

# Microvascular Lung Tissue Oxygenation—A Methodological Study in the Pig

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## Abstract

*The objective of the present study was to investigate the possibility of measuring lung tissue oxygen pressure ( $P_tO_2$ ) distributions at the microvascular level, and also if a change in the lung tissue oxygenation could be detected during hypoventilation (50% reduction in ventilatory settings). Experiments were carried out on eight mechanically ventilated ketamine-anaesthetised pigs. A thoracotomy was performed through the third right intercostal space.  $P_tO_2$  measurements were made using a Clark-type multiwire microelectrode placed onto the pleural surface of the middle lobe.  $P_tO_2$  was measured during normoventilation, hypoventilation (3 minutes) (reduction of respiratory volume/minute and frequency by 50%), and a second period of normoventilation. Baseline  $P_tO_2$  was 5.8 (range 4.4 to 10.3) kPa and decreased to 2.9 (range 1.6 to 4.2) kPa during hypoventilation, associated with some  $P_tO_2$  values close to zero. The  $P_tO_2$  increased to 5.4 (range 3.6 to 8.4) kPa during the second normoventilatory period, some values still close to zero. This study demonstrates that lung tissue  $PO_2$  registrations can be made in a suitable animal (pig) model, and that hypoventilation induced an almost reversible decrease in lung tissue oxygen pressure distributions. In addition, no microscopically visible tissue damage was inflicted by the electrode on the underlying lung surface.*

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*Key words: Experimental animals, Microelectrode, Oxygen, Pulmonary tissue*