GAMMA RAY DETECTION PROBE FOR THE EVALUATION OF BLOOD ACTIVITY TIME PROFILES

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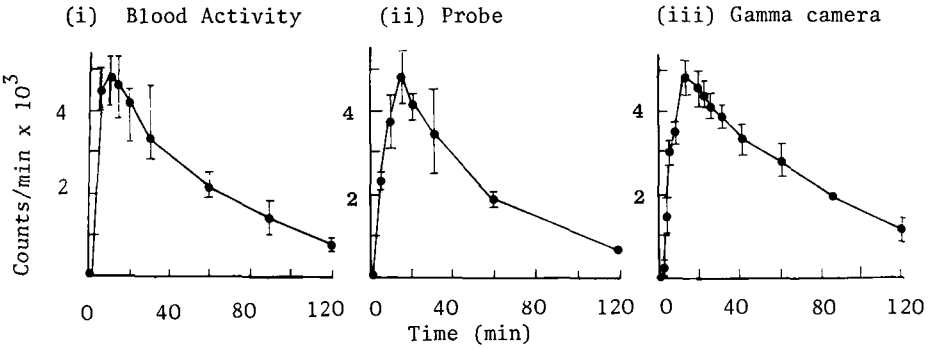
Radionuclide imaging has become an important technique in drug research and the modern gamma camera with associated computer system has been used successfully to monitor labelled pharmaceutical formulations and model drugs (Wilson et al, 1982). Such studies in animal models are normally supplemented by blood activity-time profiles obtained by counting blood samples from serial venepuncture. We describe here a new method of following blood activity using a specially designed inexpensive gamma ray probe. The probe was based on the design of Colton and Hardy (1980). The detector used comprised a 3 mm diameter by 15 mm thick NaI (Tl) crystal attached to a 1.8 m long flexible fibre optic light-guide coupled with a photomultiplier tube and pre-amplifier (Scintiflex, Nuclear and Silica Products, High Wycombe). A scaler-rate meter (SR5, Nuclear Enterprises Ltd, Reading) was used to monitor the counts. The probe was evaluated using the New Zealand White Rabbit (n=3) as a model. A solution of diethylenetriaminepentaacetic acid (DTPA) (volume 0.15 ml) labelled with technetium-99m (10 MBq) was injected intramuscularly into the thigh muscle (injection depth 1 cm, 25 gauge needle). At suitable time intervals blood activity-time data were measured in three ways. (i) Blood was removed from the right marginal ear vein, diluted with saline and counted using a gamma counter (Intertechnique CG4000). (ii) The gamma probe was placed on the front paw of the animal and the counts in 30 seconds recorded. (iii) The whole animal was imaged for 60 seconds on a Maxi Camera II Gamma Camera (General Electric, New York) coupled to a dedicated computer (Gammascope, Link Systems, High Wycombe) and the activity in a region of interest created around the front paw was measured.

The results obtained using the three different approaches shown in Figure 1 have been normalised to an arbitrary peak activity of 4.8 x 10^3 counts/min. The agreement between methods is good and indicates that the new gamma probe can be used for the determination of blood activity-time profiles in a non-invasive way and without the need of an expensive gamma camera-computer system.

Figure 1

Activity-Time profiles following IM administration of ^{99m}Tc-DTPA



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