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IMGEM: Interactive Multiple Gene Expression Maps

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Current molecular biological techniques allow us to visualize semi-quantitative levels of gene expression in situ. Autoradiographical image data from in situ hybridization histochemistry (ISHH) provides a wealth of information, which if made readily available could be beneficial for neuroscience researchers. However, in most cases due to the scope of their particular research interests, this ISHH data has been widely overlooked by many researchers. Thus, much of the gene expression data tends to get discarded or at best becomes unavailable for future review by other researchers. For example, one researcher may have vested interests in the gene expression of brain type nitric oxide synthase (bNOS) in cholinergic nuclei, and other researchers may have interests in the serotonergic nuclei. Until now there has been no considerable effort to facilitate the sharing of such gene expression data amongst researchers. In order to eliminate such progress-retarding redundancy, we developed a data sharing system (<http://imgem.psych.uic.edu>) that is available as an interactive map of brain gene expression. This interactive tool provides benefits essential for continuing to make great strides in discovery and mapping of gene expression by neuroscientists.

We employed the technological advantages of electronic databases in the open source software sector by creating a series of brain atlases as follows: 1) IMGEM contains archive 2D images of brain sections with multiple levels of resolution, and can share information with other researchers 2) by the 2D and 3D image analysis, IMGEM will facilitate the comparison of multiple gene expressions and morphological structures, 3) by 3D reconstruction of the image data, IMGEM will allow for free rotation of the 3D image and virtual-sectioning of the brain will be possible in any desired plane, 4) IMGEM includes a discussion board (or discussion forum) capability, which is capable of receiving responses or input from IMGEM users in real-time; and as an additional benefit, IMGEM can be readily edited and updated to reflect the real-time input of online users, 5) IMGEM can be seamlessly integrated with other currently available online databases and hyperlinks to other data resources on the Internet will be highlighted and easily accessible via IMGEM's user-friendly design and navigation. The long-term goal of this project is to gain further insights from the information available (data in the present and future) for brain gene expression mapping; and in doing so, to seek to better apply this collective knowledge for our continued understanding of normal and diseased human brain function.

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