AbstractID: 11646 Title: Calculation of broad beam transmission factor for 511 keV photons using energy spectra measured in the presence of scatter

Purpose: To obtain the energy spectra from patients after administration of F-18 FDG and measure the broad beam attenuation of lead under clinical conditions.

Method and Materials: A sodium iodide detector was used to measure the spectrum of photon energies emitted from patients after being injected with ^{18}F FDG. Spectra were taken through an unshielded wall, and through a wall shielded with 15.9 mm of lead as the patient was seated in the uptake room. Exposure rate readings were also made using an ionization chamber survey meter. The spectra were corrected for detector efficiency, summed over all energies, and the results converted to exposure rates. The spectra of energies emitted from a point source of ^{18}F FDG were also measured, through various thicknesses of lead.

Results: Both the spectra data and the ionization chamber results are compared to transmission factors for lead at 511 keV given in "AAPM Task Group 108: PET and PET/CT Shielding Requirements".

Conclusion: Due to scatter in the patient, the fraction of lower energies is significant compared to 511 keV photons and can influence the effective attenuation of lead in clinical PET facilities.