

Quantitative Assessment of Pulmonary Extravascular Water Volume with THO

K. NOYA, S. HANDA, T. KUNIEDA, T. DATE, K. KATAYAMA, T. OHASHI,
K. HOSONO and H. SASAMOTO

Department of Internal Medicine, School of Medicine, Keio University, Tokyo

Double indicator dilution technique suggested by Chinard & Enns (1951) made it possible to measure the extravascular water content of lungs in vivo.

Pulmonary extravascular water volume (PEV) was measured in our laboratory applying the modified technique of double indicator dilution using RISA and THO system by Ramsey et al. Current study was done to clarify the relationship of PEV with pulmonary hemodynamics and with arterial blood gas level in the acquired heart diseases.

Methods: Four normal subjects and twenty-four patients with acquired heart disease were studied. About 0.6 ml of physiological saline containing 100 μ Ci of THO and 20 μ Ci of 131 I-RISA was rapidly injected into the median cubital vein by tourniquet method. Blood was sampled continuously on rotating turntable from the brachial artery by vacuum suction pump.

131 I activity was counted in well-type scintillation counter and 3 H (Tritium) in Nuclear Chicago liquid scintillation spectrometer with 10 per cent of counting efficiency.

Calculation: Time-concentration curves for both RISA and THO were plotted on semi-logarithmic paper. Each curve without recirculation was obtained. Cardiac output and mean circulation time were calculated in usual manner. The difference between dis-

tribution volume of THO and RISA was used as PEV.

Results: Patients with episodes of cardiac decompensation, even though they had no symptoms at the time of study, had apparently higher value for PEV. Some patients of neither episode nor clinical signs showed also higher value. There was no apparent relationship between PEV and cardiac output, but some cases with high PEV showed low cardiac output indicating heart failure. The study of the relationship between PEV and pulmonary blood volume (PBV) showed no obvious correlation, and some patients with high PEV had normal PBV. PEV correlated with R-L time obtained by precordial monitoring. There was no apparent relationship between PEV and mean pulmonary arterial pressure (PPAm). Though some cases with high PPAm had high PEV, other cases with high PPAm had normal PEV. Group with normal PPAm showed normal PEV.

There were the approximately similar relations between PEV and mean left atrial pressure, and mean pulmonary arterial wedge pressure which reflecting pulmonary venous side. There was a close inverse correlation between arterial oxygen tension (PaO_2) and PEV, while no correlation was found between arterial CO_2 tension and PEV.

Lung Density Measurement by γ -Ray Thickness Gauge

K. UEMURA

Department of Radiology, School of Medicine, Tohoku University, Sendai

Lung densities of chronic obstructive lung disease were measured, which had been little reported up to now.

The purpose of this study is to observe the differences of the lung densities which may be influenced by parenchymal destruction, over-