ALLEN INSTITUTE *for* BRAIN SCIENCE™
Fueling Discovery

FACT SHEET

ALLEN INSTITUTE FOR BRAIN SCIENCE

ABOUT THE ORGANIZATION

Launched in 2003, the Allen Institute for Brain Science is an independent, 501(c)(3) non-profit medical research organization dedicated to advancing brain research by delivering data and tools for free to scientists worldwide. Founded with $100 million in seed money from philanthropist Paul G. Allen, the Institute tackles projects at the leading edge of science—far-reaching projects at the intersection of biology and technology. Our high-impact research fuels discovery across a wide range of scientific programs and disease areas, thereby addressing numerous health issues.

PUBLIC RESOURCES

The Allen Institute provides scientists and clinicians with a diverse variety of gene activity maps and highly sophisticated data search and viewing tools – all for free. These resources save researchers worldwide save time and money and may help provide clues to a variety of brain and spinal cord diseases and disorders. Each project can be accessed via the Web at www.brain-map.org, and include:

- Allen Mouse Brain Atlas
- Allen Spinal Cord Atlas
- Allen Developing Mouse Brain Atlas
- Sleep Study
- Human Cortex Study
- Transgenic Mouse Study
- Mouse Diversity Study
- Allen Human Brain Atlas
- NIH Blueprint Non-Human Primate Atlas
- Ivy Glioblastoma Atlas Project

AWARDS

- American Academy of Neurology – Paul Allen was honored with the "Public Leadership in Neurology Award" for his strong commitment to brain research. (2009)
- *TIME* – Paul Allen received the "Top 100 Most Influential People in the World" for his successful achievements at the Allen Institute. (2008, 2007)
- *WIRED* – Paul Allen and the Allen Institute received the "Rave Award" for the completion of the Allen Mouse Brain Atlas. (2007)
- Society for Neuroscience – Paul Allen received a "Special Recognition Award" for his generous contributions to neuroscience through his work with the Allen Institute. (2007)
- *TIME / USA Weekend* – Paul Allen was recognized by both *TIME* and *USA Weekend* as contributing one of the "Top Ten Medical Breakthroughs" for mapping the Mouse Brain. (2006)

IMPLICATIONS

Brain diseases and disorders affect millions of people, costing billions of dollars each year.

- **Mental disorders** – affect one in four, or 57.7 million Americans (National Institute of Mental Health - NIMH)
- **Autism** – 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; More than 200 people are diagnosed every week in the US (National MS Society)

SCIENTIFIC MODEL

The Allen Institute employs a high-throughput model, collecting data using an assembly line approach. The combination of laboratory robots, automated imaging devices and high-powered computational systems enables the generation of data on an unprecedented scale. To date, the Allen Institute has produced its public resources using *in situ* hybridization, which pinpoints and stains 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 are obtained using automated microscopes and incorporated into free, Web-based viewing applications.

FUNDING AND BUSINESS MODEL

We employ a unique business model, integrating the structure of a for-profit enterprise with the founding vision to take on ambitious, unprecedented projects at the leading edge of neuroscience. Our project-based approach delivers tangible results. Each project has a tight timeframe, tight budget and measurable milestones – ultimately culminating in a free, publicly available resource.

To support these endeavors, we've created a funding consortium of mutually interested donors as "investors" in breakthrough science. The Allen Institute seeks government funds, along with private contributions and foundation awards, as part of an ongoing public-private partnership to sustain the organization.

From the inaugural Allen Mouse Brain Atlas to our most recent studies, the unique combination of funding and business models has led to the development of resources that have the potential to create a global impact.

QUICK FACTS

- Since inception, the Allen Institute has generated data on over 2.8 million tissue sections.
- Our approximately 625,000 1X3 inch microscope slides, if laid end to end, would stretch 30 miles.
- More than 1 petabyte (1 million gigabytes) of image data has been collected.
- Approximately 20,000 unique users from around the world access the Allen Institute's projects online every month.
- To help enhance access and performance, a "mirror" site has been established in Europe.
- Five years after the Institute opened, it outgrew its headquarters. During 2008, the Institute retrofitted its laboratories and offices to accommodate new projects and 30% increase in staff.

TEAM

The Allen Institute's multidisciplinary team of more than 125 professionals in math, physics, engineering, neuroscience, molecular biology, genomics, informatics, information technology and others, enables the Institute to tackle large, high-impact projects at the intersection of biology and computational science.

FOUNDERS

Paul G. Allen
Jody Allen

LEADERSHIP

Allan Jones, Ph.D., Chief Executive Officer
Elaine Jones, Chief Operating Officer

SCIENTIFIC ADVISORY BOARD

David Anderson, Ph.D., California Institute of Technology
Thomas L. Daniel, Ph.D., University of Washington
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Joseph S. Takahashi, Ph.D., University of Texas Southwestern Medical Center
Marc Tessier-Lavigne, Ph.D., Genentech
David Van Essen, PhD, Washington University

WEB SITES

To learn more about the Allen Institute, visit www.alleninstitute.org.
To access our public resources, visit www.brain-map.org.

MEDIA CONTACT

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ALLEN INSTITUTE *for* BRAIN SCIENCE™
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ALLEN HUMAN BRAIN ATLAS

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

- *Daniel H. Geschwind, M.D., Ph.D.*, University of California, Los Angeles
- *Richard Gibbs, Ph.D.*, Baylor College of Medicine
- *Patrick R. Hof, M.D.*, Mount Sinai School of Medicine
- *Edward Jones, M.D., Ph.D.*, University of California, Davis
- *Christof Koch, Ph.D.*, California Institute of Technology
- *Clifford Saper, M.D., Ph.D.*, Harvard Medical School, Beth Israel Deaconess Medical Center
- *Larry W. Swanson, Ph.D.*, University of Southern California
- *Arthur W. Toga, Ph.D.*, University of California, Los Angeles
- *David Van Essen, Ph.D.*, Washington University

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.

MEDIA CONTACT

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ABOUT THE ALLEN MOUSE BRAIN ATLAS

The Allen™ Mouse Brain Atlas is a free, publicly available Web-based 3D map of the adult mouse brain. The Atlas details the activity patterns of approximately 20,000 genes at the cellular level. Similar in scope to the Human Genome Project, the Atlas provides researchers with a comprehensive online vehicle for exploring where each gene is expressed, or "turned on," in the brain. The Allen Mouse Brain Atlas data and its sophisticated search and viewing tools are used each day by thousands of researchers worldwide. The Atlas, launched with $41 million in seed money from philanthropist and Microsoft co-founder Paul G. Allen, was initiated in 2003 and completed in 2006.

> "By taking advantage of the data, we can really start identifying the specific circuitry that went astray in a specific disease condition. Neuroscience has been around many decades. But **combining the classical approaches of brain research with this new genetic approach is a breakthrough in neuroscience**. It's a new, extremely powerful approach to try to understand the brain. **I would say it's revolutionary**."
>
> - Susumu Tonegawa, Nobel Laureate, Director, Picower Center for Learning and Memory at the Massachusetts Institute of Technology

IMPLICATIONS

Prior to completion of the Allen Mouse Brain Atlas, a free, comprehensive resource integrating genomic and anatomic data of this scale did not exist. During that time, it would have taken one researcher several months to analyze one gene. Now they can go online to view the entire genome. The mouse is a well-established model for the study of human diseases and therapies. The vast majority of human genes have a mouse counterpart, and mouse and human brains share the same basic structural and functional architecture. Therefore, the Allen Mouse Brain Atlas has great potential for advancing understanding of brain diseases and disorders. Such disorders, which 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** – 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)

SCIENTIFIC MODEL

The Allen Institute employs a high-throughput model, collecting data using an assembly line approach. The combination of laboratory robots, automated imaging devices and high-powered computational systems enables the generation of data on an unprecedented scale. The Allen Mouse Brain Atlas was produced using a process called *in situ* hybridization, which pinpoints and stains specific areas where a gene is expressed, or "turned on." By analyzing series of thin tissue sections, this allows scientists to view gene activity throughout the entire brain, down to the level of individual cells. Digital photographs were obtained using automated microscopes and incorporated into free, Web-based viewing applications.

KEY ATLAS FEATURES

- Free, public online access with no registration requirement.
- Image-based data comprising genome-wide coverage.
- Comprehensive anatomic coverage of the adult mouse brain.
- Microscopic resolution down to the cellular level.
- Sophisticated data search and viewing tools.
- Interactive 3D Brain Explorer® viewing application.
- Detailed anatomic reference atlas of the adult mouse brain that can be viewed with the data.

KEY FINDINGS

While the Allen Institute produces high-impact projects, it also analyzes and conducts research. As part of this project, the Allen Institute identified several significant findings:

- At least 80 percent of genes are "turned on" in the brain, and only a few of these are expressed in a single area. Both of these findings have implications for interpreting and predicting side-effects of therapeutic drugs.
- Gene expression patterns reveal novel subdivisions of known brain structures and new molecular markers of specific cell types, advancing a more detailed and refined understanding of the structural and functional architecture of the brain. Similar to understanding the parts of an engine, such detailed knowledge of gene expression is essential to understanding how the brain works, diagnosing problems when things go wrong, and defining effective therapeutic strategies to address these problems.

TECHNOLOGY AND SCALE

- 1 terabyte (1,000 gigabytes) of data was produced daily
- 170 genes were processed per day
- 1 gigabyte of data was generated per gene
- A total of 250,000 microscope slides were processed and 85 million images were captured to create the Atlas
- Over 600 terabytes of data was generated

HOW IT'S BEING USED BY THE COMMUNITY

The Atlas is widely used, across the globe and across diverse areas of brain research. It averages approximately 15,000 unique users per month. The primary scientific publication on the Atlas, a peer-reviewed paper in *Nature,* has been cited in the scientific literature more than 300 times since it was published in January 2007. Currently, the Atlas is being used by scientists in a variety of settings, including:

Universities – A team of Stanford researchers used the Atlas to further understanding of glia - critical support cells within the brain. Data from the Atlas is cited in their November 2006 *Journal of Neuroscience* paper, which identifies new candidate genes possibly related to multiple sclerosis susceptibility.

Research Institutes – As part of an international collaborative study published in *Science*, investigators at the Translational Genomics Research Institute (TGen) in Arizona, used the Atlas to confirm findings about a gene linked to human memory performance.

Clinical Practices – Surgeons at the Swedish Neuroscience Institute in Seattle, WA use the Atlas to help match individual brain tumor patients to the most promising therapies.

Corporations – Large pharmaceutical companies use the Atlas to discover and develop drugs that are safer and more effective.

Government Organizations – Researchers from the National Institutes of Health access the Atlas to address a wide variety of questions about the brain in health and disease.

PRIMARY PUBLICATION

Lein, E.S., Hawrylycz, M.J. et. al. (2007) Genome-wide atlas of gene expression in the adult mouse brain, *Nature* 445:168-176, doi:10.1038/nature05453

WEB SITES

To learn more about the Allen Institute, visit www.alleninstitute.org. To access the Allen Mouse Brain Atlas and other public resources from the Allen Institute, visit www.brain-map.org.

MEDIA CONTACT

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ABOUT THE ALLEN DEVELOPING MOUSE BRAIN ATLAS

The Allen™ Developing Mouse Brain Atlas fulfills a longstanding request from the scientific community for a detailed map of how genes change during the development of the brain. Building upon the foundation established by the inaugural Allen Mouse Brain Atlas for the adult mouse, the resulting developmental atlas provides a framework to explore both when and where genes are activated in the mouse brain during multiple stages of development, from embryo through old age. As a result, the 4D Atlas has the potential to advance understanding of neuro-developmental disorders, such as autism, and adult-onset disorders with developmental roots, such as schizophrenia. The Atlas data and integrated tools are publicly available for free online.

> "The developing brain atlas provides a molecular narrative of how the genetic map of the brain unfolds in space and time. The atlas **will be invaluable in gaining insight into the origins of certain behavioral disorders, such as schizophrenia and autism**, which are increasingly thought to result from abnormalities of brain development."
>
> - David Anderson, Ph.D., Professor of Biology and Howard Hughes Medical Institute Investigator at the California Institute of Technology

IMPLICATIONS

Prior to this project there was no atlas of how genes change during the development of the brain. The extraordinary complexity of the brain presents significant challenges for understanding its functions, as well as the causes of various neurological disorders. Mature brains are shaped by biological events occurring early in development. Key aspects of brain development and maintenance are influenced or controlled by gene activity. Understanding changes in gene activity across brain development, from the embryo through adulthood and aging, can therefore provide valuable insight into the biological toolkit used to build, strengthen, and maintain a healthy brain, as well as how biological missteps lead to disease in the brain.

The Allen Developing Mouse Brain Atlas has the potential to uncover new opportunities for therapeutic intervention, as genes important for healthy brain development may be leveraged to slow the progression of degenerative diseases, prevent life-changing secondary brain damage from stroke, or repair brain tissue already damaged by injury or disease.

SCIENTIFIC MODEL

Allen Institute employs a high-throughput model, collecting data using an assembly line approach. The combination of laboratory robots, automated imaging devices and high-powered computational systems enables the generation of data on an unprecedented scale. The Allen Developing Mouse Brain Atlas relies on a process called *in situ* hybridization, which pinpoints and stains specific areas where a gene is expressed or "turned on". By analyzing series of thin tissue sections through the mouse brain at several stages of development, this process allows scientists to view gene activity throughout the developing brain, down to the level of individual cells. Digital photographs were obtained using automated microscopes and incorporated into free, Web-based viewing applications.

KEY ATLAS FEATURES

- Free, public online access with no registration requirement.
- Image-based data for several thousand genes, surveyed across the entire brain.
- 4D microscopic resolution down to the cellular level.
- Coverage of multiple stages of development, from birth through old age.
- Navigation and analysis tools to facilitate data access and mining.
- Detailed anatomic reference atlases of the adult developing mouse brain that can be viewed with the data.

PROJECT ADVISORY COUNCIL

Gregor Eichele, *Ph.D.,* Baylor College of Medicine, and Max Planck Institute, Göttingen, Germany
Z. Josh Huang, Ph.D., Cold Spring Harbor Laboratory
Alexandra Joyner, Ph.D., Memorial Sloan-Kettering Cancer Center
Luis Puelles, M.D., Ph.D., University of Murcia, Spain
John Rubenstein, M.D., Ph.D., University of California, San Francisco
Joseph S. Takahashi, Ph.D., University of Texas Southwestern Medical Center
Marc Tessier-Lavigne, Ph.D., Genentech
Phyllis Wise, Ph.D., University of Washington

WEB SITES

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ABOUT THE ALLEN SPINAL CORD ATLAS

The Allen™ Spinal Cord Atlas is a unique genome-wide map of the juvenile and adult mouse spinal cord detailing gene activity patterns at the cellular level. For scientists conducting spinal cord injury and disease research, the creation of a full picture of gene activity in the normal spinal cord fulfills a long standing scientific need. The data and integrated search and viewing tools are publicly available for free online at www.brain-map.org to encourage widespread scientific use.

> "The spinal cord is relatively small, compared to the brain, but it is a crucial highway for transmitting signals between the brain and the rest of the body in order to make everything work the way we need it to. It may be small, but can be catastrophic when it becomes broken. The problem is that we know very little about the genes that control different functions in the spinal cord. This mouse spinal cord atlas **will absolutely help researchers advance their work in this area in quantum leaps, and maybe it will help us discover how to make spinal cord patients take leaps of their own**."
>
> -Jane Roskams, Ph.D., Associate Professor at the Brain Research Center and iCord
> University of British Columbia

IMPLICATIONS

The mouse is a well-established model for the study of human diseases. The mouse shares approximately 90 percent of genes and the basic structural and functional architecture of the nervous system with humans. The Allen Spinal Cord Atlas, therefore, provides researchers and clinicians with an expanded foundation of knowledge to discover new treatments for numerous diseases and disorders, including:

- **Amyotrophic Lateral Sclerosis (ALS) or Lou Gehrig's Disease**—affects an estimated 30,000 Americans (The ALS Association)
- **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)
- **Spinal Cord Injury** — up to 400,000 Americans are currently living with a spinal cord injury (National Spinal Cord Injury Statistical Center - NSCISC);
- **Spinal Muscular Atrophy (SMA)** — approximately 1 in 35 to 40, or 7 million, Americans are carriers of SMA. It is estimated that 1 in 6,000 or 1 in 10,000 infants worldwide are born with SMA every year (Spinal Muscular Atrophy (SMA) Foundation)

SCIENTIFIC MODEL

The Allen Institute employs a high-throughput model, collecting data using an assembly line approach. The combination of laboratory robots, automated imaging devices and high-powered computational systems enables the generation of data on an unprecedented scale. The Allen Spinal Cord Atlas was produced using a process called *in situ* hybridization, which stains specific areas where a gene is expressed or "turned on." A series of thin tissue sections spaced evenly throughout the length of the juvenile and adult mouse spinal cords were analyzed, allowing scientists to view where each gene is active in the spinal cord, down to the level of individual cells. Digital photographs were obtained using automated microscopes and incorporated into free, Web-based viewing applications.

KEY ATLAS FEATURES

- Free, public online access with no registration requirement.
- Image-based data comprising genome-wide coverage (approximately 17,000 genes).
- Microscopic resolution down to the cellular level.
- Data from both juvenile and adult developmental stages.
- Surveys across the full length of the spinal cord.
- Detailed anatomic reference atlas of the adult mouse spinal cord that can be viewed along with the data.

HOW IT WILL BE USED BY THE COMMUNITY

A large group of scientists throughout the research community use the Atlas to advance understanding of the spinal cord in health and disease. The atlas provides an essential normal baseline for comparison with models of spinal cord injuries and diseases found in humans, thereby expediting the search for the cause of specific diseases and promising therapeutic targets for new drug development.

FUNDING

This project was made possible through the Institute's unique funding model designed to transform public, private and foundation funds into open community resources that fuel a diversity of breakthrough scientific discoveries. Generous donors include:

- The ALS Association®
- Paralyzed Veterans of America Research Foundation™
- Wyeth™ Research
- PEMCO™ Insurance
- National Multiple Sclerosis Society®
- International Spinal Research Trust™, UK
- Philanthropist Paul G. Allen
- Other anonymous donors

WEB SITES

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ALLEN INSTITUTE for BRAIN SCIENCE
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FUELING DISCOVERY

What Scientists, Researchers & Surgeons are Saying about Allen Institute Resources

ALLEN HUMAN BRAIN ATLAS

"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, Senior Vice President of Research Drug Discovery
Genentech

"The Allen Institute's Human Brain Atlas will define the anatomic landscape of normal gene expression in the human brain. By using this landscape as a reference, we can determine which genes are abnormally expressed in brain cancer and, more importantly, define potential relationships between genes and their networks based on their location within the landscape. **This will have important and far-reaching implications for brain cancer patients.** Defining the anatomic landscape of gene expression not only answers the question "what is expressed?" but also provides important clues about the genes function in the biology of the tumor."

-Greg Foltz, M.D., Neurosurgeon
Swedish Medical Center

ALLEN DEVELOPING MOUSE BRAIN ATLAS

"The developing brain atlas provides a molecular narrative of how the genetic map of the brain unfolds in space and time. The atlas **will be invaluable in gaining insight into the origins of certain behavioral disorders, such as schizophrenia and autism,** which are increasingly thought to result from abnormalities of brain development."

-Dr. David Anderson, Professor of Biology and Howard Hughes Medical
Institute Investigator at the California Institute of Technology

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ALLEN SPINAL CORD ATLAS

"The spinal cord is relatively small, compared to the brain, but it is a crucial highway for transmitting signals between the brain and the rest of the body in order to make everything work the way we need it to. It may be small, but can be catastrophic when it becomes broken. The problem is that we know very little about the genes that control different functions in the spinal cord. This mouse spinal cord atlas **will absolutely help researchers advance their work in this area in quantum leaps, and maybe it will help us discover how to make spinal cord patients take leaps of their own**."

-Dr. Jane Roskams, Associate Professor at the Brain Research Center and iCord
University of British Columbia

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BIOGRAPHY: Paul G. Allen, Co-Founder

Investor and philanthropist Paul G. Allen creates and advances world-class projects and high-impact initiatives that change and improve the way people live, learn, work and experience the world through arts, education, entertainment, sports, business and technology.

He co-founded Microsoft with Bill Gates in 1975, remained the company's chief technologist until he left Microsoft in 1983, and is the founder and chairman of Vulcan Inc. and chairman of Charter Communications. In addition, Allen's multibillion dollar investment portfolio includes large stakes in, Digeo, Plains All American, real estate holdings and technology, media and content companies.

In 2004 Allen funded SpaceShipOne, the first privately-funded effort to successfully put a civilian in suborbital space and winner of the Ansari X-Prize competition. Allen also owns the Seattle Seahawks of the National Football League, the Portland Trail Blazers of the National Basketball Association, and is part of the primary ownership group for the Seattle Sounders FC, Seattle's new Major League Soccer team.

With lifetime giving totaling nearly $1 billion, Allen has been named one of the top philanthropists in America. Allen gives back to the community through the Paul G. Allen Family Foundation, whose goal is to transform individual lives and strengthen communities by supporting arts and culture, youth engagement, community development and social change, and scientific and technological innovation throughout the Pacific Northwest. In 2003, Allen announced a commitment of $100 million in seed money dedicated to brain research and unveiled the creation of the Allen Institute for Brain Science in Seattle. In 2006 the Allen Institute completed its inaugural project, the Allen Mouse Brain Atlas. The Atlas is a Web-based, three-dimensional map of gene expression in the mouse brain which is free and available online. Detailing more than 20,000 genes at the cellular level, the atlas continues to help lead scientists to new insights and propel the field of neuroscience forward dramatically.

Allen is also founder of Experience Music Project, Seattle's critically acclaimed interactive music museum; the Science Fiction Museum and Hall of Fame; The Flying Heritage Collection, based in Everett, Wash., an assembly of rare World War II aircraft restored to flying condition; and Vulcan Productions, the independent film production company behind the award-winning feature *Hard Candy, Where God Left His Shoes,* the *Evolution* series on PBS, *Judgment Day: Intelligent Design on Trial*, *The Blues*, executive produced by Martin Scorsese in conjunction with Allen and Jody Patton, and the six-part series, *Rx for Survival – A Global Health Challenge*.

Learn more about Allen online at www.paulallen.com.

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BIOGRAPHY: Jody Allen, Co-Founder and President

Jody Allen is president and CEO of Vulcan Inc., the project and investment management firm she co-founded with investor and philanthropist Paul G. Allen in 1986. Since then, she has developed and led a wide range of Allen's business and charitable endeavors around the world.

Allen's responsibilities also include serving as president of Vulcan Productions, the film production company behind such acclaimed projects as *HARD CANDY; Far From Heaven,* the Emmy award-winning PBS series *Rx for Survival: A Global Health Challenge;* the *Evolution PBS* series, *The Blues*, executive-produced by Martin Scorsese in conjunction with Allen and Paul Allen; and the Peabody award-winning *Judgment Day: Intelligent Design on Trial*.

Allen is executive director of the Paul G. Allen Family Foundation, which builds strong communities and supports vulnerable populations around the Pacific Northwest by funding programs in the arts, community development and social change, youth engagement, and innovation in science and technology. In addition, Allen is executive director of Seattle's Experience Music Project, the critically-acclaimed music museum, and the Science Fiction Museum and Hall of Fame. She serves as vice-chair of First & Goal Inc

An active member of the arts and education communities, Allen currently serves on the boards of ArtsFund, Experience Music Project, the Science Fiction Museum and Hall of Fame, the Allen Institute for Brain Science and Seattle Seahawks Charitable Foundation, Charter Communications. Allen previously served on the boards of the Theatre Communications Group, the University of Washington Foundation, the Museum of Glass, the Los Angeles International Film Festival and the Oregon Shakespeare Festival.

ALLEN INSTITUTE *for* BRAIN SCIENCE
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BIOGRAPHY: Allan Jones, PhD, Chief Executive Officer

Allan Jones joined the Allen Institute in 2003 to help start up the organization as one of its first employees. Bringing extensive expertise in project leadership and high-throughput genomics operations from prior management positions at Merck and Co., Rosetta Inpharmatics, and Avitech Diagnostics, he was instrumental in recruiting an integrated interdisciplinary team, building the Institute's scientific operations from the ground up and successfully driving the Allen Mouse Brain Atlas to completion in 2006. Working closely with the founders, scientific, and business advisors, he provided strategic leadership and vision through the expansion of the Institute's portfolio of large-scale, high impact initiatives from the mouse brain atlas through to work on the human brain. Following a focused business model for project planning and execution, he has driven multiple projects from conception to delivery as free, public resources, gaining support from the NIH, foundations and other funders to further expand the Institute's offerings. Jones has broad scientific experience in genetics, molecular biology, and development. He holds a BS degree in biology from Duke University and a PhD in genetics and developmental biology from Washington University School of Medicine.

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BIOGRAPHY: Elaine Jones, Chief Operating Officer

Elaine Jones joined the Allen Institute for Brain Science in 2005 as Chief Operating Officer (COO). Jones' accomplishments include experience in both the for-profit and not-for-profit sectors. Her expertise extends to restructuring operations, establishing financial strategies and improving the effectiveness of corporate marketing. She has focused on start-up and turnaround situations, as well as the integration of acquisitions. Previously Jones worked at The Picower Institute for Medical Research, a 501(c)(3) in New York, where she served as COO. She has also worked for PHH, a Fortune 500 service organization, as V.P. of Marketing and then as S.V.P. of Operations. Jones has had assignments in the medical field at Beckman Instruments, Nichols Institute and Genzyme with responsibilities encompassing training, product development and strategic planning. Jones graduated from the University of Bridgeport with a B.S. in Medical Technology.

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