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APPLICATION OF FACTOR ANALYSIS FOR RADIONUCLIDE PULMONARY FUNCTION TEST.
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Three kinds of radionuclide function test were done on patients with COPD and the factor analysis was applied to processing of the dynamic images by these tests.
The first application was for the Xe-133 washout test. The following three compartments, fast, slow washout, and background activity, were clearly separated.
The second was for Tc-99m DTPA aerosol clearance. Mucociliary factor and alveolar penetration factor were separated and quantified.
The third was for the analysis of respiratory pattern by continuous inhalation of Kr-81m. Areas of normal and small airway disease were separated. As result, respiratory pattern specific to small airway disease was obtained. These findings suggest that factor analysis is also useful for radionuclide study of the lung.

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FUNCTIONAL IMAGING OF LIVER.
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Images using radionuclide are functional image in nature even though have not computer assisted processing. Hepatobilliary scintigraphic images represent not only the anatomical information of the liver but also the functional one, because the accumulation and excretion of the hepatobilliary imaging agents are largely depended on the hepatic function. In general, the diffuse liver disease such as hepatitis or hepatic cirrhosis was diffusely impaired all liver cells in the couse of disease. Therefore, the functional imaging of the liver may be of less value. From the time-activity curve following the intravenous injection of Tc-99m PMT, hepatic functional images of hepatic uptake rate (Ku), hepatic excretion rate (Ka) and peak-time of hepatogram were made for evaluating their clinical usefullness. Each images did not provide any advantages over the information obtained by routine sequential images. In the diffuse liver diseases, the lobar or segmental abnormalities are rare. And the focal disease of the liver can be easily detected by the other noninvasive methods such as US or CT. Therefore, it is considered that the hepatic functional images produced by computer may be unnecessary in the routine hepatic examination with radionuclide except for the functional index (Ku, Ka and peak time) as a whole liver.

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FUNCTIONAL RADIONUCLIDE IMAGING OF LIVER.
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The utility of functional imaging with computer-analysis was studied in the case of conventional radionuclide liver and hepatobiliary imagings.

When small doses of colloids are used, the distribution of radioactive colloids is influenced by the relative blood flow to the major organs of RES, particularly to liver. Therefore, the distribution change usually reflects the alteration of relative blood flow to the liver. In order to evaluate the the blood flow in the liver noninvasively, the estimation of arterial and portal blood supplies to the liver was done. The peak time of renal curve was taken as arterial phase, and the second peak time of left heart curve due to recirculation was taken as portal phase. In the patients with cirrhosis, the ratio was increased due to the increase in arterial blood flow and the decrease in portal blood flow, and the prominent radioactivity in the liver (hepatic arterialization) was found.

In the case of hepatobiliary study, the transit time of Tc-99m diethyl IDA was measured by deconvolution analysis of left heart and liver time activity curves. The transit time was sometimes prolonged in the patients with hepatobiliary disease even in the case of normal hepatobiliary image.

From the present study, the formation of functional imaging may be useful adjunct to conventional imaging.

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FUNCTIONAL IMAGING OF THE KIDNEY.
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In rutine studies,the images of renal function with radiopharmaceuticals are showed the dynamic imagies included blood flow phase,function phase,clearance phase. The data was collected to computer. ROI was difined on the kidny and the time activity curve(renogram) on this ROI was drown. The primary use of computers in renal studies has been for functional analysis. The study in this paper includ the flowing functional images

1. Blood flow image.
2. T2/3 image.
3. Mean transit time image.
4. Functional image of the peak time.
5. Functional image of the peak count.
6. Phase analysis.
   (a)phase image, (b)amplitude image.
7. Factor analysis.

In these functional imagies,factor analysis showed interesting results. Factor analysis make possible to show individual images of cortex,medulla and urine bladder. Factor analysis of renal function can provide quantitative information on clinical diagnosis. Other Functional images also provide charactaristic information. They are usefull,if appropriate imagies are applied to each stage of renal dysfunction.