IEM SEMINAR SERIES

TUESDAY
MARCH 29th, 2016

Why Spatially Resolved Biochemistry is Every (Electrical, Computer Science, Mechanical and Biomedical) Engineer's Dream

Institute for Engineering in Medicine

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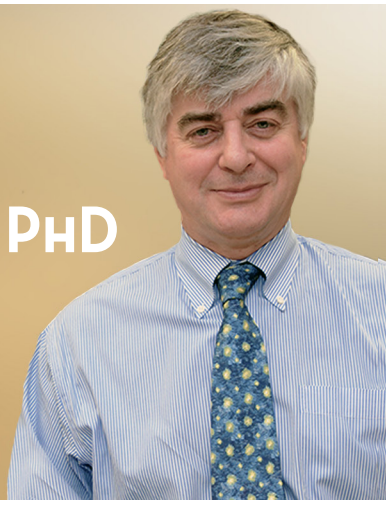

KEITH R. THULBORN, MD, PHD
Professor of Radiology, Physiology & Biophysics
University of Illinois
Chicago

FREE event, no registration required.

Pizza and drinks will be provided at around 11:45am.

12:00PM - 1:00PM
Center for Magnetic Resonance Research
Seminar Room 2-102

For additional information on Dr. Thulborn's presentation, please contact:
scot0353@umn.edu

The Institute for Engineering in Medicine (IEM) is pleased to announce the IEM Seminar by Dr. Keith R. Thulborn, "Why Spatially Resolved Biochemistry is Every (Electrical, Computer Science, Mechanical and Biomedical) Engineer's Dream."

Clinical MR imaging of the brain is based on the signal from the hydrogen nucleus in water at a concentration of 80 moles/liter. This is the strongest MR signal that can be spatially encoded in a few seconds to minutes to produce the exquisite anatomical and physiological images that have been a revolution in medicine. Such images are qualitative images based on image contrast. The signals from the other elements are biologically more interesting but have weaker signals due to much lower concentrations (millimoles/liter) and lower intrinsic sensitivity based on nuclear properties. The exploitation of these signals has demanded the development of ultra-high magnetic field magnets with dimensions that allow humans to be imaged. The radiofrequency antennae and associated hardware and the acquisition software must be adapted to the nuclear properties of each element to ensure efficient image acquisition in times acceptable to humans (<10 minutes). The quantification of these signals in terms of concentrations and metabolic rates now allows modeling of in vivo biochemistry. These engineering efforts are yielding new information relevant to increasing our understanding of human health and disease. These efforts in radiofrequency coil design, pulse sequence and image post processing, motivated by new clinical questions, will be discussed based on my experience with human brain imaging of sodium, potassium, oxygen and phosphorus at 9.4Tesla.

Keith Thulborn, MD, PhD, is Director of the Center for Magnetic Resonance Research at University of Illinois at Chicago. His PhD in Biochemistry (1979) from University of Melbourne, Australia, was followed by 2 years at Oxford University, England. He established the Center for Magnetic Resonance Research at University of Pittsburgh Medical Center by building the first 3 Tesla MRI scanner for human neuro-imaging. He left as full Professor for University of Illinois at Chicago in 2000 to build the first 9.4 Tesla MRI scanner for human metabolic imaging. His national and international collaborations are sheparding metabolic imaging into clinical practice.

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