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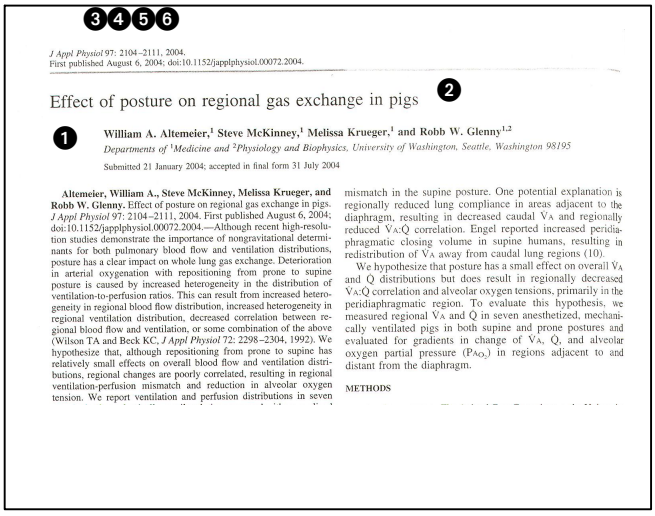

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Effect of posture on regional gas exchange in pigs ❷

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Altemeier, William A., Steve McKinney, Melissa Krueger, and Robb W. Glenny. Effect of posture on regional gas exchange in pigs. *J Appl Physiol* 97: 2104–2111, 2004. First published August 6, 2004; doi:10.1152/japplphysiol.00072.2004.—Although recent high-resolution studies demonstrate the importance of nongravitational determinants for both pulmonary blood flow and ventilation distributions, posture has a clear impact on whole lung gas exchange. Deterioration in arterial oxygenation with repositioning from prone to supine posture is caused by increased heterogeneity in the distribution of ventilation-to-perfusion ratios. This can result from increased heterogeneity in regional blood flow distribution, increased heterogeneity in regional ventilation distribution, decreased correlation between regional blood flow and ventilation, or some combination of the above (Wilson TA and Beck KC, *J Appl Physiol* 72: 2298–2304, 1992). We hypothesize that, although repositioning from prone to supine has relatively small effects on overall blood flow and ventilation distributions, regional changes are poorly correlated, resulting in regional ventilation-perfusion mismatch and reduction in alveolar oxygen tension. We report ventilation and perfusion distributions in seven anesthetized, mechanically ventilated pigs in both supine and prone postures and evaluated for gradients in change of V_A, Q, and alveolar oxygen partial pressure ($P_{A_{O_2}}$) in regions adjacent to and distant from the diaphragm.

mismatch in the supine posture. One potential explanation is regionally reduced lung compliance in areas adjacent to the diaphragm, resulting in decreased caudal V_A and regionally reduced V_A:Q correlation. Engel reported increased peridiaphragmatic closing volume in supine humans, resulting in redistribution of V_A away from caudal lung regions (10).

We hypothesize that posture has a small effect on overall V_A and Q distributions but does result in regionally decreased V_A:Q correlation and alveolar oxygen tensions, primarily in the peridiaphragmatic region. To evaluate this hypothesis, we measured regional V_A and Q in seven anesthetized, mechanically ventilated pigs in both supine and prone postures and evaluated for gradients in change of V_A, Q, and alveolar oxygen partial pressure ($P_{A_{O_2}}$) in regions adjacent to and distant from the diaphragm.

METHODS

Bibliographic Reference Citation

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(❶ Altemeier et al., ❹ 2005)

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