Biomedical Engineering

Lecture Series Seminar

New Directions in the Treatment of Patellofemoral Joint Pain

Friday, March 13th, 2009

11:00 AM, EC 2300

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The patellofemoral joint is sometimes the first cause of pain in patients suffering from osteoarthritis. Relieving that pain in through replacement of the articulating surfaces is currently the standard method of treatment. However, the loads in the patellofemoral joint are not well known, making engineering of replacements for this joint somewhat uncertain. Here, a review of the literature shows a wide range of reported loads in the joint during different activities without much indication as to which loads are correct. Application of these loads to existing successfully marketed implants, however, sheds some light on the correct range of loads that the patellofemoral joint experiences during normal activity. And, a method for recreating clinically relevant loading on patella implants is described here and the results are reviewed. Further analysis of the data in the literature shows that during the largest percentage of daily activity, the patellofemoral joint experiences low level loads, making it a candidate for implants manufactured from new materials. Several polymer materials are examined for application to the patellofemoral joint. In particular, hydrogels strengthened by partial crystallization are shown to have promise for cartilage replacement, and some traditional polymers are shown to have advantages over existing implant materials in tests where they are articulated against living cartilage.

James J. Mason received his B.S. degree in Mechanical Engineering and Materials Science from the University of California at Berkeley in 1986, his M.S. degree in Materials Science from the University of California at Berkeley in 1988 and his Ph.D. degree in Applied Mechanics from the California Institute of Technology in 1993. Upon completion of his Ph.D., Dr. Mason became a member of the faculty at the University of Notre Dame. At Notre Dame he founded a small company to develop fatigue resistant biomaterials. Shortly thereafter, Dr. Mason took a position in Warsaw, IN managing the biomechanics research group at Zimmer Inc. In 2007 he was promoted to Associate Director of Trauma Research at Zimmer Inc.