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Hybrid gamma camera for medical applications

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The development of gamma-ray detectors with low profiles has encouraged a wide range of medical imaging applications including use at the patient bedside and in operating theatres. Early development of SFOV cameras focussed primarily on a single modality - gamma ray imaging. Recently, a hybrid - gamma and optical - imaging system has been developed which combines optical and gamma cameras offering high spatial resolution dual imaging. The new system enables superimposed scintigraphic and optical image offering new possibilities for assisting clinicians and surgeons in localising the site of uptake in a number of surgical procedures. Recent improvements to the hybrid camera have been used to produce dual-modality images in both laboratory simulations and in the clinic.

The hybrid gamma-NIR fluorescence tracer ICG-99mTc-nanocolloid is already being used by some centres for sentinel lymph node biopsy. Once exposed, the NIR fluorescence reporter can be imaged at very high resolution while the radioactive component allows imaging at depths which would not be possible in NIR. Gamma detection may be carried out with a separate portable gamma camera or with a non-imaging probe. Visualisation of NIR fluorescence during surgery requires a dedicated NIR camera, several of which are available commercially.

The hybrid camera concept can be extended to include NIR imaging. We describe a NIR-gamma small field of view camera, capable of displaying co-aligned images from both modalities which can be fused into one image or viewed separately. This study is a preliminary investigation of the performance of the fluorescence component of this camera, including phantom studies and first images from a preclinical pilot study. We also report the first combined gamma and NIR fluorescence images.

Hybrid images taken in the clinic will be also be presented.

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