

CHOOSE THE SINGLE BEST ANSWER FOR QUESTIONS 1 - 53.

1. *Vibrio cholerae* produces a protease (hap) which permits the bacterium to free itself from the adhesin-receptor reaction at the intestinal mucosal cell surface. This protease is considered a virulence factor because:
 - A. As a toxin producer of non-inflammatory diarrhea, adhesion of *Vibrio cholerae* is not required for diarrhea to occur.
 - B. It allows the bacterium to free itself from sloughed mucosal cells to attach to new cells.
 - C. Cholera is caused by a pre-formed toxin which is ingested and organism attachment and release are not involved in the disease.
 - D. The hap protease also releases the A subunit of cholera toxin so it is free to enter the host cell.
 - E. It is the mechanism by which *Vibrio cholerae* adheres to the intestinal mucosa.

2. Select the organism which causes cervicofacial infection following tooth extraction and is identified by sulfur granules in pus:
 - A. *Corynebacterium diphtheriae*
 - B. *Staphylococcus aureus*
 - C. *Candida albicans*
 - D. *Streptococcus mutans*
 - E. *Actinomyces israelii*

3. All of the following viruses can be transmitted by inhalation of infectious respiratory droplets EXCEPT:
 - A. Adenoviruses
 - B. Coxsackieviruses
 - C. Influenza viruses
 - D. Rhinoviruses
 - E. Varicella-Zoster virus

4. Which of the following statements regarding pneumonia is INCORRECT?
- A. Organisms usually reside within the trachea
 - B. Despite the increasing prevalence of resistance, most pneumococcal pneumonias can still be treated effectively with penicillin.
 - C. Pneumonia in someone under age 40 should arouse suspicions of an immunologic problem.
 - D. Some combination of chills, fever, pleuritic chest pain and productive cough are seen in the vast majority of patients with pneumonia.
 - E. *Streptococcus pneumoniae* is still the most common cause of pneumonia.
5. The following statements are TRUE for gastroenteritis EXCEPT:
- A. Only a small percent of all cases of acute gastroenteritis are of viral origin.
 - B. Bacterial and parasitic infections account for less than half of the cases of acute gastroenteritis.
 - C. Acute gastroenteritis is a very common disease with significant public health impact.
 - D. Gastroenteritis involves inflammation of the lining of the intestine.
6. Select the microorganisms encountered in infection following sigmoid perforation.
- A. *Escherichia coli*, *Enterococcus*, *Staphylococcus aureus*
 - B. *Escherichia coli*, *Bacteroides fragilis*, *Streptococcus agalactiae*
 - C. *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, *Citrobacter*
 - D. *Staphylococcus epidermidis*, *Streptococcus mitis*, *Candida parapsilosis*
 - E. *Stenotrophomonas*, *Actinomyces*, *Serratia*

7. In the fall of the past year, 2 children were hospitalized with fever, diarrhea and nausea; one had seizures. An investigation found the illness was associated with a fried chicken church dinner attended by 57 people. Of the 20 interviewed attendees, 15 had diarrhea, nausea/vomiting, and/or stomach cramps an average of 25 hours after eating the meal. The illness lasted 2-3 days. Which one of the organisms listed below are most likely candidate for causing the outbreak?
- A. *Staphylococcus aureus*
 - B. *Giardia lamblia*
 - C. *Campylobacter jejuni*
 - D. *Clostridium perfringens*
 - E. *Enterotoxigenic Escherichia coli*
8. Trehalose dimycolate is responsible for the:
- A. Development of tuberculosis hypersensitivity granulomas
 - B. Formation of serpentine cords in mycobacterial colony development
 - C. Inhibition of macrophage phagosome-lysosome fusion
 - D. Relative resistance of tubercle bacilli to hydrogen peroxide
 - E. Virulence of *Mycobacterium tuberculosis*
9. Which of the following terms describes the virion component used by adenovirus to attach to host cells?
- A. Fibers
 - B. Envelope glycoproteins
 - C. Core protein
 - D. Receptor
 - E. Integrins

10. Which of the following statements is NOT TRUE of cholera toxin (choleragen)?
- A. The B subunits are responsible for binding to the mucosal surface
 - B. The A and B toxin subunits are in a ratio of 1:5.
 - C. The B subunits bind to the GM₁ ganglioside
 - D. After attachment, the A subunit is divided into 2 subunits and the A₂ subunit enters the cell and ribosylates the G_s protein
 - E. cAMP regulates transmembrane sodium and chloride transport
11. Cross-reactive antibodies to which of the following virulence factors contributes to rheumatic heart disease?
- A. Streptococcal pyrogenic exotoxin A
 - B. Streptolysin O
 - C. M protein
 - D. Protein G
 - E. Capsule
12. Influenza A viruses undergo mutations under all the following conditions EXCEPT:
- A. Reassortment of RNA between related viral strains
 - B. Reassortment of human virus strains with avian virus strains
 - C. Changes in a single amino acid of an antigenic protein
 - D. Recombination resulting in minor antigenic changes
 - E. Digestion of cellular neuraminic acid by viral neuraminidase

13. Which of the following statements regarding aspiration pneumonia is INCORRECT?
- A. A major risk factor is altered level of consciousness.
 - B. A major risk factor is abnormal gag reflex.
 - C. The causative organisms reside in the mouth.
 - D. The disease is diagnosed by culture of sputum.
 - E. Poor oral hygiene is a risk factor.
14. Viruses that cause gastroenteritis are members of the listed families EXCEPT for:
- A. Astroviridae
 - B. Reoviridae
 - C. Paramyxoviridae
 - D. Adenoviridae
 - E. Calciviridae
15. Which one of the following conditions typically present with Charcot triad (Fever, right upper quadrant abdominal pain, jaundice):
- A. Acalculus cholecystitis
 - B. Calculus cholecystitis without common duct obstruction
 - C. Ascending cholangitis
 - D. Liver abscess
 - E. Subdiaphragmatic abscess

16. The organism in this list which is least likely to be identified by our microbiology laboratory in the Detroit Medical Center (DMC), assuming it is actually infecting the patient, is:
- A. *Enterotoxigenic Escherichia coli*
 - B. *Rotavirus*
 - C. *Enterohemorrhagic Escherichia coli*
 - D. *Vibrio cholera*
 - E. *Shigella sonnei*
17. The predilection of *Mycobacterium tuberculosis* to produce pulmonary disease has been ascribed to the fact that:
- A. Cell-mediated immunity is poorly expressed in the lungs
 - B. *Mycobacterium tuberculosis* is an obligate aerobe
 - C. *Mycobacterium tuberculosis* resists phagocytosis by alveolar macrophages
 - D. Pulmonary macrophages lack microbicidal activity
 - E. The natural route of transmission is by inhalation
18. Which of the following statements concerning the parvoviruses is FALSE?
- A. The only parvovirus known to cause human disease is parvovirus B19.
 - B. Parvoviruses are small and have single-stranded DNA genomes.
 - C. Parvoviruses are sensitive to ether inactivation.
 - D. Parvovirus virions have helical symmetry.
 - E. Replication of parvoviruses occurs in the nucleus.

19. Which one of the following organisms best fits the following virulence properties and causes the pathology described: produces enzymes to create an environment friendly to the infecting organism, produces a vacuolating cytotoxin, and causes progressive destruction of the gastric and duodenal mucosa:
- A. *Helicobacter pylori*
 - B. *Giardia lamblia*
 - C. *Clostridium botulinum*
 - D. *Clostridium perfringens*
 - E. *Campylobacter jejuni*
20. Pertussis toxin induces physiologic effects on mammalian cells through which one of the following mechanisms?
- A. ADP-ribosylation of elongation factor 2
 - B. Increasing cytoplasmic cAMP levels
 - C. The formation of pores in the cytoplasmic membrane
 - D. Blocking inhibitory nerve pathways
 - E. Cross-linking T-cell receptors and MHC II
21. Each of the following statements concerning measles and/or mumps is CORRECT EXCEPT:
- A. They are paramyxoviruses and hence are enveloped and have a single-stranded RNA genome
 - B. During infection, the virus spreads through the blood stream (viremia) to various internal organs
 - C. The initial site of virus replication is the upper respiratory tract, from which it spreads via the blood to the target organs
 - D. The only effective vaccines consist of inactivated virus particles
 - E. Infection of the cells of the central nervous system occurs and may result in meningitis or encephalitis

22. Which of the following statements regarding nosocomial pneumonia is INCORRECT?
- A. Advanced age is a risk factor
 - B. Nasogastric tubes are risk factors
 - C. Antibiotic use is a risk factor
 - D. Proper use of H2 blockers prevents pneumonia
 - E. Tracheal intubation is a risk factor
23. Rotaviruses:
- A. Are members of the Caliciviridae family
 - B. Have enveloped, spherical virions
 - C. Have a segmented double-stranded DNA for a genome
 - D. Have a segmented double-stranded RNA for a genome
24. All of the following are characteristic of primary peritonitis EXCEPT:
- A. Most cases are caused by a single organism
 - B. Most patients have pre-existing ascites
 - C. Liver disease is a common predisposing condition
 - D. Abscess formation is common
 - E. *Neisseria gonorrhoea* peritonitis is more common in females
25. Which of the following causes of diarrhea is associated with normal histology by light microscopy?
- A. Norwalk virus
 - B. *Vibrio cholera*
 - C. *Salmonella typhimurium*
 - D. *Campylobacter jejuni*
 - E. *Clostridium difficile*

26. A U.S. born 45 year old man presents with chronic cough and fever. Chest X-ray reveals a shadow in the left upper lobe. A tuberculin skin test is done, and the result is positive. You would infer from these data that the patient:
- A. Has active pulmonary tuberculosis
 - B. Has been exposed to *Mycobacterium tuberculosis* or environmental mycobacteria
 - C. Has been exposed to *Mycobacterium tuberculosis*, but has acute pneumococcal pneumonia
 - D. Has been immunized with Bacille Calmette Guerin (BCG)
 - E. Is immune to tuberculosis, precluding active *Mycobacterium tuberculosis* infection at this time
27. Adenovirus vaccines were developed by the military to prevent occurrences of which of the following?
- A. Epidemic Keratoconjunctivitis
 - B. Infectious Mononucleosis
 - C. Acute Respiratory Disease
 - D. Hepatitis
 - E. Erythema Infectiosum
28. The Cestode acquired by consuming uncooked pork is:
- A. *Clonorchis sinensis*
 - B. *Enterobius vermicularis*
 - C. *Taenia solium*
 - D. *Ascaris lumbricoides*
 - E. *Taenia sagnata*

29. A complication of treating pneumococcal pneumonia with β -lactam antibiotics is:
- A. Enhancement of the natural competence of pneumococci for transformation
 - B. The release of capsular antigens which deplete pneumococcal-specific antibodies
 - C. Augmentation of complement-mediated self-attack with membrane-bound pneumolysis
 - D. The release of cell wall peptidoglycan which exacerbates the inflammatory response
 - E. All of the above
30. Which of the following is the MOST common lower respiratory pathogen in infants?
- A. Respiratory syncytial virus
 - B. Adenovirus
 - C. Rhinovirus
 - D. Coxsackievirus
 - E. Rotavirus
31. Select the CORRECT statement regarding pneumococcal pneumonia:
- A. *Streptococcus pneumoniae* is now an uncommon cause of pneumonia.
 - B. Pneumonia caused by pneumococci with a penicillin MIC < 1.0 μ g/ml can effectively be treated with penicillin.
 - C. Now that *Hemophilus influenzae* meningitis is so rare due to a vaccination, all infants should be vaccinated against the pneumococcus.
 - D. The hyperactive spleen of sickle cell patients makes them more resistant to pneumococcus.
 - E. Since development of the pneumococcal vaccine, pneumococcal pneumonia has become a disease of historical interest only.

32. The following statements are TRUE for hepatitis EXCEPT:
- A. Hepatitis is defined as inflammation of the liver
 - B. Hepatitis is most commonly caused by viruses
 - C. Acute hepatitis is responsible for more deaths than chronic hepatitis in the USA.
 - D. Chronic hepatitis can lead to liver cirrhosis and hepatic cellular carcinoma.
33. Ten of twelve people developed nausea and vomiting four hours after eating egg salad at a picnic. The most likely etiological agent is:
- A. Enterohemorrhagic *Escherichia coli*
 - B. *Staphylococcus aureus*
 - C. *Salmonella*
 - D. *Vibrio cholerae*
 - E. *Campylobacter jejuni*
34. Parasite of freshwater amoeba which may inhabit cooling towers:
- A. *Legionella pneumophila*
 - B. *Pneumocystis carinii*
 - C. *Acanthamoeba spp.*
 - D. *Histoplasma capsulatum*
 - E. *Blastomyces dermatitides*

35. A 6 month old infant presents with a history of one-day periods of nasal congestion, sneezing, and coughing. Other members of the family have similar symptoms. The child now presents with dyspnea, nasal flaring, hyperexpansion of the chest, and inspiratory and expiratory wheezes in both lung fields. Which infection best explains these symptoms?
- A. Epstein-Barr virus infection with bronchiolitis
 - B. Cytomegalovirus with acute inflammation of the epiglottis
 - C. Parainfluenza virus infection with croup
 - D. Respiratory syncytial virus infection with bronchiolitis
 - E. Adenovirus infection with interstitial pneumonia
36. The antibiotic MOST LIKELY to be effective against *Streptococcus pneumoniae* which is highly resistant to β -lactam antibiotics is:
- A. Penicillin
 - B. Trimethoprim-sulfamethoxazole
 - C. Erythromycin
 - D. Vancomycin
 - E. Cefotaxime
37. Viruses that cause hepatitis:
- A. Belong to a single family
 - B. Are transmitted both parenterally and fecal-orally
 - C. Have only RNA as a genome
 - D. Have only DNA as a genome

38. All of the following are the result of triggering cytokine release by Gram negative endotoxin EXCEPT:
- A. Disseminated intravascular coagulation (DIC)
 - B. Acute respiratory distress syndrome (ARDS)
 - C. Hemolytic uremic syndrome
 - D. Multiple organ system failure
 - E. Production of Tumor Necrosis Factor alpha
39. The pathogenesis of *Mycoplasma pneumoniae* includes:
- A. Capsule-mediated resistance to complement deposition
 - B. An acute inflammatory response caused by the release of peptidoglycan into the circulation
 - C. Oxidative damage to ciliated respiratory epithelial cells
 - D. A catalytic increase in the cAMP levels of susceptible mammalian cells
 - E. Survival and growth inside macrophages
40. Influenza is a disease characterized by which of the following conditions?
- A. Long incubation period (1-3 weeks)
 - B. Systemic infection involving viremia
 - C. Delayed onset without fever
 - D. Localized respiratory infection
 - E. Non-inflammatory response

41. Select the INCORRECT statement about *Clostridium difficile* associated diarrhea.
- A. Relapses are common
 - B. Toxic megacolon is an occasional complication
 - C. Vancomycin is the treatment of choice
 - D. Colonoscopy may reveal a classic diagnostic pattern
 - E. Nosocomial infections may occur weeks to months after an infected patient has left the hospital
42. The hepatitis virus that requires a helper virus to replicate is:
- A. Hepatitis A
 - B. Hepatitis B
 - C. Hepatitis C
 - D. Hepatitis D
 - E. Hepatitis E
43. Esophagitis, especially among immunosuppressed HIV infected individuals is most frequently caused by:
- A. A germ-tube producing organism
 - B. A lactose negative, Gram negative bacillus
 - C. An oxidase positive, pyocyanin and pyoverdinin producing Gram negative bacillus
 - D. An anaerobic Gram negative bacillus
 - E. A Gram positive, beta hemolytic coccus

44. Which of the following fungal pathogens exists in the tissue invasive form as a spherule containing endospores?
- A. *Aspergillus spp.*
 - B. *Coccidioides immitis*
 - C. *Histoplasma capsulatum*
 - D. *Blastomyces dermatitides*
 - E. *Pneumocystis carinii*
45. Which statement about *Salmonella typhi* infection is INCORRECT?
- A. Infection requires a large inoculum
 - B. Disease usually results after ingestion of contaminated food or water.
 - C. The organism is highly resistant to acid pH
 - D. Prolonged asymptomatic carriage within the gall bladder may occur
 - E. Disease may be prevented by a live attenuated oral vaccine
46. Which one of the following organisms causes non-inflammatory diarrhea?
- A. *Vibrio cholerae* O139
 - B. *Shigella sonnei*
 - C. *Entamoeba histolytica*
 - D. *Salmonella typhi*
 - E. *Campylobacter jejuni*

47. Which of the following is/are a predisposing factor(s) for Pneumocystosis?
- A. AIDS
 - B. Premature birth
 - C. Cancer chemotherapy
 - D. Immunosuppressive therapy following organ transplant
 - E. All of the above

REFER TO THE FOLLOWING CASE STUDY FOR QUESTIONS 48 AND 49.

A 42 year old man presents with fever and severe abdominal pain shortly after returning from a vacation in Mexico. On exam he is noted to have a very faint, erythematous rash. Temperature 103.4°F, pulse 72 and regular. His abdomen is tense with tenderness in the right-lower quadrant.

48. Which of the following is UNLIKELY to provide the diagnosis of this patient's illness?
- A. Blood cultures
 - B. Stool cultures
 - C. Urine cultures
 - D. Bone marrow cultures
 - E. All of the above
49. Which of the following is NOT a characteristic of the organism causing this patient's disease?
- A. It is a Gram negative bacillus
 - B. It is lactose - nonfermenting
 - C. It produces H₂S on Hektoen agar
 - D. It typically infects the gut lymphatics
 - E. Hospitalized patients require respiratory isolation because of the organism's tendency for airborne transmission

50. Which of the following organisms best fits the description of causing disease by producing a toxin which blocks protein synthesis and causes capillary thrombosis and inflamed colonic mucosa with subsequent hemorrhagic colitis?
- A. *Shigella flexneri*
 - B. EHEC
 - C. *Yersinia enterocolitica*
 - D. *Campylobacter jejuni*
 - E. *Helicobacter pylori*
51. Which of the following is the key virulence factor of *Haemophilus influenzae*?
- A. Capsule composed of polyribitol phosphate
 - B. Capsule composed of hyaluronic acid
 - C. An ADP-ribosylating exotoxin
 - D. Growth requirement for X and V factors
 - E. Pneumolysin
52. Which of the following statements is TRUE of *Vibrio cholerae* infection?
- A. Infection is indicated by PMNs in stool (fecal leukocytes).
 - B. Blood culture isolation of the organism is necessary to confirm diagnosis.
 - C. The current pandemic strain is *Vibrio cholerae* -El Tor-Inaba.
 - D. Organism is an oxidase negative, curved, Gram negative bacillus.
 - E. All serogroups can cause the clinical syndrome of "cholera".

53. A 56 year old female had presented 10 days previously with *Klebsiella pneumoniae* pneumonia and was treated with a 7 day course of I.V. antibiotic, then discharged with an additional week of oral antimicrobial therapy. A week after discharge she presented with a three day history of vomiting, crampy abdominal pain and multiple, watery, loose stools without blood. A stain for fecal leukocytes was positive. Cultures for *Salmonella*, *Shigella*, *Yersinia*, and *Campylobacter* were negative. The most likely etiological agent is:

- A. *Clostridium difficile*
- B. *Vibrio cholerae*
- C. *Clostridium botulinum*
- D. *Helicobacter pylori*
- E. *Rotavirus*

MATCHING ITEMS

In each of the following groups there are two numbered lists. Mark on the answer sheet in the line corresponding to each question number in the lower list (54-60) the letter of the related item of the upper list. In every instance there is an answer. Each alternative may be used once, more than once, or not at all.

DIRECTIONS: Select the *Escherichia coli* group (A-E below) which best fits the characteristics numbered 54-57. Some choices may be used more than once.

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

- 54. Produces heat stable and heat labile toxins which result in non-inflammatory diarrhea.
- 55. Produces toxins which cause increased amounts of cAMP and cGMP.
- 56. Produces Shiga-like toxins or Vero Toxins.
- 57. Causes inflammatory diarrhea with numerous PMNs in mucoid stool.

DIRECTIONS: Select the option (A-C below) which best fits the descriptions numbered 58-60.

- A. Hepatitis A
- B. Hepatitis B
- C. Hepatitis C

- 58. Causes chronic infection in 70% of cases.
- 59. Causes acute self-limited disease.
- 60. Presence of the surface antigen implies acute or chronic hepatitis.