Radionuclide study is utilized for early detection and regional assessment of ventilatory and perfusion abnormalities by imaging and quantifying the distribution of radioactivity in the lung. In this lecture, the procedures of the radionuclide study of the lung, physiological meaning of the data, and the relationship between the results of radionuclide study and that of conventional methods were discussed. The procedure of Xe-133 inhalation study consists of mainly three phases, namely washin, equilibrium and washout phase. Regional distribution of residual volume is measured in equilibrium. A mean transite time, calculated from washout phase, is appraised as one of sensitive indices of airtrapping. Krypton-81m gas is also available in many institutions. This gas is useful for evaluation of ventilatory disturbances during tidal breathing, and for repeated study in short intervals. The time inhalation method of this gas is easy to perform and offers various informations on pulmonary physiology and disorders of ventilatory mechanism. Radionuclide study is also useful for detection of V/Q mismatch. This is recent, utilised for quantitative evaluation of blood flow distribution and ventilation and perfusion ratio. This modality will be offer new informations of pathophysiology of the various pulmonary diseases.

The number of the test tubes used for the determination of thyroid hormones in 1981 counted about 7,450,000, which was the second large number to those used for the determination of tumor materials such as CEA and AFP. The use of newly developed FT4 and TGB is gradually increasing, since FT4 is considered to be the most valuable method to detect the state of the thyroid function, and, TGB to detect the amount of major T4 binding site. It is noted that 1-131 was replaced by I-125 in in vitro tests and by I-123 or Tc-99m in in vivo examinations. Ga-67 and Ti-201 were also introduced for the scintigraphy of the thyroid gland, but their value in the differentiation of the malignant tumors from benign ones was still equivocal. The amount of I-131 used for the treatment in 1981 was 45,516mCi, which is about twice as much as the doses used 6 years ago, indicating the increase in the number of Graves' patients treated with I-131.

It is expected in near future that the method to detect or to determine the anti TSH receptor antibody or FT3 in the serum will be introduced and the radioimmuno- detection method will also successively developed to detect the presence and the localization of some kinds of malignant tumors.

The number of scintigraphy a year is around 8000 in our hospital. Liver, bone, tumors and thyroid scans make up two third of total examinations. I presented many interesting cases which scintigraphy was very useful in diagnosis.

1) Liver-spleen scan: On the screening test of the liver, it is said that the scintigraphy is the first choice in the decision tree. Small focal defect more than 1.5 cm in diameter could be detectable with the multiplanar images, erect position images and single photon emission CT. But we should know about the limitations and pitfalls of the scintigrams.

2) Bone scan: Bone scan is the most sensitive examination in detecting skeletal involvement in patients with malignancy. There are various kind of bone scintigrams.