**Developing Functionalized Cornell’ Dot Nanoparticles for Osteoarthritis Treatment**

Osteoarthritis (OA) is the leading cause of disability in the developed world. A major shortcoming of current OA therapies is the need for multiple serial treatments, which treat only the symptoms and don’t alter the course of disease. Our goal is to developed highly targeted therapies with enhanced duration of effect that prevent the progression of OA.

The Bonassar Lab is collaborating with the Wiesner Lab (MSE) to advance the development of Cornell Prime Dot (C’ Dot) nanotechnology by engineering therapeutics to specifically target OA. Preliminary work has shown that C’ Dots can penetrate the dense, avascular cartilage matrix and reach resident chondrocytes in the tissue. Further, functionalized C’ Dots exhibit a reduced effective diffusivity due to reversible matrix interactions. In this project, we are engineering C’Dots to bind to targets in the cartilage matrix to enhance delivery of therapeutics agents.

The student working on this project will (1) design a saturation/release protocol utilizing UV-vis spectroscopy, (2a) evaluate beginning and end points using confocal fluorescence microscopy, (2b) analyze these images in MATLAB, (3) sterilely performing this retention experiment, (4) model C’ Dot release from cartilage explants over time.

This project is suitable for a student interested in tissue culture, biomaterials design and characterization, and MATLAB data analysis. No prior experience is required, but experience in MATLAB (or similar programming courses) may prove useful. The student will be trained by a graduate student and is expected to complete the project in one year.

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