

## Continuing Education Questions

WINTER 2004  
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To receive 3.0 contact hours of basic level P.A.C.E., credit for the **Focus: Bioterrorism** questions, insert your answers in the appropriate spots on the immediately following page; then complete and mail the form as directed.

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### LEARNING OBJECTIVES

1. Describe the general characteristics of *Yersinia pestis*.
2. Identify three types of plague with respect to causes, incubation periods, signs and symptoms, diagnosis and treatment.
3. Describe the form of plague most likely implicated in a bioterrorist attack.
4. State guidelines for specimen collection and transport.
5. Describe two methods used for identification of *Y. pestis* in the laboratory.
6. List various treatments used in suspected cases of *Y. pestis*.
7. Identify two actions taken to contain outbreaks of *Y. pestis*.
8. Describe the general characteristics of *Clostridium botulinum*.
9. Identify three types of botulism with respect to causes, incubation periods, signs and symptoms, diagnosis and treatment.
10. Describe the potency of *C. botulinum* toxin and its use as a biological weapon.
11. State the CDC guidelines for specimen collection.
12. Describe the methods used for identification of *C. botulinum* in the laboratory.
13. List three types of therapy administered in cases of *C. botulinum* poisoning.
14. Recall actions taken to prevent exposure to *C. botulinum*.
15. Describe the overall characteristics of *Francisella tularensis*.
16. Identify the incubation period, signs and symptoms, and mode of acquisition in tularemia.
17. Describe laboratory tests utilized in the identification of *F. tularensis*.
18. Briefly describe which BSL practices should be maintained when handling specimens suspected of *F. tularensis* contamination.
19. List two ways in which *F. tularensis* can be used as a bioweapon.
20. Describe three types of therapy available for infections with *F. tularensis*.

### *Yersinia pestis*: Still a Plague in the 21st Century

1. Which antibiotic is proven effective against the plague?
  - a. Metronidazole
  - b. Ciprofloxacin
  - c. Streptomycin
  - d. Amikacin
2. Which form of plague would most likely be implicated in a biological attack?
  - a. Bubonic
  - b. Pneumonic
  - c. Septicemic
  - d. Sylvatic
3. *Yersinia pestis* grows optimally at which temperature?
  - a. 4 °C
  - b. 15 °C
  - c. 28 °C
  - d. 37 °C
4. Which virulence factor is used as a marker for serologic diagnostic testing?
  - a. F1 antigen
  - b. V and W antigens
  - c. Yops
  - d. Plasminogen activator
5. Bubo aspirates are collected using a \_\_\_\_\_ gauge needle.
  - a. 20
  - b. 21
  - c. 22
  - d. 23
6. The incubation period of the bubonic plague is:
  - a. one to four days.
  - b. two to eight days.
  - c. three to five days.
  - d. six to ten days.

7. In order to prevent the spread of pneumonic plague, exposed individuals should receive prophylactic therapy within \_\_\_\_\_ days of exposure.
  - a. three
  - b. five
  - c. seven
  - d. nine

#### Botulin Toxin: A Weapon in Terrorism

8. *Clostridium botulinum* causes three types of botulism. Which type is most often reported to the CDC?
  - a. Foodborne botulism
  - b. Wound botulism
  - c. Infant botulism
  - d. Systemic botulism
9. Which form of botulism is more common in intravenous drug abusers?
  - a. Foodborne botulism
  - b. Wound botulism
  - c. Infant botulism
  - d. Systemic botulism
10. Which component of the cleaved toxin is the most potent toxin found in nature?
  - a. Light chain
  - b. Heavy chain
  - c. Constant chain
  - d. Lambda chain
11. *Clostridium botulinum* toxin is 100,000 times more potent than which nerve agent?
  - a. Soman
  - b. Sarin
  - c. Tabun
  - d. VX
12. *Clostridium botulinum* spores are killed at which temperature?
  - a. 80 °C
  - b. 100 °C
  - c. 120 °C
  - d. 150 °C
13. Nasal swabs sent for aerosolized exposure should be transported at:
  - a. -20 °C.
  - b. 4 °C.
  - c. Room temperature.
  - d. 37 °C.

14. *Clostridium botulinum* toxin prevents the release of which neurotransmitter at the neuromuscular junction?
  - a. Norepinephrine
  - b. Epinephrine
  - c. Acetylcholine
  - d. Dopamine

#### *Francisella tularensis* as a Possible Agent in Bioterrorism

15. *Francisella tularensis* is classified by the CDC as a Category A organism. Which BSL level should be used when manipulating cultures positive for this organism?
  - a. BSL-1
  - b. BSL-2
  - c. BSL-3
  - d. BSL-4
16. The incubation period of *Francisella tularensis* ranges from:
  - a. 1 to 14 days.
  - b. 14 to 28 days.
  - c. 28 to 35 days.
  - d. >35 days.
17. *Francisella tularensis* requires which supplement for optimal growth?
  - a. Egg yolk
  - b. Cystine
  - c. Heme
  - d. Nicotinamide adenine dinucleotide
18. Which media does *Francisella tularensis* grow best on?
  - a. Sheep blood agar
  - b. Thiosulfate citrate bile salts
  - c. Buffered charcoal yeast extract
  - d. Regan Lowe
19. What would be the most likely route of acquisition if *Francisella tularensis* were used as a biological weapon?
  - a. Inhalation
  - b. Subcutaneous
  - c. Mucous membranes
  - d. Intravenous inoculation
20. 40% of infected persons with \_\_\_\_\_ usually die if treatment is not administered promptly.
  - a. gastrointestinal disorders
  - b. cervical lymphadenopathy
  - c. pneumonia
  - d. neurological involvement

# Continuing Education Registration Form

To earn continuing education (P.A.C.E.®) credit, (1) complete the form below, (2) record your answers, and (3) tear out and mail this form with a check or money order (\$18 for ASCLS members, \$28 for non-members for all articles) to:

American Society for Clinical Laboratory Science  
P.O. Box 79154  
Baltimore, MD 21279-0154

A certificate and credit will be awarded to participants who achieve a passing grade of 70% or better. Participants should allow eight weeks for notification of scores and receipt of certificates.

**Focus: Bioterrorism** carries 3.0 hours of basic level credit. This form can be submitted for credit for up to one year from the date of issue.

**Print or type carefully.**

(01) NAME \_\_\_\_\_ ASCLS membership number \_\_\_\_\_  
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(02) ADDRESS \_\_\_\_\_

(03) CITY \_\_\_\_\_ (04) STATE/COUNTRY \_\_\_\_\_ (05) ZIP/POSTAL CODE \_\_\_\_\_

(06) DAYTIME PHONE (\_\_\_\_) \_\_\_\_\_ (07) E-MAIL: \_\_\_\_\_

(08) CREDIT CARD # \_\_\_\_\_ TYPE (CIRCLE) AE MC VIS EXP. DATE \_\_\_\_\_

## Check all that apply

- ☐ I am an ASCLS member
- ☐ I am not an ASCLS member
- ☐ I would like to receive ASCLS membership information
- ☐ I have previously participated in Focus
- ☐ I would like information on other continuing education sources

## Answers

Circle correct answer (questions are on previous two pages).

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| 4. a b c d e | 11. a b c d e | 18. a b c d e | 25. a b c d e |
| 5. a b c d e | 12. a b c d e | 19. a b c d e | 26. a b c d e |
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| 7. a b c d e | 14. a b c d e | 21. a b c d e | 28. a b c d e |

## Participant Information

Please circle the most appropriate answers.

1. Is this program used to meet your CE requirements for:  
(a) state license (b) NCA (c) employment (d) other

2. Specialty: (a) biochemistry/urinalysis (b) microbiology  
(c) lab administration (d) hematology/hemostasis (e) education  
(f) immunology (g) immunohematology

3. Workplace: (a) hospital over 500 beds (b) hospital 200–499  
beds (c) hospital 100–199 beds (d) hospital under 100 beds  
(e) private lab (f) community blood bank (g) group practice  
(h) private physician (i) clinic (j) other

4. Salary range: (a) under \$10,000 (b) \$10,000 to \$20,000  
(c) \$20,000 to \$30,000 (d) \$30,000 to \$40,000  
(e) over \$40,000

5. Did these articles achieve their stated objectives?  
(a) yes (b) no

6. How much of these articles can you apply in practice?  
(a) all (b) some (c) very little (d) none

7. Employment status: (a) full time (b) part time (c) student  
(d) not employed (e) retired

8. How long did it take you to complete both the reading  
and the quiz? \_\_\_\_\_ minutes

9. What subjects would you like to see addressed in future  
Focus articles?

# Continuing Education Questions

WINTER 2004

To receive 2.0 contact hours of basic level P.A.C.E., credit for the **Focus: Cardiac Markers** questions, insert your answers in the appropriate spots on the immediately following page; then complete and mail the form as directed.

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## LEARNING OBJECTIVES

See individual articles for learning objectives.

### The Role of Cardiac Troponin in the Recent Redefinition of Acute Myocardial Infarction

1. The major regulatory function of troponin proteins is:
  - a. release from striated muscle during injury.
  - b. binding of calcium and regulation of muscle contraction.
  - c. increasing cardiac ventricular function.
  - d. protection of cardiac and renal tissue during an infarction.
2. Does cardiac troponin T (cTnt) have the same physical properties as that from skeletal muscles?
  - a. No, the amino acid sequence differs.
  - b. No, they catalyze different reactions.
  - c. Yes
  - d. The structural characteristics of each isoform have not been established.
3. Following an acute myocardial infarction (AMI), what relative percentage of cTnt or cTnI is released within the first 6 hours due to the cytosolic pool?
  - a. All
  - b. At least 90%
  - c. Release of both occurs after 6 hours
  - d. Less than 10%

4. Which troponin remains elevated longer after an AMI?
  - a. Troponin I
  - b. Troponin T
  - c. The time of elevation is equivalent for both.
  - d. It is the level of elevation, not the time interval, that's clinically important.
5. What is the major clinical difference between cTnT and cTnI?
  - a. cTnI is a better marker for renal infarction.
  - b. cTnI is larger so it is not cleared as quickly from the body.
  - c. Clinical trials indicate that cTnT identifies more renal patients with a high cardiovascular risk.
  - d. cTnT is smaller so it is readily cleared by the kidneys.
6. Which troponin binds to other serum proteins?
  - a. cTnI
  - b. cTnT
  - c. Troponin C
  - d. Neither cTnI nor cTnT bind serum proteins.
7. Using the ESC/ACC redefinition and in the context of cardiac ischemia, what is required for a diagnosis of AMI?
  - a. New limits for CK-MB
  - b. Higher assay cutoff levels for troponin assays
  - c. Abnormal ECG readings
  - d. Abnormal concentration of biomarkers
8. A patient with unstable angina is found to have a minor increase in troponin levels. What does this imply?
  - a. The patient has an increased 30-day risk of cardiac death and AMI.
  - b. Slight elevations have no real known clinical utility.
  - c. The assay cutoff level is too low.
  - d. It is most likely a false positive.

Sharon M Miller is the liaison for the CLS Continuing Education section. She reviews Focus articles, assigns contact hours, and edits learning objectives and test questions. Direct all continuing education inquiries to Sharon M Miller, 7N591 Cloverfield Circle, St Charles, IL 60175. (630) 513-1986. [smmiller@elnet.com](mailto:smmiller@elnet.com)

**B-Type Natriuretic Peptide (BNP) and Congestive Heart Failure (CHF)**

9. The most frequent cause of hospitalization in patients over the age of 65 is:
  - a. acute myocardial infarction.
  - b. cancer.
  - c. congestive heart failure.
  - d. pneumonia.
10. Which NYHA class best fits a patient with CHF symptoms associated with a small amount of activity that are relieved by resting?
  - a. Class I
  - b. Class III
  - c. Class IV
  - d. Class II
11. Which natriuretic peptide is released from the cardiac atria and released from the stimulus of atrial distension?
  - a. CNP
  - b. BNP
  - c. Urodilation
  - d. ANP
12. In what year did Sudoh and group discover and characterize BNP in the porcine (pig) brain tissue?
  - a. 1968
  - b. 1988
  - c. 1990
  - d. 1991
13. What is the half life of B-type natriuretic peptide (BNP)?
  - a. 25 minutes
  - b. 2 hours
  - c. 20 minutes
  - d. 1 hour
14. In the review of the article, Utility of B-Type Natriuretic Peptide in the Diagnosis of Congestive Heart Failure in an Urgent-Care Setting, which BNP concentration listed below appeared to provide optimal sensitivity?
  - a. 80 pg/mL
  - b. 100 pg/mL
  - c. 115 pg/mL
  - d. 120 pg/mL
15. What was the diagnostic accuracy for utilizing BNP alone in the multinational prospective study described in the article, Rapid Measurement of B-Type Natriuretic Peptide in the Emergency Diagnosis of Heart Failure?
  - a. 74.2%
  - b. 85.6%
  - c. 81.1%
  - d. 75.0%

**Update on Selected Markers Used in Risk Assessment for Vascular Disease**

16. Which of the following best defines endothelium dysfunction?
  - a. Release of platelet-activating factor
  - b. Disruption of vascular homeostasis
  - c. Higher than normal levels of HDL
  - d. Endothelial cell necrosis
17. Which of the following risk factor is **NOT** associated with both endothelium dysfunction and CVD?
  - a. Atherosclerosis
  - b. Metabolic syndrome (insulin resistance)
  - c. Hypertension
  - d. Increased uric acid
18. According to the ATP III guidelines, what LDL level (mg/dL) is considered 'optimal'?
  - a. <100
  - b. <130
  - c. <160
  - d. <200
19. Therapeutic measures to reduce the risk for CHD focuses on the LDL level. Which of the following is considered a major risk factor, and is regarded as a CHD risk equivalent?
  - a. Abdominal obesity
  - b. Triglyceride levels > 150 mg/dL
  - c. Diabetes
  - d. High HDL

20. The metabolic syndrome has been described as inferring increased risk of CHD, requiring treatment. Which of the three indicators would indicate the presence of this syndrome in an individual?
  - a. CHD, decreased HDL, increased total cholesterol
  - b. Abdominal obesity, increased triglycerides (>150 mg/dL), and increased glucose (>100 mg/dL)
  - c. Diabetes (type 1), physical inactivity, and increased total cholesterol
  - d. Abdominal obesity, increased triglycerides (>150 mg/dL), and increased HDL (>60 mg/dL)
21. What is the recommended age and repeat interval suggested for lipoprotein testing? At \_\_\_\_ years of age and every \_\_\_\_ year(s) after that.
  - a. 20; 5
  - b. 40; 3
  - c. 45; 5
  - d. 55 for men; 65 for women; 1
22. A non-fasting patient reports to your laboratory for a lipoprotein screening. The test results are as follows: total cholesterol 226 mg/dL, HDL 30 mg/dL. Because the patient wasn't fasting, the triglycerides and LDL were not performed. What is the next ATP III recommended step for this patient?
  - a. Begin therapeutic lifestyle changes.
  - b. Weight reduction
  - c. Repeat all four tests on a fasting sample.
  - d. Assess patient risk including medical history to determine appropriate 10-year risk category.
23. Low levels of the following substance are associated with increased risk of sudden death among survivors of myocardial infarction:
  - a. phospholipids.
  - b. hs-CRP.
  - c. CAMs.
  - d. omega-3 fatty acids.
24. What is the difference between a risk 'factor' and a risk 'marker'?
  - a. A factor indicates the possible presence of a disease process while a marker is produced as a result of the disease.
  - b. There's really no difference in these terms.
  - c. A risk factor leads to the disease, while a marker measures the success of treatment.
  - d. A risk marker is specific for a given disorder, while a factor may be implicated in a number of different disorders.
25. Which key factor influences the predictive value and clinical utility of a laboratory test as an effective blood marker?
  - a. High cost
  - b. Varying reference ranges
  - c. Application to a the general public
  - d. Independence from other risk factors
26. Under what conditions would hs-CRP be invalid as an adjunct for CHD risk assessment?
  - a. Chronic gingivitis
  - b. Rheumatoid arthritis
  - c. Diabetes mellitus
  - d. Obesity
  - e. All of the above
27. PAF (platelet-activating factor) is a potent mediator of adverse inflammatory actions. Which substance is also produced that degrades PAF, may play a protective role, and may serve as an independent risk factor for CVD?
  - a. Lp(a)
  - b. Homocysteine
  - c. Lipoprotein-associated phospholipase A2
  - d. Fibrinogen
28. What outcome have recent studies shown in relationship to moderate iron overload and CVD risk, when using angiography and measurements of ferritin as a measure of iron stores?
  - a. A strong causal relationship
  - b. Iron overload did not contribute to increased CVD.
  - c. Moderate iron overload slowed thrombus formation.
  - d. Decreases vascular oxidative stress causing protection against CVD.

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## Answers to 2002 FOCUS Continuing Education Questions

### 15(1) WINTER 2002

#### BLOOD CELL MALIGNANCIES

##### Malignancy: An Evolving Definition of a Cancer Cell

1. Genes which function to preserve a normal pattern of growth are called:
  - a. tumor suppressor genes
2. An oncogene which binds DNA and controls expression of cellular genes required for proliferation or cell death belongs to which group of proteins?
  - c. transcription factors
3. The regulatory subunit of the kinase complex responsible for regulation of cell cycle progression is:
  - c. cyclin.
4. All of the following statements concerning the function of the Rb protein are true EXCEPT:
  - b. In its hyperphosphorylated state, Rb binds transcription factors (E2F proteins), rendering them inactive.
5. Over-expression of cyclin D would have what effect on cellular proliferation?
  - c. It would contribute to excess proliferation.
6. All of the following statements concerning caspases are true EXCEPT:
  - b. Caspases are indiscriminate proteases, which extensively degrade most intracellular proteins.
7. The role of Bcl-2 in cellular homeostasis is to:
  - a. protect cells against cell death (apoptosis).

8. Most tumor cells are thought to have:
  - c. reactivation of telomerase activity.

##### The New WHO Nomenclature: Introduction and Myeloid Neoplasms

9. The WHO classification for hematopoietic neoplasms is based on which of the following:
  - c. immunophenotyping, cytogenetics, morphology, and clinical features
10. The percentage of blasts in blood and bone marrow required for a diagnosis of acute leukemia according to the WHO classification is:
  - a. 20.
11. The WHO uses the term acute leukemia with multi-lineage dysplasia to describe a condition in which there is at least \_\_\_\_% dysplasia in \_\_\_\_ or more cell lines.
  - c. 50/two
12. The following are seen in a bone marrow from a patient with severe anemia: bi-nucleated erythroid precursors, uneven cytoplasmic staining in myeloid precursors, and large mononuclear megakaryocytes. This bone marrow would be interpreted as:
  - d. tri-lineage dysplasia.
13. A patient presents with 90% blasts of uncertain origin and 25% eosinophils. Cytogenetic testing demonstrates an inv(16)(p13q22) abnormality. Placement into the WHO nomenclature would be in the category:
  - a. acute myeloid leukemias with recurrent cytogenetic translocations.
14. The FAB classification of AML-M5 would now be described as:
  - d. AML not otherwise categorized.

15. Therapy related acute myeloid leukemia is more likely following treatment with:
  - b. topoisomerase II inhibitors.
16. The disease, refractory anemia with excess blasts in transformation is now classified as:
  - c. AML evolving from MDS.
17. The FAB M0 through M7 leukemias, with the exception of FAB M3, are classified by WHO in which category?
  - c. AML, not otherwise categorized
18. A 20-year-old male presents with an elevated WBC, 50% blasts, 20% promyelocytes, 20% myelocytes, and 10% polymorphonuclear cells. Auer rods are present in some cells. Which of the following genetic abnormalities might you expect to see?
  - a. t(8;21)(q22;q22); AML1/ETO
19. Chronic myelomonocytic leukemia fits the criteria for which WHO classification?
  - c. MPD/MDS
20. The WHO uses the term refractory cytopenia with multilineage dysplasia to describe a condition in which there is bi-cytopenia or pancytopenia and at least \_\_\_\_% dysplasia in \_\_\_\_ or more cell lines.
  - b. ten/two

##### The New WHO Nomenclature: Lymphoid Neoplasms

21. Which of the following systems did the WHO use as a starting point for their classification of



## CONTINUING EDUCATION

lymphoid neoplasms?  
d. REAL

22. The parameters used in classifying leukemias/lymphomas in both the REAL and WHO classifications include:  
b. morphology, immunophenotyping, and genetic features.
23. How is FAB L3 leukemia classified by WHO?  
c. Burkitt leukemia/lymphoma
24. When a malignant process is confined to a mass without evidence of blood or bone marrow involvement, how is it classified by WHO?  
a. Lymphoma
25. A five-year-old female patient presents with bone pain and a WBC of  $5.5 \times 10^9/L$ , hemoglobin of 8.0 g/dL, and platelet count of  $20 \times 10^9/L$ . On her differential there are 90% blast cells with very little cytoplasm and very indistinct nucleoli. Which of the following cytogenetic results would project the best prognosis?  
b. t(12;21)(p13;q22)
26. On a peripheral blood smear, 50% of the cells are medium sized with deeply basophilic cytoplasm. The majority of the cells have multiple cytoplasmic vacuoles and prominent nucleoli. The immunophenotype of this leukemia is most likely positive for:  
b. SmIg, CD19, and CD22.

### 15(2) SPRING 2002

#### COMPONENT THERAPY

#### Developments in Component Therapy: Novel Components and New Uses for Familiar Preparations

1. The CD4+ T cells are necessary for:  
b. graft-versus-leukemia effect to occur.

2. Dendritic cells:  
a. engulf and process antigen from foreign material.
3. A hemoglobin-based oxygen carrier is a:  
c. cell-free hemoglobin.
4. Fibrinogen-coated albumin microspheres are being studied as:  
b. platelet substitutes.
5. Cryoprecipitate reduced plasma (CRP) retains normal amounts of:  
d. von Willibrand's enzyme.
6. In ITP, the clearance of immunoglobulin coated platelets from the circulation is inhibited by treatment with:  
d. IVIG.
7. Chronic myeloid leukemia relapses are being treated with:  
c. DLI.
8. Therapeutic plasma exchange is performed using:  
b. fresh frozen plasma.
9. Acetylcholine antibodies are the source of damage in:  
c. myasthenia gravis.
10. Carbon backbones substituted with fluorine are characteristic of:  
c. perfluorocarbons.
11. Phosphatidyl choline is characteristic of:  
b. liposome encased hemoglobins.
12. Cryopreservation of platelets is accomplished using:  
a. DMSO.
13. Paraformaldehyde solution is used in preparation of:  
d. lyophilized platelets.
14. IVIG interacts with the immune system by:

a. competing for binding sites on the Fc portion of phagocytes.

15. The source of dendritic cells used in making a DC vaccine is:  
b. patient peripheral blood.
16. CD8+ T cells are involved in the development of:  
c. GVHD.

### 15(3) SUMMER 2002

#### MANAGEMENT

1. The "Public Health Preparedness for Bioterrorism" cooperative agreement grant monies will be administered by:  
b. CDC.
2. Which level of laboratory is designated by the LRN to be the sentinel of a bioterrorist event?  
a. A
3. The single most frequently cited problem during last year's anthrax outbreak was a lack of:  
d. communication.
4. The best specimen for the isolation of inhalational anthrax is:  
a. blood.
5. Category A agents of bioterrorism include:  
e. all of the above.
6. A tertiary care hospital laboratory occupies which level in the LRN?  
a. A
7. An organism which can be easily disseminated with a high degree of mortality would qualify in which category for the LRN?  
a. A
8. The Sentinel Event Alert newsletter is published by the:  
b. JCAHO.

## CONTINUING EDUCATION

9. Biological safety cabinets are categorized by:  
b. class.
10. Persons working in level D laboratories are employed by the:  
c. federal government.
11. Level B laboratories perform analytic activities requiring protection at:  
c. BSL-3.
12. The JCAHO requires that laboratories verify proficiency testing enrollment:  
a. annually.
13. Category B organisms include:  
c. Q fever.
14. Rhinorrhea is a less frequent symptom of:  
d. inhalational anthrax.
15. Joint Commission Laboratory surveys are:  
b. certified.
16. In combating bioterrorism, criminal activity is investigated by the:  
d. FBI.
17. Participation in the LRN will be inspected by the Joint Commission under standards related to:  
c. emergency management.
18. Level A laboratories can rule in which category of organism?  
d. None of the above
19. Brucellosis is an example of which category of organism in the LRN?  
b. B
20. In the vernacular of the LRN, the term "category" refers to:  
a. disease agents.

### 15(4) FALL 2002

#### NEWBORN SCREENING

##### Newborn Screening: An Overview

1. Which of the following is an important criterion used to justify including a test as part of a newborn screen?  
b. Early treatment is available
2. Who is responsible for payment of treatment in affected infants?  
d. No standard policy exists and the answers vary between states.
3. Explain why states differ in their newborn screening test menus.  
e. All of the above
4. When is the ideal time to collect blood for newborn screening tests?  
d. Between 48- and 72-hours of age
5. Thus far, which technological advance has had the greatest impact on newborn screening?  
c. Tandem mass spectrometry
6. Which newborn screening test has the highest incidence in Yupik Eskimos?  
a. Congenital adrenal hyperplasia
7. How many states currently offer FOD (including MCAD) testing by MS/MS?  
c. Fifteen
8. Which disorder results from a defect in branched-chain amino acid metabolism?  
d. MSUD
9. A newborn exhibits the following clinical symptoms: lethargy, metabolic acidosis, marked hyponatremia, hyperkalemia, and hypovolemia. What is the most likely inherited metabolic disorder?  
b. Congenital adrenal hyperplasia

10. The incidence of sickle cell disease is estimated as 1: 400 in the African American population. Would an infant from this ethnic group born in South Dakota be tested for this disease as part of the newborn screen?  
a. No
11. What is the fundamental difference between mandatory and voluntary screening?  
c. In a mandatory program, all newborns are tested without prior consent.

##### Newborn Screening: New Developments in a Proven Field

12. While it is desirable for any laboratory test to be 100% sensitive and specific (but not realistic), why is extraordinarily high specificity desired for newborn screening tests?  
a. In order to minimize issues dealing with follow-up testing and false-positive results.
13. Which administrative public health model is favored by Massachusetts?  
b. All operative responsibilities should be housed under one administrative body.
14. Describe the two-tier approach to NENSP's testing for cystic fibrosis.  
c. Those samples from an IRT (immunoreactive trypsinogen testing) run yielding the highest 5% of IRT results prompt DNA testing (PCR) to detect 27 prevalent gene mutations.
15. Tandem mass spectrometry allows measurement of 20 to 30 blood components. What is the basis of identification?  
d. Mass-to-charge ratio of fragmented ions quantified when compared to the concentration of known standards