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SEMINAR ANNOUNCEMENT

SPEAKER: Dr. Gilda Barabino
The Wallace H. Coulter Department of Biomedical Engineering
Georgia Institute of Technology
Atlanta, Georgia

TOPIC: Environmental Effects on Tissue-Engineered Cartilage

DATE: Tuesday, February 16, 2010

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

Current therapies for defects in articular cartilage, the load-bearing lining of diarthrodial joints, are hampered by the avascular nature of cartilage and its limited ability for self-repair and regeneration. The use of bioreactors for the in vitro generation of cartilage tissue using chondrocytes seeded on scaffolds is a promising approach for the development of viable cartilage substitutes. The hydrodynamic environment within bioreactors has been shown to influence matrix composition, morphology, and mechanical properties of engineered tissue constructs. We have employed a wavy-walled bioreactor with multiple well-defined hydrodynamic zones to better understand the complex interplay between hydrodynamic, biochemical and biomechanical environments and their relationship to biochemical, histological, and mechanical engineered tissue properties. For example, the level of shear in the presence or absence of growth factors and media supplements was found to modulate the thickness of the fibrous capsule that typically characterizes cartilage constructs cultivated in dynamic environments, and the thickness of the capsule impacted mechanical properties. Based on correlations we've determined between hydrodynamic parameters and cartilage tissue properties, we developed a tissue growth model with predictive capabilities. This presentation summarizes recent investigations and highlights future directions towards the elucidation of the underpinnings of optimal bioreactor-based strategies required for the development of transplantable tissue-engineered cartilage.