



ABOUT THE ALLEN HUMAN BRAIN ATLAS

Using an innovative approach to human brain mapping, the [Allen Institute for Brain Science™](#) is developing a groundbreaking resource for understanding genes “at work” in the human brain. Scheduled to be completed in 2013, this revolutionary new tool will combine information about gene activity with anatomic knowledge, presenting a comprehensive genome-wide map. The Allen™ Human Brain Atlas is expected to provide clues that fuel researchers to discover new treatments for a variety of brain diseases and disorders, including Alzheimer’s, autism, schizophrenia, Parkinson’s and drug addiction.

“The workings of the human brain and the mechanisms that control its activity remain a mystery. The atlas will provide a remarkably detailed view into gene activity programs in the brain that **will help dramatically accelerate our understanding of the molecular basis of mental function and dysfunction.**”

- Marc Tessier-Lavigne, Ph.D.,
Executive Vice President, Genentech

IMPLICATIONS

Changing the paradigm of traditional science, all data and analysis tools from the Allen Human Brain Atlas will be free and publicly available online. The Atlas will potentially lead researchers and clinicians worldwide to heightened levels of understanding and speed progress toward improved diagnostics and effective therapies. Brain diseases and disorders that affect millions of people and cost billions of dollars each year include:

- **Mental disorders** - affect one in four, or 57.7 million Americans ([National Institute of Mental Health - NIMH](#))
- **Autism Spectrum Disorders** - affects 1 to 1.5 million Americans, costing \$90 billion annually ([Center for Disease Control and Prevention - CDC](#))
- **Epilepsy** - affects an estimated 2.5 million Americans, costing \$15.5 billion annually ([Center for Disease Control and Prevention - CDC](#))
- **Alzheimer’s disease** - affects up to 4.5 million Americans, including an estimated 50 percent of people 85 and older. Every 70 seconds, someone develops Alzheimer’s ([National Institute on Aging - NIA](#))
- **Schizophrenia** - affects about 2.4 million, or one in 100 American adults ([National Institute of Mental Health - NIMH](#))
- **Parkinson’s disease** - affects 500,000 Americans, with 50,000 new cases diagnosed each year ([National Institute of Neurological Disorder and Stroke - NINDS](#))
- **Multiple Sclerosis (MS)** - affects an estimated 2.5 million people worldwide. In the US more than 200 people are diagnosed every week ([National MS Society](#))

SCIENTIFIC MODEL

The goal of this project is to create a comprehensive three-dimensional map detailing gene expression in the human brain, surveying all genes in the genome and revealing where in the brain each gene is expressed, or “turned on.” Two established scientific techniques will be used to reveal gene expression in the human brain. First, 1,000 distinct brain areas will be sampled from each brain, and each will be examined using microarray profiling, a genome-wide analysis technique that will provide quantitative readouts of all genes expressed in each structure analyzed.

Then, selected genes of significant interest to the scientific community – for example, specific disease-related genes – will be more precisely mapped within the relevant brain structures using *in situ* hybridization. This technique pinpoints specific areas where a gene is expressed or “turned on.” By analyzing series of thin tissue sections, scientists are able to view gene activity down to the level of individual cells. Digital photographs of this data will be obtained using automated microscopes and incorporated into free, Web-based viewing applications.

KEY ATLAS FEATURES

The Allen Human Brain Atlas will offer users:

- Free, public online access with no registration requirement.
- A detailed, interactive 3D anatomic atlas of the “normal” human brain.
- Data from multiple human brains, including male and female subjects.
- Genomic analysis of every brain structure, providing a quantitative inventory of which genes are turned on in which structures.
- High-resolution atlases of individual brain structures, pinpointing the activity of selected genes within those structures down to the cellular level.
- Navigation and analysis tools for accessing and mining the data.

PROJECT ADVISORY COUNCIL

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WEB SITES

To learn more about the Allen Institute, visit www.alleninstitute.org. When launched, the Allen Human Brain Atlas will be available online via www.brain-map.org.

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