**QIBA FDG PET/CT Scanner Checklist**

The following questionnaire/checklist may be used to ascertain a PET scanner’s qualification for quantitative imaging according to the QIBA FDG PET/CT profile. Answers may be provided either as “current practice” or as “feasible”, depending on the context, but it should be made clear both which was expected and how the site answered.

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|  | **Profile Section** | **Parameter** | **Specification** | Pass? |
|  | 3.3.1 |  | All necessary calibration factors needed to output PET images in units of Bq/ml shall be automatically applied during the image reconstruction process. |  |
|  | 4.2 | PET Scanner calibration | Shall be able to be calibrated according to the following specifications:Using a uniform cylinder containing F-18 in water (ideally the same used for dose calibrator cross-calibration)  Slice-to-slice variability shall be no more than ± 5% (not including end slices, as per ACR PET Core Lab). |  |
|  |  | Weight | Shall be able to record patient weight in lbs or kg as supplied from the modality worklist or operator entry into scanner interface. Shall be stored in Patient Weight field (0010,1030) in the DICOM image header, as per DICOM standard. |  |
|  |  | Height | Shall be able to record patient height in feet/inches or cm/m as supplied from the modality worklist or operator entry into scanner interface. Shall be stored in Patient Size field (0010,1020) in the DICOM image header, as per DICOM standard. |  |
|  |  | Administered Radionuclide | Shall be able to enter the radionuclide type (i.e. F-18) by operator entry into the scanner interface and through predefined protocolShall be recorded in Radionuclide Code Sequence (0054,0300) in the DICOM image header [e.g. (C-111A1, SRT, “18Fluorine”)]. |  |
|  |  | Administered Radiotracer | Shall be able to record the radiotracer (i.e. FDG), as supplied by operator entry into the scanner interface. Shall be recorded in Radionuclide Code Sequence field (0054,0300) in the DICOM image header, e.g. (C-B1031, SRT, “Fluorodeoxyglucose F18”). |  |
|  |  | Administered Radiotracer radioactivity | Shall be able to enter the administered radioactivity, in both MBq and mCi, as supplied by operator entry into the scanner interface. Shall be recorded in Radionuclide Total Dose field (0018,1074) in the DICOM image header in Bq. |  |
|  |  | Administered Radiotracer Time | Shall be able to record the time of the start of activity injection as supplied by operator entry into the scanner interface. Shall be recorded in Radiopharmaceutical Start Date Time field (0018,1078) (preferred) or Radiopharmaceutical Start Time field (0018,1072). |  |
|  |  | Decay Correction Methodology | Encoded voxel values with Rescale Slope field (0028,1053) applied shall be decay corrected by the scanner software (not the operator) to a single reference time (regardless of bed position), which is the start time of the first acquisition, which shall be encoded in the Series Time field (0008,0031) for original images.  Corrected Image field (0028,0051) shall include the value “DECY” and Decay Correction field (0054,1102) shall be “START”, which means that the images are decay corrected to the earliest Acquisition Time (0008, 0032). |  |
|  |  | Scanning Workflow | Shall be able to support Profile Protocol (Section 3) PET and CT order(s) of acquisition.  Shall be able to pre-define and save (by imaging site) a Profile acquisition Protocol for patient acquisition. |  |
|  |  | CT Acquisition Parameters | Shall record all key acquisition parameters (technique) in the CT image header, using standard DICOM fields. |  |
|  |  | PET-CT Alignment | Shall be able to align PET and CT images within ±2 mm in any direction. |  |
|  |  | Activity Concentration in the Reconstructed Images | Shall be able to store and record (rescaled) image data in units of Bq/ml and use a value of BQML for Units field (0054,1001). |  |
|  |  | Tracer Uptake Time | Shall be derivable from the difference between the Radiopharmaceutical Date Time field (0018,1078) (preferred) or Radiopharmaceutical Start Time field (0018,1072) and the Series Time field (0008,0031) or earliest Acquisition Time field (0008,0032) in the series (i.e., the start of acquisition at the first bed position), which should be reported as series time field (0008,0031). |  |
|  |  | PET Voxel size | See Section 4.3 (PET Voxel size) under the Reconstruction Software specification requirements. |  |
|  |  | CT Voxel size | Shall be no greater than the reconstructed PET voxel size.  Voxels shall be square, although are not required to be isotropic in the Z (head-foot) axis.  Not required to be the same as the reconstructed PET voxel size. |  |
|  |  | Subject Positioning | Shall be able to record the subject position in the Patient Orientation Code Sequence field (0054,0410) (whether prone or supine) and Patient Gantry Relationship Code field Sequence (0054,0414) (whether head or feet first). |  |
|  |  | DICOM Compliance | All image data and scan parameters shall be transferable using appropriate DICOM fields according to the DICOM conformance statement for the PET/CT scanner. |  |
|  |  | DICOM Data transfer and storage format | PET images shall be encoded in the DICOM PET or Enhanced PET Image Storage SOP Class, using activity-concentration units (Bq/ml) with additional parameters stored in public DICOM fields to enable calculation of SUVs.  PET images shall be transferred and stored without any form of lossy compression. |  |
|  | 4.3 | Metadata | Shall be able to accurately propagate the information collected at the prior stages and extend it with those items noted in the Reconstruction section. |  |
|  |  | Data Corrections | PET emission data must be able to be corrected for geometrical response and detector efficiency, system dead time, random coincidences, scatter and attenuation. |  |
|  |  | Reconstruction Methodology | Shall be able to provide images without resolution recovery. |  |
|  |  | Reconstruction Methodology / Output | Shall be able to perform reconstructions with and without attenuation correction. |  |
|  |  | Data Reconstruction 2D/3D Compatibility | Shall be able to perform reconstruction of data acquired in 3D mode using fully 3D image reconstruction algorithms.  Shall be able to perform reconstruction of data acquired in 2D mode using 2D image reconstruction algorithms. |  |
|  |  | Quantitative calibration | Shall apply appropriate quantitative calibration factors such that all images have units of activity concentration, e.g. kBq/mL. |  |
|  |  | Multi-bed data | Shall combine data from multiple over-lapping bed positions (including appropriate decay corrections) so as to produce a single three dimensional image volume. |  |
|  |  | Voxel size | Shall allow the user to define the image voxel size by adjusting the matrix dimensions and/or diameter of the reconstruction field-of-view.  Shall be able to reconstruct PET voxels with a size 4 mm or less in all three dimensions (as recorded in Voxel Spacing field (0028,0030) and computed from the reconstruction interval between Image Position (Patient) (0020,0032) values of successive slices).  Pixels shall be square, although voxels are not required to be isotropic in the z (head-foot) axis. |  |
|  |  | Reconstruction parameters | Shall allow the user to control image noise and spatial resolution by adjusting reconstruction parameters, e.g. number of iterations, post-reconstruction filters. |  |
|  |  | Reconstruction protocols | Shall allow a set of reconstruction parameters to be saved and automatically applied (without manual intervention) to future studies as needed. |  |