

## **Use of a precision fillable clinical simulator phantom for PET/CT scanner validation in multi-center clinical trials: The SNM Clinical Trials Network (CTN) Program**

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### **Abstract No. 437**

**Objectives:** A quantitative clinical oncology simulator phantom was developed for use in PET/CT scanner validation that is quantitatively accurate and highly reproducible. This phantom was used to evaluate scanner performance at sites participating in multi-center trials.

**Methods:** A phantom was designed to provide precise concentrations of F-18 in the background, lungs and simulated lesions in undisclosed locations. The phantom simulates 4:1 FDG lesion/background ratio in oncology imaging. Filling instructions ensure precision radioactive concentrations within +/- 3%. Seven scanners at academic sites were used as testing facilities to develop performance acceptance criteria. Routine acquisition and reconstruction parameters were allowed by each site; however the acquisition time per bed was specified to be 4 min (6min for certain older scanners) to ensure provide reasonable statistics and image quality. 30 phantoms were constructed by Medical Designs, Inc and sent to 211 scanners world-wide for evaluation of their systems in multi-center drug trials.

**Results:** Sites reported using scanners that were 49% GE, 36% Siemens and 15% Philips. DICOM images and documentation, along with SUVave and SUVmax measurements of background and lesions were submitted from 176 sites. Images were evaluated at a core lab for image noise, lesion visibility and contrast and quantitative accuracy. 12 sites failed to meet the imaging criteria or withdrew their submission. Adjustments to calibrations were needed in 13% of scanners. 164 scanners were able to provide acceptable images with quantitative accuracy and were granted scanner validation.

**Conclusions:** The precision quantitative phantom with the additional advantage of clinical simulation and lesion detectability has proven of value in accessing image quality and quantitative accuracy. Phantom filling was accomplished at all sites and quantitative accuracy was excellent. 93% of sites were able to demonstrate acceptable performance