USC Viterbi

Department of
Biomedical Engineering

USC University of Southern California

The Fred S. Grodins Keynote Lecture

Kullervo Hynynen, Ph.D.

Professor
Department of Medical Biophysics,
University of Toronto, and
Sunnybrook Research Institute,
Toronto,Ontario,Canada

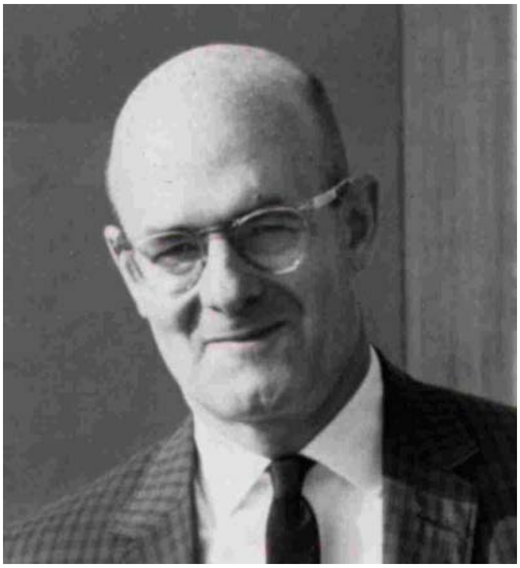
Lecture: Tuesday, 11/13/18 - 3:00 pm to 4:00 pm
MCB (Michelson Building), Conference Room, 101

Followed by a reception right outside MCB 101 from 4:00 pm to 5:30 pm. Open to all BME Faculty, Staff, and Students.

Non-invasive brain treatments using image-guided and modulated ultrasound beams

When combined with imaging-guidance focused ultrasound (FUS) provides means for localized delivery of mechanical energy deep into tissues. This focal energy deposition can modify tissue function via thermal or mechanical interactions with the tissue. MRI-guided hemi-spherical phased array technology with CT based beam modulation has made FUS treatments of brain through intact skull possible in the clinical setting. Thermal ablation of a target in a thalamus has been shown to be effective in the treatment of essential tremor and is now FDA approved. The impact of an ultrasound exposure can be potentiated by intravascular microbubbles that can enhance blood-brain barrier (BBB) permeability for a wide variety of molecules, particles and even cells. The ability to modulate the BBB has been shown to be effective in treatments of many deceases in animal models with initial patient trials showing clinical feasibility. In this talk, the progress in utilizing ultrasound phased array technology for brain treatments will be reviewed and its further potential discussed.

Bio: Dr. Hynynen received his PhD from the University of Aberdeen, United Kingdom. After completing his postdoctoral training in biomedical ultrasound also at the University of Aberdeen, he accepted a faculty position at the University of Arizona. After, he joined the faculty at the Harvard Medical School, and Brigham and Women's Hospital in Boston, MA. There he reached the rank of full Professor, and founded and directed the Focused Ultrasound Laboratory. In 2006 he moved to the University of Toronto. He is currently the Director of Physical Sciences Platform at the Sunnybrook Research Institute and a Professor in the Department of Medical Biophysics and Cross Appointed Professor at the Institute of Biomaterials & Biomedical Engineering (IBBME) at the University of Toronto. His research focuses on utilizing focused ultrasound for non-invasive, image-guided interventions. His work in the brain spans from developing devices and methods for focal tissue ablation in clinical testing to research for targeted drug and cell delivery and stroke treatments.



Grodins Keynote Lecture

Fred S. Grodins (1915-1989), joined the faculty at USC in 1967 as Professor of Physiology and Electrical Engineering. He established Biomedical Engineering (BME) at USC first as a Program in 1970 and subsequently as a full-fledged Department in 1976. Dr. Grodins was Professor and Chairman of BME until 1986. He remained active in research as Emeritus Professor at USC until his death in 1989.

Universally acknowledged as a pioneer in the field of biomedical engineering, Dr. Grodins made profound and lasting contributions in the area of physiological control. His famous monograph on “Control Theory and Biological Systems”, published in 1963, is considered a landmark publication on the application of engineering control theory to physiological systems. Dr. Grodins published over 100 scientific articles and book chapters in the areas of respiratory physiology, cardiovascular control, mathematical modeling and computer simulation. Through his career-long active research program, funded by the National Institutes of Health, Dr. Grodins was responsible for the training of numerous graduate students and postdoctoral fellows.

Dr. Grodins served on many governmental panels and advisory committees for the NIH, NSF and NASA, and was on the editorial boards of the American Journal of Physiology, the Journal of Applied Physiology, Circulation Research and Physiological Reviews. A past president and member of the board of directors of the Biomedical Engineering Society, Dr. Grodins was also a member of the American Physiological Society, Phi Beta Kappa, Sigma Xi, and the American Association for the Advancement of Science.

Dr. Grodins received his B.S., M.S., M.D. and Ph.D. (Physiology) degrees from Northwestern University. He served in the U.S. Air Force from 1944 to 1946. He was Abbott Professor of Physiology at Northwestern until his move to USC in 1967.