Comparative Medicine



Life Sciences Institute



Longitudinal In Vivo Imaging of Skeletal Tissue Regeneration

Professor Ralph Müller Department of Health Sciences and Technology Laboratory for Bone Biomechanics ETH Zürich, Switzerland

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Abstract

Professor Müller's research employs state-of-the-art biomechanical testing and simulation techniques as well as novel bioimaging and visualization strategies for musculoskeletal tissues. The study of Bone Biomechanics aims at providing a bridge between biologists, who have brought molecular and cellular components within the realm of engineering, and engineers, who have brought the methods of measurement, analysis, synthesis, and control within the realm of molecular and cell biology. More specifically, new developments in biomechanical research are aimed at the quantification and modelling of bone at the molecular, cellular, and organ-level incorporating novel principles and techniques of mechanics, imaging, and *in silico* modelling applied to the areas of tissue engineering and repair, systems mechanobiology and personalized medicine. Today, these techniques are successfully employed for the quantitative assessment and monitoring of structure-function relationships in tissue regeneration, growth and adaptation.

About the Speaker

Dr. Müller is a Professor of Biomechanics at the Department of Health Sciences and Technology and heads the Laboratory for Bone Biomechanics at ETH Zürich in Switzerland. He studied electrical engineering at ETH Zürich, where he also received his doctoral degree in 1994. In 1996, he moved to Boston where he served as a tenure-track Assistant Professor of Orthopedic Surgery at Harvard Medical School and the Associate Director of the Orthopedic Biomechanics Laboratory. Between 2000 and 2011, he was first an SNF Professor of Bioengineering at the Department of Information Technology and Electrical Engineering and then Associate and Full Professor of Biomechanics at the Department of Mechanical and Process Engineering at ETH Zürich. Dr. Müller is an author of 321 refereed original journal and 226 proceeding articles, 80 chapters and reviews, 2 books and monographs, and 646 peer-reviewed abstracts. His work has been cited over 31,000 times on Google Scholar with an h-index of 91. In 2008, he co-founded two MedTech spin-off companies, Pearltec AG, developing and marketing novel patient positioning systems for medical imaging procedures using patented technology from ETH Zürich, and b-cube AG, now a subsidiary of Scanco Medical.