

招 待 講 演

(1) A TECHNIQUE FOR DYNAMIC ISOTOPE FLOW STUDIES:

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In the search for a diagnostic methodology which is atraumatic and without morbidity and mortality, dynamic isotope studies or "motion" scanning is probably the procedure of choice in the diagnosis of, and in the delineation of the extent of, most diseases due to, or reflected by, the absence of vascular space; for example, delineating thrombotic or embolic phenomena involving the vasculature of the brain.

I shall then discuss the rationale for my particular methodology, the equipment utilized, and illustrate the technique with movies of some examples taken from patient studies.

(2) Internal Dosimetry

E. M. Smith univ. of Miami

(3) THE EVALUATION OF BRONCHOPULMONARY DISEASE WITH $^{133}\text{XENON}$ GAS AND A SCINTILLATION CAMERA

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Professor of Radiology

Director, Division of Nuclear Medicine

A scintillation (Anger) camera has been used to evaluate pulmonary function in more than 200 patients in our clinic. These patients have received $^{133}\text{xenon}$ by both intravenous injection and by inhalation. Conventional pulmonary function tests, including maximum breathing capacity, vital capacity and forced expiratory volume have been carried out on the majority of these patients at the same sitting.

The camera is fitted either with a high resolution or diverging type collimator and is directed toward the posterior thorax with the patient either seated or supine. At the initiation of the study, the patient is attached to a spirometer system but breathing room air. As the patient slowly inhales, 20 mc of $^{133}\text{xenon}$

in saline is administered intravenously as a bolus. The patient is instructed to hold his breath to determine the distribution of blood flow. The patient then exhales the radioactive gas into the spirometer system and continues to breathe to equilibrium for the ventilation portion of the study. This is followed by clearance of the radioactive gas from the patient. Serial scintiphotograms are obtained throughout the entire study. Data are also transmitted through our interface equipment onto high speed magnetic tape for computer processing. The computer is programmed to print out indices related to perfusion and ventilation and ventilation-perfusion ratio and clearance times for all regions of the lung which have been selected. As many as forty areas of the lung have been evaluated in some of our patient studies. Isointensity plots of the distribution of xenon in the lungs during the perfusion and ventilation studies are also obtained from the computer.

A summary of our clinical experience in these studies will be presented.

(4) LUNG SCINTIGRAPHY AND PULMONARY FUNCTION STUDIES IN OBSTRUCTIVE AIRWAYS DISEASE.

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In the management of obstructive airways disease it is important to distinguish emphysematous from bronchitic types because the latter are far more responsive to treatment. This paper is presented to demonstrate the capacity of radioaerosol inhalation scanning for making this separation. Eleven normal volunteers and 65 respiratory disease patients were studied by three types of lung scintigraphy - radioaerosol and radioxenon gas inhalation and perfusion scan procedures.

Aerosol scans in the 11 volunteers showed uniform distribution patterns which were nearly identical to their perfusion counterparts. All patients with functional airways obstruction had abnormal scans. Furthermore in 22 patients with miscellaneous lung disorders, the aerosol scans were positive in 14 although function tests for airway obstruction were negative.

The aerosol scans in moderate and severe cases of obstructive airways disease had two distinctly different configurations - abnormal accumulations of radioactivity in the *central* versus *peripheral* regions of the lung. These two main scan patterns corresponded with the emphysematous and bronchitic categories of Burrows et al. Partial airways obstruction was considered the main determining factor regarding the sites of excessive aerosol deposition : in the major airways which are known to collapse during expiration in the emphysematous type and in the smaller airways nearer the lung periphery in the bronchitic type. Very little inert radioactive gas is retained in the airways even at sites of partial obstruction. However, with aerosols a large fraction of the inhaled particles deposit in airways which are partially occluded as a result of turbulence, eddy currents and impingement.

Aerosol inhalation scanning is a sensitive indicator of airways obstruction and is a useful counterpart to the perfusion scan. It helps to distinguish emphysematous from bronchitic and mixed types of obstructive airways disease. It has the additional capacity for disclosing abnormalities of lung clearance in bronchopulmonary disease.

(5) **A Physiological Trigger for Static and Dynamic Studies with an Anger Scintillation Camera**

Dr. E. M. Smith Univ of Minnesota
Dr. W. Smoak
Dr. J. Mibelli

(6) **Clinical Use of a physiological Trigger for Static and Dynamic Studies with an Anger Scintillation Camera**

Dr. W. Smoak Univ of Minnesota
Dr. E. M. Smith
Dr. J. Mibelli

(7) **Radiation Dose and Features of Hg-197 Labelled Compounds as Diagnostic Agents**

Dr. Charlton RCC(England)