

Assessment

Clinical Laboratory Techniques and Microtechnology

Participant Guide

Introduction

The purpose of this assessment is to evaluate your understanding of clinical laboratory techniques and how microtechnology and bioMEMS devices can be used for some of the testing procedures.

There are ten (10) multiple choice questions and five (5) short answer questions.

1. Which of the following is NOT an advantage of applying microtechnology to clinical laboratory tests?
 - a. Decreased costs as a result of miniaturization
 - b. Larger sample size
 - c. Point of care testing
 - d. Simultaneous testing from one sample
2. Certain analytes such as HIV, HCV, glucose levels and certain drugs can now be tested on site or at home using what type of device?
 - a. Testing swabs
 - b. Magnetic microbeads
 - c. Microarrays
 - d. POC devices
3. Blood, plasma, spinal fluid, joint fluid, saliva, and blood cells – these are examples of...
 - a. Bodily components that can be tested in a clinical laboratory
 - b. Fluids currently and commonly test using LOCs
 - c. Test sample analytes for point-of-care devices
4. What does it mean when a test is qualitative? The test...
 - a. requires a qualified, training individual to describe and analyze the test.
 - b. estimates the concentration of an analyte in a sample.
 - c. determines the exact concentration of an analyte in a sample.
 - d. determines the presence or absence of an analyte in a sample.
5. What does it mean when a test is quantitative? The test...
 - a. requires a qualified, training individual to describe and analyze the test.
 - b. estimates the concentration of an analyte in a sample.
 - c. determines the exact concentration of an analyte in a sample.
 - d. determines the presence or absence of an analyte in a sample.

6. LOC and POC devices can receive a sample as small as a micro, nano or picoliters, and, in many cases, are able to analyze a variety of components in the sample simultaneously. Which of the following microtechnologies has enabled such devices?
 - a. Micro-optics
 - b. Surface micromachining
 - c. Microfluidics
 - d. Magnetic microbeads

7. Which of the following technologies has been shown to enable 3D cell growth by “levitating” the cells?
 - a. Micro-optics
 - b. Surface micromachining
 - c. Microfluidics
 - d. Magnetic microbeads

8. Which of the following is used to ensure that testing methods, instruments and procedures are consistent between clinical laboratories nationwide?
 - a. A national database of certified equipment, procedures and laboratory personnel open to all clinical laboratories.
 - b. National certification training programs that can be taken on-line or on-site by laboratories technicians.
 - c. Certification of laboratory trainings programs, laboratories, and personnel by governmental and independent agencies.
 - d. A national standard for all testing methods, instruments and procedures that must be used by all laboratories.

9. What type or area of clinical laboratory testing is used for the study of infections and inherited diseases?
 - a. Microbiology
 - b. Blood chemistry
 - c. Histology
 - d. Bloodtest
 - e. Molecular diagnostics

10. What type or area of clinical laboratory testing is used for culturing bacteria for the purpose of identifying an organism?
 - a. Microbiology
 - b. Blood chemistry
 - c. Histology
 - d. Bloodtest
 - e. Molecular diagnostics

11. Discuss an advantage and a disadvantage in replacing existing clinical laboratory techniques with micro-sized devices.
12. Discuss how microfluidics technology is enabling point of care (POC) clinical lab testing.
13. List five specific clinical laboratory techniques or tests that can now be done at the point of care of at home due to microtechnology.
14. What types of agencies certify training programs, clinical laboratory personnel, and the laboratories themselves?
15. Why is certification of clinical laboratory testing important?

Support for this work was provided by the National Science Foundation's Advanced Technological Education (ATE) Program through Grants. For more learning modules related to microtechnology, visit the SCME website (<http://scme-support.org/>).