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Title: Dynamic pressure-volume loops as predictors of long-timescale derecruitment in the lung

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Body: The tendency of the injured lung to derecruit with time is reflected in its increases in elastance during a few minutes of mechanical ventilation immediately following a recruitment maneuver. This procedure is inconvenient for clinical use, however, so we investigated whether the dynamic pressure-volume (PV) loop obtained during a single large breath can be used to estimate lung derecruitability. Anesthetized, paralyzed, tracheostomized BALB/c mice were subjected, at zero end-expiratory pressure, to 16.5 min periods of over-ventilation (tidal volume, Vt = 1.0,1.1,1.2,1.3 ml) during which PV loops were recorded every 5.5 min. Lung derecruitability (Vt = 0.25ml) was assessed for 4.5 min between each over-ventilation epoch. The mice were exposed to alternating derecruitability tests and over-ventilation epochs for up to 4 hrs. Each derecruitability test provided an initial value of lung elastance (H_1) and a subsequent mean rate of change of elastance (D_{Rate}). Each dynamic PV loop provided a measure of lung elastance ($H_{0.2ml}$) at the 0.2 ml point during inspiration. Both H_1 (Fig. 1a) and D_{Rate} (Fig. 1b) exhibited strongly correlated sigmoidal relationships with $H_{0.2ml}$. This suggests that the long timescale derecruitability of the lung, encapsulated in H_1 and D_{Rate}, is also reflected in the shape of the dynamic PV relationship, quantified by $H_{0.20ml}$. The latter may thus be a clinically useful measure of derecruitability.