

AbstractID:9680Title:PilotPatientStudy of a Dedicated Dual-Modality SPECT-CT System for Breast Imaging

Purpose: Acknowledging the limitations/discomfort of mammography has inspired the development of a dedicated SPECT-CT system to detect breast cancer, monitor therapeutic responses, and improve patient comfort. This system provides semi-quantitative 3D functional/anatomical imaging of a pendant, uncompressed breast. Fused images can potentially provide more valuable clinical information than independent systems alone.

Method and Materials: The SPECT subsystem permits fully-3D complex acquisition trajectories around the breast, avoiding physical hindrances, overcoming distortions due to inadequate sampling, and allowing lesion detection on the chest wall. The CT subsystem, restricted to circular rotation, uses a quasi-monochromatic, cone-beam x-ray source, which allows for reduced radiation dose and increased contrast between similar soft tissue attenuation coefficients. With no breast compression and an open, common field-of-view geometry system, the patient lies prone on a customized patient bed while the hybrid device non-invasively acquires 3D data underneath. A preliminary investigation on the clinical performance of the hybrid system was done by imaging women with biopsy confirmed breast cancer.

Results: SPECT patient images can clearly visualize the tracer uptake by the tumor and view into the chest wall. Physical system constraints limit chest wall visualization in the CT patient images and thus patient positioning is under modification. Eliminating overlapping tissues through 3D imaging, the CT images improve lesion isolation versus 2D imaging modalities. Complementary functional and anatomical image information helps localize suspicious areas for subsequent analysis.

Conclusion: Implementation of the world's first dedicated SPECT-CT system promises greatly improved visualization of the 3D breast volume. Complementary information from functional and anatomical imaging can guide lesion localization for subsequent analysis.

Conflict of Interest (only if applicable): MPT is an inventor of this technology, and is named as an inventor on the patent for this technology applied for by Duke. If this technology becomes commercially successful, he and Duke could benefit financially.