University of Leicester

SEEING UNDER THE SKIN

Improving healthcare with new imaging technology

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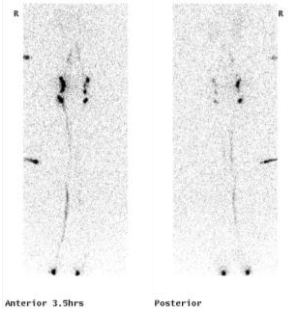
Introducing nuclear diagnostics

Nuclear diagnostic imaging allows clinicians to look at processes within the body. In nuclear diagnostics, a patient is given a radioactive tracer which produces gamma radiation and circulates around the body to areas of interest. This gamma radiation can pass through the body and be imaged with an external gamma camera or detected with a non-imaging probe (like a Geiger counter). This has many medical uses in cardiac, brain and tumour imaging. In patients with breast cancer (48,000 cases per year in Britain) it is used to determine the likelihood that the tumour has spread to other areas of the body.

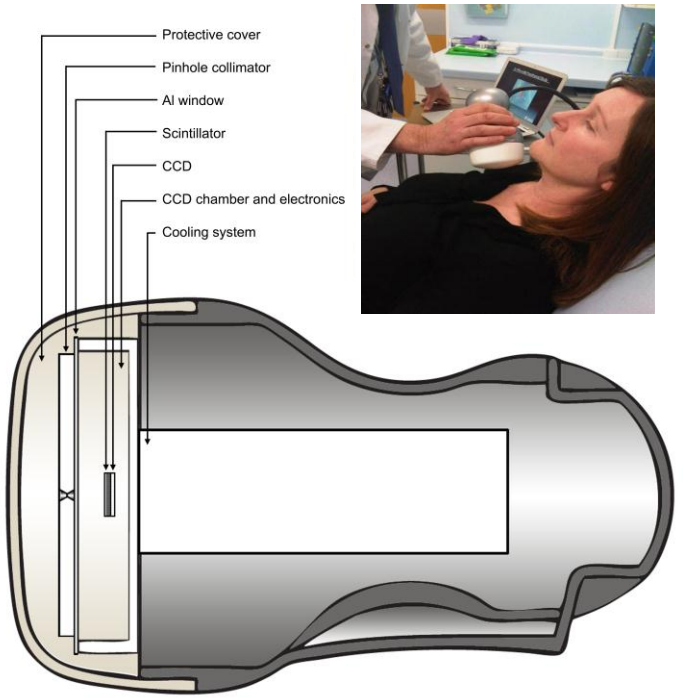
Medical gamma cameras

Gamma cameras are housed in specialised rooms. Patients need to travel to the camera rather than the other way round.

Images taken with a gamma camera (such as that on the right) can be difficult to interpret. Markers are needed to judge scale and relative position. Surgeons often need to know the depth of a source, which requires imaging from both sides of the patient.



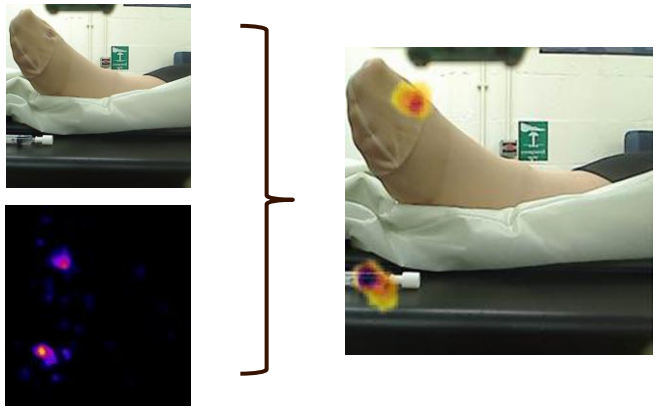
The compact gamma camera



Benefits of portability

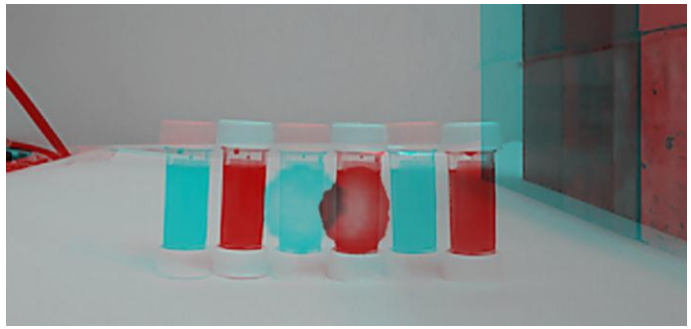
The compact gamma camera (CGC) developed in the Space Research Centre is handheld and can be taken to a patient's bedside for imaging. The CGC can also be taken into operating theatres, where surgeons currently rely on probes that detect the proximity of radiation but cannot produce an image of the source. The CGC will be particularly useful for locating tumours that need to be removed.

Context from hybrid imaging



Combining the CGC with an optical camera allows hybrid imaging. These images show both gamma and optical information.

Depth information



Two hybrid images can form a stereoscopic (3D) image, in future CGC designs these will be taken simultaneously.

Medical gamma camera image © Brendaicm/Wikimedia Commons
Patient images provided by Professor Alan Perkins, Queen's Medical Centre

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