

Summary

Evaluation of Efficiency of a Multi-Crystal Scintillation Camera Digirad 2020tc Imager™ Using a Solid-State Detectors

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Digirad 2020tc Imager™ is the movable scintillation camera, consisting of combining multi-crystal scintillators (CsI(Tl)) and photo-diodes.

Total numbers of element are 4096, which are further divided into 16×16 modules. Each module contains 4×4 elements.

We have examined Digirad 2020tc according to NEMA (National Electrical Manufactures Association), and the following results are obtained; the maximum count rate; 221 kcps, total system uniformity; 1.3% (integral uniformity), 0.9% (differential uniformity), system spatial resolution; 6.97 ± 0.72 mm (the LEHR collimator to ^{99m}Tc source at 10 cm), intrinsic energy resolution; 12.8%, total system sensitivity; 3270.8 cpm/MBq (with LEHR collimator using ^{99m}Tc source at 10 cm).

Further more, we determined the contrast of an imaging using the pin-hole ($100 \mu\text{m}\phi$) ^{99m}Tc source in order to know the signal per noise (S/N) ratio among the pixels (S/N; 93.4 ± 46.2 (first pixels)). Although the physical dimension of the camera has a smaller field of view, comparing with the standard camera, Digirad 2020tc has the equivalent characteristics as well as that of the standard camera and its field view is enough to measure the adult lung perfusion using a diverging collimator.

We will further examine Digirad 2020tc with its movable portability and expect applications in nuclear medicine.

Key words: Scintillation, Semiconductor, NEMA, CsI, Movable.