Questions review
The answers are in the vbottom of each block

Over the past decade, treatments for people with AIDS and those who are HIV-positive have shown increasing efficacy. This has resulted in patients living longer and longer with a disease that used to result in early death. At the same time, increased education targeted at those most vulnerable to contracting HIV has caused the number of new cases to level off. The changes in the life expectancy for these patients is most likely to result in which of the following?

A. Decreased incidence of HIV
B. Decreased prevalence of HIV
C. Decreases in both incidence and prevalence of HIV
D. Increased incidence of HIV
E. Increased prevalence of HIV
F. Increases in both incidence and prevalence of HIV

2.
A test result indicates that the patient is disease-free. The probability that this result is actually correct is called which of the following?

A. Accuracy
B. Negative predictive value
C. Positive predictive value
D. Sensitivity
E. Specificity

3.
One hundred men, ages 55 to 65, were screened with a newly developed test for detecting a protein that has been shown to increase the risk of prostate cancer. The men were then followed forward over 20 years to determine who did and who did not develop prostate cancer. The results of the test are shown in the table below:

<table>
<thead>
<tr>
<th>Cancer</th>
<th>No Cancer</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein present</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Protein absent</td>
<td>5</td>
<td>65</td>
</tr>
<tr>
<td>Totals</td>
<td>25</td>
<td>75</td>
</tr>
</tbody>
</table>

Using the information provided, what is the specificity of the protein-detecting test?

A. 20%
B. 30%
C. 67%
D. 75%
E. 87%
F. 93%

4.
For most screening tests, changing the cutoff value to increase the sensitivity of the test will also increase what other property of the test?
A. Accuracy  
B. Discriminant validity  
C. Negative predictive value  
D. Positive predictive value  
E. Specificity

5. To gain a sense of the pool of applicants available for admission, the dean of a local medical school decides to survey students who come to the school for pre-admission interviews. However, a faculty member points out that by surveying only those students who come for interviews, the dean will obtain results that will not include prospective students with lower MCAT scores and with less organized applications who were not granted interviews. Excluding these students creates a bias generally referred to as which of the following?  
A. Experimenter expectancy effect  
B. Late-look bias  
C. Lead-time bias  
D. Measurement bias  
E. Recall bias

6. A large pharmaceutical company begins a phase II clinical trial of a new drug for treating Alzheimer disease. Which of the following is a characteristic of phase II clinical trials?  
A. Focuses on the identification of side effects  
B. Includes only healthy volunteers  
C. Is aimed at demonstrating the safety of the drug  
D. Provides definitive information regarding the efficacy of the drug being tested  
E. Seeks to determine optimal dosage levels for a drug

7. A double-blind study design is necessary in order to eliminate which type of research bias?  
A. Confounding  
B. Experimenter expectancy effect  
C. Lead-time bias  
D. Measurement bias  
E. Recall bias

8. Students are admitted to medical school based on the votes of the admission committee. A majority is required for an offer of admission, although some students receive unanimous votes. A research study was conducted comparing those students who were admitted by unanimous vote with those who were not. Both groups of students were followed forward through their preclinical years, and any exam failures were noted. Analysis of these data compared the number of students in each study group who failed at least one exam. This type of study is best characterized as which of the following?  
A. Case series study  
B. Case-control study  
C. Cohort study  
D. Community trial  
E. Cross-sectional study
9. A study is conducted examining the relationship of cigarette smoking by parents with cigarette smoking by their children. Teenagers who are smokers and nonsmokers are identified and asked to record whether their parents have ever been cigarette smokers. The resulting data are shown in the table below:

<table>
<thead>
<tr>
<th>Children</th>
<th>Smokers</th>
<th>Non-smokers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>Smokers</td>
<td>530</td>
</tr>
<tr>
<td>Non-smokers</td>
<td>840</td>
<td>2400</td>
</tr>
</tbody>
</table>

Using this data, what is the odds-ratio comparing smoking and non-smoking children?
A. \( \frac{530 \times 2400}{250 \times 840} \)
B. \( \frac{530 \times 840}{250 \times 2400} \)
C. \( \frac{[530 + 840]/1370}{[250 + 2400]/2650} \)
D. \( \frac{530 + 250}{840 + 2400} \)
E. \( \frac{530 \times 840}{250 \times 2400} \)
F. \( \frac{(530 + 250)/780}{(840 + 2400)/3240} \)

10. In what type of experimental study does every one of the study participants receive the drug that is being investigated?
A. Community trial
B. Crossover trial
C. Double-blind placebo trial
D. Phase III clinical trial
E. Randomized controlled clinical trial

1. The correct answer is E. Although incidence has leveled off, patients are living longer. Therefore, when we count who has HIV, we will find more cases lead to increased prevalence. Recall that prevalence = incidence x duration.

2. The correct answer is B. Negative predictive value is the probability that a patient who receives a negative test result is truly free from disease.

3. The correct answer is E. Specificity is about identifying the nondiseased. Specificity is given by TN/(TN + FP), therefore: \( \frac{65}{10 + 65} = \frac{65}{75} = 86.7 \), or 87%.

4. The correct answer is C. When all the diseased people are correctly identified, the only people left over are the nondiseased. Negative predictive value tells us how sure we can be that a negative test result truly means that the patient is free from disease.

5. The correct answer is B. In late-look bias, the sickest cases are not available for research because they are dead or beyond approach. In this question, only those students who got interviews will be surveyed. Students with poorer applications ("the sickest," in this analogy) will not be a part of the study.
6. The correct answer is E. A phase II trial looks at protocol and dose levels in a relatively small group of patients. In other words, it tells us how the drug should be given, on what schedule, and at what dosage for optimum results. Note that this study is the first time the drug will be given to actual patients.

7. The correct answer is B. Experimenter expectancy effect occurs when researchers deal differently with one group in the study than they do with other groups. This different treatment can affect the study results. The solution is to be sure that neither the study subjects nor the researchers who interact with them know in which arm of the study a particular patient may be; in other words, double-blind design.

8. The correct answer is C. Students are classified by the number of votes they received (risk factor) and followed prospectively to record any exam failures (incidence outcome).

9. The correct answer is A. The computational formula for the odds-ratio is \( \frac{A \times D}{B \times C} \), where \( A = \) Parents smokers and children smokers, \( D = \) Parents nonsmokers and children nonsmokers. \( B = \) Children nonsmokers with parent smokers and \( C = \) Children smokers with nonsmoking parents.

10. The correct answer is B. In a crossover study, in which participants switch between intervention and placebo groups at a predetermined point in the study, every study participant receives the investigational drug, just at different times.

Statistics

1. If the chance of having an auto accident in one year is 5%, and the chance of getting the flu in the same year is 10%, what is the chance that in any given year someone will have an auto accident, get the flu or both?
   A. 0.05%
   B. 2.0%
   C. 5.0%
   D. 12.5%
   E. 14.5%
   F. 15%

2. The distribution of length of stay for patients admitted to a particular hospital had a mean of 7.5 days and a median of 5 days. For this same distribution, the standard deviation was 2 days and the range was 31 days. Based on this information, which of the following is the likely length of stay for 95% of patients admitted to the hospital?
   A. 1 to 9 days
   B. 2.5 to 11.5 days
   C. 3 to 7 days
   D. 4.5 to 9.5 days
   E. Cannot be derived from information provided

3. Two research studies were conducted assessing blood sugar levels in the United States. The first study had a sample size of 2,000 and the second had a sample size of 10,000. When comparing the results of these two studies it is most reasonable to assume that the distribution of blood sugar levels assessed by
the study with the sample size of 10,000 will have which of the following?
A. A closer approximation to a normal distribution  
B. A larger standard deviation  
C. A smaller standard deviation  
D. Greater validity  
E. Higher reliability

4. A medical school biochemistry class took a midterm examination. The results of the exam for the class showed a mean of 77% and a standard deviation of 8%. Assuming that the grades for the class were normally distributed, the 84th percentile for the class on this midterm exam would be which of the following?
A. 81%  
B. 85%  
C. 89%  
D. 93%  
E. 97%

5. Students in a Midwestern High School were given a standardized IQ test. After they received their results, 64 students were contacted at random and asked to provide their scores. The resulting sample had a mean of 110, a median of 110, and a standard deviation of 16. Based on this information, the best estimate of the 95% confidence interval of the mean for this sample would be approximately which of the following?
A. 78 to 142  
B. 94 to 126  
C. 100 to 120  
D. 106 to 114  
E. 108 to 118

6. The results of a study assessing depression using the Beck Depression Inventory show a 99% confidence interval of the mean ranging from 8.3 to 12.5. This 99% confidence interval can be interpreted to mean which of the following?
A. 99% of the cases in the population will be found within the specified range  
B. 99% of the cases in the sample will be found within the specified range  
C. Most of the population has depression scores below 8.3  
D. Scores greater than 12.5 indicate severe depression  
E. The actual mean of the population will very likely be found within the specified range  
F. The computed mean for the sample is not a good approximation of the population mean

7. A study was conducted comparing the efficacy of a new drug cocktail for treating liver cancer with currently existing standards of care. Tumor size 1 year into the study was used as the outcome variable. The analysis of the study data resulted in a p-value = 0.002, and the researchers declared that the results were statistically significant. In this context, the p-value should be interpreted to mean which of the following?
A. If the new drug cocktail does not work, the probability of the observed results are less than 2 chances
B. Patients are more likely to prefer the new drug cocktail than the old standard of care
C. The chance of a type II error for this study is less than 0.002
D. The new drug cocktail increases life expectancy compared to the old standard of care
E. The new drug cocktail works best for all but 2 of every 1,000 patients

8. Before data from a research project can be analyzed statistically, a null hypothesis must be stated. This null hypothesis should be interpreted as which of the following?
   A. A statement that is most likely true when the drug being tested is effective
   B. An assumption of adequate statistical power
   C. The assertion that the research findings are the result of random chance
   D. The outcome that the researcher is hoping to find
   E. The same thing as Type I error

9. Statistical power can be increased by which of the following?
   A. Accepting a larger chance of type II error
   B. Conducting research on drugs thought to have a very large impact on the disease processes in question
   C. Focusing statistical analysis on research subjects who are most adherent with research protocol
   D. Making sure the study sample is derived by a random selection process
   E. Reducing confounding factors in the research design

10. Which statistical test would most likely be used to demonstrate a relationship between average weekly hours of exercise and blood pressure?
    A. ANOVA
    B. Chi-square
    C. Fischer’s exact test
    D. Pearson correlation
    E. t-test

1. The correct answer is E. For non-mutually exclusive events, add the two probabilities and then subtract out the overlap area: \((A+B) - (AB)\). Therefore, 10% + 5% - 0.5% = 14.5%.

2. The correct answer is E. The standard percentage, which tells us the number of cases within 1, 2, and 3 standard deviations of the mean, can be used only in a normal distribution. Because the mean is not equal to the median, this is NOT a normal distribution.

3. The correct answer is E. A larger sample size gives a better picture of what is being measured, and more consistency in the measurement. Note that the standard deviation is very stable across changes in sample size. Validity supposes that we are measuring the right thing. This also would not change in the present case.

4. The correct answer is B. The 84th percentile is found one standard deviation above the mean.
Therefore, 77% + 8% = 85%.

5. The correct answer is D. The formula for the 95% CI of the mean is:
   Given that Z for 95% confidence is approximately 2, then .

6. The correct answer is E. A confidence interval projects from the data to estimate a statistical parameter for the whole population. We cannot say from this interval where portions of the sample or the population will fall.

7. The correct answer is A. The p-value gives the chance of type I error, or the chance of the observed results if the drug is actually ineffective.

8. The correct answer is C. The null hypothesis is a statement that any difference observed between the groups in a study is the result of pure random chance. It is phrased as the opposite of what the researchers generally wish for an outcome.

9. The correct answer is B. Power is the capacity to tell a difference. In statistical analysis, it can be increased by a larger sample size, accepting more type I error, or (the issue here) larger effect size.

10. The correct answer is D. Hours of exercise and blood pressure are both interval level variables; therefore, we would use a Pearson correlation.

legal

1. A 25-year-old man who was in a single-car accident is brought to the emergency room in an unconscious state. Visible bruises and lacerations are evident on his body. Head trauma is suspected. As the physician begins the examination, the man regains consciousness and states that he does not want medical care and wants to leave the hospital at once. At this point the physician should do which of the following?
   A. Administer a mental status exam to assess the patient’s competency
   B. Detain the man overnight for observation
   C. Detain the man until his release has been cleared by the police
   D. Seek a neurologic consult to assess the extent of the man’s head injuries
   E. Tell the man the possible medical issues assessed to this point and allow him to leave as he requests

2. An elderly female patient in a vegetative state has left no written record of her wishes for end-of-life care. The physicians on staff are discussing how aggressively to treat the patient. At this point, the patient’s son appears and says that after a family discussion, the family has decided that the patient should be given all possible interventions to sustain her life. After the son leaves, the patient’s daughter stops the physician and says that her mother told her more than a year ago that she would not want to be kept alive by aggressive measures. At this point the physicians’ best course of action would be to do which of the following?
   A. Ask the hospital ethics committee to hear and evaluate the case
   B. Because of conflicting information from close relatives, ask the court to rule as to what should be done
   C. Convene a meeting of the family and ask them to come to a consensus
   D. Provide all possible interventions to keep the patient alive
   E. Withhold aggressive treatment from the patient
3. Informed consent requires that the physician convey five pieces of information to the patient, including which of the following?
A. Alternative treatments that are available
B. Information about the number of cases of a similar nature that the physician has treated
C. Recommendation that the patient seek advice and counsel before proceeding
D. The latest research regarding a proposed treatment
E. The treatment preferred by the physician

4. A 5-year-old child is brought to the emergency department after suffering an acute, severe asthma exacerbation in school. As the child is being treated, the child's parents arrive at the hospital and demand that the treatment be stopped, citing their religious beliefs against medical intervention. At this point the physicians should do which of the following?
A. Continue with the treatment already initiated, but do not start any new treatments
B. Discharge the child into the parents' care after the appropriate paperwork is completed
C. Provide whatever care is required to protect the child from harm
D. Seek legal action to permit the child's treatment to continue.
E. Try to convince the parents that the treatment is needed and have them withdraw their objections

5. A 17-year-old girl is considered emancipated if which of the following is true?
A. The girl already has a child
B. The girl has been diagnosed with a sexually transmitted disease
C. The girl has graduated from high school
D. The girl is married
E. The girl is pregnant

6. Under the Good Samaritan Law, physicians are shielded from legal liability as long as they do which of the following?
A. Adhere to the AMA Code of Ethical Conduct
B. Ask the patient's permission before proceeding
C. Do whatever they think is necessary to save the patient's life
D. Receive no more than standard fees for their efforts
E. Remain with the patient until relieved

7. Which of the following locales would be acceptable sites for a conversation about one of your patients with a physician colleague?
A. Alone in an elevator in the hospital, going to see the patient
B. At breakfast in the hospital cafeteria
C. At lunch at a private club for physicians in the hospital
D. In your colleague's medical office
E. While sitting next to each other waiting for the start of a Grand Rounds presentation

8. Two psychiatric patients who are both committed to a locked hospital ward are allowed to marry if they have which of the following?
A. Completed a series of mandatory counseling sessions
B. Permission from a local judge
C. Permission from two qualified physicians
D. The consent of their next of kin
9. A patient who has duly signed all the required consent forms is being wheeled into the operating theater for surgery. Just before general anesthesia is administered, the patient is heard to say, "I'm having second thoughts. I'm not sure that I want to do this." At this point the physician's next course of action would be to do which of the following?

A. Administer the anesthesia and proceed with the operation based on the patient's prior consent
B. Ask the patient to say more about why s/he is having second thoughts
C. Enumerate to the patient the reason why the surgery is necessary
D. Explain that at this stage of the process the operation must proceed
E. Tell the patient s/he does not have to proceed and offer to wheel him/her out of the operating theater

10. A patient in a comatose state has never expressed his wishes on how medical care should proceed. A family member, on the basis of his past relationship and experience with the patient, tells the physician what the patient most likely would want. The family member is making a decision for the patient based on the doctrine of which of the following?

A. Health power of attorney
B. Implied competence
C. Subjective standard
D. Substituted judgment
E. The best interest standard

1. The correct answer is E. Rule #1 is: Patients have the right to refuse medical treatment. Note that Rule #2 reminds us that we have to assume that the patient is competent based on the information presented here.

2. The correct answer is E. Rule #4 applies. The son has expressed the wishes of the family. The daughter is giving her best sense of what her mother would want (substituted judgment). The patient's wishes, not the wishes of the family, matter here.

3. The correct answer is A. Rule #10: Informed consent requires that the patient receive and understand five pieces of information: 1) the nature of the procedure, 2) the purpose of the procedure, 3) benefits, 4) risks, and 5) availability of alternatives.

4. The correct answer is C. Rule #12: Parents cannot deprive the child of life- or limb-saving medical treatment even for religious reasons.

5. The correct answer is D. Rule #11: Marriage emancipates, as does being a member of the armed services. Otherwise, emancipation is decided by getting a sense of the child acting as an adult and contributing to the household in an adult-like fashion.

6. The correct answer is E. Rule #14: Good Samaritan laws protect physicians when they stop to help in accident situations as long as: 1) physicians do what they are competent to do, 2) they follow standard procedures, 3) they remain until relieved by another competent caretaker, and 4) they are not paid for their efforts.

7. The correct answer is D. Rule #15: Privacy is essential. Anywhere that you might be overheard is
unacceptable. Please note that being overheard by other medical personnel not involved in the case is also not allowed.

8. The correct answer is E. Rule #17: Being committed means the patients are in a locked ward and cannot come or go as they please. However, it does not mean that they are incompetent. If they are competent, they can marry whomever they want, including other patients.

9. The correct answer is E. Rule #10: Written consent can be revoked orally at any time.

10. The correct answer is D. Rule #4: Substituted judgment is used when no direct expression of the patient's wishes exists. Someone who knows the patient best uses his/her own best judgment to estimate what the patient's wishes are likely to be.

A neonate is cyanotic from birth. Echocardiography demonstrates a severe form of tetralogy of Fallot. Which of the following features would contribute most to producing the early cyanosis?

A. Large interventricular septal defect  
B. Patent ductus arteriosus  
C. Right ventricular hypertrophy  
D. Severe aortic stenosis  
E. Severe pulmonic stenosis  

The correct answer is E. Tetralogy of Fallot is a complex cluster of cardiac defects. A dextroposed aorta overrides an interventricular septal defect, which is accompanied by restriction of the right ventricular outflow tract as a consequence of pulmonary artery or valve stenosis. The ductus arteriosus usually remains patent, allowing more blood to flow into the pulmonic vasculature. Mild cases of tetralogy of Fallot do not produce cyanosis at birth, whereas severe cases do. The most important feature determining whether cyanosis is present from birth is the degree of compromise of blood flow out of the right ventricle along its normal path into the pulmonary artery.

A 22-year-old woman complains to her physician of having chronic fatigue. Screening studies demonstrate a mild microcytic anemia. Serum iron is normal, total iron binding capacity is normal, hemoglobin oxygen saturation is normal, and serum ferritin is normal. Which of the following would be most likely to cause her anemia?

A. Anemia of chronic disease  
B. Iron deficiency anemia  
C. Sickle-cell anemia  
D. Sideroblastic anemia  
E. Thalassemia minor  

The correct answer is E. Table 19-1 shows typical iron panel results for different types of microcytic anemia. Completely normal iron studies in a patient with microcytic anemia are most typical of thalassemia minor.

A 4-year-old child presents to the emergency room with high fever and cough. Chest x-ray demonstrates pneumonia. Peripheral blood counts demonstrates a white count of 50,000/mm3 with an absolute neutrophil count of 500/mm3. Most of the white cells are observed on peripheral blood smear to be
large, pleomorphic blasts with nuclear clefts. Flow cytometry demonstrates that the blasts are positive for TdT and CD10. This patient most likely has which of the following forms of acute leukemia?

A. L1  
B. L2  
C. L3  
D. M1  
E. M2  
F. M3

The correct answer is B. This child has the L2 form of acute lymphoblastic leukemia (ALL). This form is the most common, and accounts for about 70% of all cases. Cure rates in children with ALL now exceed 70%.

A 55-year-old, nonsmoking woman consults a physician because she has been experiencing intense itchiness over the preceding months. The dermatologist identifies evidence of scratching but no obvious rash. A complete blood count demonstrates a hematocrit of 59% with normocytic and normochromic red cells. Basophil and eosinophil levels are also increased to lesser degrees. No blasts and no abnormal erythroid precursors are present in the peripheral blood smear. The patient's itchiness is most likely related to which of the following?

A. All-trans-retinoic acid  
B. Auer rods  
C. Histamine  
D. LAP  
E. PDGF

Ans: histamine

A patient who presents with a myocardial infarction is found to have markedly increased platelets (1,100,000/mm³) in his peripheral smear. Some of the platelets have abnormal shapes. Mild leukocytosis and erythrocytosis are also seen. Bone marrow biopsy demonstrates increased bone marrow cellularity with many megakaryocytes. The disease this patient most likely has is considered to be in which of the following groups of diseases?

A. Acute lymphoid leukemias  
B. Acute myelogenous leukemias  
C. Chronic lymphoid leukemias  
D. Myelodysplastic syndromes  
E. Myeloproliferative syndromes

The correct answer is E. The patient's disease is essential thrombocytethmia, which is classified with the myeloproliferative syndromes. Essential thrombocytethemia often presents with either bleeding or thrombotic episodes (due to lots of platelets that may or may not work well). Fortunately, complete blood counts are so universally performed in ill patients that the condition is very likely to be picked up. A helpful hint not mentioned in the text is that you may need to clinically distinguish (either in real life or on questions) between essential thrombocytethemia and reactive thrombocytethemia: the essential process shows high platelets on many repeated studies and the reactive process tends to occur in
patients who are obviously ill with other diseases (such as severe infection) and have a generally stimulated marrow.

A patient is diagnosed with Di Guglielmo disease. This is a primarily a malignancy of which cell line?

A. Eosinophils
B. Erythrocytes
C. Megakaryocytes
D. Monocytes
E. Neutrophils

The correct answer is B. Di Guglielmo was the first to describe erythroleukemia (type M6 acute myelogenous leukemia), and some authorities still preferentially use the term Di Guglielmo disease. Clinically, most of these patients present with pancytopenia with markedly increased nucleated red cells in the peripheral smear, but they can also have a markedly elevated white count. Many of the patients have pre-existing myelodysplasia. Bone marrow biopsy in these patients is notable for a marked increase in red cell precursors, including erythroblasts, in the marrow.

A 65-year-old woman has chronic anemia. Her peripheral blood smear demonstrates a variety of changes, including bilobed neutrophils (Pelger-Huet cells), abnormal granulation of neutrophils, a few giant platelets, and mixed macrocytic and microcytic erythrocytes. Follow-up bone marrow biopsy demonstrates trilineage (erythrocyte, megakaryocyte, and granulocyte cell lines) dysplastic changes and the presence of ring sideroblasts. Less than 5% of the bone marrow cells are blasts. This patient has a disease that is best classified as which of the following?

A. Acute lymphoid leukemia
B. Acute myeloid leukemia
C. Chronic lymphoid leukemia
D. Chronic myeloid leukemia
E. Preleukemia

The correct answer is E. The patient has myelodysplasia (myelodysplastic syndrome), which is considered to be a pre-leukemic condition because it has an increased risk of progression to (typically acute myelogenous) leukemia. Myelodysplasia tends to be confusing for students because the clinical presentation tends to be vague, and it has a complex subclassification that predicts the likelihood of progression to frank leukemia based on the specific marrow findings.

A 43-year-old woman presents with chronic upper right abdominal quadrant pain. Ultrasound reveals a single stone in her gallbladder. Her gallbladder is removed and, on being opened in the surgical pathology suite, reveals a 2.5-cm-diameter, yellow, ball-like stone. Which of the following nationalities has a marked predisposition (with up to 75% of older adults being affected) for developing this type of stone?

A. African Americans
B. Egyptian
C. North Koreans
D. Pima Indians
E. Vietnamese
The correct answer is D. This patient has a cholesterol gallstone. Pima Indians have a striking incidence of cholesterol gallstones, with other Native American groups, including Navajos, also having a predisposition that is greater than that of most other groups. Caucasians of northern European descent and Hispanics have a lesser degree of increased risks, and most Asian groups and African Americans have a relatively decreased incidence of cholesterol stones.

A 25-year-old woman with sickle-cell disease who develops cramping upper right quadrant abdominal pain is found on ultrasound to have more than thirty 0.5-cm stones in her gallbladder. These stones are most likely to be composed of which of the following?
A. Calcium salts and unconjugated bilirubin
B. Compressed bacterial membranes
C. Mostly cholesterol monohydrate
D. Mostly compressed uric acid crystals
E. Triglycerides and fatty acids

The correct answer is A. Patients with hemolytic anemia have increased turnover of hemoglobin, the porphyrin ring of which is eventually processed into bilirubin. The bilirubin is then excreted into the bile, where it sometimes precipitates as pigmented bilirubinate stones. Often, these stones will be present as large numbers of small stones of similar sizes, reflecting the fact that after one severe hemolytic episode, the bilirubin concentration in the bile rose to a high enough level to initiate crystals that could then form the centers for many later stones.

A 52-year-old recovering alcoholic is being evaluated for clumsiness. Neurologic examination reveals decreased joint position sense of the lower extremities. There is also a subtle loss of vibratory sense. The patient is unkempt and has the smell of alcohol on his breath. He states that he is “only a social drinker.” What is the most likely nutritional deficit that explains the patient’s findings?
A. B1
B. B3
C. B6
D. B12
E. Folate

The correct answer is D. The patient has the classic presentation of vitamin B12 deficiency, which leads to macrocytic anemia and can produce subacute combined degeneration of the spinal cord. In this disease there is a selective demyelination of the posterior columns of the spinal cord. The ascending tracts most affected are those carrying vibratory and proprioceptive signals. The patient’s “social” drinking is a very poor marker of how much alcohol is consumed.

Q: the association between HPV infection and Retinoblastoma

Ans: HPV virus makes 2 proteins that have oncogenic properties, among them E7 cause mutation of Rb gene, the retinoblastoma gene (E6 affect p53)

Q: translocation that causing MALToma (marginal zone lymphoma)
Ans: Maltoma is associated with H. pylori and t(11;18),

Q: CD-99

Ans: CD99 is associated with Ewing Sarcoma w/ X-Ray presentation as ‘Onion skinning’ and 3 common possible translocation:
t(11;22), t(21;22) & t(2;22)

Q: p110

Ans: p110, all we need to know is the function; stimulating cell proliferation by accelerating entry to S phase in cell cycle.

Q: anticoagulation factors that related to Calcium

Ans: strongest is factor V, VIII
Giddings JC, Shearn SA, Bloom AL.
Platelet-associated coagulation factors: immunological detection and the effect of calcium.

the presence of calcium in the washing buffer gave higher factor V assays and stronger immunological reactions than when calcium-free buffer was used.

Microscopic slides taken of sections from a gallbladder, which was removed because it contained stones, demonstrate diverticula in the gallbladder wall that are lined with gallbladder mucosa. The term used in the surgical pathology report about these structures is likely to be which of the following?

A. Gallstone ileus
B. Hydrops of the gallbladder
C. Porcelain gallbladder
D. Rokitansky-Aschoff sinuses
E. Strawberry gallbladder

The correct answer is D. Diverticula of the gallbladder wall are traditionally called Rokitansky-Aschoff sinuses.

A 43-year-old woman develops a small intestinal obstruction. She has a 3-week history of steadily increasing upper right quadrant abdominal pain with fever, for which she had failed to seek medical help because she was afraid she had cancer. When she started vomiting and failing to pass stool for 3 days, she finally went to an emergency room. At surgery, she was found to have a 3-cm stone occluding her ileum. Which of the following is the most likely cause of her upper right quadrant abdominal pain with fever?

A. Acute cholecystitis
B. Ascending cholangitis
C. Gallbladder cancer
D. Hydrops of the gallbladder
E. Porcelain gallbladder
The correct answer is A. Complications of (usually untreated) acute cholecystitis can include gangrene of the gallbladder, perforation with peritonitis, and fistula formation to the adjacent small intestine with passage of a large stone into the small intestine (gallstone ileus).

A 27-year-old woman presents to a physician because her periods have diminished and then ceased over the last 3 years, and she has not been able to conceive. Physical examination demonstrates a mildly obese woman with increased hair on her upper lip and chin, around her nipples, and along the linea alba of the abdomen. This woman would be most likely to have low levels of which of the following?

A. Aldosterone  
B. Corticosterone  
C. Follicle-stimulating hormone  
D. Luteinizing hormone  
E. Testosterone

The correct answer is C. The combination of oligomenorrhea or secondary amenorrhea and hirsutism is typical for polycystic ovary disease. This condition is thought to be related to an anterior pituitary disorder leading to a combination of increased luteinizing hormone (which causes stimulation of ovarian thecal cells with resulting increased androgen production and increased stroma in the ovary making rupture of follicles difficult) and decreased follicle stimulating hormone (which impedes ovarian granulosa cells from converting androgens to estrogens). These patients are also prone to obesity and type 2 diabetes (which may present before age 40).

Rarely, two sperm will fertilize an egg that still contains genetic material. When this happens, which of the following is formed?

A. Complete mole  
B. Dysgerminoma  
C. Granulosa cell tumor  
D. Partial mole  
E. Yolk sac tumor

The correct answer is D. Fertilization of an egg by two sperm results in a triploid cell (most often 69,XXY; less often 69,XYY), which leads to development of a partial mole. The embryo may develop briefly. A complete mole is caused by fertilization of an ovum that has lost its genetic material either by one sperm that then duplicates (46,XX), or much, much less commonly by two sperm (which can produce 46,XY). The lack of any chromosomes from the egg (whose DNA is methylated differently and consequently is transcribed a little differently than sperm DNA) prevents even brief development of the embryo.

A 56-year-old woman is diagnosed with a phyllodes tumor. The tumor is resected and sent for gross and histologic evaluation. Which of the following is the most likely histologic finding?

A. Benign intraductal papillary growth  
B. Cluster of atypical tumor cells within pools of mucin  
C. Extensive dermal lymphatic infiltration with tumor cells  
D. Increased cellularity, stromal overgrowth with no cellular atypia
E. Proliferation of benign stroma, lobules and ducts

The correct answer is D. Although capable of growing to large and frightening size, this benign tumor rarely metastasizes (at which point the benign characterization would no longer be applicable).

A 47-year-old woman consults her gynecologist because of changes in her nipple and areola. On examination, she is noted to have an inflamed areola with small areas of ulceration and crusting. Punch biopsy of the areola demonstrates an intraepidermal spread of neoplastic cells occurring singly or in small groups that have a clear halo surrounding the nucleus. This patient’s condition is clinically significant because it suggests that she might have which of the following underlying conditions?

A. Breast cancer
B. Fat necrosis
C. Fibroadenoma
D. Fibrocystic disease
E. Mastitis

The correct answer is A. The condition described in the question stem is Paget disease of the breast, in which adenocarcinoma cells infiltrate the epidermis. In the breast, the condition is often linked to an underlying ductal carcinoma that may be either in situ (which suggests that "in situ" carcinomas may still have malignant cells that escape the ducts) or invasive. You should be aware that Paget disease can also occur in the genital region (often the vulva), but that a search there for underlying deeper malignant disease is sometimes negative.

A 44-year-old woman undergoes excisional biopsy of a 2-cm, dense, palpable area of her breast. The lesion turns out to be benign but does show changes of fibrocystic disease. Among the multiple findings present in this patient's fibrocystic disease, which of the following is associated with the greatest increase in risk of developing breast cancer?

A. Apocrine metaplasia
B. Atypical ductal hyperplasia
C. Cysts
D. Fibrosis
E. Sclerosing adenosis

The correct answer is B. A 4- to 5-fold increase in risk of breast cancer is seen if atypical ductal hyperplasia or atypical lobular hyperplasia is present in a fibrocystic breast. A 1.5- to 2-fold increase is seen if sclerosing adenosis, ductal hyperplasia (without cytologic atypia), or papillomas are present. No increased risk is seen if fibrosis, cyst formation, apocrine metaplasia, or (nonsclerosing) adenosis is present.

A 54-year-old woman undergoes needle biopsy of a 1-cm mass identified by mammogram. The core biopsies show pleomorphic tumor cells in "syncytial" groups that are surrounded by a dense lymphocytic host response. The biopsy is most consistent with which of the following diagnoses?

A. Ductal carcinoma
B. Lobular carcinoma
C. Medullary carcinoma
D. Mucinous carcinoma  
E. Tubular carcinoma

The correct answer is C. Medullary carcinoma is characterized by groups of cells with poorly visualized cell boundaries that appear to (but don’t actually) form a “syncytium.” (If a real syncytium had been present, the cells would all be interconnected cytoplasm to cytoplasm.) Medullary carcinoma has a better prognosis than the ordinary ductal carcinoma, probably because the intense lymphocytic response to the tumor helps to control, at least partially, its ability to grow and metastasize.

A 47-year-old man presents to the emergency room with discomfort localized to the scrotum that began as flank pain about 20 hours previously. He has also been experiencing dysuria during the preceding 12 hours. Physical examination demonstrates an edematous, tender epididymis. Which of the following is the most likely cause of his problems?

A. Chlamydia trachomatis  
B. Escherichia coli  
C. Human papillomavirus serotype 16  
D. Neisseria gonorrhoeae  
E. Treponema pallidum

The correct answer is B. This is a typical clinical presentation for epididymitis. In sexually active patients less than 35 years old, Neisseria gonorrhoeae and Chlamydia trachomatis are the most likely causes of epididymitis. In patients older than 35, sexually transmitted organisms are less frequent, and the most common causes are coliform bacteria (notably E. coli) and Pseudomonas. Prepubertal boys with epididymitis are typically infected with E. coli as well.

A 23-year-old man who has been healthy up to now complains to his doctor of nonpainful swelling of his right testicle. He is sexually active, although he denies any recent sexual activity. What is an appropriate serologic assay for the evaluation of his disease?

A. α-fetoprotein  
B. CA-125  
C. Calcitonin  
D. Carcinoembryonic antigen  
E. Parathyroid-related peptide

A 3-year-old child has a testicular mass. Serum α-fetoprotein (AFP) levels are high. Assuming that the tumor does not have a mixed histology, which of the following is the most likely diagnosis?

A. Choriocarcinoma  
B. Leydig cell tumor  
C. Sertoli cell tumor  
D. Spermatocytic seminoma  
E. Yolk sac tumor

4. A 24-year-old man goes to an emergency room after falling on his hand. X-ray of the hand demonstrates a small lytic expansile lesion in the medullary cavity at the distal end of the fifth metatarsal, through which a small fracture is present. A few fuzzy calcifications are seen in the lesion, which is mostly radiolucent. The cortex over the lesion is thinned and slightly scalloped. Which of the
following is the most likely cause of the mass?

A. Enchondroma
B. Giant cell tumor of bone
C. Osteochondroma
D. Osteoid osteoma
E. Osteosarcoma

The correct answer is A. This is a classic presentation of an enchondroma. These lesions are benign tumors of cartilage that have a predilection for involving the medullary cavity of the small bones of the hands and feet. Involvement of long bones can also occur but is less common. The lesions may be radiolucent or, if a small amount of calcification within them has occurred, may have a few calcifications.

5. 50-year-old man undergoes sinus radiologic studies because he has been having chronic headaches. The radiologist notes that several of the bones of his face are enlarged and have lytic and sclerotic areas. Follow-up physical examination demonstrates pain on palpation of some of these areas, and questioning reveals that the patient has noticed decreased hearing over the last 2 years. Additional radiologic studies show similar lesions in the pelvis, femur, and vertebrae. Laboratory studies reveal marked elevations of serum alkaline phosphatase and increased levels of urinary hydroxyproline. Biopsy of one of the lesions would be most likely to show which of the following?

A. Anaplastic cells producing osteoid and bone
B. Atypical chondrocytes and chondroblasts
C. Homer Wright pseudorosettes
D. Mosaic pattern of lamellar bone
E. Sheets of undifferentiated small, round, blue cells

The correct answer is D. The disease is Paget disease of bone, also known as osteitis deformans. This condition tends to present after age 40, and may be picked up when radiologic studies performed for other reasons demonstrate lytic and sclerotic bony lesions. The classic microscopic appearance of the lesion is a haphazard arrangement of the bone's cement lines, which creates a mosaic pattern of lamellar bone.

The formation of the primary platelet plug is integral in controlling bleeding from a damaged blood vessel. Not only do platelets provide the architectural framework to repair the defect, but vasoactive and thrombogenic mediators are also released from dense bodies and alpha granules within the platelets. In gray platelet syndrome, however, patients lack alpha granules. The cross-linking of platelets through the Gp IIb-IIIa receptor would be reduced because of lack of which of the following?

A. ADP
B. Fibrinogen
C. Fibronectin
D. Platelet factor 4
E. von Willebrand factor

The correct answer is E. von Willebrand factor, a constituent of platelet alpha granules, serves multiple functions, including cross-linking and stabilizing of the platelet plug and stabilizing circulating factor VIII. Template bleeding time, which measures formation of the primary platelet plug, will be prolonged.
A young traveler arriving back after a long flight from Australia is rushed to the emergency room after he becomes short of breath and collapses. In the hospital, there is difficulty in communicating with the patient because he is not able to express himself. In addition, there is right-sided weakness. What anomaly explains these findings?

A. Abdominal aortic aneurysm  
B. Atrial septal defect with right-to-left shunt  
C. Coarctation of the aorta  
D. Right-sided superior vena cava  
E. Ventral septal defect with left-to-right shunt

The correct answer is B. Sudden shortness of breath after a long flight with limited movement is almost certainly due to a pulmonary embolism arising from a lower extremity deep vein thrombosis. This, however, does not usually give rise to embolic strokes. For this to happen, there must be a direct communication between the right and left circulation; in this case, an atrial septal defect. Patent foramen ovale can also predispose to paradoxic emboli.

Which form of vascular collapse and widespread organ hypoperfusion is associated with increased fluid within the pericardial sac?

A. Anaphylactic  
B. Cardiogenic  
C. Hypovolemic  
D. Neurogenic  
E. Septic

The correct answer is B. Shock shares a final common pathway of vascular collapse, hypoperfusion, end organ failure, and death. The initial stimuli are, however, different and therefore will have different signs, symptoms, and physiologic parameters. A relatively rapid accumulation of fluid with the noncompliant pericardial sac will lead to wet tamponade, impaired diastolic filling, and a resultant decrease in cardiac output.