

NMQC: A NEMA-compliant software application for gamma camera quality control

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Objective:

We have developed a cross-platform software application which implements the basic scintillation camera QC analyses described in the most recent NEMA standard, thus serving as an independent complement to camera manufacturers' software.

Methods:

Our application is written using the Matlab environment, which has several benefits, foremost of which is cross-platform compatibility. Since Matlab runs on Windows, Linux, Mac OS X and Solaris, so does our software. By installing the free Matlab Common Runtime (MCR), anyone can run our software, even if they do not have Matlab or the Image Processing Toolbox.

Our application reads and analyzes DICOM or Interfile format files. In addition to the QC analysis functions, the program has features for examining and searching file headers, viewing magnified images or sections of images, and exporting results. All of the application's features are accessible through a unified graphical user interface (GUI).

Results:

Our software implements all of the basic nuclear medicine camera QC tests, including:

- (a) calculation of planar uniformity
- (b) intrinsic resolution calculation
- (c) profile analysis (Full Width at Half Maximum/Full Width at Tenth Maximum)
- (d) center of rotation calculation
- (e) sinogram/linogram display and calculation
- (f) tomographic uniformity calculation
- (g) plotting of planar uniformity test history.

These tests cover the most important areas for evaluation of gamma camera performance: uniformity, resolution, and rotational alignment.

Conclusions:

Our program gives a useful overview of a camera's current performance, as well as how its uniformity varies over time. Also, data from cameras of different brands can be used as input to our program and analyzed in a consistent way, allowing a fair comparison of different cameras' performance. Our application is easy-to-use, cross-platform, and provides analysis which is both independent of and complementary to that performed by gamma camera manufacturers' proprietary quality control software.