AbstractID: 6035 Title: PET/CT Attenuation Correction and Image Fusion

In order for an annihilation event to be accurately detected in a PET scanner, it is necessary for both annihilation photons to pass through the patient without interaction and be detected by two detectors in the scanner. The probability of this occurrence is less than that for a single photon, resulting in significant attenuation effects in a PET scan. In the past, a positron source, such as Ge-68, was used as a transmission source to provide a transmission map to be used for attenuation correction. The recent integration of PET scanners with state-of-the-art multi-slice CT scanners has provided the capability for using the CT scan as a high-quality attenuation map to accomplish the task of attenuation correction. This has resulted in an improvement in the quality of the correction and thus an improvement in overall PET image quality. However this implementation has not been accomplished without additional problems being identified. Specifically beam hardening can cause errors in the attenuation correction and accurate corrections are difficult in regions where there is physiological motion such as the heart and lungs due to difficulties in accurately registered the CT and PET scans in these areas. Close attenuation must be paid to these effects.

Integration of the CT scanner with the PET scanner has provided a significant advance in clinical diagnosis and treatment planning because of the ability to accurately register and display high quality images of anatomy from CT and images of organ function from PET. This makes it possible not only to differentiate malignant from benign lesions but to also precisely localize malignant lesions and differentiate between abnormal uptake and normal physiological uptake of radiopharmaceuticals.