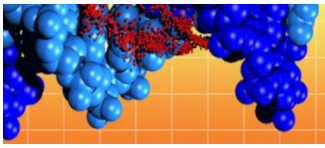

CENTER FOR BIOINFORMATICS & COMPUTATIONAL BIOLOGY

BIOINFORMATICS 2014 FALL SEMINAR SERIES

Hosted by: Department of Computer and Information Sciences,
Department of Electrical and Computer Engineering &
Center for Bioinformatics and Computational Biology
http://bioinformatics.udel.edu/seminars

MONDAY, October 6, 2014
DBI Room 102

Prevention and Rehabilitation for Post-Traumatic Osteoarthritis

3:30pm – X. Lucas Lu, PhD
Assistant Professor
Cartilage Bioengineering Laboratory
Department of Mechanical Engineering

ABSTRACT: Traumatic joint damage is one of the most common knee injuries for humans. 80% of patients who have experienced a meniscal or ligamentous tear develop osteoarthritic-like changes in the joint cartilage, which is referred to as post-traumatic osteoarthritis (PTOA). Unfortunately no effective treatments are currently available to prevent PTOA development after traumatic injuries. We have found that bisphosphonates, an FDA approved drug prescribed to treat osteoporosis, can inhibit PTOA in traumatized joints. Mechanism studies using *in vitro* organ culture models showed that the drug can directly protect the cells in cartilage from traumatic damage, and scientific evidence implies that the drug effect is related to the mevalonate pathway in joints. These findings provide us a promising therapeutic candidate for the prevention of PTOA. In addition, at the early stage of osteoarthritis, lesion or regional loss of cartilage is common in joints. Several surgical techniques, such as microfracture and transfer of artificial tissue, are developed to repair the lesions. The surgical outcome is highly dependent on the rehabilitation protocols. Using both finite element modeling and culture of stem cells, we compared the effects and timing of two most common rehabilitation strategies, continuous passive motion versus partial weight bearing, and revealed that the effects of these two profiles are case dependent. The findings are important for the design of patient-specific rehabilitation protocols.