We regard premetastatic patterns as intraosseous aggregations of tumour cells, which are not revealed to the naked eye, but can potentially be detected by advanced image analysis methods. In the presenting study, we have developed a novel algorithm capable of assessing intra osseous PSMA distribution. **Materials and Methods:** A total number of 52 PET CTs (25 patients scanned with [^{68}Ga]-PSMA-11, 27 patients with [^{18}F]-PSMA-1007) were retrospectively analysed. Nuclear medicine and radiology specialists performed a consensus reading, classifying the scans in two subgroups: one with bone lesions, the other one without serving as controls. The algorithm drives a bone mask from the CT images (i), applies it to the co-registered PET data excluding non-bone information (ii) and finally calculates conventional and radiomic parameters (iii) in an automated way. Radiomic parameters are obtained using the Grey Level Occurrence Matrix (GLCM) and normalization steps coping for intra-individual differences of tracer distribution, that are not cause by tumour formations. **Results:** Non-metastatic bone's SUV did not significantly ($p > 0.05$) differ between [^{18}F]-PSMA-1007 (mean-SUV: 0.19) and [^{68}Ga]-PSMA-11 (mean-SUV: 0.18). Bone SUV did not significantly differ between controls scanned with either [18F]-PSMA-1007 (mean-SUV: 0.16) or [^{68}Ga]-PSMA-11 (mean-SUV: 0.14). For [^{18}F]-PSMA-1007, bone PSMA heterogeneity was significantly greater ($p < 0.05$) in the bone lesion group (mean: 142.19), compared to controls (mean: 133.16). The same was true for [^{68}Ga]-PSMA-11 (controls: 131.65, bone lesions: 148.55, $p < 0.05$). Controls' bone heterogeneity was not significantly different ($p > 0.05$) between [^{18}F]-PSMA-1007 and [^{68}Ga]-PSMA-11. **Conclusion:** In this study we could demonstrate that [^{18}F]-PSMA-1007 and [^{68}Ga]-PSMA-11 PET-CT are equally suitable for the assessment of bone metastasis. Additionally we could show that intra osseous PSMA heterogeneity enables the detection of bone metastases. Moreover, PSMA heterogeneity is independent of the tracer choice ([^{18}F]-PSMA-1007 or [^{68}Ga]-PSMA-11) and thereby potentially suitable for the detection of premetastatic patterns, which still has to be evaluated.

EP-0019

Automating DICOM retrieve from PACS with free and open-source software

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Aim: To automatize the retrieve process of DICOM images to automatically download a large population of patients for research needs. **Material and Methods:** The free and open-source Orthanc PACS software was used to handle query and retrieve operations. A standalone application was developed in the JAVA language to drive the Orthanc server using its RESful API. The developed software handles: Definition of the list of patients: Each patient can be defined by providing one or multiple search attributes (name, ID, accession number, study date, modality, study description). The software can provide the matching results in the PACS before starting the retrieve operation, to fine-tune the retrieve list. Definition of a series filter: For each study found, additional series filters can be set to download only specific series (filter to retrieve or exclude some specific series description/number or modality). Scheduling option to start the retrieve operation during the night when the network bandwidth usage is lower. Report generation of the retrieve operation with summary of all retrieved elements (in the interface and/or in CSV). The full software is available for all operating system (Windows, MacOS or GNU/Linux) and published using the free and open-source GPL license with step by step documentation, as part of project http://petctviewer.org/. **Results:** The Orthanc-server was installed and declared in the PACS by a physician with the help of the network manager of the hospital in Dijon (France), in just one afternoon, using the provided user manual. The developed plugin did not require any additional installation in the operating system. The testing operation was made by setting a patient list of 108patients (defined by the first letter of last name and first name and the study date). A series filter (using series description value) was used to download only PET and CT series (i.e. discarding secondary captures, dose reports...). The operation was scheduled to start at 10pm, outside of working hours. The automatic retrieve process successfully downloaded 102 out of 108 patients. All downloaded patients were complete without any unwanted series. The 6 missing patients were due to erroneous input (wrong study date in the search parameter) or unattended series description: They were all retrieved with a second call with corrected input. **Conclusion:** This free and open-source tool allows the automatic mass retrieval of DICOM studies, hereby saving physicians and physicists from performing multiple manual query/retrieve.

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Validation of GATE Monte Carlo simulations for Siemens PET/CT and PET/MR systems

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Aim: The objective of this work is to validate a Monte Carlo (MC) simulation model for two commercially-available, whole-body PET systems. The MC models will be used in future to evaluate the performance of different image reconstruction methodologies at low acquired counts. **Material and Methods:** GATE (GEANT4 Application for Tomographic Emission) was used as the MC toolkit for the modeling of the Siemens Biograph 64 TruePoint TrueView (TPTV) PET/CT and the Siemens Biograph mMR PET/MR (mMR) systems. In both cases, we included detailed models of the detector electronics, system geometry and the physical processes involved in the data acquisition. The performance of both system models was validated following the NEMA (National Electrical Manufacturers Association) NU 2-2012 protocol. We compared the simulation results with the measured values for sensitivity, count rate, and noise equivalent count rate (NECR). **Results:** The calculated (reference value from measurements) sensitivity for the mMR was 13.8 (15.0) kcps/MBq) and 14.4 (13.9)