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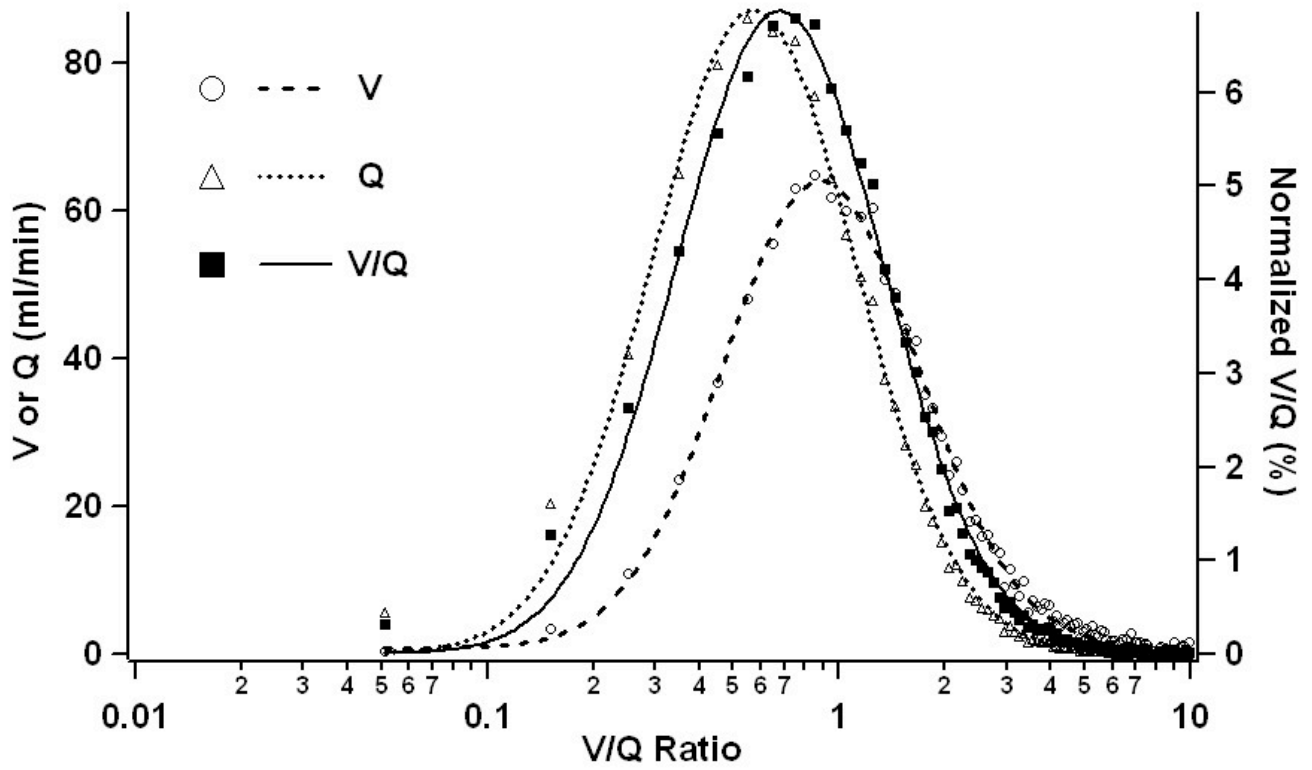
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Title: Ventilation (V), Perfusion (Q) and V/Q Quantification of the Ovine Lung using Functional CT Imaging

R.B. Easley, MD ¹, M.K. Fuld, BS ¹, D. Chon, MS ², E.A. Hoffman, PhD ², H. Shikata, PhD ² and B.A. Simon, MD, PhD ¹, ¹ Johns Hopkins Medical Inst., Baltimore, MD, United States and ² Univ. of Iowa, Iowa City, IA, United States.

Functional imaging techniques utilizing high-resolution, multi-detector CT scanning can quantify regional V, Q and V/Q ratio in the lung. This study was designed to measure regional V, Q and V/Q for all locations within the sheep lung in the prone and supine positions. Methods: Two anesthetized and mechanically ventilated sheep were studied. Sequential V and Q scans were performed from apex to base using previously published techniques. At each table location, V was measured from the wash-in and wash-out of radiodense xenon gas, and Q by bolus injection of radiocontrast with repetitive cardiac-gated imaging at the same location. The protocol was repeated in the prone position. Images were analyzed using TSIA software (Univ. of Iowa). Regional V and Q were calculated for $\sim 0.6\text{mm}^3$ voxels and the local and global distribution of V/Q quantified. Results: Regional V and regional Q can be measured and the regional and global V/Q determined (Figure). Overall V/Q ratios were slightly lower and distributions broader than expected. Contrast accumulation limited curve fitting of runs from end of study. Conclusions: Comprehensive and quantifiable distributions of V, Q and V/Q can be defined by performing functional CT imaging studies on the entire lung. This can contribute to a functional map of pulmonary physiology in the ovine lung.



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