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Predictive value of ^{18}F -FDG PET/CT information in the modern 3D-based radiotherapy treatment of head and neck cancer patients

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BOOK OF ABSTRACTS



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Methods and Materials: A total of 97 men with suspicious multiparametric prostate MRI (PI-RADS category 3 or above) and negative US scheduled for MRI/US transperineal fusion biopsy were enrolled in this prospective study. Transperineal fusion biopsy was performed using Real-time Virtual Sonography system with 2-3 cores sampled from each suspicious lesion. After fusion biopsy, standard 12-core systematic biopsy was performed by another group of physicians who were blinded to MRI results. The diagnostic performance for clinical significant PCa of fusion biopsy was evaluated in comparison with systematic biopsy.

Results: The overall cancer detection rate was 49.5% (48/97). PCa was detected by fusion biopsy in 45 patients (46.4%, 45/97) and systematic biopsy in 36 patients (37.1%, 36/97, $P=0.035$). Among 48 patients with PCa, 44 (91.7%, 44/48) were diagnosed with clinically significant PCa. In comparison with systematic biopsy, the significant PCa detection rate for fusion biopsy was statistically higher (44.3%, 43/97 versus 30.9%, 30/97, $P=0.001$). MRI / US transperineal fusion biopsy resulted in an additional diagnosis of 14 patients with clinically significant PCa, including 10 patients missed by systematic biopsy and 4 patients undergraded by systematic biopsy. If fusion biopsy was omitted, only one patient with clinically significant PCa would be missed.

Conclusion: MRI/US transperineal fusion biopsy can improve clinically significant PCa detection in patients with negative baseline TRUS findings compared with standard systematic biopsy.

10:30 - 12:00

Room C

Radiographers

SS 1014

Melange: nuclear medicine and interventional topics

Moderators:

J. Thompson; Salford/UK
N.N.

B-0882 10:30

Predictive value of 18F-FDG PET/CT information in the modern 3D-based radiotherapy treatment of head and neck cancer patients

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Purpose: The aim of the study was to evaluate the potential predictive value of the maximum standard uptake value (SUV_{max}), lean body mass corrected SUV ($SUV_{L_{peak}}$), metabolic tumour volume (MTV) and total lesion glycolysis (TLG) values of the primary tumour in the clinical outcome.

Methods and Materials: Retrospective evaluation was performed using PET/CT image datasets of 52 histologically proven head and neck cancer patients, receiving definitive 3D PET/CT fused chemo-radiotherapy (CRT). PET/CT was performed before the start of the CRT and repeated after the completion of therapy clinical for response evaluation. SUV_{max} , $SUV_{L_{peak}}$, MTV and TLG values of the primary tumour have been assessed before and after the therapy. Two patient groups were created in relation to the presence or absence of viable primary tumour tissue. Group related metabolic parameter evaluation was performed, using the Kruskal-Wallis test.

Results: In 28/52 (54%) cases viable residual tumour tissue was detected on the restaging PET/CT image datasets, and in 24/52 (46%) cases complete remissions were found. For therapeutic success prediction assessment, we were unable to find any statistically significant correlation with pre-treatment SUV_{max} and $SUV_{L_{peak}}$ values ($p=0.44$, $p=0.33$). TLG provided nearly statistically significant differences ($p=0.052$), and MTV have shown significant differences ($p=0.001$) between patient groups.

Conclusion: According to our results simple metabolic data provided by FDG PET/CT were unable to predict therapeutic response, while complex PET/CT volume information containing parameters proved to be more useful. Survey is planned to be followed with more subject and parameter inclusions.

B-0883 10:30

Comparative evaluation of in-house-prepared 99mTc-ethylene-dicysteine-deoxyglucose and 18F-fluorodeoxyglucose in breast cancer

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Purpose: To compare the uptake pattern of in-house-prepared (IHP) 99mTc-ethylene-dicysteine-deoxyglucose (99mTc-EC-DG) with 18F-fluorodeoxyglucose (18F-FDG) in histologically proven breast carcinoma patients.

Methods and Materials: Serial whole-body scans were acquired at different time intervals in five breast cancer patients (Stages II-IV). SPECT/CT was performed at 2 hours (h) post-99mTc-EC-DG administration. An average blood time-activity curve was calculated from the pooled blood sample data of five patients at 0-, 1-, 2- and 4 h after 99mTc-EC-DG injection. One-hour post-administration 18F-FDG-PET scans were also acquired. All the scans were qualitatively evaluated by one board-certified nuclear medicine physician. Quantitative comparisons were also made by drawing three-dimensional regions of interest and calculating tumour-to-background (T:B) ratios.

Results: The primary breast tumour uptake was visualised with 99mTc-EC-DG and 18F-FDG in five patients. 99mTc-EC-DG tumour uptake in $n=3$ patients was similar to the 18F-FDG uptake. Lower 99mTc-EC-DG was found in $n=2$ compared to 18F-FDG. The blood time-activity curve indicated rapid 99mTc-EC-DG clearance. The T:B ratios of 18F-FDG indicated a mean $\pm$ SD of 7.29 ± 3.26 and for 99mTc-EC-DG 2.49 ± 1.1 for the five patients. A $p=0.124$ indicated non-statistical significant difference between two paired samples.

Conclusion: IHP 99mTc-EC-DG SPECT/CT scan has similar diagnostic accuracy compared to 18F-FDG PET/CT for the primary breast tumour. Yet, advantages of 99mTc-EC-DG would be lower cost (no special equipment) as well as lower radiation dose patient and staff. IHP 99mTc-EC-DG has promising uptake properties as a diagnostic tumour-imaging agent and could play a future role in the diagnostic workup and monitoring of these patients.

B-0884 10:46

SPECT/CT artefacts: nuclear medicine point of view

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Purpose: The association of SPECT and CT images can have a synergic effect in Nuclear Medicine imaging. Although, the use of SPECT and CT combined images must be carefully done, due to the several artefacts that may occur and that can diminish the accuracy of this technique.

Methods and Materials: The acquisition and processing protocols must be carefully followed, and the acquired images must be reviewed for technical and diagnostic quality before the patient leaves the department.

Results: The identification of the artefact and its source (if related to the equipment or to patient characteristics) is very useful in order to prevent or correct the artefact or minimise its effect on image quality.

Conclusion: Nuclear Medicine Technologists and Radiographers have an important role on the implementation of strategies to avoid artefacts to occur or to minimise its impact if they are not avoidable. Images must be interpreted by skilled readers who are well aware of the patients' clinical history, using workstations that allow integrated viewing of the functional and na atomic data. In this way, a high quality study will provide useful diagnostic information for further clinical management and patient care. Knowledge and training is very important to enhance image quality and as the quality of SPECT/CT device improves, it is expected that new applications will emerge.

B-0885 10:54

Impact of cardiac CT on the use of invasive diagnostic catheterisation in paediatric patients

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Purpose: Diagnostic cardiac catheterisation is an invasive procedure used in paediatric patients with congenital heart disease. The investigation requires general anaesthesia (GA), which is associated with neurodevelopmental risks (1). However, non-invasive CT angiography with a cardiac package can also be used and provides detailed information on intra- and extra-cardiac anatomy, coronary arteries, and vascular structures. We investigated whether the introduction of a non-invasive CT scanner with a cardiac imaging package reduced the number of patients undergoing invasive diagnostic cardiac catheterisation procedures.

Methods and Materials: A retrospective analysis of patients undergoing diagnostic cardiac catheterisation and CT angiography was conducted for 2 years prior to (2013/14) and after (2016/17) introduction of a cardiac CT scanner at the Royal Hospital for Children, Glasgow. Statistical comparison of the data was undertaken using chi-squared tests.

Results: There was a significant difference in the number of diagnostic cardiac catheterisation and CT angiography procedures being conducted pre- and post-introduction of the CT scanner ($\chi^2 = 118.09$, $P < 0.01$). Diagnostic CT imaging increased from 85 to 345 cases in 2013/14 vs. 2016/17, whereas cardiac catheterisation procedures decreased from 143 to 88 cases, respectively.

Conclusion: Introduction of a CT scanner with a cardiac package resulted in a significant decrease in invasive cardiac catheterization procedures and an associated increase in non-invasive CT imaging. The shift from invasive to non-invasive investigations reduces patient and parental distress, as well as the risks associated with GAs in the paediatric population (2).

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