

**MECHANICAL ENGINEERING DEPARTMENT**

**ME/ISyE 8773-8774**

*Co-Sponsored by Biomedical Engineering*

**‘Say, can you hear? There must be something in there I fear.**

by

**Richard D. Rabbitt, Ph.D.**

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**Salt Lake City, UT 84112-9458**

**Wednesday, October 17, 2007**

**3:15 p.m. — Refreshments before the seminar**

**3:30 p.m. — Graduate Seminar**

**Room 2-101 Hasselmo Hall**

**ABSTRACT** — Sensory hair-cell organs of the inner ear are remarkably sensitive and can resolve mechanical motion at a level approaching thermal noise. This is achieved on the cellular level through an active mechano-transduction process involving multiple molecular motors – including myosin located in the ciliary hair bundles of all sensory hair cells and prestin located in the lateral wall of mammalian outer hair cells. On the organ level, biomechanical specializations play a central role in determining the sensitivity to a particular mechanical stimulus, such as sound (cochlea), linear acceleration (otolith organs) or angular acceleration (semicircular canals). The first part of the presentation will begin with a brief overview of organ-level biomechanics of the inner ear followed by a discussion of recent data on role of hair bundle motility in inner ear function. The second part of the presentation will focus on the cellular basis of amplification in the cochlea with specific attention to outer hair cell somatic electromotility and the role of prestin-mediated electromechanics on mammalian hearing. New micro-domain electric impedance (mEI) data will be presented showing liquid-crystal piezoelectric properties of the outer hair cell lateral wall. The mEI data were collected using novel MEMS developed in our laboratory for single-cell electrophysiological studies. Results further elucidate the role of active electromotile properties of hair cells in enhancing the sensitivity and selectivity of the mammalian cochlea. (Supported by the NIH R01-DC04928)

**BIO** — **Dr. Richard D. Rabbitt** was awarded the Ph.D. from Rensselaer Polytechnic Institute in 1986 and is currently Professor and Chair of Bioengineering at the University of Utah. He is a Fellow of the American Institute for Medical and Biological Engineering, Institutva Cooptavit of the Societas Bárányensis and perhaps best known for his contributions to understanding the vestibular system. His current research interests include auditory/vestibular sensory physiology, hair-cell biophysics, micro-electric impedance tomography/spectroscopy of isolated cells and MEMS biosensors.

Informal Faculty Luncheon: Wednesday, October 17, 2007, 12:00 noon. Meet in 1100 ME and walk to lunch with other faculty. Prof. Richard Rabbitt will be able to attend.