and RV/TLC in each matrix were calculated by digital computer of TOSBAC 3400 model. In various pulmonary conditions, regional V/Q and RV/TLC in each matrix were compared with overall values of A-aD and RV/TLC.

Coefficient of variation calculated from mean value of regional V/Q divided by its standard deviation was greater in cases with abnormal A-aD. A good correlation was observed between regional RV/TLC in each matrix measured by [133]Xenon and overall RV/TLC measured by helium closed circuit method.

It was concluded that the measurement of regional residual volume by this method would very much be of diagnostic value in inquiring the presence and degree of regional overinflation of the lung.

Estimation of Regional Pulmonary Ventilation using Xenon 133

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All studies were carried out with the person in the upright position and camera was placed against the posterior thorax. To study regional ventilation, 3–5 mCi of ^{133}Xe was injected into the cubital vein.

The patients held his breath and the person then rebreathed from the closed system until equibrium was attained. The system then closed off and the person breathed room air while washout data were recorded on magnetic tape for computer analysis. In the previous study it was found that ^{133}Xe clearance curve consisted chiefly of two or three exponential components, even if it was corrected for uptake of ^{133}Xe in the chest wall.

For the purpose of studying regional ventilation mathematical model was applied, in which the lungs were conventionally divided into a common dead space and bilateral upper, middle and lower regions containing the fast and the slow compartments respectively.

Before or during the experiments, several pulmonary function such as functional residual capacity, tidal volume and respiratory rates were measured.

Volume of each fast or slow compartment was estimated from initial counts of each region. These values were substituted for mathematical equation. Then tidal volume of each region was obtained by fitting closely computed points to an experimental curve using digital computer. Summation of these regional tidal volumes was completely equal to the experimental tidal volume. Furthermore Ve/V value of each region was calculated and these values were compared with the result of Brisco.