

AbstractID: 1372 Title: Lymphatic Flow Mapping Utilizing Multi-Modality Image Fusion

Radiation treatment of head and neck tumors can potentially benefit from the precise knowledge of the lymph drainage pathways. Healthy-tissue dose could be significantly reduced if the target volume includes only the ipsilateral lymph nodes through which the tumor drains. At our institution a novel clinical study is being conducted focusing on quantitative mapping of the lymphatic flow around head and neck tumors.

Selected patients have been imaged using both conventional CT and SPECT modalities. Two sets of interchangeable fiducial markers suitable for both modalities were used during the scans. The commercial fusion software did not accept the DICOM multi-frame format used by the SPECT imager. In order to import the scans to perform image fusion, the multi-frame format was converted, using in-house developed code, to the single-scan format (single files per transverse scan plane). Converted DICOM objects were also artificially labeled as CT scans. This procedure enabled us to perform the image fusion on the standard clinical treatment-planning workstation by manual matching of the fiducial markers.

Our preliminary results show that the overall objective of overlaying the precise and detailed anatomical data (CT) and data containing the relevant physiological information (SPECT) can be achieved using standard clinical equipment. Involved lymph nodes are clearly visible as well as their geometrical relationship to the patient's anatomical features. Treatment planning studies are ongoing to determine the extent of normal tissue sparing if (for patients with SPECT-identified unilateral disease) the contralateral lymph nodes are not irradiated.