

## **Intelligent Clinical Data Analysis using Machine Learning Methods Inspired by Nature**

Computing algorithms inspired by natural metaphors have been around for decades, arguably starting with the neural network model proposed by McCulloch and Pitts in 1943. Since then, numerous analytic approaches have been developed that look to the biological and physical world for examples of optimization, classification, detection, and prediction. These include genetic algorithms and derivative approaches, artificial immune systems, ant colony optimization, swarm intelligence, social and biological networks, disease contagion. This talk will examine these in the context of clinical data analysis, focusing on such issues as feature selection and dimensionality reduction in SNP analysis, disease classification and outcome prediction, detection of drug-drug interactions, and development of epidemic models. The purpose of the talk is to simulate thought and discussion on using biologically inspired methods for analyzing clinical data from a variety of sources, such as medical records, registries, surveillance systems, and claims databases.

### **John H. Holmes, PhD Biography**

John H. Holmes, Ph.D., is Associate Professor of Medical Informatics in Epidemiology and is Director of the Doctoral Program in Epidemiology in the Department of Biostatistics and Epidemiology in the University of Pennsylvania Perelman School of Medicine. Dr. Holmes' research interests are focused on several areas in medical informatics, including evolutionary computation and machine learning approaches to knowledge discovery in clinical databases (data mining), interoperable information systems infrastructures for epidemiologic surveillance, clinical decision support systems, semantic analysis, and information systems user (physician and patient) behavior. Dr. Holmes is a principal or co-investigator on projects funded by the National Cancer Institute, the National Library of Medicine, and the Agency for Healthcare Research and Quality. He chairs the Biomedical Computing and Health Informatics study section at the US National Institutes of Health. Dr. Holmes is an elected Fellow of the American College of Medical Informatics and the American College of Epidemiology. He is a Senior Fellow of the Leonard Davis Institute of Health Economics, the Center for Public Health Initiatives, and Center for Health Behavior, all located at the University of Pennsylvania.