

AbstractID: 8579 Title: Ex Post Facto Addition of Headframes to DICOM Image Sets for Radiosurgery Treatment Planning

Purpose: To facilitate Gamma Knife™ stereotactic radiosurgery (GK-SRS) headframe placement and pre-planning using pre-existing DICOM images, for a canine radiosurgery clinical trial. **Method and Materials:** Software has been developed and tested for virtual GK-SRS headframe placement using pre-existing images obtained for diagnostic or other purposes. The Matlab-based software allows for user-interactive graphical positioning of the headframe or manual entry of headframe position relative to the clinical image coordinate system. Six degrees of freedom (translations and rotations) are enabled. The process was tested by matching the graphically added (virtual) fiducial markers to the true fiducial markers obtained from headframe image sets having known translations and rotations. **Results:** GK-SRS fiducials can be virtually positioned either graphically or manually and then written to a new combined set of DICOM images for export to the GK-SRS planning system. Frame placement accuracy is estimated at 1mm (~ 1 voxel), dependent on the base image pixel resolution. GK-SRS treatment plans can be developed prior to the treatment day to optimize both frame placement (e.g. ideal location) and treatment (e.g. dose location). **Conclusions:** Adding GK-SRS fiducials to a DICOM image set allows possible headframe positions to be evaluated and enables transfer of the modified image set to the GK-SRS planning system for definition of potential stereotactic coordinate systems. Viability of GK-SRS can then be assessed with an initial treatment plan, without the patient present, to demonstrate treatment feasibility and increase efficiency on the treatment day. These tools, with slight modifications, serve a similar purpose for human GK-SRS patients, allowing off-site cases to be initially evaluated and pre-planned, to aid in both treatment optimization as well as treatment day efficiency.

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