^{18}FDG-PET/CT: Whole Body

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Image quality in the multicenter setting can be greatly influenced by variances in acquisition protocols. These variances may be related not only to equipment manufacturer and model, but also technique.

The study may permit imaging per institutional standard-of-care. However, aligning image acquisition to established standards is essential for robust quality data.

The table below is provided as a guideline and overview for ^{18}FDG-PET/CT whole body exams. Some modification may be needed to ensure similar SNR in the resulting images. Please refer to your site's specific manufacturer's imaging protocols for the optimal scanning protocol.

Exam and Patient Preparation

Imaging System	Dedicated PET/CT Scanner	The PET/CT scanner must be capable of performing both emission and transmission (e.g., CT) images for attenuation-corrected PET scan images. The ability to calculate standardized uptake values (SUVs) is also mandatory.
Imaging System Maintenance	Quality Control Procedures	A daily QC check must be performed at the beginning of the day prior to patient scanning. The QC check must include the PET scanner and dose calibrator in accordance with the manufacturer recommendations.
Patient Fasting	Patients are to be NPO prior to ^{18}FDG administration and during radiotracer uptake time.	Subjects must fast (except for water) for at least 4 hours before administration of ^{18}FDG.
Patient Hydration	Patients are encouraged to be well hydrated prior to the scan	
No Strenuous Exercise	Patients should avoid strenuous exercise for 24 hours before FDG injection to minimize uptake of the radiotracer in muscles	
Blood Glucose	The pre-injection blood glucose level must be <200 mg/dL	Blood glucose is ideally measured 1 hour prior to ^{18}FDG injection. If serum glucose is >200 mg/dL, the study should be rescheduled. The referring or primary physician of the subject should be contacted to optimize blood glucose control. Insulin should not be administered immediately before the FDG-PET/CT study to reduce glucose levels. Patients with diabetes should adhere to their oral agents or insulin routines. Medications should not be administered near the FDG injection time. In insulin-dependent patients, insulin should be administered at least 5 hours before FDG injection.

Patient Height and Weight Measurements	The patient's height and weight must be measured using calibrated and medically approved devices (not verbally relayed by the patient).	The height and weight measured on the day of the scan shall be recorded in the DICOM header of the image data.
^{18}FDG Administration via Intravenous Access	A large-bore intravenous catheter access line (typically, a 20- to 22-gauge angiocatheter) or a butterfly needle is placed in the patient's hand or arm.	The administered activity of ^{18}FDG is 7-20 mCi (259- 740 MBq). The exact time of calibration of the FDG dose should be recorded and the exact time of injection noted to permit correction of the administered dose for radioactive decay. In addition, any dose remaining in the tubing or syringe, or that was spilled during injection, should be recorded. The injection should be performed through the intravenous catheter.
Patient to Void	All participants must void prior to imaging to ensure clearance of bladder activity	

Image Acquisition and Reconstruction

^{18}FDG Uptake Time	Uptake time = 50-70 minutes	The time between the injection of FDG and the PET emission scan start (tracer uptake time) should be between 50-70 minutes. <u>A target uptake time of 60 minutes is ideal</u>. For serial scans acquired at multiple timepoints it is ideal to have the scan performed on the same scanner, with similar FDG dose activity, tracer uptake time, patient position, anatomy scanned, and acquisition and reconstruction parameters.
Patient Positioning	Patients shall be positioned supine with arms above the head or down by their side.	Positioning of the arms is dependent upon patient diagnosis/indication (i.e., breast/lung CA arms are positioned above the head; prostate CA arms rest along the sides).
Low-dose CT Acquisition	A low-dose CT transmission acquisition will be performed for attenuation correction and anatomical localization of PET findings.	The axial field of view of the CT scan for attenuation correction will range from the skull base to mid-thigh level. Arm positioning will be the same for the PET scan: above the head to reduce truncation artifacts.

		The CT scan will be performed during "shallow breathing"; no respiratory gating is necessary.
PET Emission Acquisition	After the CT transmission scan, an emission PET scan covering the same axial field of view shall be performed.	
Bed Position and Time per Bed Position	The number of bed positions and the acquisition time per bed position will be site and scanner specific.	Typical parameters are 6–8 bed positions and an acquisition time of 2–5 minutes per bed position. The total acquisition time is to be 15–30 minutes from skull base to mid-thigh level.
PET-CT Image Reconstruction Parameters	Upon completion of image acquisition, the PET-CT data shall be reconstructed/corrected per scanner manufacturer recommendations	The PET/CT image data shall be reconstructed/corrected per scanner manufacturer recommendations including, but not limited to: random coincidences, system dead time, scatter correction, and attenuation algorithms.

References

1. ACR–SPR Practice Parameter for Performing FDG-PEG/CT in Oncology, Res. 25 – 2016. https://www.acr.org/-/media/ACR/Files/Practice-Parameters/FDG-PET-CT.pdf, accessed June 10, 2021.