

# **A Comparison of the Uniformity Requirements for SPECT Image**

## **Reconstruction using FBP and OSEM Techniques**

Gamma camera non-uniformity can result in the presence of ring artifacts in reconstructed SPECT images. The uniformity requirements for SPECT have been well studied. However to date such studies have only examined these requirements relative to the data reconstructed using a conventional filtered back-projection (FBP) algorithm. With the increasing availability of iterative reconstruction techniques, it is important to re-evaluate these requirements due to of the significant difference in noise characteristics between iterative and FBP techniques. The study objective was to compare the relationship between ring artifact magnitude and image noise in tomographic images reconstructed using FBP and an ordered-subset expectation-maximization (OSEM) iterative reconstruction technique. A cylindrical phantom was filled with water and Tc-99m. Four tomographic acquisitions were performed on a dual-head gamma camera system, with total counts per acquisition ranging from ~1 Mcts to ~100 Mcts. All acquisitions were reconstructed using both FBP and OSEM techniques. Ring artifacts were generated in the transaxial data by introducing a known defect at a given location in each planar image. The levels of non-uniformity tested ranged from one to ten percent. The modified acquisitions were again reconstructed using both FBP and OSEM techniques. The ring artifacts were isolated by the subtraction of the uncorrupted from the corrupted data sets. The magnitude of the ring artifacts in the corrupted reconstructions were measured and compared to the measured root mean square noise levels for each uncorrupted reconstruction.