WFNMB2018 Abstract Submission

Radionuclide Therapy

WFNMB18-ABS-1369

Imaging and radiation safety considerations of phosphorus 32 radionuclide therapy in inoperable pancreatic primary cancer.

Enid Eslick[1], Dale Bailey[*1], Michelle Bradney[2]

[1]Department of Nuclear Medicine, Royal North Shore Hospital, St Leonards, [2]OncoSil Medical Ltd, North Sydney, Australia

Background / Aims: OncoSil Medical Ltd (Sydney, Australia) have a novel therapeutic approach for treating inoperable primary pancreatic tumours utilising siliconized phosphorus-32 Microparticles (called 'OncoSil™').[1] Typical amounts of OncoSil administered are of the order of tens of MBqs. The emission of high energy bremsstrahlung photons create challenges such as the potential for (1) radiation exposure to caregivers and (2) poor post-treatment image quality.[2] The purpose of this work was to estimate the radiation exposure to operators and caregivers during an OncoSil treatment and to assess the post-treatment image quality.

Methods: A water-filled IEC body phantom containing an internal spherical component located off the central axis was filled with a representative therapeutic activity of 85 MBq of OncoSil suspension to simulate the body situation. A Radeye B20-ER survey meter (Thermo Fisher Scientific Messtechnik GMbH) was used for radiation exposure assessments at a number of locations. A Siemens Intevo.6 SPECT/CT gamma camera (Siemens Healthineers, Hoffman Estates, USA) with medium energy collimators was used for imaging. Image were reconstructed using an ordered subset ML-EM (OSEM) reconstruction algorithm. Energy spectra were acquired after removing the collimator from the detector.

Results: The pulse height analyser (PHA) spectrum acquired on the gamma camera showed that the majority of photons were below 150 keV, however there was an appreciable tail extending beyond 200 keV. An imaging window of 50-100 keV can provide successful imaging. The highest exposure rate to an operator or caregiver, directly adjacent to the source in the phantom, was approx. 0.16 $\mu Sv.hr^{-1}.MBq^{-1}$ so that exposure from a typical OncoSil treatment of 20 MBq is 3 $\mu Sv.hr^{-1}$.

Conclusion: The estimated exposure of exposed individuals during and after a treatment is very small. It would require over 300 hours of standing directly beside a patient to approach the annual limit of exposure for a member of the public Caregivers are further allowed five times this limit. Acceptable image quality has been demonstrated on an unmodified, conventional gamma camera using medium energy collimation.

References: (1) https://clinicaltrials.gov/ct2/show/NCT03076216

(2) Ito S, Kurosawa H, Kasahara H, et al. 90Y bremsstrahlung emission computed tomography using gamma cameras. Annals of Nuclear Medicine. 2009;23(3):257–267.

Disclosure of Interest: E. Eslick Conflict with: Nil, D. Bailey Conflict with: consultant for OncoSil Medical Ltd, Conflict with: no conflict of interest, M. Bradney Conflict with: Financial support for study