When Cells Don't Communicate

Abstract

Students research and prepare a report on diseases that are the result of problems in cell communication.

Logistics

Time Required

- **Class Time:** Varies
- **Prep Time:** Varies

Materials

Computers with internet access

Prior Knowledge Needed

Cell structure and function, cell signaling pathways, molecules carry out cell communication

Appropriate For:

Primary Intermediate Secondary College

Learning Objectives

- Problems with cell communication can result in disease.
- Problems in cell communication occur at the molecular level.

Special Features You'll Find Inside

- A printable worksheet to guide student research.

Module

Amazing Cells

When Cells Don't Communicate

Classroom Implementation

Activity instructions:

- Optional: Have students read the *When Cell Communication Goes Wrong* page in the *Amazing Cells* module on the Learn.Genetics website.
- Have students research a disease that is the result of a breakdown in cell communication using the *When Cells Don't Communicate* worksheet as a guide. Remind students that errors in cell communication can be inter- or intracellular.

Quantities

Per Student

One copy of student sheet S1.

U.S. National Science Education Standards

Standards

Grades 9-12:

- Content Standard C: Life Science - The Cell - Cells have particular structures that underlie their functions. Every cell is surrounded by a membrane that separates it from the outside world. Inside the cell is a concentrated mixture of thousands of different molecules which form a variety of specialized structures that carry out such cell functions as energy production, transport of molecules, waste disposal, synthesis of new molecules, and the storage of genetic material.

B. AAAS Benchmarks for Science Literacy:

Grades 9-12

The Human Organism

- Basic Functions
  - » Communication between cells is required to coordinate their diverse activities. Some cells secrete substances that spread only to nearby cells. Others secrete hormones, molecules that are carried in the bloodstream to widely distributed cells that have special receptor sites to which they attach.

Helpful Websites:

MedlinePlus
WebMD
Mayo Clinic
Genetic Disorders Library on the Learn. Genetics website

Hint: Search for larger categories such as: "autoimmune disorders" and "neurodegenerative disorders"

The Living Environment

- The Cell
  - » The work of the cell is carried out by the many different types of molecules it assembles, mostly proteins. Protein molecules are long, usually folded chains made from 20 different kinds of amino-acid molecules. The function of each protein molecule depends on its specific sequence of amino acids and the shape the chain takes is a consequence of attractions between the chain's parts.

Module

Amazing Cells

When Cells Don't Communicate

» Complex interactions among the different kinds of molecules in the cell cause distinct cycles of activities, such as growth and division. Cell behavior can also be affected by molecules from other parts of the organism or even other organisms.

Credits

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When Cells Don't Communicate

Search

Diseases fall in to general categories. Search the general categories* to find a disease. Most diseases involve at least one breakdown in cell communication.

Cancer
Metabolic Disorders
Autoimmune Disorders
Neurodegenerative Disorders
Genetic Disorders (Single-gene or Multi-factorial)

*This is a partial list only.

Conduct an internet search to find information on a disease that results from a breakdown in cell communication. Describe the specific cause (miscommunication at the molecular level) as well as the symptoms and treatment of the disease. Use the guide below:

1. The disease upon which I am focusing:

2. The *specific* cause of the disease (the communication breakdown at the molecular level):

The type of cell communication breakdown that causes this disease:

- Losing the signal
- Signal not reaching its target
- Target ignoring the signal
- Too much signal
- Multiple breakdowns
- Other (please describe)

3. The symptoms of the disease (result on the organismal level):

4. Treatment includes: