

Part 3: Apply Your Understanding of Microarray Technology

1. What is a DNA microarray (DNA chip)?

2. Create an analogy that could be used to explain the structure and function of a microarray. For example: A DNA microarray is like a _____ because _____

3. Explain what causes the cDNA to bind to the gene spots on the microarray?

Base your answers to questions 4 and 5 on the information below.

A researcher studying tumor cell function wants to study how treatment with a cancer drug affects expression of the gene for a DNA repair enzyme. He knows that the mRNA for the enzyme contains the base sequence

AAU AGG UAC ACG

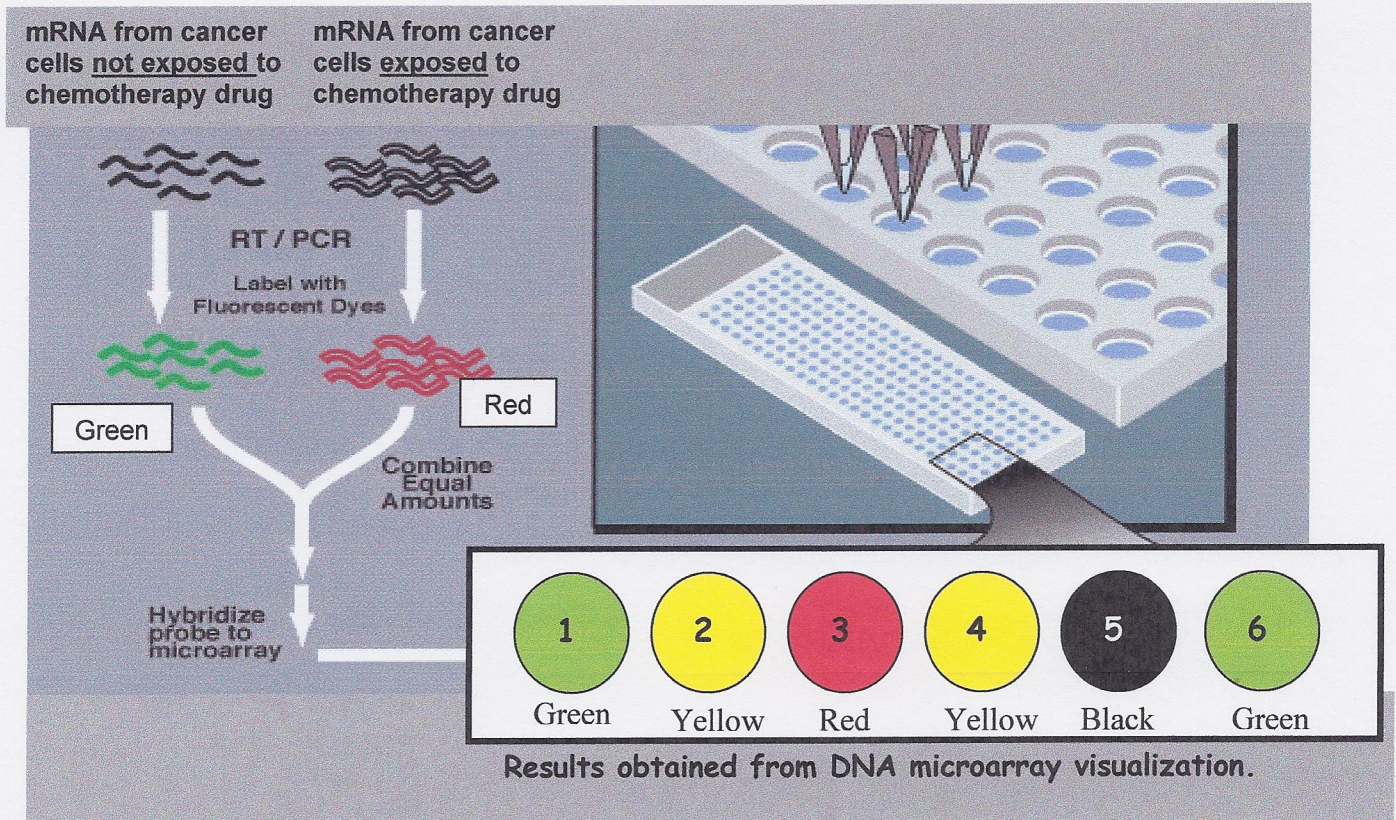
4. What sequence of cDNA bases would result if the researcher mixed this mRNA with reverse transcriptase? _____

5. What gene sequence on the DNA chip would hybridize with (bind to) this cDNA?

Base your answers to question 6-9 on the information below.

A scientist used DNA microarray analysis to study how a potential chemotherapy drug affected gene expression in cancer cells. During his experiment, the scientist isolated RNA from two kinds of cancer cells: one type was grown in a normal culture medium and the other type was grown in the same culture medium that also contained the chemotherapy drug. He used the messenger RNA from the cancer cells that were not exposed to the chemotherapy drug to make green labeled cDNA. He used the RNA from the cancer cells that were exposed to the chemotherapy drug to make red labeled cDNA.

Figure 1.



Modified from: http://www.genome.gov/Pages/Hyperion/DIR/VIP/Glossary/illustration/Images/microarray_technology.gif

The scientist mixed both kinds of cDNA together to produce a hybridization solution that he applied to a microarray that was printed with six different gene sequences. Then he washed the microarray to remove unbound cDNA and scanned the microarray to visualize the colors of the spots. Figure 1 shows the color of the spots on the DNA microarray.

Based on the results of his experiment, which gene or genes appear to be:

6. Expressed only in cells exposed to the chemotherapy drug? _____
7. Expressed only in cells not exposed to the chemotherapy drug? _____
8. Expressed in both types of cells? _____
9. Not expressed in either type of cells? _____