

# **NCCPA PANCE - Quiz Questions with Answers**

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# Infectious Diseases

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Infectious Diseases

1.

You see a 19-year-old male for a rash that developed after he was seen and treated at a walk-in clinic for a sore throat. He also complains of malaise, anorexia, and myalgias. On his examination, he has a fever of 101.0 F (38.33 C), exudative pharyngitis, gingivitis, and petechiae on his soft palate. He has tender, enlarged posterior cervical lymphadenopathy and splenomegaly. He has a maculopapular, erythematous rash on his trunk and extremities.

Which of the following antibiotics was this patient likely treated with at the walk-in clinic?

**Ampicillin**

Tetracycline (Sumycin)

Erythromycin (Erythrocin, EES)

Ceftriaxone (Rocephin)

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*Correct answer: Ampicillin*

*This patient has symptoms and exam findings consistent with infectious mononucleosis, most likely due to Epstein-Barr virus (EBV) infection. In addition to the findings listed for this patient, administration of ampicillin can increase the incidence of a maculopapular rash to 90%. A maculopapular and, occasionally, petechial rash develops in about 15% of mononucleosis cases.*

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2.

All the following statements regarding fevers are true **except**:

**the degree of fever correlates with the severity of illness**

a body temperature greater than 106.8°F (41.1°C) will cause irreversible brain damage

one of the most common causes of fever of unknown origin (FUO) is a multisystem disease

those on chronic medications have an impaired ability to mount a fever

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*Correct answer: the degree of fever correlates with the severity of illness*

*A fever is produced when monocyte-macrophage cells are stimulated to elaborate pyrogenic cytokines, triggering an elevated set point of the body's temperature. Although elevated temperature and the symptoms caused by the change in body temperature are fairly well correlated with illness, particularly infection, the degree of fever does not correlate with the severity of the illness.*

*Irreversible brain damage occurs when the body's temperature is greater than 106.8°F (41.1°C).*

*FUO is defined as a temperature of greater than 101.8°F (38.8°C) for three weeks with no discernible cause despite at least one week of diagnostic workup. The most common causes of FUO are infections and multisystem disease (i.e. autoimmune disorders, neoplasms). In 25% of cases, no diagnosis is made.*

*The elderly and those on chronic medications (i.e. NSAIDs, steroids) have an impaired ability to mount a fever and may not have fever in the presence of infection, etc. Conversely, children typically mount very high fevers.*

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**3.**

A migrant worker presents to the ER with a deep puncture wound to the foot. The tetanus status of the patient is unknown. Which of the following is the recommended treatment for this patient?

**Tetanus vaccine and tetanus toxoid**

Tetanus immune globulin

Tetanus toxoid

Tetanus immune globulin and tetanus booster

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*Correct answer: Tetanus vaccine and tetanus toxoid*

*Tetanus is due to Clostridium tetani spores that are ubiquitous in the soil. When present in a wound, they germinate, and the bacteria produce the neurotoxin tetanospasmin which interferes with neurotransmission at the spinal synapses of inhibitory neurons. The result is uncontrolled spasms and hyperreflexia. Trismus, neck stiffness, dysphagia, and irritability are common. Asphyxia can develop with spasms of the glottis and respiratory muscles if untreated. In a patient with uncertain tetanus status and a major wound, tetanus vaccine and tetanus toxoid should be given. This confers passive immunity. Penicillin is also given to all patients to eradicate toxin-producing organisms.*

*Tetanus immune globulin is given if the patient is symptomatic for tetanus. It alone does not provide proper immunization.*

*Tetanus toxoid can be administered after immune globulin for convalescing tetanus patients.*

*Tetanus immune globulin and a tetanus booster would be incorrect in this scenario. However, in a patient with a major wound and up-to-date immunization status, if it has been over five years since the last booster, another booster should be given.*

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**4.**

You have a patient with a known history of latent TB infection (LTBI) who you have just diagnosed with HIV. He is experiencing a productive cough, fever, and night sweats. Which of the following tests would you use to definitively confirm the diagnosis of reactivation TB illness?

**A sputum culture**

A tuberculin skin test (TST) such as the purified protein derivative (PPD)

A chest radiograph

A smear of his sputum

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*Correct answer: A sputum culture*

*Definitive diagnosis of TB requires identification of *Mycobacterium tuberculosis* from either sputum cultures (six to eight weeks to grow) or by RNA or DNA amplification techniques (one to two days for results).*

*This patient has a known history of LTBI, so his TST/PPD is already positive. These tests are used to identify individuals who have been infected, but it does not differentiate between active and latent infection. Positive testing is reported in terms of the size of induration, not the presence of erythema. There is a lower threshold for those with immunosuppression, radiographic evidence of TB, or contacts of those with active TB infection.*

*A chest radiograph in the setting of reactivation TB illness will demonstrate fibrocavitary apical disease with nodules and infiltrates in the posterior and apical segments of the right upper lobe, apical-posterior segments of the left upper lobe, and superior segments of the lower lobes. While this is highly suggestive of reactivation TB, it does not definitively diagnose it.*

*A sputum smear showing acid-fast bacilli is, again, highly suggestive of reactivation TB but does not definitively diagnose it.*

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**5.**

All the following treatments are recommended for a confirmed infection of *Neisseria gonorrhoeae* **except**:

**fluoroquinolones**

ceftriaxone (Rocephin)

cefixime (Suprax)

azithromycin (Zithromax, Zmax)

*Correct answer: fluoroquinolones*

*Neisseria gonorrhoeae* infection typically includes a history of sexual contacts, clinical signs and symptoms of dysuria, and serous or milky penile discharge in men or dysuria, frequency, and urgency, and purulent urethral discharge in women. Vaginitis, cervicitis, pelvic inflammatory disease, and infertility in women can be possible as well. Gram stains and cultures are essential to confirm the diagnosis. There is widespread resistance to penicillin, tetracyclines, and fluoroquinolones; therefore, they are not recommended treatments.

*IM ceftriaxone is currently a treatment of choice for *Neisseria gonorrhoeae* infection as well as for oral cefixime. Azithromycin or doxycycline should be given at the time of treatment for a confirmed case of *Neisseria gonorrhoeae* infection to cover for co-infection with chlamydia.*

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**6.**

A previously unvaccinated 10-year-old boy is brought to the ER by his mother for evaluation. She states that for the past week, her son has had a fever, chills, body aches, and headaches along with congestion, runny nose, and cough. Even though he seemed to be getting better, she decided last night to start treating him with aspirin, and today he is much worse. She states that he has developed vomiting, is hard to wake up, and is very confused.

Based on this child's history, which of the following would you expect to find on his labs?

**Elevated liver function tests (LFTs)**

Hyperglycemia

Decreased serum ammonia

Decreased prothrombin time (PT)

*Correct answer: Elevated liver function tests (LFTs)*

*This child has a history and symptoms suggestive of Reye syndrome. It is a dangerous, rapidly fatal condition that has a 30% fatality rate. It is defined as a fatty liver with encephalopathy, and it may develop two to three weeks after the onset of influenza A or varicella infection, especially if aspirin is ingested. It rarely occurs in those older than 18 years of age. Clinical manifestations include vomiting, lethargy, jaundice, seizures, and changes in mental status. Labs will show hypoglycemia, increased liver enzymes, and ammonia levels along with a prolonged prothrombin time (PT). Treatment is supportive.*

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**7.**

Which of the following patients is **most** at risk for developing candidal endocarditis?

**A 22-year-old IV drug user**

A 45-year-old uncontrolled diabetic

A 62-year-old with leukemia undergoing aggressive chemotherapy

A 55-year-old with an indwelling catheter

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*Correct answer: A 22-year-old IV drug user*

*Candida albicans is the most common form of pathogenic Candida species and is part of the normal flora of human hosts. During times of immunosuppression, however, it can become an opportunistic pathogen. Candidal endocarditis occurs most often through direct inoculation at the time of surgery, injection/IV drug use, or in late-stage HIV disease. Approximately 50% of cases involve non-albicans Candida species and are resistant to treatment.*

*A 45-year-old uncontrolled diabetic is at risk for Candidal infections due to the stress of chronic illness. Cutaneous disease, mucosal disease of the mouth and esophagus, and vulvovaginal disease are the most common manifestations.*

*A 62-year-old with leukemia undergoing aggressive chemotherapy is most likely at risk for hepatosplenic candidiasis due to low WBC counts.*

*A 55-year-old with an indwelling catheter is at an increased risk for Candidal fungemia, which can be life-threatening.*

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**8.**

Which of the following is the **first** symptom experienced in a person affected by malaria infection?

**Shaking chills**

Fever

Diaphoresis

Seizure

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*Correct answer: Shaking chills*

*The typical malarial attack occurs in three stages: shaking chills (the cold stage), followed by fever (the hot stage), and finally, diaphoresis (the sweating stage).*

*Plasmodium species are the organisms responsible for malaria. Transmission occurs via the bite of the Anopheles mosquito. The mosquito ingests the parasite, and it is there that the sporozoite matures and then is transferred to humans via saliva. The sporozoites first invade the hepatocytes and mature there as tissue schizonts. The schizonts then escape the liver and invade the RBCs, where they multiply and cause rupture of the cell within 48 hours. As this cycle continues, the release of tissue necrosis factors and cytokines contribute to the symptoms of fatigue, headache, dizziness, GI complaints, myalgias, arthralgias, backache, and dry cough. There may be liver and spleen enlargement if the symptoms continue for more than four days.*

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**9.**

Which of the following statements regarding pneumocystis jiroveci pneumonia (PJP) is **true**?

**It may be prevented by the use of nebulized pentamidine (Nebupent).**

It is the second most common opportunistic infection in HIV disease.

The treatment of choice is amphotericin B (Ambisome).

Imaging results are disproportionate to clinical and physical exam findings.

*Correct answer: It can be prevented by the use of nebulized pentamidine (Nebupent).*

*PJP is caused by a fungus found in the lungs of many humans and animals. It is transmitted through the air and lies dormant in the alveoli. Sporadic cases are found in patients with abnormal cellular immunity, which is caused by cancer, severe malnutrition, immunosuppressive drugs, irradiation, or in those with HIV/AIDS and a CD4 count of fewer than 200 cells/uL. It presents with fever, shortness of breath, and a nonproductive cough. Nebulized pentamidine can be used to prevent PJP, and it may be used either IV or IM as an alternative in active PJP.*

*PJP is the most common opportunistic infection in HIV disease. It is an AIDS indicator disease and usually occurs when the CD4 count falls below 200 cells/uL.*

*The treatment of choice is trimethoprim-sulfamethoxazole (TMP-SMX). Empiric treatment is started for immunocompromised patients who present with a cough or dyspnea. Steroids can be added in those with a PaO<sub>2</sub> of less than 70 mm Hg to promote oxygenation and prevent degeneration. Dapsone and pentamidine are alternatives for those who are allergic to sulfa.*

*In PJP, the clinical and physical exam findings are disproportionate to the imaging results. Between 5% and 10% of patients have a normal chest radiograph. If findings are noted, interstitial infiltrates that are either heterogeneous, miliary, or patchy may be seen.*

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**10.**

You suspect Rocky Mountain Spotted Fever (RMSF) in a 14-year-old girl who has recently returned from summer camp on the eastern U.S. coast. Which of the following physical exam findings would appropriately support your suspicion?

**Fever, flushed face, injected conjunctiva, and a maculopapular/petechial rash that demonstrates centripetal spread**

An acute, flu-like illness with one or more flat to raised "bull's-eye" shaped lesions

Fever, exudative pharyngitis, gingivitis, soft palate petechiae, tender posterior cervical lymphadenopathy, splenomegaly, and a diffuse, maculopapular/petechial rash

Fever, flushed face with circumoral pallor and a strawberry tongue, and a diffuse, blanching erythematous/fine papular rash (sandpaper rash)

*Correct answer: Fever, flushed face, injected conjunctiva, and a maculopapular/petechial rash that demonstrates centripetal spread*

*Fever, flushed face, injected conjunctiva, and a maculopapular/petechial rash that demonstrates centripetal spread are the classic physical exam findings in RMSF. These findings, along with complaints of chills, headaches, nausea, vomiting, myalgias, restlessness, and insomnia, generally develop two to 14 days after exposure.*

*An acute, flu-like illness with one or more flat to raised "bull's-eye" shaped lesions are findings in early, localized Lyme disease infection, which develops seven to 10 days after exposure. Flu-like illness occurs in up to 50% of patients. The "bull's-eye" lesions of erythema migrans do not occur in up to 25% of patients.*

*Fever, exudative pharyngitis, gingivitis, soft palate petechiae, tender posterior cervical lymphadenopathy, splenomegaly, and a diffuse, maculopapular/petechial rash are findings consistent with infectious mononucleosis due to Epstein-Barr virus. The rash occurs in up to 15% of infected patients. The incidence of rash increases to 90% when ampicillin is administered to these patients.*

*Fever, flushed face with circumoral pallor and a strawberry tongue, and a diffuse, blanching erythematous/fine papular rash (sandpaper rash) are characteristic of*

*scarlet fever, which is due to pharyngitis caused by group A B-hemolytic streptococci (GABHS).*

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**11.**

All the following statements regarding rabies are true **except**:

**rats and mice are vectors that can transmit rabies**

the incubation period between bite and onset of symptoms may be anywhere from 10 days to years

rabies can induce hydrophobia (painful spasms caused by drinking water)

postexposure immunization includes rabies immunoglobulin and human diploid cell vaccine (HDCV)

*Correct answer: rats and mice are vectors that can transmit rabies*

*Rhabdovirus is transmitted to humans via infected saliva from an animal bite or an open wound. Common vectors are dogs, bats, skunks, foxes, raccoons, and coyotes. Rodents and lagomorphs (rabbits and hares) do not transmit rabies.*

*The incubation period between bite and onset of symptoms may be anywhere from 10 days to years; the typical period is three to seven weeks. There is a correlation between the length of incubation and the distance of the wound from the brain.*

*A history of an animal bite may not be apparent. Pain and paresthesias, along with temperature and wind sensitivity, are common at the wound site. Restlessness, muscle spasms, and extreme excitability along with bizarre behavior are all common manifestations. Hydrophobia and ascending paralysis may also be seen. Convulsions, paralysis, and thick, tenacious saliva are also common in those infected with rabies.*

*There is no specific treatment for rabies. Prevention of the disease is key. Household pets should be immunized. Wounds from animal bites should be thoroughly cleaned, debrided, and flushed. They should not be sutured. Postexposure immunization includes rabies immunoglobulin (in the wound and IM at a distant site) and human diploid cell vaccine (HDCV) on days 0, 3, 7, 14, and 28.*

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**12.**

Which of the following is **not** an AIDS indicator disease?

**Clostridium difficile colitis**

Invasive cervical cancer

Progressive multifocal leukoencephalopathy

Histoplasmosis

*Correct answer: Clostridium difficile colitis*

*HIV infects all cells containing the T4 antigen, primarily the CD4 helper-inducer lymphocytes. As a result, HIV disease results in a disordered function of the immune system that manifests as a syndrome of nonspecific and specific diagnoses. The immunodeficiency causes infections and malignant diseases at any site, and these will typically develop as the CD4 count drops. Clostridium difficile colitis is an HIV-related illness that can occur anytime in HIV infection but may become more likely as the CD4 count falls below 500 cells/uL. It is not an AIDS indicator disease.*

*AIDS is defined by the CDC as a CD4 count below 200 cells/uL or the development of an AIDS indicator disease. Invasive cervical cancer, progressive multifocal leukoencephalopathy, and histoplasmosis (disseminated or extrapulmonary) are all AIDS indicator diseases. Others include multiple or recurrent bacterial infections, candidiasis, coccidioidomycosis, cryptosporidiosis, cytomegalovirus, HIV-related encephalopathy, chronic/severe herpes simplex, isosporiasis, Kaposi sarcoma, lymphoid interstitial pneumonia and/or pulmonary lymphoid hyperplasia, lymphomas, mycobacterium sp. infections, pneumocystis jiroveci pneumonia, any recurrent pneumonia, recurrent Salmonella septicemia, toxoplasmosis of the brain, and HIV-related wasting syndrome.*

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**13.**

A 15-year-old female presents to your office for evaluation of headaches, neck stiffness, fatigue, malaise, arthralgias, and myalgias. The teen is afebrile and otherwise has been in good health. Her mother states that she just returned from summer camp in Wisconsin a few weeks ago. Further questioning reveals that she recalls a red, ring-like rash in her groin that went away after about a week while she was there.

Which of the following organisms is the **most** likely etiologic agent for her current illness?

**Borrelia burgdorferi**

Rickettsia rickettsii

Hookworms

Entamoeba histolytica

*Correct answer: Borrelia burgdorferi*

*This patient has classic symptoms of early disseminated Lyme disease which is caused by the organism Borrelia burgdorferi. It is transmitted by the small tick Ixodides, and it is the most common vector-borne illness in the U.S. Up to 75% of those affected do not recall having been bitten by a tick. She describes the classic, early localized infection known as erythema migrans, which typically occurs seven to 10 days after the bite. A flu-like illness can also occur during this stage in up to 50% of patients. Her current symptoms are typical of the second stage of the illness, occurring days to weeks later. Patients may also have cardiac or neurologic symptoms in 20% of cases as well. Stage 3 or late persistent infection can occur months to years later and typically demonstrates musculoskeletal symptoms of frank arthritis and chronic synovitis. Subacute encephalopathy (memory loss, mood changes), axonal polyneuropathy (paresthesias, encephalopathy), and leukoencephalitis (cognitive change, paraparesis, ataxia, bladder dysfunction) are common findings.*

*Rickettsia rickettsii is the organism responsible for Rocky Mountain spotted fever. It is transmitted by the wood tick. Two to 14 days after exposure, patients will present with a flushed face, injected conjunctiva and faint macules to maculopapules, and petechiae that develop on the wrists and ankles and then spread to the extremities and the trunk. Fever, chills, headache, nausea, vomiting, myalgias, restlessness, insomnia, and irritability are all common symptoms. Up to 10% of patients do not develop a rash.*

*Hookworms are endemic to the tropic and subtropic regions. Humans are the only host. The larvae are present in the sand and the soil and penetrate the skin of the feet causing pruritic, erythematous dermatitis with a maculopapular or vesicular eruption. They then migrate via the bloodstream to the pulmonary alveoli where they are carried to the mouth by cilia and swallowed. The larvae attach to the large intestine, mature, and release eggs to continue the life cycle. The pulmonary stage may present with a cough, wheeze, low-grade fever, and blood-tinged sputum. The intestinal stage may be asymptomatic in a light infection or present with anorexia, diarrhea, pain, and ulcer-like epigastric symptoms with heavy infection.*

*Entamoeba histolytica are the organisms responsible for amebiasis. Humans are the only host. The cysts are viable in the soil and water for weeks to months and are transmitted via fecally contaminated food, water, fly droppings, or by human-to-human contact. Once ingested, the cysts hatch into trophozoites in the intestines where they invade the mucosa and induce necrosis. The disease may be asymptomatic or cause symptoms of colitis (semiformal stools without blood) or severe dysentery (greater number of liquid stools streaked with blood or bits of necrotic tissue). Cramping, fatigue, weight loss, and increased flatulence are typical complaints. Severe disease can cause fever, colic, tenesmus, and vomiting; patients are prostrate and toxic. Perforation of the bowel is possible. Extraintestinal disease can cause hepatic abscesses.*

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**14.**

Which of the following is a minor criterion for the diagnosis of acute rheumatic fever (ARF) as defined by the Jones criteria?

**Fever**

Carditis

Arthritis

Sydenham chorea

*Correct answer: Fever*

*The diagnosis of ARF requires the presence of two major criteria or one major and two minor criteria plus evidence of a recent B-hemolytic streptococcal infection (either by culture or antistreptolysin-O (ASO) titer). The major criteria are carditis, erythema marginatum, subcutaneous nodules, Sydenham chorea, and arthritis.*

*The minor criteria are fever, polyarthralgia, reversible prolongation of the PR interval, rapid erythrocyte sedimentation rate, elevated C-reactive protein, and history of rheumatic fever.*

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**15.**

Which of the following statements regarding latent tuberculosis infection (LTBI) is **true**?

**Reactivation TB illness develops from LTBI in the setting of immune compromise**

Approximately 75% of those infected with TB will develop LTBI

LTBI is asymptomatic, but these patients are infectious and could spread TB

Ghon and Ranke complexes are commonly seen on chest radiographs of those with LTBI

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*Correct answer: Reactivation TB illness develops from LTBI in the setting of immune compromise*

*TB infection is caused by inhaling Mycobacterium tuberculosis organisms within aerosol droplets expelled during coughing by an individual with the active disease. Most exposed people mount an immune response sufficient to prevent progression from initial infection to clinical illness. T cells and macrophages surround the organism in forming a granuloma. Approximately 95% of infected persons will contain the bacterium without becoming symptomatic; this is known as LBTI. Reactivation TB illness develops from LBTI in the setting of immune compromise.*

*LBTI is asymptomatic. These patients have inactive TB in their bodies, most commonly in the apices of the lungs. They are not considered to be infectious, nor can they spread TB.*

*Ghon complexes (calcified primary focus) and Ranke complexes (calcified primary focus and calcified hilar lymph node) are seen on the chest radiograph of a person with a healed primary infection.*

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**16.**

A 44-year-old bisexual man with a history of multiple sex partners, who is not in a monogamous relationship, asks for HIV screening. Which of the following laboratory tests is the **most** appropriate screening test for HIV disease?

**HIV ELISA and Western blot if positive**

HIV ELISA and CD4 count

Viral load and CD4 count

HIV ELISA and viral load if positive

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*Correct answer: HIV ELISA and Western blot if positive*

*Screening for HIV infection tests antibodies to the virus. Two enzyme-linked immunosorbent assay (ELISA) tests followed by a confirmatory Western blot analysis can confirm HIV infection with a sensitivity of greater than 95%.*

*A CD4 count is used to monitor known HIV disease. It is recommended that the CD4 count is drawn at the same time of the day by the same laboratory for the best accuracy. Those with a CD4 count of more than 350 cells/uL should have it checked every six months; otherwise, it should be checked every three months or when there is a change in the patient's status.*

*A viral load is a measure of actively replicating virus that is taken after the diagnosis of HIV disease. It correlates with disease progression. Changing viral loads may also be used to measure treatment response.*

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17.

An HIV-positive patient presents to the ER for evaluation of fever, progressive dyspnea, tachypnea, and a nonproductive cough. His CD4 count is 100 cells/uL. His chest radiograph shows perihilar infiltrates and no effusions. Which of the following is the **most** appropriate empiric antibiotic for this patient at this time?

**Trimethoprim-sulfamethoxazole (Bactrim, Sulfatrim)**

Levofloxacin (Levaquin)

Ceftriaxone (Rocephin) plus azithromycin (Zithromax)

Doxycycline (Vibramycin)

*Correct answer: Trimethoprim-sulfamethoxazole (Bactrim, Sulfatrim)*

*This patient likely is suffering from *Pneumocystis jiroveci* pneumonia (PJP), also formerly known as *Pneumocystis carinii* pneumonia (PCP). It is the most common opportunistic infection in patients with HIV, typically in those with CD4 counts of less than 200 cells/uL. It may also occur in patients with cancer, malnourished states, and immunosuppression. Chest radiograph is the cornerstone of the diagnosis and will typically demonstrate diffuse or perihilar infiltrates without effusions. Sputum staining, via either induced sputum or bronchoalveolar lavage, will establish the diagnosis in more than 90% of patients. There is an extremely high mortality rate (near 100%) if not treated, and trimethoprim-sulfamethoxazole is the treatment of choice.*

*Levaquin or a fluoroquinolone is the first-line treatment for community-acquired pneumonia (CAP) in a patient with an underlying chronic disease treated as an outpatient. It may also be used in the inpatient setting for coverage against *S. pneumoniae* and *Legionella* sp.*

*Ceftriaxone plus azithromycin (a B-lactam and macrolide combination) may be used for coverage against *S. pneumoniae* and *Legionella* sp. during inpatient treatment of CAP.*

*Doxycycline is an appropriate treatment for CAP in an otherwise healthy adult treated for CAP as an outpatient.*

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**18.**

A patient undergoing treatment for active TB begins to experience symptoms of numbness and tingling in both of her feet. Which of the following medications is likely the underlying cause?

**Isoniazid (INH)**

Ethambutol (EMB)

Rifampin (RIF)

Pyrazinamide (PZA)

*Correct answer: Isoniazid (INH)*

*This patient is experiencing symptoms of peripheral neuropathy which can be a side effect of taking isoniazid (INH). Co-administering vitamin B6 (pyridoxine) can reduce the risk. INH can also induce hepatitis.*

*Ethambutol (EMB) can induce optic neuritis producing the symptoms of red-green vision loss.*

*Rifampin (RIF) can trigger hepatitis, a flu-like syndrome, and cause an orange discoloration of body fluids.*

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**19.**

A 19-year-old, sexually active female presents to your office for evaluation of vaginal discharge. She states that the discharge is yellow-green and has a frothy consistency. Diffuse vaginal erythema is present on examination. Which of the following diagnostic findings would you expect on her workup?

**Motile flagellates on a wet mount**

Gram-negative intracellular diplococci on a Gram stain

Treponemal spirochetes on dark-field microscopy

Multinucleated giant cells on a Tzanck smear

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*Correct answer: Motile flagellates on a wet mount*

*This patient likely has a trichomonas infection. It is a flagellated protozoan that infects the vagina, Skene gland, and lower urinary tract of females and the genitourinary tract of males. In addition to pruritus and a malodorous, frothy, yellow-green discharge, there may also be diffuse vaginal erythema and red macular lesions visible on the cervix. Wet mount will demonstrate motile flagellates. Trichomonas is a sexually transmitted disease; therefore, the patient and all partners require treatment.*

*Gram-negative intracellular diplococci on a Gram stain is a diagnostic finding for infection with *Neisseria gonorrhoeae*.*

*Treponemal spirochetes on dark-field microscopy is diagnostic for infection with *Treponema pallidum* or syphilis.*

*Multinucleated giant cells on a Tzanck smear is diagnostic for infection with the herpes simplex virus (HSV).*

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**20.**

Which of the following is the **initial** clinical symptom of botulism?

**Visual changes**

Nausea and vomiting

Cranial nerve palsies

Mental status changes

*Correct answer: Visual changes*

*Botulism is caused by Clostridium botulinum, a strictly anaerobic, spore-forming bacillus found in the soil. When inadvertently packed in food, botulinum toxin is produced and stored until ingested. The toxin produces systemic symptoms by inhibiting the release of acetylcholine at the neuromuscular junction. IV drug users are at an increased risk of botulism, and infants under the age of one should not be fed honey due to an increased risk. The initial clinical symptom is visual changes including diplopia and loss of accommodation. Manifestations will appear 12 to 36 hours after ingestion.*

*Additional manifestations of botulism include nausea and vomiting, ptosis, impaired extraocular muscle movements, fixed/dilated pupils, cranial nerve palsies, dysphonia, dry mouth, and dysphagia. Respiratory failure may necessitate intubation and mechanical ventilation. Persistent dysphagia may necessitate IV nutritional support and hyperalimentation.*

*Mental status changes and sensory deficits do not occur with botulism.*

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**21.**

Due to the growing prevalence of drug-resistant influenza, which of the following regimens is the 2009 recommendation from the CDC for the treatment of suspected influenza A?

**Oral oseltamivir (Tamiflu) and rimantadine (Flumadine)**

Amantadine (Symmetrel) and rimantadine (Flumadine)

Zanamivir (Relenza) and amantadine (Symmetrel)

Zanamivir (Relenza) and 1/2 strength oral oseltamivir (Tamiflu)

*Correct answer: Oral oseltamivir (Tamiflu) and rimantadine (Flumadine)*

*For the treatment of influenza, neither amantadine nor rimantadine is recommended as single-therapy agents due to drug resistance. The prevalence of resistance to oral oseltamivir is also on the rise. Due to this, the 2009 recommendation from the CDC is to use zanamivir or a combination of oral oseltamivir and rimantadine if influenza A is suspected or confirmed. Local surveillance monitoring can also provide direction for the choice of therapy.*

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**22.**

After a mission trip to Africa, an otherwise healthy 22-year-old female presents to the ER complaining of a sudden onset of severe, frequent, gray/turbid colored diarrhea that is without odor, blood, or pus. She has no fever, her vitals are normal, and she denies any abdominal cramping, vomiting, or nausea.

What is the most important clinical intervention for this patient?

**Fluid and electrolyte replacement**

Hospitalization and isolation

Stool culture and susceptibility testing

Empiric tetracycline or ampicillin

*Correct answer: Fluid and electrolyte replacement*

*This patient's history and clinical symptoms are consistent with cholera. Infection occurs after ingestion of food or water contaminated with *Vibrio cholerae*. It produces a toxin that activates adenylyl cyclase in the intestinal epithelial cells of the small intestine. This results in the hypersecretion of water and chloride ions into the bowel and massive diarrhea. Cholera can be fatal due to hypovolemia as dehydration, hypotension, and electrolyte balance develop rapidly. The diarrhea is often described as "rice water" and appears gray or turbid and lacks odor, blood, or pus. Therefore, fluid and electrolyte replacement is the essential first step for this patient. Mild cholera cases can be treated with oral rehydration; more severe cases will require IV replacement.*

*This patient may require hospitalization for IV replacement if her cholera is not appropriately treated, but given her current clinical status, she may recover with oral rehydration and other supportive therapy. There is no need for isolation, but proper waste disposal and sanitation are necessary to prevent the spread of cholera.*

*Stool cultures and susceptibility testing should be done to confirm the diagnosis of cholera, but if it is suspected, rehydration and replacement of electrolytes is the most important, first clinical intervention.*

*Empiric tetracycline, ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole (TMP-SMX), and fluoroquinolones can all be used to shorten the duration and reduce the severity of the symptoms, but fluid and electrolyte replacement is necessary for survival with cholera. Resistance does exist, so susceptibility testing is*

*recommended. However, antibiotics in the treatment of cholera should be reserved for those who are severely ill or with serious comorbidities.*

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**23.**

A 31-year-old sexually active female presents with complaints of vaginal pruritus and malodorous, frothy, yellow-green discharge. Her pelvic exam shows diffuse vaginal erythema and red, macular lesions on her cervix. A wet mount shows motile flagellates.

Which of the following is the recommended treatment for her condition?

**Metronidazole (Flagyl)**

IM ceftriaxone (Rocephin) with azithromycin (Zithromax, Zmax)

Fluconazole (Diflucan)

IM penicillin

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*Correct answer: Metronidazole (Flagyl)*

*This patient has symptoms and exam findings consistent with Trichomonas infection. Trichomonas is a flagellated protozoan that infects the vagina, Skene gland, and lower urinary tract of females and the genitourinary tract of males. It is treated with a single 2-gram dose of metronidazole. All partners should be treated as well to prevent reinfection.*

*IM ceftriaxone with azithromycin is the treatment for Gonorrhea and Chlamydia infection. In women, N. gonorrhoeae infection can be asymptomatic or have urinary symptoms along with vaginitis and cervicitis. Chlamydia co-infection is presumptively diagnosed and treated. While Chlamydia infection may be asymptomatic as well, it can also manifest as cervicitis, salpingitis, or pelvic inflammatory disease. It is a leading cause of infertility.*

*Fluconazole is used to treat vulvovaginal candidiasis. Symptoms can include pruritus, burning, dyspareunia, and a white, cottage cheese or curd-like discharge. The physical exam will demonstrate white plaques on the vaginal walls.*

*IM penicillin is the recommended treatment for syphilis. This infection is caused by T. palladium, and the earliest manifestation will be a chancre, which is a painless ulcer at the site of inoculation. There may also be regional lymphadenopathy.*

---

**24.**

A six-year-old girl presents to your office accompanied by her mother with complaints of intense, perianal itching that is waking her at night. Her mother reports that she has also begun wetting the bed again. Your examination reveals excoriations to the buttocks and perianal area.

Based on this patient's presentation, which of the following is the **most** appropriate treatment for this patient?

**Mebendazole (MBZ)**

Metronidazole (Flagyl)

Clindamycin (Clindagel)

Erythromycin (Eryped)

---

*Correct answer: Mebendazole (MBZ)*

*This child likely has a pinworm infection, also known as enterobiasis. Humans are the only host for *Enterobius vermicularis*. There is a worldwide distribution and children tend to be infected more than adults. Infestation produces symptoms of intense anal itching, a crawling sensation that is worse at night, insomnia, enuresis, weight loss, and irritability. Excoriations in the area are a common examination finding. The gravid female worms pass through the anus to lay eggs on the perianal skin at night, and the eggs can survive for two to three weeks outside the host. Once ingested, the eggs hatch in the duodenum, and the larvae pass to the cecum and mature in three to four weeks. Infection is easily spread by hands, food, drink, and fomites. Mebendazole, albendazole, or pyrantel are given to the affected person and all household members as treatment, and the treatment is repeated in two to four weeks. Handwashing and thorough cleaning of bed linens are necessary to prevent reinfection.*

*Metronidazole, clindamycin, or erythromycin are not recommended treatments for pinworm infection.*

---

**25.**

All the following statements regarding the treatment of influenza infections are true **except**:

**zanamivir (Relenza) or oseltamivir (Tamiflu) will significantly reduce the severity of influenza infection if given within 72 hours of the onset of symptoms**

amantadine (Symmetrel) and rimantadine (Flumadine) are no longer recommended as single therapy agents because of resistance

the CDC recommends using zanamivir (Relenza) or a combination of oseltamivir (Tamiflu) and rimantadine (Flumadine) if influenza A is suspected

the virus can be isolated from the throat or nasal mucosa

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*Correct answer: zanamivir (Relenza) or oseltamivir (Tamiflu) will significantly reduce the severity of influenza infection if given within 72 hours of the onset of symptoms*

*The neuraminidase inhibitors zanamivir and oseltamivir will significantly reduce the severity of influenza infection if given within 48 hours of the onset of symptoms. They are generally effective against both influenza A and B and have fewer side effects than amantadine and rimantadine. They are also recommended for patients with influenza requiring hospitalization or in those with a high risk of morbidity and mortality.*

*Neither amantadine nor rimantadine is recommended as single therapy agents due to resistance.*

*The prevalence of resistance to oseltamivir is on the rise. The 2009 recommendation from the CDC was to use zanamivir or a combination of oseltamivir and rimantadine if influenza A is suspected or confirmed.*

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# Cardiovascular System

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Cardiovascular System

26.

Which of the following is the **most** common sign/symptom associated with sick sinus syndrome?

**Asymptomatic**

Syncope

Heart failure

Palpitations

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*Correct answer: Asymptomatic*

*Sick sinus syndrome includes inappropriate sinus bradycardia, sinus pause, sinus arrest, or episodes of alternating sinus tachycardia and bradycardia. Elderly patients are most often at risk, but it may occur in infants who have had heart surgery.*

*Most patients with sick sinus syndrome are asymptomatic; however, they may have syncope, dizziness, confusion, heart failure, palpitations, or decreased exercise tolerance. Symptomatic patients may require permanent pacing.*

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**27.**

Which of the following is the **correct** combination and order of drugs that should be used to treat acute ventricular tachycardia (V-tach)?

**Amiodarone, lidocaine, and procainamide**

Lidocaine, flecainide, and adenosine

Verapamil, digoxin, and lidocaine

Propranolol, dofetilide, digoxin

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*Correct answer: Amiodarone, lidocaine, and procainamide*

*The preferred pharmacologic interventions for acute V-tach include amiodarone, lidocaine, and procainamide, in that order. It should be noted that in V-tach with severe hypotension or loss of consciousness, synchronized cardioversion may be necessary. In pulseless V-tach, immediate defibrillation with CPR is indicated.*

---

**28.**

At what maximum heart rate will symptoms commonly present due to bradycardia?

**50 beats per minute**

60 beats per minute

30 beats per minute

40 beats per minute

---

*Correct answer: 50 beats per minute*

*Sinus bradycardia may be normal in well-conditioned athletes. Sinus node pathology, with increased risk for ectopic rhythms, is another possible cause of bradycardia. Symptoms due to bradycardia do not generally occur at heart rates above 50 beats per minute.*

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**29.**

A patient with significant aortic regurgitation will likely have which of the following on physical examination?

**An Austin Flint murmur best heard at the apex**

A thready carotid pulse

A harsh, mid-systolic murmur best heard at the 2nd right intercostal space (RICS)

Jugular venous distention, peripheral edema, and hepatosplenomegaly

---

*Correct answer: An Austin Flint murmur best heard at the apex*

*An Austin Flint murmur suggests a large-flow aortic regurgitation. It may be best heard with the patient sitting, leaning forward, and in full exhalation. Lower-grade disease may sound like a mid-systolic, high-pitched, blowing murmur that is best heard at the 2nd to 4th left intercostal space (LICS). An Austin Flint murmur is a mid-diastolic, low-pitched, rumbling murmur that is best appreciated at the apex. Other physical signs include large, bounding arterial pulses due to volume overloading of the left atrium.*

*A thready carotid pulse is a finding common in severe aortic stenosis.*

*A harsh, mid-systolic murmur best heard at the 2nd right intercostal space (RICS) is typical of aortic stenosis.*

*Jugular venous distention, peripheral edema, and hepatosplenomegaly are common physical findings in right-sided heart failure that may be due to disorders of either the tricuspid or pulmonic valves.*

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**30.**

A four-month-old infant presents for a well-child visit. His mother states that she is worried about him not gaining weight and states that there are times that he seems irritable and not interested in interaction with people or his surroundings. On physical examination, the infant is small and frail. His weight plots three percentage points lower today than at his two-month visit. You hear a systolic ejection murmur at the second left intercostal space (LICS) with an early to mid systolic rumble. You also note that he has a wide, fixed split S2. There are no signs of cyanosis present.

Based on this information, what is this patient's **most** likely diagnosis?

**Ostium secundum atrial septal defect**

Ventricular septal defect

Coarctation of the aorta

Pulmonary atresia

*Correct answer: Ostium secundum atrial septal defect*

*This infant presents with failure to thrive (based on his weight loss crossing more than two major percentiles downward on the standardized growth scale) in addition to an audible murmur and fixed split S2 that is consistent with an atrial septal defect (ASD). This is a non-cyanotic congenital heart anomaly, and it most commonly presents as failure to thrive and easy fatigability in addition to the physical findings noted here. There may also be a right ventricular heave that is palpable as well. ASD accounts for seven percent of congenital heart disease and is the second most common type after ventricular septal defect. Ostium secundum is the most common type of ASD.*

*A ventricular septal defect is associated with a systolic murmur heard best at the left lower sternal border. Symptoms of heart failure may also be present.*

*Coarctation of the aorta presents with a systolic murmur heard best at the left upper sternal border and left interscapular area, which may be continuous. Infants may present with symptoms of heart failure, and older children may have systolic hypertension or murmur. Pathognomonic is a finding of differences between arterial pulses and blood pressure in the upper extremity and lower extremity.*

*Pulmonary atresia is a cyanotic congenital heart defect. The associated murmur depends on the presence of tricuspid regurgitation. Physical exam findings include*

*cyanosis with tachypnea at birth, tachypnea without dyspnea, hyperdynamic apical impulse, and single S1 and S2.*

---

**31.**

A six-month-old child is brought into her pediatrician's office for a well-child visit. The child seems to have trouble breathing, but she is not cyanotic. Her pulses and blood pressure are diminished and decreased, respectively, in her lower extremities compared to her upper extremities. An enlarged apical impulse and 1+ pitting edema are seen on physical examination. Basilar rales are heard on pulmonary auscultation.

Which of the following is the **most** likely diagnosis?

**Coarctation of the aorta**

Pulmonary atresia

Transposition of the great vessels

Patent ductus arteriosus

---

*Correct answer: Coarctation of the aorta*

*This child is presenting with symptoms of congestive heart failure. Coarctation of the aorta, a non-cyanotic congenital heart defect, may present with symptoms of congestive heart failure in infants. Older children may have systolic hypertension, a murmur, or underdeveloped lower extremities. A difference between arterial pulses and blood pressure in the upper and lower extremities is pathognomonic.*

*Patent ductus arteriosus is also a non-cyanotic congenital defect, but will typically have a machinery murmur and wide pulse pressure.*

*Pulmonary atresia and transposition of the great vessels are cyanotic congenital defects.*

---

**32.**

Acute arterial occlusion threatens limb viability. Which of the following does **not** characterize the symptoms of acute arterial occlusion?

**Pulsus paradoxus**

Pallor

Poikilothermia

Paralysis

---

*Correct answer: Pulsus paradoxus*

*Acute arterial occlusion is a sequela of peripheral arterial disease and may be caused by either thrombosis or embolism. The symptoms of occlusion depend on the artery, the area it supplies, and the collateral circulation. Acute arterial occlusion threatens limb viability and results in pain, pallor, pulselessness, paresthesias, poikilothermia, and paralysis. Pulsus paradoxus is an abnormally large decrease in systolic blood pressure and pulse wave amplitude during inspiration. It may be present in various disorders, but especially those that put restrictive pressure on the heart (pericardial effusion, cardiac tamponade, pericarditis).*

---

**33.**

A 55-year-old male presents to the emergency department after experiencing severe chest pain followed by syncope. He has no discernable pulse or respirations, and his blood pressure is 85/55 mmHg. Electrocardiogram reveals a tachycardia with a broad QRS complex.

Which of the following is the **most** likely diagnosis?

**Ventricular tachycardia**

Ventricular fibrillation

Ventricular premature beats

Atrial fibrillation

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*Correct answer: Ventricular tachycardia*

*Ventricular tachycardia is defined as three or more consecutive ventricular premature beats. It is a frequent complication of acute myocardial infarction and dilated cardiomyopathy. As with all ventricular arrhythmias, dizziness, syncope, and sudden death are possible. A pulse may or may not be present. An electrocardiogram will reveal a broad QRS complex tachycardia.*

*Ventricular fibrillation is similar to ventricular tachycardia, except an electrocardiogram will reveal no discernable p waves or QRS complexes.*

*Ventricular premature beats are common and typically benign. Ischemia and electrolyte disturbances are common causes. Patients may be aware of skipped beats or be asymptomatic.*

*Paroxysmal supraventricular tachycardia is the most common paroxysmal tachycardia in patients without structural pathology. It is more common in younger patients, women, those who consume alcohol or caffeine, smokers, and those with anxiety. Most patients will typically complain of a "racing heart." As with all supraventricular arrhythmias, patients may present with palpitations, angina, fatigue, and other symptoms of heart failure. Electrocardiogram will reveal tachycardia.*

*Atrial fibrillation will present with palpitations, angina, fatigue, and other symptoms of heart failure. Electrocardiogram will reveal no discernable p waves in an irregularly irregular rhythm.*

---

**34.**

A 66-year-old male with a history of stable angina presents to the ER with the complaint of crushing retrosternal chest pain for the past 30 minutes that is not relieved with his nitroglycerin, which he has taken once. He is diaphoretic and states that he is also nauseous. He is seated with his fist clenched and held over his chest and gives his history through clenched teeth.

Which of the following tests is the **definitive** diagnostic procedure for his condition?

**Coronary angiography**

Cardiac biomarkers

12-lead electrocardiogram (EKG)

Exercise stress test

*Correct answer: Coronary angiography*

*This patient has a history of stable angina that has previously been controlled with nitroglycerin (NTG). This episode constitutes an immediate diagnosis of unstable angina (UA) as his pain is unresponsive to NTG. According to the American Heart Association, UA is indistinguishable from non-ST segment myocardial infarction (NSTEMI) and should be treated as a single entity for initial treatment and intervention algorithms. It is considered an acute coronary syndrome (ACS) and, along with his symptoms and the finding of Levine's sign (clenched fist over the chest and clenched teeth), is highly suggestive of ischemia. The 12-lead EKG is central to the decision pathway in patients with ACS. Based on initial findings, patients can be triaged to acute reperfusion therapy if indicated (by STEMI). Therefore, it is essential for the evaluation, but not definitively diagnostic. The evolution of cardiac biomarkers is diagnostic of myocardial infarction in that those biomarkers provide evidence of damaged myocardium. However, coronary angiography is the most definitive diagnostic procedure as it allows for direct visualization of the occluded coronary vessel. Despite this, it should be used selectively because of cost and invasiveness. It is helpful if surgical intervention (stents) is indicated.*

*Exercise stress tests are the most useful, cost-effective non-invasive testing method to make the diagnosis of angina. For stable patients with ACS who have no acute EKG changes and no cardiac biomarker elevations during evaluation, it can be used as a diagnostic test for MI.*

---

**35.**

All the following are common causes of dilated cardiomyopathy **except**:

**Diabetes**

Excessive alcohol intake

Genetic abnormality

Postpartum state

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*Correct answer: Diabetes*

*Dilated cardiomyopathy is the most common cardiomyopathy, accounting for approximately 95% of all cases. The most common cause of dilated cardiomyopathy is a genetic abnormality (25% to 30% of cases); other causes include excessive alcohol consumption, postpartum state, chemotherapy toxicity, endocrinopathies, and myocarditis. Men, particularly African-American men, have a higher rate of incidence.*

*Diabetes can be a cause of restrictive cardiomyopathy. Other causes include amyloidosis, radiation, postoperative changes, and endomyocardial fibrosis.*

---



**36.**

A 68-year-old male presents to the emergency department with intermittent racing heart, chest pain, and dizziness. He is an active smoker and drinker, with a previous history of acute myocardial infarction. His blood pressure is 105/95 mmHg, pulse is 115 beats per minute, respirations are 18 breaths per minute and temperature is 98.8°F (37.1°C). Cardiac and pulmonary auscultation are unremarkable. His electrocardiogram reveals tachycardia without a discernable p wave. His chest radiography is unremarkable, and his cardiac enzymes are negative.

Which of the following is the **most** likely diagnosis?

**Atrial fibrillation**

Paroxysmal supraventricular tachycardia

Atrial premature beats

*Correct answer: Atrial fibrillation*

*Atrial fibrillation is the most common arrhythmia that can lead to a significant decrease in cardiac output and the most common cause of embolic cerebrovascular accidents. Patients will typically present with palpitations, angina, fatigue, and other symptoms of heart failure. Electrocardiogram will reveal an irregularly irregular rhythm with no discernable p waves.*

*Paroxysmal supraventricular tachycardia is the most common paroxysmal tachycardia in patients without structural pathology. It is more common in younger patients, women, those who consume alcohol or caffeine, smokers, and those with anxiety. Its symptoms will be similar to that of atrial fibrillation. Electrocardiogram will reveal tachycardia.*

*Atrial flutter may also present the above symptoms, but it will present with a “saw-tooth” pattern on electrocardiogram.*

*Atrial premature beats will be seen on electrocardiogram and are typically benign, not requiring treatment if asymptomatic.*

---

**37.**

A 70-year-old male endorses chest pain and fatigue. His pain is intermittent, does not seem to be associated with activity, and is self-resolving. He denies cough or fever. He has a history of coronary artery disease with previous angioplasty, but takes no current medications. Chest radiography is unremarkable.

Which of the following on electrocardiogram would help support the diagnosis of atrial fibrillation?

**No discernable p waves**

Wide-complex tachycardia

Regular, narrow-complex tachycardia

QRS complex that twists around the baseline

---

*Correct answer: No discernable p waves*

*In atrial fibrillation, blocking of the AV node results in no identifiable p waves and causes an irregularly irregular rhythm.*

*A wide-complex tachycardia may be indicative of ventricular tachycardia, a potentially life-threatening rhythm.*

*A regular, narrow-complex tachycardia typically represents AV nodal reentry tachycardia, such as paroxysmal supraventricular tachycardia.*

*Torsades de pointes is defined as a QRS complex that twists around the baseline on electrocardiogram.*

---

**38.**

An 80-year-old man presents for his annual examination. He has a long-standing history of heart failure, for which he is prescribed lisinopril and labetalol. Which of the following is the most useful diagnostic study to determine his prognosis?

**Echocardiography**

Chest radiography

Complete metabolic profile

Electrocardiography

*Correct answer: Echocardiography*

*Echocardiography is the most useful study for heart failure, as it assesses the size and function of the chambers, valvular abnormalities, pericardial effusion, shunting, and segmental wall abnormalities. Ejection fraction, which is also determined via echocardiography, is a key diagnostic and prognostic indicator in congestive heart failure.*

*Chest radiography may reveal pulmonary effusions, perivascular or interstitial edema (Kerley B lines), venous dilation and cephalization, and alveolar fluid. However, it is used more in the diagnosis of heart failure, and less in the prognosis.*

*Patients with heart failure may or may not have anemia, renal insufficiency, hyperkalemia, hyponatremia, and/or elevated liver enzymes.*

*Electrograms will commonly show nonspecific changes in patients with heart failure, such as low voltage.*

---

**39.**

A 61-year-old African-American male presents to the emergency department with shortness of breath. He states this has been occurring intermittently for years, but he has not sought care until now. He denies any cardiac or pulmonary history. He notes drinking five to six alcoholic beverages per day. Crackles are heard on auscultation of the lungs, and increased jugular venous pressure is noted. Chest radiography reveals pulmonary congestion. ECG shows nonspecific ST- and T-wave changes.

Which of the following murmurs is **most likely** to be heard?

**S<sub>3</sub> gallop**

S<sub>4</sub> gallop

Midsystolic click

Opening snap

*Correct answer: S<sub>3</sub> gallop*

*Dilated cardiomyopathy is the most common type of cardiomyopathy, accounting for approximately 95% of cases. Dilation of the left ventricle occurs secondary to a reduction in the strength of contraction. The most common cause of dilated cardiomyopathy is genetic abnormality (25% to 30% of cases); other causes include excessive alcohol consumption, postpartum state, chemotherapy toxicity, endocrinopathies, and myocarditis. Men, particularly African-American men, have a higher rate of incidence. Signs and symptoms are that of left or biventricular congestive heart failure: dyspnea, S<sub>3</sub> gallop, pulmonary crackles, and increased jugular venous pressure. Long-standing disease may show cardiomegaly and pulmonary congestion on radiography. ECG may show nonspecific ST- and T-wave changes, conduction abnormalities, and ventricular ectopy. Left ventricular dilation and dysfunction, with high diastolic pressure and low cardiac output, will be seen on echocardiography. Treatment should be targeted at the underlying disease, abstinence of alcohol, if causal, and supportive therapies for congestive heart failure.*

*An S<sub>4</sub> gallop may be heard in hypertrophic cardiomyopathy. Signs and symptoms, as well as ECG changes, are similar to that of dilated cardiomyopathy. A prominent “a” wave may be seen on examination of the jugular venous pulse. Chest radiography is often unremarkable.*

*Patients with mitral valve prolapse commonly present with mid-systolic clicks or a late systolic murmur. A thin female is the most common patient type. Patients are commonly asymptomatic.*

*A mid-diastolic “opening snap” after  $S_2$  can be heard on the apex of patients with mitral stenosis, which impedes the blood flow between the left atrium and left ventricle.*

---

**40.**

Which set of clinical signs would **best** describe the hemodynamic effects of shock?

**Decreased BP, decreased cardiac output, increased heart rate**

Increased BP, increased cardiac output, decreased heart rate

Decreased BP, decreased cardiac output, decreased heart rate

Increased BP, decreased cardiac output, decreased heart rate

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*Correct answer: Decreased BP, decreased cardiac output, increased heart rate*

*Shock is defined as severe cardiovascular failure caused by poor blood flow or inadequate distribution of flow. The inadequate delivery of oxygen to body tissues may lead to organ failure and death unless the underlying cause is identified and treated. There are multiple causes of shock; hypovolemic, cardiogenic, obstructive, distributive (septic, anaphylactic, neurogenic) shock can all produce the clinical syndrome known as shock. The primary clinical features include hypotension (decreased BP), orthostatic changes, tachycardia (increased heart rate), peripheral hypoperfusion, altered mental status, oliguria or anuria, insulin resistance, and metabolic acidosis. In the case of hypovolemic and cardiogenic shock, there will also be decreased cardiac output.*

---

**41.**

All patients with acute coronary syndromes (both STEMI and UA/NSTEMI) must undergo risk stratification to determine if aggressive treatment is needed in an attempt to prevent reinfarction or death. The Thrombolysis In Myocardial Infarction (TIMI) system is the quickest and easiest scoring system that can easily be completed at the bedside.

According to TIMI, which of the following patients should undergo the **most** aggressive treatment?

**A 67-year-old male with diabetes, hypertension, and dyslipidemia who currently takes ASA daily and shows ST-segment deviation and elevated cardiac enzymes**

A 55-year-old diabetic with known coronary artery disease who shows 50% stenosis of his left anterior descending (LAD) coronary artery

A 70-year-old obese, physically inactive woman with a positive family history

A 60-year-old smoker with two episodes of angina at rest in the past 24 hours

---

*Correct answer: A 67-year-old male with diabetes, hypertension, and dyslipidemia who currently takes ASA daily and shows ST-segment deviation and elevated cardiac enzymes*

*In the TIMI, one point is given for each of the following factors:*

- *Age 65 years or older*
- *Three or more risk factors for CAD*
- *The use of aspirin within the last seven days*
- *Known CAD with stenosis of 50% or greater*
- *More than one episode of rest angina within the last 24 hours*
- *ST-segment deviation*
- *Elevated cardiac markers*

*Scores of 3 or more are considered to be high risk.*

*A 67-year-old male with diabetes, hypertension, and dyslipidemia who currently takes ASA daily and shows ST-segment deviation and elevated cardiac enzymes scores a 5.*

*A 55-year-old diabetic with known coronary artery disease who shows 50% stenosis of his left anterior descending (LAD) coronary artery scores a 1.*

*A 70-year-old obese, physically inactive woman with a positive family history scores a 2.*

*A 60-year-old smoker with two episodes of angina at rest in the past 24 hours scores a 1.*

---



**42.**

Which of the following statements regarding Torsades de Pointes is **correct**?

**The initial therapy of choice is IV magnesium.**

Hyperkalemia is a common cause.

It is a stable form of supraventricular tachycardia.

Risk factors include drugs that shorten the QT interval.

---

*Correct answer: The initial therapy of choice is IV magnesium.*

*Torsades de Pointes is also known as polymorphic ventricular tachycardia (V-tach). It is a V-tach in which the QRS complex twists around the baseline. The EKG will show a continuously changing axis or "turning of points." While it may occur spontaneously, patients with hypokalemia or hypomagnesemia may be susceptible to developing this arrhythmia. Drugs that prolong the QT interval may also precipitate episodes. It is an unstable form of ventricular tachycardia that requires correction with IV magnesium as it may degenerate into ventricular fibrillation. Isoproterenol infusion and overdrive pacing may be indicated after initial therapy, and recurrent episodes may require the placement of a permanent pacemaker.*

---

**43.**

An accentuated S1 heard with an opening snap following S2 should raise your suspicion of which of the following disorders?

**Mitral stenosis**

Mitral regurgitation

Tricuspid regurgitation

Aortic stenosis

*Correct answer: Mitral stenosis*

*The murmur associated with mitral stenosis is a low-pitched, mid-diastolic murmur that can range from grade 1 to 4. It is best heard with the patient in the left lateral decubitus position and in full exhalation at the apex. There is little to no radiation. S1 is accentuated, and there may be an opening snap that follows S2.*

*Mitral regurgitation produces a pansystolic, medium- to high-pitched blowing murmur that ranges from soft to loud that is best heard at the apex and radiates to the left axilla. S2 is often decreased, and there may be a prolonged apical impulse.*

*Tricuspid regurgitation will produce a pansystolic, medium blowing murmur of varying intensity that is best heard at the left lower sternal border (LLSB) that radiates to the right sternum and xiphoid area. It may be accentuated with inspiration.*

*Aortic stenosis produces a mid-systolic, medium-pitched, harsh murmur that is best heard at the 2nd right intercostal space (RICS). It radiates to the neck and left sternal border (LSB) and may be accentuated with the patient sitting and leaning forward. It is a loud murmur of grades 4 to 6 and often associated with a thrill.*

---

44.

A 51-year-old woman presents for a follow-up to her annual examination. She is an active one-pack-per-day smoker for the last 30 years. Her laboratory values obtained at her last visit are within normal limits. Her pulse at today's visit is 86 beats per minute, her blood pressure is 162/98 mmHg, and respirations are 18 breaths per minute. Her pulse at her previous visit was 78 beats per minute, her blood pressure was 161/101 mmHg, and respirations were 12 breaths per minute.

Which of the following is an appropriate diagnosis regarding this patient's blood pressure?

**Hypertension Stage 2**

Hypertension Stage 1

Prehypertension

Hypertensive urgency

*Correct answer: Hypertension Stage 2*

*Hypertension Stage 2 is defined as a blood pressure reading of  $\geq 140$  systolic OR  $\geq 90$  diastolic.*

<b>Blood Pressure Category</b>	<b>Systolic BP mmHg</b>		<b>Diastolic BP mmHg</b>
Normal	<120	AND	<80
Pre-HTN	120–139	AND	80–89
Hypertension Stage 1	140–159	OR	90–99
Hypertension Stage 2	$\geq 160$	OR	$\geq 100$
Hypertensive urgency	$\geq 220$	AND/OR	$\geq 125$

**45.**

A 78-year-old female presents to the emergency department with dyspnea on exertion and fatigue. A mid-systolic murmur with a thrill is heard at the second right intercostal space that increases in intensity when the patient is leaning forward. Her lungs are clear to auscultation and her chest radiograph is unremarkable. Laboratory values are pending.

Which of the following is the **most** likely cause of this patient's symptoms?

**Aortic stenosis**

Aortic regurgitation

Mitral stenosis

Mitral valve prolapse

*Correct answer: Aortic stenosis*

*Aortic stenosis impedes the ejection function of the left side of the heart. It is the most common valvular disease and the second most frequent cause for cardiac surgery. Like all valvular disorders, aortic stenosis will commonly present with dyspnea, fatigue, and decreased exercise tolerance. Cough, rales, paroxysmal nocturnal dyspnea, or hemoptysis are possible. Common causes include rheumatic heart disease, connective tissue disorders, infection, senile degeneration, and congenital defects. On cardiac auscultation, a mid-systolic loud murmur with a thrill (grade 4-6) can be heard at the second right intercostal space, which is intensified by having the patient sit and lean forward.*

*Aortic regurgitation is the retrograde blood flow into the left ventricle. A systolic and diastolic decrescendo best heard at the second to fourth left intercostal space is common.*

*Mitral stenosis will impede the blood flow between the left atrium and ventricle, resulting in a mid-diastolic low pitch murmur best heard at the apex with the patient in the left lateral position.*

*Mitral valve prolapse will often present in thin females with minor chest wall deformities and mid-systolic clicks.*

---

46.

All the following are correct associations **except**:

**ventricular septal defect (VSD) - diastolic murmur**

atrial septal defect (ASD) - wide fixed split S2

coarctation of the aorta - diminished or absent lower extremity pulses

patent ductus arteriosus (PDA) - continuous (machinery) murmur

---

*Correct answer: ventricular septal defect (VSD) - diastolic murmur*

*A VSD is the most common of all congenital heart defects. It produces a systolic murmur that is best heard at the left lower sternal border (LLSB).*

---

**47.**

A patient with known coronary artery disease presents to the ER with crushing, retrosternal chest pain. A 12-lead EKG shows ST-segment elevation in leads V4, V5, and V6. Based on this information, where is the location of his cardiac damage?

**Anterolateral**

Inferior

Posterior

Anteroseptal

*Correct answer: Anterolateral*

*A patient with clinical symptoms of acute myocardial infarction should always have a 12-lead EKG to determine the presence of an acute coronary syndrome. The presence of ST-segment elevation of greater than one millimeter in two contiguous leads confirms the diagnosis of ST-segment myocardial infarction (STEMI). The location of these changes on the EKG can be a clue as to the location of the myocardial damage. In an anterolateral infarct, you will typically see these changes in the lateral precordial leads V4, V5, V6.*

*An inferior wall infarct will likely demonstrate changes in leads II, III and aVF.*

*Posterior wall infarcts show changes in V1 and V2.*

*Anteroseptal infarcts will also show changes in V1 and V2.*

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**48.**

You hear a pansystolic murmur on a patient with a history of rheumatic heart disease. Which of the following physical exam techniques would **most** help you identify the murmur of tricuspid regurgitation?

**Auscultate at the left lower sternal border (LLSB) with the patient in full inspiration**

Auscultate at the 2nd right intercostal space (RICS) with the patient sitting and leaning forward

Auscultate at the 2nd to 4th left intercostal space (LICS) with the patient sitting and leaning forward in full exhalation

Auscultate at the apex with the patient in left lateral decubitus position in full exhalation

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*Correct answer: Auscultate at the left lower sternal border (LLSB) with the patient in full inspiration*

*The pansystolic murmur associated with tricuspid regurgitation is best heard at the LLSB and will increase slightly with inspiration. Inspiration will increase right-sided murmurs as it increases negative intrathoracic pressure, increasing venous return/right-sided preload.*

*Auscultation at the 2nd right intercostal space (RICS) with the patient sitting and leaning forward is a technique that may accentuate the mid-systolic murmur of aortic stenosis.*

*Auscultation at the 2nd to 4th left intercostal space (LICS) with the patient sitting and leaning forward in full exhalation will accentuate the murmur of aortic regurgitation. This murmur is a soft systolic, diastolic decrescendo murmur.*

*Auscultation at the apex with the patient in left lateral decubitus position in full exhalation will accentuate the mid-diastolic murmur of mitral stenosis.*

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**49.**

A six-month-old child is brought into her pediatrician's office for a well-child visit. The child seems to have trouble breathing, but she is not cyanotic. An enlarged apical impulse and 1+ pitting edema are seen on physical examination. Basilar rales are heard on pulmonary auscultation. A systolic murmur, best heard at the lower left sternal border, is present.

Which of the following is the **most** likely diagnosis?

**Ventricular septal defect**

Coarctation of the aorta

Tetralogy of Fallot

Patent ductus arteriosus

*Correct answer: Ventricular septal defect*

*This child is presenting with symptoms of congestive heart failure. Ventricular septal defect may present with signs of congestive heart failure if the pathology is severe enough; some patients may be asymptomatic. It is the most common of all congenital heart defects. A systolic murmur, best heard at the lower left sternal border, is common.*

*Coarctation of the aorta may also present with symptoms of congestive heart failure in infants. Older children may have systolic hypertension, a murmur, or underdeveloped lower extremities. A difference between arterial pulses and blood pressure in the upper and lower extremities is pathognomonic.*

*Patent ductus arteriosus is also a non-cyanotic congenital defect but will typically have a machinery murmur and wide pulse pressure.*

*Tetralogy of Fallot is a cyanotic congenital defect.*

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**50.**

A 24-year-old female presents to the emergency department with fever, cough, and back pain. She is an intravenous drug user but has no other pertinent medical history. On physical examination, her cardiac and pulmonary auscultation are unremarkable. She has painful, violet, raised lesions on her fingers and conjunctival petechiae.

Which of the following diagnostic test should be ideally completed prior to beginning treatment?

**Three sets of blood cultures at least one hour apart**

Echocardiography

Chest radiography

Electrocardiogram

*Correct answer: Three sets of blood cultures at least one hour apart*

*Infective endocarditis is an infection of at least one cardiac valve. Infective endocarditis in intravenous drug users is most commonly caused by *S. aureus* and affects the tricuspid valve. *Streptococcus viridans*, *Staphylococcus aureus*, and enterococci are more common in patients who are not intravenous drug users. Most patients will have a stable murmur, but this may be absent in right-sided infections. Palatal, conjunctival, or sublingual petechiae, splinter hemorrhages, Osler nodes (painful, violaceous, raised lesions on the fingers, toes, or feet), Janeway lesions (painless red lesions on the palms or soles), and Roth spots (exudative lesions in the retina) are common.*

*An echocardiograph is essential in the diagnosis of infective endocarditis. Ideally, before antibiotic treatment is started, three sets of blood cultures at least one hour apart should be obtained. This helps confirm a specific pathogen and appropriate antibiotic regimen.*

*A chest x-ray may be helpful in determining cardiac abnormality or the presence of pulmonary infiltrates, but will not affect antibiotic choice in infective endocarditis.*

*An electrocardiogram is not helpful in the diagnosis of infective endocarditis.*

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**51.**

A 53-year-old woman presents for her annual examination. She has no pertinent medical history and is a non-smoker. Her pulse is 88 beats per minute, her blood pressure is 146/90 mmHg, and her respirations are 18 breaths per minute. She states she checks her blood pressure at her local grocery store frequently and her blood pressure is usually between 100 and 110 mmHg and 60 and 70 mmHg for systolic and diastolic, respectively. She goes on to state her blood pressure is “always high at the doctor’s office.”

Which of the following is the **most** appropriate next step?

**Order home blood pressure monitoring/recording**

Have the patient return in 30 days to repeat the blood pressure

Begin furosemide (Lasix) 20 mg daily

Begin metoprolol (Lopressor, Toprol) 25 mg daily

*Correct answer: Order home blood pressure monitoring/recording*

*This patient is most likely suffering from “white coat” hypertension. If her blood pressure is within a normal range at her local grocery store, her blood pressure should remain in a normal range upon home monitoring as well. A 24-hour ambulatory blood pressure monitoring order is appropriate, as is home blood pressure monitoring.*

*The patient should return after a few weeks with this data and have her blood pressure repeated; however, a repeat visit/blood pressure check without home monitoring may falsely diagnose the patient with hypertension.*

*Pharmacological therapy should be reserved for patients who are diagnosed with hypertension and should be used in conjunction with lifestyle modifications.*

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**52.**

A 56-year-old male is seen for an annual evaluation. He states he is in good health today and denies any symptoms. He has no pertinent medical history. ECG revealed nonspecific ST- and T-wave changes and left ventricular hypertrophy. A loud S<sub>4</sub> gallop is heard on cardiac auscultation, and a prominent “a” wave is seen. Which of the following is the **most likely** diagnosis?

**Hypertrophic cardiomyopathy**

Dilated cardiomyopathy

Restrictive cardiomyopathy

Takotsubo cardiomyopathy

*Correct answer: Hypertrophic cardiomyopathy*

*Some patients with hypertrophic cardiomyopathy are asymptomatic, while others may experience dyspnea, angina, syncope, and arrhythmias. On physical examination, a sustained PMI or triple apical impulse, loud S<sub>4</sub> gallop, variable systolic murmur, a bisferiens carotid pulse, and a prominent “a” wave can be seen. ECG may show nonspecific ST- and T-wave changes, exaggerated septal Q waves, and left ventricular hypertrophy.*

*Dilated cardiomyopathy will typically present with dyspnea, an S<sub>3</sub> gallop, pulmonary crackles, and increased jugular venous pressure. ECG may show nonspecific ST- and T-wave changes, conduction abnormalities, and ventricular ectopy.*

*Restrictive cardiomyopathy may also present with dyspnea on exertion and peripheral edema. Low-voltage changes on ECG are common.*

*Takotsubo cardiomyopathy (stress-induced cardiomyopathy) has symptoms common to that of an acute myocardial infarction (e.g., retrosternal chest pain). Nonspecific ECG changes can occur.*

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**53.**

A 32-year-old female is brought to the ER by her husband with the complaint of palpitations. She states that she feels like her "heart is racing." She denies any past medical history; she does not smoke or take any medications. Her vital signs are: T 98.6° F, HR 146, BP 120/80 and R 16. She appears anxious but is not dyspneic or diaphoretic. Her lungs are clear, and her heart sounds are normal. Her EKG shows a narrow complex tachycardia.

Based on this presentation and findings, which of the following is **not** used to treat this condition?

**Magnesium**

Valsalva maneuver

Adenosine (Adenocard)

Synchronized cardioversion

*Correct answer: Magnesium*

*This patient presents with symptoms and EKG findings consistent with paroxysmal supraventricular tachycardia (PSVT). This is the most common paroxysmal tachycardia and usually occurs in persons without structural problems. The most common presenting complaint is that of a "racing heart." In a stable patient, PSVT may be treated with Valsalva maneuvers (bearing down, coughing, breath-holding) or carotid sinus massage. The initial medication of choice in treating PSVT is adenosine via rapid IV push. If ineffective, B-blockers or calcium-channel blockers may be used. Patients with signs of instability should be treated with synchronized cardioversion. Sustained or recurrent PSVT should be referred for treatment with catheter ablative surgery.*

*Magnesium is not used for PSVT. It is commonly given for management of Torsades de Pointes (polymorphic ventricular tachycardia).*

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**54.**

Which of the following would likely indicate a diagnosis of hypertrophic cardiomyopathy over other cardiomyopathies?

**Prominent “a” waves**

S<sub>3</sub> gallop

Dyspnea

Pulmonary hypertension

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*Correct answer: Prominent “a” waves*

*Hypertrophic cardiomyopathy demonstrates massive hypertrophy, small left ventricle, systolic anterior mitral motion, and diastolic dysfunction. Dyspnea and angina are common complaints. A sustained pulse of maximal impact or triple apical impulse, loud S<sub>4</sub> gallop, variable systolic murmur, a bisferiens carotid pulse, and jugular venous pulsations with a prominent “a” wave are likely.*

*An S<sub>3</sub> gallop may occur in dilated cardiomyopathy.*

*Dyspnea is common in all cardiomyopathies.*

*Pulmonary hypertension is commonly found in patients with restrictive cardiomyopathy.*

---

**55.**

A 22-year-old female presents to the emergency department with intermittent racing heart, chest pain, and dizziness. She is an active smoker and consumes a lot of caffeinated beverages. She denies any pertinent medical history. Her blood pressure is 105/95 mmHg, pulse is 115 beats per minute, respirations are 18 breaths per minute, and temperature is 98.8°F (37.1°C). Cardiac and pulmonary auscultation are unremarkable. Her electrocardiogram reveals tachycardia. Her chest radiography is unremarkable, and her cardiac enzymes are negative.

Which of the following is the **most** likely diagnosis?

**Paroxysmal supraventricular tachycardia**

Atrial fibrillation

Atrial flutter

Atrial premature beats

*Correct answer: Paroxysmal supraventricular tachycardia*

*Paroxysmal supraventricular tachycardia is the most common paroxysmal tachycardia in patients without structural pathology. It is more common in younger patients, women, those who consume alcohol or caffeine, smokers, and those with anxiety. Most patients will typically complain of a “racing heart.” As with all supraventricular arrhythmias, patients may present with palpitations, angina, fatigue, and other symptoms of heart failure. Electrocardiogram will reveal tachycardia.*

*Atrial fibrillation will present with symptoms like that of paroxysmal supraventricular tachycardia, but is more common in older adults and will present with no discernable p waves on electrocardiogram. Excessive alcohol intake is a common cause (“Holiday heart”).*

*Atrial flutter may also present the above symptoms, but it will present with a “saw-tooth” pattern on electrocardiogram.*

*Atrial premature beats will be seen on electrocardiogram and are typically benign, not requiring treatment if asymptomatic.*

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**56.**

All of the following are signs/symptoms of right-sided heart failure **except**:

**Orthopnea**

Distended neck veins

Hepatic congestion

Peripheral edema

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*Correct answer: Orthopnea*

*Right-sided heart failure causes systemic vascular congestion and is characterized by distended neck veins, tender or non-tender hepatic congestion, decreased appetite, nausea, and dependent pitting edema. The most common cause of right-sided failure is left-sided failure. The most predominant features are peripheral edema and hepatomegaly. Orthopnea is a common symptom of left-sided failure.*

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**57.**

Which of the following medications is considered a Class II antiarrhythmic drug?

**Metoprolol (Lopressor, Toprol)**

Verapamil (Verelan, Calan)

Amiodarone (Cordarone, Pacerone)

Lidocaine (Lidoderm)

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*Correct answer: Metoprolol (Lopressor, Toprol)*

*Class II antiarrhythmic drugs are B-blockers. These are used to slow AV conduction and are used in the treatment of supraventricular tachycardia. They may also be used to prevent ventricular fibrillation in susceptible patients. Examples of this class include metoprolol, esmolol, and propranolol.*

*Verapamil is an example of a class IV antiarrhythmic. Class IV drugs are slow calcium channel blockers, and they are used in the treatment of supraventricular tachycardia. Diltiazem is another drug in this class.*

*Amiodarone, along with sotalol, dofetilide, and ibutilide are Class III antiarrhythmic drugs. They are potassium channel blockers that prolong action potentials. These drugs are helpful in the treatment of refractory V-tach and supraventricular tachycardia. Although grouped together, each of these medications has its own specific indications.*

*Lidocaine is a class Ib antiarrhythmic drug. It shortens repolarization and is therefore used in the treatment of V-tach, prevention of V-fib, and symptomatic premature ventricular beats.*

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**58.**

The finding of a "water bottle heart" on the frontal view of a chest radiograph is a telltale sign of which of the following disorders?

**Pericardial effusion**

Congestive heart failure

Infective endocarditis

Hypertensive cardiovascular disease

*Correct answer: Pericardial effusion*

*Pericardial effusion may be secondary to pericarditis, uremia, or cardiac trauma. It produces restrictive pressure on the heart. It may produce chest pain that is accompanied by cough and dyspnea, but it may also be asymptomatic. A massive enlargement of the cardiac silhouette on the frontal view of a chest radiograph, also known as a water bottle heart, is a typical finding.*

*Congestive heart failure will typically demonstrate cardiomegaly and bilateral or right-sided pulmonary effusions, perivascular or interstitial edema known as Kerley B lines, venous dilation and cephalization, and alveolar fluid on the frontal view of a chest radiograph.*

*Chest radiography may demonstrate underlying cardiac abnormality or reveal pulmonary infiltrates if the right side of the heart is involved, but there are no key diagnostic findings. Echocardiography is essential to this diagnosis as it will identify vegetations and affected valves.*

*A chest radiograph is not considered necessary in the evaluation of uncomplicated hypertension; however, in more complicated disease, it may demonstrate the findings of left ventricular hypertrophy or prominence and a slight increase in the tortuosity of the aorta at its arch. Calcifications of the aorta may also be visible as well.*

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**59.**

A 65-year-old male presents to your office with the chief complaint of impotence. He states the problem has been worsening over the past several months. He is a smoker but has no other medical problems that he is aware of. Your review of symptoms elicits a history of right thigh and buttock pain with activity that has led him to give up exercise. On exam, you note a weak right femoral pulse and a right iliac bruit.

Based on this information, what is this patient's **most** likely diagnosis?

**Leriche syndrome**

Takayasu arteritis

Buerger's disease

Giant cell arteritis

*Correct answer: Leriche syndrome*

*Leriche syndrome often presents in older men with clinically significant peripheral arterial disease in which there is involvement of the iliac artery. The chief complaint is usually impotence.*

*Takayasu arteritis is a rare type of vasculitis that involves the aorta and its main branches. It may lead to aneurysms as well as stenosis and results in the clinical findings of hypertension, heart failure, and stroke.*

*Buerger's disease is also known as thromboangiitis obliterans. It is an inflammatory arteritis that typically affects younger male smokers and results in intermittent claudication of the hands and feet with activity that is relieved with rest.*

*Giant cell arteritis is a systemic inflammatory condition of the medium and large vessels. It frequently affects those over the age of 50 and frequently co-exists with polymyalgia rheumatica. Because there is typically involvement of the temporal artery, patients will usually complain of scalp tenderness, jaw claudication, throat pain, and diplopia. Blindness may result if left untreated.*

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**60.**

Which of the following represents a major criterion of the modified Duke criteria used to establish the diagnosis of infective endocarditis?

**Two positive blood cultures**

Fever greater than 100.4°F (38°C)

Immunologic phenomena (Osler nodes, Roth spots)

Vascular phenomena (stroke or pulmonary emboli)

*Correct answer: Two positive blood cultures*

*The modified Duke criteria are used in establishing the diagnosis of infective endocarditis (IE). A combination of two major OR one major and three minor OR five minor criteria will definitively diagnose IE. IE is considered "possible" with one major and one minor OR three minor criteria. The major criteria are 1) two positive blood cultures of a typical causative organism and 2) echocardiographic evidence of endocardial involvement including new valvular regurgitation. The minor criteria are: 1) a predisposing factor (recent valve replacement; IV drug use; recent dental, upper respiratory, urologic or lower GI procedure); 2) Fever over 100.4°F (38°C); 3) Vascular phenomena (embolic disease or pulmonary infarction); 4) Immunologic phenomena (glomerulonephritis, Roth spots, Osler nodes); and 5) positive blood culture not meeting major criteria.*

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**61.**

Which of the following types of ischemic heart disease is **most** closely related to non-ST segment elevation myocardial infarction (NSTEMI)?

**Unstable angina**

Stable angina

Variant (Prinzmetal) angina

Cocaine use

*Correct answer: Unstable angina*

*The American Heart Association (AHA) views unstable angina (UA) and non–ST-segment elevation myocardial infarction (NSTEMI) as a single entity. UA is a common manifestation of cardiovascular disease.*

*There are three common presentation patterns of UA:*

- 1. angina at rest,*
- 2. new onset of angina symptoms, or*
- 3. an increasing pattern of pain in previously stable patients.*

*Of the three, the AHA reports that angina at rest is the most common presentation. UA should be suspected when the pain is less responsive to nitroglycerin, lasts longer, and occurs at rest or with less exertion than previous episodes of angina. When a patient presents with these symptoms, a 12-lead EKG may show absent ST-segment changes or ST depressions, and additional information (cardiac biomarkers, repeat EKG, and additional testing) is necessary. The initial treatment and intervention algorithms for UA/NSTEMI is/are the same.*

*Stable angina is predictably exacerbated by physical activity and relieved by rest. Variant (Prinzmetal) angina is due to vasospasm at rest with preservation of exercise capacity. Cocaine use is associated with myocardial ischemia and infarction secondary to vasospasm. Patients with this form of ischemic heart disease are often much younger than typical cardiac patients.*

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**62.**

A 62-year-old female presents for an acute visit for a headache. She states the pain is only on her left side and is focused around her left temple. She additionally complains of double vision and tenderness on the left side of her scalp. She has a history of arthritis in her shoulders. Her physical examination is normal.

Which of the following diagnostic tests will confirm the **most** likely diagnosis?

**Temporal artery biopsy**

Erythrocyte sedimentation rate

CT of the head

Complete blood count

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*Correct answer: Temporal artery biopsy*

*Giant cell arteritis is an inflammatory condition of medium and large vessels. Patients who are older than 50 years of age and have polymyalgia rheumatica (primarily presenting as pain and stiffness of the shoulders or pelvic girdle) are at the greatest risk. Unilateral temporal headaches with scalp tenderness, jaw claudication, throat pain, diplopia, and elevated inflammatory markers are common. Nodular, enlarged, tender, or pulseless temporal artery is possible, but not necessary for diagnosis. A temporal artery biopsy is used for definitive diagnosis. Erythrocyte sedimentation rate and C-reactive protein are elevated, but nonspecific. Normochromic normocytic anemia and thrombocytosis are also common.*

*A CT of the head may reveal alternate pathology but is not indicated in suspected temporal arteritis.*

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**63.**

A 22-year-old Asian man who is working hospital maintenance on the overnight shift with his brother is brought into the ER for a syncopal episode. His brother states that he did not complain of "feeling funny" or overexerting himself prior to fainting. He states his brother is healthy with no medical problems. He also reports their father died suddenly in his sleep when he was 40 years old. The patient is unresponsive, and his exam and EKG shows a pulseless, sustained V-tach. You initiate CPR and prepare the patient for immediate defibrillation.

If this patient survives, what is the definitive treatment for his condition?

**An implantable cardioverter-defibrillator**

Radiofrequency ablation

Lifelong verapamil (Calan, Verelan)

There is no definitive treatment

*Correct answer: An implantable cardioverter-defibrillator*

*The cause of this patient's sudden episode of symptomatic V-tach is likely Brugada syndrome. It is a genetic disorder that causes syncope, ventricular fibrillation, and sudden death, often during sleep or in the overnight hours. It is more common in Asian men. The diagnosis may be made on incidental EKG findings that show various changes in the first three precordial leads. The underlying genetic defect lies in the sodium ion channel of the myocardium. While there are some pharmacologic interventions for those incidentally diagnosed, the definitive treatment for a patient with Brugada who has survived an episode of V-tach or V-fib is an implantable cardioverter-defibrillator.*

*Radiofrequency ablation is helpful if the underlying cause of the ventricular arrhythmia is identifiable (ectopy), but Brugada syndrome is due to an ion channel defect.*

*Certain medications can be used to unmask latent Brugada in asymptomatic patients. Verapamil is one of them, so it is not recommended in patients with known Brugada syndrome.*

*If diagnosed, there is treatment for Brugada syndrome. Unfortunately, it is often a postmortem diagnosis.*

**64.**

An obese, 51-year-old female presents for evaluation of her legs. She states that over the past several months, she has noticed progressive swelling around her ankles and in the past few weeks she has developed a rash as well. She denies previous medical history and takes no medications. Her exam demonstrates numerous dilated, tortuous veins on the medial surface of lower extremities as well as significant edema distally bilaterally. Her overlying skin is atrophic, hyperpigmented, and you note areas of subcutaneous fibrosis. You also find a small ulceration on the left lower leg just above the medial malleolus.

Which of the following is the **most** important intervention for this patient at this time?

**Compression stockings**

Endovenous radiofrequency or laser ablation

Wet compresses and hydrocortisone cream

Duplex ultrasonography

*Correct answer: Compression stockings*

*This patient presents with symptoms and findings consistent with chronic venous insufficiency. Her exam demonstrates varicosities which is a risk factor for the development of the disorder. There is usually progressive edema followed by skin and subcutaneous changes. Stasis ulcers typically occur just above the medial malleolus. Small ulcerations will usually heal with leg elevation and compression stockings. Large ulcers may require more aggressive intervention.*

*Endovenous radiofrequency or laser ablation is an appropriate intervention for symptomatic varicosities, but it is not indicated for the treatment of chronic venous insufficiency with stasis ulcerations.*

*Wet compresses and hydrocortisone cream can be used to treat stasis dermatitis, but alone will not be effective for edema and ulceration. They may be used adjunctively to compression stockings.*

*Duplex ultrasonography would be indicated if this patient had signs and symptoms of deep vein thrombosis (DVT). This patient has no risk factors for DVT (surgical procedures, prolonged bed rest, trauma, oral contraceptives or estrogen use, or inherited or cancer-associated hypercoagulable states). Half of all patients with DVT*

*will be asymptomatic, but classic findings would be unilateral swelling, heat, and redness over an area with suspected thrombophlebitis.*

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**65.**

A seven-year-old female is brought to the ER by her mother for evaluation of fever, joint pain, and rash. She states that her daughter was diagnosed with "strep throat" two weeks ago and that she took "some" of the prescribed antibiotic. On exam, you note a temperature of 102.1 F (38.9 C) as well as numerous round plaques with erythematous, serpiginous borders and central clearing on her trunk. You also palpate numerous, small nodules along her spine and posterior neck. Her labs demonstrate an elevated erythrocyte sedimentation rate (ESR) in addition to an elevated C-reactive protein.

Which of the cardiac valves is **most** susceptible to disease with this disorder?

**Mitral**

Aortic

Tricuspid

Pulmonic

*Correct answer: Mitral*

*This child demonstrates symptoms and findings of acute rheumatic fever. It is a systemic immune response that occurs two to three weeks following a B-hemolytic streptococcal pharyngitis that most often affects the skin, heart, joints, and central nervous system. Children aged five to 15 years are most commonly affected. The diagnosis requires two major or one major and two minor Jones criteria to be present. Major criteria include carditis, erythema marginatum, subcutaneous nodules, chorea, and polyarthritis. Minor criteria include fever, Polyarthralgia, reversible prolongation of the PR interval, rapid erythrocyte sedimentation rate, or C-reactive protein. The mitral valve is most often involved (75% to 80%) in this disorder. Valve disease may either be self-limited or lead to progressive deformity. The typical lesion is a perivascular granuloma with vasculitis.*

*The aortic valve is the second most common to be involved in acute rheumatic fever, representing 30% of associated valvular disease.*

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66.

A 54-year-old male is seen for an annual evaluation. He states he is in good health today and denies any symptoms. He has no pertinent medical history. ECG revealed nonspecific ST- and T-wave changes and left ventricular hypertrophy. Which of the following signs on physical examination would increase the suspicion of hypertrophic cardiomyopathy?

Prominent “a” waves

S<sub>3</sub> gallop

Pulmonary crackles

Widening pulse pressure

*Correct answer: Prominent “a” waves*

*Sudden cardiac death can occur in patients with hypertrophic cardiomyopathy younger than 30 years of age at a rate of 2% to 3% per year. Dyspnea, angina, syncope, and arrhythmias are common; some patients may be asymptomatic, while others are only diagnosed after sudden death. A sustained PMI or triple apical impulse, loud S<sub>4</sub> gallop, variable systolic murmur, a bisferiens carotid pulse, and a prominent “a” wave on examination of the jugular venous pulse can be seen. Chest radiography is unremarkable. ECG may show nonspecific ST- and T-wave changes, exaggerated septal Q waves, and left ventricular hypertrophy. An echocardiogram is diagnostic; it will reveal left ventricular hypertrophy, asymmetric septal hypertrophy, small left ventricle, and diastolic dysfunction.*

*Dilated cardiomyopathy is the most common type of cardiomyopathy, accounting for approximately 95% of cases. Dyspnea, an S<sub>3</sub> gallop, pulmonary crackles, and increased jugular venous pressure are common on presentation.*

*Aortic insufficiency (regurgitation) results in volume overloading due to retrograde blood flow from the left ventricle. Bounding pulses with a widened pulse pressure can be seen.*

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67.

An infant is brought to her first pediatric outpatient visit after birth. Except for premature birth at 35 weeks and 4 days, the pregnancy and labor were uncomplicated. Which of the following is likely to be heard on cardiac auscultation if the patient has an isolated patent ductus arteriosus?

**Continuous machinery murmur**

Systolic murmur best heard at the lower left sternal border

Early to mid-systolic ejection rumble at the second left intercostal space

Variable, non-diagnostic murmur

*Correct answer: Continuous machinery murmur*

*Patent ductus arteriosus (PDA) is a failed or delayed closure of the channel bypassing the lungs which allows placental gas exchange during the fetal state. If isolated, a continuous machinery murmur is often heard on cardiac auscultation. Most patients respond to intravenous indomethacin and do not require surgical interventions. Like congenital heart defects in general, PDAs are more common in premature births.*

*A ventricular septal defect is the most common congenital heart defect and can be distinguished by a systolic murmur at the lower left sternal border.*

*An atrial septal defect is the second most common congenital heart defect. Patients will present with a rumble during early to mid-systole that is best heard at the second left intercostal space during cardiac auscultation.*

*Hypoplastic left heart syndrome is a significant congenital heart defect that can lead to shock, heart failure, and respiratory distress. Murmurs are often variable and non-diagnostic.*

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**68.**

A 67-year-old male with a history of multiple myocardial infarctions, coronary artery disease, and hypertension is brought to the ER by his wife who states that he "isn't acting like himself." She states this episode started within the past two hours. You note he is exhibiting signs of altered mental status. His BP is 222/130 mm Hg, and you note papilledema on his fundoscopic exam.

Which of the following medications should be given immediately?

**Nicardipine (Cardene) plus esmolol (Brevibloc)**

Captopril (Capoten)

Labetalol (Trandate)

Nitroglycerin (Nitrostat)

*Correct answer: Nicardipine (Cardene) plus esmolol (Brevibloc)*

*This patient is demonstrating signs of a hypertensive emergency. Diastolic pressure greater than 130 mm Hg along with the finding of optic disc edema (papilledema) indicates that this patient is undergoing or very near to end-organ damage. His blood pressure must be immediately reduced as he is already demonstrating signs of encephalopathy and is at risk of nephropathy, intracranial hemorrhage, aortic dissection, pulmonary edema, unstable angina, or another MI. Out of the answer choices given, nicardipine plus esmolol (an antiarrhythmic, beta-blocker) are the preferred agents. If myocardial ischemia is present, nitroglycerin plus a beta-blocker should also be given. Nicardipine is a calcium channel blocker, causing peripheral vasodilation.*

*Captopril is an oral angiotensin-converting enzyme inhibitor that may be used in the setting of less severe emergencies.*

*Labetalol is a beta-blocker that is the preferred agent for blood pressure control during pregnancy.*

*Nitroglycerin would be indicated if this patient was complaining of angina or if his exam showed signs of myocardial ischemia.*

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**69.**

At what minimum heart rate will symptoms commonly present due to tachycardia?

**150 beats per minute**

130 beats per minute

170 beats per minute

190 beats per minute

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*Correct answer: 150 beats per minute*

*Sinus tachycardia can occur due to fever, exercise, pain, emotion, shock, thyrotoxicosis, anemia, heart failure, and as a side effect of medications. Typically, clinically significant symptoms will not occur at heart rates of less than 150 beats per minute.*

---

**70.**

Which of the following congenital conditions is **most** likely to present with cyanosis?

**Transposition of the great vessels**

Atrial septal defect

Coarctation of the aorta

Patent ductus arteriosus

*Correct answer: Transposition of the great vessels*

*Congenital heart anomalies are the most common congenital structural malformations. They are classified as either cyanotic or non-cyanotic. Cyanotic malformations include the Tetralogy of Fallot (ventricular septal defect, an overriding aorta, pulmonary stenosis, and right ventricular hypertrophy), pulmonary atresia, hypoplastic left heart syndrome, and transposition of the great vessels.*

*Non-cyanotic congenital defects include an atrial septal defect, ventricular septal defect, patent ductus arteriosus, and coarctation of the aorta.*

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**71.**

In a patient with heart failure, an implantable cardioverter-defibrillator (ICD) is indicated when the ejection fraction falls below:

**35%**

55%

40%

45%

Correct answer: 35

*The key management principle in the treatment of heart failure is the recognition and treatment of any reversible causes. Preventive, rehabilitative nonpharmacologic measures (progressive aerobic exercise, low-sodium diet, smoking/alcohol cessation) should be implemented in addition to pharmacologic measures. The ejection fraction should be periodically monitored with echocardiography, as it is the key diagnostic and prognostic indicator in heart failure. ICDs are indicated when the ejection fraction in a patient with heart failure falls below 35%.*

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72.

A 50-year-old male presents to the emergency department with a racing heart. He is noticeably fatigued, and his heartbeat is irregular on auscultation. His remaining physical examination is unremarkable. Diagnostics are still pending. Which of the following is the **most likely** diagnosis?

**Atrial fibrillation**

Ventricular tachycardia

Sick sinus syndrome

Ventricular premature beats

*Correct answer: Atrial fibrillation*

*Atrial fibrillation is the most common chronic arrhythmia; it is a type of supraventricular arrhythmia. Palpitations, angina, fatigue, and symptoms of heart failure are commonly seen in patients with supraventricular arrhythmias. Some patients may be asymptomatic.*

*Patients with ventricular tachycardia or sick sinus syndrome may also complain of palpitations or be asymptomatic, but this is less common than in atrial fibrillation.*

*Ventricular premature beats may or may not be noticed by patients. Palpitations are not a common symptom.*

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**73.**

Which of the following is the **least** reliable indicator of a deep vein thrombosis (DVT)?

**Pain with dorsiflexion**

Swelling, heat, and tenderness

Induration and a palpable cord

Duplex Ultrasound

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*Correct answer: Pain with dorsiflexion*

*Thrombophlebitis is inflammatory changes that lead to partial or complete occlusion of a vein. Virchow triad of stasis, vascular injury, and hypercoagulability predispose a vein to the development of thrombophlebitis. DVT usually occurs in the lower extremities or pelvis. Although half of all patients with DVT are asymptomatic, there may be swelling, heat, and redness over the affected area. Dull pain, erythema, tenderness, induration, and a palpable cord are all signs of thrombophlebitis. Homan's sign (pain with dorsiflexion) is unreliable and lacks both sensitivity and specificity for the diagnosis of DVT.*

*Duplex ultrasound is the preferred study for DVT. However, a negative result in a patient highly suspicious for DVT indicates the need for further study.*

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**74.**

An otherwise healthy 23-year-old female presents to the ER for evaluation of "her heart skipping beats." She denies chest pain, dizziness, or syncope. She states that she is currently on no medications and is a graduate student. She is studying for finals and has increased her coffee consumption recently. Her vitals and physical exam findings are normal. Her EKG demonstrates a normal rate and rhythm. However, you note an occasional wide QRS complex of different morphology followed by a compensatory pause.

Which of the following is her **most** likely diagnosis?

**Premature ventricular contractions (PVCs)**

Junctional rhythm

First-degree heart block

Long QT syndrome

*Correct answer: Premature ventricular contractions (PVCs)*

*Ventricular premature beats, or premature ventricular complexes (PVCs), are common and typically benign. They can occur with increasing frequency as the myocardium is irritated by factors such as ischemia or an electrolyte imbalance, but also may occasionally occur in a healthy patient with no structural abnormalities, especially in the setting of stimulant use. The EKG findings of a widened QRS complex of different morphology followed by a compensatory pause are consistent with PVCs. The compensatory pause is usually what the patient symptomatically experiences as the "skipped beat." PVCs may also present asymptotically as an incidental finding on routine EKG.*

*Junctional rhythms may occur in patients with normal hearts or those with myocarditis, coronary artery disease, or digitalis toxicity. They are one form of supraventricular arrhythmia, and EKG will demonstrate p wave abnormalities.*

*First-degree heart block is an A-V conduction disturbance in which all the atrial beats are conducted to the ventricles, but the P-R interval will be prolonged, greater than 0.21 seconds. Patients are usually asymptomatic, but higher-grade blocks may produce symptoms of weakness, fatigue, light-headedness, and/or syncope. Exam findings will usually demonstrate bradycardia.*

*Long QT syndrome may be congenital or acquired and may present with the complaint of recurrent syncope. It is a form of ventricular arrhythmia, and EKG findings will demonstrate a QT interval between 0.5 to 0.7 seconds long. It may lead*

*to other ventricular arrhythmias such as V-tach, Torsades de Pointes, or, in some cases, sudden death.*

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**75.**

Which of the following is the correct order of events in the pathophysiology of atherosclerosis?

**Lipid deposition, fibrosis, calcification, plaque formation**

Plaque formation, lipid deposition, calcification, fibrosis

Lipid deposition, calcification, plaque formation, fibrosis

Calcification, fibrosis, lipid deposition, plaque formation

*Correct answer: Lipid deposition, fibrosis, calcification, plaque formation*

*Atherosclerosis is associated with premature coronary and peripheral vascular morbidity and mortality. Atherosclerotic heart disease is the most common cause of cardiovascular death and disability. Major risk factors are smoking and elevated cholesterol (>200 mg/dL) due to diet or familial dyslipidemia. Inflammation also appears to play a role, and C-reactive protein levels are often noted. The initiating phenomenon is lipid deposition, which is followed by fibrosis, calcification, and plaque formation in the intima layer of large and medium vessels.*

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**76.**

A premature infant without signs of cyanosis has a continuous, machine-like sounding murmur in addition to a widened pulse pressure and hyperdynamic apical pulse. Which of the following is generally the recommended treatment for this patient's problem?

**IV indomethacin (Indocin)**

Extracorporeal membrane oxygenation

Alprostadil (prostaglandin E1)

Surgical repair

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*Correct answer: IV indomethacin (Indocin)*

*A continuous, machine-like sounding murmur with a widened pulse pressure and hyperdynamic apical pulse are findings of a patent ductus arteriosus (PDA). PDA is a non-cyanotic congenital heart anomaly due to a failed or delayed closure of the channel bypassing the lungs, which allows placental gas exchange during the fetal state. It is more common in premature infants and represents 12% to 15% of significant congenital heart disease. Unlike other congenital anomalies, surgical treatment is usually not indicated as many patients respond to IV indomethacin.*

*Extracorporeal membrane oxygenation and alprostadil (prostaglandin E1) are interventions that are commonly used to maintain a patent ductus arteriosus in order to stabilize an infant with a cyanotic anomaly prior to surgical correction.*

*Surgical correction is generally not indicated in PDA.*

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77.

A 65-year-old female patient with diabetes and hypertension comes to the ER with the complaint of severe heartburn that has lasted for the past hour despite taking several OTC medications. She is diaphoretic, anxious, and restless. Her EKG shows peaked T-waves and ST-segment elevation. Her labs are drawn emergently.

Which of the following is **most** likely to be elevated at this point in her episode?

Myoglobin

Cardiac troponin I

Cardiac troponin T

CK-MB

*Correct answer: Myoglobin*

*This patient presents to the ER about an hour after the onset of her symptoms. Her chief complaint is atypical (indigestion), but women and diabetics are more likely to present with atypical symptoms rather than the classic crushing retrosternal chest pain or pressure. She is demonstrating the early EKG findings of ST-segment elevation myocardial infarction with peaked T-waves and ST-elevation. The evolution of her cardiac biomarkers will confirm this diagnosis. Myoglobin is the first biomarker to elevate, usually within one to two hours after the onset of chest pain. It peaks in six to seven hours then returns to normal in 24.*

*Cardiac troponin I and cardiac troponin T are two cardiac-specific troponins that, when elevated, are the most specific for myocardial infarction. Both should be measured on all patients with symptoms consistent with acute coronary syndrome (ACS) and repeated in eight to 12 hours. Initial sampling should occur within 12 hours of the onset of symptoms. Cardiac troponin I will peak in 24 hours and troponin T in 12 to 48 hours. Troponin I returns to baseline in five to ten days; troponin T returns to baseline in five to 14 days.*

*CK-MB should be measured at presentation and repeated in eight to 12 hours. It peaks at 24 hours and returns to normal in 48 to 72 hours. This enzyme is the most helpful when evaluating for reinfarction.*

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**78.**

Which of the following would be least helpful in the initial workup of a patient with suspected postural hypotension?

**Echocardiogram**

Fasting glucose

Hemoglobin/Hematocrit

Electrocardiogram

*Correct answer: Echocardiogram*

*Postural hypotension is defined as a greater than 20 mmHg drop in systolic blood pressure or a drop of greater than 10 mmHg in diastolic blood pressure between supine and sitting and/or standing measurements. If a rise in pulse of more than 15 beats per minute is measured, a depleted circulating blood volume is a probable cause. Diagnostic studies should be directed at suspected causes, to include complete blood count, basic metabolic profile, and an electrocardiogram. A tilt test or neurological studies may be appropriate if the clinical examination is unrevealing or if symptoms persist or are severe.*

*An echocardiogram may reveal a cause of postural hypertension, but should be reserved in lieu of less likely causes.*

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**79.**

A 67-year-old male presents to the emergency department with chest pain. He states the chest pain is in the center of his chest with radiation to his shoulders. The pain lasts approximately 15 minutes in duration and changes in intensity but does not seem to be affected by activity. He has a history of high cholesterol, which is controlled with diet. His pulse is 110 beats per minute, blood pressure is 135/90 mmHg, and respirations are 18 breaths per minute. Physical examination is unremarkable, as is his electrocardiogram. His cardiac enzymes are negative.

Which of the following is the **most** likely diagnosis?

**Variant angina**

Unstable angina

Stable angina

Non-ST-segment elevation myocardial infarction

*Correct answer: Variant angina*

*Variant (Prinzmetal) angina is a form of unstable angina in which the patient has angina of varying intensity while at rest, with preservation of exercise capacity. Variant angina is caused by vasospasm. Symptoms are identical to that of unstable angina: midsternal chest pain, lasting longer than stable angina (typically three minutes), with radiation to the jaw, shoulders, arms, wrists, back of the neck, or a combination thereof; failure to alleviate pain with nitroglycerin use; pain that is not alleviated by rest.*

*Unstable angina, as above, may present with the same symptoms as variant angina; however, exercise tolerance is typically limited, and pain may often be exacerbated by activity.*

*Stable angina does not typically last longer than three minutes and is often alleviated by rest and/or nitroglycerin use.*

*A non-ST-segment elevation myocardial infarction would yield positive cardiac enzymes.*

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**80.**

After assessing a cyanotic newborn, it is determined her airway is patent and her heart rate is regular with an appropriate rate. However, a murmur is heard on cardiac auscultation. Which of the following is an appropriate next diagnostic step, but does not give detailed information about the cardiac valves?

**Chest radiography**

Echocardiography

Cardiac catheterization

Magnetic resonance imaging

*Correct answer: Chest radiography*

*A cyanotic neonate with a murmur may have a congenital heart anomaly. Initial studies should include electrocardiogram (ECG) and chest radiography. Chest radiography is a quick way to assess for the potential presence of pulmonary pathology, but it does not provide much detail about the cardiac valves.*

*Echocardiography, Doppler ultrasonography, magnetic resonance imaging, cardiac catheterization, and angiography may be necessary but are not as fast or cost-efficient as an ECG and chest radiography.*

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**81.**

A 52-year-old male presents to the ER with the complaint of decreased exercise tolerance that has been worsening over the past several months. He has recently noticed palpitations and swelling in his legs. He has no known medical history. His cardiac workup demonstrates changes consistent with restrictive cardiomyopathy. His myocardial biopsy demonstrates infiltrative immunoglobulins with light chains.

Based on his presentation and myocardial biopsy, what is his **most** likely diagnosis?

**Amyloidosis**

Sarcoidosis

Undiagnosed chronic hypertension

Systemic lupus erythematosus

*Correct answer: Amyloidosis*

*Restrictive cardiomyopathy usually presents with decreased exercise tolerance. As the disease advances, patients may also present with signs and symptoms of right-sided congestive heart failure (dependent pitting edema, distended neck veins, hepatomegaly) and pulmonary hypertension. Restrictive cardiomyopathy results from fibrosis of the myocardium or infiltration of the ventricular wall due to collagen-vascular disease. The most common of these is amyloidosis. In this patient, the myocardial biopsy demonstrating the infiltration of immunoglobulins with light chains (amyloid deposits) confirms the diagnosis. Other causes of restrictive cardiomyopathy include radiation, postoperative changes, diabetes, and endomyocardial fibrosis.*

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82.

Which of the following statements regarding tricuspid and pulmonic valve disorders is true?

**EKG may show right-axis deviation, P-wave abnormalities, and/or prominent R and deep S waves.**

Symptoms frequently include cough, rales, paroxysmal nocturnal dyspnea or hemoptysis and hoarseness.

Findings often include accentuated or diminished S1 and S2 as well as an Austin Flint murmur.

Anticoagulant therapy is usually indicated as these disorders may be associated with the development of atrial fibrillation.

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*Correct answer: EKG may show right-axis deviation, P-wave abnormalities, and/or prominent R and deep S waves.*

*Tricuspid and pulmonic valve disorders that present in either infancy or childhood are associated with congenital anomalies. Adults may present with stenosis of either valve that is usually the result of rheumatic scarring or connective tissue disease. Tricuspid regurgitation may be intrinsic or functional. In all cases, right-sided pressure overload leads to right-sided cardiomegaly, systemic venous congestion, and right-sided heart failure. Patients present with complaints of exercise intolerance and findings of jugular venous distention, peripheral edema, and hepatomegaly, all of which suggest systemic venous congestion. Chest x-ray may demonstrate a prominent right heart border with dilation of the superior vena cava, and EKG may show right-axis deviation, P-wave abnormalities, and/or prominent R and deep S waves consistent with right-sided atrial and ventricular enlargement.*

*Symptoms of cough, rales, paroxysmal nocturnal dyspnea or hemoptysis, and hoarseness are associated with left-sided failure that may be attributable to either aortic or mitral valve disorders.*

*A physical exam finding of an accentuated S1 is common in mitral stenosis, finding of a diminished S2 is common in mitral regurgitation, and finding of an Austin Flint murmur is common with aortic regurgitation.*

*Anticoagulant therapy is more often indicated in aortic and mitral disorders as these are associated with the onset of atrial fibrillation.*

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**83.**

Which of the following diagnostic studies will **best** differentiate between cardiomyopathies?

**Echocardiogram**

Electrocardiogram

Chest radiography

Holter monitoring

*Correct answer: Echocardiogram*

*An echocardiogram is a diagnostic of cardiomyopathies. Dilated cardiomyopathy will reveal left ventricular dilation and dysfunction, with high diastolic pressure and low cardiac output. Hypertrophic cardiomyopathy will reveal left ventricular hypertrophy, asymmetric septal hypertrophy, small left ventricle, and diastolic dysfunction. Restrictive cardiomyopathy will reveal reduced left ventricular function.*

*An electrocardiogram cannot differentiate cardiomyopathies, as often changes are nonspecific.*

*Long-standing dilated cardiomyopathy and restrictive cardiomyopathy may reveal cardiomegaly on radiography, while hypertrophic cardiomyopathy has an unremarkable radiograph.*

*Holter monitoring may or may not capture any electrical changes, as would be seen in an electrocardiogram.*

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**84.**

Which of the following is a potential side effect of chemotherapy?

**Dilated cardiomyopathy**

Hypertrophic cardiomyopathy

Restrictive cardiomyopathy

Takotsubo cardiomyopathy

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*Correct answer: Dilated cardiomyopathy*

*Dilated cardiomyopathy is the most common type of cardiomyopathy, accounting for approximately 95% of cases. Dilation of the left ventricle occurs secondary to a reduction in the strength of contraction. The most common cause of dilated cardiomyopathy is a genetic abnormality (25% to 30% of cases); other causes include excessive alcohol consumption, postpartum state, chemotherapy toxicity, endocrinopathies, and myocarditis. Men, particularly African-American men, have a higher rate of incidence.*

*Hypertrophic cardiomyopathy is a genetic disorder.*

*Restrictive cardiomyopathy is the result of amyloidosis, radiation, postoperative changes, diabetes, or endomyocardial fibrosis.*

*Takotsubo cardiomyopathy (stress-induced cardiomyopathy) occurs after a major catecholamine discharge, resulting in hypocontractility of the left ventricular apex.*

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**85.**

An indigent patient who has a known history of heart failure and scant medical care presents to the ER complaining of exertional dyspnea, cough, and fatigue. As you are questioning him about his symptoms, he states that he is asymptomatic at rest, but that activities such as grooming, ambulating, and other acts of ordinary physical activity result in the onset of symptoms. He admits to marked limitation of physical activity.

According to the New York Association Functional Classification of Heart Disease, this patient has which of the following classes of heart disease?

**Class III**

Class I

Class II

Class IV

*Correct answer: Class III*

*The New York Heart Association Functional Classification of Heart Disease has delineated four classes of heart failure defined by the degree of limitation of daily activity. Class III is defined as marked limitation of physical activity; comfortable at rest, but less than ordinary physical activity causes symptoms.*

*Class I is defined as no limitation of physical activity; ordinary physical activity does not cause undue fatigue, dyspnea, or anginal pain.*

*Class II is defined as slight limitation of physical activity; ordinary physical activity results in symptoms.*

*Class IV is defined as unable to engage in any physical activity without discomfort; symptoms may be present even at rest.*

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**86.**

All the following are risk factors for varicose veins **except**:

**hypertension**

obesity

history of phlebitis

history of pregnancy

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*Correct answer: hypertension*

*Varicose veins are dilated, tortuous veins that develop superficially in the lower extremities secondary to venous dysfunction. Risk factors include previous pregnancy, obesity, family history, prolonged sitting/standing, and a history of phlebitis.*

*Some patients with varicose veins may be asymptomatic, while others note aching and fatigue. Prolonged disease can yield chronic distal edema, abnormal pigmentation, fibrosis, atrophy, and skin ulceration. Graduated elastic stockings can provide external support. Lower extremity elevation and regular exercise may provide symptomatic relief. Endovenous radiofrequency or laser ablation, compression sclerotherapy, and surgical stripping of the saphenous tree may be necessary.*

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87.

The key finding on an EKG in a patient with a Mobitz Type I block is:

**Progressive prolongation of the PR interval followed by a missing QRS complex**

Complete dissociation of P waves and QRS complexes

Elongated PR intervals (greater than 0.21 seconds)

A fixed number of non-conducted P waves for every QRS complex

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*Correct answer: Progressive prolongation of the PR interval followed by a missing QRS complex*

*AV block is characterized by refractory conduction of impulses from the atria to the ventricles through the AV node and/or the bundle of His. There are three types of blocks: first-degree, second-degree [subdivided into Mobitz type I (Wenckebach) and Mobitz type II], and third-degree (complete). Mobitz type I (Wenckebach) is a progressive lengthening of the PR interval with shortening of the RR interval. Eventually, this results in an atrial impulse that is not conducted to the ventricles. This will be seen as a missing QRS complex resulting in a skipped beat.*

*Third-degree heart block is also called complete heart block as there is complete dissociation between atria and ventricles. This will result in EKG findings of varying atrial and ventricular rates and no relationship between the P waves and QRS complexes.*

*First-degree heart block is defined as a fixed but prolonged PR interval on an EKG. It is usually greater than 0.21 seconds. All atrial beats are conducted to the ventricles. Bradycardia may be present.*

*Second-degree, Mobitz type II is defined by intermittently non-conducted atrial beats. This will manifest on an EKG as a fixed number of non-conducted P waves for every QRS complex. Therefore, it may be further named by this ratio (e.g. 2:1, 3:1 or 4:1 Mobitz II block).*

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**88.**

A 60-year-old female with a history of prosthetic valve replacement is diagnosed with infective endocarditis. Her exam demonstrates painful, violaceous, raised lesions on her fingers and toes. These lesions are known as:

**Osler nodes**

Janeway lesions

Roth spots

Splinter hemorrhages

*Correct answer: Osler nodes*

*Prosthetic valve endocarditis is most often caused by Staphylococcus aureus, Gram-negative organisms, or fungi if the disease develops within two months of implantation. Later disease is typically due to streptococci or staphylococci. Most patients will present with fever (may be absent in the elderly) and nonspecific complaints (cough, dyspnea, arthralgias, back or flank pain, GI complaints). 25% will have classic features including palatal, conjunctival, or subungual petechiae; splinter hemorrhages (non-blanching, longitudinal red to brown linear, subungual hemorrhages); Osler nodes (painful, violaceous, raised lesions of the fingers, toes, or feet); Janeway lesions (painless red lesions of the palms and soles); and Roth spots (exudative lesions on the retina).*

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**89.**

Which of the following physical exam findings would you expect to find in a patient with cardiac tamponade?

**Pulsus paradoxus**

A widened pulse pressure

Bradycardia

Hypertension

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*Correct answer: Pulsus paradoxus*

*Cardiac tamponade occurs when fluid compromises cardiac filling and impairs cardiac output. It may occur in the setting of acute pericarditis that develops into a cardiac effusion or cardiac effusion due to uremia or cardiac trauma. It may be a cause of obstructive shock and produce the clinical symptoms of tachycardia, tachypnea, narrow pulse pressure, hypotension, jugular venous distention, and pulsus paradoxus.*

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**90.**

A 25-year-old asymptomatic patient has a family history of hypertrophic cardiomyopathy. On cardiac physical examination, a triple apical impulse is seen, and a loud S<sub>4</sub> gallop is heard. Which of the following is the **most** appropriate initial treatment?

**Metoprolol (Lopressor, Toprol)**

Furosemide (Lasix)

Lisinopril (Prinivil, Zestril)

No treatment is required at this time

*Correct answer: Metoprolol (Lopressor, Toprol)*

*Sudden death can occur due to hypertrophic cardiomyopathy in patients younger than 30 years of age at a rate of 2% to 3% per year. Due to this risk, preventive treatment is appropriate. Some patients are asymptomatic, while others will present with dyspnea, angina, syncope, and arrhythmias. A sustained PMI or triple apical impulse, loud S<sub>4</sub> gallop, variable systolic murmur, a bisferiens carotid pulse, and a prominent “a” wave on examination of the jugular venous pulse can be seen. Beta-blockers or calcium-channel blockers are initial treatments. Ablation of the hypertrophic septum may be required. If severe, dual-chamber pacing, implantable defibrillator, or mitral valve replacement may be necessary.*

*Diuretics (furosemide) may be of benefit in the treatment of restrictive cardiomyopathy.*

*Lisinopril is not used in the treatment of cardiomyopathies.*

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**91.**

Pulmonic stenosis is associated with which of the following murmurs?

**Mid-systolic crescendo-decrescendo murmur**

Holosystolic murmur

Mid-diastolic opening snap

Mid-systolic click

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*Correct answer: Mid-systolic crescendo-decrescendo murmur*

*Pulmonic and tricuspid disorders will typically lead to right-sided cardiomegaly, systemic venous congestion, and right-sided heart failure. Pulmonic stenosis will typically reveal a mid-systolic crescendo-decrescendo murmur best heard at the second to third left intercostal space. Tricuspid regurgitation and mitral regurgitation have an associated pansystolic (holosystolic) murmur.*

*A mid-diastolic opening snap is associated with mitral stenosis, while a mid-systolic click is associated with mitral valve prolapse.*

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