

Fyziologické aspekty změny polohy ... na ventilaci

M Mlcek¹; JB Borges¹; M Otahal²

¹Charles University, First Faculty of Medicine, Institute of Physiology,
Prague, Czech Republic

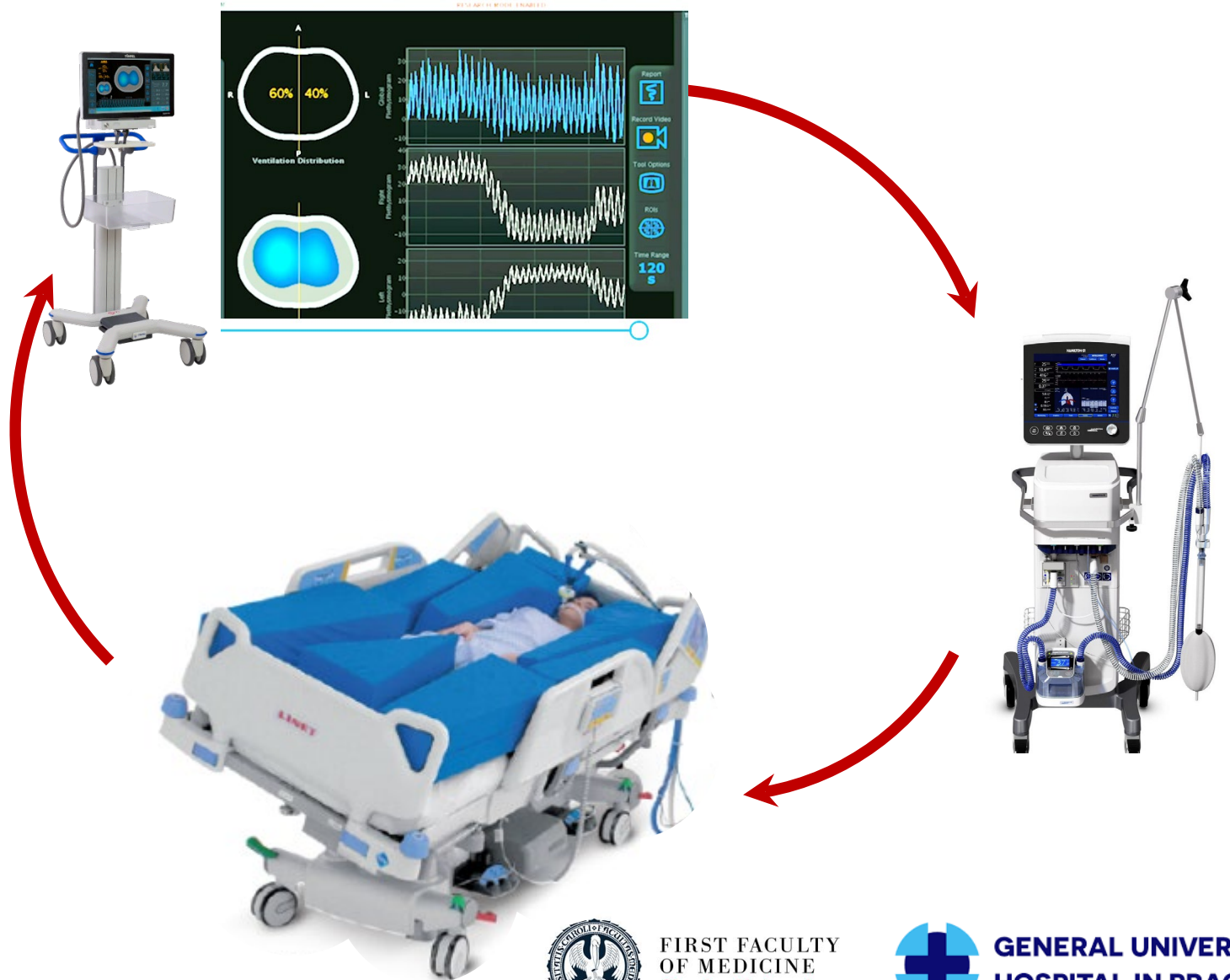
²First Faculty of Medicine, Charles University and General University Hospital in
Prague, Department of Anesthesiology and Intensive Care, Prague, Czech Republic



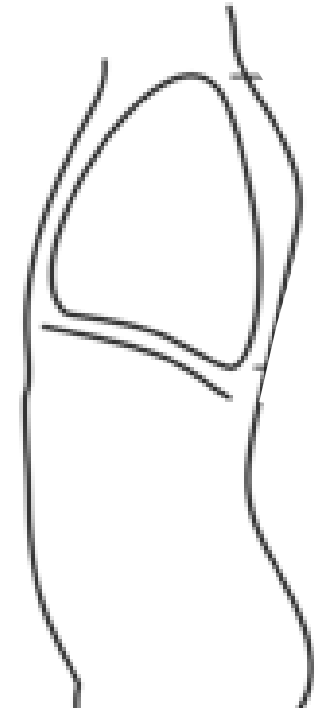
The Concept...

- + Body positioning
- + Regional monitoring
- + Ventilation adjustment

... to reduce VILI
by reducing
overdistension/collapse



Principles



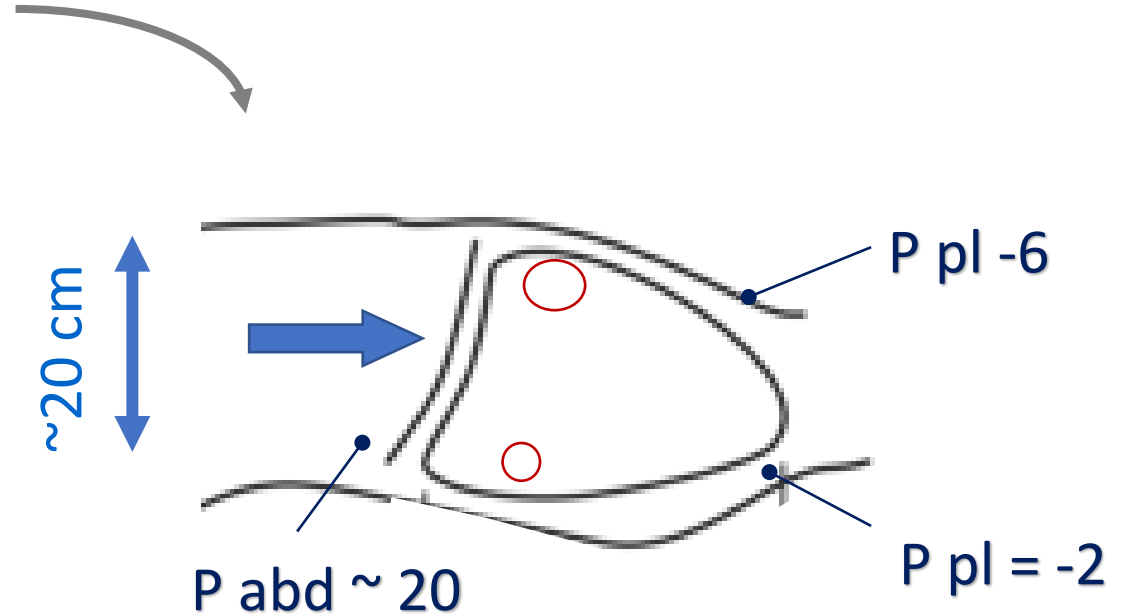
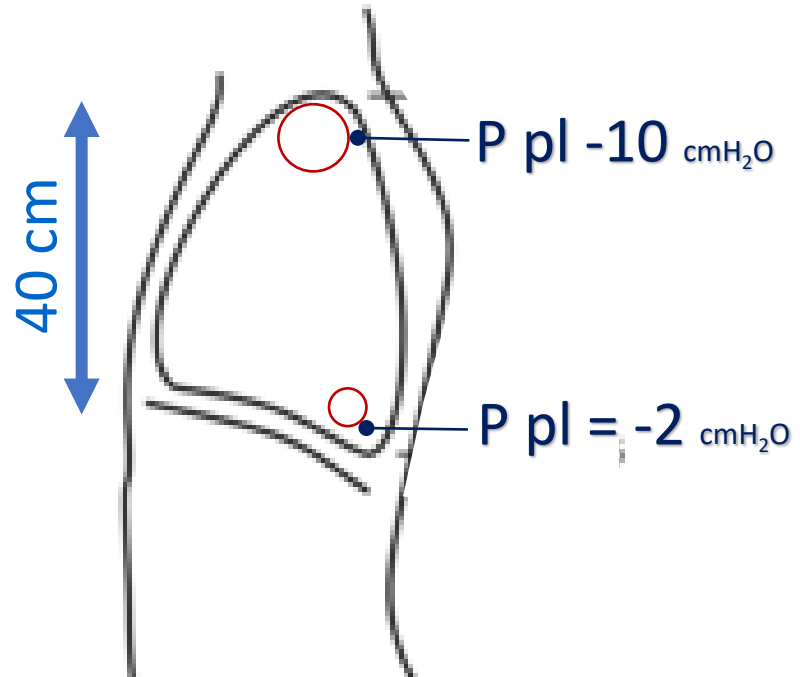
Positioning Gravity



Gravity is...

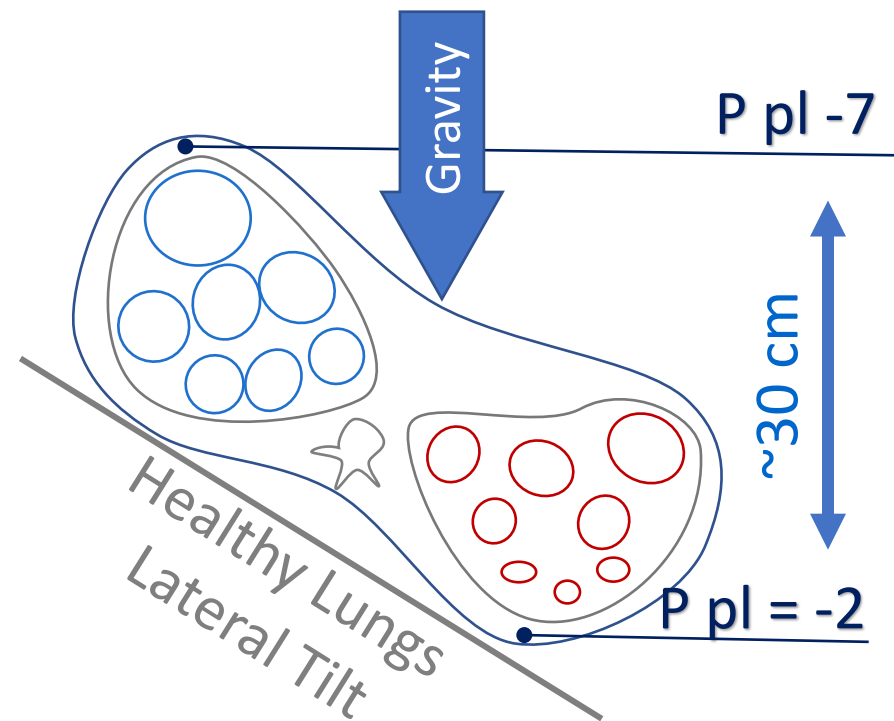
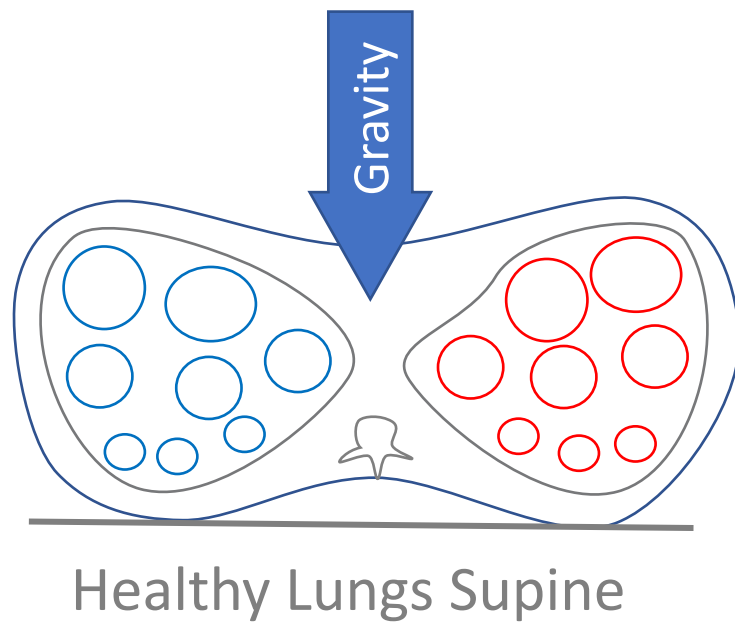
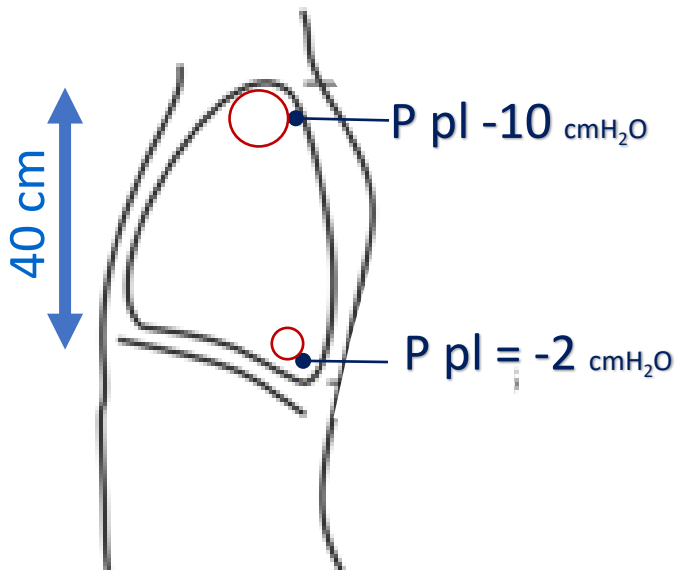
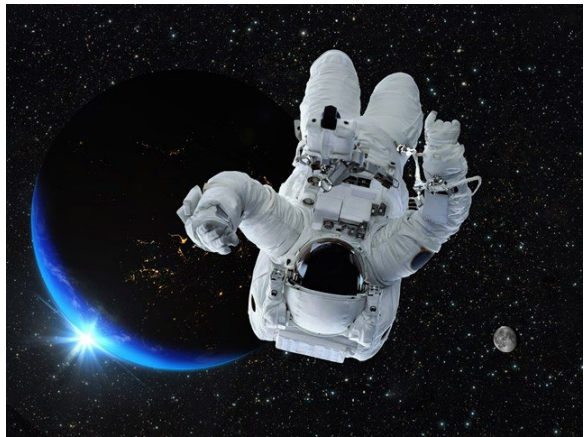
- a **major** determinant of **ventilation distribution**
- ...
- a **minor** determinant of pulmonary **blood flow distribution**

Principles: Tilt Physiology – Healthy Lungs



Normal Lung density ~ 0.2

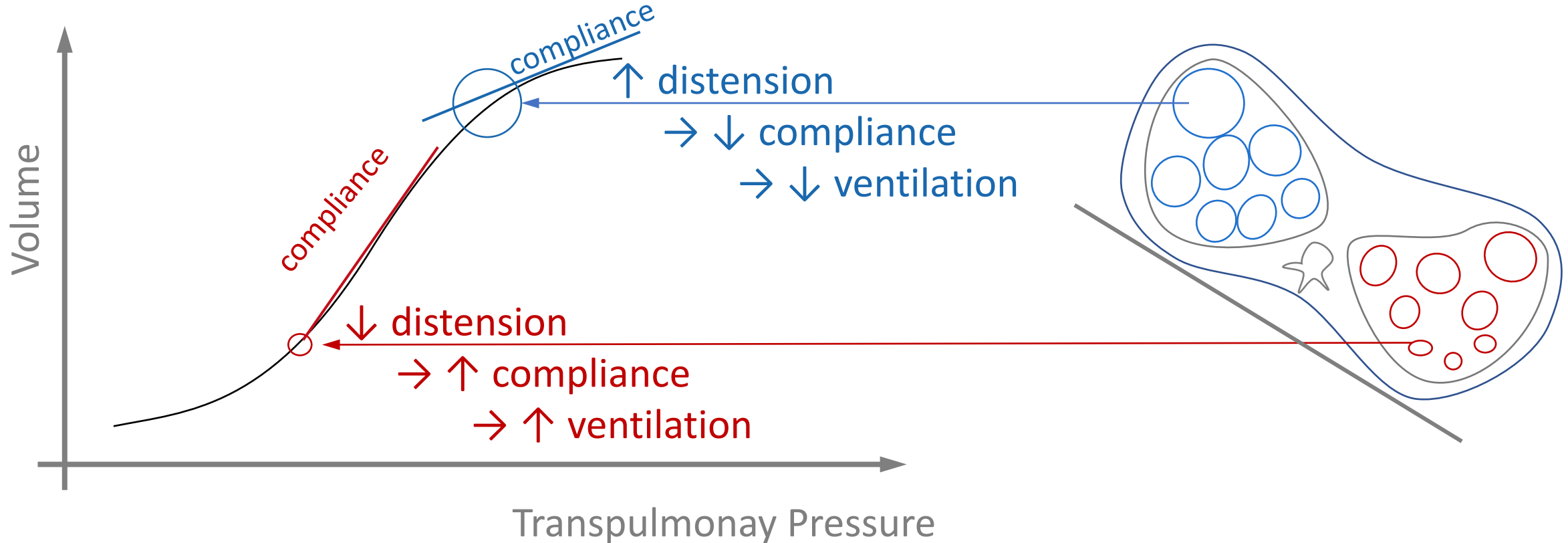
ARDS lung density ~0.7



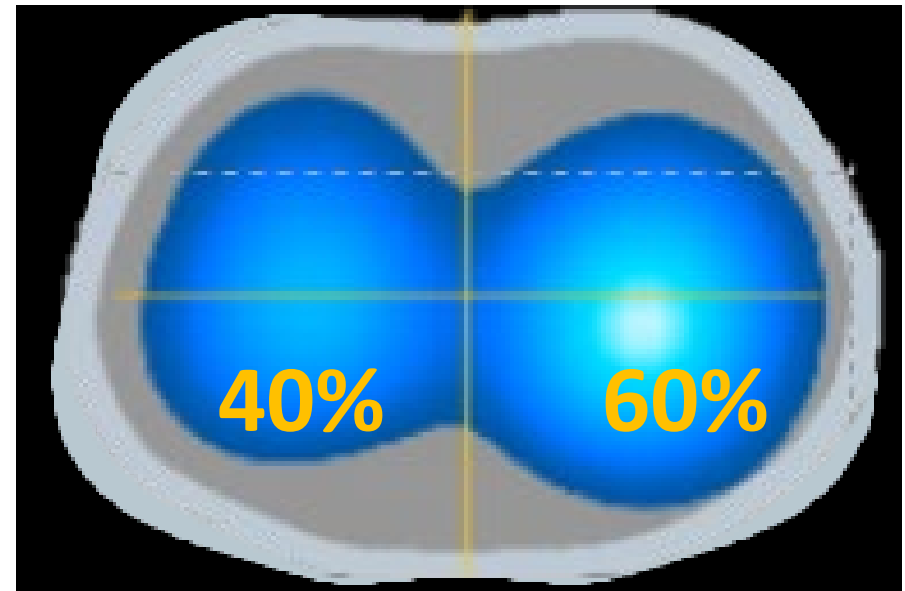
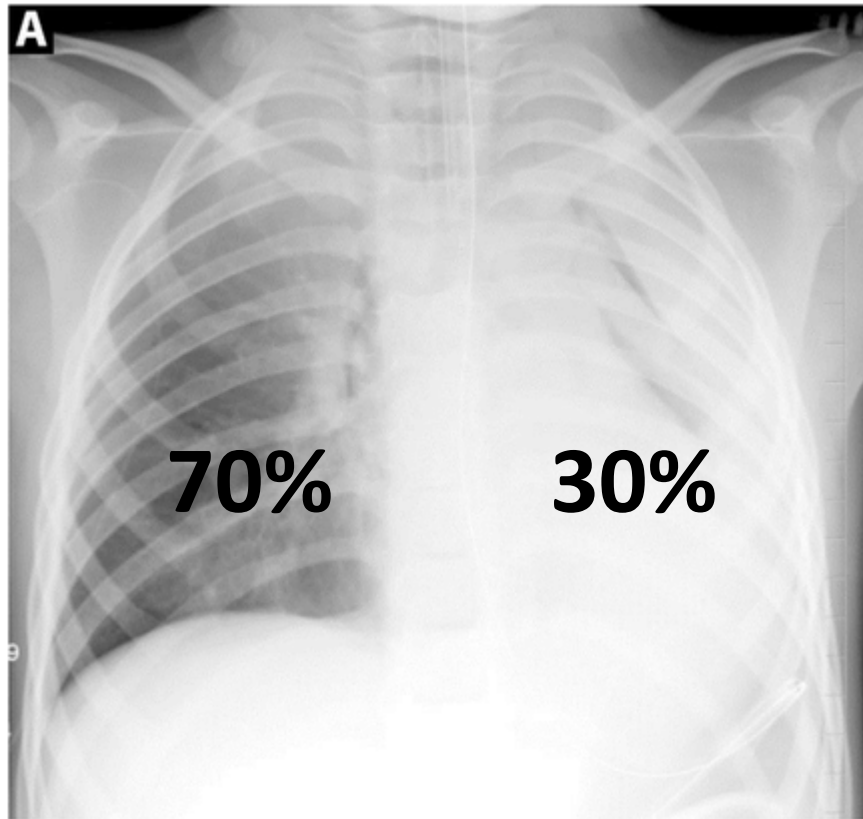
Normal Lung density ~ 0.2

ARDS lung density ~ 0.7

Tilt Physiology – Effect on Ventilation



Assessment: Ventilation (VT) vs Aeration (FRC)

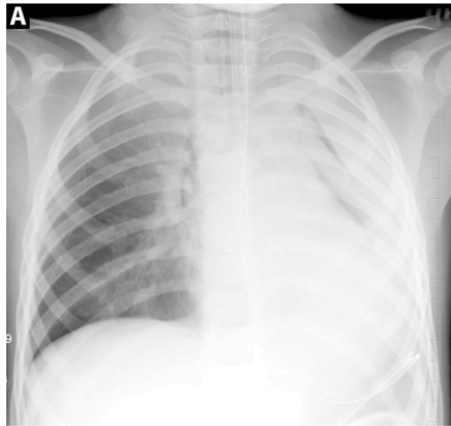


Clinical Implications

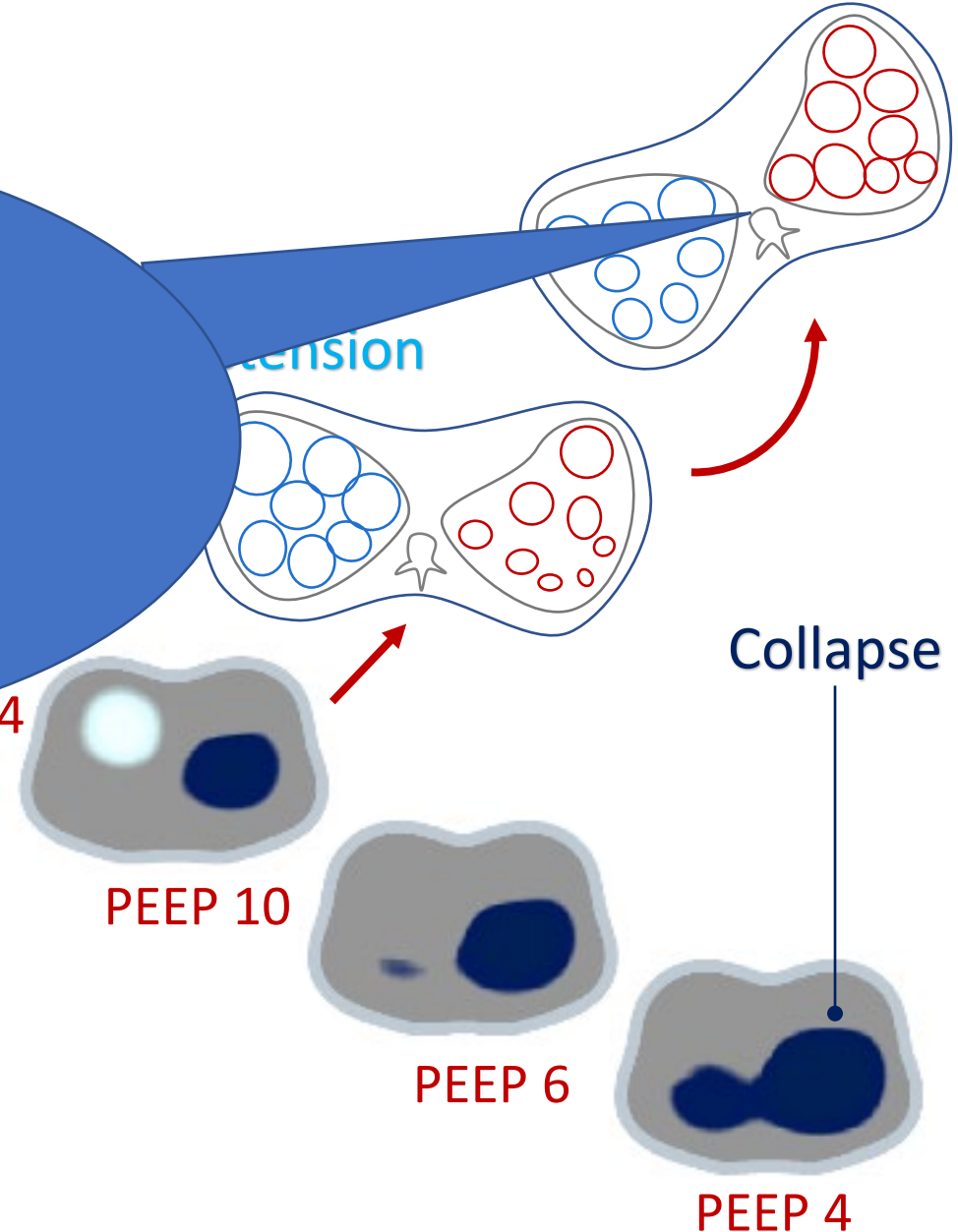
How to Open **ONE** Lung?

Asymmetrical Lung Injury

Assymetrical Lung

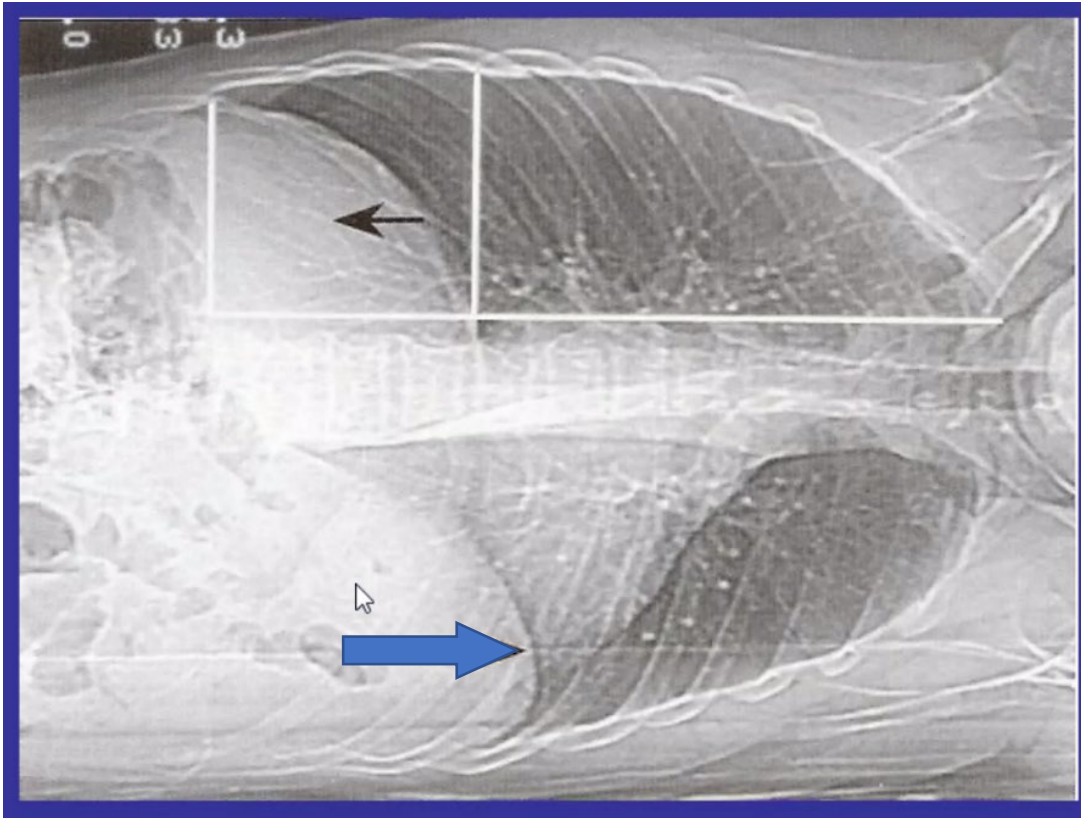


TILT ACTS AS
**TARGETED
OPENING**



- Incidence of Asymmetry
(R/L or L/R > 65%:35% by EIT)**
- ~50% of 30 early C-19 patients
 - 15% of 43 mixed C-19 patients

Other Mechanisms: Not only P_L



- Diaphragm
- Chest Wall Stiffness

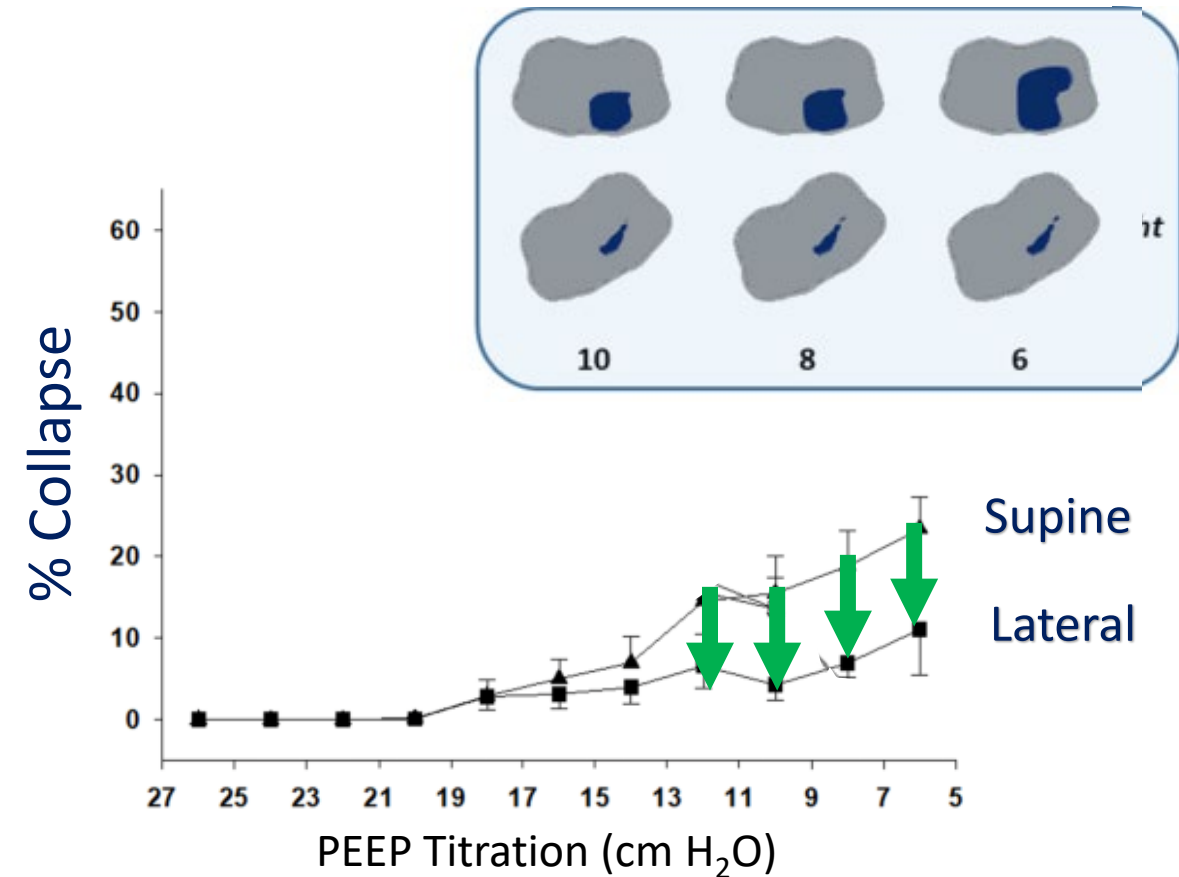
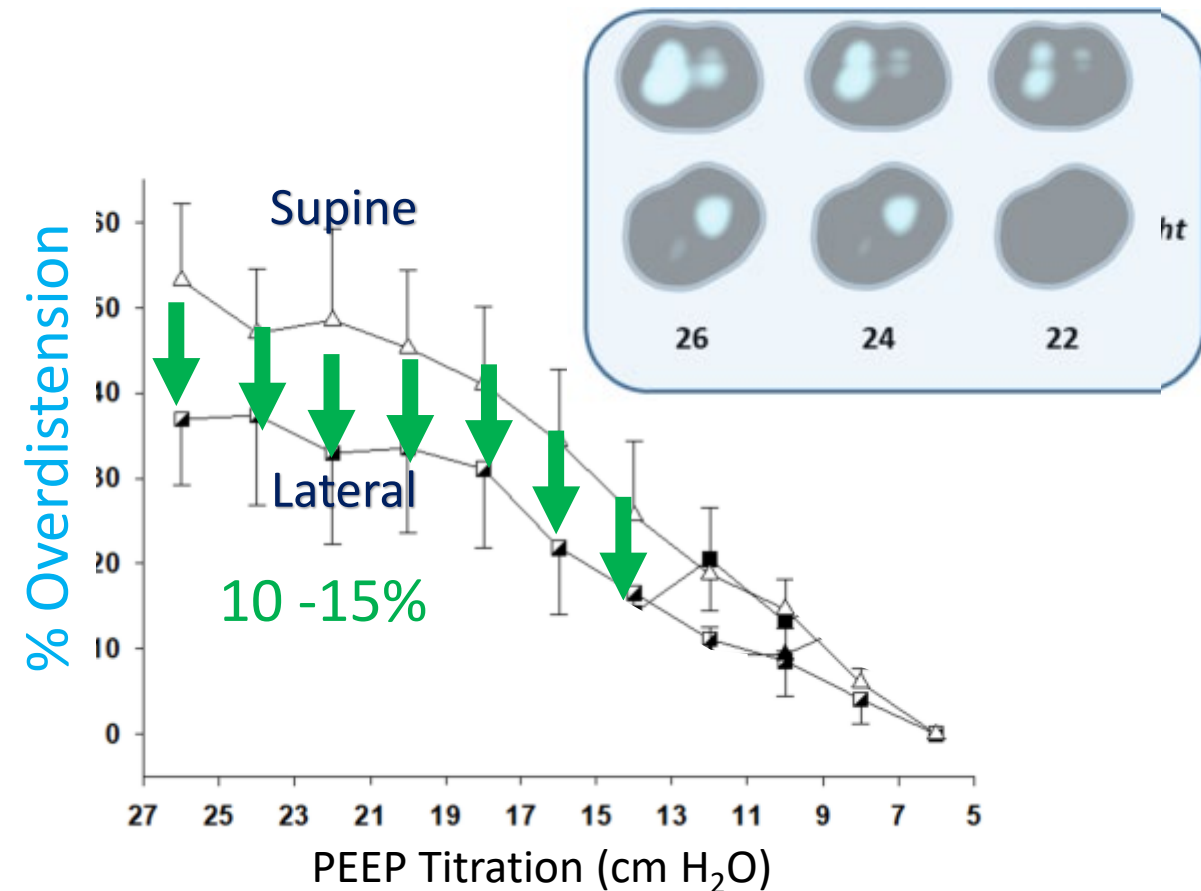
Targeted lateral positioning decreases lung collapse and overdistension in COVID-19-associated ARDS

Mlcek, Otahal, Borges et al. BMC Pulmonary Medicine, 2021

↓ Overdistension

&

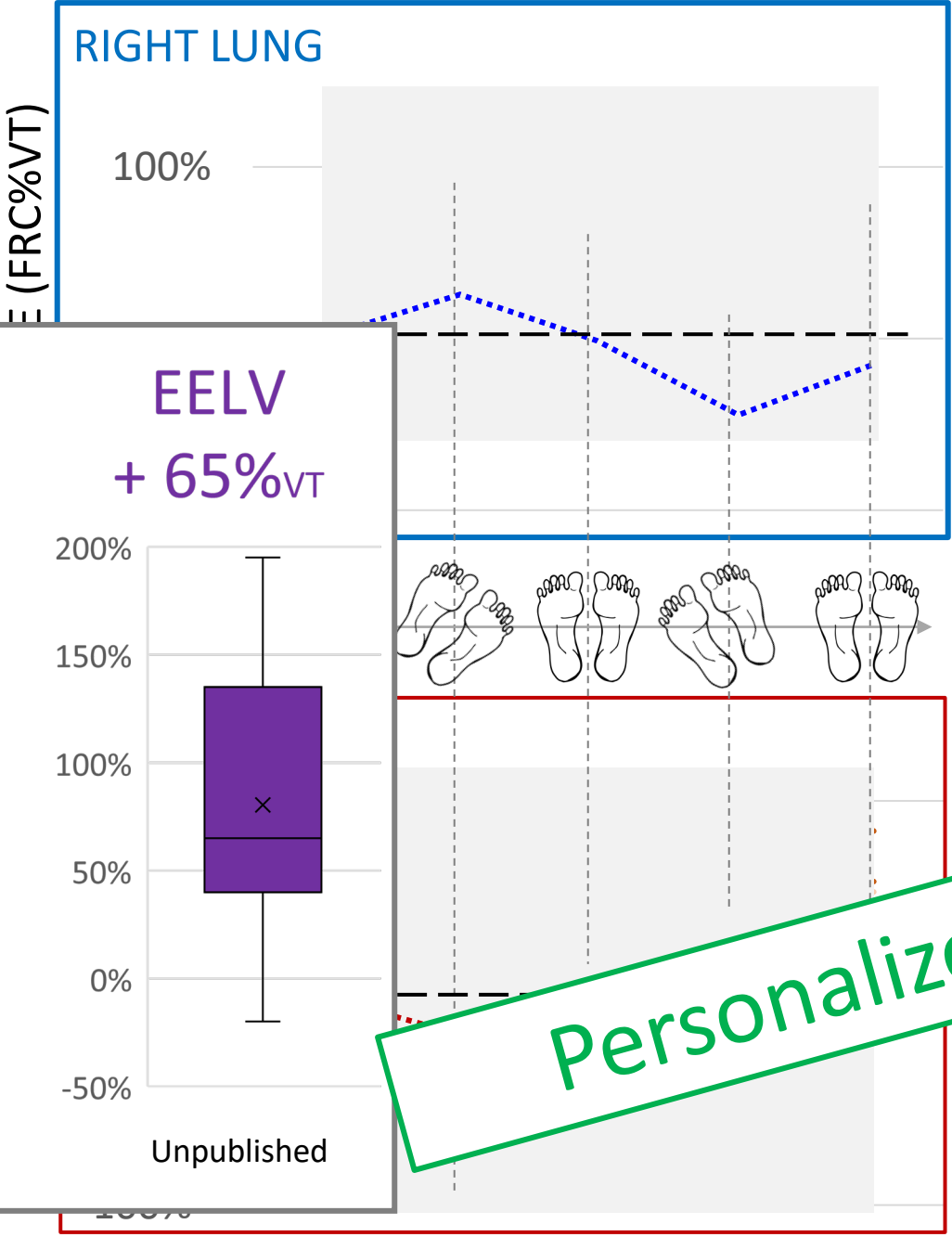
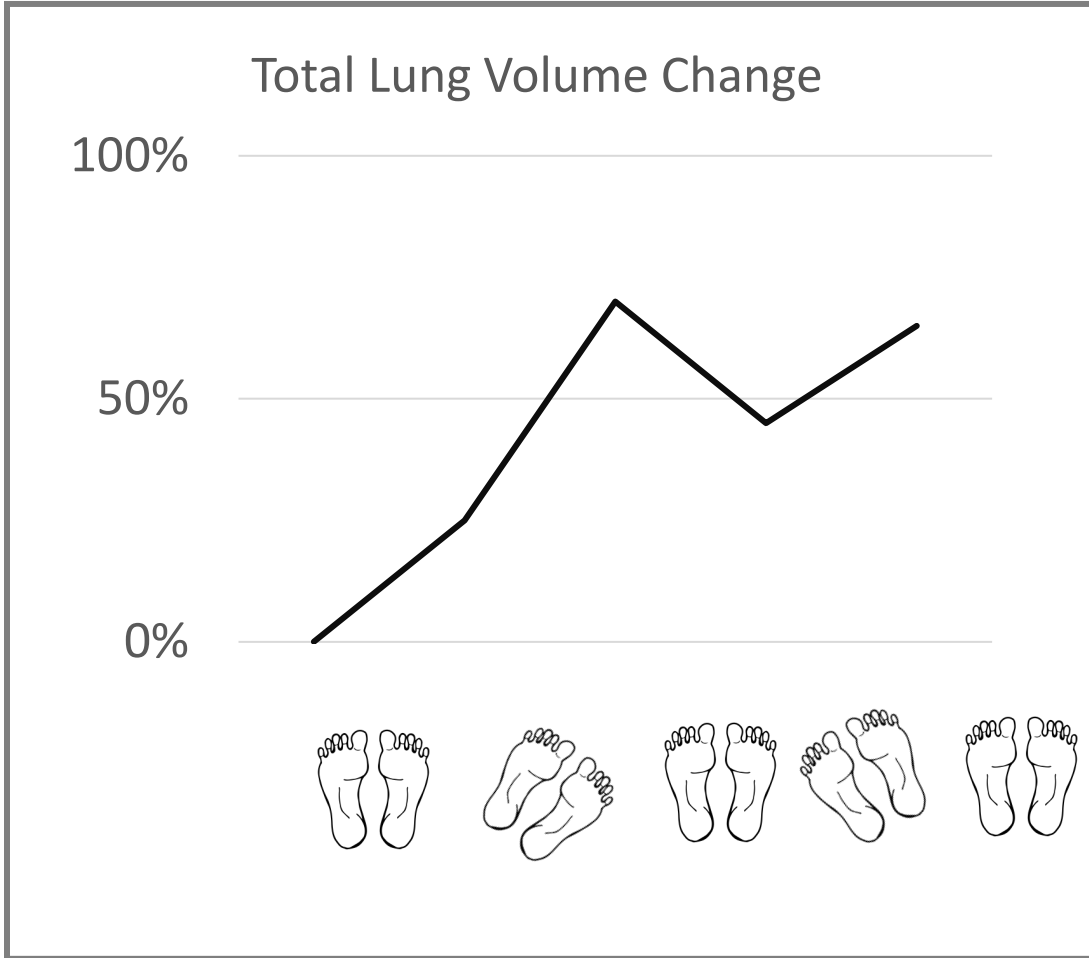
↓ Collapse



How to Open **TWO** Lungs?

Volume Change

Healthy



How LARGE is the effect?

ARDS Data

How LARGE?

- + 1100 ml
- + 700 ml
- + 300 ml

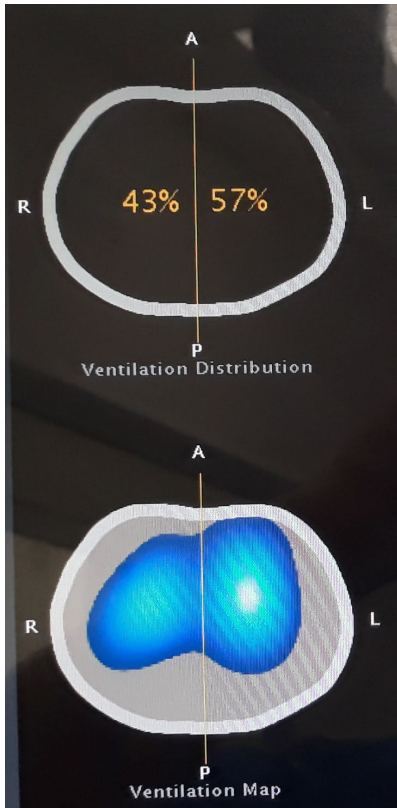
Effect magnitude depends on:

- Vertical distance
- Airway pressure, PEEP
- Lung compliance
- Abdominal compartment
- Lung inhomogeneity
- ...

Personalize ...



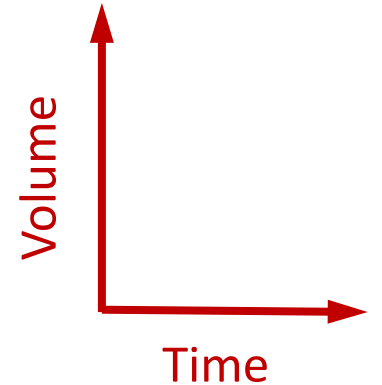
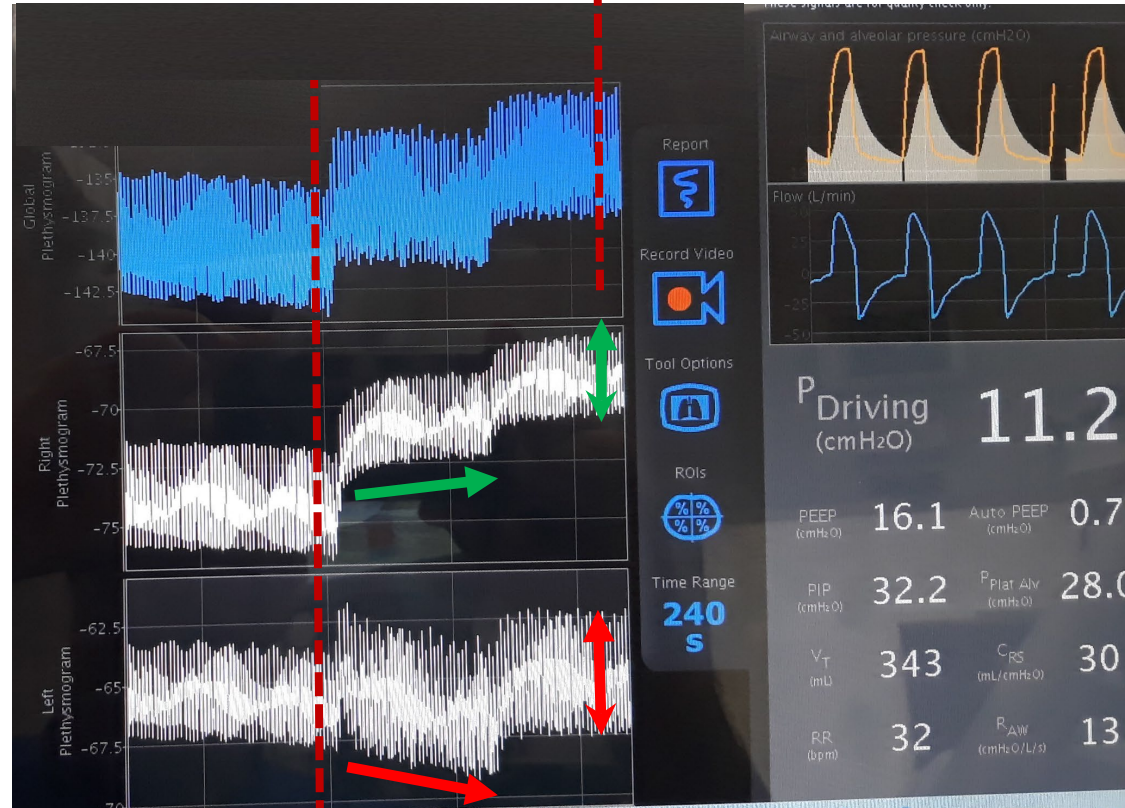
Monitoring the Effect



Tot

RL

LL



PEEP

14

16

TILT



FIRST FACULTY OF MEDICINE
Charles University

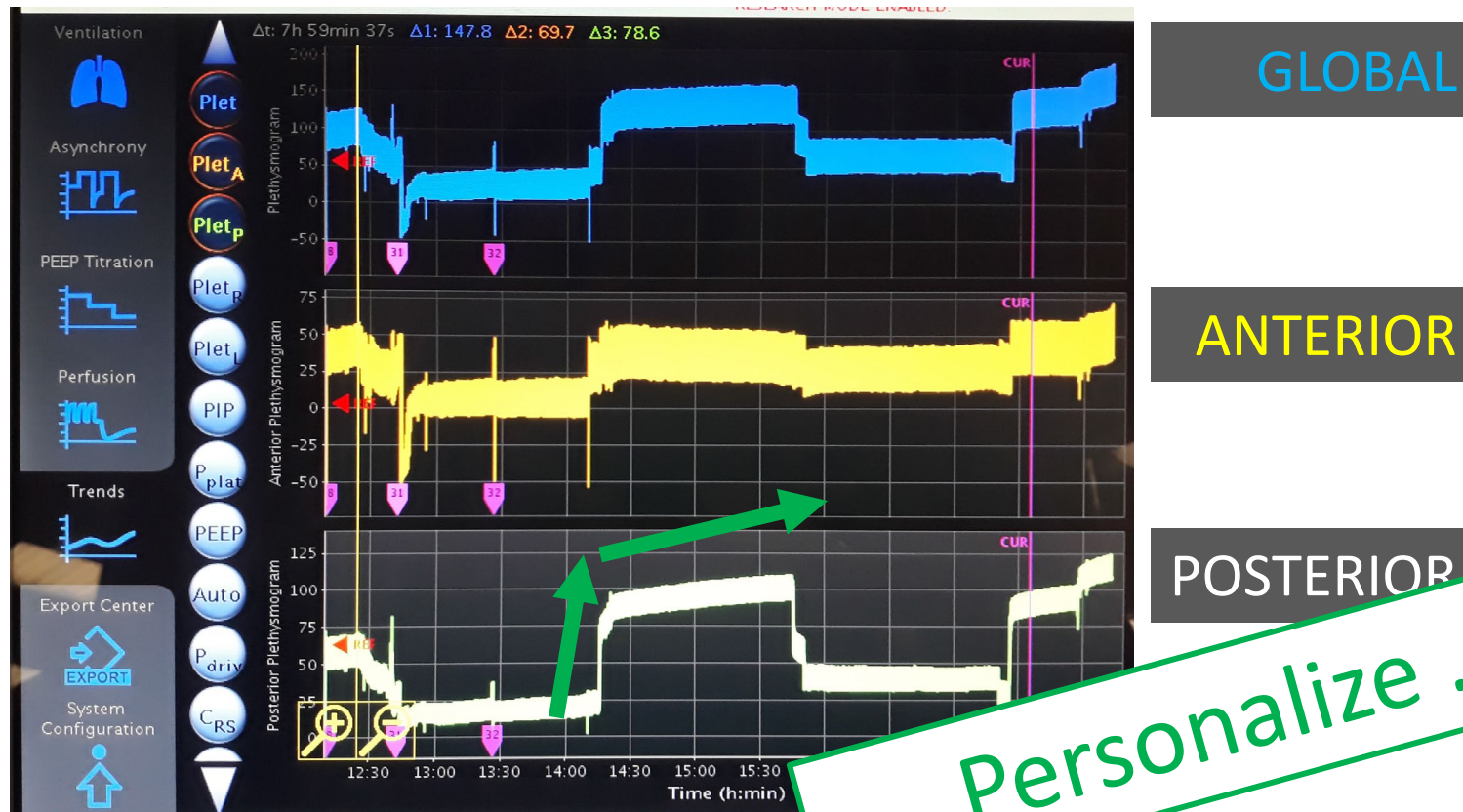


GENERAL UNIVERSITY HOSPITAL IN PRAGUE

How FAST is the effect?

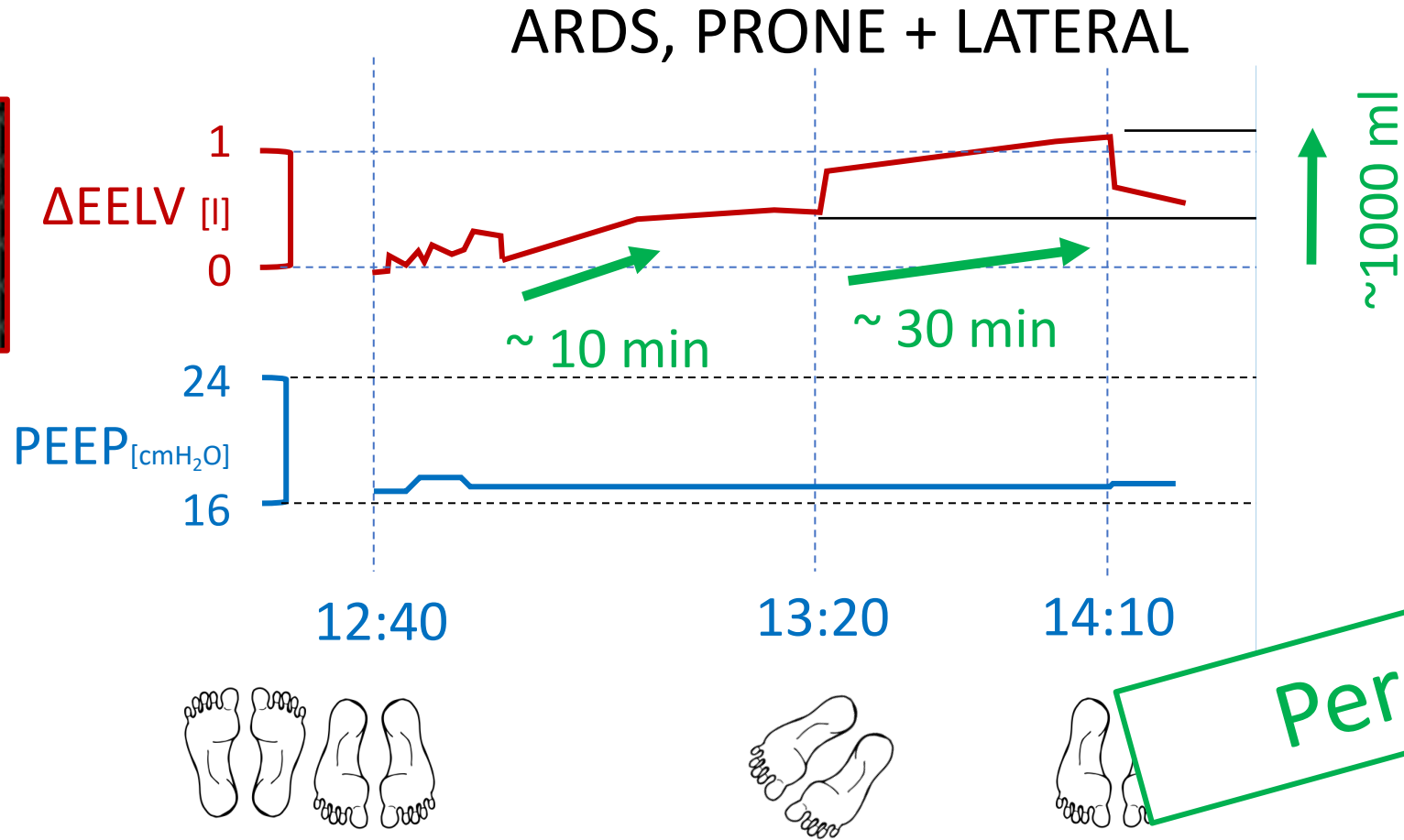
ARDS Data

How FAST?



minutes 1.5 hr...

How FAST, How MUCH?



Personalize ...

Conclusions

- **POSITION MATTERS**

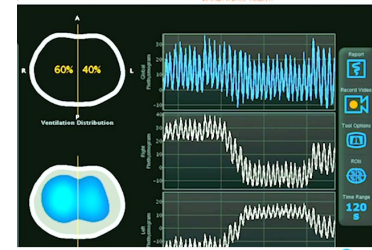
Moving may be significant / useful /adverse

- **TARGETED LATERAL TILT**

CAN REDUCE overdistsension and collapse

- **PERSONALISED APPROACH**

is available **NOW**



Thank You...



FIRST FACULTY
OF MEDICINE
Charles University



GENERAL UNIVERSITY
HOSPITAL IN PRAGUE

Thank You...