24

EFFECT OF SPATIAL RESOLUTION ON SPECT VALUE.

A.Kojima, Y.Koga, Y.Takaki, H.Izunaga, H.Takamoto, Y.Hirota, M.Takahashi, W.Misumi, M.Matsumoto Department of Radiology, Kumamoto University School of Medicine, Kumamoto.

Quantitative analyses have often been performed using SPECT in nuclear medicine. It is associated with some problems to quantitatively estimate radioactivity in organs by SPECT. SPECT values in SPECT image do not always mean true radioactivity. Although there are many factors, we studied the effect of finite spatial resolution on SPECT values.

1. Spatial resolution (FWHM) was obtained using the line source phantom.
2. For various sizes of regions in the phantom, we obtained relationship between radioactivity and SPECT values, and relationship between sizes of hot regions and SPECT values in three FWHMs.
3. Results of these experiments were compared with data of theoretical calculations.

Our results were as follows:

1. SPECT values were dependent on sizes of hot regions.
2. The size denpendence was changed by different FWHMs.
3. When sizes of hot regions were small, SPECT values underestimated true radioactivity, and when 2.5 - 3 times larger than FWHM, SPECT values represented true radioactivity.

26

EVALUATION OF THE PHYSICAL DATA AND THE DIAGNOSTIC CAPABILITY ON IMAGES OF SPECT.

K.Onoue, K.Tachibana, H.Kitani, H.Maeda, K. Hamada, H.Narita and M.Fukuchi.Department of Nuclear Medicine and RI Center, Hyogo College of Medicine, Nishinomiya, Hyogo.

SPECT has been used to detect relevant features of diseases. Generally the reliability of SPECT images is dependant on data acquisition, reconstruction and the kind of filters used. This paper is an objective evaluation of the diagnostic capability of image treatment using a phantom when applied by different individuals. Using a color CRT monitor, defects in the phantom were evaluated by five doctors and five technologists who are specialists in nuclear medicine. The subjective evaluation of diagnostic capability was done on four degrees of gradiated difficulty as well as the reliability of the projected image was taken into consideration. Eight observers concluded that image eveness was critical for diagnosis while five felt it was critical only when the defect could not be detected on the image. The reliability of diagnosis was not always in proportion to image clarity but was affected by the quality of the image. False positive decreased when a low -pass filter was used or image-smoothing employed, but false negative increased on the edges.

These findings suggest that observer's views of the same image are subjective and that a physically good image does not necessarily enhance diagnostic capability.

27

DYNAMIC TOMOGRAPHIC STUDY OF THE KIDNEYS WITH SHIMADZU'S WHOLE BODY RING-TYPE EMISSION CT.

H.Fujimoto,G.Uchiyama, M.Karikomi,K.Kachi,T.Hihara,Y.Saito, S.Hayashi,T.Araki,T.Arai,A.Ide,Y.Yamada and A.Ueno.Yamanashi University School of Medicine,Yamanashi.

A dynamic tomographic imaging of kidneys was attempted with a ring-type ECT (SET-030W,Shimadzu). Dynamic data were acquired every one minute after an intravenous injection of Tc-99m-DTPA. Sequential tomogragraphic images of the kidneys with some diseases were reconstructed,and time-activity curves were obtained on the region of interest on the image. Thus,a renogram on a certain tomographic image could be produced. Different from conventional ECT, this apparatus is equipped with detectors in a circle,so that tomographic images can be obtained in very short time. Based upon this advantage,it can be used for dynamic studies. But it is still impossible to describe the detail of anatomical structure of the kidneys because of its poor spatial resolution.Improvement of the spatial resolution will be indispensable to analyze the renal dynamic tomographic images more exactly.

28

BASAL STUDY ON THE MEASUREMENT OF LIVER VOLUME AND RADIOACTIVITY IN LIVER BY SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY (SPECT).

S.Sato,H.Mimura,S.Sakumoto,T.Sugiu,K.Orita, Y.Hiraki*,I.Nagaya* and K.Aono*.1st Department of Surgery and Department of Radiology* Okayama University Medical School, Okayama.

It is important to measure liver volume and it's uptake rate after administration of radioactive agents for the understanding of liver function and metabolism. Basal study was performed using body phantom to check the influence of liver volume, back ground and splenic uptake.

Data collected by 360°full scan, 64 viws were pretreated by Butterworth filter and image was reconstructed by Shepp & Logan filter. Volume was calculated by cut-off method, and radioactivity was evaluated by counts in effective voxels.

This phantom experiments showed that calculated liver volume had a tendency to be a little larger than actual volume. But up take rate was measurable since correlation between liver radioactivity and calculated counts in voxel was good. So, it was conceivable that this method using SPECT was available for clinical application.