INTRODUCTION: It has been proposed that almitrine bismesylate improves arterial P O₂ in patients with COPD and in dogs by enhancement of hypoxic pulmonary vasoconstriction. Previous studies demonstrated that almitrine infused peripherally at 3.3 μg/kg/min had no effect on the HP response and that 14.3 μg/kg/min significantly inhibited HPV. Nakanishi et al suggested that low-dose almitrine (0.3, 1.0, 3.0 but not 5.0 μg/kg/min) increased P O₂ in LLL open-chest beagles. The present study examines the hypothesis that low-dose almitrine enhances HPV in closed-chest dogs.

METHODS:  Six female dogs of mixed breed weighing 19.8 ± 2.7 kg received a pentobarbital/pentacurium anesthetic. Each lung was ventilated separately via an endobronchial tube with 5% H₂O of PEEP. The right lung was continuously ventilated with 100% O₂, while the left lung was ventilated either with 100% O₂ (hyperoxia) or with an hypoxic gas mixture (hypoxia). Inspired, end-tidal, and mixed-expired O₂ and CO₂ were recorded using a mass spectrometer. End-tidal CO₂ was held at approximately 36.4 ± 0.2 mmHg throughout and end-tidal O₂ at 66 ± 6 mmHg during hyperoxia. Arterial (Paw), pulmonary artery compartment (PAP) and systemic arterial (SAP) pressures, pulmonary artery occlusion (PAOP), and central venous (CVP) pressures; arterial and mixed venous blood gases; hemoglobin (Hb); and temperature (°C) were measured. Arterial pH (pHb) and arterial pressures were controlled. A differential CO₂ elimination method corrected for the Haldane effect was used to measure percent left lung blood flow during hyperoxia (20% O₂). Arterial oxygen tension and % VA were calculated. Percent left lung blood flow (20% O₂) during hypoxia was calculated using a blood mixing equation. On two consecutive days, each dog received either almitrine or saline (Victor Lab). The 6 phases were 100% O₂, hypoxia, and hypoxia with 4 doses of either almitrine or saline. Almitrine (5mg) was dissolved in its solvent saline (5ml) and then diluted with saline. The almitrine doses were 0.003, 0.03, 0.3, and 3.0 μg/kg/min or the equivalent volumes of saline at 20 minutes. Measurements then required 10–15 minutes for each phase. The data were analyzed by a one-way within subjects ANOVA with Newman-Keuls test; p<0.05 was considered significant. RESULTS: The mean general condition for all phases were maintained in the following ranges: HR (138–188 bpm); CVP (3.3–4.0 mmHg); SAP (135–143 mmHg); temp (37.8–38.7°C); Hb (120–13.3 g/dl); Paw and PAP (10 to 11 cmH₂O); P(fio₂,0.5–1.0 mmHg); pH (7.35–7.37); PaCO₂, (38.5–39.6 mmHg). It was found that the change in P O₂ (AP) (0.07–0.16 mmHg) and the change in percent left lung blood flow (20% O₂) were significantly different for all other points (p<0.01).