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A LIVER SCANNING AGENT IN A KIT TYPE LABELED WITH A NEW GENERATOR-PRODUCED Ga-68.

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We have developed a new liver scanning agent in a convenient kit form for use in positron computed tomography (PCT). The labeling procedure for Ga-68 human serum albumin microspheres (HSAM) is rapid, simple and highly efficient. A new Ge-68-Ga-68 generator which delivers Ga-68 directly in ionic form is used in place of the currently available generator, from which Ga-68 is eluted in chelate form. The labeling can be completed in only 10 min using the new generator coupled with an acetate buffer system, whereas this requires approximately 45 min with the currently available generator without a buffer.

This method gives high labeling yields of over 95% at optimum pH 4.4-5.6. The preparation is stable on standing over a period of 3h in vitro. The acetate buffer in the solution maintains the labeling percentage at a higher level than would be obtained without a buffer.

It is concluded that this Ga-68-labeled liver scanning agent in kit form for use in PCT is extremely useful, particularly in hospitals not equipped with cyclotron.

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IMAGING OF THE HEPATOMA USING DYNAMIC POSITRON EMISSION TOMOGRAPHY WITH N-13 AMMONIA.

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Four patients with primary hepatoma was studied using dynamic positron emission tomography (PET) with N-13 ammonia. After intravenous injection of 10-20mCi of N-13 ammonia, dynamic PET scans were performed every 150 seconds for 30 minutes.

Every tumor started to show remarkable accumulation of radioactivity from the very early period (0-2.5 min after isotope injection), whereas the radionuclide was accumulated in the liver more gradually. The mean count ratio between the hepatoma and the liver in the earliest scan was 2.70.

Central necroses of the tumor showed low radioactivity. Daughter nodules of less than 2cm size were also visualized.

It was considered that the early, rich blood supply to the tumor and the very active metabolism of the tumor might be the reason for the ammonia accumulation in hepatoma.

This dynamic PET study should be very useful for the detection of hepatoma, as well as for the assessment of tumor blood supply and metabolism.

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EVALUATION ABOUT THE EFFECTIVENESS OF THE CANCER THERAPY USING ^{18}F-2-FLUORO-2-DEOXY-D-GLUCOSE IN EXPERIMENTAL AND CLINICAL STUDY.

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We studied the X-ray irradiated tumor uptake of ^{18}F-2-fluoro-2-deoxy-D-glucose (^{18}FDG) experimentally. We used two cell lines derived from mammary carcinoma of C3H/He mouse, MM48 (radioresistant) and FM3A (radiosensitive). Solid tumors, 10 mm in diameter, were irradiated with 20 Gy. In MM48, we found tumor uptake of ^{18}FDG showed the same level as unirradiated tumors until 8 days after irradiation. On the contrary, in FM3A, we found declining tumor uptake of ^{18}FDG with time.

From these experimental studies, we would be able to evaluate the effectiveness of cancer therapy using ^{18}FDG. Clinical studies are now undertaken. We present some of the cases.

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A PERFORMANCE STUDY OF POSITRON COMPUTED TOMOGRAPH FOR BRAIN.

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The positron computed tomograph (PCT) has been developed and installed in the Gumma university hospital, where performance of this PCT has been evaluated.

This PCT (Hitachi PCT-H1) is designed to attain high quality imaging for dynamic brain study with both high resolution and sensitivity. This machine encompasses 4 detector-rings with 128detectors on each ring, and provides 7 slices-imaging simultaneously.

Measured spacial resolution is 7.4mm FWHM at the center of FOV by using Ge-68-Ga-68 line source packed in 2mm diameter stainless steel tube and S.&L. filter for image reconstruction.

Sensitivity under this resolution is 55kcps/μCi/ml for in-plane and 79kcps/μCi/ml for crossplane using a 20cm diameter cylindrical phantom. Under these conditions, coincidence rate at where true coincidence rate and random coincidence rate are equal, is 45kcps for in-plane and 55kcps for crossplane.

This system has special configuration to have the coincidence of cross-section of PCT imaging and Xray CT imaging by using common bed. Also, this special function will be presented.