AbstractID: 6891 Title: Clinical Implementation of Automated Image Registration Using Subregion Matching

The clinical implementation of automated registration at St. Jude Children's Research Hospital is presented. The registration is a modification of Moseley's method, and allows for improved accuracy and automation by employing the following modifications. (1)The reference coordinate system utilized is based on a computed radiation isocenter (accuracy of <1mm) rather than collimation boundary matching (accuracy of 1-2mm). (2)The uncertainty associated with magnification error is removed by coupling the AP and lateral image registration. (3)User input can be either automatically generated or limited to a one time selection of subregions of anatomical interest (SROI) (user drawn boxes) on the reference images only. This method has been incorporated into the Supervised Portal Image Registration (SPIR) software written with a MATLAB interface. Using SPIR, the oncologist enters a minimum of 3 SROIs into the reference EPID portal images (AP and lateral with 6MU exposure) acquired with a Siemens BEAMVIEW EPID. These images can be enhanced using a CLAHE based image enhancement. Then weekly portal images are taken to verify patient position. SPIR uses the reference images to determine in-plane positioning errors to an accuracy up to 1mm and 1° for images with pixel dimensions of 0.5mm. Out-of-plane errors are not quantified but detected using a threshold value. This method has been successfully applied to the cranial site, and does not require high contrast landmarks or high resolution images. SPIR allows for an accurate treatment of cranial patients where the bite block is not appropriate (ie sedated patients, young children, prone position).