College of Engineering
Department of Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

3:30-4:30pm, Friday, September 7, 2012

Frank H. Walk Design Presentation Room

Cryopreservation of Human Adipose Tissue Derived Adult Stem Cells

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Human adipose (fat) tissue provides a uniquely abundant and accessible source of adult stem cells. In response to chemical, hormonal or structural stimuli, these adipose-derived adult stem cells (ASCs) can differentiate along multiple lineage pathways, including adipocytes, chondrocytes and osteoblasts. Successful cryopreservation of scientifically and commercially important ASCs would revolutionize the tissue engineering and regenerative medicine industry. In a typical cryopreservation protocol, the system to be preserved is first loaded with cryoprotective agents (CPAs) to alleviate cell damage from either dehydration or intracellular ice formation during the subsequent freezing process. The temperature of the system is then reduced to a predefined temperature (liquid nitrogen temperature) for long term storage. Before the cryopreserved system is transplanted, it must be thawed and the added CPAs must be removed. Thus, there are many steps within a cryopreservation protocol that could (and do) lead to a loss of cell function, including exposure to CPAs, cooling, dehydration/ice formation in the presence of ice and removal of CPAs. This talk will present an overview of our studies on the freezing storage of ASCs in the presence of polymeric CPAs as well as highlight our recent efforts to fabricate uni- and multi-dimensional adult stem cell (artificial tissue) constructs.

* Dr. Devireddy earned a Bachelor's degree in Mechanical Engineering from the University of Madras in 1993, followed by a Master of Science in the same field in 1995 from the University of Colorado at Boulder. Subsequently, he was awarded the Doctor of Philosophy degree in Mechanical Engineering from the University of Minnesota at Minneapolis in 1999. After spending a year as a Postdoctoral Fellow in the Department of Chemical Engineering and Materials Science at the University of Minnesota at Minneapolis, he joined the Louisiana State University, where he currently serves as a faculty member in Mechanical Engineering. Dr. Devireddy is interested in a wide of variety of biological phenomena at low temperatures with particular emphasis on phase change phenomena. Dr. Devireddy has co-authored more than 60 journal papers and over 80 conference proceedings and meeting abstracts. He is also the recipient of several best paper awards including one from the Society of Cryobiology in 1998, another from the ASME Heat Transfer Division in 2002 and another from Materials Research Society in 2004. Dr. Devireddy's research is (or was) supported by the Louisiana Board of Regents, the LSU System Office, NASA, LSU Council on Research, the Whitaker Foundation, the National Science Foundation, and the National Institutes of Health. Dr. Devireddy is an ASME Fellow.