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Title:	BrainInfo online 3d macaque brain atlas: A database in the shape of a brain
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Abstract: A goal of BrainInfo is to enable neuroscientists throughout the world to map neuroanatomical data directly into a three-dimensional ‘template atlas’ of the macaque brain. The brain of a single rhesus macaque (Macaca mulatta) has been segmented and mapped from a high-resolution MRI and is available on the Web. The model is a fully integrated, stereotaxic atlas of the cortex, subcortex, brainstem, and cerebellum. It can be used as 486 coronal, 346 horizontal, or 191 parasagittal 150-um thick 'sections'. Each voxel in the atlas is a cube 150 um on a side. Up to 90 brain structures appear in each section, and each voxel belongs to one and only one structure. The atlas can also be sectioned transversely at any angle. Registration and alignment problems that must be overcome by histologically based atlases are not an issue for the MRI-based atlas. One or more structures can be singled out and examined as simulated 3d objects, with a ‘ghost’ of the full brain remaining in view for orientation. The voxels identified with a given structure are designated by a color and by a fly-over caption in all views.

The atlas is designed for use as 'a database in the shape of a brain' to display images both from the neuroscience literature and from individual investigators. Investigators can map data in either of two formats, ‘area data’ or ‘point data’. Examples of area data are the cross-sections of primary structures, cytoarchitectonic areas, lesion sites, and areas of gene expression. Examples of point data are stimulation sites that elicit a particular response, recording sites that show similar unit response patterns or field potentials, and cells that share certain physical or neurochemical features. One can map an image of a brain section cut at any angle to an equivalent section in the atlas. Using software integrated into the atlas, the investigator can then warp the data image to match the atlas image by clicking pairs of equivalent landmarks in the two images. The same warp parameters can then be applied to neighboring data images with minimal adjustment, so that long series of images can be mapped to fit into the database. Data images, with approval of the author and atlas curator, become available as atlas ‘overlays’ to other users. Spatial searches of several types are available to find images mapped to a certain location. Searches of textual metadata are also integrated into the atlas. These and other tools facilitate the comparison of image data from many sources and the storage of far more image data than can be published in other forms.

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