**Biomolecular Functions Activity**

**Participant Guide**

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|  | 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 |

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|  | 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. |

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|  | 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 |

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|  | | 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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|  | *Support for this work was provided by the National Science Foundation's Advanced Technological Education (ATE) Program through Grants. For more learning modules related to microtechnology, visit the SCME website (*[*http://scme-nm.org*](http://scme-nm.org)*).*    *This Learning Module was developed in conjunction with Bio-Link, a National Science Foundation Advanced Technological Education (ATE) Center for Biotechnology @* [*www.bio-link.org*](http://www.bio-link.org)*.* | |