

# USMLE

## Step 2

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### **EXPLANATIONS TO RELEASED ITEMS**

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## 2005 EDITION

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**Answer Key for the 2005 Step 2 Sample Questions**

Block 1 (Questions 1-46)

1. E	11. B	21. B	31. E	41. A
2. D	12. B	22. B	32. D	42. H
3. E	13. B	23. A	33. D	43. B
4. C	14. D	24. A	34. E	44. D
5. A	15. D	25. C	35. A	45. B
6. C	16. C	26. C	36. C	46. W
7. D	17. E	27. E	37. B	
8. B	18. A	28. D	38. C	
9. C	19. A	29. B	39. F	
10. C	20. C	30. B	40. D	

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Block 2 (Questions 47-92)

47. A	57. C	67. D	77. C	87. E
48. C	58. D	68. E	78. A	88. N
49. E	59. C	69. C	79. A	89. G
50. A	60. C	70. E	80. A	90. H
51. D	61. A	71. D	81. C	91. H
52. B	62. E	72. E	82. F	92. G
53. F	63. B	73. A	83. C	
54. B	64. A	74. C	84. D	
55. E	65. B	75. B	85. F	
56. I	66. C	76. E	86. G	

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Block 3 (Questions 93-138)

93. D	103. F	113. D	123. C	133. H
94. C	104. D	114. A	124. B	134. J
95. C	105. A	115. E	125. C	135. G
96. B	106. C	116. C	126. A	136. A
97. A	107. D	117. E	127. A	137. C
98. D	108. D	118. C	128. D	138. O
99. E	109. A	119. A	129. A	
100. B	110. B	120. E	130. G	
101. E	111. B	121. D	131. I	
102. B	112. A	122. C	132. A	

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### **Explanation to Block I of the 2005 USMLE Step 2 Release Items (Questions 1-46)**

1. **The correct answer is E.** Recall bias is a problem with retrospective studies. Patients, specifically Alzheimer's patients, may not remember whether or not they used aluminum cookware in the forties. Next of kin may remember past events better than the general population because they are concerned about the health of a family member, and try to identify possible causes of the observed symptoms.

Diagnostic bias (**choice A**) occurs when a doctor's diagnosis of a disorder is made more likely or less likely by knowledge of some fact about the patient. For example, awareness of a patient's menstrual history and tampon use may make the diagnosis of toxic shock syndrome more likely.

Ecologic fallacy (**choice B**) may lead to improper inferences about individuals based on associations measured only at the group level. For example, blacks as a group may use cigarettes more than whites, and also tend to have more heart disease than whites. This does not mean that a randomly selected black person with heart disease necessarily got it because he or she smoked cigarettes, however tempting the inference.

The statistical power of a study refers to the probability of rejecting a false null hypothesis. Nothing in the question stem indicates that the study lacks power (**choice C**); in fact, the large sample size helps to prevent this type of error.

The 95% confidence interval given (1.9-3.2) means that this interval has a 95% chance of containing the true population value for the relative risk. The value stated (2.6) is contained within that interval, indicating that lack of statistical significance (**choice D**) is not a problem here.

2. **The correct answer is D.** The patient described has a multiple features of COPD (dyspnea on exertion, increased A-P diameter, distant breath sounds, wheezes, hyperresonance). All patients with COPD should receive Pneumococcus vaccine, (**choice E**), but it's only given once. The influenza viral vaccine, (**choice D**), should be given annually. The rest of the choices are given in childhood and are not commonly used on annual basis. Tetanus vaccine is given every 10 years.

3. **The correct answer is E.** Midsternal chest pain that is aggravated by eating in a HIV+ patient with a depressed CD4 count is suggestive of infectious esophagitis. Opportunistic pathogens responsible for HIV associated esophagitis include Candida species, herpes simplex virus, cytomegalovirus, and the HIV virus itself. Candidal esophagitis is by far the most common type, but this patient did not respond to a trial of the antifungal drug, clotrimazole. At this stage, esophagoscopy with a biopsy and cultures is indicated to confirm the presence of esophagitis and to identify the responsible pathogen. Based on the pathogen, further treatment options should be considered i.e.: Acyclovir (**choice A**) for herpes. **Choice B, C and D** are not indicated at this stage, in the absence of complaints of regurgitations or acid reflux. However, they may be required if all other tests are normal.
4. **The correct answer is C.** This patient has had a cerebrovascular accident (or stroke), most likely secondary to occlusion of the right middle cerebral or right internal carotid artery. Middle cerebral artery occlusion leads to contralateral hemiplegia, contralateral hemisensory loss, and a homonymous hemianopia. If the dominant hemisphere is involved, there may be confusion, apraxia, and hemineglect on the affected side of the body. Clinically, it may not be possible to distinguish middle cerebral artery occlusion from internal carotid occlusion. The presence of a bruit in this patient suggests atherosclerotic narrowing of the right carotid artery (most commonly at the bifurcation).

An embolus to the middle cerebral artery from a ruptured ulcerated carotid plaque is a plausible mechanism for stroke in this case. However, it is essential to exclude a cerebral hemorrhage for both diagnostic and therapeutic purposes. A CT scan of the head without contrast will detect hemorrhage, particularly in the acute phase of stroke. Therapeutically, if hemorrhage is excluded, the patient can be considered for clot lysis treatment with tissue plasminogen activator (TPA), which, in selected patients, may improve neurological deficit if administered within three hours of the stroke. If a CT scan is performed immediately, she could potentially receive TPA within the three-hour time limit.

Electroencephalography (EEG; **choice A**) is useful to document a seizure focus or to assess cerebral activity in comatose patients. It is rarely indicated as an initial test in the emergency room.

Carotid duplex scan (**choice B**) is useful for detecting stenosis of the internal carotid artery. In this patient, it will confirm the presence of plaque and estimate the severity of the lesion, but will not detect ulcerated plaque. This test will not affect initial management of this patient.

Echocardiography (**choice D**) is useful for detecting mural thrombi and valvular vegetations as sources of emboli. Echocardiography may be considered after the CT scan if no clear source of embolus is determined, or if the patient has atrial fibrillation or a history of endocarditis.

Carotid angiography (**choice E**) is useful for demonstrating occlusion, recanalization, ulceration, and dissection of large arteries and stenosis of small arteries. The procedure is invasive, and may cause discomfort. It is not indicated in the initial evaluation of stroke.

5. **The correct answer is A.** It is useful to formulate a differential diagnosis of pelvic pain in a patient of reproductive years that includes pelvic inflammatory disease, appendicitis, accidents in pelvic tissues, complications of pregnancy, mechanical bowel problems, and post-traumatic injury. Many of these entities can be ruled out by obtaining a thorough history. The history does not reference a traumatic etiology, e.g., uterine instrumentation, and therefore it can be dropped from consideration. There is a paucity of GI symptoms and no mention of abdominal distention or abnormal bowel sounds, ruling out mechanical bowel problem. A negative pregnancy test and a normal-sized uterus most likely rule out pregnancy-related problems such as infected ectopic pregnancy or infected abortion. An accident to pelvic tissues, such as an adnexal torsion or degenerating myoma, would, most likely be detected on physical examination with definite lateralizing or localizing findings (rupture of endometrioma would not be likely in 14-year-old). This is not the case here, so an accident to pelvic structures can be ruled out. This narrows the choices down to appendicitis and pelvic inflammatory disease. The onset of appendicitis is more insidious than what is represented here. The first symptoms may be nausea and loss of appetite. Pain typically begins in the periumbilical area, and then gradually shifts to the right lower quadrant. Fever is not usually significant unless the appendix ruptures. Cervical motion results in right lower quadrant tenderness. Unless the appendix has ruptured, the CBC can be normal, or only reflect modest changes supportive of an infectious process. One must recognize that the presentation of acute appendicitis may not be typical. That consideration notwithstanding, none of these findings typical of appendicitis is supported by the given information. These facts are supportive of pelvic inflammatory disease: she is in a risk group for pelvic inflammatory disease, she has no nausea or vomiting, there is a cervical exudate and bilateral lower quadrant tenderness, the magnitude of fever ( $39.8^{\circ}\text{C}$ ) is more typical of pelvic inflammatory disease than appendicitis, and the extent of leukocytosis  $21,300/\text{mm}^3$  is also more typical of pelvic inflammatory disease than appendicitis. Often a Gram stain of cervical secretion will reveal Gram-negative intracellular diplococci that are indicative of a gonorrheal infection. Investigation must be undertaken to rule out sexually transmitted disease such as chlamydia,







conversion of purines into uric acid, and renal failure (underexcretion of uric acid). Hypercalcemia is secondary to the release of osteoclast-activating factor from the malignant plasma cells. This release leads to pain, lytic lesions in bone, and pathologic fractures. Alkaline phosphatase is not elevated in osteolytic metastases, but is increased in osteoblastic (e.g., prostate cancer).

Carcinoma of the pancreas (**choice A**) is not associated with hypercalcemia. It would most likely present with painless jaundice and weight loss.

Drug-induced hypercalcemia (**choice B**) is associated with thiazide therapy; however, it is an uncommon complication, and does not produce this degree of hypercalcemia. Furthermore, if hypercalcemia occurs in patients on thiazides, primary hyperparathyroidism is likely present since the block  $\text{Na}^+$  reabsorption leaves the channel open for parathormone-enhanced calcium reabsorption. Primarily hyperparathyroidism (**choice D**) is not the cause of hypercalcemia in this patient since the serum phosphorus is normal (it would be decreased), and the patient does not have normal anion gap metabolic acidosis (due to PTH inhibition of bicarbonate reclamation in the proximal tubule).

Renal cell carcinoma (**choice E**) is associated with ectopic production of parathormonelike peptide that increases calcium and decreases phosphorus reabsorption in the kidney. However, this type of malignancy-induced hypercalcemia is not related to metastasis, and would not explain the patient's complain of lower back pain.

10. **The correct answer is C.** Heparin is the most common drug associated with thrombocytopenia in a hospitalized patient. The type I variant occurs early, is transient, and is not immune-mediated (most likely type in this patient). The type II variant is immune-mediated (heparin-specific antibody against the platelet). The heparin complex leads to con-dose-related destruction of platelets (median time is 10 days after therapy) and a platelets release reaction of thrombogenic agents, resulting in venous (more common) or arterial thromboses. The activated partial thromboplastin time is prolonged due to enhancement of antithrombin II activity by heparin against coagulation factors that are serine proteases.

Acute adrenal insufficiency (**choice A**) is unlikely since cortisol deficiency would cause a neutropenia, and would not have any effect on the platelet count.

Disseminated intravascular coagulation (DIC, choice B) is unlikely since the prothrombin time would also be prolonged from consumption of coagulation factors on the final common pathway (e.g., fibrinogen, prothrombin, and factor V).

Immune thrombocytopenic purpura (**choice D**) is unlikely since it usually occurs after an upper respiratory infection, and is not likely to occur in the postsurgical setting. In addition, it would not be associated with a further drop in hematocrit, as noted in this patient.

Thrombotic thrombocytopenic (TTP, choice E) is unlikely since it most commonly occurs in young women, and is associated with fever, CNS abnormalities, renal failure, microangiopathic hemolytic anemia, and thrombocytopenia. There is no relationship of TTP to drugs or the postoperative state.

11. **The correct answer is B.** Toxicology screen in this patient reveals both alcohol and benzodiazepine ingestion. Alcohol (ethanol) toxicity is dose-related with drowsy and confused patients whose blood levels are at 200 mg/dL. When levels are 300-400 mg/dL, respiratory depression and coma occur. Benzodiazepines are sedatives that depress mental and respiratory function when taken in an overdose. Symptoms include drowsiness, dysarthria, ataxia, and confusion. Administration of flumazenil, a benzodiazepine antagonist, reverses toxicity, serving a therapeutic as well as diagnostic function. Many consider the use of flumazenil standard in the management of a coma patient. Patients with alcohol or benzodiazepine toxicity do not show a response to naloxone, glucose, or thiamine.

Alcohol only (**choice A**) is a possibility due to its sedative effects. As mentioned above though, it is generally not expected to cause coma until blood level reach at least 300 mg/dL.

Alcohol and cocaine (**choice C**) is not likely in this instance. Cocaine is a stimulant that causes CNS and sympathetic stimulation, manifesting as hypertension, tachypnea, tachycardia, and mydriasis.

Alcohol and PCP (**choice D**) ingestion can cause respiratory depression and coma. PCP (phencyclidine) is a dissociative anesthetic that causes agitation, bizarre behavior, hypertension, and tachycardia. Moderate ingestion of PCP can lead to stupor, progressing to coma and respiratory depression. It is easily detected on toxicology screens of the blood or urine. Because PCP is not detected in this case, it is unlikely that this patient ingested PCP.

Alcohol and salicylates (**choice E**) is unlikely due to the lack of salicylates on toxicology screen. Salicylates cause nausea, vomiting, tinnitus, and malaise with severe intoxication associated with lethargy, convulsion, and coma.





spread to involve the valves. Symptoms of congestive heart failure predominate. Chest radiograph confirms cardiac enlargement.

In total anomalous pulmonary venous return (**choice E**), there is no direct pulmonary venous connection into the left atrium, and all of the blood returning to the heart (the systemic and pulmonary venous blood) returns to the right atrium. The presentation of total anomalous pulmonary venous return depends on the presence or absence of venous channel(s) obstruction. If obstruction is present, the infant will profoundly cyanotic and ill; chest x-ray will show pulmonary venous congestion. In most cases of total anomalous pulmonary venous return without obstruction, the heart is enlarged, the pulmonary artery and right ventricle are prominent, and the pulmonary vascularity is increased.

16. **The correct answer is C.** This is a classic presentation of Wernicke's encephalopathy. The history of alcoholism and administration of dextrose preceding the development of worsening encephalopathy and ophthalmoplegia are classic signs of Wernicke's. The patient has been thiamine-depleted by excess alcohol ingestion and poor nutritional intake. Administering glucose triggers a number of metabolic pathways that completely deplete the patient's already low thiamin levels. The treatment, therefore, is to administer intravenous thiamine.

This item illustrates the importance of knowing what the various populations are at risk for. This man is an alcoholic, and has not been eating properly. His neurological symptoms provide more evidence that he is deficient in thiamine so correcting that deficiency is the most important immediate step.

An anticoagulant (**choice A**) is not indicated in this case since there is no evidence of DVT, PE or any thromboembolic event. There are no focal CNS findings.

Diazepam (**choice B**) may only complicate things further, and alter his mental state. There is no indication for diazepam.

Vitamin C (**choice D**) is given IV to patients on TPN, or who cannot take it orally, and therefore are deficient. Since this patient is malnourished, it would be appropriate to add vitamin C to his list of medications. Vitamin C is not, however, the first drug you would administer here. Magnesium containing IV fluids (**choice E**) is an appropriate adjunct here, but will not treat the cause of his confusion. His presenting symptoms do not suggest hypomagnesemia.

This item illustrates the importance of knowing what the various populations are at risk for. This man is an alcoholic and has not been





exchange problem in the lung, which may include a ventilation defect (a problem getting air to the alveoli, e. g., atelectasis), perfusion defect (a problem getting blood to the alveoli for gas exchange, e.g., pulmonary embolus), or a diffusion defect (a problem with O<sub>2</sub> exchange at the interface of the alveoli and pulmonary capillaries, e.g., interstitial fibrosis). The PaO<sub>2</sub> in this patient, whose blood gases were drawn on room air (21% oxygen), is calculated as follows:  $PaO_2 = 0.21(713) - 58/0.8 = 77.5$  mmHg, which is medically significant. As for the drop in the patient's systolic blood pressure, it is most likely secondary to the effect for acidosis decreasing cardiac contractility.

Occult hemorrhage (**choice B**) would not explain the presence of respiratory acidosis and hypoxemia. Loss of whole blood does not alter the pH, oxygen saturation, or the PO<sub>2</sub>.

Primary cardiac irritability and failure (**choice C**) is unlikely because ventricular extrasystoles should not decrease cardiac output significantly, or push a patient into heart failure if ventricular fibrillation is not present.

Primary hypoxemia caused by anesthetic gases (**choice D**) is unlikely since the hypoxemia relates to hypoventilation secondary to atelectasis (increased A-a gradient). Hypoventilation secondary to depression of the respiratory center produces respiratory acidosis and hypoxemia; however, the A-a gradient is normal since ventilation, perfusion, and diffusion are normal.

A pulmonary embolus (**choice E**) is very unlikely since it produces respiratory alkalosis (tachypnea blows off CO<sub>2</sub>). The A-a gradient is increased for the first 48 hours owing to a perfusion defect. After 48 hours there is a ventilation defect (atelectasis) caused by a problem in surfactant synthesis.

20. **The correct answer is C.** The patient has classic signs and symptoms of polymyalgia rheumatica: chronic fatigue and pain, and stiffness of the muscles in the neck/shoulder area and pelvic girdle that is most pronounced in the morning. Muscle tenderness 'but not weakness, is commonly present, along with normal serum creatinine kinase (CK) levels, indicating a lack of inflammation. The erythrocyte sedimentation rate (ESR) is almost always elevated. Although the patient does not have symptoms suggestive of such a condition, temporal arteritis is commonly present as well.

Fibromyositis (**choice A**) is a common musculoskeletal ailment in women ages 20-50. Trigger points of pain are the characteristic findings. The ESR is normal, unlike that of polymyalgia rheumatica.

Osteoarthritis (**choice B**) is the most common rheumatological disease in the elderly population. Pain primarily targets the weight-bearing joints, and musculoskeletal findings, fatigue, and elevated ESRs are not present.

Polymyositis (**choice D**) is characterized by muscle tenderness, pain, and weakness, the latter not being present in polymyalgia rheumatica. Furthermore, patients characteristically have a periorbital purplish discoloration and elevated serum CK since the underlying disease is a myositis.

Seronegative rheumatoid arthritis (**choice E**) is characterized by ankylosing spondylitis, Reiter's syndrome, enteropathic arthritis, and psoriatic arthritis. Most patients are HLA-B27-positive. Lower back pain secondary to sacroiliitis, rather than musculoskeletal disease, is the primary abnormality.

21. **The correct answer is B.** This elderly man has signs and symptoms of subacute obstruction to urinary outflow—frequency, hesitancy, slow stream, and a large postvoid residual. The absence of other medical problems and the presence of an enlarged prostate suggest that the obstruction is at the level of the prostatic urethra. The normal urinalysis and firm, nontender prostate rule out acute prostatitis. Both benign prostatic hypertrophy and prostate cancer can cause urinary obstruction, but benign hypertrophy, which affects the central, periurethral prostate, is a far more common cause than cancer, which affects the peripheral zones of the prostate. The absence of a palpable prostatic nodule also argues against prostate cancer.
22. **The correct answer is B.** The kidney needs to flush out the myoglobin caused by the crush injury before it precipitates in the kidney and causes renal failure. Mannitol, a diuretic, will accomplish this task.

Intravenous administration of hydrochloric acid until urine pH is less than 4.0 (**choice A**) would not be correct because the urine needs to be alkalinized, not acidified, to flush myoglobin out in the urine.

Continuous infusion of dopamine (**choice C**) is useful for maintaining renal perfusion. The problem with a crush injury in whom renal insufficiency appears to be due to myoglobinuria. The use of contrast in this setting is contraindicated because of renal toxicity.

Arteriography (**choice E**) is useful for determining flow to the kidneys, but the contrast load in the face of renal insufficiency in a patient with known myoglobinuria is not warranted.

23. **The correct answer is A.** Herpes zoster (shingles) is the clinical manifestation of latent varicella zoster virus reactivation. It is characterized by a painful, unilateral rash in a dermatomal distribution. Initially the rash is erythematous and maculopapular, but it rapidly evolves to weeping vesicular lesions, as seen in this case. The etiology of reaction is unknown, although patients who are immunocompromised may be more susceptible, and may have more severe disease. Herpes zoster can occur at any age, although it occurs more frequently in patients over 60.

Impetigo (**choice B**) is a superficial infection caused most commonly by group A streptococci, although it is also caused by other streptococci and Staphylococcus aureus. Lesions begin as red papules, and evolve to vesicular, then pustular lesions, eventually breaking down to form golden, honeylike crusts. These lesions are generally not painful, and usually occur in children.

Pyoderma gangrenosum (**choice C**) is an ulcerative skin lesion associated with myeloproliferative disorders, rheumatoid arthritis, and inflammatory bowel disease. It is characterized by a rapidly developing painful ulcer with an undetermined edge and gangrenous border. It usually occurs in the lower extremities.

Syphilis (**choice D**) can produce skin lesions in the primary, secondary, or tertiary stages. In the primary stage, lesions begin as a painless papule in the genital region, rectum, or within the oral cavity. The lesions then erode, forming indurated ulcers (chancres). Skin lesions in secondary syphilis are varied. They may appear as macules, nonscaling papules and annular plaques, scaling papules and plaques, pustules, or nodules. Vesicles and bullae are not seen except in newborns and those with HIV. The rash is often generalized, with noteworthy lesions on the palms and soles. In tertiary syphilis, patients may form gumma, which are painless, nodular, papulosquamous, or ulcerative indurated lesions that form characteristic circles or arcs with peripheral hyperpigmentation.

Systemic lupus erythematosus (**choice E**) can present with a variety of skin lesions. The classic malar (butterfly) rash is an erythematous lesion over the cheeks and bridge of the nose bilaterally, usually sparing the nasolabial folds. Other lesions that can be seen in SLE include macules, papules, plaques, bullae, purpura, subcutaneous nodules, and ulcers.

24. **The correct answer is A.** Lower abdominal discomfort, suprapubic tenderness, and pyuria all point to a diagnosis of cystitis. Cystitis in sexually active women is often temporally associated with vaginal intercourse, especially in young girls who have intercourse for the first time. It is thought that perineal trauma during intercourse transfers enteric bacterial flora towards the urethral opening and lower urinary tract.

25. **The correct answer is C.** Pain on passive extension of the wrist and fingers is a classic sign of a Volkmann's contracture, commonly seen with supracondylar fractures. Increasing pressure on the tissue causes occlusion of the arteries, leading to muscle and nerve damage. Immediate surgical exploration and fasciotomy must be performed to preserve the tissue.

Since there is an acute problem in how this boy reacted to the initial treatment, it is logical to deal with the cause of that reaction, not merely to treat the symptoms of that reaction. But choices B, D, and E all ignore or fail to directly address the cause, so you can rule all of them out. Choice A threatens to do even more harm, so it's out, and Choice B aims to mask the symptoms with painkillers, so it can't be correct. Only Choice C directly investigates to see what's causing the boy's pain and therefore gain information that may be used to solve the problem.

26. **The correct answer is C.** The findings of increased skin pigmentation, left ventricular cardiac failure cardiomegaly and  $S_3$ ), evidence of liver disease (spider angiomas and a small liver) and gonadal atrophy (secondary to anterior pituitary involvement), are classic symptoms of hemochromatosis. Patients with hemochromatosis and liver disease are at risk for hepatoma.
27. **The correct answer is E.** Infants of diabetic mothers are at risk for a myriad of metabolic derangements, the most immediate life threatening one being hypoglycemia. Careful monitoring of glucose throughout pregnancy is essential to minimize both maternal and fetal morbidity and mortality. In this case, control of diabetes was difficult. Resulting maternal hyperglycemia causes fetal hyperglycemia. Recall that glucose is readily transported across the placenta by facilitated diffusion. The fetus responds to hyperglycemia by increasing its secretion of insulin. At delivery the maternal glucose is withdrawn with the clamping of the umbilical cord but fetal insulin secretion continues in excess of that needed for fetal euglycemia. Hypoglycemia is secondary to fetal beta-islet cell hyperplasia induced by chronic maternal hyperglycemia. As many as 50% of infants of diabetic mothers have blood glucose levels less than 30 mg/dl during the first 2 to 6 hours of life. Most infants are asymptomatic. Clinical manifestations of hypoglycemia vary with degree and duration of hypoglycemia, and include tremor, cyanosis, apnea, irritability and convulsions. Severe hypoglycemia unrecognized and untreated can be fatal. Treatment may include small doses of glucagons and/or glucose sufficient to achieve euglycemia.

Other tests are useful in observing the pathophysiology of conditions that evolve over a longer period of time. For example, determination of blood

group Rh (**choice A**) would be indicated in cases of either ABO or Rh incompatibility, or if blood transfusion is anticipated. Blood group and Rh typing results are not given so it is not necessary to give consideration to this condition. Erythroblastosis fetalis secondary to Rh incompatibility may be responsible for hyperbilirubinemia.

Serum bilirubin (**choice D**) is then used to monitor the severity of the sensitization. Interestingly, hyperbilirubinemia is also a risk for infants of diabetic mothers (IDM). The etiology is unknown in IDM; however, factors implicated include prematurity and polycythemia.

A hematocrit level (**choice B**) is useful in assessing fetal anemia or polycythemia. Venous hematocrits of 65 to 70 vol% have been seen in 40% of DM. Phototherapy and exchange transfusion are used to treat hyperbilirubinemia depending on its severity. Hyperbilirubinemia does not develop in utero because bilirubin diffuses freely across the placenta and is cleared by the maternal circulation.

In cases of intrauterine fetal stress, particularly depicted by nonreassuring electronic fetal heart rate tracing, determination of pH (**choice C**) would be indicated to identify fetal acidosis secondary to hypoxia/anoxia. Because Apgars scores are reported as 7/7 it is highly unlikely this neonate is acidotic.

28. **The correct answer is D.** Uterine atony is the mostly likely cause of postpartum bleeding here. Being a primigravida, she went two weeks beyond the term. Twenty hours for the first is above average (but within normal limits), but three hours in stage 2 is prolonged, and thus is responsible for the uterine atony after the baby was delivered. A soft and boggy fundus is a good indication of a noninvoluting atonic uterus.

A cervical laceration (**choice A**) is not a very likely event when associated with prolonged labor. It is often seen when labor proceeds too rapidly, when the cervix is not adequately dilated. The amount of bleeding is a little too profuse for a cervical laceration/ tear.

DIC (**choice B**) is usually associated with placental abruption, or the birth of a long dead fetus, both of which are not the case here.

A retained piece of placenta (**choice C**) is unlikely, as we have been told that the placenta was delivered intact.

Uterine inversion (**choice E**) is also unlikely since the fundus is easily palpable perabominally, and the placenta was not retained in utero. The most common cause of inversion is strong traction to a placenta implanted

at the fundus, and a strong umbilical cord that won't snap under the force of applied traction.

29. **The correct answer is choice B.** A solitary, discrete, and freely movable breast mass in a young woman is most likely a fibroadenoma, the most common benign tumor of the female breast.

Fat necrosis (**choice A**) is unlikely in the absence of a history of trauma to the breast.

Fibrocystic disease (**choice C**) is common in this patient's age group, and may present as a unilateral mass, but more typically it presents as bilateral nodules that vary in size and in a degree of tenderness with a patient's menstrual cycle.

Intraductal papilloma (**choice E**) classically presents with bloody nipple discharge and a subareolar mass.

30. **The correct answer is B.** All cell counts are markedly decreased. Aplastic anemia can result in pancytopenia (deficiency of all three cell lines and is rare, idiosyncratic complication of chloramphenicol.

Anemia due to blood loss (**choice A**) should not appreciably affect the other cell lines. Blood loss should stimulate erythropoiesis, thus the reticulocyte count should be elevated.

Aplastic crisis of sickle cell disease (**choice C**) may be associated with Parvovirus B19 infection, but it only affects the red cell line; leukocyte and platelet counts should not be low. Further, we are told this child was previously healthy; there is no mention of a chronic condition such as sickle cell disease.

Infectious mononucleosis (**choice D**) is not typically associated with pancytopenia. Fever, hepatosplenomegaly and lymphadenopathy are common, and we are specifically told they are absent.

Viral infections may cause transient bone marrow suppression, but severe viral-induced pancytopenia (**choice E**) is uncommon. The child is afebrile and has not signs or symptoms of a viral infection. Details are given prominently in question stems as either pertinent positives or negatives; the history of chloramphenicol use is a pertinent positive.

31. **The correct answer is E.** To diagnose major depressive disorder, The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) requires that depressed mood or loss of interest in pleasure must be present for at least two weeks, all requirements that are met in the case described. Other

signs and symptoms of depression include significant weight change or change of appetite, sleep disturbance, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, diminished ability to think or concentrate, and recurrent thoughts of death or suicide. DSM-IV further requires that five or more of the above criteria be met to confirm the diagnosis. This case meets five criteria.

Adjustment disorder with mixed disturbance of emotions and conduct (**choice A**) is not correct because this diagnosis requires that symptoms develop in response to an identifiable stressor.

Anorexia nervosa (**choice B**) is incorrect because this diagnosis requires the presence of amenorrhea. The individual in question has regular menses.

Attention-deficit/ hyperactivity disorder (**choice C**) is a disorder requiring that some hyperactive, impulsive, or inattentive symptoms be present before age 7. Furthermore, symptoms need to be present for at least six months.

Dysthymic disorder (**choice D**) is a disorder characterized by depressed mood lasting most of the day for most days for at least two years in adults, and for one year in children.

32. **The correct answer is D.** This patient has a history of severe aortic stenosis and exertional angina that progressed to left (as evidenced by bilateral crackles in the lungs) and right (as evidenced by jugular neck vein distention) heart failure. Aortic stenosis, caused concentric left ventricular hypertrophy and the need for oxygen with exercise, is the most common valvular lesion associated with exertional angina. This Patient also has a microcytic anemia with a guaiac-positive stool, which at her age (66) is secondary to colorectal cancer until proven otherwise. Thrombocytosis (elevated platelet count) is a feature of malignancy, but also accompanies chronic iron deficiency anemia. Another possibility for this patient's anemia is angiodysplasia involving the right colon, which has a known association with aortic stenosis. Angiodysplasia may cause chronic blood loss, leading to iron deficiency or massive blood loss (hematochezia).

Anemia of chronic disease (**choice A**) is unlikely since the patient has gastrointestinal blood loss to explain her anemia.

An autoimmune hemolytic anemia (**choice B**) is highly unlikely since it produces normocytic anemia and jaundice from increased macrophage destruction of antibody-coated RBCs.

Folate deficiency (**choice C**) is highly unlikely since it is the most common cause of a macrocytic anemia, and is most often related to alcohol abuse.

A microangiopathic hemolytic anemia (**choice E**) is unlikely since there is an obvious explanation for the patient's microcytic anemia. Intravascular hemolysis of RBCs from severe aortic stenosis is the most common cause of microangiopathic hemolytic anemia; however, there is no history of hemoglobinuria (iron lost in the urine can produce iron deficiency), and schistocytes are not present in the peripheral blood.

33. **The correct answer is D.** The combination of lethargy, fever, and stiff neck suggests acute meningitis. The preceding flulike illness, rapid onset of symptoms, and diffuse petechial rash suggest meningococcal meningitis.

Coxsackievirus B (**choice A**) causes focal necrosis of skeletal muscle, brain degeneration, and aseptic meningitis.

Echovirus (**choice B**) causes gastrointestinal tract infection after a prodrome of upper respiratory signs and symptoms, especially in children, and particularly in the summer. It can cause aseptic meningitis with a rash (Rubelliform rash), and acute hemorrhagic conjunctivitis. It can progress to myocarditis, encephalitis, and septic shock.

Haemophilus influenzae (**choice C**) is a good choice in unimmunized infants, but not in a young adult.

It is important to remember that in young, healthy adults, the major pathogens responsible for bacterial meningitis are Streptococcus pneumoniae (**choice E**) and Neisseria meningitidis (**choice D**).

34. **The correct answer is E.** A stab wound to the chest may perforate the myocardium, causing blood to leak into the pericardial space, resulting in pericardial tamponade. Tamponade results in increased intrapericardial pressure, which causes decreased venous return and ventricular filling (the cause of distended neck veins). Stroke volume decreases, and pulse pressure decreases. Cardiac trauma causes rapid onset of tamponade, the classic triad of symptoms being: (a) failing arterial blood pressure; (b) increased systemic vascular resistance; and (c) quiet heart on auscultation. This patient urgent pericardiocentesis is indicated. This procedure involves draining the pericardium so that cardiac compression is relieved. Percutaneous pericardiocentesis can be performed blindly, or can be echocardiogram-guided. Removing a small amount of fluid results in immediate hemodynamic improvement.

X-ray film of the chest (**choice A**) may confirm the diagnosis of pericardial effusion by revealing an enlarged cardiac contour with a globular configuration. However, history of a stab wound, distended neck veins, and critically low blood pressure are reason enough to make the diagnosis without first obtaining an x-ray. This patient needs immediate intervention because he is going into shock.

Endotracheal intubation (**choice B**) is indicated to maintain a patent airway for a patient who is comatose, or for mechanical ventilation in respiratory failure. At this stage, the patient is maintaining his airway and has normal breath sounds. Intubation is not indicated.

EGG (**choice C**) may show low QRS voltage and electrical alternans (pathognomonic for tamponade). If the patient were hemodynamically stable, an ECG could be done to help confirm the clinical diagnosis. This patient is not stable.

Inserting the tube into the left side of the chest (**choice D**) is indicated for a hemo-or pneumothorax secondary to a stab wound to the lung. The presence of normal bilateral breath sounds makes this diagnosis unlikely.

35. **The correct answer is A.** Quadriplegic patients, who are unable to sense pain or shift body position, are at high risk for developing decubitus ulcers over areas of constant pressure (e.g. sacrum, occiput, heels). Malnutrition and moisture (from perspiration, urine due to loss of voluntary bladder control, etc.) as seen in this patient, further increases the risk of skin breakdown. The area of erythema over this patient's sacrum likely represents an incipient sacral decubitus ulcer. Treatment for small and superficial areas of skin breakdown includes nutritional support and relief of continued pressure over the area by frequent turning and cushioning. Ulcers that are extensive or extend more deeply into the subcutaneous tissue, muscle and fasciae may require surgical treatment, with debridement (**choice E**) of necrotic tissue and wound coverage by skin flap procedures. Antibiotics (**choice D**) are not indicated in the absence of infection.
36. **The correct answer is C.** This patient has a classic history for symptomatic Hodgkin's disease: fever, night sweats, pruritus, and painless lymphadenopathy in two separate locations (supraclavicular lymph node and anterior mediastinum). The patient is at stage II B (two separate areas of lymph node involvement above the diaphragm + symptoms).

Since painful lymph nodes usually indicate an inflammatory process, drug reaction (**choice B**), infectious mononucleosis (**choice D**), sarcoidosis (**choice F**), systemic lupus erythematosus (**choice G**), toxoplasmosis

**(choice H)**, tuberculosis **(choice I)**, and tularemia **(choice J)** can be excluded.

Lymph nodes that are enlarged and nontender often represent a neoplastic process such as metastasis (e.g., carcinoma or leukemia) or a primary malignant lymphoma. Chronic lymphocytic leukemia (CLL, choice A) is easily excluded on the basis of the patient's age (CLL occurs in patients >60 years old) and the localized nature of the lymphadenopathy (CLL had generalized lymphadenopathy). Metastatic carcinoma (choice E) is unlikely since the lymph node involvement in the patient is in two different locations.

37. The correct answer is B. This patient is taking phenytoin for a seizure disorder, and has bilateral tender axillary lymphadenopathy consistent with reactive hyperplasia secondary to phenytoin. Classically it produces diffuse hyperplasia with numerous plasmacytoid cells and immunoblasts, the latter being easily confused with Reed-Sternberg cells. The patient's epigastric distress most likely represents erosive gastritis secondary to aspirin.

Lymph nodes that are enlarged and nontender often represent a neoplastic process such as metastasis (e.g., carcinoma, leukemia) or a primary malignant lymphoma. Hence, chronic lymphocytic leukemia (CLL, choice A) and metastatic carcinoma **(choice E)** are unlikely choices.

Since painful lymph nodes usually indicate an inflammatory process, infectious mononucleosis **(choice D)**, sarcoidosis **(choice F)**, systemic lupus erythematosus **(choice G)**, toxoplasmosis **(choice H)**, tuberculosis **(choice I)**, and tularemia **(choice J)** are primarily excluded by the patient's presentation and history of taking a drug that has known effects on the lymphatic system.

38. **The correct answer is C.** Cluster headache is of an unknown etiology, and primarily affects middle-aged men. Episodes are described as severe unilateral periorbital pain associated with Horner's syndrome (ptosis, miosis, and anhydrosis of the affected side), ipsilateral nasal congestion, clear rhinorrhea, lacrimation, and eye redness on the affected side. The episodes usually occur at night, last less than two hours, and resolve spontaneously. These symptoms occur daily for several weeks, with the patient then being symptomatic for weeks to months before a new round of frequent attacks occur.

Acute sinusitis **(choice A)** causes pain and pressure over the cheek or forehead, depending on the sinus that is affected. The pain is usually described as a constant throbbing. Associated symptoms include a

discolored (purulent) nasal discharge, fever, and cough. On examination, pain will be elicited upon palpation or percussion over the infected sinus.

Chronic sinusitis (**choice B**) causes a persistent purulent nasal discharge and postnasal drip with associated cough. Facial pain and tenderness are minimal or absent.

An intracranial tumor (**choice D**) can cause headaches that are usually described as a dull ache deep within the cranium. These headaches occur intermittently, are made worse by exertion or changes in position, and are associated with nausea and vomiting.

Meningoencephalitis (**choice E**) presents with severe global headache, high fevers, neck stiffness, nausea and vomiting, and neurologic deficits.

Migraine (**choice F**) headaches causes throbbing frontal-temporal pain, can be unilateral or bilateral, are more common in young women, and are associated with nausea and vomiting, photophobia, phonophobia, visual blurring, and anorexia. Visual hallucinations or sensorimotor disturbances may precede the attack. Episodes last several hours (usually no longer than 24 hours), and can be relieved with sleep.

Pheochromocytoma (**choice G**) causes sever generalized headaches that can occur with palpitations, chest pain, profuse sweating, anxiety, increased appetite, hypertension, or tachycardia.

Post-traumatic headache (**choice H**) is nondescript with associated vertigo, and impaired memory and concentration that can last for several months to years after the initial injury.

Subarachnoid hemorrhage (**choice I**) causes a sudden onset of severe headache that is classically described as “the worst headache of my life”. Other findings may include altered mental status, fever, vomiting, nuchal rigidity, low back pain, focal neurologic deficits, seizures, or retinal hemorrhages.

Temporal arteritis (**choice J**) causes a headache described as superficial and dull with episodes of a sharp picklike pain. These headaches usually occur in the temporal region, although they can occur at any part of the cranium, unilateral or bilateral, are usually worse at night, and are often made worse by cold exposure. Associated features include scalp tenderness, temporal artery tenderness, malaise, myalgias, fever, weight loss, and jaw claudication.

Temporomandibular joint syndrome (**choice K**) is characterized by pain and tenderness in the muscles of mastication, and in the

temporomandibular joint. Pain is brought on by moving the jaw. There may be difficulty in moving the jaw, with incoordination upon opening and closing.

39. The correct answer is F. Migraine headaches are described as a throbbing frontal-temporal pain, can be unilateral or bilateral, are more common in young women, and are associated with nausea and vomiting, photophobia, phonophobia, visual blurring, and anorexia. A visual hallucination or sensorimotor disturbances may precede the attack. Episodes last several hours (usually no longer than 24 hours), and can be relieved with sleep.

Acute sinusitis (**choice A**) causes pain and pressure over the cheek or forehead, depending on the sinus that is affected. The pain is usually described as a constant throbbing. Associated symptoms include a discolored (purulent) nasal discharge, fever, and cough. On examination, pain will be elicited upon palpation or percussion over the infected sinus.

Chronic sinusitis (**choice B**) causes a persistent purulent nasal discharge and postnasal drip with associated cough. Facial pain and tenderness are minimal or absent.

Cluster headaches (**choice C**) are of an unknown etiology, and primarily affect middle-aged men. Episodes are described as severe unilateral periorbital pain associated with Horner's syndrome (ptosis, miosis, and anhidrosis of the affected side), ipsilateral nasal congestion, clear rhinorrhea, lacrimation, and eye redness on the affected side. The episodes usually occur at night, last less than two hours, and resolve spontaneously. These symptoms occur daily for several weeks, with the patient then being asymptomatic for weeks to months before a new round of frequent attacks occur.

An intracranial tumor (**choice D**) can cause headaches that are usually described as a dull ache deep within the cranium. These headaches occur intermittently, are made worse by exertion or changes in position, and are associated with nausea and vomiting.

Meningoencephalitis (**choice E**) presents with severe global headache, high fevers, neck stiffness, nausea and vomiting, and neurologic deficits.

Pheochromocytoma (**choice G**) causes severe generalized headaches that can occur with palpitations, chest pain, profuse sweating, anxiety, increased appetite, hypertension, or tachycardia.

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Subarachnoid hemorrhage (**choice I**) causes a sudden onset of severe headache that is classically described as "the worst headache in my life". Other findings may include altered mental status, fever, vomiting, nuchal rigidity, low back pain, focal neurologic deficits, seizures, or retinal hemorrhages.

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Temporomandibular joint syndrome (**choice K**) is characterized by pain and tenderness in the muscles of mastication, and in the temporomandibular joint. Pain is brought on by moving the jaw. There may be difficulty in moving the jaw, with incoordination upon opening and closing.

40. **The correct answer is choice D.** This patient presents with the classic infectious mononucleosis syndrome, an Epstein-Barr viral infection. The patient is typically a young person with fevers, sore throat, lymphadenopathy, and/or hepatosplenomegaly. There will often be a mild leukopenia with a predominance of lymphocytes, many of which may be atypical. An autoimmune hemolytic anemia, with a cold IgM antibody, may also occasionally occur.
41. **The correct answer is choice A.** This patient has evidence of pancytopenia with symptoms of bruising, anemia, and back pain. The most common explanation for pancytopenia in this age group, in the absence of medication reaction, is acute leukemia, and most commonly is acute lymphoblastic leukemia (ALL).
42. **The correct answer is choice H.** Fibroids are present in 30 to 50% of women, and commonly cause menorrhagia and pelvic pain.
43. **The correct answer is choice B.** Dermoid cysts (also called ovarian germ cell tumors or benign cystic teratomas) account for 5 to 10% of ovarian neoplasms and are bilateral in 10 to 15% of cases. Malignancy is rare. Calcifications are common.

44. **The correct answer is choice D.** Endometriosis is a benign, progressive disease characterized by the presence and growth of glands and stroma of the lining of the uterus in aberrant locations; they can organize into masses called endometriomas. The typical patient is in her mid-thirties, nulliparous, infertile, with symptoms of secondary dysmenorrhea and pelvic pain.
45. **The correct answer is B.** This patient has a classic history of an aortic dissection; mainly a tearing anterior chest pain that radiates not only into the left arm, but also into the left back. His height (6' 8") also suggests that he may have Marfan's syndrome.

With his history, the only possible disorders listed that could be included in his differential for chest pain include angina pectoris (**choice A**, ECG would likely have been positive, and pain has been present for 1 hour), dissecting aortic aneurysm (**choice H**, not enough history is given to identify Marfan's syndrome clearly), and myocardial infarction (**choice R**, the pain radiation to the back works against the diagnosis, as does the absence of ECG findings).

Musculoskeletal causes of pain are ruled out (arthritis of the spine [**choice D**], cervical disc disease [**choice E**], and costochondritis [**choice G**]) since the pain radiates down the arm and into the back, and would not produce a drop in blood pressure or an increased pulse.

Pericardial disease and myocarditis are also unlikely, since the pain radiates (ruling out chronic constrictive pericardiopathy [**choice F**] and pericardial tamponade [**choice T**]), and is not localized to the anterior chest. No neck vein distention was described (again rules out choices F and T), and the ECG was reported as normal (rules out myocarditis [**choice S**]).

Gastrointestinal causes of chest pain are usually in the epigastric area, and simulate an inferior acute myocardial infarction. Therefore, duodenal ulcer (**choice I**), esophageal spasm (**choice J**), gas entrapment syndrome (choice K), and hiatal hernia (choice M) can be excluded.

Herpes zoster (**choice L**) produces pain within a dermatome.

Hypertrophic cardiomyopathy (**choice N**) and mitral valve prolapse (**choice Q**) do not have the type of pain described in this patient. The former condition is associated with syncope with exercise, sudden death, and angina with exercise. The latter is associated with a classic midsystolic ejection click and palpitations.

Lung cancer (**choice O**) and metastatic disease to the lung (choice P) are excluded on the basis of the history and normal lung findings.

Since the lungs are clear to auscultation, pneumonia (choice U) and pneumothorax (**choice V**) are easily excluded,

A pulmonary embolus (**choice W**) is excluded by the history and the absence of ECG changes (e.g., right axis deviation).

46. **The correct answer is W.** The history of a sudden onset of dyspnea, tachypnea (increased respiratory rate), pleuritic-type chest pain (pain increased with deep breathing), normal heart and lung exam, and the presence of new-onset right axis deviation clearly point to a pulmonary embolus. A normal lung exam excludes all other lung disorders listed. A normal heart exam excludes the valvular defects and pericardial disease. The history of pleuritic chest pain excludes the gastrointestinal disorders. An ECG without ischemic changes excludes myocarditis, angina, and myocardial infarction.

**Explanations to Block II of the 2005 USMLE Step 2 Released Items  
(Questions 47-92)**

47. **The correct answer is A.** Vertigo that lasts for only a few seconds upon lying down or standing up, with no change in hearing function, is characteristic of benign positional vertigo. Fatigable nystagmus, that is, nystagmus that diminishes with repetitive motion, is also a key finding of benign positional vertigo. All of the other choices cause vertiginous symptoms, but they frequently present with more severe symptoms, such as vomiting, headache, seizure, and/or deafness.
48. **The correct answer is C.** This patient has a fever, a rash, and joint pains, and his hematocrit (Hct) has dropped from 32 to 21 %. Leukocyte and platelet counts are mildly elevated. The clinical findings are consistent with a pure red blood cell (RBC) aplastic crisis secondary to a parvovirus infection. The virus infects the RBC stem cell, stopping RBC production. A reticulocyte count is necessary to distinguish the drop in Hct from an acute sequestration crisis where RBCs are trapped in an enlarged spleen (note that the patient does not have splenomegaly). In a parvovirus-induced RBC aplastic crisis, the reticulocyte count is very low (reticulocytopenia), whereas in a sequestration crisis, the reticulocyte count is high while the bone marrow responds to the RBC loss. A hemoglobin electrophoresis (**choice A**) is unnecessary since the patient is known to have sickle cell disease. A bleeding time (**choice B**) is unnecessary since the patient does not have a bleeding problem related to platelets (e.g., petechia, ecchymoses, or epistaxis). The patient's mildly elevated platelet count is most likely secondary to splenic dysfunction (autosplenectomy) and/or the bone marrow's response to the parvovirus infection. A serum HIV antibody assay (**choice D**) is unnecessary since there is no evidence of generalized lymphadenopathy—a common finding in HIV infections—or a chest x-ray compatible with a *Pneumocystis carinii* pneumonia (the most common initial AIDS defining lesion in HIV-positive patients). A CT scan of the abdomen (**choice E**) is an expensive test, and would not reveal why the patient has a drop in his Hct.
49. **The correct answer is E.** The sudden onset of pain and the empty right hemiscrotum suggest a diagnosis of torsion of an undescended testicle. Immediate surgery maximizes the chance of saving the testicle. Since this is the clinical picture of a traumatic injury with very acute symptoms, it's logical to expect that active intervention will be required. Choice A masks the problem, so it's out. Choice B assumes it's an endocrine problem, not trauma, so eliminate this choice. Choice C is silly, and since the right side of the scrotum is empty, it is more sensible to suspect its contents have been moved and damaged than that there is some

kind of cyst involved, so Choice D is out. An immediate operation to restore the proper anatomical relationships makes the most sense.

50. **The correct answer is A.** This patient presents with a history typical of appendicitis: a 16-hour onset of abdominal pain, loss of appetite, and mild nausea. On physical examination she has a low-grade fever, there is guarding and tenderness in the right lower quadrant with referred pain upon palpation of other areas, and bowel sounds are absent. These findings suggest peritoneal irritation originating in the right lower quadrant, the usual location of the vermiform appendix. The patient is using oral contraceptives (presumably correctly), and thus her likelihood of becoming pregnant is very remote. Furthermore, she is three weeks from her last menstrual period. Additionally, the adnexae are reported as normal, so it is unlikely that there is an ectopic pregnancy (**choice B**). A negative pregnancy test would be helpful in confirming this assumption. Physical examination states that the adnexa (which include the ovaries) are normal. On the basis of that examination, a clinically significant ovarian cyst (**choice C**) can be ruled out.

A tubo-ovarian abscess (**choice D**) usually develops from a pre-existing salpingo oophoritis. Often the infection has existed untreated for some time. If an adnexal mass, often confluent with the uterus, is detected on pelvic examination, the possibility of a tubo-ovarian abscess or other intraperitoneal collection of pus must be considered. At that point, bowel and omentum are often involved with the pelvic organs in a fibrinous, seropurulent exudate that binds them together, initiating fibrous adhesion formation. When the uterus is identified, it is usually displaced anteriorly. The abscess fills the cul-de-sac, and may spontaneously drain through the rectum. The patient is clinically ill and is febrile. Bowel sounds may be present, and though the lower abdomen may be boardlike, the upper abdomen is usually soft. Right upper quadrant pain and tenderness suggest spread to the liver and subdiaphragmatic area, the so-called Fitz-Hugh-Curtis syndrome. None of these findings is present in this case, and the adnexa are described as clear; thus, the presence of a tubo-ovarian abscess is ruled out.

Ninety percent of ureteral calculi (**choice E**) up to 5 mm in diameter pass spontaneously. Some may lodge anywhere from the renal pelvis to the urinary bladder. Depending on the level of impaction, the pain radiates down into the groin and labia majora. When calculi are lodged near the bladder, the patient experiences urgency. The visceral location of the pain often obscures the nature of the cause. Agitation and a constant search for a comfortable position with episodes of pain so severe as to interfere with respiration are a frequent clinical observation. A relatively normal pulse and lack of fever are characteristic. Although up to 20% of patients with renal lithiasis have no known cause, a history of renal lithiasis or

conditions predisposing to it, such as hyperparathyroidism and gout, should be considered. The clinical vignette given in this case is not compatible with the diagnosis of ureteral calculus.

51. **The correct answer is D.** The findings of edema, hypertension, fluid overload, hypoalbuminemia, and proteinuria are classic symptoms of glomerulonephritis. Although each of the other choices can cause an elevated BUN and creatinine, they would not be associated with such extreme proteinuria. The presences of sever proteinuria and RBC casts should always suggest the diagnosis of glomerulonephritis.
52. **The correct answer is choice B.** The history of a tonic-clonic seizure implies a period of unconsciousness during which this young man aspirated anaerobic mouth organisms. Foul-smelling sputum is a classic clue for anaerobic infection. Symptoms may take several days to develop and can lead to a lung abscess. Treatment is with a drug such as clindamycin, which will cover for anaerobic infection. (Be sure to watch out for *C difficile* diarrhea!)
53. **The correct answer is E.** This patient presents with the classic signs of thrombotic thrombocytopenic purpura (TTP). These include fever, microangiopathic hemolytic anemia with fragmented red blood cells (schistocytes), thrombocytopenia (reason for petechia and blood in the stool), CNS changes (patient is confused and oriented only to person), and renal failure (serum BUN/creatinine ratio is 11:1). TTP is due to an unknown substance in plasma that damages arteriole endothelial cells, leading to deposition of platelets on the damaged surface and their consumption in platelet clots. The serum lactate dehydrogenase is elevated due to intravascular hemolysis of RBCs that are damaged by the platelet thrombi in the microvasculature. Although an unconjugated hyperbilirubinemia is described in this patient, it is unusual with an intravascular hemolytic process, and is more commonly associated with extravascular macrophage-associated destruction of RBCs. However, since the free hemoglobin from the damaged RBCs complexes with haptoglobin (synthesized by the liver), and the hemoglobin-haptoglobin complex is phagocytosed by macrophages, jaundice is possible, albeit unlikely. Although the serum blood urea nitrogen and creatinine levels are both increased, they have maintained their normal -10:1 ratio, indicating renal failure that affects both of the analytes equally.

Disseminated intravascular coagulation (DIC, choice A) consumes both platelets and coagulation factors. Therefore, thrombocytopenia, prolonged prothrombin and partial thromboplastin times, and fibrin split products (secondary fibrinolysis by plasmin) are usually present. TTP is not DIC since only platelets are consumed. Immune thrombocytopenic purpura (ITP, choice B) is unlikely since it is not associated with a

microangiopathic hemolytic anemia. TTP is not an immune-mediated thrombocytopenia.

Meningococcal meningitis (choice C) is unlikely since the patient does not have nuchal rigidity and DIC, which invariably accompany the infection. Furthermore, *Streptococcus pneumoniae* is the most common cause of meningitis in the patient's age bracket.

Sarcoidosis (choice D) and systemic lupus erythematosus (choice E) are not associated with the hematologic findings or the classic constellation of acute clinical findings noted in this patient.

54. **The correct answer is B.** Oxycodone is an opiate used for pain relief. Her dilated pupils and the fact she is sweating should make you suspect the diagnosis. Although restlessness and irritability are not required to make the diagnosis, they are usually present, as is a dysphoric mood. The DSM-IV requires three or more of the following symptoms, along with cessation or reduction in heavy or prolonged opioid use (or administration of an opioid antagonist) to make the diagnosis of opiate withdrawal: dysphoric mood, nausea or vomiting, muscle aches, lacrimation or rhinorrhea, pupillary dilation, piloerection, sweating, diarrhea, yawning, fever, or insomnia.

Poisoning with anticholinergic agents (in this case amitriptyline; **choice A**) may also cause dilated pupils. Tachycardia with mild hypertension is common, and the body temperature is often elevated. The skin is flushed, hot, and dry. Peristalsis is decreased, and urinary retention is common. Patients may have myoclonic jerking or choreoathetoid movements. Agitated delirium is frequently seen, and severe hyperthermia may occur.

Renal calculi (**choice C**) are frequently associated with blood in the urine, and alone will not account for dilated pupils. Two erythrocytes/hpf is a negligible amount. Since a drug reaction is described and cardinal findings of renal calculi are absent, this choice is incorrect.

Serotonin syndrome (**choice D**) occurs when a serotonin reuptake inhibitor (in this case, paroxetine) is combined with another drug that can potentiate serotonin, such as monoamine oxidase inhibitors. Serotonin syndrome has also been reported with less obvious serotonergic drugs such as lithium and carbamazepine, creating a toxic effect with symptoms of abdominal pain, diarrhea, diaphoresis, hyperpyrexia, tachycardia, hypertension, myoclonus, irritability, agitation, epileptic seizures, and delirium. In its most severe form, it can result in coma, cardiovascular shock, and death. For this reason, a clearance period is required before switching between a serotonin reuptake inhibitor and a monoamine oxidase inhibitor. Since

none of the drugs other than paroxetine possess serotonergic activity, this choice is incorrect.

Tricyclic intoxication (**choice E**) is commonly seen in suicidal overdose. The tricyclic agent in this case is amitriptyline. These drugs have anticholinergic and cardiac depressive properties. Anticholinergic poisoning associated with tricyclic antidepressants is identical to those of other anticholinergic drugs such as atropine, scopolamine, amantadine, and antihistamines. Cardiotoxic effects include QRS interval widening, ventricular arrhythmias, atrioventricular block, and hypotension. Seizures and coma are common with severe intoxication. Life-threatening hyperthermia may result from status epilepticus and anticholinergic-induced impairment of sweating.

55. **The correct answer is E.** This boy has the typical manifestations of attention deficit-hyperactivity disorder: fidgeting, difficulty remaining seated, distractibility, difficulty awaiting his turn, interrupting, and inattentiveness. Methylphenidate (Ritalin; **choice E**) is the usual first line of pharmacologic therapy. Behavior and environmental management are also important. The other drugs mentioned in the list can be used when ADHD is complicated by other traits for which these drugs are useful. The second drug of choice is dextroamphetamine. Desipramine and fluoxetine are also being studied for use in this condition.
56. **The correct answer is choice I.** The point of this question is to generate a differential diagnosis for this man's anemia. The fact that the patient has had 6 months of weakness and is neither tachycardic nor orthostatic suggests that his anemia is of chronic duration. The next thing to consider is the morphology of the red blood cells (RBCs). In this case, we are told that the patient's RBCs are microcytic and hypochromic. Causes of microcytic anemia include iron deficiency, lead poisoning, the thalassemias, and sideroblastic anemia. The presence of occult blood in his stool provides us with a cause of ongoing iron loss. This man has iron deficiency anemia, most likely from chronic hemorrhage from a gastrointestinal malignancy.
57. **The correct answer is C.** Based on the abrupt onset of headache, sore throat, a nonproductive cough, and clear CXR, this patient most likely has pneumonia. An elevated monocyte count can occur in the absence of leukocytosis. Also, the absence of a "left shift" (i.e., increased neutrophil and band count) on the differential makes bacterial infection less likely. Influenza is an orthomyxovirus, and causes epidemics and pandemics in the fall and winter. The incubation period is 1-4 days. Influenza vaccine is a trivalent vaccine with about 85% efficacy, and lasts from a few months to one year. The vaccine is recommended annually for adults over 65 years old, for adults and children with chronic comorbidities (including

lung disease), and for nursing home residents. BCG (Bacillus Calmette-guerain; **choice A**) is a live tuberculosis vaccine that is not administered in the United States. The patient's symptoms may be compatible with TB; however, the normal CXR excludes this diagnosis. Elderly patients with reactivated TB often have lower lobe infiltrates and pleural effusion.

Haemophilus influenzae type b (**choice C**) is a pathogen that primarily affects children under 5 years of age. In adults, Haemophilus b may cause pneumonia, but more frequently just colonizes the upper respiratory tract. The vaccine is not recommended.

Pertussis (**choice D**), also known as whooping cough, is caused by Bordetella pertussis. It usually causes a characteristic cough (a "whoop") and lymphocytosis. The pertussis vaccine is combined with tetanus and diphtheria toxoid in children. The whole-cell vaccine is contraindicated in adults because of adverse reactions. An acellular vaccine has recently been developed, but is not recommended for adult immunization.

Pneumococcal vaccine (**choice E**) is recommended for people at an increased risk for developing pneumococcal disease (individuals without a spleen, and those with sickle cell anemia), for adults with chronic illnesses, and for immunocompromised individuals. The vaccine is 60-70% effective for preventing bacteremia in immunocompetent patients. A single dose confers lifelong immunity. Except in asplenic individuals, the recommended vaccination frequency is once every six years.

58. **The correct answer is choice D.** Patients with pseudotumor cerebri present with headache, vomiting, blurred vision, papilledema, and diplopia. There are no focal neurologic signs or changes in level of consciousness. Migraine headaches (**choice A**) are paroxysmal, throbbing, or pulsating headaches, accompanied by nausea or vomiting and associated with a positive family history. There is no papilledema. Optic neuritis (**choice B**) is an acute process of inflammation or degeneration of the optic nerve with rapidly progressive loss of vision. Posterior fossa tumors (**choice C**) primarily produce signs and symptoms of increased intracranial pressure due to obstruction of cerebrospinal fluid pathways and development of hydrocephalus. Alterations in personality, e.g., lethargy, irritability, and forgetfulness, are often present. Tension headaches (**choice E**) present with continuous, symmetrical dull pain without nausea or vomiting.
59. **The correct answer is choice C.** Femoral fracture is the most common cause of fat embolism. Fat embolism is associated with petechiae over the upper limbs and chest. In addition to confusion, these patients can exhibit

agitation and hypoxia, which explain the dyspnea of this patient. This patient may have a chest x-ray showing patchy diffuse infiltrates and may develop the adult respiratory distress syndrome. Disseminated intravascular coagulation (**choice B**) can result in spontaneous bleeding and petechiae, however, it is not limited to the chest and will also be found in areas of trauma, such as intravenous lines, blood drawing sites, and incisions. Hypovolemic shock (**choice D**) can cause tachycardia; however, confusion and dyspnea are unlikely to be associated with the chest petechiae. Thrombocytopenia (**choice E**) can cause petechiae, but in a setting of a femoral fracture with confusion and dyspnea, this diagnosis is unlikely.

60. **The correct answer is C.** With his mother's and maternal cousin's history of sudden death, this patient most likely has a hereditary cardiac defect. Therefore, prolonged QT syndrome would be highest on the differential list. With prolonged QT syndrome here is a sudden loss of consciousness during exercise, or during stressful experiences. Typically the onset is late in childhood or in early adolescence. Prolongation of the QT interval is often present on an ECG, but it may have to be induced with carefully monitored exercise. Since the cardiac exam is normal, an acquired cause of the syndrome is unlikely (e.g., mitral valve prolapse). Beta-blockers may be lifesaving.

A tilt test (**choice A**) provides a crude estimate of volume depletion. The blood pressure and pulse are measured with the patient both lying down and sitting up. Considering the patient's family history of syncopal episodes, orthostatic hypotension (volume depletion related to running) is an unlikely cause of syncope in this patient. A sudden loss of consciousness during exercise is rarely due to epilepsy or some other lesion in the CNS. Therefore, CT scan of the head (**choice B**), electroencephalography (**choice D**), and lumbar puncture (**choice E**) are not indicated.

61. **The correct answer is A.** This patient most likely has aortic stenosis (AS), as evidenced by the systolic ejection murmur heard best at the second right intercostal space first noted at age 19. The finding of an ejection click is highly suggestive of congenital valvular AS, and may also be present in rheumatic AS. The S4 suggests left ventricular hypertrophy secondary to outflow obstruction. Patients with valvular lesions are at high risk for developing endocarditis after certain procedures (such as dental surgery), and need preliminary antibiotic prophylaxis. Most patients with endocarditis present having had a febrile illness for days or weeks. The symptoms are nonspecific, or may be secondary to embolization (such as abdominal or flank pain). In this patient, the left shift on differential (increased segmented neutrophil and band count) is compatible with bacterial infection. The increased sedimentation rate is compatible with a

diagnosis of endocarditis. The most common organisms responsible for native valve endocarditis are Viridans streptococci (60yo), *Staphylococcus aureus* (30%), and enterococci (S-1 0916). *Streptococcus viridans* is part of the normal flora in the oropharynx (therefore more likely the cause of bacteremia following dental procedure), has an incubation period of one to two weeks, and shows up as Gram positive cocci in chains on Gram stain.

*Staphylococcus aureus* shows up as Gram-positive cocci in clusters (**choice B**), and causes a rapidly progressive clinical course. Patients are more likely to have acute valvular regurgitation, which is the most common cause of endocarditis in intravenous drug users.

*Streptococcus pneumoniae* shows up as Gram-positive diplococci (**choice C**). The pneumococcus is not known to cause endocarditis, and is the most common cause of community-acquired pneumonia.

The HACEK organisms (*Hemophilus aphrophilus*, *H. parainfluenzae*, *Actinobacillus*, *Eikenella*, *Kingella* and *cardiobacterium*) show up as Gram-negative bacilli in chains (**choice D**). They are part of the normal oral flora, and cause 5-10% of all (native and prosthetic valve) cases of endocarditis.

*Neisseria meningitidis* shows up as Gram-negative diplococci (**choice E**), and is a rare cause of endocarditis. It most commonly causes meningitis.

62. **The correct answer is E.** This patient has both clinical and laboratory evidence of systemic lupus erythematosus (SLE). Clinically she has an oral ulcer and recurrent arthralgias/arthritis of the ankles. Laboratory findings that are consistent with SLE include absolute leukopenia, thrombocytopenia, positive rapid plasma reagin (RPR), a serum antinuclear antibody titer, positive anti-DNA antibodies, and probable renal disease (3+ proteinuria, neutrophils in the urine). Disseminated gonococcal disease (choice A) produces a pustular dermatitis of the hands or feet, and septic arthritis in the knee. None of these symptoms exist in this patient. Polyarticular arthritis (**choice B**) is not evident on physical exam, nor do radiographs confirm any erosive disease at this time. In Still's disease (juvenile rheumatoid arthritis), patients usually have a fever, rash, generalized lymphadenopathy, and polyarthritis. Reiter's syndrome (**choice C**) is more common in men than women, and is normally associated with conjunctivitis, HLA B-27-positive arthritis, and urethritis (usually due to *Chlamydia trachomatis*). None of these findings exist in this patient. Secondary syphilis (**choice D**) is highly unlikely since skin lesions, generalized lymphadenopathy, condyloma latum, and other features of the disease are not present.

The positive RPR in this patient is most likely a false positive result due to the presence of anti-cardiolipin antibodies in her serum cross-reacting with the cardiolipin in the test system. She needs a fluorescent treponema antibody absorption test to rule out the possibility of active syphilis since she is sexually active.

63. **The correct answer is B.** The presence of palpitations, lid lag, and a goiter in a young woman suggests hyperthyroidism. Therefore, the next step in diagnosis should be measurement of the TSH level (the most sensitive and specific indicator of hyperthyroidism).

Ambulatory EKG monitoring (**choice A**) may pick up an episode of intermittent tachyarrhythmia, but will not be useful otherwise in a 22-year-old female with a regular heart rate of 96/min and no history of CAD or IHD.

Measurement of urine catecholamines (**choice C**), a preliminary test for pheochromocytoma, is not justifiable.

There is little reason to suspect cardiac systolic dysfunction or structural heart disease, so the MUGA (**choice D**) scan and echocardiogram (**choice E**) are unnecessary first steps.

64. **The correct answer is A.** In evaluating the perineum of a parturient, it is helpful to consider these factors: the severity of coexisting medical conditions, antepartum complications, the length of each stage of labor, the type of anesthesia for delivery, the nature of the episiotomy repair, the weight of the fetus, postpartum blood loss, and performance of an operative delivery. In this case, the weight of the fetus, the type of anesthesia, and the fact that an episiotomy was performed are given. It can be assumed that other information relevant to the suggested evaluation is noncontributory. The value of routine episiotomy has recently been questioned. Some studies have shown that deliveries associated with routine episiotomies are more likely to have extensions and greater soft tissue trauma than are spontaneous lacerations. Another disadvantage of episiotomy is that it has been associated with dyspareunia remote from the immediate postpartum period. Pain and edema following episiotomy and repair are to be expected for several postpartum days. Treatment is symptomatic, and consists of sitz baths and possibly oral analgesics. Some practitioners advise intermittent use of a heat lamp to the perineum during the first few postpartum days.

Local injection of lidocaine into the perineum (**choice B**) would only relieve discomfort for a short time, and would further contaminate and traumatize the perineum. The same would be true of topical anesthetics via aerosol, cream, or ointment. Often there is rebound tenderness when the

anesthetic effects wear off. In any case, the findings as described are normal for postpartum day 1, and do not require this treatment.

Intravenous ampicillin (**choice C**) is not indicated because there is no evidence of infection. Routine postpartum care requires daily inspection of the perineum and a progressive decrease in discomfort and edema. Should there be a delay in anticipated convalescence because of increasing symptomatology, reevaluation and re-examination of the patient is mandatory. Necrotizing fasciitis is a rare and serious complication of episiotomy extension caused by anaerobic bacteria. It is associated with obesity and diabetes mellitus. Treatment includes aggressive antibiotic therapy and extensive debridement. As described, this patient did not have this complication.

Intravenous morphine therapy (**choice D**) should not be necessary for analgesic relief of a second-degree episiotomy. If analgesia beyond oral analgesics is necessary, full evaluation of the perineum, vagina, and rectum is indicated. The preferred routes of administration for morphine are intramuscular, subcutaneous, or oral. Furthermore, there is no evidence that the patient cannot tolerate oral analgesics.

Epidural anesthesia (**choice E**) should not be necessary for analgesic relief after a second-degree episiotomy. It would provide much more analgesia than needed, and is an invasive and expensive procedure that could interfere with maternal ambulation and parenting activity.

65. **The correct answer is B.** With experimental protocols associated with uncertain results, it is unreasonable to attempt to coerce a patient into receiving treatment. The decision of the patient and his family should be respected, as there is no demonstrable advantage afforded by the experimental therapy.
66. **The correct answer is C.** While irritability, restlessness, and poor academic performance may be seen with many disease processes (including attention deficit/hyperactivity disorder, substance abuse, and other psychiatric illnesses), the presence of palpitations, unexplained weight loss, and increased thyroid hormone levels suggests hyperthyroidism as the etiology of this patient's behavior disturbance. Thyroid cancer rarely causes hyperthyroidism and is unusual in this age group. A TSH-secreting pituitary adenoma is a rare cause of hyperthyroidism, but primary thyroid disease is by far more common.
67. **The correct answer is D.** *Sarcoptes scabiei* is a mite that infests the epidermis, causing scabies. Diagnostically, burrows (thin, white, superficial threadlike lines) are found on the skin. More commonly, though, inflammatory papules result from host hypersensitivity. These

lesions are generalized, but seem to favor the hands, wrists, elbows, axillae, waistline, and feet. Patients most commonly present with pruritus, and often a history of itching can be elicited from family members or close personal contacts. Epstein-Barr virus (**choice A**) is the cause of infectious mononucleosis, an illness in which approximately 5% of patients will develop a rash that may appear as a macular, petechial, scarlatiniform, urticarial, or erythema multiform lesion. Using ampicillin in a patient with infectious mononucleosis can cause a pruritic, maculopapular eruption. Typical clinical manifestations include fever, lymphadenopathy, pharyngitis, and hepatosplenomegaly.

Group A streptococcal (**choice B**) skin infections include impetigo, which appears as a focal, vesicular, pustular lesion with amber crusting, and erysipelas, which is a painful cellulitis with distinct borders.

Measles virus (**choice C**) produces a rash that appears initially on the face, and then proceeds to the trunk, and eventually the extremities. The lesions begin as papules that coalesce to form irregular maculopapular lesions. Other manifestations include fever, coryza, cough, conjunctivitis, and photophobia. Koplik's spots (gray-white papules with an erythematous base on the buccal mucosa) is pathognomonic for this disease.

Varicella-zoster virus (**choice E**), or chickenpox, appears as a generalized pruritic eruption that occurs most commonly on the trunk, but can also involve the head and extremities. The lesions begin as macules that rapidly progress to papules, vesicles, and pustules, with crusting as the lesions begin to heal. Characteristically, all types of lesions will be present at the same time. A prodrome of fever, chills, malaise, headache, sore throat, nonproductive cough, and anorexia precedes the formation of skin lesions by two to three days.

68. **The correct answer is choice E.** Abdominal pain that radiates to the back and is associated with nausea, vomiting, epigastric tenderness, and hyperamylasemia in a patient with a history of alcohol abuse all point to a diagnosis of acute alcoholic pancreatitis. The rapid progression of symptoms, severity of the pain, and potential unreliability of the patient all argue for admission to the hospital. The initial treatment of acute pancreatitis is supportive—bowel rest, analgesia, and intravenous hydration. Surgery is reserved for the complications of alcoholic pancreatitis, e.g. pancreatic pseudocysts, abscesses, and phlegmons.
69. **The correct answer is C.** Physical findings are the key to diagnosis in this case. The patient is overweight being in the 50th percentile for height, 95th percentile for weight. Body mass index computation could also confirm this. She has mild hirsutism characterized by upper lip and periareolar hair growth. Skin changes on her neck and axillary folds

suggest she has acanthosis nigricans. Such changes are usually found in intertriginous areas, particularly the thighs. The etiology of acanthosis nigricans is unknown but its development may be secondary to certain growth factor receptors. Her ovaries are enlarged. By history she is oligomenorrheic. She is hyperglycemic and should be considered to have diabetes mellitus (blood sugar 250 mg/dl). This constellation of findings is typical of the clinically rare HAIR-AN syndrome: hyperandrogenism, insulin resistance, and acanthosis nigricans. It is a type of chronic anovulation typified by the polycystic ovarian syndrome (PCO). The slightly enlarged ovaries are a finding that supports this diagnosis. On ultrasound examination of the pelvis, polycystic ovaries often have a series of subcapsular follicle cysts, described as a "string of pearls." insulin resistance occurs in obese individuals and in both thin and obese patients with non-insulin dependent (type II) diabetes mellitus. It is postulated that in such individuals there is an insulin receptor defect. This is usually caused by a single base pair substitution or deletion encoding the insulin receptor, leaving it markedly deficient in function. Elevated insulin levels stimulate excess ovarian androgen production that results in menstrual disturbances and hyperandrogenism. The latter effect has serious consequences on general metabolic health predisposing to hypertension, lipid abnormalities, atherosclerosis, and coronary heart disease. Laboratory tests of help in establishing the diagnosis include evaluation for diabetes mellitus, measurement of serum testosterone (free or total) and fasting insulin. Some authorities would calculate a fasting glucose-insulin ratio. Recently the value of LH: FSH ratio in the diagnosis of polycystic ovarian disease has been challenged. In this case, there is slight elevation of testosterone (origin from the ovary) and dehydroepiandrosterone sulfate (origin from the adrenal gland) supporting the findings of hyperandrogenism. The latter finding is sometimes associated with PCO.

Patients with Addison's disease (**choice A**), primary adrenal insufficiency, may present with weight loss, anorexia, abdominal pain, nausea, vomiting, diarrhea and/or fever. This patient's clinical presentation includes none of these symptoms. Acanthosis nigricans is generally described as gray-brown velvety discoloration. Hyperpigmentation may occur in Addison's disease but commonly appears as a diffuse brown, tan, or bronze darkening of both exposed and unexposed parts such as elbows or creases of the hand and of areas normally pigmented such as the areolas about the nipples. Diagnosis is made using adrenal stimulation with ACTH. There is a subnormal response and/or failure of cortisol levels to rise over basal. In more advanced stages of adrenal destruction, serum sodium, chloride, and bicarbonate levels are reduced while the serum potassium level is elevated.

Adult-onset 21-hydroxylase deficiency (**choice B**) may account for 5 to 25 percent of women with virilization featuring acne, hirsutism and oligomenorrhea, depending on the patient population. It is an autosomal recessive group of disorders in which glandular hyperplasia occurs as a secondary event due to interruption of a normal feedback inhibition loop. Intermediate adrenal androgens are then formed as the enzymatic cascade from cholesterol to cortisol is blocked. The particular step involves a failure to convert 17-OH progesterone to 11-deoxycortisol by the enzyme 21-hydroxylase (P450c21). Presenting symptoms are hirsutism and oligomenorrhea. Diagnosis is made using morning serum levels of 17-OH progesterone. Levels over 800 ng/dl are virtually diagnostic of 21-hydroxylase deficiency. In cases of indeterminate values, an ACTH stimulation test may be used to provoke an exaggerated response of serum 17-OH and other adrenal androgens. Measurement of urinary metabolites, pregnanetriol and 17-ketosteroids can provide additional information about the diagnosis. Additionally, these values are depressed with glucocorticoid treatment. Since this is an inherited disorder family history could reveal a pattern of inheritance. Carbohydrate intolerance and abnormal pigmentation are not part of this syndrome.

Ovarian teratoma (**choice D**) is bilateral only 15% of the time. It is the most common tumor of adolescents, and almost always benign. It is not associated with virilization, carbohydrate intolerance, insulin resistance, or abnormal pigmentation. Serum androgens would be within normal limits. Dermoids are most often found anterior to the uterus, and have a variety of adult tissues in them including hair, skin, teeth, bone, and dermal tissue. They are often asymptomatic but occasionally will twist causing acute symptoms. Treatment consists of ovarian cystectomy, rarely unilateral oophorectomy.

Pregnancy (**choice E**) must always be considered in an adolescent with abnormal menses. The reliability of a sexual history in young adolescents is suspect. A pregnancy test is mandatory. Some aspects of this case could be consistent with pregnancy, e.g., increased pigmentation and amenorrhea. None of the serum studies support the diagnosis of pregnancy, and ovaries are not usually enlarged during pregnancy in a spontaneously ovulating woman except in unusual circumstances, e.g., multiple ovulations. This clinical encounter is an opportunity to counsel the patient about the propriety of having sexual relations, and the implication that it has on her health and future.

70. **The correct answer is E.** Tumors of the testis present as a painless mass that is often noticed after trauma to the area.

Epididymitis (**choice A**) presents as a painful mass at the superior portion of the testis.

A hematoma (**choice B**) would present as a painful mass in the scrotum, and would be discolored due to the blood in the sac.

A hernia (**choice C**) would appear as a large mass occupying the entire sac. It would be found anterior to the normally sized and normally placed testis.

A hydrocele (**choice D**) is a scrotal mass that presents with or without pain, but will transilluminate.

71. **The correct answer is D.** Fibroids are present in 30 to 50% of women, and if submucosal, are capable of prolapsing through the cervix (known as an "aborting" myoma). Carcinoma of the cervix (**choice A**) typically presents with painless spotting, often postcoital. The vast majority of endometrial cancers (**choice B**) occur in menopause with post-menopausal bleeding. Risk factors for premenopausal endometrial cancer include a strong family history and unopposed estrogen therapy. Incomplete abortion (**choice C**) is unlikely, since the menses have been regular, and the most recent was 18 days ago.

Sarcoma of the uterus (**choice E**) is a rare malignancy, also characteristically postmenopausal.

72. **The correct answer is E.** A patient with longstanding emphysema has a high likelihood of being a chronic CO<sub>2</sub> retainer with chronic hypoxia. This hypoxia (high baseline CO<sub>2</sub>) was what kept the respiratory center going (and the drive to breathe). Instituting oxygen (at a rate of 6 L/min) has taken away his respiratory "kick", and has hence inhibited the respiratory center, leading to increased CO<sub>2</sub> retention and now CO<sub>2</sub> narcosis and respiratory depression. To prevent further hypoventilation (if he is breathing at all) and possible respiratory arrest, immediate intubation and mechanical ventilation is indicated to reverse the ongoing respiratory acidosis and tissue hypoxia.

Discontinuing the O<sub>2</sub> (**choice A**) will only lead to further exacerbation of hypoxia, respiratory acidosis, and to respiratory arrest.

Respiratory stimulants (**choice B**) are not very helpful, and hence are not used nowadays. It does not make sense to reduce the O<sub>2</sub> flow (to 2 L/min or to 24% via Venturi mask; **choices C and D**) when the patient is so acidotic, and is on the verge of respiratory arrest.

73. **The correct answer is choice A.** This patient has erysipelas, a superficial form of cellulitis classically occurring on the face and caused by group A, beta-hemolytic streptococcus. The port of entry in this patient was a break

in the skin caused by scratching of his scab. Treatment is immediate institution of antibiotic therapy with penicillin or erythromycin to prevent rapid systemic toxicity.

74. **The correct answer is C.** The patient is an African American with a nodular rash, hepatosplenomegaly, and chest x-ray evidence of bilateral hilar adenopathy (so called "potato nodes") consistent with sarcoidosis. A biopsy of the skin lesions would most likely reveal noncaseating granulomas. Since sarcoidosis is a diagnosis of exclusion, acid-fast and fungal disease would have to be ruled out by culture. It is likely that noncaseating granulomas are also present in the hilar lymph nodes, liver, and spleen as well.

Cutaneous involvement by Hodgkin's disease (**choice A**) is uncommon, and would indicate a stage IV disease. Furthermore, the most common type of Hodgkin's disease (HD) in women is nodular sclerosing HD, which almost always involves the anterior mediastinum, not the hilar lymph nodes. Fat-laden histiocytes (**choice B**) imply some type of fat necrosis, such as erythema nodosum. Erythema nodosum is usually located on the anterior portion of the lower extremities, and is not a systemic disease. It is commonly associated with coccidioidomycosis, histoplasmosis, and tuberculosis.

A paravascular homogeneous eosinophilic infiltrate (**choice D**) or a vasculitis with giant cells (**choice E**) implies a diagnosis of polyarteritis nodosum (PAN), or some other systemic vasculitis. This is an unlikely diagnosis owing to the absence of nodular lesions, the rapid onset of this patient's history, and the presence of hilar adenopathy (PAN does not commonly involve the lungs).

75. **The correct answer is choice B.** Left lower quadrant tenderness in a patient greater than 60 years old should always suggest the diagnosis of diverticulitis. Fever and leukocytosis are common; rebound tenderness is consistent with peritoneal inflammation. Although the leukocytes seen in the urine may raise the question of acute pyelonephritis, (**choice B**) the localization of symptoms is far more suggestive of diverticulitis. The leukocytes found in the urine are probably due to the inflammatory mass involving the adjacent bladder.
76. **The correct answer is E.** Hirsutism is a manifestation of excess androgen. The precursors to 50-70% of circulating testosterone in females (dehydroepiandrosterone and androstenedione) are produced by the ovaries and adrenal glands. The remainder of testosterone is usually secreted by the ovaries. Causes of hirsutism can be divided into those that cause virilization (temporal hair recession, acne, clitoromegaly) and those that do not. Idiopathy, adrenal hyperplasia, Cushing's syndrome,

polycystic ovarian syndrome, obesity, and drugs (steroids) cause hirsutism without virilization. Ovarian hyperthecosis, ovarian neoplasm, or adrenal neoplasia cause hirsutism with virilization. If the patient does not have signs of Cushing's syndrome (and this patient does not), the initial step in the workup is to obtain serum dehydroepiandrosterone sulfate (DHEAS) and testosterone levels. High DHEAS suggests either adrenal hyperplasia or neoplasm. Low DHEAS and high serum testosterone ( $< 2 \times$  normal) suggests hypothalamic disease or polycystic ovaries. Follicle-stimulating hormone (FSH) and luteinizing hormone (LH) tests will distinguish between these two conditions. The LH-to-FSH ratio is less than 2.0 in hypothalamic disease, and is greater than 2.0 in polycystic ovarian disease. Very high ( $> 2$  times normal) serum testosterone suggests an ovarian neoplasm. Cortisol (**choice A**) is increased in Cushing's syndrome.

The levels are helpful only in the context of a suppression test. T4 (**choice A**) is a measure of thyroid gland secretion, but should be interpreted in conjunction with the free thyroxine index, or thyroid-binding globulin. Estrogen and progesterone levels (**choice B**) are useful in conjunction with FSH and LH levels in the evaluation of secondary amenorrhea to assess gonadal failure. They are not indicated in the evaluation of hirsutism.

If the serum testosterone is elevated, measuring FSH and LH levels (**choice C**) is indicated in the evaluation of hirsutism in order to differentiate between polycystic ovarian syndrome and hypothalamic disease (see above).

Late-onset congenital adrenal hyperplasia can be diagnosed by measuring 17 alphahydroxyprogesterone (**choice D**) after an adrenocorticotrophic hormone stimulation test. A poststimulation level of  $> 1,200$  ng/L at 30 minutes is diagnostic. This is not an initial step in the evaluation of hirsutism. Prolactin should be measured in women with oligo- or amenorrhea, particularly if they have galactorrhea. An increased prolactin level is suggestive of a prolactinoma.

77. **The correct answer is C.** Characteristic features on physical examination consistent with orbital cellulitis include proptosis, limitation of extraocular movements, ocular pain, and changes in visual acuity. The other choices listed are very rarely seen nowadays with the advent of potent antibiotics and widely available treatment options for infections in the region of the face. Previously, the face, sinuses, and throat were the primary sites of infection that spread to these intracranial sinuses.
78. **The correct answer is choice A.** Fever, bilateral inguinal lymphadenopathy, and painful genital ulcers in a woman with a history of unprotected sex are all consistent with the diagnosis of a primary herpes simplex infection. Treatment with oral acyclovir has been shown to

shorten symptoms and speed the healing of lesions in primary genital herpes infections in immunocompetent hosts.

79. **The correct answer is A.** A decline in renal function two weeks after starting indomethacin strongly suggests that the medication is causing the symptoms. Common adverse effects of NSAIDs in older patients include renal problems, hyperkalemia, confusion, and GI hemorrhage.

Diuretic use (**choice B**) in the elderly is always risky because of possible electrolyte imbalances and dehydration. It is wiser to elucidate the cause before prescribing additional medications.

Multiple myeloma (**choice C**) is a good consideration; however, the symptoms do not indicate such a diagnosis.

Measuring UNa and creatinine levels (**choice D**) is usually useful for renal function assessment, and for SIADH and RTA.

Renal sonogram (**choice E**) would not be a good step at this stage.

80. **The correct answer is A.** This patient has developed chorioamnionitis, a diagnosis that is based on the following facts: 14-hour duration of active labor, maternal fever, uterine tenderness, bacterial contamination of the amniotic cavity as evidenced by Gram stain examination, and fetal tachycardia. Most intrauterine infections are polymicrobial, and are caused by organisms that ascend from the vagina: anaerobes (*Prevotella* and *Peptostreptococcus* sp.), group B and viridans streptococcus, *E. coli*, *G. vaginalis*, and the genital mycoplasmas. Most authorities recommend treatment with ampicillin and gentamicin; both cross the placenta readily. The choice of antibiotics should include those that are effective against common pathogens responsible for infection. Ampicillin and gentamicin is such a combination. Ciprofloxacin (**choice B**) is a fluoroquinolone known to cause chronic arthrosis deformans in animal studies. Therefore, quinolones are contraindicated in pregnant or lactating women. Clindamycin (**choice B**) resembles erythromycin, and is active against Gram-positive bacteria (except enterococci). Clindamycin is the drug of choice in polymicrobial aerobic-anaerobic infections when used in combination with an aminoglycoside. Erythromycin (**choice C**) is active against many of the organisms responsible for chorioamnionitis, but as monotherapy its spectrum of activity is not wide enough to assure effectiveness in the treatment of this entity. It is a useful drug for treating chlamydia, *Ureaplasma urealyticum*, *Legionella*, and *Campylobacter*. It is often used as a substitute antibiotic for penicillin-allergic patients. Metronidazole (**choice D**) is an antiprotozoal drug that is strikingly active against most anaerobes, including *Bacteroides* species. As monotherapy, its spectrum of activity is not wide enough to assure effectiveness in the

treatment of chorioamnionitis. Although there has been no evidence of mutagenicity, teratogenicity, or carcinogenesis in humans, animal studies in rats have found metronidazole to be a carcinogen. Therefore, use of metronidazole in the first trimester is discouraged.

Penicillin (**choice E**) is the drug of choice for infections caused by group A and group B streptococci, *Treponema pallidum*, aerobic gram-positive rods, clostridia, actinomyces, and some *Bacteroides* species. Staphylococci, gonococci, and coliform bacteria that are often involved in chorioamnionitis development may produce beta-lactamase, an enzyme that disrupts the beta-lactam ring of penicillin, rendering it inactive. Similar to other drugs suggested for monotherapy, penicillin's spectrum of activity is not wide enough to assure effectiveness in the treatment of chorioamnionitis.

81. **The correct answer is C.** Lead-time bias may be misleading when evaluating early-diagnosis screening test for cancer. Lead time is defined as the difference between the time one is able to detect a disease by screening in an asymptomatic patient and the time when a disease may be detected based on that patient's developing symptoms. Lead time bias occurs when asymptomatic patients with indolent tumors detected by screening appear to have prolonged survival only because they were diagnosed sooner than patients who were diagnosed based on symptoms development.
82. **The correct answer is F.** A person with panic attacks will typically present to multiple emergency rooms, and may frequently be told that nothing is wrong, because once an attack is over, there are no remaining abnormalities. By definition, a panic attack is discrete period of intense fear or discomfort in which four (or more) of the following symptoms develop abruptly and reach a peak within 10 minutes: palpitations, pounding heart, accelerated heart rate, sweating, trembling or shaking, sensations of shortness of breath or something, feelings or choking, chest pain or discomfort, nausea or abdominal distress, feeling dizzy, unsteady, lightheaded, or faint, derealization (feeling of unreality) or depersonalization (being detached from oneself), fear of losing control or going crazy, fear of dying, paresthesias (numbness or tingling sensations), chills, or hot flushes. Such an episode is described in the question.

Alcohol withdrawal (**choice A**) requires that there has been a history of heavy alcohol use. Furthermore, the person will present with autonomic hyperactivity, as evidenced by abnormal vital signs. Since the alcohol use is moderate and vital signs are stable, this diagnosis is incorrect.

Coronary insufficiency (**choice B**) is incorrect. The ECG would show ST segment and T wave changes, and laboratory studies would show elevated cardiac enzymes. No such changes are described.

Hyperthyroidism (**choice C**) also presents with a syndrome not unlike a panic attack, but autonomic hyperactivity—usually a pulse above 100/min—is present, and thyroid hormones are increased. In the absence of these symptoms, this diagnosis cannot be made.

Hypoglycemia (**choice D**) requires low blood glucose levels. This abnormality is not reported; therefore, this choice is incorrect.

Although panic attacks can occur during major depressive disorder (**choice E**), since depression is not described, this diagnosis cannot be made.

Paroxysmal atrial tachycardia (PAT, **choice G**) is an inborn conduction defect of the heart characterized by random episodes of tachycardia. The disorder can be identified on the ECG. Since the ECG is reported to be normal, this choice is incorrect.

Pheochromocytoma (**choice H**) is a disorder of the endocrine system in which a tumor of the adrenal glands or sympathetic nervous chain will secrete catecholamines and cause “spells” or “attacks” of headache, severe sweat, palpitations, visual blurring, and weight loss. Hypertension is usually sustained.

No trauma is described. The diagnosis of post-traumatic stress disorder (**choice I**) cannot be made.

Pulmonary embolus (**choice J**) is a medical emergency caused by emboli originating from the venous system, typically a thrombus from the lower extremities. There is usually high fever, and the pulse is persistently elevated. The lack of a previous medical history, the absence of fever, and the return of pulse to less than 100/min suggest that pulmonary embolus is not the correct diagnosis.

The diagnosis of somatization disorder (**choice K**) cannot be made unless the patient presents with four pains symptoms, two gastrointestinal symptoms, one sexual symptom, and one pseudoneurological symptom.

83. **The correct answer is C.** Hyperthyroidism causes nervousness, restlessness, fatigue, weakness, heat intolerance, increased sweating, muscle cramps, frequent bowel movements, and weight loss. Physical

signs include stare and lid lag, tremors, tachycardia or atrial fibrillation, tremors of the finger, moist warm skin, fine hair, and hyperreflexia.

Alcohol withdrawal (**choice A**) is manifested by tremulous, irritability, anorexia, and nausea. Symptoms usually appear within a few hours after reducing or stopping alcohol intake. Symptoms resolve within 48 hours. A more serious withdrawal syndrome is delirium tremens, which is characterized by tremulousness, hallucinations, agitation, confusion, disorientation, and autonomic hyperactivity, including fever tachycardia and diaphoresis. Symptoms begin 72-96 hours after cessation of drinking, and resolve within three to five days.

Coronary insufficiency (**choice B**) causes chest pain that is typically described as retrosternal tightness, *or* pressure radiating to the jaw or left arm that is associated with dyspnea, nausea and vomiting, and diaphoresis. There may be feelings of nervousness or restlessness associated with the other symptoms.

Hypoglycemia (**choice D**) is characterized by irritability, tremulousness, diaphoresis, tachycardia, and confusion. Symptoms are generally transient, and are relieved with glucose intake.

Major depressive episode (**choice E**) presents with a variety of findings, including a loss of interest and pleasure, withdrawal from activities, feelings of guilt, inability to concentrate, associated anxiety, fatigue, feelings of worthlessness, somatic complaints of undetermined etiology, loss of sexual drive, sleep disturbance, anorexia with weight loss, and constipation. Agitation and psychotic ideation may be present. Physical examination is generally unremarkable.

Panic disorder (**choice F**) is characterized by intermittent, recurrent episodes of intense anxiety with associated dyspnea, tachycardia, palpitations, headache, dizziness, paresthesias, choking, smothering feelings, nausea, and bloating. Patients also have a sense of impending doom.

Paroxysmal atrial tachycardia (**choice G**) begins and ends abruptly, and lasts a few seconds to several hours. Symptoms include palpitations, chest pains, and nervousness. Heart rates are generally 140-240 beats per minute.

Pheochromocytoma (**choice H**) causes anxiety that can occur with palpitations, chest pain, profuse sweating, severe headaches, increased appetite, hypertension, or tachycardia.

Post-traumatic stress disorder (**choice I**) is characterized by re-living a prior traumatic event, and is associated with decreased response and avoidance of current events that are associated with the trauma. Patients experience startle reactions, intrusive thoughts, illusions, sleep disturbances, nightmares, difficulty concentrating, and hyperalertness.

Pulmonary embolism (**choice J**) can cause apprehension along with dyspnea, pleuritic chest pain, and cough. Physical findings include tachypnea, tachycardia, accentuation of the pulmonic component of the second heart sound, and inspiratory rales.

Somatization disorder (**choice K**) is characterized by multiple physical complaints referable to several organ systems without an identifiable organic etiology. It is highly suspected when multiple symptoms change constantly, and when at least three physicians are unable to make a diagnosis. Typical symptoms include chest pain, dyspnea, pain, nausea, and vomiting. Anxiety, panic disorder, and depression are often present.

84. **The correct answer is choice D.** Wrist-drop and footdrop are classic clinical signs of lead poisoning in an adult; basophilic stippling is a classic hematologic sign.
85. **The correct answer is choice F.** This is a classic presentation of multiple sclerosis, a relapsing-remitting disease. It is most often seen in young females, presenting with pain on moving the globe and central vision loss, or optic neuritis. The loss of the pupillary light reflex results in the Marcus Gunn, or differentiated, pupil. Diplopia is a common complaint in multiple sclerosis. The exam findings describe the median longitudinal fasciculus (MLF) syndrome, or internuclear ophthalmoplegia. In a young person, this is visually diagnostic of multiple sclerosis.
86. **The correct answer is G.** Pneumonia is characterized by a fever, cough with a purulent sputum, and dyspnea. There may be associated pleuritic chest discomfort, hemoptysis, malaise, nausea, or vomiting. On examination, dullness to percussion, egophony, increased tactile fremitus, bronchial breath sounds, or rales in the area of consolidation may be present. Chest x-ray reveals a dense lobar consolidation (infiltrate) in the area of infection.

Acute bronchitis (**choice A**) presents with fever and cough with a purulent sputum. Dyspnea, hemoptysis, and malaise may be present. Pulmonary examination and chest x-ray are normal.

Asthma (**choice B**) is characterized by dyspnea, cough (nonproductive or whitish sputum), tightness in the chest, and episodic wheezing. Physical

examination reveals tachypnea, tachycardia, conversational dyspnea, prolonged expiration, and diffuse wheezing. Chest x-ray is normal.

Chronic obstructive pulmonary disease (**choice C**) produces a chronic cough (clear to purulent sputum), dyspnea, hyperresonant lungs on percussion, diminished breath sounds with a prolonged expiratory phase, wheezes, and rhonchi. Chest x-ray reveals hyperinflated lung fields, low and flat diaphragms, and increased interstitial markings.

Congestive heart failure (**choice D**) causes a cough (nonproductive or clear-whitish sputum), hemoptysis, dyspnea, orthopnea, paroxysmal nocturnal dyspnea, or dependent edema. On examination, elevated jugular venous pressure (neck vein distention), rales, third heart sound, or peripheral edema may be found. Chest x-ray reveals an enlarged heart, pulmonary venous distention, increased interstitial lung markings signifying edema, or pleural effusions.

Cystic fibrosis (**choice B**) is suspected in any young adult who presents with a history of chronic lung disease, pancreatitis, or infertility. Typical features include a cough productive of sputum, exercise intolerance, and recurrent pneumonias. Steatorrhea (malabsorption) is common. Hemoptysis may occur. Physical examination is significant for digital clubbing, increased anteroposterior chest diameter, hyperresonance to percussion, wheezes, and basilar rales/rhonchi. Chest x-ray findings hyperinflation, increased interstitial markings, peribronchial cuffing, mucus plugging, bronchiectasis (ring shadows and cysts), small rounded peripheral opacities, or focal atelectasis may be seen.

Metastatic cancer to the lung (**choice F**) presents with cough, hemoptysis, and dyspnea. Physical examination is variable depending on the extent of the disease. Decreased breath sounds may be found if there is associated atelectasis or pleural effusion. Chest x-ray reveals single or multiple spherical densities with sharp margins.

Primary lung carcinoma (**choice H**) causes, hemoptysis, anorexia, weight loss, and hoarseness. Physical examination is variable depending on the stage of the disease. Chest x-ray findings are nonspecific. Findings include hilar masses and enlargement, peripheral lung mass, atelectasis, cavitation, and pleural effusion.

Primary pulmonary hypertension (**choice I**) is characterized by manifestations of right-sided heart failure, including weakness, fatigue, peripheral edema, ascites peripheral cyanosis, or syncope. Hemoptysis may be a presenting symptom. A chest x-ray enlarged main pulmonary arteries with reduced peripheral branches, and an enlarged right ventricle. Lung fields are normal on x-ray.

Pulmonary embolism (**choice J**) causes an abrupt onset of dyspnea, pleuritic chest pain, hemoptysis, apprehension, and syncope. Examination reveals tachypnea, tachypnea, fever, rales, and accentuation of the pulmonary component of the second heart sound. Chest x-ray may show platelike atelectasis, elevation of a hemidiaphragm, unilateral pleural effusion, oligemia in the affected lung region (Westermark sign), or a homogenous, wedge-shaped density that is pleural-based and points to the hilum (Hampton's hump).

Sarcoidosis (**choice K**) presents with an insidious onset of malaise, fever, dyspnea, and nonproductive cough. Hemoptysis is rare. Examination may reveal rales, lymphadenopathy, skin lesions such as erythema nodosum or subcutaneous nodules, and eye involvement (anterior uveitis). Chest x-ray findings include bilateral hilar adenopathy, diffuse pulmonary parenchymal changes (i.e., increased interstitial markings), or both.

Sleep apnea (**choice L**) is manifested by snoring and excessive daytime sleepiness and depression. As a result of repetitive oxygen desaturation during the apnea episodes, systemic hypertension, pulmonary hypertension (weakness, fatigue, peripheral edema, ascites, peripheral cyanosis, syncope, and hemoptysis), and cardiac arrhythmias may develop. Chest x-rays reveals enlarged main pulmonary arteries with reduced peripheral branches, an enlarged right ventricle, and normal lung fields, which are indicative of pulmonary hypertension.

Spontaneous pneumothorax (**choice M**) causes an abrupt onset of dyspnea and chest pain on the affected side. Tachycardia, tachypnea, and findings on the affected side such as diminished breath sounds decreased tactile fremitus, and hyperresonance on percussion can be seen. Chest x-ray showing a visceral peripheral line is diagnostic.

Tuberculosis (**choice N**) causes a cough (nonproductive to purulent sputum), hemoptysis, fatigue, weight loss, anorexia, fever, and night sweats. Examination is significant for rales/rhonchi in the upper lung fields. Chest x-rays reveals apical cavities with surrounding infiltrates, hilar and paratracheal lymph node enlargement, and segmented atelectasis. Pleural effusions may also develop. The recent increase in the incidence of tuberculosis in the United States has been linked to immigrants from Asia and Central America as well as the emergence of HIV infection.

Viral pleurisy (**choice O**) causes pain described as chest or back pain that is localized, sharp, fleeting, and made worse by cough, sneezing, deep breathing, or movement. There may be associated fevers. Chest x-rays may be normal or reveal pleural effusion or thickening.

87. **The correct answer is E.** Cystic fibrosis is suspected in any young adult who presents with a history of chronic lung disease, pancreatitis, or infertility. Typical features include a cough productive of sputum, exercise intolerance, and recurrent pneumonias. Steatorrhea (malabsorption) is common. Hemoptysis may occur. Physical examination is significant for digital clubbing, increased anteroposterior chest diameter, hyperresonance to percussion, wheezes, and basilar rales/rhonchi. Chest x-ray findings hyperinflation, increased interstitial markings, peribronchial cuffing, mucus plugging, bronchiectasis (ring shadows and cysts), small rounded peripheral opacities, or focal atelectasis may be seen.

Acute bronchitis (**choice A**) presents with fever and cough with a purulent sputum. Dyspnea, hemoptysis, and malaise may be present. Pulmonary examination and chest x-ray are normal.

Asthma (**choice B**) is characterized by dyspnea, cough (nonproductive or whitish sputum), tightness in the chest, and episodic wheezing. Physical examination reveals tachypnea, tachycardia, conversational dyspnea, prolonged expiration, and diffuse wheezing. Chest x-ray is normal.

Chronic obstructive pulmonary disease (**choice C**) produces a chronic cough (clear to purulent sputum), dyspnea, hyperresonant lungs on percussion, diminished breath sounds with a prolonged expiratory phase, wheezes, and rhonchi. Chest x-ray reveals hyperinflated lung fields, low and flat diaphragms, and increased interstitial markings.

Congestive heart failure (**choice D**) causes a cough (nonproductive or clear-whitish sputum), hemoptysis, dyspnea, orthopnea, paroxysmal nocturnal dyspnea, or dependent edema. On examination, elevated jugular venous pressure (neck vein distention), rales, third heart sound, or peripheral edema may be found. Chest x-ray reveals an enlarged heart, pulmonary distention, increased interstitial lung markings signifying edema, or pleural effusions.

Metastatic cancer to the lung (**choice F**) presents with cough, hemoptysis, and dyspnea. Physical examination is variable depending on the extent of the disease. Decreased breath sounds may be found if there is associated atelectasis or pleural effusion. Chest x-ray reveals single or multiple spherical densities with sharp margins.

Pneumonia (**choice G**) is characterized by a fever, cough with a purulent sputum, and dyspnea. There may be associated pleuritic chest discomfort, hemoptysis, malaise, nausea, or vomiting. On examination, dullness to percussion, egophony, increased tactile fremitus, bronchial breath sounds,

or rales in the area of consolidation may be present. Chest x-rays reveals a dense lobar consolidation (infiltrate) in the area of infection.

Primary lung carcinoma (**choice H**) causes cough, hemoptysis, anorexia, weight loss, and hoarseness. Physical examination is variable depending on the stage of the disease. Chest x-ray findings are nonspecific. Findings include masses and enlargement, peripheral lung mass, atelectasis, cavitation, and pleural effusion.

Primary pulmonary hypertension (**choice I**) is characterized by manifestation of right-sided failure, including weakness, fatigue, peripheral cyanosis, or syncope. Hemoptysis may be a presenting symptom. A chest x-ray reveals enlarged main pulmonary arteries with reduced peripheral branches, and an enlarged right ventricle. Lungs are normal on x-ray.

Pulmonary embolism (**choice J**) causes an abrupt onset of dyspnea, pleuritic chest pain, hemoptysis, apprehension, and syncope. Examination reveals tachypnea, tachycardia, fever, rales, and accentuation of the pulmonary components of the second heart sound. Chest x-ray may show platelike atelectasis, elevation of a hemidiaphragm, unilateral pleural effusion, oligemia in the affected lung region (Westermark sign), or a homogenous, wedge-shaped density that is pleural-based and points to the hilum (Hampton's hump).

Sarcoidosis (**choice K**) presents with an insidious onset of malaise, fever, dyspnea, and nonproductive cough. Hemoptysis is rare. Examination may reveal rales, lymphadenopathy, skin lesions such as erythema nodosum or subcutaneous nodules, and eye involvement (anterior uveitis). Chest x-ray findings include bilateral hilar adenopathy, diffuse pulmonary changes (i.e., increased interstitial markings, or both).

Sleep apnea (**choice L**) is manifested by snoring and excessive daytime sleepiness and depression. As a result of repetitive oxygen desaturation during the apnea episodes, systemic hypertension, pulmonary hypertension (weakness, fatigue, peripheral edema, ascites, peripheral cyanosis, syncope, and hemoptysis), and cardiac arrhythmias may develop. Chest x-rays reveals enlarged main pulmonary arteries with reduced peripheral branches, an enlarged right ventricle, and normal lung fields, which are indicative of pulmonary hypertension.

Spontaneous pneumothorax (**choice M**) causes an abrupt onset of dyspnea and chest pain on the affected side. Tachycardia, tachypnea, and findings on the affected side such as diminished breath sounds decreased tactile fremitus, and hyperresonance on percussion can be seen. Chest x-ray showing a visceral peripheral line is diagnostic.

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88. **The correct answer is N.** Tuberculosis causes a cough (nonproductive to purulent sputum), hemoptysis, fatigue, weight loss, anorexia, fever, and night sweats. Examination is significant for rales/rhonchi in the upper lung fields. Chest x-rays reveals apical cavities with surrounding infiltrates, hilar and paratracheal lymph node enlargement, and segmented atelectasis. Pleural effusions may also develop. The recent increase in the incidence of tuberculosis in the United States has been linked to immigrants from Asia and Central America as well as the emergence of HIV infection.

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Pneumonia (**choice G**) is characterized by a fever, cough with a purulent sputum, and dyspnea. There may be associated pleuritic chest discomfort, hemoptysis, malaise, nausea, or vomiting. On examination, dullness to percussion, egophony, increased tactile fremitus, bronchial breath sounds, or rales in the area of consolidation may be present. Chest x-rays reveal a dense lobar consolidation (infiltrate) in the area of infection.

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homogenous, wedge-shaped density that is pleural-based and points to the hilum (Hampton's hump).

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89. **The correct answer is G:** The description of the wet mount preparation that showed "mobile, pear-shaped, flagellated organism" correctly identifies trichomonas vaginalis. Helpful in deriving the diagnosis is a determination of vaginal pH, which for trichomoniasis is between 6 and 7. The characteristic of the discharge alone is enough to make the diagnosis. Since trichomoniasis is a sexually transmitted disease, evaluation for other sexually transmitted diseases is indicated. Counseling in the practice of safe sex is also indicated, as is referral of the male partner for medical evaluation. Metronidazole is the drug of choice in the treatment of trichomoniasis. Although there has been no evidence of mutagenicity, teratogenicity, or carcinogenesis in humans, animal in the first trimester has been discouraged. The most common side effects of metronidazole are associated with the gastrointestinal tract, including a metallic taste, nausea, and occasionally vomiting or diarrhea. Alcohol ingestion may aggravate any of these. Vaginal metronidazole is approved as a gel and may also be used but is less effective than oral medication. Clotrimazole,

miconazole and ketoconazole are chemically related to metronidazole. Patients who cannot be prescribed metronidazole can be tried on clotrimazole vaginal tablets.

90. **The correct answer is H.** The microscopic description of a KOH wet mount is showing “Spores and hyphae” correctly identifies a fungal infection; the most likely species is *Candida*. A complete history may reveal predisposing factors for this condition. These include pregnancy, used of oral contraceptives, use of antibiotics, hypothyroidism, anemia, and zinc deficiency. Chronic refractory infection may be associated with diminished immune response characteristics of debilitating disease, e.g., acquired immunodeficiency syndrome. Determining vaginal pH is helpful for making the diagnosis, which for candidiasis is between 4 and 5. The characteristics of the discharge alone are not enough to make the diagnosis. The treatment of choice for *Candida vaginitis* is topical application of one of the synthetic imidazoles, e.g., miconazole, or one of the triazoles, e.g. topical terconazole or oral fluconazole. Recurrent vaginal candidiasis is often difficult to distinguish from reinfection. A candidal infection not responsive to usual treatment may be an indication for culture. *C. glabrata* and *C. tropicalis* are often resistant to the imidazoles, and may respond to triazoles or to topical gentian violet. Treatment of the male partner and elimination of *Candida* species from the gastrointestinal tract have not been suggested as an adjunct to treatment, no tall commercial products have the appropriate subspecies of *Lactobacillus acidophilus* capable of producing hydrogen peroxide. It is this property of *Lactobacillus* that inhibits the opportunistic growth of various containing organisms.

The only other antifungal medication listed is griseofulvin (**choice F**). Griseofulvin is fungistatic in vitro for the dermatophyte species *Microsporum*, *Epidermophyton*, and *Trichophyton*. The drug has no effect on bacteria or to her fungi.

91. **The correct answer is H.** The presence of raised, pruritic, erythematous plaques covered by silvery scales in areas of pressure (elbows and knees) is pathognomonic for psoriasis. Picking off the silvery scales produces pinpoint areas of hemorrhage (Auspitz sign) due to the capillaries in the superficial dermis extending up close to the epidermal surface. Topical steroids are the treatment of choice.
92. **The correct answer is G.** The presence of “herald patch on the trunk followed by a rash that follows the cleavage lines of the skin in a “Christmas tree” distribution is pathognomonic for pityriasis rosea. It is a noninfectious, self-limited disease.

Allergic contact dermatitis (**choice A**), atopic dermatitis (**choice B**), dyshidrotic eczema (**choice C**), irritant contact dermatitis (**choice D**), lichen simplex chronicus (**choice E**), and nummular eczema (**choice F**) are all examples of eczema. Eczema has acute, subcutaneous, and chronic stages. Acute eczema exhibits vesicles with crusting over the surface in addition to early signs of scaling from scratching. Chronic eczema is associated with dry, lichenified (thickened) skin due to excessive scratching, leading to increased thickness of the stratum corneum (called hyperkeratosis).

Scabies (**choice I**) is caused by *Sarcoptes scabiei*, a mite that produces pruritic vesicles and pustules in the webs between the fingers (burrows) as well as in the heels of the palms and creases in the wrist.

Tinea corporis (**choice J**) is a superficial dermatophyte infection involving the stratum corneum. On the body surface, it produces circular, pruritic lesions with red, crusty borders and centers. Keratin scraped from the erythematous border, when digested in warmed potassium hydroxide on a glass slide, reveals the classic hyphae and budding yeasts of the offending dermatophyte, which is most commonly *Trichophyton rubrum*.

### Explanations to Block III of the 2005 USMLE Step 2 Items (Questions 93-138)

93. **The correct answer is A.** Intravenous administration of angiotension-converting enzymes inhibitors (**choice A**) is appropriate treatment for hypertension in postoperative patients who are not showing signs of renal insufficiency.

Intravenous administration of morphine (**choice B**) is useful for managing pain in the postoperative setting, and may be helpful for managing pulmonary edema. Morphine is cleared by the liver, and therefore is not contraindicated in patients with renal insufficiency. However, the underlying problem in this patient is renal failure, for which treatment will resolve all of the other problems.

Fluids bolus with 2 L of lactated Ringers solution (**choice C**) would be contraindicated in this patient, who manifesting signs of volume overload due to renal insufficiency.

Hemodialysis (**choice D**) is the correct answer. Hemodialysis is warranted in the patient with signs of renal insufficiency (oliguria, hypertension, pulmonary edema, hyperkalemia, elevated BUN/creatinine). The risk for complications with hyperkalemia warrants rapid toxin removal via hemodialysis.

Pertioneal dialysis is an appropriate method for managing the patient with chronic renal insufficiency. It is not, however, warranted for patients with acute signs of renal insufficiency (hyperkalemia).

94. **The correct answer is C.** The median nerve supplies innervation to the abductor pollicis brevis, the superficial part of flexor brevis, and the opponens pollicis.

The axillary nerve (**choice A**) arises from the C5 and C6 nerve roots, and supplies the deltoid and teres minor muscles.

The brachial cutaneous nerve (**choice B**) supplied only cutaneous sensation to the arm, and therefore would not result in atrophy of the thenar eminence.

The radial nerve (**choice D**) supplies all the muscles on the posterior or extensor side of the arm and forearm (extensor carpi radialis longus and brevis, supinator, extensor digitorum, extensor minimi, extensor carpi ulnaris, extensor pollicis longus, and extensor indicis).

The ulnar nerve (**choice E**) supplies all the innervation to the hypothenar muscles (abductor short flexor, opponens of the little finger, palmaris brevis, all dorsal and palmar interossei, and the two ulnar lumbricals).

95. **The correct answer is C.** She most likely has a placenta previa (painless third trimester bleeding) or placental abruption (acute onset contractions and third trimester bleeding), but could also have cervical trauma, malignancy, or dilatation. Ultrasonographic localization of the placenta is noninvasive, is highly diagnostic of placenta previa, and has largely replaced placental localization by double set-up examination (speculum examination with the capability of doing immediate cesarean in the placenta is visualized). Therefore (**choice B**) is wrong. Doppler umbilical flow study (**choice A**) is an antepartum assessment of fetal well being, and since there is no suspicion of fetal distress, it is unnecessary. Amniocentesis for pulmonary maturity (**choice D**) is appropriate for the timing of a planned cesarean delivery (for placenta previa, previous classical incision, fetal macrosomia) prior to 39 weeks' gestation. Immediate cesarean delivery (**choice E**) would be indicated if there were maternal or fetal instability.

96. **The correct answer is B.** Photosensitivity is an adverse reaction to the skin resulting from exposure to ultraviolet radiation or visible light. It can occur with simultaneous exposure to certain drugs such as sulfonamides (as in this patient) amiodarone, thiazides, tetracycline, and furosemide. The skin lesions appear as "exaggerated" sunburn in sun-exposed areas. Confluent erythema with pruritus is typically seen. Other manifestations may include edema, vesicles, and bullae.

Eczema (**choice A**) refers to epidermal eruptions that are characterized by intracellular edema on histology. Clinically, it is characterized by vesicles, weeping papules, or lichenification in addition to erythema with nondistinct borders and pruritus.

Jellyfish sting (**choice C**) causes localized burning pain, swelling and erythema at the site of contact. In severe cases, generalized muscle cramps, nausea, vomiting, and pulmonary edema may occur.

Salmonella typhi (**choice D**) is a major of diarrhea that is often contracted in Mexico. It is characterized by fevers to 40-41 C, headache, malaise, chills, and diarrhea. This disease is manifested on the skin as "Rose spots", which appear as small, pale-red, blanching, slightly raised macules on the chest and abdomen.

Toxicogenic Escherichia coli (**choice E**) is a major cause of bacterial gastroenteritis for those traveling abroad-especially those traveling to tropical or subtropical regions with poor hygienic conditions. Typically,

patients will have diarrhea with abdominal cramping. There are no known associated skin manifestations.

97. **The correct answer is A.** This patient has a high-pitched diastolic murmur and a wide pulse pressure (systolic-diastolic), both of which are signs of aortic regurgitation. A regurgitant aortic valve results in blowing high-frequency diastolic murmur, most commonly heard at the left parasternal border. A murmur like this, which is heard loudest at the right sternum (as in this case), is suggestive of aortic insufficiency (AI) secondary to aortic root dilation. As AI worsens, there are larger amounts of blood, which in turn results in large stroke volume that increases systolic blood pressure. Most patients are asymptomatic during compensatory phase (as in this case). Later in the disease, the left ventricle fails.

This patient is tall, and has long arms, fingers, and toes. These signs are present in Marfan's syndrome, a systemic connective tissue disease that is inherited in an autosomal dominant fashion. Abnormalities occur in the skeletal (long fingers and toes [arachnodactyly], joint dislocations, pectus excavatum), ocular (myopia, lens dislocation), and cardiovascular systems. Aortic disease is associated with aortic root dilation accompanied by aortic regurgitation (as in this case), or dissection with rupture. This patient has Marfan's syndrome with asymptomatic AI secondary to aortic root dilation.

Patients with septal defect (**choice B**) have a functional pulmonic ejection murmur due to increased flow across the right ventricular outflow tract. The murmur ends before the second heart sound, which is wide and fixed split.

Coarctation of the aorta (**choice C**) is localized narrowing of the aorta immediately distal to the origin of the subclavian artery. Patients are usually asymptomatic, and present with hypertension. Systolic blood pressure is higher in the arms than in the legs. Femoral pulses are delayed and weak with respect to the radial pulse. On auscultation, a late systolic ejection murmur is heard at the base, and posteriorly.

Ebstein's anomaly (**choice D**) is a congenital development anomaly in the tricuspid valve in which the leaflets originate from the right ventricular wall rather than the aorto-ventricular hypoplastic. Patients have a holosystolic murmur of tricuspid regurgitation, wide splitting of the second heart sound, large v wave in the jugular venous pulse, and pulsatile liver.

Mitral stenosis (**choice E**) is preceded by an opening snap (if the valve is mobile), and produces a low-pitched diastolic rumble heard best at the apex.

98. **The correct answer is D.** The patients described in this third group “elected not to participate” in the study and “self-selected” themselves out of the study. Self selection bias, therefore, refers to differences between groups that may be related to the patient’s decision of whether or not to enroll in the study. (A possible explanation for third group having a significantly higher rate of tuberculosis than the placebo group is that patients who are not enrolled in the study are less likely to be followed by physicians and may therefore develop clinically overt disease.)
99. **The correct answer is E.** Ventricular septal defect, with a left-to-right shunt, is the most common congenital heart disorder. A harsh, holosystolic murmur is heard best along the lower left sternal border, radiating over the precordium to the back. Biventricular hypertrophy is seen in large left to right shunts.
100. **The correct answer is B.** Of all vitamins, pregnancy demands the greatest increase in folic acid, from 180  $\mu\text{g}$  (a 122% increase). The main dietary sources of folate are liver, dark-green leafy vegetables, and dried beans. A deficiency in folate during pregnancy has been implicated in an increased risk for neural tube defects. Calcium (**choice A**) is found in milk product, as well as in dark-green leafy vegetables, and requires a 50% increase in pregnancy (800 mg to 1200 mg). Vitamin A (**choice C**) is found in liver, egg yolk, and chicken meat, and requires no increase in pregnancy (800  $\mu\text{g}$ ). Vitamin B12 (**choice D**) is found in liver, muscle meat, fish, and eggs, and requires a 10% increase in pregnancy (2.0  $\mu\text{g}$  to 2.2  $\mu\text{g}$ ). Vitamin D (**choice E**) is found in salmon and fish oils, and requires a 100% increase in pregnancy (5  $\mu\text{g}$  to 10  $\mu\text{g}$ ).
101. **The correct answer is E.** This patient has alcoholic liver disease (hepatomegaly, elevation of serum AST, slight elevation of total bilirubin, prolonged prothrombin time), pancytopenia (anemia, thrombocytopenia, and leukopenia), and a macrocytic anemia. The most likely cause of his anemia is folate deficiency secondary to a poor diet. His liver disease is alcohol-induced since his serum AST is preferentially elevated (alcohol is a mitochondrial poison, and AST is located in hepatocyte mitochondria). Folate deficiency causes DNA synthesis problems, leading to hematopoietic cells that have nuclear enlargement to such a degree that they cannot enter the bone marrow sinusoids, and instead enter the circulation. These cells are destroyed by macrophages in the extrasinusoidal tissue, a process called ineffective hematopoiesis. The

prolonged prothrombin is due to reduced synthesis of coagulation factors by the liver.

An adverse drug reaction (**choice A**) would not explain the pancytopenia and macrocytic anemia.

Hypersplenism (**choice B**) most commonly develops in the setting of portal hypertension and cirrhosis, the latter most often due to alcohol. An enlarged spleen secondary to portal hypertension traps and destroys circulating RBCs, platelets, and leukocytes. The patient, however, does not have any clinical evidence of portal hypertension (ascites, splenomegaly). Therefore, this diagnosis is unlikely.

A myelophthisic marrow (**choice C**) refers to metastasis to the bone marrow, leading to bone marrow fibrosis and decreased hematopoiesis. There is no evidence of cancer in this patient.

Peripheral destruction of cells (**choice D**) is unlikely since there is no evidence of splenomegaly or immune-mediated disease.

102. **The correct answer is B.** This is a typical presentation of chronic lymphocytic leukemia. There is usually a significantly elevated white blood cell count, which are predominantly mature lymphocytes. Other features of CLL include infections with encapsulated organisms such as pneumococcus, meningococcus, and H. influenzae. Myelofibrosis (**choice A**) is usually characterized by reduced cell counts and not leukocytes counts elevated to this degree. Chronic myelogenous leukemia (**choice C**) will present with a peripheral smear that essentially looks like bone marrow, i.e., would not explain the high white blood cell count and the other findings of splenomegaly and adenopathy.

103. **The correct answer is F.** The patient is a long-time smoker with primary cancer most likely secondary to smoking. He has weight loss, a cough, metastases to the right supraclavicular nodes (a normal draining site for lung cancer), hilar lymph nodes, and adrenal gland (most common extrapulmonary site of metastasis). A non-small-cell lung carcinoma is more likely than a small cell carcinoma since the main mass is more peripherally located, whereas small cell cancers are more centrally located.

A B-cell lymphoma (**choice A**) is not associated with smoking, and does not have the distribution noted in this patient nor the tendency for metastasizing to the adrenal glands.

A lung abscess (**choice B**), although most commonly located in the posterior portion of the right lower lobe, is most often due to aspiration of

infected oropharyngeal material. A fluid is usually noted, and calcification would be unlikely diagnosis.

A mesothelioma (**choice C**) is related to asbestos exposure, and has no association with smoking.

A metastatic adenocarcinoma of the breast (**choice D**) is unlikely, since no mention of a breast mass or previous breast surgery is made. Furthermore, solitary metastases are uncommon, and calcification is not a feature of metastatic lesions.

Multiple endocrine neoplasia (**choice E**) is an autosomal dominant disease with multiple endocrine abnormalities, (e.g., primary hyperparathyroidism, pituitary adenoma, Zollinger-Ellison syndrome, pheochromocytoma) and medullary carcinoma of the thyroid. There is nothing in the patient's presentation that suggests any of these findings.

Sarcoidosis (**choice G**) is not associated with a localized lung mass, and is uncommon in the elderly age bracket.

Tuberculosis (**choice H**) is associated with fever and upper lobe cavitory lesions.

104. **The correct answer is D.** Depressive symptomatology following the death of a loved one is normal for two months following the loss. This is known as normal grief, or bereavement. Conversion disorder (**choice A**) is wrong because there is no evidence for meeting the criteria for the disorder. They are misleading you into thinking that because the husband had a heart attack, she is manifesting chest pain as a conversion symptom. Generalized anxiety disorder B (**choice B**) is wrong because there is no evidence of excessive anxiety over normal life stressors. Major depressive disorder (**choice C**) is wrong because the patient does not meet enough of the criteria for the disorder. Pathological grief (**choice E**) is seen when the patient shows delayed symptoms or psychotic symptoms. Denial of death is also a form of pathological grief. None of these are seen here.
105. **The correct answer is A.** A diagnosis of acute stress disorder required the person to have been exposed to a traumatic event that involved actual or threatened death or serious injury, and that the person's response involved intense fear, helplessness, or horror. Such an event is described in the question. The disturbance must last between two days and four weeks, and must occur within four weeks of the traumatic event.

The diagnosis of agoraphobia (**choice B**) cannot be given if another mental disorder better accounts for the symptoms. In this case, acute stress disorder better accounts for the symptoms.

A diagnosis of generalized anxiety disorder (**choice C**) requires that another mental disorder does not better account for the symptoms. In this case, acute stress disorder better accounts for the symptoms.

In hypothyroidism (**choice D**), there are often elevated levels of TSH. The TSH level in the question is within the normal range. Hypothyroidism presents with weakness, fatigue, cold intolerance, constipation, depression, and hoarseness. Dry, cold, yellow and puffy skin, scant eyebrows, a thick tongue, bradycardia, and delayed return of deep tendon reflexes are seen. This is clearly the clinical picture described.

In panic disorder (**choice E**), panic attacks do not occur in response to a stressor. Therefore, this diagnosis can be excluded.

106. **The correct answer is C.** Acute otitis media is most often caused by *Streptococcus pneumoniae* and the treatment of choice is amoxicillin. However, if after treatment the symptoms persist, suspect a beta-lactamase producing, amoxicillin-resistant organisms, such as *Haemophilus influenzae* or *Moraxella catarrhalis*.
107. **The correct answer is D.** Hot flashes arise as estrogen secretion from the ovaries decreases. They often begin while a woman is still menstruating. Eighty percent of women will experience hot flashes as menstruation ceases. During a hot flash, the face and the upper entire body become very warm and flushed. Episodes typically last one to five minutes, but can last longer. Sweating also occurs, varies in amount, and may cause the woman to feel chilled. During the hot flash, the heart rate increases and the woman may feel breathless or dizzy. The skin temperature can increase by 7 or 80°F without the core temperature increasing. Hot flashes occur most commonly at night (they can interrupt sleep) or in the morning. In this patient, the description of the event and the increasing intermenstrual interval make hot flashes the most likely diagnosis.

Carcinoid tumors (**choice A**) secrete vasoactive substances, and are associated with the carcinoid syndrome. The manifestations are facial flushing, edema of the head and neck, abdominal cramps, diarrhea, bronchospasms, cardiac valvular lesions, telangiectasias, and increased 5-hydroxyindoleacetic acid in the urine. The typical flush is erythematous, and involves the face and neck (blush area).

Symptoms of excessive caffeine ingestion (defined as > 500 mg/day = 4-5 cups of brewed coffee; **choice B**) include anxiety, restlessness, insomnia, and gastrointestinal- and heart-related symptoms. Excessive sweating is not a typical feature.

The symptoms of generalized anxiety disorder (**choice C**) include pervasive feelings of anxiety, worry, hypervigilance, and somatic complaints. The symptoms are not episode.

Patients with hyperthyroidism (**choice E**) may present with increased sweating, anxiety, increased heart rate, and menstrual irregularities. However, the sweating, anxiety, and increased heart rate are not episodic, and usually accompanied by signs such as stare, lid lag, tachycardia, tremor, or hyperreflexia, none of which is present in this case.

108. **The correct answer is D.** Local extension of sinusitis, otitis media, or mastoiditis may lead to meningitis and/or brain abscess. Signs and symptoms in this child point to an infection of the central nervous system. Headache, altered mental status, and papilledema indicate increased intracranial pressure. A CT scan of the head should be performed first to rule out a mass lesion (i.e., a brain abscess), because removal of CSF in the presence of a mass may cause herniation.

Measurement of serum ammonia level (**choice A**) might be indicated if hepatic failure was considered to be a cause of altered mental status; however fever and a history of chronic sinusitis point to infection.

X-ray films of the sinuses (**choice B**) would be redundant; we know that the child has a history of chronic sinusitis. Furthermore, the signs and symptoms point to an infection of the central nervous system.

Electroencephalography (**choice C**) may be indicated for evaluating the seizure, but in a child with an infection of the central nervous system, the priorities are rapid diagnosis and initiation of antimicrobial therapy.

Lumbar puncture (**choice E**) is appropriate in this setting to rule out meningitis, but it should follow an appropriate imaging study to minimize the risk of herniation.

109. **The correct answer is A.** Amebic abscesses are common in countries in tropical or subtropical zones, and in areas with poor sanitation. *Entamoeba histolytica* causes an intestinal infection, and the liver is seeded via the portal system. The presentation is abdominal tenderness in the right upper quadrant, leukocytosis, and fever. The differential will often show eosinophilia.

Appendicitis (**choice B**) presents with right lower quadrant pain that may start in the periumbilical area. Fever, leukocytosis, and pain are the common manifestations, but eosinophilia is not seen.

Cholecystitis (**choice C**) will present with fever, leukocytosis, and pain. However, eosinophilia is not found, and Murphy's sign is usually present.

Hepatitis (**choice D**) usually present with fever, chills, and pain. Again, the high eosinophil count is not commonly seen with hepatitis.

Pyogenic abscess (**choice E**) is the most common type of liver abscess; however, the history of travel, eosinophilia, and lack of primary source for the pyogenic abscess make it a less likely diagnosis.

110. **The correct answer is B.** Absent breath sound over the left chest, tracheal deviation to the right, and hypotension despite volume in a patient with evidence of blunt chest trauma all point to the diagnosis of a left tension pneumothorax. Therefore, the next step in management is immediate decompression of the left hemithorax, either with a thoracostomy tube or with a large bore needle.

Intubation (**choice A**) is part of the ABCs, but the patient is breathing on his own at present,

In addition, you do not have a blood gas report. The hypotension is due to inadequate dilation of the LV caused by raised intrathoracic pressure from the pneumothorax should be adequate to bring up the BP (unless he is bleeding into the abdomen or the third intercostal space).

More fluids/blood/volume expander (**choice C**) are not required at this moment. You have not been given the hematocrit either, so you cannot estimate the amount of blood loss.

Peritoneal lavage (**choice D**) would probably be the next area on which to focus your attention. Pericardiocentesis (choice E) is not indicated at the time. There is no neck vein engorgement either.

111. **The correct answer is choice B.** While yearly influenza vaccination, weight loss, exercise, use of an inhaled beta-agonist, and pneumococcal vaccination may all benefit this patient, smoking cessation has by far the greatest benefit.
112. **The correct answer is choice A.** After bowel surgery, the organisms most likely to cause infection are *E. coli*, (**choice C**), or *Bacteroides fragilis*. This patient received adequate antibiotic coverage for a possible *E. coli* infection, i.e., gentamicin and ampicillin, but did not receive anaerobic coverage eg: Metronidazole, and therefore is at risk for a *Bacteroides* infection. *Proteus mirabilis* (**choice D**) causes most hospital acquired infections especially UTI. It is also associated with the formation of 'struvite' stones due to its urease activity. *Pseudomonas aeruginosa*

**(choice E)** is better known to cause nosocomial infections in patients with pre-existing burns. It is also commonly found in alcoholics causing pneumonia, in patients with cystic fibrosis, in patients with in-dwelling catheters. It also causes nosocomial infections. *Brucella abortus* **(choice B)** is rarely found in the US and is usually killed during pasteurization of milk, implying an animal (cattle) source.

113. **The correct answer is D.** Any colonic polyp found on barium enema, sigmoidoscopy, or colonoscopy must be removed by polypectomy for two reasons: first, to assure that it is benign, and second, to remove it before it can degenerate into a malignant polyp. Re-evaluating the patient over time will not make the polyp go away. Instead, it will allow the carcinomatous changes (if already present) to progress unchecked (and probably undiagnosed). Colectomy is not the correct treatment if the polyp is benign.

114. **The correct answer is A.** Axillary-subclavian venous thrombosis is typified by repeated overuse of an upper extremity. It is often seen in athletes, in mothers who repeatedly lift children with a single hand, and in continuous a jackhammer. The enlarged cutaneous veins are suggestive of collateral vein formation due to an obstruction of the deep venous system.

Deep vein valvular insufficiency **(choice B)** in extremity is pathologically analogous to varicose veins in the foot, in which case the distal, dependent cutaneous veins should be engorged.

Thrombophlebitis of the anterior chest wall and breast (Mondor's disease; choice C) is a self-limited condition in which the involved veins feel like a "cords" to palpation, and are usually tender and painful.

Thrombophlebitis (aseptic inflammation) of the cephalic vein **(choice D)** is usually due to prolonged cannulation, or "pH-imbalanced" infusion (i.e., too acidic or alkaline); this is not the case here.

Thrombosis of preexisting UL varicosities **(choice E)** is usually manifested by redness, swelling, and tenderness surrounding the thrombosed superficial vein.

115. **The correct answer is choice E.** This patient has toxic shock syndrome, which typically presents with abrupt onset high fever, vomiting, watery diarrhea, rash, and conjunctivitis. Hypotensive is common. 90% of cases are seen in women, 95% of which are seen within 5 days of tampon use.

Staphylococcus aureus is the primary infectious agent so treatment is targeted toward it. Nafcillin is a beta-lactamase resistant penicillin, and is

the drug of choice for infection with beta-lactamase producing Staphylococci.

116. **The correct answer is C.** A case typical of primary dysmenorrhea is described. The differential diagnosis of dysmenorrhea requires that organic or psychological causes of pelvic pain be ruled out. Primary dysmenorrhea occurs in the absence of organic pelvic pathology such as endometriosis, pelvic inflammatory disease, or leiomyomata uteri. These conditions could be detected on physical examination. Physical examination in this case is negative, suggesting that these entities are not responsible for the patient's condition. The pathogenesis of primary dysmenorrhea is unknown, but there seems to be an association between elevated prostaglandin F<sub>2</sub>-alpha levels in secretory endometrium and the symptoms of dysmenorrhea, including uterine hypercontractility, complaints of severe cramping, and other prostaglandin-induced symptoms. Pharmacologic treatment of primary dysmenorrhea is based on this relationship. Nonsteroidal anti-inflammatory drugs (NSAIDs), in this case ibuprofen, are the drugs of choice. Often the family history will reveal similar symptoms in mothers and sisters of symptomatic patients. Laboratory studies are usually not diagnostic, and so determination of serum levels of pituitary or thyroid hormones is not necessary. A detailed history of menstrual function is required, including mention of the last normal menstrual period. In the absence of reliable menstrual data, a pregnancy test is indicated. Attention should also be paid to the amount of analgesic medication ingested. It is entirely possible that some of the digestive disturbances associated with painful menses are secondary to the irritating qualities of aspirin or NSAIDs. In addition to focusing on the patient's chief complain, this encounter would be an appropriate time to educate this sexually active young adolescent with regard to the effect of her sexual behavior on her general health and future well being.

Condom usage, as noted in this case, is effective in decreasing transmission of venereal disease. Pelvic inflammatory disease is manifested by fever, abdominal and pelvic tenderness to palpation, and possibly cervical mucopurulent discharge. None of these findings is present in this case. Therefore, the prescription of doxycycline for 10 days (**choice A**) is not indicated. It would nevertheless be appropriate to obtain cultures for sexually transmitted diseases because the patient is in an at-risk group. Ambulatory treatment of acute pelvic inflammatory disease, which uses doxycycline, includes an initial intramuscular injection of ceftriaxone. There are other regimens for treating acute pelvic inflammatory disease. Therapy is directed at eliminating both Chlamydia and gonorrhea. These regimens last from 10 to 14 days.

Another strategy for treating menstrual discomfort uses oral contraceptives and premenstrual nonsteroidal anti-inflammatories. This regimen uses

birth control pills to decrease the endometrial thickness, and NSAIDs to inhibit production of Prostaglandins. Acetaminophen (**choice B**) is an analgesic that has little antiinflammatory effect. Its mechanism of action is not known. Given premenstrually, it has little effect on the mechanism responsible for the patient's symptoms.

Codeine (**choice D**) is an effective narcotic analgesic with many undesirable side effects, including nausea and vomiting, constipation, and sedation. There are better pharmacologic options available for treatment, as mentioned above.

Danazol (**choice E**) is a weak androgen that is used to treat endometriosis. It is a derivative of 17-alpha ethinyl testosterone. Because it inhibits ovarian steroidogenic enzymes that synthesize estrogens, its use creates a pseudomenopause. With menstruation stopped, the pain of endometriosis at the time of menses is also stopped. Undesirable side effects of danazol include acne, oily skin, deepening of the voice, weight gain, edema, and adverse plasma lipoprotein changes. There are more effective drugs for treating endometriosis, e.g., GNRH agonist (leuprolide, goserelin). An early adolescent is not likely to manifest the symptoms of endometriosis, and there are no intensified after a trial of appropriate pharmacotherapy as mentioned above, laparoscopy would be indicated to assess the status of the pelvic viscera.

117. **The correct answer is choice E.** The question tell you that the patient is reinfected with gonorrhea that is again sensitive to penicillin, eliminating (**choices A and B**). Excessive alcohol intake (**choice C**) plays no role in reinfection and since the patient was treated with one week of penicillin, which is an adequate treatment for gonorrheal infection, (**choice D**) is incorrect as well. Even though the partner' urethral culture is negative for gonorrhea, the question states that he has an anal fissure—the probable source of reinfection in a homosexual male.
118. **The correct answer is C.** This patient has classic signs and symptoms of polymyalgia rheumatica: malaise, muscle pain, weight loss, mild anemia, normal creatine kinase levels, and a markedly elevated erythrocyte sedimentation rate (ESR).

Hyperthyroid myopathy (**choice A**) is unlikely since the patient is not described as having thyromegaly or cardiac arrhythmias, which are common symptoms for elderly patients with hyperthyroidism. Furthermore, myopathy id hyperthyroidism is accompanied by muscle weakness, not pain.

Myasthenia gravis (**choice B**) is a neuromuscular disease wherein an autoantibody against the acetylcholine receptor leads to muscle weakness (not myalgias),

Rheumatoid arthritis (**choice D**) is unlikely since the patient is not complaining of joint pains or morning hand stiffness.

Steroid myopathy (**choice E**) is unlikely since the patient is not currently on steroids. Corticosteroids are the treatment of choice for polymyalgia rheumatica, and may produce a myopathy characterized by proximal muscle weakness, not myalgias.

119. **The correct answer is A.** Placement of Foley catheter is the correct answer because of the physical findings of suprapubic fullness. This is also the easiest and quickest procedure to assure that the patient is not obstructed or unable to void.

Renal ultrasonography (**choice B**) is a useful test for evaluating the size of the kidney, and if a Doppler, may be helpful for determining renal blood flow. It will not, however, give you an answer as to why no urine output exists.

CT scan of the abdomen (**choice C**) would be helpful for delineating the size and possible function of the kidney. It would not, however, be a good test for determining renal function because you need to give contrast, which may aggravate the kidney problem.

Transfusion of packed red blood cells (**choice D**) is used only when the patient is anemic. A hemoglobin of 9 mg/dL is adequate in this postoperative setting.

Administering 20 units of regular insulin (**choice E**) would be useful for someone who has an elevated blood sugar, but a blood sugar level of 190 mg/dL in the immediate postoperative period is not unusual, and usually remains untreated. In addition, if insulin was to be given, it should be given IV.

120. **The correct answer is choice E.** A physician's obligation is always to the patient and confidentiality must be respected. An exception to this rule is where there is potential harm to others that can be prevented by notifying appropriate authorities. However, in this case, since the patient underwent a simple appendectomy, there is no exception to the rule of respecting the patient's confidentiality.
121. **The correct answer is D.** This infant has growth retardation and pallor, which are signs of anemia. The most likely cause of microcytic,

hypochromic anemia is iron deficiency in the body and in the diet. The dietary history provides us with adequate information that conveniently helps us to rule out deficiencies in vitamin C (**choice A**) and vitamin D (**choice E**) should not be given to infants under 12 months of age because its use is associated with iron deficiency and milk allergies. Baby formulas that are available today contain almost all the important nutrients, and usually do not cause deficiencies. Introducing fresh fruits and vegetables to her diet at three months of age (**choice C**) is a little early, and would rarely be recommended by a pediatrician.

122. **The correct answer is C.** This patient has been exposed to hepatitis B because of her husband's illness, and is at risk for developing hepatitis B. Hepatitis B is transmitted through exchange of blood or other body fluids. It is common practice to test individuals for hepatitis when they have a risk of exposure. Prophylactic treatment can then be undertaken to prevent infectious morbidity. In this case, serological testing—particularly the positive HbsAg and IgM-antiHBcAg—confirms the diagnosis of an acute hepatitis B infection. The negative anti-HAV test makes the probability of hepatitis A infection less likely. Up to 90% of infants who are infected during perinatal period are unable to clear the virus, and thus are at increased risk for developing chronic viral hepatitis. Infants who become chronically infected have a 10% higher lifetime risk of developing cirrhosis or primary hepatocellular carcinoma. A strategy has been developed to provide these at-risk infants with prophylaxis, which involves administering hepatitis B immune globulin (for passive immunization) and recombinant vaccine (for active immunization). This regimen is 85 to 90% effective for preventing perinatal transmission. Breast-feeding is contraindicated in patients who have active hepatitis.

Administering only hepatitis B immune globulin (HBIG; **choice A**) would provide the newborn only with passive immunization, affording incomplete long-term protection. Serum levels of hyperimmune globulin persist for about two months, after which the newborn would be susceptible to viral infection.

Satisfactory vaccination using a recombinant vaccine involves administering a series of three injections: one immediately, one after one month, and one after six months. Unless the series is completed, effective immunization cannot be assured. Administration of recombinant vaccine only (**choice B**) would not afford the newborn immediate protection.

Giving HBIG at birth would provide immediate protection against infection, but since the duration of breast-feeding is unknown and could last for six or more months, there would be a window of opportunity for infection undertaking passive and active immunization (**choice D**).

Suggesting serologic testing at birth and then administering the vaccine and hyperimmune globulin (**choice E**) is incorrect because the newborn with hepatitis B infection does not show clinical or chemical signs of disease at birth, results of maternal serologic testing are likely to be unchanged by the end of the pregnancy. HbsAg appears in the serum of infected individuals as early as one to two weeks after parenteral infection, and may be positive for six months or longer. High titers of IgM anti-HbcAg are found in patients with acute disease, and may be the only marker of acute hepatitis if HbsAg is no longer detectable. Further testing would not provide information that could change the timetable of effective neonatal prophylaxis. Delaying the immunization is not justified.

123. **The correct answer is choice C.** The most characteristic features of Factor VIII deficiency are spontaneous or traumatic hemorrhages, which can be subcutaneous, intramuscular, or intraarticular. Affected infants often present with excessive bleeding after circumcisions or with hematomas after injections. Excessive bruising is seen with activity. PTT is prolonged with a decrease Factor VIII activity. In 80% of cases, the family is positive for the disease.

124. **The correct answer B.** The description of this lesion atop his forehead as a noduloulcerative lesion with a rolled-up border is almost diagnostic of a basal cell epithelioma (carcinoma). These lesions are slow growing, unlikely to metastasize, and occur on chronically sun-exposed skin.

The patches of erythematous skin on this patient's forehead in the vicinity of the primary lesion are most likely to be actinic keratoses (**choice A**), which are premalignant areas of dysplasia that also occur in areas of chronic sun exposure. The usual treatment of a biopsy-confirmed basal cell epithelioma is surgical excision.

Kaposi's sarcoma (**choice C**) is a reddish-brown nondulopapular lesion (usually multiple in AIDS), and may involve the visceral organs in 25% of cases. It is more commonly seen in HIV+ gay men. They are more numerous over the legs and hands. A viral etiology is been considered for this condition.

Melanoma (**choice D**) usually arises from a nevus, and is divided into four subtypes. Its incidence is rising faster than any other cancer in the United States. Melanomas constitute 1% of all skin cancers, but accounts for 60% of death due to skin cancer. Prognosis is based on the depth of invasion. Seborrheic keratoses (**choice E**) are "wartlike" skin tags on the faces of old people. They are hereditary, and are seen more commonly in patients having an oily complexion.

125. **The correct answer is C.** This is an example of type I hypersensitivity, which is mediated by IgE (immediate type or anaphylactic hypersensitivity). The usual tests for inhalant or food sensitivity make use of the reaction between antigen and IgE antibody that occurs on the patient's skin by scratch, puncture, or intradermal techniques. If IgE antibody specific for the test antigen is bound to the subject's mast cells, the interaction of injected antigen with cell-bound IgE releases histamine, a potent vasoactive agent that causes increased capillary permeability, dilatation, and axon reflex stimulation, leading to the familiar wheal and flare reaction.

The type III immunopathologic mechanism (**choice A**) Arthus or immune-complex) of tissue injury involving humoral antibody and antigen occurs in the extracellular spaces, such as blood vessels in the skin. Examples of type II reactions include serum sickness and immune complex pericarditis or arthritis following meningococcal or haemophilus influenzae infection.

In type IV (**choice D**), cell-mediated, or delayed-type hypersensitivity, pathologic changes follow antigen interaction with specifically sensitized, thymus-derived T lymphocytes. The basis for the tissue injury in classic cell-mediated immune reactions is not completely understood, but it is clear that macrophages and cytotoxic cells play major roles.

Reactions of this sort are mediated by release of histamine from mast cells, not lymphokines (**choice E**). Lymphokines are not a significant product of mast cells.

Influx of phagocytic cells in response to injection of foreign proteins (**choice B**) does not cause the typical "wheal and flare" reaction.

126. **The correct answer is choice A.** The fetus described here has trisomy 21, Down's syndrome. Overall, it affects 1:800 live born, and accounts for 50% of all cytogenetic diseases. It is characterized by mental deficiency, short stature, muscular hypotonia, bradycephaly, and a short neck. Typical facies are oblique orbital fissures, flat nasal bridge, small or folded ears, and nystagmus. Congenital heart defects and duodenal atresia are common. These fetuses show no evidence of distress in utero; therefore antepartum nonstress testing (**choice B**) would not assist in the prenatal diagnosis. Congenital cytomegalovirus (**choice C**) is characterized by prematurity, low birth weight, microcephaly, chorioretinitis, hepatosplenomegaly, and **jaundice**. Measurement of maternal serum alpha-fetoprotein level (**choice D**) has a sensitivity of approximately 40% for the diagnosis of trisomy 21. This sensitivity of approaches 80% when using multiple markers (estriol, human chorionic gonadotropin). Maternal serum alpha-fetoprotein has a greater sensitivity

for open neural tube defects. Congenital rubella (**choice E**) is characterized by cataracts, patent ductus arteriosus, and deafness.

127. **The correct answer is choice A.** Dermatomyositis is characterized by the signs and symptoms of polymyositis as well as the typical skin findings of the heliotrope rash—the purple-red discoloration of the skin in the areas described in this patient. Papules over the knuckles and elbow are also frequently seen. Muscle weakness involves the proximal muscle groups, specifically the upper arms and upper legs, so patients will often describe difficulty combing their hair, climbing stairs, or rising from a chair. Since this is an “itis”, there is an elevation of muscle enzymes, i.e., CPK and aldolase.

From a strategy point of view, there are several key pieces of information in this vignette that can help form a picture of this patient’s problem. The movement problems are of recent onset, and are joint-focused. The discolorations on the face and extremity joints are situated consistently with the dermatomes of the body, so this becomes a likely clue to the correct answer. Additionally, none of the other response choices explain the discolorations and several, such as psoriasis, have different types of skin manifestation. The lack of swelling also points away from rheumatoid arthritis, and mixed connective tissue disease would have less localized findings. Both clues are reasoning to eliminate lead toward choice A as the best response.

128. **The correct answer is D.** Torsion of the testis allows for movement of the testis that compromises the blood supply and accounts for the abnormal position.

Epididymitis (**choice A**) is an inflammation of the epididymis. In the early stages of the disease, the epididymis is the only portion of the testis that is enlarged. Even with an inflamed epididymis, however, the testis would stay in its normal plane. Epididymitis is commonly associated with prostatitis and pyuria.

A hemorrhage tumor (**choice B**) is an isolated swelling of the testis that is tender, but not erythematous, and would not displace the testis from its normal plane.

Incarcerated hernia (**choice C**) is characterized by a swollen, erythematous scrotum; however, the testis is normal in size and portion. The sac is located anterior to the scrotal contents.

With torsion of the testicular appendix (**choice E**), the appendix, but not the testis itself, twist.

129. **The correct answer is A.** The patient's symptoms are most compatible with hypercalcemia. Polyuria and constipation are the most characteristic symptoms. Other symptoms include nausea, vomiting, muscular weakness, hyporeflexia, confusion, psychosis, tremor, and lethargy. ECG changes compatible with hypercalcemia are narrow QT interval, ventricular extrasystoles, and idioventricular rhythm. Hypercalcemia occurs in 10-20% of patients with carcinoma (commonly of the breast, lung, kidney, or head and neck) and multiple myeloma. Parathyroid hormone-releasing protein has been identified in two thirds of patients with cancer and hypercalcemia. Until the primary cause for hypercalcemia can be controlled, therapy should aim to increase calcium excretion and decrease calcium resorption from bone. The initial therapy in malignant hypocalcemia involves ECF volume repletion with saline (patients with hypercalcemia are often volume-depleted), saline diuresis, and pharmacotherapy with an infusion of bisphosphonates. Bisphosphonates inhibit bone resorption, and must be administered intravenously. Hypercalcemia will abate over several days.

Glucocorticoids (**choice B**) lower serum calcium by inhibiting cytokine release, promoting cytolysis of some tumor cells, and inhibiting intestinal absorption of and increasing kidney excretion of calcium. Oral prednisone is effective in hypercalcemia secondary to multiple myeloma, other hematological malignancies, and sarcoid. Other tumors rarely respond.

Intravenous mannitol (**choice C**) causes diuresis, and is useful in the treatment of cerebral edema, brain herniation in coma, and oliguric renal failure. It is not indicated in the treatment of hypercalcemia.

Intravenous mithramycin (**choice D**) inhibits bone resorption. It is associated with significant hepatic, renal, and bone marrow toxicity, and is less effective than bisphosphonate therapy. Hence, its use is limited to refractory malignant hypercalcemia.

Oral hydrochlorothiazide (**choice E**) should be avoided in hypercalcemia because it impairs calcium excretion by the kidney.

130. **The correct answer is G.** This patient has a diet that lacks fresh vegetables. Therefore, her anemia (MCV is not provided) is most likely related to folate deficiency.

The only other listed possible anemias that may be related to diet are iron deficiency (**choice H**; nutritional deficiency is a rare cause in adults, particularly in those who eat meat) or B12 deficiency (**choice L**), which is unlikely since the deficiency is related to abstaining from meat products. Furthermore, her neurological examination is normal, ruling out subacute combined degeneration associated with B12.

131. **The correct answer is I.** The patient is an African-American man who developed a painful hemolytic crisis due to sickle cell thalassemia (low hemoglobin and elevated reticulocyte count) while skiing at a high altitude. Sickle thalassemia is more likely than sickle cell disease because the painful crises he has had during his life have been infrequent. Thalassemia reduces the severity of sickle cell disease. In  $\beta$ -thalassemia, there is a decrease in  $\beta$ -globin chain production, which is the globin chain that is involved with the point mutation and replacement of valine for glutamic acid. In  $\beta$ -thalassemia, there is a decrease in  $\beta$ -globin chain synthesis. The  $\alpha$ -globin chains that are produced prefer to combine with normal  $\beta$ -globin chains rather than those that are abnormal. The precipitating event that caused the painful crisis in this patient relates to the lower atmospheric pressure at high altitudes (the percent oxygen is still 21%) and lower levels of oxygen available in the lungs for exchange with the pulmonary capillaries. Reduced oxygen tension in the blood precipitates a sickle cell crisis.

None of the other causes of anemia listed has a direct correlation with reduced oxygen tension.

132. **The correct answer is A.** Acute pericarditis is characterized by retrosternal chest pain that may radiate to the neck, shoulders, back, or epigastrium. The pain is usually pleuritic in nature, and is relieved by sitting upright. Dyspnea can also occur. A pericardial friction rub is heard. Fever and leukocytosis are often present. ECG reveals generalized ST segment elevation (J point elevation). Treatment with aspirin or other nonsteroidal anti-inflammatory agents usually resolves the symptoms within a few days. In viral pericarditis, this condition often follows an upper respiratory infection.

Cardiogenic shock (**choice B**) associated with chest pain most commonly occurs following an acute myocardial infarction. Patients will typically present with altered sensorium and left-sided heart failure after an episode of chest pain. ECG will reveal isolated ST segment and T wave changes in the inferior, anterior, septal, and/or lateral leads.

Chronic constrictive pericardiopathy (**choice C**) presents with slowly progressive dyspnea on exertion, orthopnea, fatigue, and weakness. Physical examination reveals an elevated jugular venous pressure with a rapid y descent, peripheral edema, hepatomegaly, ascites, and Kussmaul's sign (an increase in jugular venous pressure during inspiration). Chest x-ray may show cardiomegaly. ECG displays low QRS voltage and diffuse flattening or inversion of the T waves.

Mitral valve disease (**choice D**) can cause chest pain, dyspnea, orthopnea, and paroxysmal nocturnal dyspnea. For those with mitral valve prolapse, the chest pain is retrosternal, prolonged, poorly related to exertion, and generally does not resemble classic angina pectoris. Physical examination is helpful in distinguishing among the various mitral valve diseases. In mitral stenosis, there is an apical crescendo diastolic murmur, an opening snap, and prominent mitral regurgitation, a holosystolic murmur radiating to the axilla and a third heart sound are characteristic in mitral valve prolapse, one finds a mid to late systolic click that occurs earlier with the Valsalva maneuver.

Myocarditis (**choice E**) often follows an upper respiratory infection. Chest pain is a pleuritic or nonspecific in nature. Examination reveals tachycardia, gallop rhythm, and signs of heart failure. ECG displays nonspecific ST segment and T wave changes in addition to conduction abnormalities. Ventricular ectopy may also be seen.

Pericardial tamponade (**choice F**) causes symptoms depending on the etiology. Some of these symptoms include chest pain radiating to the neck, back, and shoulders, dyspnea, and dizziness. Examination is significant for elevated jugular venous pressure, hypotension, pulsus paradoxus, tachycardia, distant heart sounds, and cool extremities. ECG reveals a tachycardia with low voltage and electrical alternans.

Pleuritis (**choice G**) cause chest pain that is made worse by deep breathing. Other exacerbating factors are sneezing, cough, and movement. Fevers may occur. Examination reveals pleural friction rubs. ECG is unremarkable.

Pulmonary embolism (**choice H**) causes an abrupt onset of dyspnea, pleuritic chest pain, hemoptysis, apprehension, and syncope. Examination reveals tachypnea, tachycardia, fever, rales, and accentuation of the pulmonary component of the second heart sound. A characteristic ECG finding is an S wave in the lead I, Q wave in lead III, and T wave inversions in leads V1-V3, although this is uncommon. Tachycardia and nonspecific ST segment and T wave changes are more common. The majority of patients will have a  $PO_2 < 55$  mmHg, and initially a lowered  $PCO_2$  level. Chest x-ray may be normal, or show platelike atelectasis, elevation of a hemidiaphragm, unilateral pleural effusion, oligemia in the affected lung region (Westermark sign), or a homogenous, wedge-shaped density that is pleural-based and points to the hilum (Hampton's hump).

Rheumatic fever (**choice I**) can cause a carditis that is manifested in one of the following: (a) pericarditis; (b) cardiomegaly; (c) congestive heart failure; (d) mitral or aortic regurgitation murmurs; (e) PR segment prolongation on ECG; (f) changing quality of heart sounds; (g) sinus

tachycardia; or (h) cardiac arrhythmias. There is associated erythema marginatum, subcutaneous nodules, chorea, migratory polyarthritis, fevers, elevated erythrocyte sedimentation rate, and/or evidence of prior infection with beta-hemolytic streptococcus.

Spontaneous pneumothorax (**choice J**) causes an abrupt onset of dyspnea and chest pain on the affected side. Tachycardia, tachypnea, and findings on the affected side such as diminished breath sounds, decreased tactile fremitus, and hyperresonance on percussion can be seen. Chest x-ray, which shows a visceral peripheral line, is diagnostic.

133. **The correct answer is H.** Pulmonary embolism (**choice H**) causes an abrupt onset of dyspnea, pleuritic chest pain, hemoptysis, apprehension, and syncope. Examination reveals tachypnea, tachycardia, fever, rales, and accentuation of the pulmonary component of the second heart sound. A characteristic ECG finding is an S wave in lead I, Q wave in lead III, and T wave inversions in leads V1-V3, although this is uncommon. The majority of patients will have a  $PO_2 < 55$  mmHg, and initially a lowered  $PCO_2$  level. Chest x-ray may be normal, or show platelike atelectasis, elevation of a hemidiaphragm, unilateral pleural effusion, oligemia in the affected lung region (Westermark sign), or a homogenous, wedge-shaped density that is pleural-based and the points to the hilum (Hampton's hump).

Acute pericarditis (**choice A**) is characterized by retrosternal chest pain that may radiate to the neck, shoulders, back, or epigastrium. The pain is usually pleuritic in nature, and is relieved by sitting upright. Dyspnea can also occur. A pericardial friction rub is heard. Fever and leukocytosis are often present. ECG reveals generalized ST segment elevation (J point elevation). Treatment with aspirin or other nonsteroidal anti-inflammatory agents usually resolves the symptoms within a few days. In viral pericarditis, this condition often follows an upper respiratory infection.

Cardiogenic shock (**choice B**) associated with chest pain most commonly occurs following an acute myocardial infarction. Patients will typically present with altered sensorium and left-sided heart failure after an episode of chest pain. ECG will reveal isolated ST segment and T wave changes in the inferior, anterior, septal, and/or lateral leads.

Chronic constrictive pericardiopathy (**choice C**) presents with slowly progressive dyspnea on exertion, orthopnea, fatigue, and weakness. Physical examination reveals an elevated jugular venous pressure with a rapid y descent, peripheral edema, hepatomegaly, ascites, and Kussmaul's sign (an increase in jugular venous pressure during inspiration). Chest x-ray may show cardiomegaly. ECG displays low QRS voltage and diffuse flattening or inversion of the T waves.

Mitral valve disease (**choice D**) can cause chest pain, dyspnea, orthopnea, and paroxysmal nocturnal dyspnea. For those with mitral valve prolapse, the chest pain is retrosternal, prolonged, poorly related to exertion, and generally does not resemble classic angina pectoris. Physical examination is helpful in distinguishing among the various mitral valve diseases. In mitral stenosis, there is an apical crescendo diastolic murmur, an opening snap, and prominent mitral regurgitation, a holosystolic murmur radiating to the axilla and a third heart sound are characteristic in mitral valve prolapse, one finds a mid to late systolic click that occurs earlier with the Valsalva maneuver.

Myocarditis (**choice E**) often follows an upper respiratory infection. Chest pain is a pleuritic or nonspecific in nature. Examination reveals tachycardia, gallop rhythm, and signs of heart failure. ECG displays nonspecific ST segment and T wave changes in addition to conduction abnormalities. Ventricular ectopy may also be seen.

Pericardial tamponade (**choice F**) causes symptoms depending on the etiology. Some of these symptoms include chest pain radiating to the neck, back, and shoulders, dyspnea, and dizziness. Examination is significant for elevated jugular venous pressure, hypotension, pulsus paradoxus, tachycardia, distant heart sounds, and cool extremities. ECG reveals a tachycardia with low voltage and electrical alternans.

Pleuritis (**choice G**) cause chest pain that is made worse by deep breathing. Other exacerbating factors are sneezing, cough, and movement. Fevers may occur. Examination reveals pleural friction rubs. ECG is unremarkable.

Rheumatic fever (**choice I**) can cause a carditis that is manifested in one of the following: (a) pericarditis; (b) cardiomegaly; (c) congestive heart failure; (d) mitral or aortic regurgitation murmurs; (e) PR segment prolongation on ECG; (f) changing quality of heart sounds; (g) sinus tachycardia; or (h) cardiac arrhythmias. There is associated erythema marginatum, subcutaneous nodules, chorea, migratory polyarthritis, fevers, elevated erythrocyte sedimentation rate, and/or evidence of prior infection with beta-hemolytic streptococcus.

Spontaneous pneumothorax (**choice J**) causes an abrupt onset of dyspnea and chest pain on the affected area. Tachycardia, tachypnea, and findings on the affected side such as diminished breath sounds, decreased tactile fremitus, and hyperresonance on percussion can be seen. Chest x-ray, which shows a visceral peripheral line, is diagnostic.

134. **The correct answer is J.** Ataxia and mild resting tremor are typical features of lithium toxicity. Although she has been taking lithium carbonate for eight years, toxic side effects didn't emerge until diuretic medicine was introduced. Lithium carbonate is not metabolized, and is eliminated renally. Diuretics can increase serum levels of lithium by competitively inhibiting its elimination.

No alcohol use is mentioned in the question; therefore, alcohol-induced amnestic episode (blackout; **choice A**), alcohol withdrawal (**choice B**), and alcohol-related dementia (**choice F**) can be excluded.

Bipolar disorder, depressed (**choice D**), masked depression (**choice I**), and pseudodementia (**choice O**) are incorrect. Features of a depressive episode are not described in the question. Pseudodementia is a term used for the apparent presence of dementia in a severe depression.

Apathetic hyperthyroidism (**choice C**) is incorrect because it is a term used for asymptomatic hyperthyroidism. The presence of any identifiable symptoms excludes the diagnosis.

Delirium because of a medical condition (**choice E**) is incorrect. The diagnosis of delirium requires that symptoms develop over a short period of time (usually hours to day, not weeks). Symptoms tend to fluctuate.

Alzheimer's type dementia (**choice G**) is incorrect because memory impairment and cognitive disturbances are expected to develop gradually, not within two weeks, as described. Features of Alzheimer's dementia, such as language disturbance (aphasia), impaired ability to carry out motor activities despite intact motor function (apraxia), failure to recognize or identify objects despite intact sensory function (agnosia), and disturbance in executive functioning, are not described.

Since ataxia is not present in generalized anxiety disorder (**choice H**), this is incorrect.

Memory decline is not expected at 29 years of age; therefore, normal age-associated memory decline (**choice K**) is not correct.

Normal pressure hydrocephalus (**choice L**) presents with progressive dementia, a gait disturbance, and urinary incontinence. Additional psychiatric symptom can be depression, apathy, and an akinetic mute state. These clinical features are not described; therefore, this is not correct.

Parkinson's disease (**choice M**) is a disorder of the extrapyramidal system that is characterized by poverty of the movement (akinesia), an

expressionless face (masked facies), rigidity, and a rhythmic tremor. These features of Parkinson's disease are not described in the question; therefore, this choice is incorrect.

Pick's disease (**choice N**) is a dementia associated with fronto-temporal atrophy in the brain. Features of the illness include personality change, hypersexuality, and "hyperorality" (the person will put inedible things in his mouth). These features are not described. Therefore this diagnosis is incorrect.

The diagnosis of schizophrenia requires delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, or negative symptoms (i.e., affective flattening, alogia, or avolition) to be present for at least one month. Since this is not described, the diagnosis of residual schizophrenia (**choice P**) cannot be made.

The diagnosis of vascular dementia (**choice Q**) requires that there be evidence of cerebrovascular disease judged to be etiologically related to the disturbance. Since no such focal neurological signs or symptoms or laboratory evidence is described, this diagnosis is incorrect.

135. **The correct answer is G.** The features of Alzheimer's dementia described in the question are: gradual and continuing memory loss, and failure to recognize or identify objects despite intact sensory function (agnosia). Other features of Alzheimer's dementia that are not described in the question are language disturbance (aphasia), impaired ability to carry out motor activities despite intact motor function (apraxia), and disturbance in executive functioning. Their absence does not preclude the diagnosis.

Since there is no alcohol use described, alcohol-induced amnesic episode (**choice A**), alcohol withdrawal (**choice B**), and alcohol-related dementia (**choice F**) are incorrect.

Apathetic hyperthyroidism (**choice C**) is incorrect because it is a term used for asymptomatic hyperthyroidism. The presence of any identifiable symptoms excludes the diagnosis.

Bipolar disorder, depressed (**choice D**), masked depression (**choice I**), and pseudodementia (**choice O**) are incorrect. Features of a depressive episode are not described in the question. Pseudodementia is a term used for the apparent presence of dementia in a severe depression.

Parkinson's disease (**choice M**) is a disorder of the extrapyramidal system, and is characterized by poverty of movement (akinesia), an expressionless face (masked facies), rigidity, and a rhythmic tremor. These features of

Parkinson's disease are not described in the question; therefore, this choice is incorrect.

Pick's disease (**choice N**), is a dementia that is associated with fronto-temporal atrophy in the brain.

Features of the illness include personality change, hypersexuality, and "hyperorality" (the person will put inedible things in his mouth). These features are not described; therefore, this diagnosis is incorrect.

136. **The correct answer is A.** This is the perfect description of a patient with achalasia. Achalasia cardia is a motility disorder characterized by a loss of peristalsis in the lower two thirds of the esophagus, and an impaired lower esophageal sphincter that is probably due to loss of ganglion cell in the Auerbach's plexus. There may also be some degeneration of the vagus nerve and dorsal motor nucleus. The patient will complain of difficulty swallowing solids, and then difficulty swallowing liquids. The ingested food and fluids collect in the lower esophagus, which dilates in response. The food is regurgitated, and aspiration is a potential risk. Barium swallow is diagnostic (may show "bird beak" appearance at the lower end), and is confirmed by esophageal manometry. People of South American origin should be evaluated for Chagas' disease, which is a common cause of Achalasia in that region. Treatment choices are as follows in order of preference: pneumatic dilation, botulin toxin injection, and myotomy.
137. **The correct answer is C.** Esophageal cancer is the correct answer in this elderly patient with weight loss, a history of smoking, and an otherwise normal exam. The swallow is classic for esophageal cancer with a distal narrowing with partial obstruction.
138. **The correct answer is O.** The tight skin over her hand is scleroderma, and finger blanching in response to cold caused by Raynaud's phenomenon. Systemic sclerosis (scleroderma) affecting the esophagus is characterized by fibrosis of the muscular layer, which thus impairs peristalsis and motility. There is also a loss of lower esophageal sphincter tone, which results in GERD-like symptoms. The patient usually complains of severe heartburn and bad reflux that often does not respond to over-the-counter medication. GERD carries a risk of Barrett's esophagus, stricture formation, and severe erosions in the lower segment. Treatment options usually incorporate cisapride and omeprazole. This woman has already developed a stricture. The other findings are consistent with CREST syndrome (C, calcinosis cutis; R, Raynaud; E, esophageal reflux; S, sclerodactyly; T telangiectasias).

Diffuse esophageal spasm (**choice B**) is diagnosed on the basis of esophageal manometry if a patient has > 10% simultaneous contractions.

Esophageal cancer (**choice C**) is characterized by progressive dysphagia to solid foods, and weight loss. Endoscopic biopsy is diagnostic, and treatment usually involves surgically removing the involved areas with anastomosis.

Esophageal candidiasis (**choice D**) is usually seen in immunocompromised patients (HIV+ or immuno-suppressed patients). It appears as yellow-white linear plaques on the mucosal surface, and the patient usually complains of odynophagia (pain during deglutition) and varying extents of dysphagia. Oral thrush is often coexistent. Treatment is with nystatin “swish and swallow” (in HIV+ patients, fluconazole is the first drug of choice).

Esophageal reflux (GERD, **choice E**) is characterized by severe postprandial heartburn associated with spicy and fatty foods. Sour/bitter gastric content reflux will usually be regurgitated into the mouth. Initial treatment involves lifestyle modifications, and may be supplemented with medications if required later on.

Globus hystericus (**choice F**) is a psychogenic complaint that is common in young anxious women. The typical complaint is one of a choking sensation, like a lump in the throat, and may be associated with complaints of sweating, dizziness, and dyspnea. These patients need psychiatric evaluation for probable depression, anxiety, or panic attacks.

Herpetic esophagitis (**choice G**) is another condition that causes odynophagia, dysphagia, and chest pain, and is more likely to be found in an immunosuppressed/immunodeficient individual. Oral ulcers may coexist. Herpetic lesions are described as multiple, small, deep ulcers, and are treated with oral acyclovir.

A lower esophageal web (Schatzki’s ring; **choice H**) is a mucosal ring at the squamocolumnar junction of the lower esophagus, and is always associated with hiatal hernia. Dysphagia is intermittent and not progressive, and occurs if the diameter of the bolus is < 13mm. Patients are usually diagnosed on upper endoscopy.

A paraesophageal hernia (rolling hiatal hernia; **choice I**) is an upward dislocation of the gastric fundus through the hiatus (usually anterior to the esophagus), and lies alongside the lower esophagus. Paraesophageal hernia is four times more common in females, and the median age of affected individuals is 48. Signs and symptoms include dysphagia and postprandial fullness, heartburn, and reflux, and hematemesis in a third of patients. The esophagus is neither dilate nor immobile.

Peptic stricture of the esophagus (**choice J**) is the result of long-standing acid reflux into the esophagus. It would be difficult to differentiate peptic stricture from the reflux due to scleroderma; however the obstruction here is more mechanical than that due to immobility. Besides, the other signs of CREST are not seen along with a peptic stricture. Peptic stricture appears as a narrowing on the barium swallow.

Pharyngoesophageal (Zenker's) diverticulum (**choice K**) is a mucosal outpouching through the muscular wall (between the cricopharyngeus and inferior constrictor muscles) of the upper esophagus. It is seen in the elderly, and is very rarely associated with reflux. Dysphagia develops over time. Treatment is resection.

Plummer-Vinson syndrome (**choice L**) is a condition in which iron deficiency anemia is associated with an upper esophageal web. Such webs cause intermittent dysphagia to solid foods, but hardly any reflux. The lower esophagus is relatively uninvolved.

Polymyositis (**choice M**) is characterized by proximal muscle weakness with elevated muscle enzyme (CPK and aldolase). There are no symptoms of reflux or dysphagia, and diagnosis is made by muscle biopsy. This condition is associated with higher incidence of malignancy, especially if there is an associated dermatomyositis that is associated with a "heliotrope rash" and Gottron's sign. Treatment is usually with corticosteroids.

Pseudobulbar palsy (**choice N**) is a motor neuron paralysis associated with muscle wasting and relatively intact sensory function, and is due to bilateral corticobulbar disease. Characteristic muscles involved include those eye, tongue, and limbs.

TE fistula (**choice P**) is either congenital or secondary to esophageal carcinoma that has probably invaded the trachea. Congenital TE fistulas are divided into five subtypes. Depending on the two connected segments, symptoms of cough, cyanosis, regurgitation, and aspiration pneumonia are encountered. Treatment in children or newborns is usually surgical connection.