CLINICAL APPLICATION OF EMISSION CT USING GAMMA CAMERA(4)

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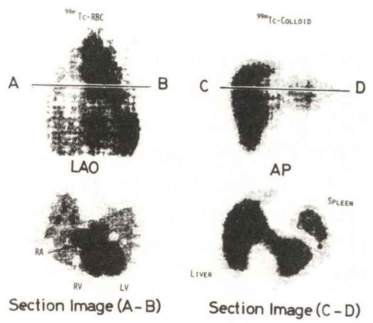
During the past few years,we have attempted to reconstruct the single photon emission CT using conventional gamma camera.
Fundamental problems concerning the choice of reconstruction algorithms,correction for attenuation and effect of statistical noise were examined primarily by computer simulation study,and clinical studies were also performed on the lung,blood pool and liver scintigraphy. Fundamental studies by the simulation phantom revealed that the convolution method with Chesler's filter,which was characteristics with high cut frequency,since the RI emission was liable to be marred by the statistical noise.
A patient was set on a rotating chiar in front of the gamma camera and the emission data from body were collected at every 36 views,completing the total observations approximately 8-18 minutes.
In the lung study with ^{99m}Tc-MAA,a series of section images were found to be more helpful to localize segmental abnomalities than usual scintigraphy,such as a hiler mass with accompanying obstructive pneumonitis. The blood pool study with ^{99m}Tc-RBC were found to be most helpful to localize right and left ventricle as well as atrium at heart level.
The most advantageous part to be the liver scintigraphy,which is arranged concentrically around porta hepatis. The total counts of projection data per slice were ranging from 250,000. to 500,000. counts.
The resolution(FWHM) of these RCT was about 1.5 cm by phantom study using a line source in water media.

In conclusion,present method was proved to be simple and economical method which is feasible on various conventional radionuclide imaging and potentiate its diagnostic ability.



A NEW APPROACH CALCULATING REGIONAL CEREBRAL BLOOD FLOW IN RAPID RADIONUCLIDE COMPUTED TOMOGRAPHY IN XE-133 CLEARANCE STUDY

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A method calculating regional cerebral blood flow from rapid radionuclide computed tomographic(RCT) data in Xe-133 clearance study was presented. We presume that rapid scan of RCT assures that a true time integral is observed even if the local radioactivity concentration changes fairly rapidly. An integration with interval of 15-60 sec was made to assess counts enough to give actually negligible errors involved in calculations. Instead of conventional techniques mathematically analyzing clearance curves we took simply table-looking-up technique. The method can be applied for either clearances intracarotidly injected or inhalated.
The local solubility coefficient of xenon was evaluated approximately as 1.15 multiplied by the area under the observed clearance curve at the location and divided by the average area of the entire slice. The early picture method was based on one single picture integrated over a certain period during an initial part of the clearance curve. The clearance rate then the blood flow was determined comparing the integrated values with table values precalculated assuming one component clearance. The sequence of pictures method was designed to analyze a sequence of four pictures each being integrated over a certain period. Then the same table-looking-up procedure gave the blood flow as mean value of four integration period.
Errors involved in this method were evaluated using curves simulated by computer. Methods proposed gave fairly small statistical errors when compared with conventional curve analyzing techniques. This comes from inherent property of values integrated over a certain period. Errors due to actually existing two components at one location did not exceed 2 % when difference of the two components was less than 50 %.