
DNA Microarrays

Assessment

Participant Guide

Introduction

The purpose of this assessment is to determine your understanding of the applications, operations, interpretation, and fabrication of DNA microarrays.

There are 16 assessment questions.

1. Which of the following is NOT a nitrogenous base of a DNA molecule?
 - a. Cytosine
 - b. Guanine
 - c. Uracil
 - d. Adenine
 - e. Thymine

2. What is the term for a nitrogenous base with a sugar and phosphate?
 - a. Oligonucleotide
 - b. Nucleotide
 - c. Polymorphism
 - d. Genome

3. Which of the following is NOT a valid base pair sequence?
 - a. T-A, C-G, G-C, C-C
 - b. A-T, A-A, G-G, C-G
 - c. G-G, G-A, C-G, T-A
 - d. C-G, G-C, C-G, A-T

4. A DNA microarray uses synthetic _____ as probes to capture target molecules from test and control samples.
 - a. Oligonucleotides
 - b. Nitrogenous Bases
 - c. Polymorphisms
 - d. Genomes

5. DNA microarrays depend on which of the following processes to occur on the surface of the microarray in order to accurately analyze the DNA of the control and test samples?
 - a. Replication
 - b. Transcription
 - c. Reverse Transcription
 - d. Hybridization

6. Which of the following applications do NOT use DNA microarrays?
 - a. Identification of specific antibodies for specific diseases
 - b. Identification of specific genes for specific diseases
 - c. Compare the gene sequences of various species
 - d. Study how genes react to specific drugs or drug dosages
 - e. All of the above applications use DNA microarrays

7. Which of the following BEST explains the process that takes place on the surface of a DNA microarray?
 - a. Hybridization occurs between a synthetic oligo probe on the array and a complementary ssDNA from the control or test sample
 - b. Hybridization occurs between a ssDNA from the control sample and a complementary DNA from the test sample
 - c. DNA transcription divides a DNA molecule from the test sample into a ssDNA and RNA
 - d. A copy DNA is made from the test sample's RNA using reverse transcription

8. Which of the following BEST describes a GeneChip[®]? A grid or array consisting of thousands or millions of ...
 - a. genes from a specific organism strategically placed on a glass or silicon substrate using an inkjet printing process
 - b. synthetic oligos that were fabricated using an inkjet printing process
 - c. synthetic oligos that were fabricated using a photolithography process
 - d. ssDNA from a control and a test sample strategically placed on a silicon substrate using a photolithography process

9. The photolithography fabrication process used in DNA microarray fabrication requires which of the following components?
 - a. Glass substrate, a set of masks, UV light, hundreds of oligonucleotide solutions
 - b. Silicon substrate, a set of masks, UV light, four nucleotide base solutions with blocking agent
 - c. Silicon substrate, a set of masks, UV light, hundreds of oligonucleotide solutions with blocking agent
 - d. Glass substrate, a set of masks, UV light, a blocking agent, four oligo solutions

10. Which of the following best describes the process steps of the photolithography process used for DNA microarray fabrication?
 - a. Coat, align, expose, develop
 - b. Protect, deprotect, develop
 - c. Protect, deprotect, addition
 - d. Coat, deprotect, addition

11. In the photolithography process of a DNA microarray using masks, which of the following identifies and controls the placement of specific nucleotide bases on the array?
 - a. Blocking agent
 - b. Ultraviolet (UV) light
 - c. Masks
 - d. Substrate atoms

12. In the photolithography process of a DNA microarray using masks, which of the following removes the blocking agent from the top of the oligo chain?
 - a. UV light
 - b. Masks
 - c. Nucleotide base
 - d. mRNA

13. Which of the following prevents the addition of a nucleotide base to specific features during the addition step of photolithography fabrication?
 - a. Mask
 - b. Blocking agent
 - c. UV light
 - d. Fluorescent tag

14. In the interpretation of a DNA microarray, what color would indicate the presence of cDNA from the control sample as well as the test sample?
 - a. Yellow
 - b. Red
 - c. Green
 - d. Black

15. In the interpretation of a DNA microarray, what color would indicate the presence of cDNA from only the test sample?
- Yellow
 - Red
 - Green
 - Black
16. DNA microarrays are fabricated with “positive and negative control features”, features that verify the validity of the test. Which of the following would indicate an “invalid” test?
- Positive control feature with both control and test sample genes
 - Positive control feature with both control and test sample genes AND negative controls with no hybrids shown
 - Positive control feature with targets only from the control sample
 - Negative control feature with genes from neither the control or test sample

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