Aim/Introduction: Several international agencies have published numerous guidelines for QC tests for the SPECT and SPECT/CT systems. Most of third world countries lack any recommendations for routine testing of these systems. This study aims to propose a national quarterly QC (QQC) tests for the SPECT and SPECT/CT systems that guarantee the system reliability and optimized performance. **Materials and Methods:** Eight QQC tests were performed by a qualified medical physicist immediately after the PPM. The COR and intrinsic uniformity calibrations were acquired before conducting these tests. Up-to-date, more than 25 QQC tests have been conducted on five systems at King Faisal Specialist Hospital and Research Center. They include; intrinsic and extrinsic flood field uniformity, system spatial resolution and linearity, whole body system spatial resolution without scatter, total tomographic performance and SPECT/CT spatial registration tests. They are practical and consume about 3 hours. The required radionuclides and phantoms such as Carlson and two sizes quadrant bar phantoms were used. All these tests were evaluated visually and using the vendor software for the uniformity tests and COR calibrations. **Results:** These tests evaluate the performance of the system quantitatively and qualitatively using several performance indicators which demonstrates its suitability for clinical use. Several times it was found that the photopeaks needed to be adjusted. Uniformity tests showed consistent behavior of the systems with some abnormalities in some occasions. These were resolved by either acquire the uniformity calibration tables or retune the system. Consistently, 3-and-5 millimeters bars were determined for the system and whole-body spatial resolution tests, respectively and always the resolved bars were look linear. Most of the tests showed consistent behavior in resolving different objects of Carlson phantom. Three spheres, seven rods and four pairs of hot lesions inserts were usually resolved. Often, the uniform area looks uniform but with the occasional appearance of ring artifacts. Moreover, the linearity part shows straight lines in both directions. For SPECT/CT systems, the accuracy of image registration was evaluated visually by displaying the fused slices of SPECT and CT images of Carlson phantom. **Conclusion:** The proposed national QQC tests are suggested to be performed for the SPECT and SPECT/CT systems in order to offer a set of tests that have been constantly examined and could guarantee the system reliability. Tests results occasionally showed deficiencies in image quality or SPECT performance. Most of the issues were solved and modified by the user and/or service personnel. **References:** None.

EP-0897

Is there any ^{18}F-FDG PET/CT BAT pattern in oncological patients?

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Aim/Introduction: Brown Adipose Tissue (BAT) represents an endocrine metabolic active tissue with complex pathological implications, demonstrating high uptake of ^{18}F-FDG. Consequently, ^{18}F-FDG PET/CT, highly used in cancer evolution assessment, proved to be an essential tool for its detection and quantification. The purpose of this study is to evaluate BAT ^{18}F-FDG PET/CT possible pattern characteristics in oncological patients as well as possible factors which can influence BAT activation. **Materials and Methods:** The BAT imaging pattern, with qualitative and quantitative statistical analysis, was realized in 48 ^{18}F-FDG PET/CT scans performed for 41 patients who were referred to our Nuclear Medicine Laboratory between July 2017 and April 2019, for different oncological diagnosis. **Results:** The median value (m_v) of patients age with ^{18}F-FDG BAT positive scans was 33.7 years. This tissue was active more often in female patients (58.5%), the m_v Body Mass Index (BMI) was 24.39, and the Blood Glucose (BG) level was normal (m_v = 90 mg/dl). In 58% of cases the initial diagnosis was Hodgkin's lymphoma and 51.2% of patients have received surgical treatment and chemotherapy. We noticed that 65.9% of cases were reported in cold seasons (autumn and winter), even if the scan room temperature was always the same. BAT was unilateral in 2.4% of cases, the rest being bilateral, with symmetric distribution in 68.3%, homogeneous in 43.9%. In 12.19% of cases the localization was unique, all the rest being multiple. We mention that the maximum value of SUV_{max} was calculated in paravertebral localization but supraclavicular SUV_{max} had the best Pearson correlation (ρ) with thoracic aorta SUV_{max} (used like reference). A statistical significant ρ (direct and low intensity, Sig<0.05) was found between BMI and BG level, and between latero-cervical SUV_{max} and SUV_{max} latero-thoracic. **Conclusion:** Complex BAT data can result from the ^{18}F-FDG PET/CT scans analysis, making evidence of multiple factors which could contribute to BAT activation. These data could be useful both for a correct image interpretation and for making new treatment strategies based on this type of tissue. **References:** None.

EP-65

Technical aspects -> Instrumentation and data analysis -> Instrumentation -> General aspects

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EP-0898

Variable Density 3D-grids for Non-uniform Activity Distributions in PET and SPECT Phantoms: a Proof of Concept

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Aim/Introduction: Radiomics, extraction of extensive

quantitative features from radiological images, has generated recent interest promising improved assessment of disease and prediction of outcome. A challenge is that many radiomic features cannot be properly correlated to existing PET and SPECT phantoms which use compartments filled with uniform distributions of activity. This study presents a method to generate 3D-printed meshes of variable density, that, when immersed in a uniform tracer concentration, create predefined non-uniform activity distributions. The problem is to maximize the dynamic range between high and low activity concentrations, within the limitations of 3D-printing technology and system spatial resolution so gradients appear smooth. **Materials and Methods:** We developed MATLAB scripts that create 3D-meshes with two components: a 3D-grid of thin bars, and cubes centred at each node of the grid. The bars hold the cubes in position. Activity concentration (AC) is varied by cube size, specified by values in a three dimensional matrix with the elements representing concentration at each node. The symmetry of this geometry is exploited to minimize the number of stereolithography triangles and therefore its file size. Linear-gradients with grid spacing of 3, 4, 5, and 6mm were printed by Shapeways (Eindhoven Netherlands) using selective laser sintering (SLS). These phantoms were immersed in a solution with ^{18}F-FDG and scanned using a GE D690 PET scanner (GE Healthcare, USA). Imaging revealed a limit of ~.75mm between cube faces beyond which printer support material could not be removed. At 5mm grid spacing, the dynamic range varied from 1/2 to 1/8 of maximum activity. Spherical linear-gradients and uniform spheres were printed using 5 and 6mm grid spacings. **Results:** The optimal grid spacing was found to be 5mm, balancing image smoothing with the ability to create printable geometry. Initial measurements using a maximal AC of 125 kBq/mL on a linear-gradient phantom witha 5mm grid-spacing, showed decrease concentration of 1.1%/mm vs. a predicted 1%/mm. Gradient and uniform spheres ranging, for example, from 100% AC (at the centre) to 40% AC (periphery) likewise performed as expected. In this particular example, 44% AC was observed in the periphery relative to the maximum AC in the hot sphere. **Conclusion:** We have demonstrated a method for developing non-uniform distributions of activity with the potential to more realistically represent non-uniform features observed in patient images and for use towards radiomic feature applications. This approach can be used to create complex geometries with variable activity concentrations. **References:** PMID 28766726.

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A web-based platform for collecting, researching and presenting molecular hybrid imaging artefacts

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Aim/Introduction: Imaging artefacts affect image quality and quantifiability and, thereby, may hamper the diagnostic interpretation. The possible reasons for and solutions to particular hybrid imaging artefacts should be made available to the users in the form of a representative collection of cases. Currently, this mainly exist as print media, coming with high logistic and temporal efforts in collecting and preparing, processing and provision of artefact cases. The instructive presentation of the cases is limited by inflexibility and impracticability due to the static nature of such media. These observations render the identification of a reason or adaptation of a solution strategy for an artefact based on print media almost impossible. **Materials and Methods:** A web-based platform was developed (http://www.ipet-science.de/artifacts/). An upload-mask has been implemented that captures artefact cases with all case-related data and images. Submitted cases will then be moderated by experts and scientifically processed. For cases with unknown reasons or solutions, a comment section where these aspects can be processed or discussed with other users is included. The user can search an increasing number of cases and adapt solution approaches for his own problem. A pilot-phase was performed. Invited users uploaded cases from the literature or their own clinical routine. Feedback was recorded in the form of an integrated questionnaire. **Results:** Over two months a total of 25 artefact cases were uploaded. The average time to upload was 13 min. The upload-mask reduces time needed to collect data and enables a sustainable and complete data collection. The database enables the structured collection of larger amount of data. The database and search-mask allow for a specific and faster research. 15 questionnaires could be evaluated. 80% rated the operability being very instructive, 75% the performance very practical and 85% the overall performance and necessity very interesting. **Conclusion:** The platform and the underlying software are stable. In terms of effort, completeness and sustainability, it shows clear advantages over the presentation in the form of print media. It will be a very useful toll in clinical practice to assist with artefacts in hybrid molecular imaging. The next steps include the ability to upload DICOM data. As the number of uploaded cases increases, an AI-based evaluation of the database is sought and then should assist the user in finding most reliable solution strategies for their own case very quickly. As legal data security issues are solved, the platform will enter wider test period. **References:** None.

EP-0900

[^{11}C]PBR28 and [^{11}C]UCB-J Blood Metabolite Analysis by Solid Phase Extraction

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Aim/Introduction: Quantitative analysis of PET scans often requires the measurement of radioligand concentration in plasma over time. Chromatographic methods have been mainly used for this purpose in the past, in which blood samples may require pre-treatment or the use of online trapping column with column-switching HPLC methods to overcome plasma protein binding [1]. More recently, Solid Phase Extraction (SPE)