DEPARTMENT OF RADIOLOGICAL SERVICES
UNIVERSITY of CALIFORNIA, IRVINE - SCHOOL OF MEDICINE

RESEARCH SEMINAR SERIES IN RADIOLOGICAL SCIENCES

WHEN: Wednesday April 9, 2014

12:00 noon

WHERE: LIVE - Irvine Campus: Medical Education Bldg, Colloquium 3070

TELECAST - UC Irvine Medical Center: Radiology Conference Room 0117

NOTE: Guest Speaker, will be in Med Ed Colloquium 3070; video cast will be in UCIMC Radiology Conference Room 0117

Speaker: Charles A. Mistretta, Ph.D Professor

Title: "4D DSA: A New Tool For Interventional Radiology"

Abstract:

The introduction of conventional DSA did much to stimulate the development of interventional radiology. That technique provided a time resolved series of 2D images. However, the hope that most of angiography could be done with intravenous injections was not realized because of vessel overlap problems and the need to reinject using different projection angles. Recently, using undersampled acquisition and constrained reconstruction techniques, it has been possible to achieve image acceleration factors up to 800 in magnetic resonance angiography. Using related principles, it has been possible to

develop a 4D version of DSA that provides a time series of 3D angiographic volumes 300 times faster than would be possible with multiple C-Arm gantry rotations. The 3D angiograms obtained at rates up to 30/sec can be view from any angle without reinjection or re-exposure. The technique is particularly useful for examinations of AVMs and fistulas where the contrast is rapidly changing. Similar techniques are under development to enable 4D Fluoroscopy that will permit real time viewing of device placement from any angle without gantry movement.

About the Presenter:

Charles A. Mistretta received his Ph.D. from Harvard in 1968 and in 1971, encouraged by John Cameron, began his career in Medical Physics at the University of Wisconsin. Dr. Mistretta became a full professor in the Department of Radiology in 1978 and in 1986 was designated as the John R. Cameron Professor in the Departments of Medical Physics, Radiology, and Biomedical Engineering.

Mistretta has been involved in numerous research areas related to the development of modern time-resolved angiography. This began with the development of digital subtraction angiography (1980). The development of fast angiographic techniques was then extended to magnetic resonance angiography where the development of highly undersampled acquisition such as VIPR and the introduction of constrained reconstruction techniques like HYPR permitted violations of the Nyquist theorem by factors as large as 800. These principles were extended to X-ray angiography in the form of 4D digital subtraction angiography [DSA] that provides time-resolved 3D volumes 300 times faster than traditional rotational 3D DSA techniques. 4D DSA is combined with 4D Fluoroscopy that provides fluoroscopic viewing from arbitrary views without gantry rotation. These techniques complete a thirty-year circle of angiographic development that permitted improved, less invasive diagnosis and safer interventions.

Chuck presently holds 45 issued and 7 pending US patents and their foreign counterparts. He is a Fellow of the American Association of Physicists in Medicine the ISMRM and the American Institute for Medical and Biological Engineering. He has received the Edith Quimby Award for Lifetime Achievement from the AAPM, and has been awarded the J. Allyn Taylor International Prize in Medicine, and an MIT Technology Achievement Award. He was the RSNA Outstanding Researcher for 2010 and was recently selected by the International Organization of Medical Physics as the recipient of the 2012 Marie Curie Skłodowska Award. He has recently been elected to the National Academy of Engineering.