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**Title:** Diaphragm postinspiratory inspiratory activity (PIIA) with sustained hypoxia

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**Body:** Introduction: Each breath neurally has three phases: inspiration, postinspiration and expiration. However, postinspiration activity, i.e. "expiratory breaking", may not be universal, and may be undesirable in some muscles. Little is known about postinspiratory activity (PIIA) during hypoxia. Aim: Determine if postinspiratory activity occurs in costal (COS) and crural (CRU) diaphragm during sustained hypoxia in awake canines. Methods: 28 days after implantation of sonomicrometry and EMG electrodes in COS and CRU, we measured awake airflow, SpO<sub>2</sub>, ETCO<sub>2</sub>, diaphragm EMG and shortening (SHORT) during room air breathing then 25 min isocapnic hypoxia (mean 79.7% SpO<sub>2</sub>). We report: 5 min room air (BASE), sustained hypoxia - first 2 min (PEAK) and final 5 min (PLATEAU).

Results: For N=8 (mean 28.9 kg), minute ventilation, tidal volume, EMG and SHORT of COS and CRU increased significantly from BASE to PEAK, then decreased to PLATEAU ( $p<0.01$ ). Within-breath EMG revealed PIIA for CRU during BASE, but minimal for COS. With sustained hypoxia, PIIA of both COS and CRU increased significantly from BASE to PEAK ( $p<0.01$ ), and then remained elevated through PLATEAU. Conclusion: Hypoxia elicits prominent diaphragm postinspiratory activity which does not resolve when hypoxia is sustained. This occurs even in COS which has minimal spindles or proprioceptive feedback for protection. This deviation of PIIA from normal diaphragm activity may be potentially injurious.