

Initial experience with the EANM accreditation procedure of FDG PET/CT devices

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Background: Quantitative FDG PET/CT studies in a multicenter setting are hampered by large variability in applied PET methodology, resulting in an up to 2 fold differences in results between centres. Therefore, in 2010 the European Association of Nuclear Medicine (EANM) published the European procedure guideline for PET tumour imaging with FDG. The guideline specifically aims at harmonizing quantification in multi-center studies. As SUVs are lesion size dependent, QC experiments measuring SUV as function of 'lesion' size are defined along with harmonizing criteria. To our best knowledge the European guideline is the first and only guideline with harmonizing performance standards and the EARL (EANM Research Ltd) accreditation program is the first initiative for implementation into practice.

Materials and Methods: A pilot accreditation program was launched by EARL from October 2010 till April 2011 in collaboration with and endorsed by the European Organisation for Research and Treatment of Cancer (EORTC). Eleven FDG PET/CT imaging sites (12 systems) that participated in an EORTC trial were included in the program. Accreditation QC included: (1) verification of PET/CT system calibration and uniformity using a uniform cylinder and (2) assessment of SUV recovery and image quality using a modified NEMA NU2 2007 phantom. After 3 months calibration QC was repeated to assess repeatability of calibration accuracy.

Results: After initial minor technical issues, e.g. related to data transfer, data entry errors and clock synchronization, all imaging sites met calibration accuracy requirements, i.e. global scanner calibration was within 10% without (visible) image artifacts. QCs for assessing SUV recovery allowed for harmonizing scanner performance to within the lower and upper (harmonizing) standards. Initially only for 2 imaging sites, recalibration or adjustment of reconstruction parameters was needed to achieve harmonized scanner performance.

Conclusion: The pilot study has shown the feasibility and successful execution of the EARL FDG PET/CT accreditation program in a multicenter setting. Retrospective analysis of clinical data collected in a Dutch trial demonstrated good correspondence in baseline SUV results between sites that were performing PET studies in accordance with the guideline, while SUV differed substantially (2 fold) for an imaging site that did not comply with the harmonizing standards. The results encourage to further spread the accreditation initiative across Europe.