BONE BIOMECHANICS: FROM BENCH TO BEDSIDE
Tony M. Keaveny
Dept. of Mechanical Engineering and Bioengineering, Univ of California, Berkeley

Abstract
Millions of people take drugs for osteoporosis, but millions of osteoporotic fractures continue to occur. Thus, there remains a need to better understand the mechanisms by which bone deteriorates with age and disease, and how drug treatments alter bone strength. There is also a need to improve clinical assessment of bone strength for elderly orthopaedic surgery patients. In this context, I will discuss recent research on the micro-mechanical failure mechanisms of trabecular bone and whole bones, and how we are translating this research to a clinically deployable technology. At the core of this technology is biomechanical analysis of medical images, ranging from high-resolution micro-CT scans to rather coarse clinical scans. I will discuss some of the challenges encountered in translating this technology “from bench to beside” and how this general approach is now being extended to a very different clinical application — patient-specific analysis of blood flow in stroke patients for their clinical management.

Bio
Tony M. Keaveny is Professor of Mechanical Engineering and Bioengineering at the University of California at Berkeley and director of the Berkeley Orthopaedic Biomechanics Laboratory. An expert in bone biomechanics, osteoporosis, finite element modeling, and the biomechanics of bone-implant systems, Dr. Keaveny has published numerous articles in such journals as the Journal of Bone and Mineral Research, Bone, Spine, Journal of Orthopaedic Research, Journal of Biomechanics, Journal of Biomechanical Engineering, and is co-author of the textbook “Orthopaedic Biomechanics: Mechanics and Design in Musculoskeletal Systems”. Dr. Keaveny has served as Principal Investigator on numerous grants funded by NIH, NSF, The Whitaker Foundation, and various industrial entities, and is the recipient of the Y.C. Fung Young Investigator Award and the Van C. Mow Medal, both from the ASME Bioengineering Division. A keen advocate of translational research, in 2004 Dr. Keaveny founded O.N. Diagnostics in Berkeley, California, to translate some of his laboratory research at UC Berkeley into clinical practice.