THE PERFORMANCE CHARACTERISTICS OF GAMMA CAMERA

A PROJECT REPORT PRESENTED BY

JEYASINGAM JEYASUGITHTHAN

to the Board of study in Physics of the

POSTGRADUATE INSTITUTE OF SCIENCE

in partial fulfillment of the requirement

for the award of the degree of

MASTER OF SCIENCE IN MEDICAL PHYSICS

of the

UNIVERSITY OF PERADENIYA

SRI LANKA

2006

ABSTRACT

The performance characteristic parameters of Gamma camera were investigated by using various experimental methods. There were large number of factors, which contributed to the final image quality, including uniformity, resolution and collimation. In addition, for certain types of studies, count rate capability also came into play.

The intrinsic count rate performance of the camera was tested using 2 mm thickness Cupper attenuators. In the first step Cupper attenuators were calibrated and then corresponding attenuation factors were measured using a point source of ^{99m}Tc. In the next step a graph of observed count rate against input count rate was observed using calibrated Cupper plates and a point source of ^{99m}Tc. The input count rate and observed count rate correspond to a 20% counts loss were obtained from the count rate performance curve. Maximum count rate was also obtained from the graph. The system count rate performance of the camera was tested using two source scatter phantom which was made by wood and filled by uncooked rice. The input count rate and observed count rate correspond to a 20% counts loss were Measured.

[illegible] flood field uniformity of the camera was tested by a point source of ^{99m}Tc in solution with 20% window. Values were obtained for useful and center field-of-view. Intrinsic uniformity over available PHA window widths also obtained using a ^{99m}Tc source. The performance of system flood field uniformity was tested using ^{99m}Tc solution containing flood phantom with a 20% PHA window. Digital image was observed.

A point source of ^{99m}Tc in solution with 20% window and quadrant bar phantom was used to test the performance of intrinsic spatial resolution of the camera. Intrinsic spatial resolution in terms of full width at half maximum (FWHM) was measured and also the digital image was observed. The performance of system spatial resolution of the camera also measured using ^{99m}Tc solution containing flood phantom and quadrant bar phantom with a 20% PHA window and the digital image was observed.

Finally the total performance of the camera was tested using a total performance phantom (Thyroid Phantom) and the image of the Thyroid phantom was observed.