➢ **Tuesday November 6th, 9:30 a.m. – 12:30 p.m.**

The Allen Brain Atlas and Beyond: Atlasing Gene Expression in the Brain

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The **Allen Brain Atlas** is a Web-based, genome-wide digital atlas of gene expression in the adult mouse brain. This anatomically comprehensive, cellular resolution image database details the expression patterns of ~20,000 genes throughout the brain, as revealed by *in situ* hybridization (ISH). Seamlessly integrated anatomic atlases, collectively the **Allen Reference Atlas**, provide a standardized anatomic framework for visualization and analysis of the gene expression data. The Allen Brain Atlas and associated informatics analysis tools are freely and publicly accessible online at www.brain-map.org.

Since its completion, the Allen Brain Atlas has been enhanced with additional features and tools to further increase its utility for the scientific community. 2007 updates to the Atlas include:

- ***NeuroBlast***, an advanced mining tool that offers powerful searching capabilities to help extract relevant data quickly and easily. Starting from a gene of interest, this tool allows users to retrieve a list of genes exhibiting similar expression patterns across all or a specific part of the brain.
- ***Fine Structure Annotation*** options that direct researchers immediately to the 50 genes most specific to defined fine brain structures of interest.
- ***Easy Browsing and Quick View*** options that allow viewers to quickly access and flip through representative images, data summaries and anatomic plates from the Allen Reference Atlas.
- ***Programmatic access*** that allows third-party search programs to see and retrieve Allen Brain Atlas metadata programmatically for research or other applications. The available metadata include computed informatics values characterizing gene expression, gene symbols, ISH probe sequences, and other information.

Associated with the Atlas is **Brain Explorer**, a downloadable 3D viewing application. Brain Explorer offers a fully interactive 3D version of the Allen Reference Atlas. It also enables visualization of Allen Brain Atlas gene expression data in 3D, navigation from the reconstructed three-dimensional images to the original two-dimensional data, manipulations such as custom image rotation and virtual slicing of the brain, and gene search capabilities including NeuroBlast.

In mid-November 2007, the Allen Institute will release data for two more projects. First, the **Sleep Study**, which examines gene expression in five different sleep conditions, will be expanded with additional data and transitioned into a new Web application. Second, the Institute will release a first installment data from its ongoing project, **Gene Expression in the Human Cortex**. All Institute projects can be accessed online at www.alleninstitute.org.

Selected References

Dong, HW (2007) *The Allen Reference Atlas: A Digital Color Brain Atlas of the C57BL/6J Male Mouse*. Wiley.

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

Ng L et al. (2007) Neuroinformatics for genome-wide 3-D gene expression mapping in the mouse brain. *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 4(3):382-393, doi:10.1109/tcbb.2007.1035