



Biomedical Engineering

Lecture Series Seminar

Strategy for Cartilage Tissue Engineering Using Stem Cells

Chun-Yuh Charles Huang, Ph.D

Department of Biomedical Engineering
University of Miami

Thursday, October 14, 2010

1:00 pm, EC2300

Abstract: Articular cartilage has specific characteristics such as avascularity and low cellularity which limit capability of self-repair. The outcome of injuries to articular cartilage usually results in the development of degenerative changes, ultimately leading to osteoarthritis that afflicts the articular joints of 15% of the US population. Tissue engineering offers a promising way to produce functional replacement tissues for repairing damaged cartilage. Previous mechanobiology studies of bone marrow derived stem cells (BM-MSCs) has suggested that dynamic loading can be a potential stimulus to promote cartilage development (chondrogenesis) of BM-MSCs. Mechanical loading has also been shown to affect distribution and metabolism of nutrients within the cartilaginous tissue. Based on these findings, a novel bioreactor system could be developed to study the biological responses of engineered tissue to physical and biochemical signals which are analyzed online, and subsequently provide the optimal environment for developing functional replacement tissues by feed-back controlling these signals. The presentation will describe a novel strategy for cartilage tissue engineering using bioreactor technology. Finally, a recent study of stem cells derived from human periodontal ligament will be also presented.

Bio: Charles Huang is an Assistant Professor in the Department of Biomedical Engineering at the University of Miami (UM). He is also an Adjunct Professor at Nova Southeastern University (NSU). Before rejoining the UM BME department, he was an Assistant Professor in the Department of Pediatric Dentistry at NSU (2007-2008). He received his B.S. and M.S. in mechanical engineering at the National Chiao-Tung University in Taiwan. He later obtained his M. Phil and PhD in Mechanical Engineering/Biomechanics at Columbia University. Currently, he is involved in mechanobiology research, stem cell research, and craniofacial research. His recent mechanobiology studies of stem cells were published in the internationally renowned journal *Stem Cells*. Huang has also contributed to other notable publications in peer-reviewed journals such as *Cellular and Molecular Bioengineering*, *Journal of Biomechanics*, *Journal of Orthopaedic Research*, *Spine*, and *Stem Cells and Development*.