



**AUSTRALIAN AND NEW ZEALAND
SOCIETY OF NUCLEAR MEDICINE INC.**

(Incorporated in NSW)

Technical Standards Committee

MINIMUM QUALITY CONTROL SCHEDULE FOR GAMMA CAMERAS

Version 1.2, November 2013

1 Summary

A minimum level of routine Quality Control (QC) is required to ensure that Gamma Cameras are functioning properly and to detect problems before they impact on clinical studies.

This document specifies the minimum set of QC tests and their minimum frequencies. The tests and minimum frequencies have been developed from a review of international literature, knowledge of gamma camera systems, local experience in gamma camera QC, and are based on an achievable QC programme.

For best practice standards it is recommended some testing be performed at a higher frequency than the minimum acceptable. This document also indicates the optimum recommended testing frequencies for tests that fall into this category. These are recommendations only and the optimal tests and frequency will depend on the design of the equipment, historical equipment performance, and complexity of the tests. Practices are encouraged to call on the advice of ACPSEM certified Nuclear Medicine Physicists to draw up detailed QC protocols for their specific equipment

These minimum QC requirements cover standalone gamma cameras (or the gamma camera component of a combined multimodality system) but not ancillary equipment.

This document is restricted to minimum QC for traditional gamma cameras. It does not cover some of the specialised cardiac scanners which do not have traditional gamma camera detectors. QC programs for these cardiac scanners should be designed with the advice of a Nuclear Medicine Physicist and be based on the manufacturers recommendations.

A separate technical guidance document is available that provides information on the way in which the QC tests may be performed¹.

Practices should have a documented plan for instrument quality control with appropriate recordkeeping to allow demonstration of compliance.

¹ It should be noted that the technical guidance document provides suggestions only and that there may be other acceptable methods by which the different QC tests can be performed. Practices are free to choose their own implementation methods as long as these methods prove sensitive to changes in the parameter being assessed.

2 Gamma Camera QC Tests - Minimum & Recommended Frequencies

QC TEST	Minimum Frequency	Recommended Frequency (if different from minimum)	Comment
Visual inspection and basic safety check	Daily		A visual inspection of the system looking for loose items, damage to collimators, and a check of safety systems such as interlocks and collision prevention (e.g. touch pad tests).
Background Radiation and Contamination	Daily		
Daily uniformity	Daily		Can be performed intrinsically or extrinsically.
Quantitative High Count Intrinsic Uniformity	Monthly	Weekly	
Energy Window/Peaking	Daily		The check should include peaking of the radionuclide and/or a check of the energy window position relative to the photopeak.
CT Daily Routine	Daily		This will vary by system, but usually includes a tube warm-up and air calibration.
CT Other	As specified by manufacturer and by local regulatory requirements for irradiating devices		This should include an annual review of CT doses against appropriate guidelines or recommendations, where these are available.
Photomultiplier fine-tuning	As per manufacturer's recommendations	Weekly	Only for systems which have photomultiplier fine tuning available as a user test.

Centre of Rotation and Multiple Head Registration Check	Monthly	Weekly, particularly if COR has been shown to drift.	
SPECT-CT Registration	Yearly	Monthly	
Intrinsic Energy Resolution	Yearly		For systems that provide a method for performing quantitative energy resolution measurements.
Planar System Sensitivity	Half Yearly		
High Count Collimator Uniformity Check of all collimators used for SPECT	System dependent	Yearly	Systems that use an extrinsic collimator response combined with an intrinsic response require infrequent checks. Systems that do not separate intrinsic and collimator responses require checks following intrinsic calibrations.
Qualitative Collimator Uniformity Check	Half Yearly or if collimator damage suspected	Monthly on a rotational basis; with a different collimator checked each month	Qualitative check for collimator damage
Uniformity with Asymmetric Energy Window	Yearly	Half Yearly	
Multiple Window Spatial Registration	Half yearly		Only if multiple peak imaging is performed
Spatial Resolution and Linearity	Half yearly	Monthly	A qualitative check is acceptable, not necessarily the NEMA test methods.
Whole Body Spatial Resolution	Yearly		Not required for 'step and shoot' whole body acquisition systems
Whole Body Uniformity	Yearly		
Detector-Detector Sensitivity Variation	Half Yearly		To check for differential head sensitivity variations

Detector Head Tilt	Half yearly		Not required if detector head tilt is assessed as part Centre of Rotation and Multiple Head Registration checks.
SPECT Uniformity	Yearly	Half Yearly	This test should include a uniformity check for CT-based attenuation correction on SPECT-CT systems.
SPECT Resolution	Yearly	Half Yearly	This should include a quantitative FWHM comparison of SPECT reconstructed resolution versus planar resolution for a point or line source.
SPECT Contrast	-	Half Yearly	
Display Screen Image Quality	Monthly		

3 Bibliography

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