Dealing Signals

Abstract

Use standard playing cards with your students to introduce cellular interactions such as cell to cell recognition and signal and receptor specificity.

Logistics

Time Required

- **Class Time:** 30 minutes
- **Prep Time:** 10 minutes

Materials

2-3 decks of standard playing cards, depending on class size

Prior Knowledge Needed

cells are bound by a membrane

Appropriate For:

Primary Intermediate Secondary College

Learning Objectives

- Trans-membrane proteins help cells recognize other cells of the same type.
- Some foreign invaders such as viruses and bacteria mimic cell to cell recognition mechanisms. This allows them access to healthy cells.
- Molecular receptors in the cell membrane interact with specific signals.

Special Features You'll Find Inside

- Information about cell adhesion and signal/receptor specificity.
- Illustrated step-by-step instructions to carry out this activity.

Module
Amazing Cells

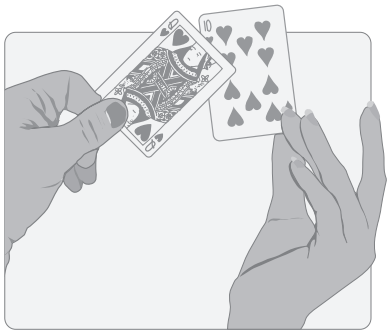
Dealing Signals

Classroom Implementation

Activity instructions:

To demonstrate cell to cell recognition:

- Give each student a playing card.
- Ask students to group themselves according to the suit of the playing card they are holding.

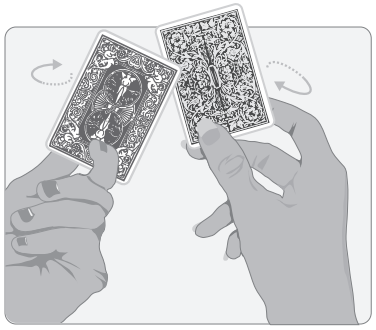


Discussion Points:

- Cells selectively group themselves and adhere to other cells of a specific type. For example, liver cells will adhere to other liver cells, but not to cells of another type such as brain cells. This has been demonstrated in various studies of embryonic development and is what gives rise to specific tissue types.
- Transmembrane proteins known as Cell Adhesion Molecules (CAMs) are responsible for this recognition and adhesion. Some CAMs bind to other CAMs of the same molecular structure (homophillic binding) while others bind to CAMs with a different molecular structure, or an extra-cellular matrix (heterophillic binding).

Foreign invader option:

- Ask students with cards of the same suit to compare the backs of the cards. (There should be some students whose cards have a different backing).



Discussion Points:

- Foreign invaders in the body such as viruses and bacteria have many of the same proteins and mechanisms as healthy cells do.
- Some foreign invaders have CAMs bind to the CAMs of healthy cells, thus giving the invaders access to healthy cells.

Quantities

Per Student

- One playing card, any suit, from the same deck
- Foreign Invader Option: Include 3-4 cards from a deck with a different backing

Module

Amazing Cells

Dealing Signals

Standards

U.S. National Science Education Standards

Grades 5-8:

- Content Standard C: Life Science - Structure and Function in Living Systems; Specialized cells perform specialized functions in multicellular organisms. Groups of specialized cells cooperate to form a tissue, such as a muscle.

B. AAAS Benchmarks for Science Literacy:

Grades 9-12

The Living Environment

- Cells
  - » Every cell is covered by a membrane that controls what can enter and leave the cell.
  - » Within every cell are specialized parts for the transport of materials, energy transfer, protein building, waste disposal, information feedback, and even movement. In addition, most cells in multicellular organisms perform some special functions that others do not.

Credits

Christian Davies, Brockbank Junior High, Magna, UT
Barbara Egan, Beavercreek High School, Beavercreek, OH
Mary Hoelscher, Sobriety High School, Maplewood, MN
Chris Kuka, Bend High School, Bend, OR
Molly Malone, Genetic Science Learning Center
Harmony Starr, Genetic Science Learning Center (illustrations)

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