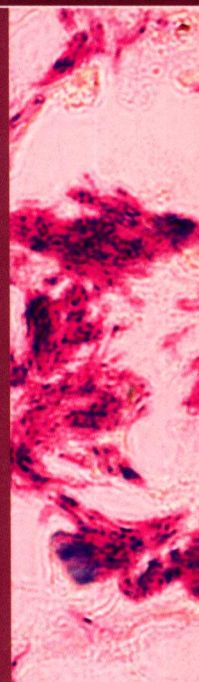
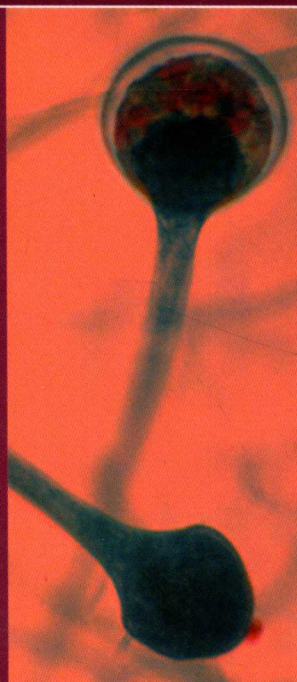
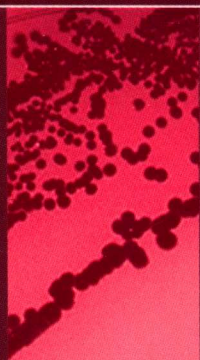


Lippincott's
Illustrated  Review of

Microbiology & Immunology



Bonnie A. Buxton • Lauritz A. Jensen • Randal K. Gregg



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Dedication

This book is dedicated to our mentors who trained us, our students who challenge us, and our families for their constant support.

Preface

Lippincott's Illustrated Q&A Review of Microbiology and Immunology presents essential concepts of medical microbiology and immunology for students preparing for Step 1 of the United States Medical Licensing Examination (USMLE) and the Comprehensive Osteopathic Medical Licensing Examination (COMLEX). Questions are written in the clinical vignette-style used on these examinations. Clinical vignette-style questions help develop problem-solving skills by requiring students to integrate a patient's clinical manifestations, history, and demographic information with physical exam findings and laboratory data to identify the disease and choose the correct management options. The questions also assess the student's ability to integrate basic and clinical science in order to solve problems. The questions are written at the level of competence expected of students who perform well on medical licensure examinations.

Many questions have accompanying photomicrographs. Complete explanations are provided for the answers, as well as each distracter. Questions are divided by chapter into the following categories: Bacteriology, Virology, Mycology, Parasitology, Infectious Diseases, Basic Immunology, and Clinical Immunology.

The review book is also designed to be used by medical students and allied health students as a companion to various microbiology and immunology textbooks. Use of this book will facilitate classroom learning and provide students with an opportunity for self-assessment in these two disciplines.

Questions are also presented online. Students can work through the online questions in either "quiz" or "test" mode.

B.A. Buxton

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Chapter 1

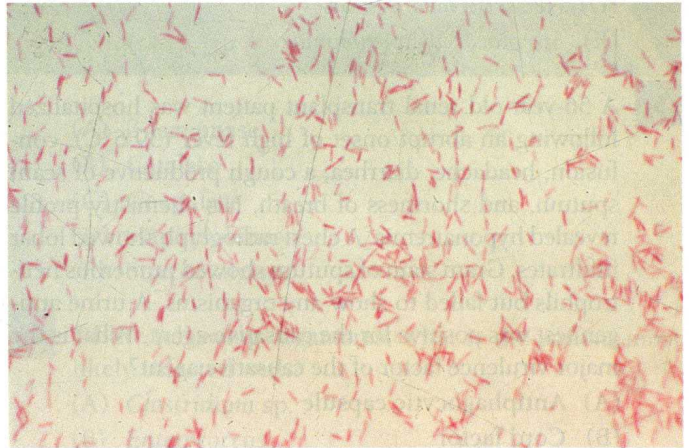
Bacteriology

QUESTIONS

Select the best answer.

The next two questions are linked.

- 1 A 67-year-old diabetic woman is hospitalized with a 3-day history of fever, headache, diarrhea, dyspnea, and a cough productive of scant sputum. A chest radiograph reveals patchy, multilobar consolidation. No organisms are seen on sputum Gram stain; however, culture of sputum and blood on buffered charcoal yeast extract agar and blood agar are shown in the photograph. Bacteria from the colonies, stained with basic fuchsin, are also shown. Direct fluorescent antibody staining of cultured bacteria leads to a definitive diagnosis. With which organism is this woman infected?

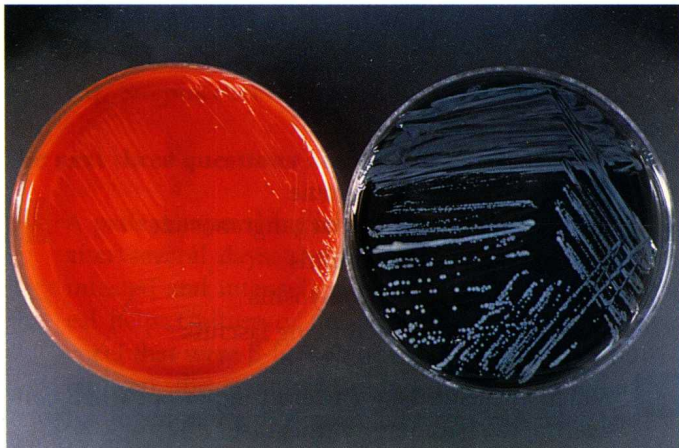


- (A) *Actinomyces israelii*
- (B) *Corynebacterium diphtheriae*
- (C) *Haemophilus influenzae*
- (D) *Legionella pneumophila*
- (E) *Nocardia asteroides*

- 2 What is the source of infection for the patient in the above question?

- (A) Aerosolized spores from soil
- (B) Aerosols from contaminated water
- (C) Colonization of the upper airways
- (D) Inapparent carrier of the organism
- (E) Person with the same disease

- 3 A 5-year-old child died from severe septic shock, disseminated intravascular coagulation, and cardiac insufficiency following a sudden onset of fever, severe headache, and vomiting. The causative agent, a Gram-negative diplococcus, was isolated from blood and cerebrospinal fluid (CSF) on Thayer–Martin agar and was also identified in CSF by latex agglutination. What is the most important virulence factor involved in disease production by the etiologic agent in this case?



2 Chapter 1

- (A) Exotoxin production
- (B) Flagella
- (C) Lipooligosaccharide
- (D) Pili
- (E) Polysaccharide capsule

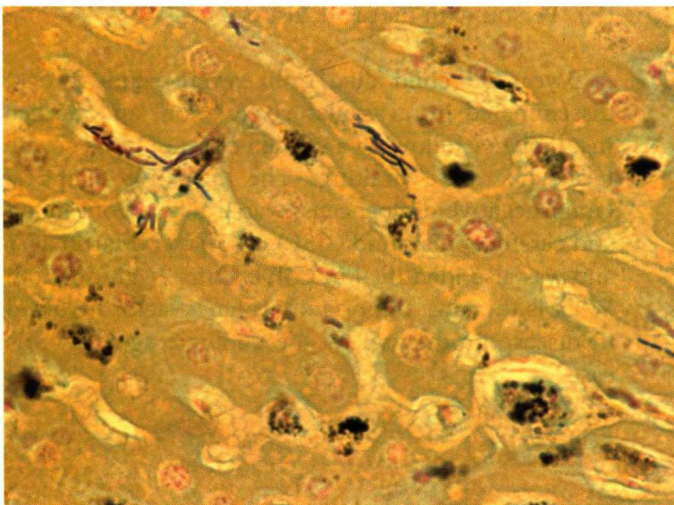
4 Vaccination against which bacterial species has been most successful at reducing the number of cases of invasive diseases, including meningitis?

- (A) *Escherichia coli* K1
- (B) *Haemophilus influenzae* b
- (C) *Listeria monocytogenes*
- (D) *Neisseria meningitidis*
- (E) *Streptococcus pneumoniae*

5 A 56-year-old renal transplant patient was hospitalized following an abrupt onset of high fever (39.6°C), confusion, headache, diarrhea, a cough productive of scant sputum, and shortness of breath. His chemistry profile revealed hyponatremia. A chest radiograph showed lobar infiltrates. Gram stain of sputum showed numerous neutrophils but failed to show any organisms. A urine antigen test was positive for the causative agent. What is the major virulence factor of the causative agent?

- (A) Antiphagocytic capsule
- (B) Cord factor
- (C) Exotoxin production
- (D) Intracellular growth
- (E) Pyocyanin

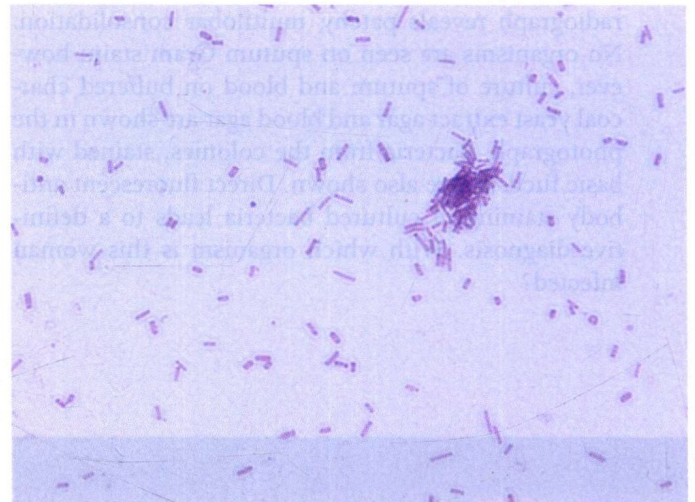
6 A steer dies on a ranch in North Dakota and a veterinarian is consulted. Histological sections of the spleen from the deceased animal show evidence of a bacterial causative agent (shown in the photograph). The bacterium was also cultured aerobically on blood agar. Which of the following substances is associated with increased virulence of this isolate, and if detected, would alarm the state health officials and result in a more extensive investigation at the national level?



- (A) Capsule
- (B) H antigen
- (C) Hemolysin
- (D) Lipid A
- (E) Lipoteichoic acid

The next two questions are linked.

7 Infected pressure sores were observed on the buttock of an elderly, bedridden patient recently treated for a malignancy of the rectum. Some of the lesions are conspicuously necrotic, exceptionally painful to the touch, and readily give off a musty sweet odor. Moreover, these lesions seem to have developed overnight. A Gram stain of the watery discharge from one of the lesions reveals an abundance of bacteria (shown in the photograph). What is the most likely diagnosis?

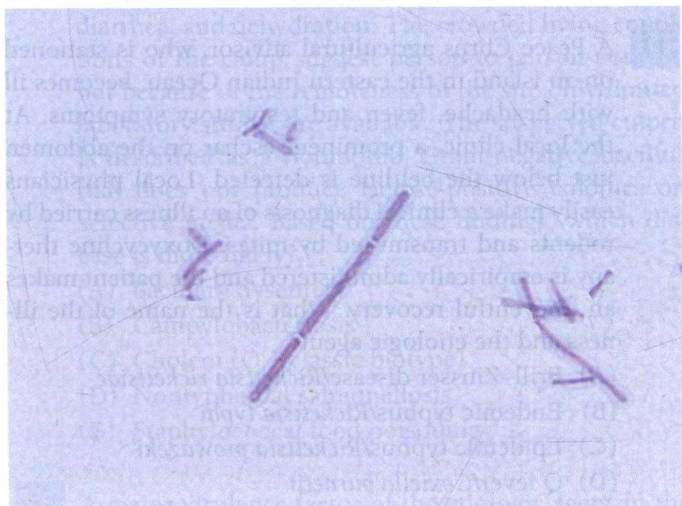


- (A) Clostridial gas gangrene
- (B) *Pseudomonas* ecthyma gangrenosum
- (C) Staphylococcal cellulitis
- (D) Staphylococcal pyomyositis
- (E) Streptococcal necrotizing fasciitis

8 Which virulence factor is most important when considering the pathology of this case?

- (A) α -Toxin (lecithinase)
- (B) Enterotoxin
- (C) Pyocyanin
- (D) Pyrogenic exotoxin A
- (E) Streptolysin S

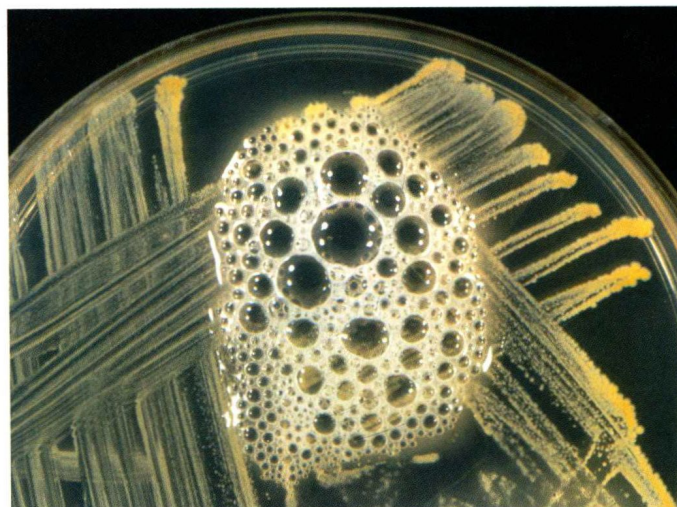
- 9 While planting a tree, a man punctured his foot through his tennis shoe with the prongs of a rake. He was not initially concerned with the wound and washed it only superficially. At 4:00 AM, he awakened with excruciating pain in the foot and sought medical care at the emergency department. The lesion was cleaned and excised of devitalized tissue and an IV β -lactam antibiotic was administered, which subsequently cleared the infection. A Gram stain of an anaerobic culture taken from wound secretions is shown. Of the following microbial groups, which is most compatible with this case?



- (A) Actinomycetes
- (B) Clostridia
- (C) Pseudomonads
- (D) Staphylococci
- (E) Streptococci

The next three questions are linked.

- 10 A patient injured herself at home in the garden, and after several days, the resulting skin lesion became infected and intensely painful and she sought medical help. Culture of the wound grew Gram-positive cocci that were β -hemolytic on blood agar. On nutrient agar, the organism produced effervescence when hydrogen peroxide was added to the colonies (shown in the photograph). What is the enzyme responsible for this bubbling?



- (A) β -lactamase
- (B) Catalase
- (C) Coagulase
- (D) Staphylokinase
- (E) Streptokinase

- 11 Of the following organisms, what is the patient most likely infected with?

- (A) *Clostridium* sp.
- (B) *Enterococcus*
- (C) Group A *Streptococcus*
- (D) *Meningococcus*
- (E) Methicillin-resistant *Staphylococcus aureus* (MRSA)

- 12 Based on these initial findings, what is the best antibiotic choice for the patient in the above case?

- (A) Amoxicillin/clavulanate
- (B) Cephalexin
- (C) Dicloxacillin
- (D) Polymyxin B
- (E) Trimethoprim-sulfamethoxazole (TMP-SMZ)

- 13 A pediatric patient with a persistent cough is evaluated for sinopulmonary disease. History and physical examination determines that the child suffers from nasal polyps and, possibly, chronic airway obstruction. A sputum sample produces several bacterial species, including *Haemophilus influenzae* and a mucoid variety of *Pseudomonas aeruginosa*. Which of the following is the most likely diagnosis?

- (A) Bronchiolitis
- (B) Chronic obstructive pulmonary disease (COPD)
- (C) Cystic fibrosis
- (D) Interstitial pneumonia
- (E) Sarcoidosis

- 14** During a medical mission to tropical Latin America, a woman presents with a chronic infection of her foot as seen in the accompanying photograph. Secretions from the lesions, upon Gram staining, clearly reveal the presence of filamentous Gram-positive cells. Which bacterial species is descriptive of the offending agent?



- (A) *Actinomyces israelii*
- (B) *Blastomyces dermatitidis*
- (C) *Clostridium perfringens*
- (D) *Mycobacterium leprae*
- (E) *Streptococcus pyogenes*

The next two questions are linked.

- 15** In early July, a middle-aged African-American male from rural southwestern Missouri is brought to regional urgent care facility. He has been vomiting most of the night and is currently febrile. Furthermore, he complains of “achy muscles” and a throbbing headache. Rales are detected on auscultation. Physical examination reveals a petechial rash on the forearms, and an engorged tick is removed from the groin area. Considering the particulars of this case, which of the following is the most crucial action that should be taken for successful management and a positive outcome?
- (A) Aggressive management of fluid intake to prevent rehydration
 - (B) Chest radiographic study to rule out interstitial pneumonia
 - (C) Gram stain clean-catch urine sample for evidence of a urinary tract infection (UTI)
 - (D) Immediate initiation of doxycycline
 - (E) Submit a blood sample for immunodiagnosis to the lab

- 16** With regard to the above case, which laboratory results would be most useful in confirming the clinical diagnosis?
- (A) Intracytoplasmic inclusions in McCoy tissue culture cells
 - (B) Positive bacterial growth on selective and differential media
 - (C) Twofold increase in a Weil–Felix *Proteus* OX-19 titer
 - (D) Type-specific latex agglutination antibody titer of 1:64
 - (E) Visualization of bacteria in the tissue by means of Gram stain

- 17** A Peace Corps agricultural advisor, who is stationed on an island in the eastern Indian Ocean, becomes ill with headache, fever, and respiratory symptoms. At the local clinic, a prominent eschar on the abdomen just below the beltline is detected. Local physicians easily make a clinical diagnosis of an illness carried by rodents and transmitted by mites. Doxycycline therapy is empirically administered and the patient makes an uneventful recovery. What is the name of the illness and the etiologic agent?
- (A) Brill–Zinsser disease/*Rickettsia rickettsiae*
 - (B) Endemic typhus/*Rickettsia typhi*
 - (C) Epidemic typhus/*Rickettsia prowazekii*
 - (D) Q fever/*Coxiella burnetii*
 - (E) Scrub typhus/*Orientia tsutsugamushi*

The next two questions are linked.

- 18** Physicians and state epidemiologists investigate a cluster of acute diarrheal cases in children who attend a preschool in a small Midwestern town. The children presented with fever, acute episodes of bloody diarrhea, and petechial rash or purpura. Two of the children have scanty urine output and are showing signs of renal failure. Fecal leukocytes and parasites are absent in microscopic smears, and no obvious pathogens are identified using standard microbiologic media. What is the most common infectious agent consistent with this clinical picture?
- (A) *Bacillus cereus*
 - (B) Enterohemorrhagic *Escherichia coli* (EHEC)
 - (C) *Salmonella typhi*
 - (D) *Shigella flexneri*
 - (E) *Yersinia enterocolitica*
- 19** The preschool in the above case only serves pasteurized milk and packaged cookies to the children and epidemiologists quickly rule out a food source as the risk factor. With this in mind, which of the following is the most plausible means by which the children were infected?

- (A) Contagious transmission from an infected child
- (B) Drinking water of the preschool is contaminated with the microbe
- (C) Failure to wash hands after visiting a petting zoo
- (D) Fecal–oral transmission, most likely from the restroom
- (E) Visiting the elderly in an assisted-living or nursing home facility

The next three questions are linked.

- 20** Medical outreach physicians, working in a refugee camp in central Africa, are concerned with the number of young children presenting with high fever, bloody diarrhea, and dehydration. The crowded living conditions of the camp suggest person-to-person contact, but because of the remoteness of the site only limited laboratory studies are available. The suspected culprit is described as a nonmotile, Gram-negative bacillus that does not produce lactose-positive colonies on selective media. Based on these findings, which disease is more likely?

- (A) Bacillary dysentery
- (B) Campylobacteriosis
- (C) Cholera (O:1 classic biotype)
- (D) Nontyphoidal salmonellosis
- (E) Staphylococcal food poisoning

- 21** A major virulence factor of the etiologic agent in the above question is a toxin. What is the role of this toxin in disease production?

- (A) Acts as a superantigen thereby inducing inflammation
- (B) Blocks protein synthesis causing intestinal cell death
- (C) Increases cAMP concentration within intestinal cells
- (D) Increases cGMP concentration within intestinal cells
- (E) Suppresses cytokine secretion by immune cells

- 22** What is the proper course of action the physicians should take with regard to the management of the outbreak described in the above case?

- (A) Advise patients to increase their vitamin intake due to the effects of diarrhea
- (B) Avoid antibiotics and allow the symptoms to abate naturally
- (C) Avoid contact with animal reservoirs to prevent reintroduction of the organism into the community
- (D) Prescribe antimotility drugs to reduce transmission
- (E) Treat affected patients with antibiotics

The next three questions are linked.

- 23** During the summer in western Massachusetts, a teenager complains of aching muscles and joints and mild fever. He notices a rash on the side of his upper leg (shown in the photograph), which prompts his mother to take him to the clinic. What is the most likely etiology and route of transmission?



- (A) *Borrelia burgdorferi*/tick bite
- (B) *Ehrlichia chaffeensis*/tick bite
- (C) *Francisella tularensis*/deer fly bite
- (D) *Leptospira interrogans*/rodent bite
- (E) Necrotic arachnidism/spider bite

- 24** How would the physician determine the diagnosis in the above case?

- (A) CBC assessment and visualization of the microbe from the lesion by dark field microscopy
- (B) History and clinical presentation of the patient plus elevated liver function tests
- (C) History and clinical presentation of the patient alone
- (D) Culture of the organism from blood and synovial fluid
- (E) Serologic tests to detect antibodies in the patient serum against the organism

- 25** With regard to the above case, what is the drug of choice?

- (A) Ceftriaxone
- (B) Chloramphenicol
- (C) Doxycycline
- (D) Metronidazole
- (E) Streptomycin

- 26** A 7-year-old female child is taken to an urgent care facility because of fever and periodic incontinence. The physician suspects a urinary tract infection. What is the most likely etiology of this child's infection?

(A) *Escherichia coli*
 (B) *Proteus mirabilis*
 (C) *Pseudomonas aeruginosa*
 (D) *Staphylococcus saprophyticus*
 (E) *Ureaplasma urealyticum*

The next two questions are linked.

- 27** During a gynecologic office visit, a positive leukocyte esterase test of the urine along with a voiding symptom prompts the physician to order a urine culture. The bacterium, which was isolated in clinically significant numbers, grows profusely on MacConkey agar, as shown in the accompanying photograph, and ferments lactose. Which of the following cellular attributes is most important in determining virulence and classifying this microbe as a uropathogen?



(A) β -lactamase
 (B) Fimbriae
 (C) Flagella
 (D) Glycocalyx
 (E) Urease

- 28** With reference to the above case, what is the most likely source and mode of transmission for this urinary bacterial isolate?

(A) Contamination with perianal and bowel flora
 (B) Hematogenous spread from the kidneys
 (C) Inadvertent inoculation with commensal organisms on skin
 (D) Transmission from an uncircumcised sexual partner
 (E) Waterborne spread

The next two questions are linked.

- 29** A 78-year-old hospitalized male with an indwelling catheter develops a new onset of fever. The urine sample has an alkaline pH. The bacterium isolated from the urine is a urease-producing, highly motile, Gram-negative bacillus. What is the most likely complication of this infection?

(A) Deposition of antigen-antibody complexes in the glomeruli
 (B) Development of epididymitis
 (C) Development of prostatitis
 (D) Formation of struvite kidney stones
 (E) Rapid dissemination throughout the body

- 30** What is the pathogen most likely involved in the above case?

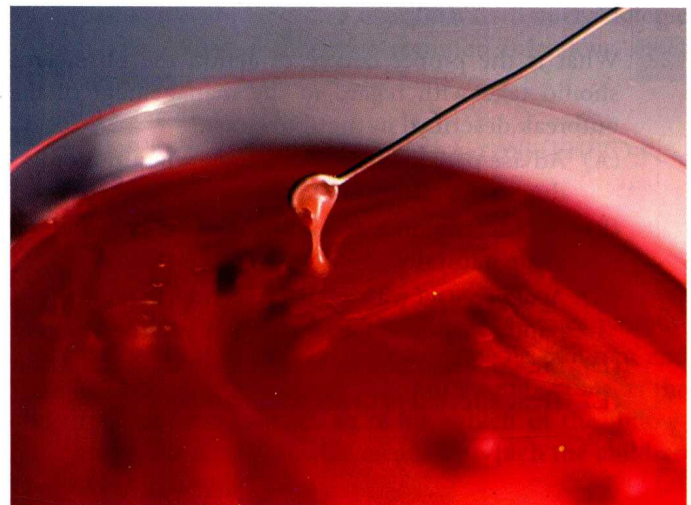
(A) *Escherichia coli*
 (B) *Proteus mirabilis*
 (C) *Pseudomonas aeruginosa*
 (D) *Staphylococcus saprophyticus*
 (E) *Ureaplasma urealyticum*

The next two questions are linked.

- 31** An 85-year-old male nursing home patient with a history of alcoholism suddenly developed a flu-like illness. He complained of chills and fever and had frequent coughing spells productive of thick, bloody sputum. The attending physician diagnosed bronchopneumonia and prescribed antibiotics, but regrettably the patient died within a week. What is the most likely cause of the patient's pneumonia?

(A) *Haemophilus influenzae*
 (B) *Klebsiella pneumoniae*
 (C) *Legionella pneumophila*
 (D) *Mycoplasma pneumoniae*
 (E) *Streptococcus pneumoniae*

- 32** A bacterium, cultured on MacConkey agar (shown in the photograph), was isolated from sputum and blood of the patient in the above case. What is the primary function of the pathogenicity determinant depicted in this photo?



- (A) Antiphagocytic, unless opsonization occurs
- (B) Degrades secretory IgA on mucosal surfaces
- (C) Inhibits the function of complement
- (D) Lyses neutrophils and macrophages
- (E) Protease activity and disrupts membranes

33 A bacterium was isolated from the central nervous system of a newborn that died of meningitis. The vagina of the mother was colonized with the same isolate as determined by the capsular antigen. The microbe grew well on standard blood and MacConkey agar at ambient atmospheric conditions. What is the most likely etiologic agent?

- (A) *Escherichia coli* K1
- (B) Group B *Streptococcus* type III capsule
- (C) *Haemophilus influenzae* type b
- (D) *Neisseria meningitidis* serogroup b
- (E) *Streptococcus pneumoniae* (encapsulated variety)

34 An adult tourist visiting a remote area of Guatemala developed fever, prostration, malaise, dysentery, and dehydration. Based on current epidemiologic data of the region, a local physician reported that the causative agent was probably a diarrheogenic strain of *Escherichia coli* and did not prescribe antibiotic therapy. Presuming the Guatemalan doctor to be correct, which type of virulent *E. coli* is most consistent with this clinical picture?

- (A) Enteroaggregative *E. coli* (EAEC)
- (B) Enterohemorrhagic *E. coli* (EHEC)
- (C) Enteroinvasive *E. coli* (EIEC)
- (D) Enteropathogenic *E. coli* (EPEC)
- (E) Enterotoxigenic *E. coli* (ETEC)

The next two questions are linked.

35 A 40-year-old man presented with a rubeola-like rash on the extremities, chills, fever, myalgia, and malaise 5 days after returning from a June fishing trip in Arkansas. A history of tick bites is noted and Rocky Mountain spotted fever (RMSF) is suspected. What is the etiologic agent of this disease?

- (A) *Babesia microti*
- (B) *Orientia tsutsugamushi*
- (C) *Rickettsia prowazekii*
- (D) *Rickettsia rickettsii*
- (E) *Rickettsia typhi*

36 With reference to the above question, which antimicrobial agent should be employed?

- (A) Chloramphenicol
- (B) Ciprofloxacin
- (C) Doxycycline
- (D) Penicillin G
- (E) TMP-SMZ

37 A previously healthy woman became nauseated and vomits 12 hours after eating home-pickled eggs. Within 24 hours, she developed a diffuse flaccid paralysis and respiratory impairment, necessitating hospitalization and mechanical ventilation. Other symptoms included diplopia and dysarthria. What is the most likely diagnosis?

- (A) Botulism
- (B) Brucellosis
- (C) Gastrointestinal anthrax
- (D) Legionellosis
- (E) Meningococcal disease

The next three questions are linked.

38 A 52-year-old woman presented with indigestion and heartburn occurring shortly after meals which she treated with over-the-counter antacids. Physical examination revealed mild epigastric tenderness. A radiolabeled-urea breath test is positive. What is the most probable etiologic agent?

- (A) *Campylobacter jejuni*
- (B) *Clostridium difficile*
- (C) *Helicobacter pylori*
- (D) *Shigella dysenteriae*
- (E) *Yersinia enterocolitica*

39 What cancer is the patient in the above case at risk for as a consequence of this infection?

- (A) Pancreatic cancer
- (B) Gastric adenocarcinoma
- (C) Hepatoma
- (D) Colon cancer
- (E) Esophageal cancer

40 What virulence factor of the organism may be associated with induction of this cancer?

- (A) cagA
- (B) Heat shock protein B
- (C) Mucinase
- (D) Urease
- (E) Vacuolating cytotoxin

41 Hemorrhagic colitis, hemolytic uremic syndrome, and thrombotic thrombocytopenic purpura are clinical manifestations of which bacterial species?

- (A) *Campylobacter jejuni*
- (B) *Escherichia coli* O157:H7
- (C) *Shigella flexneri*
- (D) *Vibrio cholerae*
- (E) *Yersinia enterocolitica*

- 42 Over the course of a summer, several patients present to hospitals in the northwestern United States with complaints of fever, chills, headache, and other viral-like symptoms. Reportedly, with many of these patients, the fever subsides only to return with a vengeance later. Of significance is that spirochetes are observed in peripheral blood smears. Another common denominator is that all patients are outdoor enthusiasts and frequently engage in activities like camping, fishing, and hiking in mountainous areas. What is the most likely etiologic agent?

(A) *Borrelia hermsii*
 (B) *Treponema pallidum*
 (C) *Rickettsia rickettsiae*
 (D) *Proteus vulgaris*
 (E) *Vibrio vulnificus*

The next three questions are linked.

- 43 A 23-year-old male presents with ulcerated lesions on the penis as shown in the accompanying photograph as well as marked unilateral inguinal lymphadenopathy. The lymph node, however, is not particularly painful to the touch. The patient denies abnormal discharge and any discomfort during intercourse. He is presently afebrile. Consistent with the presentation, what is the probable causative etiology?



(A) *Chlamydia trachomatis*
 (B) *Haemophilus ducreyi*
 (C) *Neisseria gonorrhoeae*
 (D) *Treponema pallidum*
 (E) *Trichomonas vaginalis*

- 44 The 20-year-old pregnant partner of the above patient presented with a 2-week history of flu-like symptoms. Physical examination reveals a generalized nontender lymphadenopathy and numerous discrete cutaneous hyperpigmentations on the soles of the feet as shown in the accompanying photograph. Which of the following laboratory procedures would give you a definitive diagnosis?



(A) Bacteriologic culture
 (B) Giemsa-stained histological section
 (C) Gram-stained smear
 (D) Growth in cell culture
 (E) Specific antibody test

- 45 Assuming that the patient in the above case has no drug allergies, which antibiotic would be the best choice for treatment?

(A) Ciprofloxacin
 (B) Doxycycline
 (C) Metronidazole
 (D) Penicillin
 (E) TMP-SMZ

- 46 A 5-day postoperative patient develops a high fever. An IV catheter is removed and culture of the tip reveals Gram-positive cocci believed to be *Staphylococcus aureus*. Which of the following laboratory test results would further support this belief?

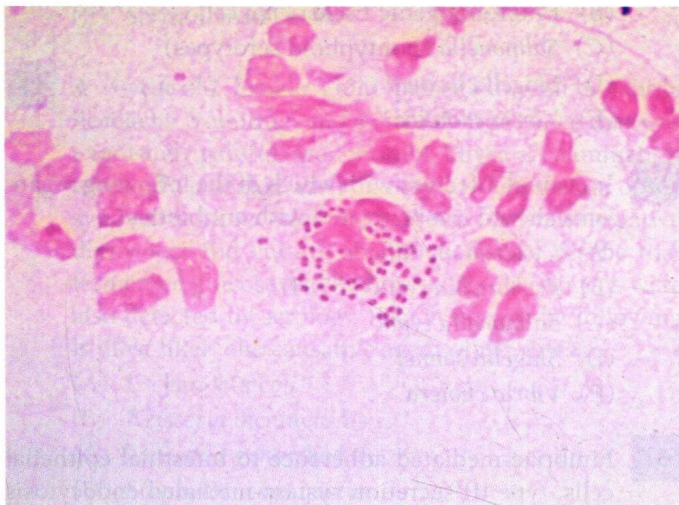
(A) α -Hemolysis on blood agar
 (B) Bacitracin sensitivity
 (C) Coagulase positivity
 (D) Lactose fermentation
 (E) Urea hydrolysis

- 47 A high school student who was appropriately immunized with the diphtheria-tetanus-acellular pertussis (DTaP) series by kindergarten, but who had received no additional boosters since, stepped on a nail while walking barefoot. The nail was easily removed and the lesion freely bled. What should the student be given?

(A) Equine tetanus antitoxin
 (B) Human tetanus immune globulin
 (C) Prophylactic antibiotic treatment for *Clostridium tetani*
 (D) No treatment
 (E) Tetanus toxoid

The next two questions are linked.

- 48 The Gram-stained smear of urethral exudate from a male (shown in the photo) is diagnostic for which disease?

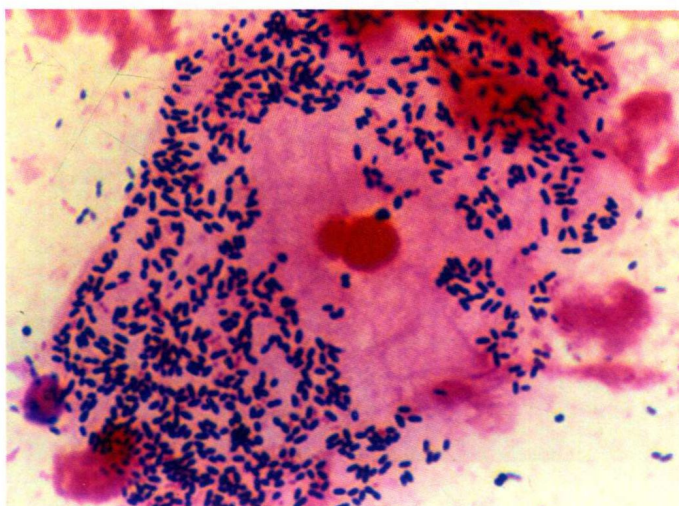


- (A) Chancroid
- (B) Gonorrhea
- (C) Lymphogranuloma venereum
- (D) Nongonococcal urethritis
- (E) Primary syphilis

- 49 What is the appropriate therapy for the patient in the above case, assuming no further tests were conducted?

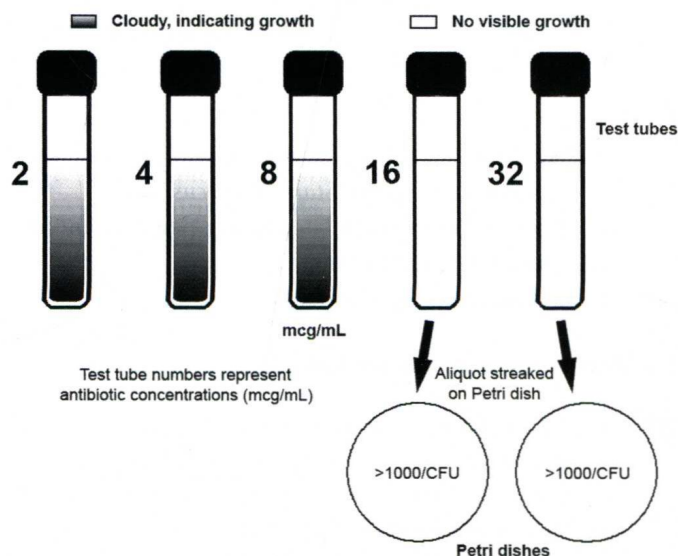
- (A) Ceftriaxone
- (B) Ceftriaxone plus azithromycin
- (C) Ciprofloxacin
- (D) Penicillin
- (E) Tetracycline

- 50 A 24-year-old woman presents with a vagina discharge that is characterized by a thin milky appearance, a marked amine odor, and a pH of 4.5. A Gram-stain of the vaginal discharge is shown in the photograph. What is the most likely diagnosis?



- (A) Atrophic vaginitis
- (B) Bacterial vaginosis
- (C) Gonorrhea
- (D) Group B strep colonization
- (E) *Trichomonas vaginalis* infection

- 51 A tube dilution panel for a particular antibiotic gives results as illustrated in the accompanying photograph. With regard to the sensitivity of this particular bacterial isolate to the antibiotic tested, which statement is true?



- (A) Results reflect the bacteriostatic properties of the antibiotic
- (B) The antibiotic is bactericidal at all tube dilution concentrations
- (C) The minimum inhibitory concentration (MIC) is 8 mcg/mL
- (D) The MIC is >32 mcg/mL
- (E) The minimum bactericidal concentration (MBC) is 16 mcg/mL

- 52 A preschool-aged child from Georgia is hospitalized because of edema and hematuria. Of note is that the child was recently successfully treated for a pyoderma (see photo). Which microbe is likely associated with this child's condition?



- (A) Acid-fast *Nocardia asteroides* complex
- (B) Coagulase-negative *Staphylococcus*
- (C) *Escherichia coli* or related Gram-negative enteric
- (D) Group A *Streptococcus*
- (E) *Pseudomonas aeruginosa*

The next two questions are linked.

53 A 37-year-old man presented with a 2 day history of low grade fever, abdominal cramps diarrhea, nausea, and vomiting. One day prior to the onset of symptoms, six family members had eaten at an all-you-can-eat fried chicken buffet. Two other members of his family (his 82-year-old mother and a 14-month-old son) had similar symptoms. Examination of a fecal smear from the patient revealed abundant fecal leukocytes. Which of the following laboratory profiles is consistent with the most likely microbial cause of this man's condition?

- (A) Aerobic, β -hemolytic, spore-forming Gram-positive rod
- (B) Bacitracin-sensitive, Gram-negative cocci
- (C) Coagulase-negative, Gram-positive cocci
- (D) Nonlactose fermenting, Gram-negative bacilli
- (E) Oxidase-positive, motile, curved, Gram-positive bacilli

54 Which of the following medications, if taken by the man in the above case, could have increased his susceptibility to the infection he developed?

- (A) Acetaminophen
- (B) Antacids
- (C) β -Blockers
- (D) Ibuprofen
- (E) Statins

55 Which of the following bacterial agents has the lowest infective dose for producing gastrointestinal disease in the human host?

- (A) Enteropathogenic *Escherichia coli*
- (B) Enterotoxigenic *Escherichia coli*
- (C) *Salmonella* (nontyphoid serotypes)
- (D) *Shigella flexneri*
- (E) *Vibrio cholerae*

56 Intestinal infection with which of the following organisms should not be treated with antibiotics?

- (A) *Clostridium difficile*
- (B) *Escherichia coli* O157:H7
- (C) *Salmonella typhi*
- (D) *Shigella sonnei*
- (E) *Vibrio cholera*

57 Fimbriae-mediated adherence to intestinal epithelial cells, type III secretion system-mediated endocytosis and transport to the lamina propria to elicit a localized inflammatory response are descriptive of the infectivity and pathogenesis of which diarrheogenic agent?

- (A) *Campylobacter jejuni*
- (B) *Clostridium difficile*
- (C) Enterotoxigenic *Escherichia coli*
- (D) *Salmonella* sp.
- (E) *Vibrio cholerae*

58 A critically ill patient, who has a Foley catheter, develops a serious UTI. The organism is identified as a motile, nonurease-producing, Gram-negative enteric bacillus with a high degree of antibiotic resistance that rarely causes disease in immune competent people. The agent formed pigments on nutrient agar cultivated at room temperature, as shown in the photograph. What is the etiology of this patient's UTI?

