

Biomolecular Functions Activity

Participant Guide

Description and Estimated Time to Complete

This activity is one of three activities for the Biomolecular Application for bioMEMS Learning Module. This activity provides you with the opportunity to think about the functions of biomolecules by comparing them to macroscopic equivalent components. It would be helpful to review the Biomolecular Applications for bioMEMS PK prior to starting this activity.

Estimated Time to Complete

Allow at least 30 minutes to complete

Introduction

The three types of biomolecules that can be used in bioMEMS biological interfaces include the following:

- Nucleic acids, such as DNA. These are the molecules that cells use to carry genetic information.
- Proteins, such as enzymes, fibers, molecular motors, channels and pores, vesicles. These molecules are often referred to as the "work horses" of the cell because they perform so many of the jobs of cellular metabolism.
- Lipids, such as phospholipid vesicles and membranes. These are relatively small molecules that self-assemble into very thin membranes in order to make separate compartments in the cell. They also provide a membrane barrier on the outside of all cells.

Activity Objectives and Outcomes

Activity Objectives

- Demonstrate your understanding of biomolecule functions by comparing their functions to equivalent macroscopic components.

Activity Outcomes

In this activity you will make the connection between familiar functions and those of biomolecules. The keywords and referenced glossaries in the primary knowledge unit may be useful in completing this activity.

Activity: Biomolecules' Functions

In the following table, list a function(s) performed by each of the biological molecules and an equivalent macroscopic component.

Macroscopic components	Function	Molecular example(s)
struts, beams, casings		actin microfilament structures
cables		collagen
fasteners, glue		intermolecular forces
solenoids, actuators		conformation-changing proteins, actin/myosin, kinesin/microtubules
boat motors		flagellar motor
drive shafts		bacterial flagella
containers		vesicles
pipes		various tubular structures
pumps		flagella, transmembrane proteins
highways		microtubules
automobiles		kinesin
Clamps		enzymatic binding sites, cell surface receptors
Electric generators		ATP synthase

Table 1: Biomolecules and their Functions

Summary

Biomolecules provide functional specificity useful for biosensing, chemical conversions, and separations in bioMEMS design. Most of these functions such as transducing and moving fluids are the same functions as macroscopic components.

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