Biomedical and Health Informatics Series

Tuesday, March 27th, Room T-739, 12:00-12:50

Atul Butte, MD, PhD

Assistant Professor
Stanford University School of Medicine
Director, Center for Pediatric Bioinformatics Lucile Packard Children's Hospital

"Exploring Genomic Medicine Using Integrative Biology"

Abstract: The past 10 years have led to a variety of measurements tools in molecular biology that are nearly-comprehensive in nature. For example, microarrays are just one of at least 30 large-scale measurement or experimental modalities available to investigators in molecular biology. Instead of focusing on the cell, or the genotype, or on any single measurement modality, using integrative biology allows us to think holistically and horizontally. A disease like diabetes can lead to myocardial infarction, nephropathy, and neuropathy; to study diabetes in genomic medicine would require reasoning from a disease to all its various complications to the genome and back.

I will highlight three recent integrative-biology projects from the laboratory with direct implications for medicine. (1) I will show how we have built computational tools that simultaneously integrate genetic, genomic, proteomic, and knockout measurements to help enable the discovery of genes with variants associated with complex polygenic disorders, including obesity and diabetes mellitus. (2) Nearly 100 years ago, Johannsen proposed the "equation" that phenotype is secondary to both genes and environment. I will show the methods we have constructed that take advantage of the enormous amount of publicly-available genomic data to enable a first-step towards solving Johannsen's "equation" for all genes, environmental factors, and phenotypes. (3) Modern day use of DNA sequencing has enabled the re-organization of species in the taxonomical trees that date back to Linnaeus. But Linnaeus was also among the first to suggest a taxonomical classification for diseases, or nosology. Sufficient genomic data now exists for us to consider building the first genomic-data driven nosology. I will show how such a nosology enables the discovery of new biomarkers for disease and suggests novel roles for drugs in the treatment of disease.

Atul Butte, M.D., Ph.D. is an Assistant Professor in Medicine (Medical Informatics) and Pediatrics at the Stanford University School of Medicine and the Lucile Packard Children's Hospital, and a board-certified pediatric endocrinologist. Dr. Butte received his undergraduate degree in Computer Science from Brown University in 1991, and worked in several stints as a software engineer at Apple Computer (on the System 7 team) and Microsoft Corporation (on the Excel team). He graduated from the Brown University School of Medicine in 1995, during which he worked as a research fellow at NIDDK through the Howard Hughes/NIH Research Scholars Program. He completed his residency in Pediatrics and Fellowship in Pediatric Endocrinology in 2001, both at Children's Hospital, Boston. Dr. Butte received a Ph.D. in Health Sciences and Technology from the Medical Engineering / Medical Physics Program in the Division of Health Sciences and Technology, at Harvard Medical School and Massachusetts Institute of Technology.

Dr. Butte's laboratory focuses on solving problems relevant to genomic medicine by developing new biomedical-informatics methodologies in integrative biology. Dr. Butte has authored more than 25 publications in bioinformatics, medical informatics, and molecular diabetes and has delivered more than 35 presentations world-wide on bioinformatics, including nine at the National Institutes of Health or NIH-sponsored meetings. Along with Isaac Kohane and Alvin Kho, Dr. Butte has co-authored one of the first books on microarray analysis titled "Microarrays for an Integrative Genomics" published by MIT Press. Dr. Butte's recent awards include the 2007 Genome Technology "Tomorrow's Principal Investigator" Award, the 2006 Howard Hughes Medical Institute Early Career Award, the 2006 PhRMA Foundation Research Starter Grant in Informatics, the 2002 and 2003 American Association for Clinical Chemistry Outstanding Speaker Award, and the 2001 Lawson Wilkins Pediatric Endocrine Society Clinical Scholar Award. Dr. Butte's research is supported by grants from the Howard Hughes Medical Institute, the National Library of Medicine, the National Institute for General Medical Science, and the National Human Genome Research Institute.