24

APPLICATION OF KARHUNEN-LÒEVE EXPANSION TO RADIOISOTOPE DYNAMIC STUDIES.
K.Murase,Y.Yasuhara,Y.Sugawara,S.Kawamura, M.Kataoka,T.Mochizuki,A.Iio and K.Hamamoto. Ehime University School of Medicine,Ehime.

An application of Karhunen-Lòeve(K-L) expansion to radioisotope dynamic studies was reported with explanation of the method. K-L expansion is a method for extraction of only useful parameters with discriminating unuseful ones in pattern recognition. This method was applied to cardiac dynamic studies with the multi-gated(MUGA) blood-pool scintigraphy and renal ones using I-123 OIH.

Prior to clinical application, the simulation studies were done and the accuracy and usefulness of the method were ascertained.

In application to cardiac dynamic studies, the atrial and ventricular patterns were extracted. The ejection fraction calculated from the extracted ventricular pattern correlated well with the left ventricular ejection fraction(LVEF) calculated from MUGA method (r=0.895,n=29 in fixed-ROI method, r=0.790,n= 29 in variable-ROI method). The contribution of the extracted ventricular pattern correlated well with LVEF (r=-0.793,n=29 in fixed-ROI method, r=-0.714,n=29 in variable-ROI method).

In application to renal dynamic studies, three patterns (the vascular or background pattern contained liver, the renal parenchymal pattern and pyelic pattern) could be extracted.

Further investigation on the clinical usefulness of this method is necessary and is now in progress.

25

EVALUATION OF ATTENUATION CORRECTION METHODS FOR THE HEART SPECT IMAGES BY USING NUCLEAR MAGNETIC RESONANCE IMAGES.
H.Toyama M.Hosoba*,H.Wani*,H.Murata**,A.Kurosaki** and Y.Kojima**.Tsukuba Univ.,Ibaraki. *Shimazu Comp.,Kyoto.**Toranomon Hospt., Tokyo.

The ECG gated single photon emission CT images of the myocardium and cardiac pool with Tl-201 chloride and Tc-99m RBC,respectively,were taken for three normal volunteers,whose spin echo images were also examined with super conductive NMR imaging device. Fifteen slices for each gated heart image were picked up and reconstructed with Tanaka's Radial post correction (RPC) and Sorenson's Pre-correction (PRE) methods. Following %error value; 100 x (Tij-Cij)/Tij was calculated for each pixel in the heart, where Tij is true image of the heart estimated from the spin echo image with computer simulation, Cij is the reconstructed Spect image with each attenuation correction method. On the RPC method,mean %error in the heart had minimum value at the attenuation coefficient of 0.14(1/cm) and 0.12 (1/cm) for the myocardium and the blood pool,respectively. On the case of PRE,however,mean %error increased accordance with decrease of attenuation coefficient from 0.18 to 0.10 for the myocardium and 0.15 to 0.10 for the blood pool.This fact shows that RPC method has optimum value of attenuation coefficient which corressponds the mean value for the thorax including low attenuator of the lung.

26

THREE-DIMENSIONAL DISPLAY OF RADIO-NUCLIDE IMAGE.
M. Matsuo, T. Tamaki, A. Iida, K. Kurono, K. Tauchi and M. Kono. Nagoya City University Medical School, Nagoya. K. Yamazaki and K. Sugimura. Kobe University School of Medicine, Kobe.

The development of the emission CT has enabled us to show the tomographic images such as transaxial, sagittal and coronal planes. However, these are two-dimensional images displayed on the two-dimensional CRT.

In order to obtain the real three-dimensional image, we developed a system for making the white light-reproduced multiplex hologram of RI images, such as bone scintigram and liver scintigram. This sytem made it possible for many doctors to observe the real three-dimensional image simultaneously in a light room.

27

IMAGE ANALYSIS SYSTEM IN POSITRON EMISSION TOMOGRAPHY.
S.Miura,I.Kanno,H.Iida, M.Murakami,K.Takahashi,H.Sasaki and K.Uemura.Research Institute for Brain and Blood Vessels-Akita,Akita.

In positron emission tomography (PET) the analysis of PET image is important to the clinical study and the research work. We have originally developed the hardware and software system for the management and analysis of PET image using the off-line computer (VAX-11/750, DEC) and image processor IP 8500 (DeAnza).

In this system, the PET study image and the film image with autoradiogram are inputted to the host computer by way of high speed parallel interface (DRE-11) and drum scanner, respectively. Image data of clinical study are individually preserved to floppy disk.

The functions of this system are mainly as follows; 1) Display of image at free size and position on CRT. 2) Display of transaxial, coronal and sagittal images. 3) Calculation of physiological parameter within ROI. 4) Arithmetic calculation between image files. 5) Fitting and analysis of time activity curve.