



Introduction to 3D Anatomy

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Virtual Operative Neurosurgical Anatomy: Introduction of a New Interactive Paradigm



[Click here](#) to view related content for this model.

Model 1: The instructions for use of this and the other following models are as follows: Please use the full screen function for optimal visualization (by clicking on the arrows on the right lower corner of the model). To move the model in 3D space, use your mouse's left click and drag; to enlarge the object, use the mouse's wheel. The right click and drag function moves the model across the plane. (Please note that you have to zoom in to see the inner ear structures. Alternatively, please click on the “Select an annotation” link at the bottom of the window and “show annotations” so that the anatomical labels become visible.)

Commentary

The intricacies of cranial and cerebral anatomy have been the fascination of generations since the Middle Ages with attempts to figuratively represent these structures in increasing anatomical detail for the purposes of education, clinical application, and fascination. The initial renditions of

cranial anatomy were represented by two-dimensional (2D) schematics of the ventricular system surrounded by disorganized neural tissue.¹ Increasingly sophisticated and innovative 2D schematics have been developed by physicians, anatomists, and illustrators through the ages to advance anatomical and surgical understanding of the intricacies of cranial anatomy. The recent advances in graphic design and computer animation have provided a new environment that can not only be highly accurate but also be potentially revolutionary for interactive 3D anatomical representation.

Within the realm of surgical education, anatomical relationships have to be mentally converted from 2D into 3D space for clinical and surgical applications. The design of 3D anatomical representations began in the late 1980s and evolved with the development of computer graphics^{2,3} and has an established presence in the neurosurgical literature. The next 3D modelling development was achieved with the introduction of the Visible Human Project to create a complete 3D representation of a male and female human body for the purpose of education.^{2,4}

Evolution of 3D modelling in neurosurgery has involved surgical planning for temporal lobectomy,⁵ cerebral aneurysm clipping,^{6,7} transpetrous surgical approach,⁸ temporal bone dissection,^{9,10} and posterior fossa surgical planning.¹¹ Educational models that have been created include an interactive 3D virtual model of the temporal

bone¹²⁻¹⁷ and 3D cerebrovascular atlas¹⁸. These models provide a unique perspective on the presented anatomy unparalleled by the existing 2D representations of neuroanatomy.

The following series of articles from the *Neurosurgical Atlas* in the upcoming issues of the *Operative Neurosurgery* will introduce interactive 3D models that provide an immersive third dimension of both normal and pathological neurosurgical anatomy. These models are the result of 5 years of intense computerized sculpting work by The Neurosurgical Atlas team to create exceptionally detailed interactive virtual specimens that hopefully will provide an unparalleled realism (Model 1).

The neurosurgical operating room has also been created in this virtual environment and will be presented in the near future (Model 2). We sincerely hope that the viewers will find this new interactive environment helpful in their understanding of cranial anatomy and operative neurosurgery for educational, illustrative, and surgical training purposes.



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Model 2: The operating room that has been constructed using computerized graphics modeling to allow for realism in demonstrating the setup.

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