

Thesis Title The Measurement of Hole Angulation for
 Collimator Used in SPECT
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ABSTRACT

The use of a gamma camera for single photon emission computed tomography (SPECT) imaging requires greater demand on camera performance than planar imaging, since camera specifications that are adequate for planar imaging may produce serious image artefacts in SPECT. Collimator has the most significant impact on the quality of SPECT images. Some effects from collimator can be corrected by software program, but hole misalignment in the collimator septa construction cannot be corrected by correction of software program because each collimator construction and design may be different. Collimator holes of a parallel hole collimator which are not perpendicular to the collimator face in the X direction will cause a center of rotation offset, and in the Y direction will simulate a camera head tilt. Angulation errors in either X or Y direction cause a loss in spatial resolution in the reconstructed images. The special perspex phantom was constructed to use in this regional hole angulation measurement. One of the eleven parallel hole collimators tested showed the result of a little higher than acceptance level of a mean hole tilt of 0.35 degree, and a hole tilt standard deviation of less than 0.20 degree. This experiment shown that it is of great importance to perform acceptance testing of SPECT collimators, and the manufacturers should arrange the specification for level of hole angulation for acceptance test for SPECT imaging.