

SCIENCE DISCOVERY LAB

Module: Gene Editing in Diabetes Treatment

Topics: Gene Editing, Type I Diabetes, Gel Electrophoresis

Overview: This lesson is designed to take place in Seattle Children's *Science Discovery Lab*, a next-generation science classroom. In the module, students learn about gene editing, its role in producing insulin therapies for patients with type I diabetes, and how to run a gel using gel electrophoresis.

Grade Levels: This module is appropriate for students in grades 9-12.

Lab Equipment: Gel electrophoresis apparatus and power supplies, reagents for DNA analysis, micropipettes, mini-centrifuges.

Health Issue: Type I diabetes occurs when an individual is unable to make any or sufficient amounts of insulin on their own. To manage blood glucose levels, they must rely on insulin therapies.



Objectives:

- Learn what gene editing is and how it is performed.
- Learn how gene editing is used to create insulin therapies for patients with type I diabetes.
- Use gel electrophoresis to visualize engineered gene products.

General Information: All activities done in the *Science Discovery Lab* are for educational purposes only. No personal or health-related information is collected from students and Seattle Children's does not retain materials.

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Next Generation Science Standards

Gene Editing in Diabetes Treatment supports the following Next Generation Science Standards:

Disciplinary Core Ideas	LS1.A: Structure and Function All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.	
Science and Engineering Practices	Planning and Carrying Out Investigations Analyzing and Interpreting Data	
Crosscutting Concepts	Structure and Function	
Vocabulary	DNA Nucleotides Gene Protein	Diabetes Gel Gel electrophoresis Micropipette

Gene Editing in Diabetes Treatment supports the following Performance Expectation:

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.

Understandings about the Nature of Science	
Scientific and Engineering Practices Categories	Crosscutting Concepts Categories
Scientific Investigations Use a Variety of Methods	Science is a Way of Knowing
Scientific Knowledge is Based on Empirical Evidence	Scientific Knowledge Assumes an Order and Consistency in Natural Systems
Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena	Science is a Human Endeavor