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**3-Dimensional virtual models of the human middle ear and temporal bone**

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Purpose: The three-dimensional (3-D) anatomy of the human temporal bone is complex, and learning it poses a challenge for students in basic science and in clinical medicine.

Material and Methods: We have developed 3-D models of various parts of the temporal bone and surrounding structures using histological sections from normal ears. Sections were digitized and then imported into a general purpose 3-D rendering and analysis software package (Amira v3.1, Mercury Computer Systems/TGS, San Diego, CA). The sections were aligned, anatomical structures of interest were segmented, and various models were generated.

Results: The resultant models are surface renderings of structures of interest. For each structure, the surface transparency can be individually controlled, thereby revealing the 3-D relations between surface landmarks and underlying structures. The 3-D surface models can also be sliced open at any section and the appropriate raw histological image can be superimposed on the model. The stack of images can also be re-sectioned in other planes. We have also developed a freeware 3-D viewer which allows our models to be downloaded from our website onto PC, Mac, and Linux platforms. The 3-D viewer allows full rotation and transparency control as well as the ability to slice open the model in x, y or z planes. The presentation will demonstrate real time versions of our models and various features of the 3-D viewer.

The models can be downloaded as freeware at  
<https://research.meei.harvard.edu/otopathology/3dmodels>

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