

AbstractID: 10751 Title: Assessment of Inter and Intra-Scanner Variation in Diffusion Tensor Imaging using the ACR Phantom

Purpose: Diffusion Tensor Imaging (DTI) has become a widely used MRI sequence to assess patient response to many forms of therapy. In order to track small changes in patient DTI parameters in a clinical setting, knowledge of inter-scanner and intra-scanner variations is necessary to insure that a perceived patient therapy response is statistically significant. Ideally, inter and intra-scanner variations should be determined from a large sample of healthy patients so that scanner specific effects can be quantified. However, this type of analysis is not practical in most institutions. Because of the lack and availability of DTI phantoms which closely model typical pathology, we will assess the usefulness of the MRI ACR phantom for this application. **Method and Materials:** Clinical DTI acquisitions were performed using the ACR phantom on 8 GE scanners (two 3T and six 1.5T) using an 8-channel head coil at M.D. Anderson Cancer Center to assess inter-scanner variations. Repeated acquisitions were also performed at each scanner to assess intra-scanner variations. DTI image sets were analyzed using several ROIs in homogeneous regions of the phantom. Axial profiles were obtained for each ROI in each scan for several DTI parameters. **Results:** We have compared several DTI parameters obtained from our scans of the ACR phantom to published patient measurements as well as patient data gathered from our own institution and found that the ACR phantom is quite viable for quantification of inter and intra-scanner variations in DTI measurement. **Conclusion:** This work suggests that the widely available ACR phantom may be useful for assessing DTI variability between scanners. With this information, it may be possible for institutions to schedule consecutive DTI acquisitions for a single patient on scanners which behave similarly, limiting the effects of inter-scanner variations on physicians' ability to assess therapy response.