

Cardiac Bioelectricity & Arrhythmia Center (CBAC) Presents:

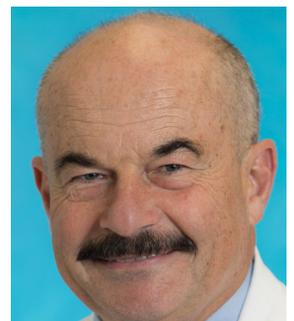
New Approaches to Unravel the Genetics of Complex Diseases

Monday, November 4
5:30pm - 6:30pm
Reception at 5:00pm

Brauer Hall, Rm 12
Danforth Campus

James Weiss

Distinguished Professor of
Medicine & Physiology
Chief, Division of Cardiology
Director, Cardiovascular
Research Lab, UCLA

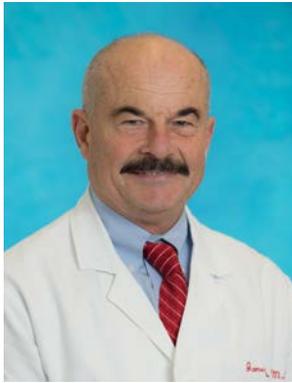


Presentation Title: New Approaches to the Genetics of Complex Diseases

Presenter: James N. Weiss, MD, Division of Cardiology, David Geffen School of Medicine at UCLA, Los Angeles, CA

Abstract

Gene Module Association Studies (GMAS) are a novel approach complementing Genome Wide Association Studies (GWAS) to understand complex diseases by focusing on how genes work together in groups rather than singly. The first step is to characterize phenotypic differences among a genetically diverse population. The second step is to use DNA microarray (or other high throughput) data from the population to construct gene co-expression networks. Co-expression analysis typically groups 20,000 genes into 20-30 modules containing 10's to 100's of genes, whose aggregate behavior can be represented by the module's "eigengene." The third step is to correlate expression patterns with phenotype, as in GWAS, only applied to eigengenes instead of SNPs. The goal of the GMAS approach is to identify groups of co-regulated genes that explain complex traits from a systems perspective. From an evolutionary standpoint, we hypothesize that variability in eigengene patterns reflects the "good enough solution" concept, that biological systems are sufficiently complex so that many possible combinations of the same elements (in this case eigengenes) can produce an equivalent output, i.e. a "good enough solution" to accomplish normal biological functions. However, when faced with environmental stresses, some "good enough solutions" adapt better than others, explaining individual variability to disease and drug susceptibility. If validated in heart failure, GMAS may imply that common polygenic diseases as well are related much as to group interactions between normal genes, as to multiple gene mutations.



James N. Weiss, MD
David Geffen School of Medicine
at UCLA

James N. Weiss received his undergraduate degree in physics from Hamilton College, and his medical degree and internal medicine training at the University of Pennsylvania School of Medicine. He completed his cardiology fellowship at the University of California, Los Angeles in 1981, including clinical electrophysiology training at the University of Maastricht, the Netherlands. He then joined the faculty at the UCLA School of Medicine, where he was director of Clinical Cardiac Electrophysiology from 1981-1985. He became the first holder of the Chizuko Kawata Endowed Chair in Cardiology in 1993, the Director of the Cardiovascular Research Laboratory in 1997, the Chief of Cardiology in 2001, and is currently Distinguished Professor of Medicine and Physiology. From a background in ion channel biophysics and basic and clinical cardiac electrophysiology, he currently leads an interdisciplinary group which combines mathematical and experimental biology to develop innovative techniques to treat cardiac arrhythmias, to prevent injury from heart attacks and to understand the genetic basis of heart disease using systems biology approaches. He has directed a National Institutes of Health Specialized Center of Research in Sudden Cardiac Death from 1995-2005, since continued as a National Institutes of Health Program Project Grant, and several other grants. He has published over 300 articles and holds memberships in numerous professional organizations, including the American Heart Association, American College of Cardiology, the Heart Rhythm Society, the American Society of Clinical Investigation, and the Association of University Cardiologists.