**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](http://www.bio-link.org).

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Southwest Center for Microsystems Education (SCME) NSF ATE Center

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Website: [www.scme-nm.org](http://www.scme-nm.org)

**Therapeutic BioMEMS Overview**

**Knowledge Probe (pre-test)**

**Instructor Guide**

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| Notes to Instructor |
| This knowledge probe (KP) helps to evaluate the participants' current knowledge of current and future applications of Therapeutic bioMEMS Devices. This probe could be compared to the final assessment to provide information on what was learned as a result of completing the supporting PK and activity.  This assessment is part of *Therapeutic BioMEMS Overview Learning Module:*   * **Knowledge Probe (KP) or pretest** * Therapeutic BioMEMS Overview PK * Marketing a Therapeutic BioMEMS Activity * Assessment for Therapeutic BioMEMS   There are ten multiple-choice questions in this KP. Answers are indicated in red. |
| 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. |

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| 1. Which of the following BEST describes “therapeutic bioMEMS”? MEMS or micro-sized devices used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ diseases and /or conditions?    1. identify and diagnose    2. monitor and possibly cure    3. prevent and manage    4. diagnose and manage 2. Which of the following is an example of a fully “in vivo” therapeutic bioMEMS?    1. Cochlear Implant    2. MIS    3. Continuous Glucose Monitoring system    4. Pacemaker 3. A bilayer phospholipid vesicle used to deliver drugs in a timely and efficient manner is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    1. liposome    2. microbead    3. cannula    4. biosensor 4. Implantable continuous glucose monitors use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to measure glucose levels in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between body tissues.    1. biosensors, connective tissue    2. biosensors, interstitial fluid    3. infrared light, connective tissue    4. ultraviolet light, interstitial fluid 5. Which of the following is NOT currently used or being researched as a drug delivery device.    1. Liposomes    2. Micropumps    3. Hydrogels    4. Synthetic tissue 6. One of the main problems with minimally invasive surgery devices being used today is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.    1. lack of haptic feedback    2. inability to cauterize tissues    3. poor quality of visual feedback    4. limited degrees of freedom |

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| 1. Which of the following BEST describes the “artificial retina”?    1. An optical sensor placed beneath the retina and used to stimulate the optic nerve using electrical pulses.    2. A receiver/transmitter placed in the eye and used to convert light energy to electrical energy that stimulates the optic nerve.    3. 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.    4. Photovoltaic cells placed beneath the retina that use the light entering the eye to stimulate the photoreceptors beneath the retina. 2. Which of the following artificial retina arrays provides the highest resolution?    1. 4x4    2. 16x16    3. 32 x 32 3. Drug-eluting stents are used as a therapeutic device for which of the following conditions?    1. Restenosis    2. Retinitis pigmentosa    3. Diabetes    4. Hepatitis 4. Which of the following microtechnologies is working to address the problems associated with the need for new or damaged organs?    1. Microfluidics    2. Cell culture    3. Drug delivery    4. 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*](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)*.* |