

Module: Where is DNA? DNA Isolation Curriculum

Seattle Children's Research Institute

**SCIENCE
ADVENTURE
LAB**

Topics: DNA isolation, cellular structure, molecular biology, biochemistry.

Overview: This lesson is designed to take place onboard the Seattle Children's *Science Adventure Lab*, a mobile science laboratory. In this module, students isolate DNA from a strawberry. Students learn the general steps used to isolate DNA, which include lysis, separation and precipitation. By completing this module, students learn about the properties and function of DNA and that isolating DNA is the first step in advanced biotechnology applications such as cloning, DNA sequencing and DNA fingerprinting.

Grade Levels: This module is appropriate for students in Grades 4-6.

Time Required: Minimum time required to complete this module is 60 minutes.

Lab Equipment Used: Transfer pipets, heat blocks, reagents for DNA isolation.

Health Issue: DNA is found in nearly every type of cell in the human body. Our DNA affects our growth, development and health. Scientists have identified about 4,000 diseases caused by genetic mutations. Mutations in DNA can be harmless and undetectable or they may cause genetic diseases such as hemophilia, muscular dystrophy and cancer. A greater understanding of specific disease genes may lead to improved care and cures in the future.



Objectives:

- To isolate DNA from a strawberry.
- To develop the laboratory skills and knowledge required to conduct an experiment and test hypotheses.
- To expose students to authentic equipment and tools used by scientists.
- To empower students with the confidence that they can be successful in science and encourage them to pursue careers in science and healthcare.

General Information: All activities done onboard the *Science Adventure Lab* are for educational purposes only. No personal or health-related information is collected from students and no materials are retained by Seattle Children's.



Where is Your DNA? Supports the Following Next Generation Science Standards and Common Core State Standards



Science and Engineering Practices

Asking Questions and Defining Problems
Planning and Carrying Out Investigations
Constructing Explanations and Designing Solutions
Obtaining, Evaluating, and Communicating Information
Developing and Using Models
Engaging in Argument from Evidence
Analyzing and Interpreting Data

Disciplinary Core Ideas

Definitions of Energy
Conservation of Energy and Energy Transfer
Energy in Chemical Processes and Everyday Life
Information Technologies and Instrumentation
Structure and Function
Human Impacts on Earth Systems
Structure and Properties of Matter
Chemical Reactions
Inheritance and Variation of Traits

Crosscutting Concepts

Cause and Effect
Energy and Matter
Systems and System Models
Science is a Human Endeavor
Patterns
Scale, Proportion, and Quantity
Influence of Science, Engineering, and Technology on Society and the Natural World



Mathematics

Measurement and Data

Language and Literacy

Comprehension and Collaboration
Presentation of Knowledge and Ideas
Research to Build and Present Knowledge

For detailed explanations of the standards, please visit:

[Next Generation Science Standards] - <http://www.nextgenscience.org/next-generation-science-standards>

[Common Core State Standards] - <http://www.k12.wa.us/CoreStandards/Resources.aspx>

