

AbstractID: 7459 Title: Improving the accuracy of topograms for node localization in breast lymphoscintigraphy

Purpose: To characterize and compensate for fan-beam distortion of a CT topogram, thereby improving a technique for localization using planar lymphoscintigram/topogram fusion by minimizing misregistration between modalities.

Method and Materials: We are currently investigating the feasibility of fusing planar scintigrams and CT topograms as a means of localization for breast lymphoscintigraphy and determined a maximum expected lateral offset between modalities of ± 2.8 cm for an average size patient. The spatial distortion due to the fan-beam of the topogram is linearly related to offset from isocenter, suggesting the possibility of rescaling the topograms used for localization. In this work, we have adjusted the anterior topogram by determining the location of the node in the lateral scintigram and using the distance above or below isocenter to apply the appropriate magnification to the topogram so that it is correctly scaled for the plane of the node (vice versa for the lateral topogram). An IDL program [ITT Visual Information Solutions, Boulder CO] was written to facilitate the modification of the topograms; the program was tested with a data set of an anthropomorphic thorax phantom acquired using a hybrid SPECT/CT camera [Symbia®, Siemens Medical Solutions USA, Hoffman Estates IL]. Registration was visually assessed by fusing the scintigram with the original topogram, with the modified topogram, and with the full-thickness coronal-projection CT to verify the localization.

Results: The IDL program has been executed and is successfully modifying topograms to minimize distortion. The visual comparison of the scintigram/modified topogram and scintigram/full-thickness coronal-projection CT demonstrates less than ± 0.34 cm offset.

Conclusion: Appropriately magnified CT topograms have been generated and fused with planar scintigrams that have potential for producing images with improved anatomic localization for breast lymphoscintigraphy compared to the standard-of-care Co-57 sheet source backlighting method.

Conflict of Interest: Research sponsored by Siemens Medical Solutions USA.