

AbstractID: 1305 Title: Dosimetric Evaluation of a Coordinate Transformation System for Staged Stereotactic Treatments

For large arteriovenous malformations (AVMs), staged stereotactic radiosurgery has the potential to treat a large volume to an effective dose by splitting the treatment over multiple stages (usually two), irradiating an effectively smaller volume of the AVM nidus during each treatment session. The stages are separated by several months to allow for normal tissue recovery between treatments. The purpose of this work is to dosimetrically assess a methodology of calculating a combined treatment plan for multiple Gamma Knife treatments. An in-house linear-least-squares algorithm based on 6 fiducial markers invasively placed in the patient's skull as control points was previously developed. Dosimetric accuracy was assessed using an anthropomorphic head phantom with EDR2 film placed between two slices. The phantom was CT scanned and a 5 shot treatment was delivered. This film was removed, and after placing a second film, 2 of the 5 shots were again delivered to the phantom. The stereotactic frame was then displaced by a small amount and the phantom was rescanned. The coordinates of the remaining 3 shots were run through the coordinate transformation algorithm and subsequently delivered to the phantom. The two resulting films were then compared to each other and to the treatment plan. Excellent dosimetric and positional agreement was found. Dose profiles extracted from the films agreed very well with each other and the treatment plan. Furthermore, the average distance-to-agreement (DTA) amongst the dose distributions was 0.043 mm with 97% of pixels having a DTA less than 0.5 mm.