prediction. Leave-one-out cross validation (LOOCV) was performed on patient data and clinically relevant simulations (500 kidneys, 500 tumors) to assess model performance, with the |%bias| defined as the absolute value of the relative difference between STP predicted TIA and ground-truth TIA estimated from four-timepoint SPECT/CT. ***Results:*** In LOOCV, 31%, 58%, 95%, and 92% of patient tumors had TIA |%bias| < 20% using our proposed bivariate STP model at TP1-TP4, respectively. For comparison, the corresponding values with a widely used STP approach [1] was 0%, 12%, 91%, and 91%. For kidney, with our proposed method, 69%, 88%, 94%, and 85% had TIA |%bias| < 20% at TP1-TP4, respectively compared with 0%, 22%, 91%, and 32% of kidneys with approach [1]. Notably, the mean |%bias| at TP1 was 94% for tumor and 89% for kidney with STP approach [1], but improved to 30% for tumor and 15% for kidney with our bivariate STP model. As with clinical results, simulation results also demonstrated substantial improvements over approach [1], particularly at early time points. Compared with our bivariate model, further improvements were observed with our multivariable model that included clinical biomarkers. ***Conclusion:*** While the optimal timepoint for prediction is near TP3, practical considerations often lead to patients being imaged at other timepoints. Our data-driven models are less sensitive to timepoint selection and provide significantly improved predictions at non-optimal timepoints compared to the widely used method. ***References:*** [1] Hänscheid, et al. J Nucl Med 2018;59:75-81.

EPS-210

Pitfalls in dosimetric analysis: precision obtained by various users on the same patient dataset and dosimetry package

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Aim/Introduction: The variety of dosimetry protocols implemented in molecular radiotherapy (MRT) requires the appraisal of the sources of variation that impact dosimetry procedures in nuclear medicine practice. This work, done as part of an IAEA-CRP[1], presents a dosimetric analysis performed on a single patient dataset by independent operators following a standard protocol and using the same dosimetry solution. It addresses some of the pitfalls that can occur while performing clinical dosimetry. ***Materials and Methods:*** Patient (administered with Lutathera®) and calibration phantom images were acquired on a GE Infinia Hawkeye (3/8" NaI crystal thickness and medium energy collimator) and reconstructed on a Hermes™ workstation. A calibration factor of 122.6 Bq/counts was derived from phantom images. Dosimetry was performed by eight clinical centres on PLANET® Dose (DOSIsoft SA), using a fixed protocol: rigid registration, semi-manual (organs) and threshold-based (tumours) segmentation, absorbed dose point kernel convolution of activity to derive absorbed dose rates (ADR), and ADR time integration to obtain absorbed doses (AD) in liver, kidneys and four lesions. Several training/brainstorming iterations were performed to analyse results and identify the causes of observed variations. ***Results:*** Liver and the kidneys presented low AD (in the range of 2 - 4 Gy) while lesions had AD up to 41 Gy i.e. in the range of results observed in the literature. Mean relative variations in organ volumes ranged between 5.8% and 12.3%, and from 0.6% to 58.6% in lesions. The relative variation in activity in healthy organs decreased to 10% while for lesions were as high as 49%. Some intriguing fluctuations in activity were observed despite the absence of equivalent variations in counts, thereby justifying the introduction of a new checkpoint (activity to counts ratio). Similarly, additional checkpoints were introduced to better characterise the sources of variation observed in participant results: activity concentration (AC) and the ADR/AC ratio. Mono- and bi-exponentially ADR fitting over time resulted in differences in AD across lesions of up to 23%. ***Conclusion:*** Significant discrepancies were identified for several volumes of interest even when dosimetric analysis was performed on the same patient dataset using the same methodology and software but by various operators. Many of these fluctuations can be eliminated or significantly reduced by establishing checkpoints, implementing sanity checks, and cross-validating data among physicists, physicians, or specialists. This work demonstrated the need for rigorous dosimetry software training and quality assurance procedures in order to achieve reliable, traceable, and reproducible dosimetry. ***References:*** [1]https://www.iaea.org/projects/crp/e23005

EPS-211

Impact of Dosimetry Method on Healthy Organ and Tumor Absorbed Dose Estimates for Lutetium-177-DOTATATE Therapy of Neuroendocrine Tumors

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Aim/Introduction: Somatostatin receptor-based radiopharmaceutical therapies for neuroendocrine tumors have consistently demonstrated favorable outcomes. Dosimetry can play an integral role in patient-individual therapy planning and