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COMPARISON OF EXTRAVASCULAR LUNG WATER VOLUME
WITH RADIOGRAPHIC FINDINGS IN DOGS WITH INCREASED
PERMEABILITY PULMONARY EDEMA

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The relationship between extravascular lung water volume (ELWV) and chest radiographical findings was studied in general-anesthetized beagles. Beagles were injected 0.02ml/kg (Group A) or 0.04ml/kg (Group B) of oleic acid, thereby increasing pulmonary vascular permeability. ELWV, PaO₂, PaCO₂ and pH were measured, and chest radiographs were taken before and at 15, 30, 45, 60, 90, 120, 150 and 180 minutes after the injection of oleic acid. ELWV was measured by the thermal-sodium double-indicator dilution method. ELWV values were compared with lung density values, which were converted to equivalent aluminum thickness.

1. The ELWV value increased to about 20 percent over the control value, and chest radiographs showed little change in group A. In contrast, in group B, when the value of ELWV increased by more than 30 percent over the control value, chest radiographs began to show changes. Up to 180 minutes, the ELWV values increased by more than 50 percent, and the chest radiographs became more abnormal.

2. When the value of ELWV increased by more than 30 percent over the control value before treatment, the density of chest radiographs increased to 10 percent of the baseline level.

3. In both groups, PaO₂ decreased and PaCO₂ and AaDO₂ increased after the injection of oleic acid. This clearly showed that pulmonary gas exchange function was reduced following an increase in ELWV.

In conclusion, this comparison showed the probability that the thermal-sodium doubleindicator dilution measurement of extravascular lung water can detect slight hyperpermeability pulmonary edema that does not show on chest radiographs. The chest radiograph was not suitable for the detection of slight pulmonary edema, because it did not show any changes in the early stages of this condition.