

## **Broad Institute**

The Eli and Edythe L. Broad Institute is a collaboration of the Massachusetts Institute of Technology, Harvard University and its affiliated hospitals, and the Whitehead Institute for Biomedical Research.

### **Mission**

The Broad Institute's scientific mission is to complete a comprehensive picture of the molecular components of life, create a comprehensive understanding of the biological circuits that underlie cellular functions and responses to perturbation, and discover the molecular basis of all major inherited diseases.

### **Summary**

Research efforts aimed at tackling the cancer genome, finding new candidate genes associated with diseases, understanding the molecular underpinnings of cancer, and decoding the genomes of more organisms continued this year at the Broad Institute. Broad researchers published exciting results and discoveries in prestigious journals such as the *New England Journal of Medicine*, *Cell*, *Nature*, and *Science*. Individuals garnered accolades such as the National Institutes of Health Director's Pioneer Award, the American Philosophical Society's Judson Daland Prize for Outstanding Achievement in Clinical Investigation, Howard Hughes Medical Institute (HHMI) Early Career Scientist awards, and more.

In September 2008, Eli and Edythe Broad announced a gift of \$400 million to permanently endow the institute. The institute also received other generous donations, including a \$5 million contribution in January from the Blavatnik Family Foundation toward cancer vaccine research. In June, the Merkin Family Foundation announced a gift to launch the Richard Merkin Foundation for Stem Cell Research at the Broad Institute.

### **Accomplishments and Future Projects**

Over the course of the year, Broad scientists have conducted a myriad of genome-wide association studies that have yielded gene candidates related to such diseases as schizophrenia, high cholesterol, rheumatoid arthritis, lung cancer, and obesity.

Researchers also created a catalog of 1,100 mitochondria proteins. In the future, researchers will be able to use this catalog to shed light on metabolic and other diseases linked to the mitochondria, including neurodegeneration, cancer, and diabetes.

In fall of 2008, researchers reported the first results of The Cancer Genome Atlas (TCGA) project, revealing a potential mechanism underlying the ability of brain tumors to resist treatment. As the TCGA project continues, Broad scientists will work to unravel the genetic nature of lung cancer and ovarian cancer as well as glioblastoma.

Another cancer project, Project Achilles, also brought forth important results this year. Researchers working on this project identified a colon cancer oncogene. Other

important accomplishments in cancer research included the development of a new technique that allowed scientists to analyze preserved tissue and led to the discovery of a genetic signature that predicts patient outcomes in liver cancer. Additionally, a study in glioblastoma using a new method for detecting kinase activity revealed a potential therapeutic target.

Broad researchers also sequenced the genomes of six species of *Candida*, which are opportunistic human pathogens. Researchers will extend this research toward understanding the underpinnings of fungal infections.

### Major Publications

- A mitochondrial protein compendium elucidates complex I disease biology, *Cell* (July)
- Genome-scale DNA methylation maps of pluripotent and differentiated cells, *Nature* (July)
- Integrated detection and population-genetic analysis of SNPs and copy number variation, *Nature Genetics* (September)
- Common variants at *CD40* and other loci confer risk of rheumatoid arthritis, *Nature Genetics* (September)
- CDK8 is a colorectal cancer oncogene that regulates  $\beta$ -catenin activity, *Nature* (September)
- A mutation in hairless dogs implicate *FOXI3* in ectodermal development, *Science* (September)
- Gene expression in fixed tissues and outcome in hepatocellular carcinoma, *New England Journal of Medicine* (November)
- Somatic mutations affect key pathways in lung adenocarcinoma, *Nature* (October)
- Chromatin signature reveals over a thousand highly conserved large non-coding RNAs in mammals, *Nature* (February)
- Evolution of pathogenicity and sexual reproduction in eight *Candida* genomes, *Nature* (May)

### Honors and Awards

- Postdoctoral fellow Steve McCarroll received the Broad Institute's 2008 Lawrence H. Summers Fellowship (September).
- Core member Aviv Regev earned the NIH Director's Pioneer Award (September).
- Senior associate member and codirector of the Metabolic Disease Initiative Vamsi Mootha received the 2008 Judson Daland Prize (November).
- Core member Aviv Regev and associate member Bradley Bernstein received HHMI Early Career Scientist awards (March).

- Core member and Cancer Program director Todd Golub earned an award from the American Association for Cancer Research for groundbreaking genomic research to improve cancer diagnosis and treatment (April).

**Eric S. Lander**

**Director**

**Professor of Biology**

*More information about the Broad Institute can be found at <http://www.broadinstitute.org/>.*