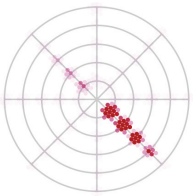
OPEN DATA RESOURCES

ALLEN INSTITUTE for BRAIN SCIENCE

The Allen Institute for Brain Science provides a variety of unique online public resources that give users a powerful way to search and view extensive gene expression data, neuron projection pathways, detailed molecular characterization of single cells and neuroanatomy – all openly accessible via the Allen Brain Atlas data portal at brain-map.org.

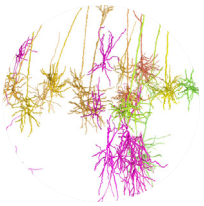
ALLEN BRAIN OBSERVATORY

The Allen Brain Observatory presents the first standardized in vivo survey of physiological activity in the mouse visual cortex, featuring representations of visually evoked calcium responses from GCaMP6-expressing neurons in selected cortical layers, visual areas and mouse lines. Key features include searchable data from hundreds of two-photon calcium imaging sessions across multiple visual areas and depths in the visual cortex, standardized visualizations of cellular responses to five types of rich visual stimuli, gathered from several transgenic mouse lines. Raw data and advanced analysis modules are available for download via the Allen Software Development Kit (SDK). Visit observatory.brain-map.org.



ALLEN CELL TYPES DATABASE

The Allen Cell Types Database contains multi-modal characterization of cells from the adult human and mouse visual cortex, based on their electrophysiological, molecular and structural properties. Key features include single-cell transcriptomics, whole-cell patch clamp recordings with images of biocytin-filled neurons, full 3D digital reconstructions of selected cells, and computational analysis tools accessible via the Allen SDK. Visit celltypes.brain-map.org.

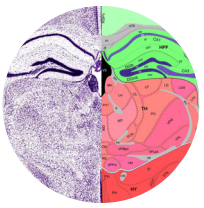


ALLEN MOUSE BRAIN CONNECTIVITY ATLAS

The Allen Mouse Brain Connectivity Atlas is a high-resolution map of neuronal projections in the mouse brain. Generated using transgenic mice genetically engineered to target selected neuronal subsets, the atlas provides a comprehensive "wiring diagram" of the brain. Key features include projection pathways in a navigable Common Coordinate Framework and histological reference images. The data is presented within the interactive Brain Explorer® 3D viewer and can be searched by anatomical region, injection site or axonal trajectories, as well as a "virtual" retrograde search. Visit connectivity.brain-map.org.

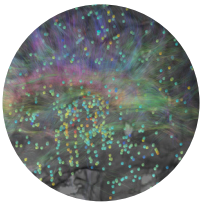
ALLEN MOUSE BRAIN ATLAS

The Allen Mouse Brain Atlas, the first Allen Brain Atlas resource, is a genome-wide, three-dimensional map of gene expression throughout the adult mouse brain. Similar in scale to the Human Genome Project, the atlas comprises cellular resolution *in situ* hybridization images with comprehensive anatomic coverage that reveal where each gene is expressed in the mouse brain, as well as an integrated suite of powerful data search and visualization tools, including Correlative Search and an anatomic reference atlas. Visit mouse.brain-map.org.



ALLEN HUMAN BRAIN ATLAS

The Allen Human Brain Atlas is a unique multi-modal atlas that maps gene expression across the human brain. Key features include an "all genes, all structures" RNA microarray survey that is spatially mapped to an MRI reference space, *in situ* hybridization image data at cellular resolution for selected genes in targeted brain regions, and an annotated human brain atlas guide. Anatomic and gene-based search options are supported, as well as interactive viewing with the Brain Explorer® 3D software. Visit human.brain-map.org.



OPEN DATA RESOURCES

ALLEN BRAIN ATLAS API

The Allen Brain Atlas API provides the computational neuroscience community with under-the-hood programmatic access to selected Allen Institute's vast datasets using a REST-based approach. The API contains tools to access high-resolution images, 3D gene expression summaries, microarray and RNA-sequencing data, and raw MRI and DTI files contained in the Institute's suite of atlas resources. Visit brain-map.org/api/index.html.

ALLEN SDK

The Allen Software Development Kit (SDK) contains a set of software libraries that interact with the API and enable users to computationally access and analyze selected data. The Allen SDK focuses primarily on the Allen Brain Observatory and Allen Cell Types Database, and includes source code for downloading and running simulations of Generalized LIF and perisomatic biophysical neuronal models. Visit alleninstitute.github.io/AllenSDK.

NIH BLUEPRINT NON-HUMAN PRIMATE ATLAS

The NIH Blueprint Non-Human Primate Atlas provides a developmental neuroanatomical framework for exploring the cellular and molecular architecture of the developing postnatal brain of the rhesus macaque. This resource was funded by a a contract to the Allen Institute for Brain Science, in partnership with researchers at the University of California, Davis, from the National Institutes of Health Blueprint for Neuroscience Research award. The atlas is accessible via the Allen Brain Atlas portal or directly at blueprintnhpatlas.org.

BRAINSPAN ATLAS OF THE DEVELOPING HUMAN BRAIN

The BrainSpan Atlas is a rich resource for studying human brain development. The atlas provides a broad and detailed anatomical analysis of gene expression across multiple stages of early human brain development, comprising *in situ* hybridization, RNA-sequencing and microarray data, along with supporting neuroanatomical reference materials. The atlas was developed by a consortium of scientific partners from multiple organizations and was funded by awards from the National Institute of Mental Health. This resource is directly accessible at developinghumanbrain.org.

ALLEN DEVELOPING MOUSE BRAIN ATLAS

The Allen Developing Mouse Brain Atlas is a detailed map of gene expression changes during the development of the brain. The atlas provides a framework to explore both when and where genes are activated in the mouse brain from embryo through adulthood. Informatics data processing enables both spatial search and temporal search. Anatomic and temporal search locates enhanced gene expression in primary brain areas, and manual data annotation allows users to view curated summaries of gene expression in small structures. Developmental reference atlases provide additional context to interpret the data. Visit developingmouse.brain-map.org.

ALLEN SPINAL CORD ATLAS

The Allen Spinal Cord Atlas is a comprehensive, genome-wide map of gene expression throughout the mouse spinal cord. This resource details gene diversity in the normal spinal cord and provides an essential baseline for understanding how the spinal cord may be altered in disease or injury. The atlas includes image-based *in situ* hybridization data at cellular resolution for both juvenile (P4) and adult (P56) stages, with anatomic coverage across the full length of the spinal cord and accompanying histological reference images. The atlas was made possible through the generous support of a diverse consortium of funders, representing disease organizations, foundations, and corporate and private donors. Visit mousespinal.brain-map.org.

IVY GLIOBLASTOMA ATLAS PROJECT

The Ivy Glioblastoma Atlas Project (Ivy GAP) is a unique platform for exploring the anatomic and genetic basis of glioblastoma at the cellular and molecular levels. Data available via the Allen Brain Atlas data portal include cellular resolution *in situ* hybridization data, revealing gene expression across features structures inherent in tumor and tissue structure, genome-wide RNAseq profiling for anatomical structures identified in the ISH survey, as well as associated histological data suitable for neuropathological examination. A companion database of de-identified tumor specimen numbers, available at ivygap.org, provides additional clinical and genomic data. This project was made possible through the support of the Ben and Catherine Ivy Foundation and with project partners at the Ben and Catherine Ivy Center for Advanced Brain Tumor Treatment. Visit glioblastoma.alleninstitute.org.

AGING, DEMENTIA AND TBI

The Aging, Dementia, and Traumatic Brain Injury (TBI) Study is a new resource containing neuropathologic and molecular characterization of specimens from TBI and control brains in an aged population-based study from a cohort of the Adult Changes in Thought (ACT) study. The brain regions assessed include parietal cortex, temporal cortex, hippocampus and cortical white matter. This resource includes histology and immunohistochemistry data with quantitative image analysis to assess overall local pathological state of the tissue, protein quantification for pathological markers, measurements of oxidative stress, *in situ* hybridization data covering genes for canonical markers of major cell classes, RNA-sequencing data on the same regions assessed for pathological changes, and de-identified clinical data for each case. Visit aging.brain-map.org.