

AbstractID: 8331 Title: Stereoscopic Visualization Of Diffusion Tensor Imaging Data: A Comparative Survey Of Several DTI Visualization Techniques

Purpose: To compare several methods for displaying DTI data in MRI for clinical use.

Method and Materials: A diffusion tensor imaging (DTI) visualization tool was developed at our institution by graphically displaying the principal eigenvector as a headless arrow, using either regular or stereoscopic LCD monitors. This tool utilizes stereoscopic vision to represent diffusion tensor's spatio-directional information, while allowing color, the traditional tool for displaying directional information, to be used for other diffusion characteristics, such as functional anisotropy (FA). In this tool, the principal eigenvector at each voxel, V_{max} , is depicted as a headless arrow, while a color scale is used to encode the FA index. We compared: a) grayscale FA map (GSFM), b) coded orientation map (CCOM), c) V_{max} maps using regular non-stereoscopic display (VM), and d) V_{max} maps using stereoscopic display (VMS). A survey of clinical utility was performed by eight board-certified neuroradiologists, using a paired comparison questionnaire format with forced and graded choices. Five representative cases were selected based on the typical brain tumor patient population at our institution.

Results: V_{max} map was favored over traditional methods of display in most of the cases (80% vs. 10%, 10% no preference). However, when stereoscopic (VMS) and the non-stereoscopic (VM) modes were compared, VMS was preferred in 45% of them while VM was 35% and 30% had no preference. The main reason given for the preference of the stereoscopic DTI visualization tool (VMS, VM) to the conventional DTI visualization methods (CCOM and GSFM) was better delineation of white matter tract and improved 3D anatomy effect.

Conclusion: DTI data displayed by our V_{max} based display methodology seems to be preferred over traditional display methods in tests of clinical utility.