

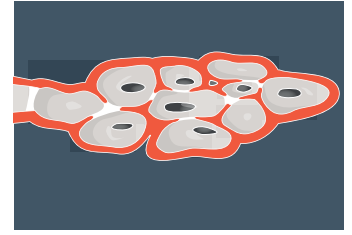
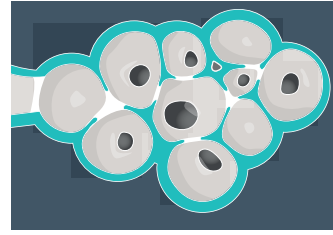
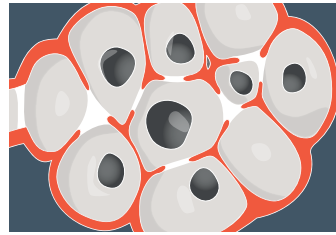
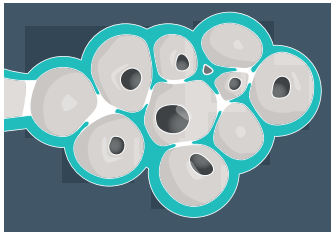


Personalized lung protection

The right protection, for each patient at the right time

GETINGE 

The physiological challenges of mechanical



Volutrauma

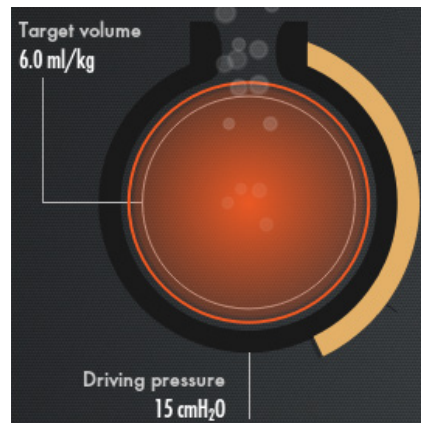
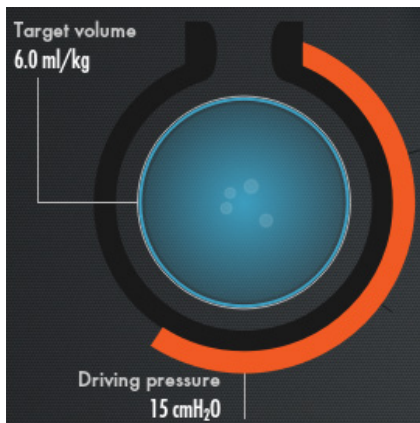
– lung injury due to alveolar overdistension during controlled ventilation

Protective strategies proposed as standard of care are prescribing low tidal volume per predicted body weight (VT/PBW) and limited plateau and driving pressure (Pdrive), but real world delivery of these recommendations is sub-optimal.¹⁻³ Stress Index⁴⁻⁶, and transpulmonary pressure (PL) are two ways to assess lung stress, where the later allows for distinguishing between lung and chest-wall contribution to the patient's respiratory system mechanics. Transpulmonary pressure has also been proposed as a way to guide PEEP titration in ARDS by targeting a slightly positive end-expiratory transpulmonary pressure (PL_{ee}).^{7,8}

Atelectrauma

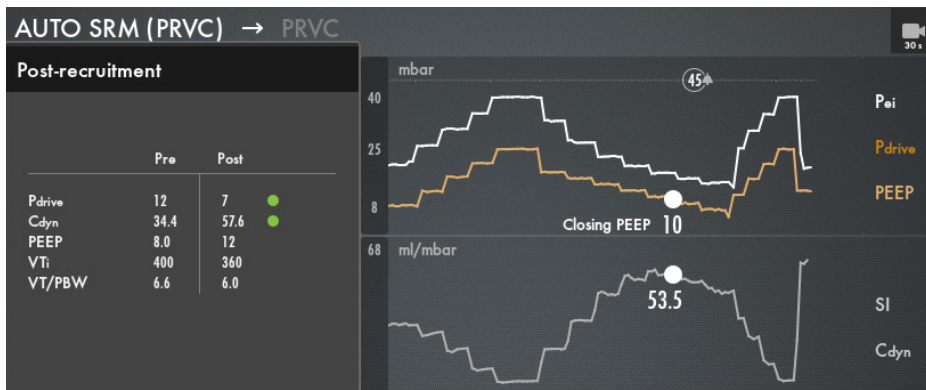
– lung injury due to cyclic closing and re-opening of alveoli

Protective strategies includes increased PEEP, and lung recruitment with the patient in supine position or by prone positioning.⁹ A decremental PEEP titration approach has been proposed as an optimal method, where it also provides diagnostic information about lung recruitability through the precise analysis of the respiratory system compliance (C_{dyn}). Through this approach, PEEP that is inefficient in recruitment can be avoided.¹⁰ Advanced hemodynamic monitoring aids in understanding any effects on the cardiocirculatory function, severity of lung injury and find an optimal benefit-to-cost ratio for both heart and lungs.^{11,12}

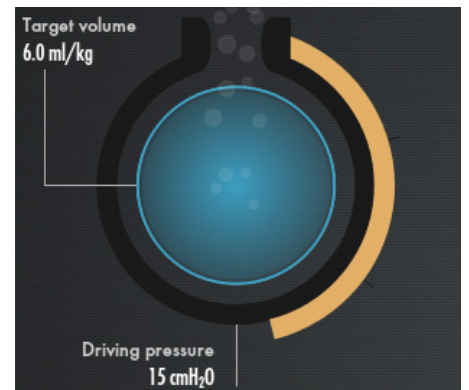


Servo Compass: Reduced lung volume? / Strong inspiratory efforts?

Pes & PL monitoring: Effect on PL by increasing PEEP?

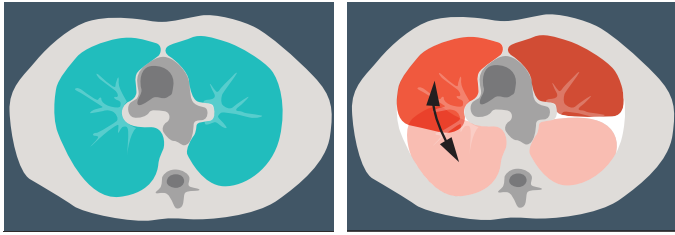


Auto SRM: Responder to Open lung approach by improved C_{dyn} and reduced Pdrive



Servo Compass: Lung protective ventilation

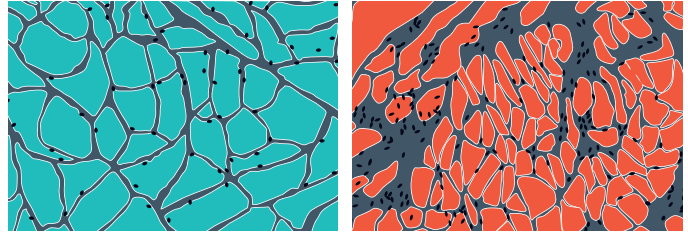
ventilation requires a powerful toolkit



Barotrauma (pendelluft)

– alveolar pressure drop with lung volume re-distribution during spontaneous breathing

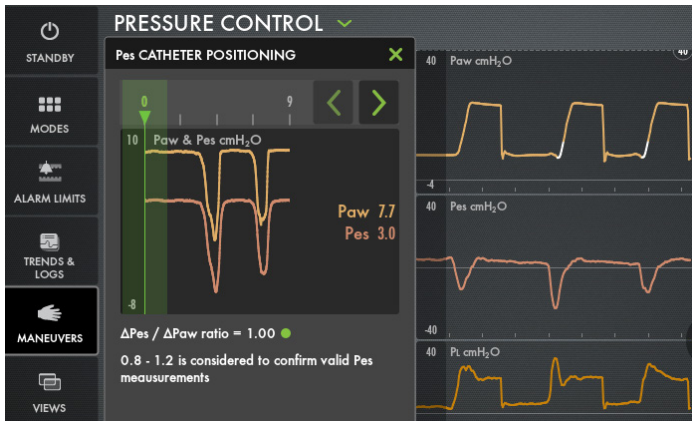
The concept of Patient self-inflicted lung injury (P-SILI) describes how a strong spontaneous breathing drive in already injured lungs (two-hit model) aggravates the situation, where deep sedation and neuromuscular blockade (NMBA) is recommended in order to protect the "baby lung".^{13,14} Concern about the impact of the patient's own respiratory drive, and assessment whether spontaneous breathing will be beneficial or detrimental, can be assessed by both esophageal pressure monitoring (Δ Pes and PL) and electrical activity of the diaphragm (Edi).¹⁵⁻¹⁷



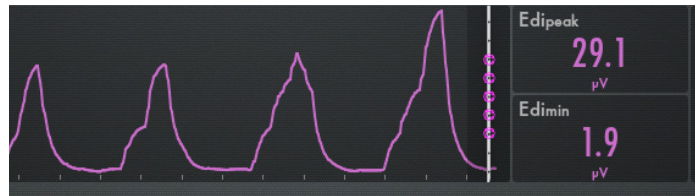
Myotrauma

– diaphragmatic injury due to inappropriate load and/or asynchrony

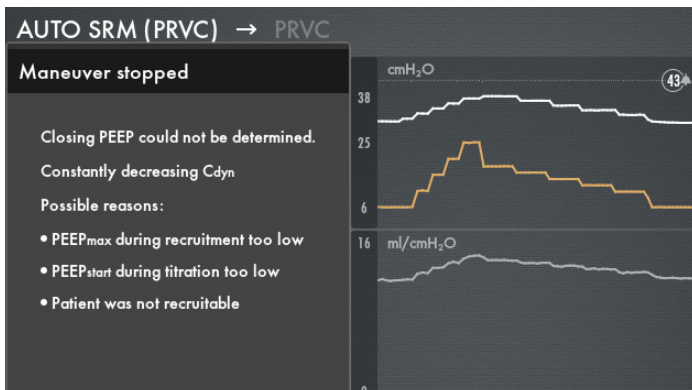
Edi is the Gold standard for assuring optimal timing and effort of spontaneous breathing, and can be used to assess impact of sedation and to optimize patient inspiratory effort levels to shorten time of ventilation and improve outcome.¹⁸⁻²⁴ Edi can also reveal reverse triggering which is the phenomenon of large diaphragmatic contractions triggered by ventilator inflations in paralyzed patients that may result in excessive tidal volumes.^{25,26} Edi could also help to improve patient-ventilator interaction and predict successful weaning during extra-corporeal life-support (ECLS).²⁷⁻²⁹



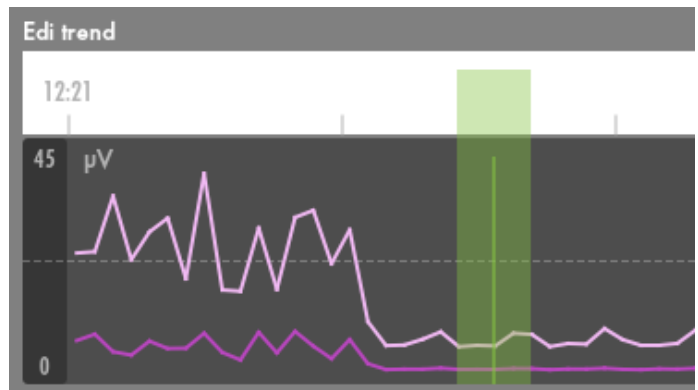
Pes & PL monitoring: Baydur-test passed / Excessive Δ Pes and PL drive



Edi monitoring: Strong respiratory drive / Muscle paralysis by NMBA



Auto SRM: Non-responder – pursue lung rest strategy?



Edi monitoring: Titration of support to protect both lungs and diaphragm

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Watch video explaining Servo-u personalized lung protection

How has personalized lung protection been integrated in the Servo-u ventilator system? Why is it so unique and what can it do for you?

<https://www.youtube.com/watch?v=8CO8Ifm2018>

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