

Microbiology Questions

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From Jawtez!

1. A housewife who lives on a small farm is brought to the emergency department complaining of double vision and difficulty talking. Within the past 2 hours, she noted a dry mouth and generalized weakness. Last night she served home-canned green beans as part of the meal. She tasted the beans before they were boiled. None of the other family members are ill. On examination, there is symmetrical descending paralysis of the cranial nerves, upper extremities, and trunk. The correct diagnosis is which one of the following ?

- (A) Tetanus
- (B) Strychnine poisoning
- (C) Botulism
- (D) Morphine overdose
- (E) Ricin intoxication

Answer C

2. Tetanus toxin (tetanospasmin) diffuses to terminals of inhibitory cells in the spinal cord and brainstem and blocks which of the following?

- (A) Release of acetylcholine
- (B) Cleavage of SNARE proteins
- (C) Release of inhibitory glycine and γ -aminobutyric acid
- (D) Release of protective antigen
- (E) Activation of acetylcholine esterase

Answer C

3. A 45-year-old man who immigrated to the United States 5 years ago sustained a puncture injury to the lower part of his right leg when his rotary lawn mower threw a small stick into his leg. Six days later, he noticed spasms in the muscles of his right leg; on day 7, the spasms increased. Today—day 8—he had generalized muscle spasms, particularly noticeable in the muscles of his jaw. He was unable to open his jaw and came to the emergency department (ED). In the ED, you see a man who is alert and lying quietly in bed. A door slams down the hall, and suddenly he has general muscle spasm with arching of his back. The correct diagnosis is which of the following?

- (A) Botulism
- (B) Anthrax
- (C) Gas gangrene

- (D) Tetanus
- (E) Toxic shock syndrome

Answer D

4 .Which of the following statements about tetanus and tetanus toxoid is correct?

- (A) Tetanus toxin kills neurons.
- (B) Tetanus toxoid immunization has a 10% failure rate.
- (C) The mortality rate of generalized tetanus is less than 1%.
- (D) Double vision is commonly the first sign of tetanus.
- (E) Tetanus toxin acts on inhibitor interneuron synapses

Answer E

5 . Which of the following food items is most frequently associated with infant botulism?

- (A) Corn syrup
- (B) Canned infant formula
- (C) Liquid multivitamins
- (D) Honey
- (E) Jarred baby food

Answer D

6 . A 12-year-old Boy Scout went to summer camp for 2 weeks in late August at a site located just outside Mystic, Connecticut. When he returned home, his mother noticed a bull's-eyeshaped rash on the back of her son's left calf. Shortly after Labor Day, the boy developed a flulike illness that resolved after 4 days of bed rest. Three weeks later, the boy complained to his mother that his body hurt all over whenever he moved. This prompted a visit to the pediatrician, who ordered an infectious disease workup. What is the most likely source of the boy's infection?

- (A) Respiratory transmission from another sick camper
- (B) Ingestion of urine-contaminated water from a stream
- (C) The bite of a mosquito harboring a parasite
- (D) Ingestion of fecally contaminated food
- (E) The bite of a spirochete-infected tick

Answer E

7. A 47-year-old man presents with slowly progressive arthritis in his knees. He enjoys hiking in the coastal areas of Northern California, where the prevalence of *B. burgdorferi* in the Ixodes ticks is known to be 1–3% (considered low). The patient is concerned about Lyme disease. He never noticed a tick on his body and did not see an expanding red rash. The result of an EIA for Lyme borreliosis is positive. What should be done now?

- (A) A biopsy specimen of the synovium of a knee joint should be examined for *B. burgdorferi*.
- (B) The patient should be given an antibiotic to treat Lyme disease.
- (C) PCR on the patient's plasma should be done to detect *B. burgdorferi*.
- (D) A serum specimen should be submitted for immunoblot assay to detect antibodies reactive with *B. burgdorferi* antigens.
- (E) Culture of synovial fluid on blood and chocolate agar

Answer D

8. Which one of the following is a recommended therapy for herpes simplex virus infection?

- (A) Acyclovir
- (B) Attenuated live virus vaccine
- (C) Herpes immune globulin
- (D) Interferon- α
- (E) Ribavirin

Answer A

9. The use of live oral polio vaccine has been replaced by inactivated polio vaccine in many countries. Which of the following is the primary reason?

- (A) It is more cost effective to use the inactivated vaccine.
- (B) There is a greater risk of vaccine-induced disease than wild virus-induced disease in areas where poliovirus has been eradicated.
- (C) Only a single dose of inactivated vaccine is necessary compared with multiple doses of the oral vaccine.
- (D) Circulating poliovirus strains have changed and the live vaccine is no longer effective in many countries.

Answer B

10. The inhabitants of a group of small villages in rural sub-Saharan Africa experienced an epidemic of meningitis. Ten percent of the people died, most of them younger than the age of 15 years. The microorganism that most likely caused this epidemic was

- (A) *Streptococcus agalactiae* (group B)
- (B) *Escherichia coli* K1 (capsular type 1)
- (C) *H. influenzae* serotype b
- (D) *N. meningitidis* serogroup A
- (E) West Nile virus

Answer D

11. A 6-year-old boy develops a fever and headache. He is taken to the emergency department, where he is noted to have a stiff neck, suggesting meningeal irritation. A lumbar puncture is done, and culture of the cerebrospinal fluid grows *N. meningitidis* serogroup B. Which of the following should be considered for his family (household) members?

- (A) No prophylaxis or other steps are necessary.
- (B) They should be given *N. meningitidis* polysaccharide vaccine.
- (C) They should be given *N. meningitidis* serogroup B polysaccharide capsule vaccine.
- (D) They should be given rifampin prophylaxis.

Answer D

12. A 48-year-old alcoholic man is admitted to a hospital because of stupor. He is unkempt and homeless and lives in an encampment with other homeless people, who called the authorities when he could not be easily aroused. His temperature is 38.5°C, and his blood pressure 125/80 mm Hg. He moans when attempts are made to arouse him. He has positive Kernig and Brudzinski signs, suggesting meningeal irritation. Physical examination and chest radiography show evidence of left lower lobe lung consolidation. An endotracheal aspirate yields rust-colored sputum. Examination of a Gram-stained sputum smear shows numerous polymorphonuclear cells and numerous Gram-positive lancet-shaped diplococci. On lumbar puncture, the cerebrospinal fluid is cloudy and has a white blood cell count of 570/μL with 95% polymorphonuclear cells; Gram-stain shows numerous Gram-positive diplococci. Based on this information, the likely diagnosis is

- (A) Pneumonia and meningitis caused by *S. aureus*
- (B) Pneumonia and meningitis caused by *S. pyogenes*
- (C) Pneumonia and meningitis caused by *S. pneumoniae*
- (D) Pneumonia and meningitis caused by *E. faecalis*
- (E) Pneumonia and meningitis caused by *Neisseria meningitidis*

Answer C

13. The patient in Question 12 is started on antibiotic therapy to cover many possible microorganisms. Subsequently, culture of sputum and cerebrospinal fluid yields Gram-positive diplococci with a minimum inhibitory concentration to penicillin G of greater than 2 µg/mL. The drug of choice for this patient until further susceptibility testing can be done is

- (A) Penicillin G
- (B) Nafcillin
- (C) Trimethoprim–sulfamethoxazole
- (D) Gentamicin
- (E) Vancomycin

Answer E

14. Which one of the following microorganisms can be part of the normal vaginal flora and cause meningitis in newborns?

- (A) *Candida albicans*
- (B) *Corynebacterium* species
- (C) *Staphylococcus epidermidis*
- (D) *Ureaplasma urealyticum*
- (E) Group B streptococci

Answer E

From Harrisons'

15. An 87-year-old nursing home resident is brought by ambulance to a local emergency room. He is obtunded and ill-appearing. Per nursing home staff, the patient has experienced low-grade temperatures, poor appetite, and lethargy over several days. A lumbar puncture is performed, and the Gram stain returns gram-positive rods and many white blood cells. *Listeria meningitis* is diagnosed and appropriate antibiotics are begun. Which of the following best describes a clinical difference between *Listeria* and other causes of bacterial meningitis?

- A. More frequent nuchal rigidity.
- B. More neutrophils are present on the cerebrospinal fluid (CSF) differential.
- C. Photophobia is more common.
- D. Presentation is often more subacute.
- E. White blood cell (WBC) count is often more elevated in the CSF

Answer D

16 . A 39-year-old injection drug user with a history of right-sided endocarditis and HIV infection notes back pain and fevers over the past week. He had an abscess recently on his right arm that he drained on his own. He is part of a needle-exchange program and always cleans his arm before shooting heroin into the vein in his antecubital fossa. On physical examination, he has a temperature of 38.1°C, heart rate of 124 beats per minute, and blood pressure of 75/30 mmHg. He is in a great deal of distress and is slightly confused. He has a 4/6 left lower sternal border murmur that varies with the respiratory cycle. His jugular venous pressure is monophasic and to the jaw when seated at 90°. Lung examination is clear. Abdomen is benign. He is very tender over his lower spine. His extremities are warm. Leg strength is 5/5 on the right, with 4/5 left hip flexion and extension, 3/5 left knee flexion and extension, and 3/5 left foot extension. His Babinski reflex is upgoing on the left and downgoing on the right. What is the next step in management?

- A. Avoidance of antibiotics until more definitive culture data is obtained; serial neurologic examinations
- B. Urgent MRI and neurosurgical consultation; vancomycin after blood cultures are drawn
- C. Urgent MRI and neurosurgical consultation; vancomycin plus cefepime after blood cultures are drawn
- D. Urgent MRI and neurosurgical consultation; avoidance of antibiotics until more definitive culture data are obtained
- E. Vancomycin plus cefepime after blood cultures are drawn; serial neurologic examinations

Answer C

17 . An HIV-positive patient with a CD4 count of 110/ μ L who is not taking any medications presents to an urgent care center with complaints of a headache for the past week. He also notes nausea and intermittently blurred vision. Examination is notable for normal vital signs without fever but mild papilledema. Head CT does not show dilated ventricles. The definitive diagnostic test for this patient is

- A. cerebrospinal fluid (CSF) culture
- B. MRI with gadolinium imaging
- C. ophthalmologic examination including visual field testing
- D. serum cryptococcal antigen testing
- E. urine culture

Answer A

18 . A 26-year-old woman presents late in the third trimester of her pregnancy with high fevers, myalgias, backache, and malaise. She is admitted and started on empirical broad-spectrum antibiotics. Blood cultures return positive for *Listeria monocytogenes*. She delivers a 5-lb infant 24 h after admission. Which of the following statements regarding antibiotic treatment for this infection is true?

- A. Clindamycin should be used in patients with penicillin allergy.
- B. Neonates should receive weight-based ampicillin and gentamicin.
- C. Penicillin plus gentamicin is first-line therapy for the mother.
- D. Quinolones should be used for *Listeria* bacteremia in late-stage pregnancy.

E. Trimethoprim-sulfamethoxazole has no efficacy against Listeria.

Answer B

19 . A 23-year-old previously healthy female letter carrier works in a suburb in which the presence of rabid foxes and skunks has been documented. She is bitten by a bat, which then flies away. Initial examination reveals a clean break in the skin in the right upper forearm. She has no history of receiving treatment for rabies and is unsure about vaccination against tetanus. The physician should

D. clean the wound with a 20% soap solution, administer tetanus toxoid, administer human rabies immune globulin IM, and administer human diploid cell vaccine

Answer D