci
D. Re-aspirate the knee, begin nafcillin and order a Lyme Disease test on serum and synovial fluid

Case for question 36
An 8-year-old boy developed pain in his right shin. He thinks he might have injured it after falling off his bicycle. His parents noticed that their son's leg is red, warm and tender and bring him to the Emergency Department. His temperature is 102.5°F. Examination of his leg shows an area that is red, warm and tender just inferior to his left knee. X-rays show no
fracture. An orthopedist is consulted and the bone is aspirated. Antibiotics are started and he
is admitted to the hospital. The next day culture of the aspirated fluid is growing
Staphylococcus aureus.

36. Predisposing factors to the development of osteomyelitis in children include
   A. Diabetes mellitus (type II)
   B. Occult bacteremia
   C. Penetrating trauma to the site of infection
   D. Congenital anomalies of the vascular system in bone
   E. Neuropathy

Case for question 37
A 63-year-old woman was brought in by her husband because of fevers and change in mental
status that started the day prior to presentation. The patient had a change in personality. The
patient complained about the odor of fish however there was no fish in the house. That
morning she made hard-boiled eggs, however she did not put any water in the pot. On
examination her temperature was 101.2° F. There were no focal neurological findings. A CT
scan without contrast was normal. A lumbar puncture showed WBC 80/mm³, 88% lymphocytes, 10% monocytes and 2% neutrophils, protein 68 mg/dL and glucose 72 mg/dL
(scum glucose 88 mg/dL). PCR for HSV was positive.

37. Which statement concerning acute encephalitis is TRUE?
   A. Encephalitis is usually caused by bacteria
   B. Symptoms include lethargy, confusion, delirium, change in personality, psychosis
   C. The CSF (cerebrospinal fluid) usually shows a predominance of neutrophils
   D. The pathogen is always cultured from the CSF

Case for question 38
A neonate is admitted to the intensive care unit after delivery at 34 weeks. He is small for
gestational age and is microcephalic. He is lethargic and has poor tone. Over the first day of
life he becomes covered with petechiae and develops jaundice. The liver can be palpated 7 cm
below the costal margin and the spleen is also palpable. Laboratory abnormalities include an
elevated ALT, thrombocytopenia, and hyperbilirubinemia.

38. The most likely pathogen causing this syndrome is:
   A. Streptococcus pneumoniae
   B. Cytomegalovirus
   C. Neisseria meningitidis
   D. Candida albicans

Case for question 39
A 68-year-old female presents with fever and dysuria that started 12 hours ago. On
examination her temperature is 102.6° F. She does not have flank tenderness. A urinalysis
shows 50 WBC/hpf. Urine gram stain shows polymorphonuclear leukocytes and gram-
negative rods. Urine culture grows greater than 100,000 colonies per mL of E. coli.
39. Which statement is TRUE?
A. Gram negative bacteria are an uncommon cause of urinary tract infections
B. The E. coli strain causing this infection probably does not have a “P” pili
C. E. coli with any O (somatic) antigen can cause urinary tract infections
D. Certain K antigens are found more commonly among pyelonephritic strains of E. coli

40. A 64-year-old white male with acute myelogenous leukemia develops an invasive form of pulmonary aspergillosis. He is initially treated with a liposomal form of amphotericin B but does not tolerate the drug as it caused intolerable side effects including nausea and vomiting. He is switched to high dose voriconazole and develops an acute psychotic episode felt to be related to the voriconazole. Indicate the most appropriate treatment strategy for this patient at this time:

A. Fluconazole
B. Saturated solution of potassium iodide
C. Caspofungin
D. 5-Fluorocytosine
E. Alternating doses of voriconazole and liposomal amphotericin B

Case for question 41
A 48-year-old male was first known to be HIV positive 10 years ago. Because of denial he did not seek medical attention. He now presents with headache and fevers that started several weeks ago. A lumbar puncture showed an opening pressure of 300 millimeters of water, 20 WBC/mm³, 1 RBC/mm³, protein 65, glucose 62 and India ink stain was positive for encapsulated yeast consistent with cryptococcus.

41. Which of the following is NOT an AIDS defining condition?
A. Candida esophagitis
B. Kaposi’s sarcoma in a person less than 60 years
C. Pneumococcal pneumonia
D. Cryptococcal meningitis
E. Pneumocystis carinii pneumonia

Case for question 42
A 63-year-old female has intermittent fevers and fatigue that started a few weeks ago. She has a history of a murmur due to a bicuspid aortic valve. On examination her temperature is 100.5°F. There is a systolic murmur consistent with aortic stenosis. Examination of the finger nail beds show a few splinter hemorrhages. Blood cultures are drawn.
42. What is the most likely organism to cause endocarditis in this patient?
   A. *Streptococcus pneumoniae*
   B. *Staphylococcus aureus*
   C. *Enterococcus faecalis*
   D. *Strep viridans*
   E. *Candida albicans*

**Case for question 43**
A 40 year old man presents in September to an Emergency Room in New Jersey with headache, neck stiffness and unilateral paralysis of the facial (VII) nerve. A CT scan of the head with contrast is negative. A lumbar puncture is performed and shows normal opening pressure and 500 WBC/mm³ with a lymphocytic predominance. Gram stain is negative for bacteria and routine bacterial culture is now pending.

43. What is the likely causative organism?
   A. Enterovirus
   B. *Streptococcus pneumoniae*
   C. Herpes simplex
   D. *Borreliia burgdorferi*

**Case for question 44**
A 28-year-old HIV-infected black male lives in Scottsdale, Arizona. His most recent CD4 count is 180 cells/mm³ and he is treated with combination antiretroviral therapy. He has an excellent response with a drop in his viral load from 36,000 virions/mL to less than 50. He now develops unrelenting headaches and begins to lose weight. He develops bilateral hilar adenopathy and skin lesions compatible with erythema nodosum in his pretibial regions. A spinal fluid is performed and he has a lymphocyte predominant CSF pleocytosis with negative routine cultures and a negative VDRL.

44. The most likely diagnosis in this patient would be:
   A. *Cryptococcus neoformans*
   B. *Histoplasma capsulatum*
   C. *Coccidioides immitis*
   D. *Mycobacterium tuberculosis*
   E. *Treponema pallidum*

**Case for question 45**
A 17-year-old male, who had a splenectomy 6 months ago because of a splenic injury sustained in a motor vehicle accident, develops a fever to 102.4° F. He had been on penicillin, but stopped it a few months ago because he felt well. He feels very weak and is unable to stand. His friend drives him to the local hospital. On physical examination his blood pressure is 60 mm Hg, his neck is supple and he has no rash. Blood cultures are drawn and ceftriaxone is started. He is admitted to the ICU. 12 hours later the technologist in the laboratory calls and states there are bacteria growing in his blood cultures.
45. All of the following are likely to grow from his blood cultures EXCEPT
   A. Pseudomonas aeruginosa
   B. Neisseria meningitidis
   C. Streptococcus pneumoniae
   D. Haemophilus influenzae

Case for question 46
A 78-year-old male with a history of stroke presents with cough of 3 days duration and weakness that began one day prior. On the day of presentation he felt short of breath. On examination his temperature is 102.4°F, pulse 110/minute and respirations 26/minute. Percussion of the lungs reveals dullness at the right base and auscultation reveals rales. The WBC count is 18,000/mm3 with 86% neutrophils and 12% bands. A CXR shows a right lower lobe pneumonia.
46. All but which one of the following factors helps to prevent bacterial colonization of the lower respiratory tract?
   A. Cilia of respiratory epithelium
   B. Cough reflex
   C. Alveolar macrophage
   D. Locally-produced IgM

Case for question 47
A 9-year-old boy is brought to the emergency room in March with a fever and a rash. He is in foster care and his medical and vaccination history is unknown. He goes to a public elementary school. The other foster children in the household are currently healthy. On physical examination his temperature is 102°F. He has palpable lymph nodes in the cervical, axillary and inguinal regions. His lungs are clear. He has multiple vesicular lesions on an erythematous base (a dew drop on a rose petal) in various stages of development. Some are flat erythematous macules, some vesicles, and some crusts. They are very pruritic. He does not appear to have any lesions involving the mucous membranes, but they are otherwise covering his entire body.

47. What is the likelihood that other susceptible children in the household will become infected with this same pathogen?
   A. 1-2%
   B. 10-20%
   C. 40-50%
   D. 70-90%

Case for question 48
A 36-year-old woman from Puerto Rico acquires heterosexually-transmitted HIV but is stable with a CD4 count of 2,000 virions/ml and a CD4 count of 350 cells/mm3. The patient develops fever, chills, general malaise, weakness and night sweats. She subsequently develops chest pain and shortness of breath. Chest x-ray reveals a pericardial enlargement with scattered calcified granulomas in her mediastinal lymph nodes and in her spleen. A bone
marrow is performed showing numerous small intracellular organisms within histiocytes. The AFB stain is negative.

48. The most likely organism responsible for this patient’s illness is:
   A. *Mycobacterium tuberculosis*
   B. *Histoplasma capsulatum*
   C. *Blastomyces dermatitidis*
   D. *Aspergillus fumigatus*
   E. *Cryptococcus neoformans*

Case for question 49
A 33 year-old postal worker acquires varicella from his daughter. He is seen by his primary care physician, noted to have disseminated skin lesions consistent with varicella, and given instructions to stay home until all lesions are crusted and to take acyclovir for 7 days. On day 6 of his rash he notes the onset of pain in his right leg while ambulating. His wife reports that he has developed fevers to 38.6°C over the past day. On day 7 he sees an infectious diseases physician. He enters the exam room in a wheelchair complaining of severe pain in his entire right leg with radiation to the foot. On exam his right leg has numerous small scabs and a few intact pustules and vesicles and a 3 cm irregular area of dusky erythema in the calf.

49. Which of the following statements is true concerning this case:
   A. His illness is most likely caused by exposure to anthrax at his workplace
   B. He may have a limb-threatening disease
   C. The organism(s) responsible for his presenting illness likely originated in his intestinal tract
   D. The cause of his presenting complaint was likely to have preceded his varicella eruption
   E. He most likely has a significant underlying immunodeficiency disorder

Case for question 50-51
A 68-year-old male with type II diabetes and chronic lung disease presents with severe abdominal pain, fever, chills and radiographic evidence of free air in the peritoneum. He undergoes urgent surgical intervention where a ruptured diverticular abscess is noted with diffuse secondary peritonitis. Post-operatively he develops hypoxemia, diffuse pulmonary infiltrates, oliguria, confusion and metabolic acidosis. His blood cultures are positive for *Escherichia coli*, *Bacteroides fragilis* and *Clostridium species*.

50. The most likely reason that this patient developed multiorgan failure following peritonitis is:
   A. Activation of proinflammatory cytokines and the coagulation system.
   B. Increased levels of prostaglandin E2 alpha in the superoptic nucleus of the hypothalamus.
   C. Hepatic acute phase protein synthesis.
   D. Stress hormone response
   E. Polyclonal B cell activation from polymicrobial bacteremia
51. As part of the pharmacologic treatment of his polymicrobial bacteremia he is given metronidazole.
All of the following statements concerning metronidazole are correct EXCEPT:

A. If taken with alcohol it produces a disulfiram-like effect
B. It has therapeutic action against amoebae and anaerobic bacteria
C. It must be given intravenously since it is so poorly absorbed after oral administration
D. Following peripheral administration, therapeutic levels are found in the cerebrospinal fluid
E. Dosage should be reduced in patients with impaired liver function

Case for question 52
A 21-year-old college student who works as a landscaper in the summer months in coastal area of Massachusetts presents to the emergency room in late August with progressive shortness of breath, a non-productive cough, and fever and chills. He denies any insect or tick bites. There are no rashes noted. A chest x-ray shows bilateral patchy infiltrates. He is treated for community-acquired pneumonia with azithromycin and a urine for Legionella antigen is ordered. Over the next 48 hours he continues to worsen and now a fellow landscaper friend is in the emergency room with fever and non-productive cough.

52. What would you do now?
A. Continue to treat with azithromycin and await results of urine antigen for Legionella
B. Perform a thick and thin smear of peripheral blood looking for Babesia protozoan parasites
C. Add an aminoglycoside intravenously
D. Add a third generation cephalosporin intravenously

53. A 22-year-old female traveled to the jungles of South America. She did not take any malaria chemoprophylaxis. Upon return to the United States she starts having fever and is diagnosed with malaria. Indicate which of the following statements concerning anti-malarial agents are correct:

A. Hemolysis can occur in patients with glucose-6-phosphate deficiency as a result of treatment with primaquine
B. There are at present no drugs available for treating the liver stage of Plasmodium vivax
C. Chloroquine is an example of an anti-malarial drug for which P. falciparum has not been able to develop resistance
D. A and B
E. B and C
Case for question 54
A 6-month-old infant presents in the winter with fever, cough, wheezing, tachypnea and decreased appetite. A chest radiograph shows hyperaeration and streaky perihilar infiltrates bilaterally. You diagnose bronchiolitis.

54. The organism most likely to be causing this child’s infection is:
   A. *Chlamydia pneumoniae*
   B. *Haemophilus influenzae*
   C. *Mycoplasma pneumoniae*
   D. *Streptococcus pneumoniae*
   E. Respiratory syncytial virus

Case for question 55
A 72-year-old man is admitted to the ICU with bacteremic pneumococcal pneumonia. Early consultation proves lifesaving as the patient’s antibiotic therapy is adjusted to account for local antibiotic resistance patterns. After a rocky 72 hours, the patient stabilizes and is improved enough to be transferred to the regular medical floor by the fifth hospital day. As discharge planning proceeds, the patient develops fever (101°F), diarrhea and abdominal discomfort. Fecal leukocytes are present; other tests on stool are pending.

55. Which of the following statements about this patient’s diarrhea is TRUE
   A. The causative organism is present as part of the normal enteric flora in more than 90% of persons.
   B. The diarrhea is likely a side effect of the antibiotics and not due to an infection.
   C. Complications from this situation can include bowel perforation and toxic megacolon.
   D. The dormant form of this organism is usually transmitted through undercooked eggs.

56. A 3-year-old boy has a superficial skin infection. His pediatrician prescribes amoxicillin. The infection does not improve and culture obtained on his initial visit is growing *Staphylococcus aureus*. He is treated with amoxicillin with clavulanic acid. The next day there is significant improvement of the skin infection. The most likely explanation for this:

   A. Clavulanic acid’s ability to inhibit protein synthesis is potentiating amoxicillin’s antibiotic action
   B. Clavulanic acid helps increase the conversion of the prodrug amoxicillin to an active drug
   C. Clavulanic acid inhibits beta-lactamase activity
   D. Clavulanic acid inhibits amoxicillin excretion via the organic acid secretory system in the kidneys
   E. Clavulanic acid inhibits amoxicillin efflux from the bacterial cells
57. Immunization induces protective antibody responses in infants in the first 6 months of life despite the presence of transplacentally-acquired antibody. An exception is which of the following vaccines?
   A. Live-virus measles
   B. Hepatitis B
   C. Pneumococcal protein-polysaccharide conjugate
   D. Tetanus toxoid

Case for question 58
A 18 year-old female, 7 days post-Caesarean section delivery of a healthy baby boy, notes severe lightheadedness while showering at home. She presents to the E.R. where she is noted to have an oral body temperature of 39°C, a heart rate of 110/minute, a systolic blood pressure of 84 mm, and diffuse erythema of her bilateral upper and lower extremities and trunk. Her abdominal wound is dehisced at its inferior margin; there is moderate serosanguinous discharge noted.

58. All of the following statements regarding this case are true EXCEPT
   A. Her illness is most likely caused by a protein elaborated by bacteria
   B. The abdominal wound is the likely source of infection
   C. The pathogens involved can cause a variety of soft tissue infections
   D. This type of illness is seen only in women
   E. Multiple organ systems are involved in the pathogenic process

Case for question 59
A high school football team from Rhode Island travels to Louisiana for the championship game that they subsequently win. At the celebration picnic the following day, their hosts serve typical picnic fare (hot dogs, hamburgers, barbecued chicken, potato salad, garden salad) as well as a wide variety of local foods (gumbo, shrimp, crayfish, oysters). Three days later after returning home, several team members and adult coaches develop diarrhea that turns bloody after 24 hrs.

59. All but which one of the following pathogens could cause their bloody diarrhea?
   A. Campylobacter jejuni
   B. Campylobacter fetus
   C. Escherichia coli O157:H7
   D. Vibrio parahemolyticus

Case for question 60
A 3-year-old is brought to the office in February because of painful ulcers in the mouth for more than a week. She has been staying home from day care because she refuses to eat. On exam she is drooling and irritable. Her temperature is 101°F. She has cervical lymphadenopathy and vesicular lesions and crusts on the lips. You finally pry her mouth open and see more ulcerative lesions on the gums and the anterior tongue with an erythematous
base. The tonsils and posterior pharynx are spared. The remainder of her exam is unremarkable.

60. This is probably her first infection with:
   A. Streptococcus pyogenes
   B. Mycoplasma pneumoniae
   C. Herpes simplex virus
   D. Corynebacterium diphtheriae

61. A 36-year-old male develops the sudden onset of myalgias and fevers during an outbreak of influenza A. He sees his primary care physician who performs a rapid test for influenza A that confirms the diagnosis. Indicate which of the following is an anti-viral agent, against influenza A, which inhibits viral endocytotic vesicle membrane fusion and viral entry into the cell cytoplasm:

   A. Zidovudine
   B. Foscarnet
   C. Acyclovir
   D. Indinavir
   E. Rimantidine

Case for question 62
A 20-year-old college student presents with abrupt onset fever, general malaise, weakness, lightheadedness and shortness of breath. He has previously been in excellent health, takes no medications and has no known allergies. In the emergency room he is found to have a blood pressure of 70/30, pulse of 110, respiratory rate of 24 and a core temperature of 40°C. He was awake and alert. No localizing physical findings are noted with the exception of two small petechial skin lesions in the left ankle. His chest x-ray shows non-cardiac pulmonary edema, his platelet count is low (80,000/mm³) and he has evidence of lactic acidosis and disseminated intravascular coagulation. His O₂ saturation breathing room air is 96%.

62. The most appropriate immediate treatment for this patient in the emergency room would be:
   A. Intravenous fluids, blood cultures, ceftriaxone.
   B. CSF examination, blood cultures, ceftriaxone.
   C. Ceftriaxone, platelet transfusion, bicarbonate therapy.
   D. Vancomycin, ceftriaxone, blood cultures.
   E. Blood products, ventilatory support, blood cultures.

Case for question 63
A 58-year-old female with rheumatoid arthritis presents with a painful swollen knee. On examination her temperature is 103.0°F, the left knee is swollen, red, and tender. Synovial fluid is obtained and shows an elevated white blood cell (WBC) count.
63. The most likely organism to cause this infection in this patient is:
    A. *Neisseria meningitidis*
    B. *Salmonella*
    C. *Mycobacterium tuberculosis*
    D. *Haemophilus influenzae*
    E. *Staphylococcus aureus*

Case for question 64
A 44 year-old infectious diseases physician and amateur boxer sustains multiple lacerations of the skin overlying the 1st metacarpophalangeal joints on his hand after landing a left hook into his opponent’s mouth during an altercation at a faculty meeting. Afterwards, he washed the lesions vigorously with soap and water and covered his left hand with rolled gauze. Two days later, the physician notes pain, swelling and erythema of the dorsum of his left hand. In the E.R. he is febrile to 38.2°C. He is unable to clench his fist on the left. Laboratory studies shows he has a white blood cell count of 16,000/mm³.

64. The organism(s) most likely responsible for his illness:
    A. *Pasteurella multocida*
    B. *Eikenella corrodens*
    C. *Staphylococcus aureus*
    D. All of the above
    E. B and C

65. Routinely recommended childhood vaccines should not be given in which of the following clinical situations?
    A. Minor upper respiratory tract infection
    B. Child’s mother is in the first trimester of pregnancy
    C. High fever with vomiting and diarrhea
    D. History of possible seizure

66. The antifungal action of the combination of amphotericin B plus ketoconazole can be less than the antifungal action of amphotericin B alone. The most likely explanation for this:
    A. Ketoconazole inhibits the absorption of amphotericin B
    B. Ketoconazole stimulates cytochrome P₄₅₀ metabolism of amphotericin B
    C. Ketoconazole stimulates the emergence of fungal resistance to amphotericin B
    D. Ketoconazole inhibits kidney reabsorption of amphotericin B
    E. Ketoconazole inhibits fungal ergosterol synthesis
67. Indicate which of the following anti-fungal treatments has the greatest effect on inhibiting gonadal and adrenal steroid synthesis:

A. Fluconazole
B. Nystatin
C. Ketoconazole
D. Amphotericin B
E. Itraconazole

68. Each of the following drugs is used to treat systemic fungal infection except:

A. Fluconazole
B. Griseofulvin
C. Ketoconazole
D. Amphotericin B
E. Flucytosine

69. All of the following are side effects attributed to treatment with amphotericin B except:

A. Hypertension
B. Fever
C. Anemia
D. Decline in renal creatinine clearance
E. Chills

70. An antibiotic that inhibits bacterial dihydrofolate reductase:

A. Cefepime
B. Sulfamethoxazole
C. Ciprofloxacin
D. Trimethoprim
E. Gentamicin
71. A 32-year-old female with advanced HIV infection whose CD4 count on antiretroviral treatment is 48, has CMV retinitis. Indicate which of the following statements concerning treatment for cytomegalovirus (CMV) is correct:

A. Protease inhibitors are part of the first-line therapy for this virus
B. Nucleoside analogs are among the drugs used as treatment for this virus
C. Acyclovir is preferred over ganciclovir as a treatment for this virus
D. A and B
E. B and C

Questions 72-76. Match up the numbered antibiotic compounds below with the single most appropriate lettered antibiotic mechanism of action. Each lettered choice may be used once, more than once, or not at all.

72. Azithromycin
73. Vancomycin
74. Ciprofloxacin
75. Ceftriaxone
76. Chloramphenicol

A. Inhibition of bacterial DNA gyrase (topoisomerase II)
B. Inhibition of bacterial glutathione synthesis
C. Inhibition of bacterial protein synthesis
D. Inhibition of bacterial dihydopteroate synthetase
E. Inhibition of bacterial cell wall synthesis

77. Indicate which of the following pairings are correct:

A. Mebendazole: A treatment against pinworm (a nematode)
B. Interferon -2b: An anti-viral agent that produces flu-like symptoms
C. Methenamine: A topical antibiotic used to treat burns
D. A and B
E. B and C
78. An antibiotic to be avoided in infants less than 2 months old, and in pregnant women at term, due to displacement of bilirubin from plasma binding sites:

A. Methicillin
B. Erythromycin
C. Sulfamethoxazole
D. Gentamicin
E. Cefixime

79. Indicate which of the following statements concerning acyclovir is correct:

A. It is used in the therapy of genital herpes infections
B. Viruses lacking thymidine kinase will be resistant to its therapeutic action
C. It inhibits only actively replicating viruses and has no effect on latent viruses
D. A and B
E. A, B and C

80. All of the following antibiotic drug: side effect pairings are correct except:

A. Vancomycin: Flushing ("red neck syndrome")
B. Penicillin G: Stimulation of platelet aggregation
C. Erythromycin: Ototoxicity
D. Chloramphenicol: Cyanosis ("gray baby syndrome")
E. Gentamicin: Neuromuscular paralysis

81. Indicate which of the following statements is correct:

A. The use of 2 different antibiotics in a patient can produce a greater than additive response
B. The most accurate quantitative data on bacterial susceptibility to antibiotics is obtained using the disk diffusion method
C. In comparing bactericidal and bacteriostatic agents, it is only the bactericidal agents that are used to combat an on-going bacterial infection
D. A and B
E. B and C
82. Indicate the drug of choice for treating tapeworms (cestodes):
   A. Niclosamide
   B. Mebendazole
   C. Ivermectin
   D. Thiabendazole
   E. Albendazole

83. Indicate which of the following statements concerning melarsoprol is correct:
   A. It is used in the treatment of African trypanosomal infections (African sleeping sickness)
   B. The drug contains arsenic as part of its structure
   C. Following intravenous administration, it kills trypanosomal parasites in the central nervous system
   D. A and B
   E. A, B and C

84. Indicate which of the following statements concerning anti-viral treatments is correct:
   A. If HIV positive patients take protease inhibitors for at least 5 years, they can stop their protease inhibitor treatment without experiencing a reemergence of the HIV virus
   B. Ganciclovir is a prodrug which requires thymidine kinase activity to be converted to an active drug
   C. Stavudine (d4T) does not require enzymatic conversion for therapeutic effect (i.e., it is not a prodrug)
   D. A and B
   E. B and C

85. Indicate which of the following statements concerning antibiotics are correct:
   A. Aminoglycosides (e.g., gentamicin) are inactive against anaerobic organisms
   B. A patient who shows a hypersensitivity reaction to penicillin, is more likely to show a hypersensitivity reaction to cephalosporins, compared to a patient who doesn’t show a hypersensitivity reaction to penicillin
   C. Penicillin derivatives that are resistant to penicillinase activity do not encounter problems with bacterial resistance
   D. A and B
   E. B and C
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