DNA Overview Activity:
Exploring DNA Applications
Participant Guide

Description and Estimated Time to Complete

This is one of two activities in the *Overview of DNA Learning Module*. This activity provides the opportunity for you to further explore the applications of DNA and its significance as the genetic material. This will help you to better understand how microsystems are used for DNA analysis.

Estimated Time to Complete
Allow approximately 1 hour

Introduction

Deoxyribonucleic acid (DNA) is a long polymeric molecule found in most cells that functions as the carrier of genetic information. The information carried in the linear sequence of bases in DNA defines an organism. Changes in the linear sequence, sometimes called mutations or polymorphisms, explain differences between individuals and diagnose diseases such as cancer.

Past and current studies of DNA identify how DNA can be used in biomedical applications. Such applications include the following:
- Improve diagnosis of a disease
- Test the best treatment options for a disease
- Execute rational drug design
- Create custom drugs
- Utilizing DNA in gene therapy

Activity Objectives and Outcomes

Activity Objectives
- Describe microsystem applications that rely on DNA

Activity Outcomes
Upon completion of this activity, you will be able to explain ways in which DNA and DNA concepts are used in different fields.

Activity: Exploring DNA Applications

Description
In this activity you explore DNA's role in applications such as infectious and inherited diseases. You will also continue your exploration of the basic concepts of DNA.

1. Go to the Infectious Diseases tutorial at the Koshland Science Museum.
    (URL: http://bit.ly/2w4sU7D*)*
    NOTE: If for some reason the link is broken, go to the Koshland Science Museum website and do a search for "Infectious Diseases". This should bring up the tutorial.

2. Complete the tutorial.

3. Complete the tutorial "Putting DNA to Work".
    (URL: http://bit.ly/2xdqofP*)*
    a. Read through the material and complete all of the activities.
    b. Be sure to take notes and write down any questions you may have.
    c. Discuss your results with other students.

4. Complete the **Post-Activity Questions** at the end of this procedure.

Post-Activity Questions

1. What is a virus chip?

2. In what time frame was the SARS disease agent identified using the virus chip?

3. How are the dots visualized?

4. Describe how DNA sequences are used in forensics to identify a specific individual.

5. Discuss an application of DNA and DNA sequences (genes) in agriculture. You may discuss an example that was used in this tutorial OR research another example (for example, bovine genes). Just be sure to include the sources for your discussion.

6. What part(s) of these tutorials did you find the most interesting and why?

Summary

DNA is the genetic material with the genetic information stored in the linear array of nitrogenous bases. Many fields from forensics, agricultural to biomedical are using the information found in DNA to identify specific individual, specific diseases and variations of diseases, and identify the specific gene(s) in plants and animals that contribute to specific trait.

References

1. Putting DNA to Work: Marian Koshland Science Museum. http://bit.ly/2xdqofP
2. DNA Interactive: Dolan DNA Learning Center. Cold Spring Harbor Laboratory. http://www.dnai.org
3. Overview of DNA: SCME Primary Knowledge Unit

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