

SEPTEMBER 10, 2008

Joseph DeRisi Receives Heinz Award

Howard Hughes Medical Institute investigator Joseph L. DeRisi has been selected to receive the Heinz Award in Technology, the Economy and Employment for his extraordinary breakthroughs in detecting both new and existing viruses.

Established by Teresa Heinz in 1993 to honor the memory of her late husband, U.S. Senator John Heinz, the Awards celebrate the accomplishments and spirit of the Senator by recognizing the extraordinary achievements of individuals in the areas of greatest importance to him.

The Heinz Awards, administered by the Heinz Family Philanthropies, recognize outstanding individuals for their contributions in the areas of: Arts and Humanities, the Environment, the Human Condition, Public Policy, and Technology, the Economy and Employment.

Nominations are submitted by an anonymous Council of Nominators and are reviewed by jurors appointed by the Heinz Family Philanthropies. Award recipients are ultimately selected by the Board of Directors.

Award recipients receive a medallion and an unrestricted cash prize of up to \$250,000.

An HHMI investigator and professor of biochemistry at the University of California, San Francisco, DeRisi is one of the world's foremost researchers in the application of molecular genomics to the study of infectious disease. His research group has focused on developing new technologies that can be used to uncover the existence of potentially devastating human pathogens long before they become serious menaces.

After graduating in 1992 from the University of California, Santa Cruz, with an undergraduate degree in biochemistry, DeRisi went to Stanford University to do graduate work in the lab of HHMI investigator Patrick O. Brown. At that time, DNA microarrays were so new that the National Institutes of Health had rejected Brown's initial requests to develop the technology. But one of Brown's favorite phrases is “blast ahead,” and he knew that microarrays were going to be important so he pieced together other funding to work on them.

Analogous to mailboxes in an apartment building, DNA microarrays consist of thousands of distinct DNA fragments attached to a glass slide. DNA samples that a researcher wants to identify are tagged with fluorescent labels and washed over the slide. Just as letters are sorted into mailboxes, DNA pieces in the sample stick to matching DNA fragments on the slide, allowing the unknown DNA to be identified.

Although DeRisi went to Stanford to study retroviruses, he was soon swept up in the scientific and engineering challenges of microarrays. “The project I was doing required high-density arrays, and no one was going to make them for me,” he says. After building and programming a robot that attached the DNA fragments to the slide using precision-guided metal pen tips, DeRisi and the other members of Brown's lab used the device to achieve a number of notable firsts. They were the first research group to look at the activity of all genes in yeast simultaneously, for example, and they were the first to use microarrays to explore global gene expression in human cancers.

DeRisi's expertise in molecular biology, bioinformatics, and microarray technology made him a hot prospect, and a UCSF Fellows position was quickly followed by a faculty appointment. DeRisi used his new position to launch a major study on malaria. By tracking the expression of genes of *Plasmodium falciparum*—the parasite that causes the most severe form of the disease in humans—over time, DeRisi and his colleagues have uncovered particular genes that turn on and off in sequence as *P. falciparum* attacks and destroys blood cells. He is working on tests of new antimalarial drugs to see if they interfere with the process.

In a separate line of research, DeRisi and his colleagues created a “Virochip”—a comprehensive array of the most conserved and characteristic DNA sequences from each viral family. This broad array maximizes the probability of detecting a new virus. The chip is used for rapid detection of viruses and discovery of unknown viruses. In 2003, he used the chip to identify and characterize the SARS virus within 24 hours after receiving a sample from the Centers for Disease Control.

DeRisi and his longtime collaborator, HHMI investigator Don Ganem have also used the Virochip to screen for viruses in the prostate tissue samples. Although the Virochip contains only sequences from known viruses, DeRisi said it can also detect new viruses because they invariably contain sequences that have been conserved in their evolution from related viruses.