

UCSD Bioengineering Professor Wins 2004 Packard Foundation Fellowship

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The David and Lucile Packard Foundation has named Trey Ideker, an assistant professor at UCSD's Jacobs School of Engineering, as one of this year's 16 recipients of the Packard Fellowships for Science and Engineering. Ideker and each of the other fellows will receive unrestricted research grants of \$625,000 over five years.

Ideker is a pioneer in systems biology, a relatively new discipline that models cellular behavior as a complex network of thousands of interacting genes, proteins, and other cellular components. Ideker's goal is to create computational models that will explain what goes wrong in diseases such as cancer, with the ultimate goal of developing earlier diagnosis and much more effective treatments.

"Dr. Ideker has provided powerful new approaches for a generation of microbiologists and cell biologists to understand the mechanisms and processes of disease from the perspective of interactions of proteins and genes as networks in cells," said Shu Chien, professor and chair of bioengineering at the Jacobs School. "The potential impact of his innovative research in systems biology is enormous."

Recently, Ideker and his collaborators developed Cytoscape, a software program being used by several hundred labs to actually visualize cellular processes, from expression of genes to the production of proteins. The tool is designed to show how all the parts of a system interact to create a continuum of states, from a healthy cell to one that has become cancerous. The Cytoscape project is an ongoing collaboration between UCSD, the Institute for Systems Biology, the Memorial Sloan-Kettering Cancer Center, and Institut Pasteur in France.

Biotechnological advances have not, by themselves, been able to fully explain the behavioral repertoire of even simple bacterial cells. Ideker notes that in the post-genomic era, the focus is shifting beyond an understanding of individual proteins and pathways to discovering how thousands of seemingly unrelated cellular proteins interact in a complex web of signaling, regulation, structure, and metabolism.

"An important outcome of our research will be to provide drug companies with sophisticated computer models that can pinpoint promising new drug targets or identify potential toxic side effects long before the clinical trials stage," said Ideker. "I would consider my research a success if, a decade from now, drug companies were using these tools to discover a new generation of more effective drugs. Computer modeling is standard procedure for many other industries such as aircraft design and automobile manufacturing, and it should be in drug development also."

The Packard Foundation established its Fellowship Program in 1988 to fulfill David Packard's commitment to strengthening university-based science and engineering programs. By supporting unusually creative researchers early in their careers, the foundation hopes to develop scientific leaders, further the work of promising young scientists and engineers, and support efforts to attract talented graduate students into university research in the United States.

"The long-term commitment to the fellowship program has enabled scientists to pursue innovative lines of scientific inquiry and to inspire and train the next generation of young scientists and engineers," said Lynn Orr, a

professor of earth sciences at Stanford University and chairman of the Packard Fellowship Advisory Panel. "Their research will make a positive impact on local, national, and global levels."

Ideker received his Ph.D. in molecular biotechnology in 2001 from the University of Washington. He was a Pfizer Fellow of Computational Biology at the Whitehead Institute for Biomedical Research in Cambridge, MA, for two years until he joined the Jacobs School's Department of Bioengineering in 2003. He and Leroy Hood published a landmark paper in *Science* three years ago in which they built a computational model of yeast metabolism. That paper continues to define the emerging field of systems biology.

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