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 he-
lium closed circuit method.

It was concluded that the measurement of re-
geonal 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
equilibrium was attained. The system then closed
off and the person breathed room air while wash-
out 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 ventila-
tion mathematical model was applied, in which
the lungs were conventionally divided into a com-
mon dead space and bilateral upper, middle and
lower regions containing the fast and the slow
compartments respectively.

Before or during the experiments, several pul-
monary function such as functional residual ca-
pacity, 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. Sum-
mation of these regional tidal volumes was com-
pletely equal to the experimental tidal volume.
Furthermore Ve/V value of each region was cal-
culated and these values were compared with the
result of Brisco.