Southwest Center for Microsystems Education (SCME)
University of New Mexico

Therapeutics BioMEMS Overview Learning Module

This learning module contains the following:
Knowledge Probe (KP or pre-test)
Primary Knowledge (PK) reading material
Marketing a Therapeutics BioMEMS Activity
Final Assessment

This learning module is an overview of BioMEMS that are currently being used or tested as therapeutic devices for patients. As an activity you will study a particular therapeutic BioMEMS and develop a marketing brochure for doctors and patients.

Target audiences: High School, Community College, University

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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.

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Website: www.scme-nm.org

Therapeutic BioMEMS Overview
Knowledge Probe (pre-test)
Participant Guide

Introduction

Bio MEMS – Bio MicroElectroMechanical Systems

This learning module is an overview of BioMEMS that are currently being used or tested as therapeutic devices for patients. As an activity you will study a particular therapeutic BioMEMS and develop a marketing brochure for doctors and patients.

The purpose of this knowledge probe is to evaluate your current understanding of therapeutic bioMEMS prior to completing the Therapeutic BioMEMS Learning Module.

There are ten (10) multiple choice questions. Answer to the best of your knowledge.

1. Which of the following BEST describes "therapeutic bioMEMS"? MEMS or micro-sized devices used to _____ diseases and /or conditions?
   a. identify and diagnose
   b. monitor and possibly cure
   c. prevent and manage
   d. diagnose and manage

2. Which of the following is an example of a fully "in vivo" therapeutic bioMEMS?
   a. Cochlear Implant
   b. MIS
   c. Continuous Glucose Monitoring system
   d. Pacemaker

3. A bilayer phospholipid vesicle used to deliver drugs in a timely and efficient manner is called a _____.
   a. liposome
   b. microbead
   c. cannula
   d. biosensor

4. Implantable continuous glucose monitors use _____ to measure glucose levels in the _____ between body tissues.
   a. biosensors, connective tissue
   b. biosensors, interstitial fluid
   c. infrared light, connective tissue
   d. ultraviolet light, interstitial fluid

5. Which of the following is NOT currently used or being researched as a drug delivery device.
   a. Liposomes
   b. Micropumps
   c. Hydrogels
   d. Synthetic tissue

6. One of the main problems with minimally invasive surgery devices being used today is the _____.
   a. lack of haptic feedback
   b. inability to cauterize tissues
   c. poor quality of visual feedback
   d. limited degrees of freedom

7. Which of the following BEST describes the "artificial retina"?
   a. An optical sensor placed beneath the retina and used to stimulate the optic nerve using electrical pulses.
   b. A receiver/transmitter placed in the eye and used to convert light energy to electrical energy that stimulates the optic nerve.
   c. An electrode studded array placed on or beneath the surface of the retina that converts light energy to electrical energy that stimulates the retinal neurons.
   d. Photovoltaic cells placed beneath the retina that use the light entering the eye to stimulate the photoreceptors beneath the retina.

8. Which of the following artificial retina arrays provides the highest resolution?
   a. 4x4
   b. 16x16
   c. 32 x 32

9. Drug-eluting stents are used as a therapeutic device for which of the following conditions?
   a. Restenosis
   b. Retinitis pigmentosa
   c. Diabetes
   d. Hepatitis

10. Which of the following microtechnologies is working to address the problems associated with the need for new or damaged organs?
    a. Microfluidics
    b. Cell culture
    c. Drug delivery
    d. Tissue engineering

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).

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