Book Reviews


Neurofunctional Systems. 3D Reconstructions with Correlated Neuroimaging is directed at neurologists, neurosurgeons, neuroradiologists, nuclear physicians, neurophysiologists, traumatologists and oncologists. Its aim is to familiarise the reader with the 3-dimensional (3D) appearance of the basal ganglia, and the limbic, corticospinal, auditory, visual and medial lemniscal systems. The arteries and the sulci of the cerebral hemispheres are also illustrated. Extensive and intricate representations of brain sections are provided in the book, as are images of the 3D reconstructions of the various systems arising from these sections. In addition the systems are described verbally in detail. The printed illustrations and text are supplemented by a comprehensive set of computer images which allows interactive investigation of these 3D structures and an exploration of their relations to cerebral anatomy in general. The images have been created by sectioning up to 7 post-mortem brains, relating them to MRI data from other subjects. The reconstructions of cerebral arteries were made from 1 female brain.

The authors also provide very detailed descriptions of the methodology used in the acquisition of the raw data, its digitisation and conversion into 3D reconstructions. Accounts are also given of the systems used to depict these reconstructions including for example details of the lighting models used in the computer reconstruction. References are, as one might expect, comprehensive and form an excellent collection of classic papers.

The effort expended has clearly been rewarded by beautiful illustrations and reconstructions of these major neurological systems. The hard-copy and computer screen reconstructions will certainly be of help to medical students in the visualisation of these basic brain systems and appreciation of their relationships with each other and with overall brain anatomy. The brief clinical notes provided with the comprehensive description of each system will also entertain students and whet their appetite for clinical neurology by demonstrating the link between structure and function through disease processes.

Inevitably with such painstaking work, it is possible to study only a limited number of brains within a reasonable time span. The authors acknowledge that for some of the neurofunctional systems the individually reconstructed images are essentially probability maps incorporating the limited variability from the small number of individuals studied. No estimates are made of how representative their maps might be. The authors acknowledge, for example, that routine temporal lobectomies may sometimes produce small, sometimes large or sometimes no visual field defects. In a case where brain anatomy may be grossly disrupted by a mass lesion, an idealised representation derived from a few normal brains may be of limited value. Issues of homology are especially vexatious in the diseased brains that may need interventional treatment. The authors’ debatable proposition that computer-generated representations are ‘more accurate than drawings’ then becomes irrelevant.

There are a few curiosities in the text. I am not sure all of us would agree that in MR images the central sulcus is easy to identify. For the purposes of medical students, monocular field defects may always be due to lesions anterior to the optic chiasm but what of anterior calcarine cortical lesions? It is surprising that many new relevant references have not been considered.

The book, and the accompanying computer software, admirably perform their task of demonstrating the value of 3D graphical representations of selected neurological systems. The book and the accompanying program could certainly help students visualise these systems and give them an excellent introduction into what can now be achieved through the interaction of traditional neuroanatomical techniques and modern technology. This is not a book for individual students but may help teachers of neuroanatomy demonstrate complex neurological systems, particularly when access to human tissue is rationed. The usefulness of the book to its other target audience would seem limited.

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