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Performance Measurements of Small Animal Positron Emission Tomographs

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FOREWORD

SCOPE

The scope of this document is to propose a standardized methodology for evaluating the performance of positron emission tomographs (PET) designed for animal imaging. The objective is to establish a baseline of system performance in typical imaging conditions, and a concerted effort has been made to develop a procedure that is independent of camera design and applicable to a wide range of camera models and geometries. Camera designs such as circular ring geometry of discrete crystal or continuous block detectors, planar detector (rotating or stationary), continuous crystals, gas avalanche detectors, time-of-flight or non time-of-flight, single slice or multi-slice dedicated PET tomographs and other coincidence-capable imaging systems are covered by this procedure. It is understood that every system to be tested under this standard is able to create transverse sinograms and transverse slice images with a standard, filtered backprojection, image reconstruction algorithm. The software provided or recommended by the manufacturer should be able to accomplish basic functions such as defining and manipulating two-dimensional regions-of-interest (with circular and rectangular profiles), the ability to define linear profiles, and permit extraction of data such as coincidence event counts detected within specified intervals of acquisition time. Tomographs must have a transverse field of view of at least 33.5 mm in diameter to be tested against all standards. It is assumed that the isotope ^{18}F (and/or ^{11}C) is available in sufficient quantity and concentration to perform the tests as described in the standard, and the site performing the test has access to a dose-calibrator, or similar device, calibrated against a standard reference radioactive source. These specifications represent a subset of measurements that characterize the performance of positron emission tomographs for specific imaging tasks typically encountered in small laboratory animal imaging facilities. This subset is deemed to be common across all tomographs existing at the time of writing.

This standards publication was developed by the Animal PET Standard Task Force chartered by the Nuclear Section. Committee approval of the standard does not necessarily imply that all committee members voted for its approval or participated in its development. At the time it was approved, the Task Force was composed of the following members:

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