LS LAMP 2010 Summer Research Training Program
Project Description

Title: Functional Hydrogels for Micropatterned Models of Neural Axon Growth

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Overview:
In the Optic Nerve Engineering Laboratory, we are developing tissue culture models of axon growth in which we can control the structure, the spatial distribution of biomolecules, and the physiology of neurons growing in 3D hydrogel environments. We are developing new hydrogels that promote axon growth while allowing researchers to tailor the chemistry of the gels by illumination with UV light. This technology allows us to specify the location and timing of crosslinking and the binding of functional groups to the gel. We are also harvesting embryonic neural tissues from rodents in order to demonstrate the efficacy of the gels to constrain and direct axon growth. In the future, these techniques will allow us to determine the best combinations of structural and molecular cues for designing smart tissue engineering nerve implants. The successful candidate will work closely with graduate students engaged in different aspects of the project.

Project Objectives:
- Synthesize photoactive hydrogels using existing protocols.
- Adapt photoactive hydrogel chemistry for use in micropatterned hydrogels.
- Demonstrate production of molecular gradients immobilized in hydrogels.
- Grow neural explants in molecularly-patterned hydrogels.

Prerequisites and prior experience desired:
- Knowledge in cell biology and organic chemistry is helpful, but not required.
- Experience in cell/tissue culture and tissue dissection is helpful but not required.
- Experience in organic synthesis is helpful but not required.
- A positive attitude, eagerness for learning, creativity, and a curious mind are absolutely required.