

Submission Dates: February 15, 2008 Priority: 1 of 1



# Ted Stevens

United States Senator for Alaska

**Please Note:**  
- Fill out one request form for each request  
- This form (and any attachments) can be returned via:  
Fax - (202) 224-2354  
Mail - The Honorable Ted Stevens  
United States Senate  
522 Hart Senate Office Bldg.  
Washington, D.C. 20510  
- Requests are due by February 15, 2008.

## FISCAL YEAR 2009 PROJECT REQUEST FORM

**Project Name:** Allen Brain Atlas – Human Brain Project  
**Project Location:** Allen Institute for Brain Science (Seattle, WA)

**Project Description (please attach additional pages as required):**

The Allen Institute for Brain Science, a 501(c) (3) nonprofit medical research organization based in Seattle, Washington, requests an appropriation for FY 2009 of \$3.0 million to support the Allen Brain Atlas - Human Brain project, which will create a comprehensive three-dimensional map detailing genes at work in the human brain. The Allen Brain Atlas - Human Brain project will survey selected genes in the genome and reveal where each gene is expressed or "turned-on" within specific cells. Such information will provide unprecedented insights into gene-related diseases, as well as potential drug therapies for diseases such as Alzheimer's, Autism, Epilepsy, Schizophrenia, Parkinson's and drug addiction.

**Related Appropriations Bill:** LHHS  
**Amount of federal funding requested for FY09:** \$3 million  
**Total funding to complete this project:** \$55 million  
**Number of years to fund this project:** 3  
**Matching funds from the State of Alaska:** \$0  
**Matching funds from local and private entities:**  
\$43 million will be sources from various private sources. FY10 request of \$4 million and FY11 request of \$5 million are anticipated.

**List legislation that authorizes this project:**

**Check all that apply:**  
 A language in the bill is necessary in order to proceed with the project. If so, was it in the budget and all of the laws that need to be amended?  
 If so, report language needed (if so, attach requested language)

**If this project was funded in prior appropriations bills (within the last five years), list each bill and the amount funded:**

**Amount included in the President's FY09 Budget:** N/A  
**Amount included in the State of Alaska FY09 Budget:** N/A  
 Check this box if state funding was sought but not provided.



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**Federal Funding Application for Fiscal Year 2009  
The Allen Institute for Brain Science – Allen Brain Atlas - Human Brain project**

**Executive Summary:**

The Allen Institute for Brain Science, a 501(c) (3) nonprofit medical research organization based in Seattle, Washington, requests an appropriation for FY 2009 of \$3.0 million to support the Allen Brain Atlas - Human Brain project, which will create a comprehensive three-dimensional map detailing genes at work in the human brain. The Allen Brain Atlas - Human Brain project will survey selected genes in the genome and reveal where each gene is expressed or "turned-on" within specific cells. Such information will provide unprecedented insights into gene-related diseases, as well as potential drug therapies for diseases such as Alzheimer's, Autism, Epilepsy, Schizophrenia, Parkinson's and drug addiction.

**Background on the Allen Institute**

The Allen Institute tackles leading-edge projects that fuel innovation and discovery for countless pioneering scientists throughout the United States and the world. The Institute makes both the results of its research and associated analysis tools freely, openly and easily available to the worldwide scientific community through its websites. This free and open access saves scientists and researchers time, money and, ultimately, expedites progress toward breakthrough discoveries that address pressing medical issues. The Institute's inaugural project, the Allen Brain Atlas – Mouse Brain, is widely used by leading research universities, government research labs, pharmaceutical, biotechnology companies, and others worldwide.



The scientific research effort at the Allen Institute is assisted by consulting scientists organized into an Institute Scientific Advisory Board, as well as Scientific Advisory Councils which are project specific. These individuals have specific expertise and convene twice a year.

Members include:

- **Allen Institute Advisory Board**
  - David Anderson, California Institute of Technology,
  - Tom Daniel, Washington University
  - Catherine DuLac, Harvard University
  - Christof Koch, California Institute of Technology
  - Marc Tessier-Lavigne, Genentech
  - Michael Stryker, University of California, San Francisco
  - Joe Takahashi, Northwestern University
  - Phyllis Wise, University of Washington
- **Center Advisory Council**
  - David Anderson, California Institute of Technology
  - Gyorgi Buszaki, Rutgers University
  - Ed Callaway, Salk Institute
  - Tom Daniel, University of Washington
  - Catherine Dulac, Harvard University
  - Eb Fetz, University of Washington
  - Sacha Nelson, Brandeis University
  - Michael Stryker, University of California, San Francisco
  - Karel Svoboda, Howard Hughes Medical Institute, Janelia Farm
- **Mouse Development Atlas Advisory Council**
  - Gregor Eichele, Max Planck institute
  - Josh Huang, Cold Spring Harbor
  - Alexandra Joyner, Memorial Sloan-Kettering Cancer Center
  - Marc Tessier-Lavigne, Genentech
  - Luis Puelles, University of Murcia, Spain
  - John Rubenstein, University of California, San Francisco
  - Joe Takahashi, Northwestern University
  - Phyllis Wise, University of Washington
- **Human Brain Atlas Advisory Council**
  - Daniel Geschwind, University of California, Los Angeles
  - Richard Gibbs, Baylor College of Medicine
  - Patrick Hof, Mount Sinai School of Medicine
  - Ted Jones, University of California, Davis
  - Christof Koch, California Institute of Technology
  - Clif Saper, Harvard University
  - Larry Swanson, University of Southern California
  - Art Toga, University of California, Los Angeles
  - David Van Essen, Washington University
  - Chris Walsh, Harvard University

### **Why Focus on Brain Research?**

Brain injuries, diseases and disorders affect millions of people and cost billions of dollars to treat each year. Mental disorders affect 57.7M people a year in the United States according to the National Institute for Mental Health (NIMH).



#### Examples include:

- *Percussive brain injuries* - body armor and medical technology allow soldiers in Iraq to survive traumatic field injuries and live. But they must deal with percussive brain injuries to an extent never experienced in prior conflicts—some estimates are as high as 20%;
- *Spinal cord injuries* - approximately 200,000 people in the U.S. have spinal cord injuries and there are approximately 11,000 new U.S. cases each year, including military cases;
- *Autism spectrum disorders* –up to 1 in 166 children are affected with autism spectrum disorders according to the Center for Disease Control (CDC);
- *Epilepsy* – the CDC estimates that 2.7 million Americans suffer from epilepsy at an annual health care cost of \$15.5 billion;
- *Schizophrenia* - about 2.4 million, or 1 in 100, American adults are diagnosed with schizophrenia according to the NIMH;
- *Parkinson's disease* – affects 500,000 Americans, with 50,000 new cases reported each year according to the National Institute of Neurological Disorders and Stroke;
- *Alzheimer's disease* - affects up to 4.5 million Americans, including an estimated 5% of people age 65-74 and nearly 1 in 2 people 85 and older according to the National Institute on Aging; and
- *Multiple Sclerosis* – affects an estimated 400,000 Americans at an annual cost of \$28 billion according to the National MS Society.

#### A Proven Record of Success

The brain is a highly complex organ for which much is still unknown. The Allen Institute is uniquely situated to provide a useful toolbox to all scientists and to move their research forward. The data and tools save researchers valuable time and money. The Institute's recent accomplishments include:

1. The Allen Brain Atlas – Mouse Brain, [www.brain-map.org](http://www.brain-map.org), a \$41M map of the mouse brain indicating where more than 20,000 genes are expressed or "turned on", was completed in the targeted timeframe of three years and delivered 20% under budget. In the process, a new business model for scientific research was created in which projects have start and completion dates, measurable results and established budgetary requirements. Medical and scientific communities have extensively benefited from the Allen Brain Atlas – Mouse Brain, which was named among *Time Magazine's* 2006 Top Ten in Medicine List. In a short period of time, it has become one of the most widely used, publicly available databases ever generated for the neuroscience community. It is used by more than 10,000 scientists per month, with some using the data for five to six hours daily.
2. The Department of Defense funded a \$1.8M sleep deprivation study to provide basic research that might lead to improving performance in the field. The research was delivered on time and on budget. To facilitate use of the database, the Institute hosted a seminar in Seattle, Washington, in November 2007 for researchers to assemble and



discuss how the freely available database could be used in their individual sleep programs in order to expedite their research and improve their success.

3. Initial data on the Human Cortex was made available to the public November 2007. This is significant in that it proves the Allen Institute can deliver human brain atlas results. In addition, pilot studies were done on the difference between male and female mouse brains, as well as differences within five mouse strains. The pilot projects provide critical information for the design of the Allen Brain Atlas - Human Brain project, which will include males, females and potentially different races.

The Allen Institute has demonstrated that it not only follows through on its project commitments, but also delivers field changing resources that fuel discovery to advance research programs of countless scientists working toward improved understanding and treatment of brain diseases and disorders.

#### **Current Projects**

1. Allen Brain Atlas – Mouse Spinal Cord. The construction of an atlas of gene expression in the mouse spinal cord does not exist. Through a collaborative venture of physicians and scientists in the spinal cord community, and medical associations serving those afflicted by illness or injury related to spinal cord dysfunction, the Institute is developing a spinal cord gene atlas. The Institute will deliver to the research community the Web-based data at no cost to the users. This work will be an invaluable resource for a large segment of the American population – from returning disabled Iraq veterans to newborn infants to patients of all ages suffering from spinal cord related disabilities or illnesses. This project is so important that a consortium of advocacy groups, foundations and others are working together to fund it.

2. Allen Brain Atlas – Developing Mouse Brain. In order to understand the key events in the development of the brain, the Institute will create a detailed survey of gene expression across the life cycle of the mouse, from embryo through adulthood and aging. Using the Allen Brain Atlas as an example, this database and tools for its use, will be offered with total open access freely on the Web to provide critical information for researchers in diseases such as Autism, Epilepsy, Schizophrenia, Parkinson's, Alzheimer's and Drug Addiction. Currently, there is no comprehensive data base in the world that currently provides this information.

#### **A One of a Kind Project – The Allen Brain Atlas - Human Brain project**

The goal of this one-of-a-kind project is to create a comprehensive three-dimensional map detailing genes at work in the human brain, surveying all genes in the genome and revealing where each gene is expressed or "turned on". Knowing where genes are "turned on" is critical in the development of drug therapies. Such information can provide unprecedented insights into how Alzheimer's, Autism, Epilepsy, Schizophrenia, Drug Addiction or other brain disease-related genes are involved in the disease and how best to intervene therapeutically. It will also be an important tool in the area of treatment of traumatic brain injuries and brain tumors. As



with other Institute projects, all data and associated tools will be made freely and publicly available on the Web to encourage widespread use and collaboration.

The Allen Institute is taking a completely novel approach to mapping the human brain. For the first time, the Institute will overlay comprehensive, genome-wide genetic information onto a detailed, 3-dimensional anatomic map of the human brain. Again, all data and associated tools will be available freely and publicly on the Web to help researchers and physicians worldwide understand brain diseases and disorders and develop therapeutic treatments.

To understand the brain's role in behavior and disease requires knowledge of the brain's structural organization, functional organization, and how the mechanisms underlying both structure and function work. For well over a century, neuroanatomists have been mapping the brain's structural organization. The development of brain imaging techniques, such as PET and fMRI helped to understand the brain's functional organization. The Allen Brain Atlas - Human Brain project will help researchers connect anatomic and functional information with underlying genetic information.

This project will provide an essential and unique window into gene activity in the human brain. It has the potential for advancing new and existing research programs on brain diseases and disorders. It will offer critical information for developing new and better therapeutic drugs. In addition to serving the scientific research community, the Allen Brain Atlas - Human Brain project is expected to support an even broader user community that includes the medical and education communities. Expertise in massive scale laboratory projects, informatics, and computational hardware and software systems for collecting and making data freely available to the public via the Web are assets unique to the Institute and will be central to the Allen Brain Atlas - Human Brain project.

Key deliverables of the Allen Brain Atlas - Human Brain project will include:

- o A detailed, interactive, 3-dimensional anatomic atlas of the human brain
- o Data and associated reference images from several male and female brains
- o An inventory of which genes are expressed or "turn-on" in each brain structure
- o High resolution images pinpointing the activity of selected genes within cells
- o Navigation and analysis tools
- o Free public access via the Web
- o A national education program through which students can use the data in customized curricula

### Budget

The total project cost is \$55 million and will be completed in 2011.

Personnel	\$14.22 million
Lab Supplies/services	\$22.47 million
Communication/T&E/tools	\$ .39 million
G&A/CapEX	\$17.63 million
Other	\$ .29 million



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Total for four years                      \$55M

### **Justification and Impact on Community, State, Nation**

The Allen Institute for Brain Science focuses on those projects that will have a high impact in the fields of Neuroscience and Genomics. Our teams of scientists are multidisciplinary in their approach, but more importantly, are multidisciplinary in their reach, delivering data and tools freely to researchers to be used in a variety of disease related research in which results are then published and used by an even greater number of researchers.

Philanthropist Paul G. Allen provided the seed money to start the Institute and create the Allen Brain Atlas through his powerful concept of venture philanthropy. His vision of creating an Institute in which the total focus is unlocking the secrets of how the brain works by developing databases and tools and making them freely available to the public to jump start or enhance research programs is unique. Others have come forward to support and become part of this critical effort because they recognize the financial and physical burden of brain diseases and disorders on families in every state, not to mention the staggering impact on military families.

The concept of data and tools reached through total open access to be used for scientific discovery to benefit humanity is unique in the United States. The Allen Institute is at the forefront of changing how research is done by applying its unique business model to scientific research, such that results are produced in as little time as possible with as little cost as possible.

Patients with diseases for which there is still no cure such as Autism, Epilepsy, Schizophrenia, Parkinson's, Alzheimer's and Drug Addiction need strong voices in the research community to expedite research. The Allen Brain Atlas - Human Brain project will be a tool used immediately by researchers in their own programs, physicians treating patients, and by families trying to understand how to deal with traumatic brain diseases and injuries.