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***Transforming Medicine: Genomics, Bioinformatics, and Human Health***

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The completion of human genome sequencing in April 2003 marked the beginning of a new era for modern biology. Since that time, the impact of having the human sequence in hand has been nothing short of tremendous. The attainment of this goal, which many have compared to landing a man on the moon, will obviously have a profound effect on how biological and biomedical research will be conducted in the future. The intelligent use of sequence data from humans and other organisms, along with recent technological innovation fostered by the Human Genome Project, has already led to important advances in our understanding of diseases that have a genetic basis. More importantly, the advent of the genomic era will have a profound effect on how health care is delivered from this point forward.

This lecture will provide an overview of current research themes in genomics and bioinformatics, all of which are aimed at understanding the genetic factors influencing risk for complex diseases. These efforts include whole-genome association approaches to common disease, large-scale clinical genotyping projects, the comprehensive identification of the structural and functional components in the human genome (the ENCODE Project), the Cancer Genome Atlas, and new advances in the area of chemical genomics. These research efforts, all of which rely on cutting-edge genomic and bioinformatic approaches, have already begun to yield important insight into genetic pathways that make us more susceptible to genetic disorders. These findings, in turn, are establishing an important groundwork for the discovery of new molecular targets for diagnosis, treatment, and prevention of human disease.

Biosketch

Andreas D. Baxevanis, Ph.D.

Dr. Baxevanis is the Deputy Scientific Director and the Director of the Computational Genomics Program at the National Human Genome Research Institute, National Institutes of Health.

He received his B.S. in biological sciences from Cornell University in 1984 and his Ph.D. in the Department of Biology at The Johns Hopkins University in 1991, where his thesis work involved understanding the basic physicochemical properties of the core histone proteins. His postdoctoral work at the National Center for Biotechnology Information, NIH, concentrated on understanding both the core histones and the high mobility group class of proteins from an informatics standpoint, applying both sequence- and structure-based techniques in identifying key structural determinants for these chromosomal proteins.

Dr. Baxevanis' current research focuses on better-understanding structure-function relationships in the homoeodomain class of proteins and how mutations in these proteins contribute to human disease. His group is also involved in projects aimed at the identification of certain key human disease genes, as well as in the development of new programs for the analysis of sequence, gene expression, and clinical data.

He is co-author of the textbook *Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins*, now in its third edition and currently in use at over 125 universities worldwide. He is currently the editor-in-chief of *Current Protocols in Bioinformatics*, associate editor of *Proteins: Structure, Function, and Bioinformatics*, and a member of the advisory board of *Genome Biology*. He has also served as executive editor for the Database Issue of *Nucleic Acids Research* and Senior Editor of *Molecular Cancer Therapeutics*. Dr. Baxevanis currently serves on a number of academic scientific advisory boards.

His involvement in educational activities include teaching bioinformatics at The Johns Hopkins University, serving as an adjunct faculty member at Boston University, lecturing in numerous courses, and developing materials such as the *User's Guide to the Human Genome*, a recent supplement to *Nature Genetics* intended to facilitate the use of genomic sequence data.

Dr. Baxevanis' accomplishments have been recognized by the Bodossaki Foundation, who has awarded him their 2000 Academic Prize in Medicine and Biology. This award is Greece's highest honor for young academics and scientists of Greek heritage throughout the world.