

## AbstractID: 9245 Title: Automated CT-SPECT Registration of the Liver of the Patients Treated with Radioactive Microspheres for Hepatic Tumors

The accurate registration of the CT and SPECT images of the liver is essential for the radiation-absorbed dose calculation of the patients treated with radioactive microspheres. Many investigators utilize the interactive image registration techniques which do not impose rigid body restriction including the use of the fiducial markers. However the interactive techniques are time consuming and are not suited for handling large amount of data. We have developed a technique to automatically register the CT and SPECT images of the liver infused with radioactive microspheres. A 3-D liver mask is created from the SPECT images by thresholding and constraining the liver volume to the volume obtained from the CT scans. The SPECT liver mask is subtracted from the CT liver mask after they are scaled to the same voxel sizes. An iterative optimization algorithm is utilized to minimize the squared sum of the subtracted masks differences. The iteration involves the relative translation and rotation of the masks in three dimensions. Upon reaching the optimization goal, the final transformation matrix is applied to the SPECT image data sets and the resultant images are superimposed on the CT scans. The technique worked robustly and the registration accuracy was visually confirmed. The advantage of this technique is that it is rather insensitive to the irregularity in the SPECT liver masks due to the inhomogeneous activity distribution. This study was supported in part by the MDS Nordion, Inc.