KARIM
1.LF UK A VFN V PRAZE

Na POLOZE záleží
ZMĚNA POLOHY LÉČÍ

AKUTNĚ.CZ 2024

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Klinika anesteziologie, resuscitace a intenzivní medicíny
1. lékařská fakulta UK a Všeobecná fakultní nemocnice v Praze
U nemocnice 2, Praha 2

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

1. LÉKAŘSKÁ FAKULTA Univerzita Karlova

POLOHOVÁNÍ
NA POLOZE záleží

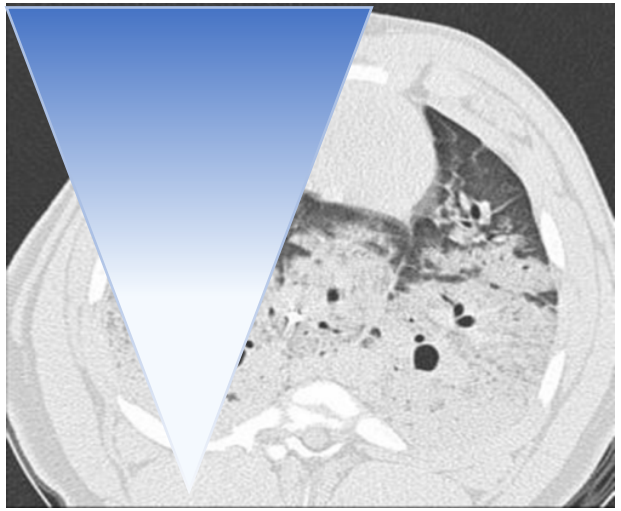
PROČ je polohování důležité???

Protože GRAVITACE!!!

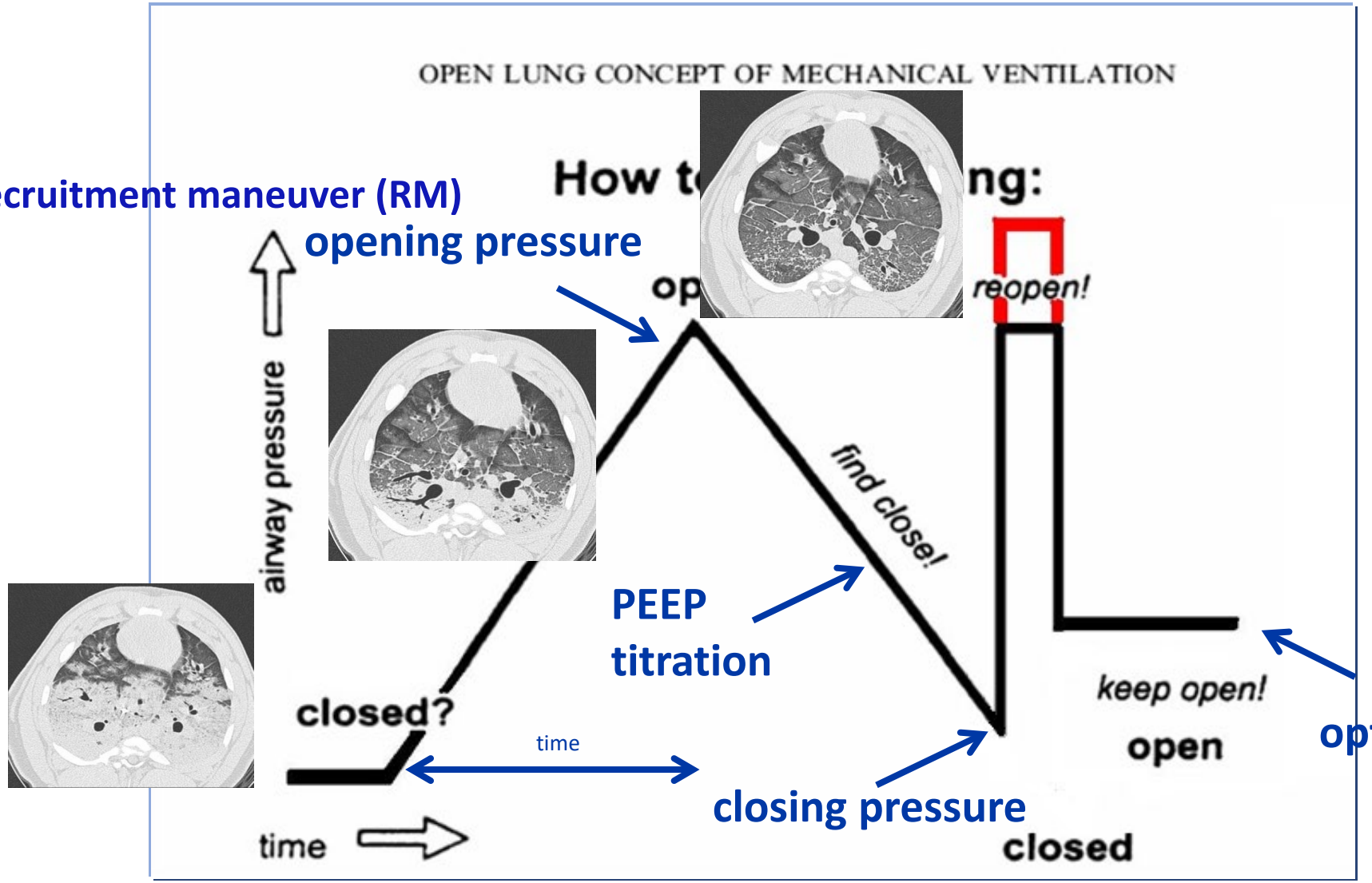
SUCHÁ

GRAVITACE

MOKRÁ

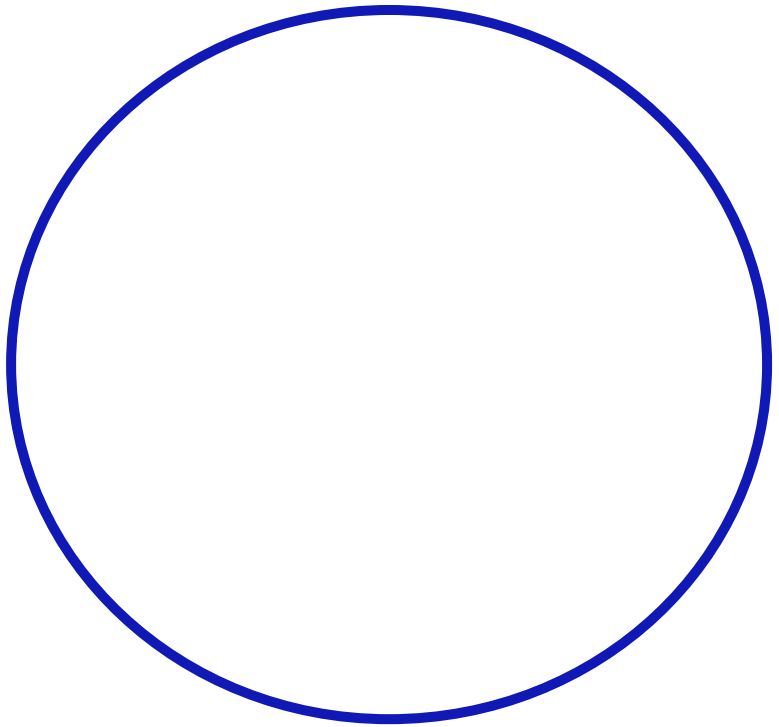


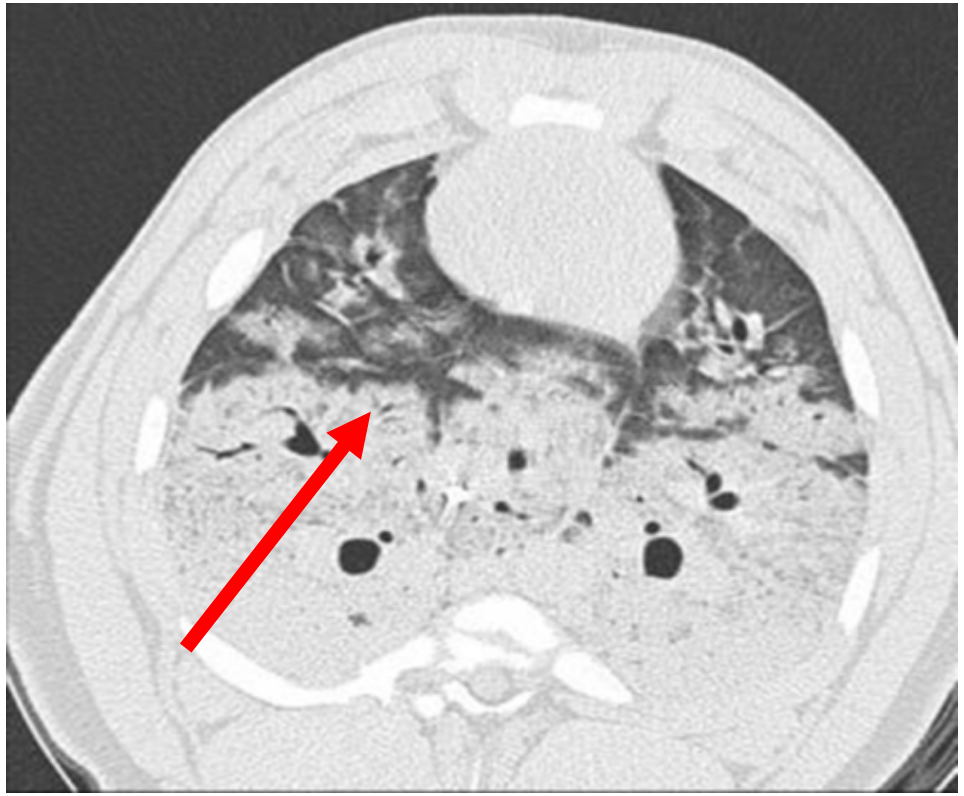
Open up the lung and keep the lung open



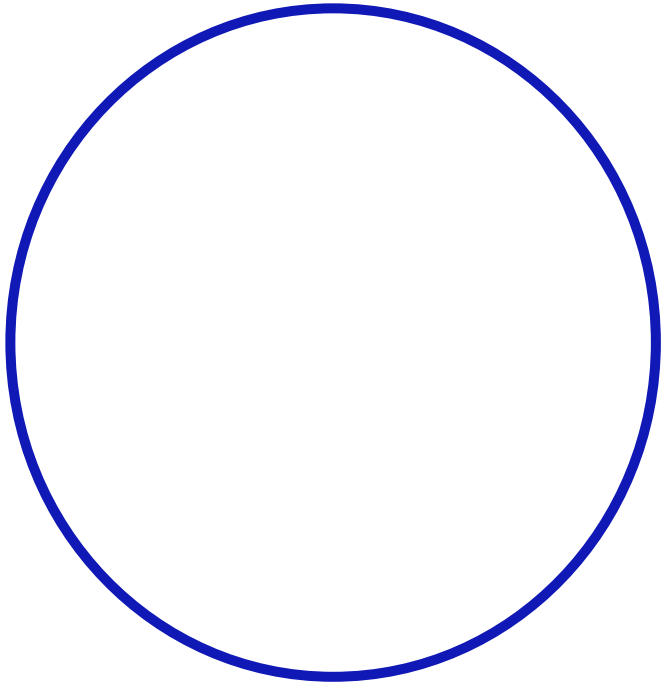
Lachmann B, ICM, 1992

PEEP optimalizace

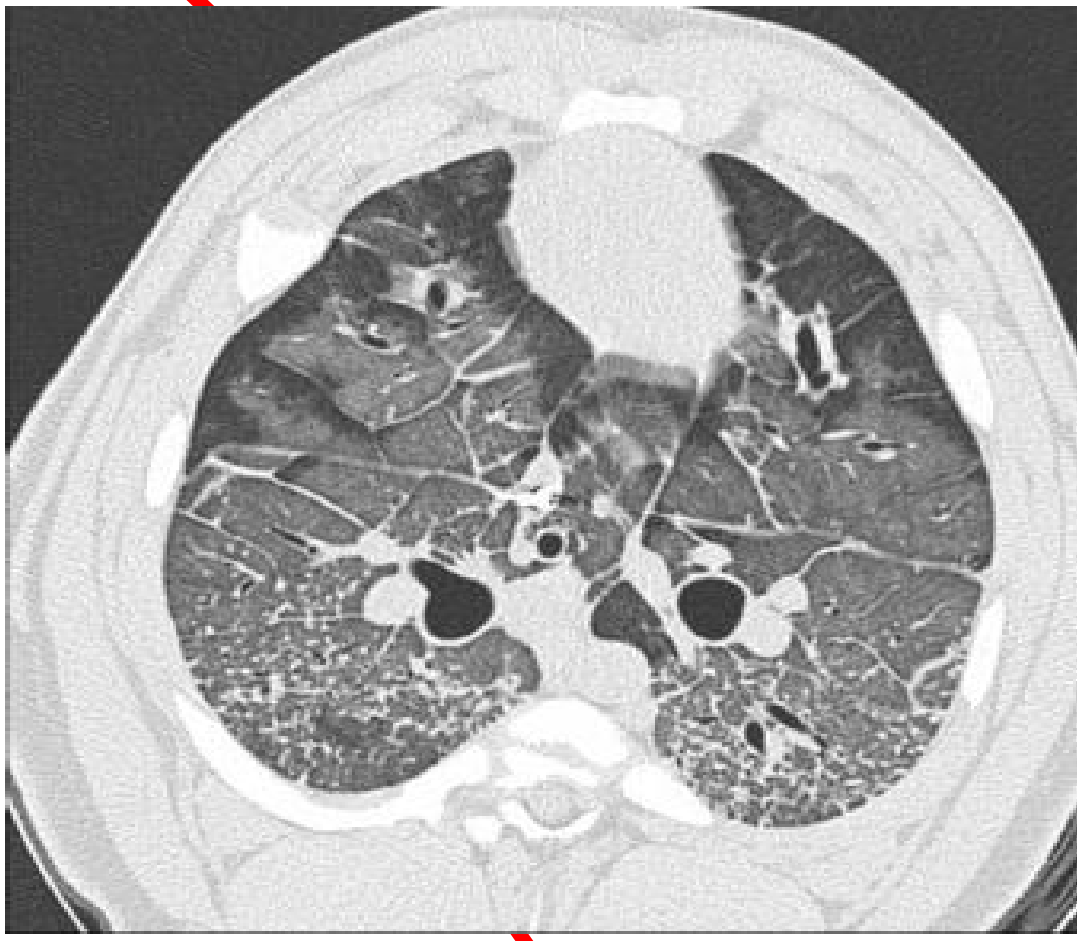




RM v PRONACI !?!



hyperdistension = volumotrauma

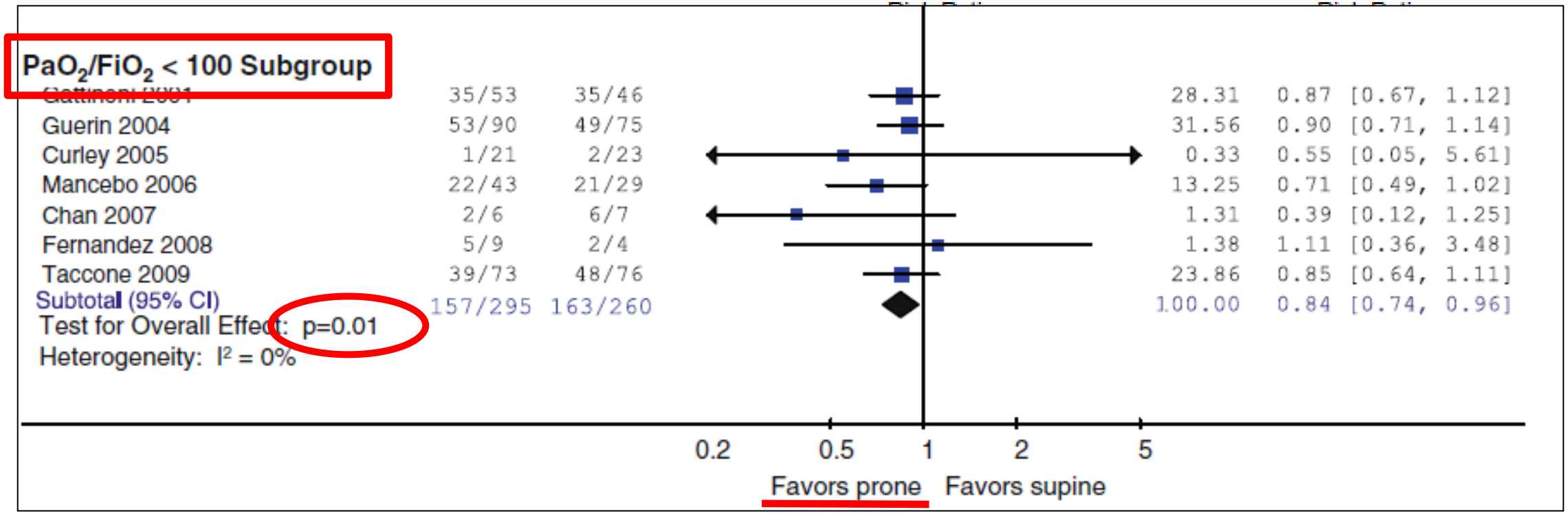


reareation

homogenization

Efekt PRONACE na mortaltitu ARDS

Prone ventilation reduces mortality in patients with acute respiratory failure and severe hypoxemia: systematic review and meta-analysis



Sud, ICM, 2010

PRONACE … PROSEVA trial

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Prone Positioning in Severe Acute Respiratory Distress Syndrome

The NEW ENGLAND JOURNAL of MEDICINE

Claude Guérin, M.D., Ph.D., Jean Reignier, M.D., Ph.D., Jean-Christophe Richard, M.D., Ph.D.,

- **multicenter, prospective, randomized, controlled trial**
- **26 ICUs in France and 1 in Spain, all of which have used prone positioning in daily practice for more than 5 years**
- **237 pts. PRONE / 229 pts. supine group,**
- **Sever ARDS paO2/FiO2 < 150, FiO2 > 0.6**
- **Vt 6ml/kg, Ppeak < 30 cmH2O, pH 7.20 - 7.45**

PEEP (cm H_2O)	5	5	8	8	10	10	10	12	14	14	14	16	18	18-24
F_iO_2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0

- stopping prone: improvement in oxygenation
  (Pao2:Fio2 ≥150, with a PEEP of ≤10 cm of water and an Fio2 of ≤0.6)

Guerin, NEJM, 2013

PRONACE … PROSEVA trial

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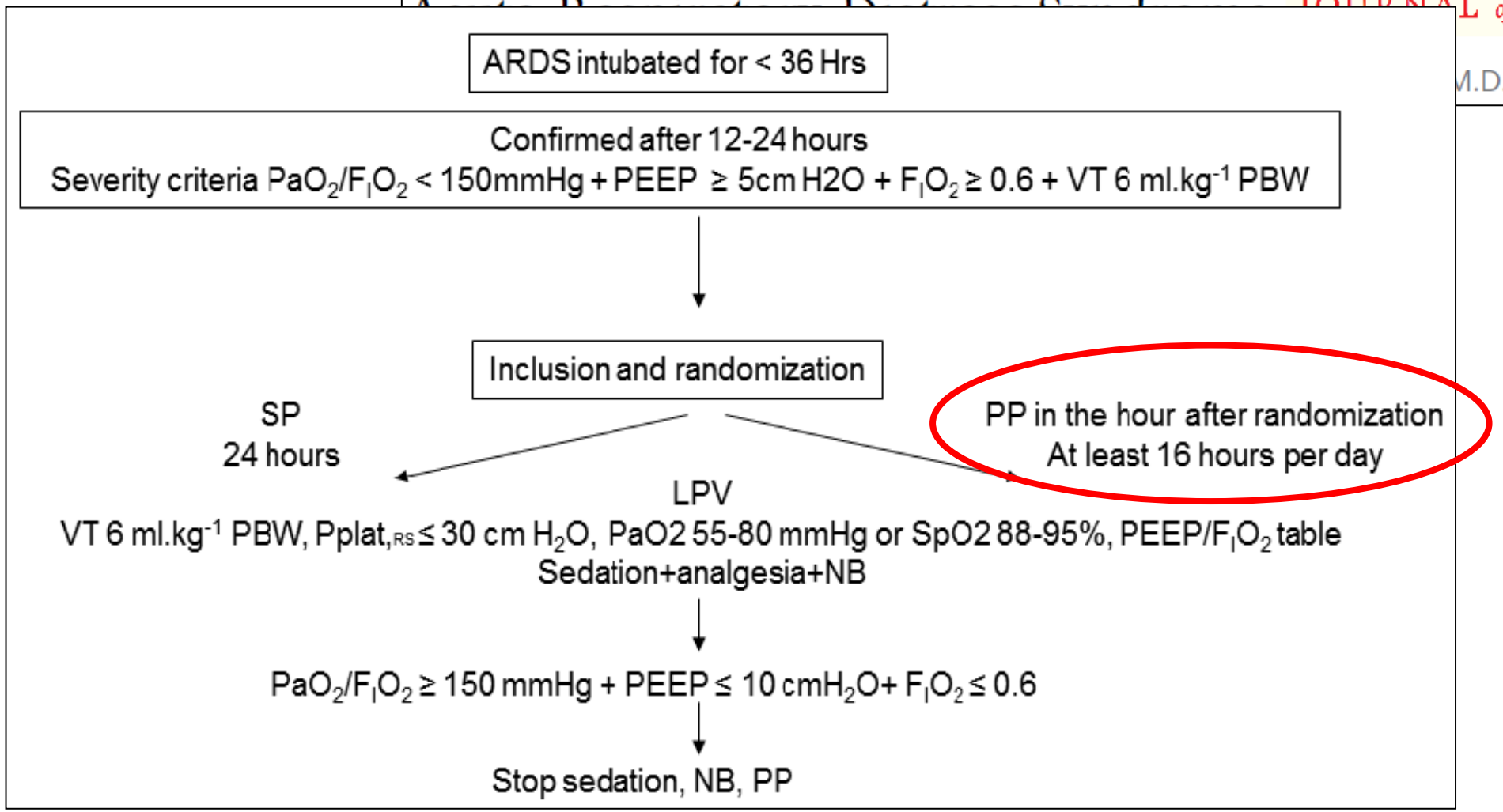
Prone Positioning in Severe

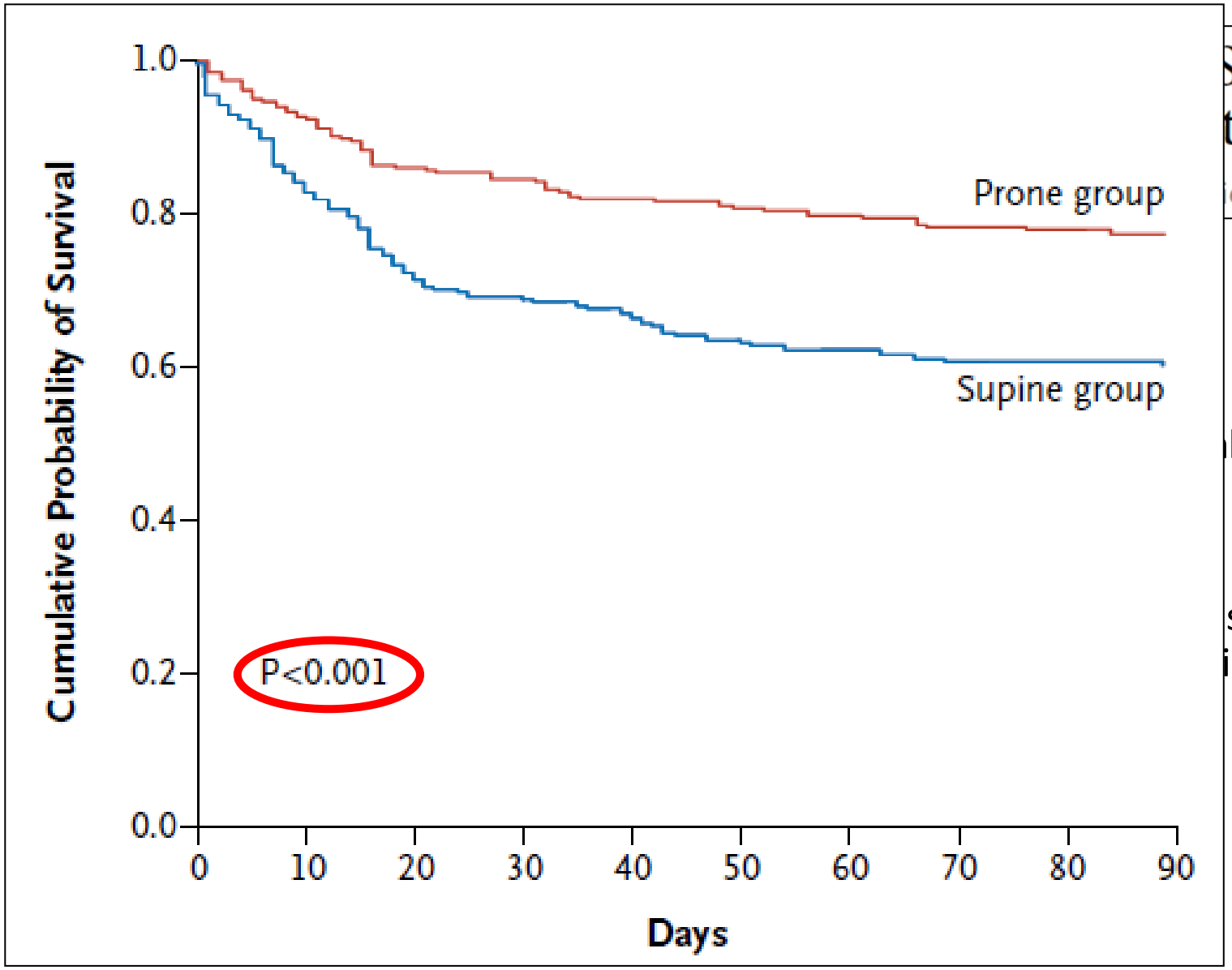
The NEW ENGLAND JOURNAL of MEDICINE

M.D., Ph.D.,



Guerin, NEJM, 2013

PRONACE … PROSEVA trial



Severe
tress Syndrome

The NEW ENGLAND JOURNAL of MEDICINE

er, M.D., Ph.D., Jean-Christophe Richard, M.D., Ph.D.,

P 16.0% vs. S 32.8% (P<0.001)

lity **P 23.6% v.s. S 41.0% (P<0.001)**

s did not differ significantly between the
idence of cardiac arrests, which was higher in

Guerin, NEJM, 2013

Efekt SEMI-PRONE 135° / lateral 90°

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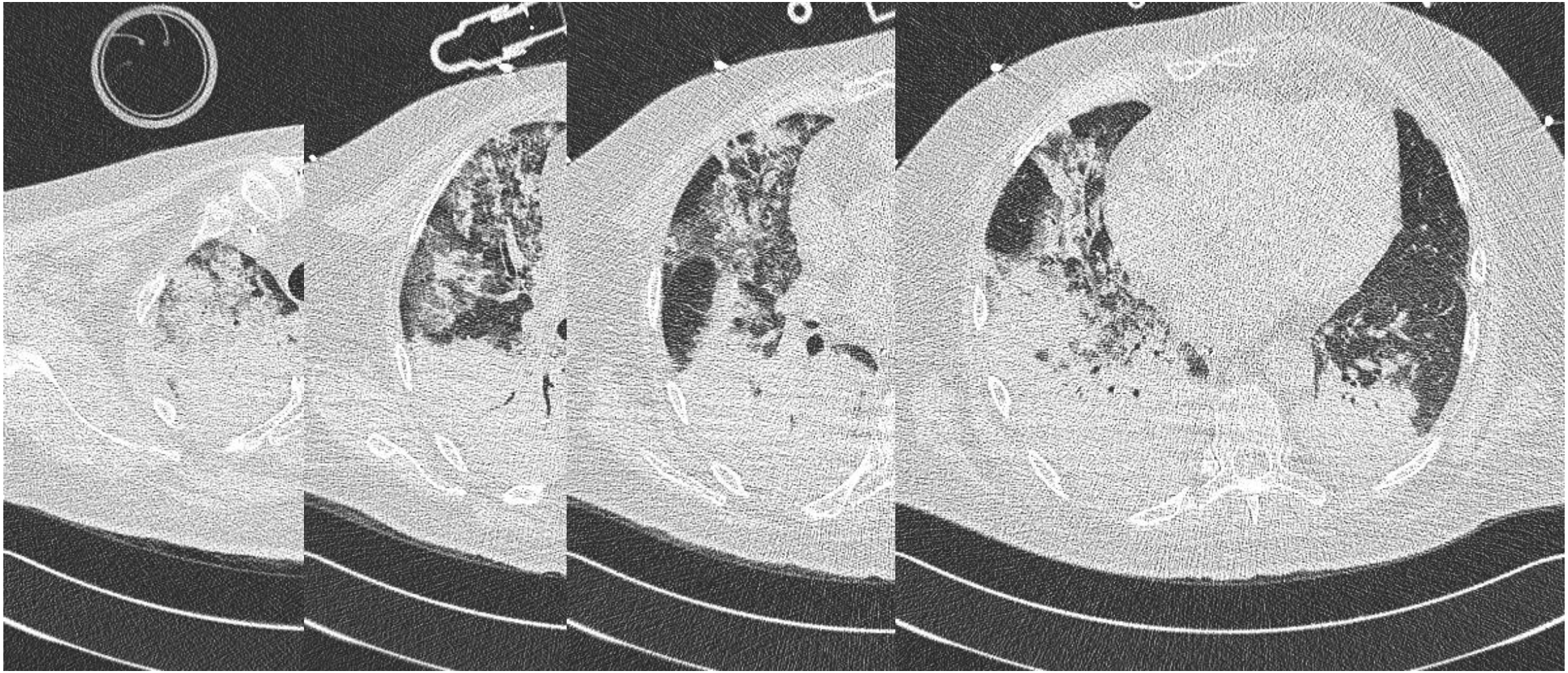
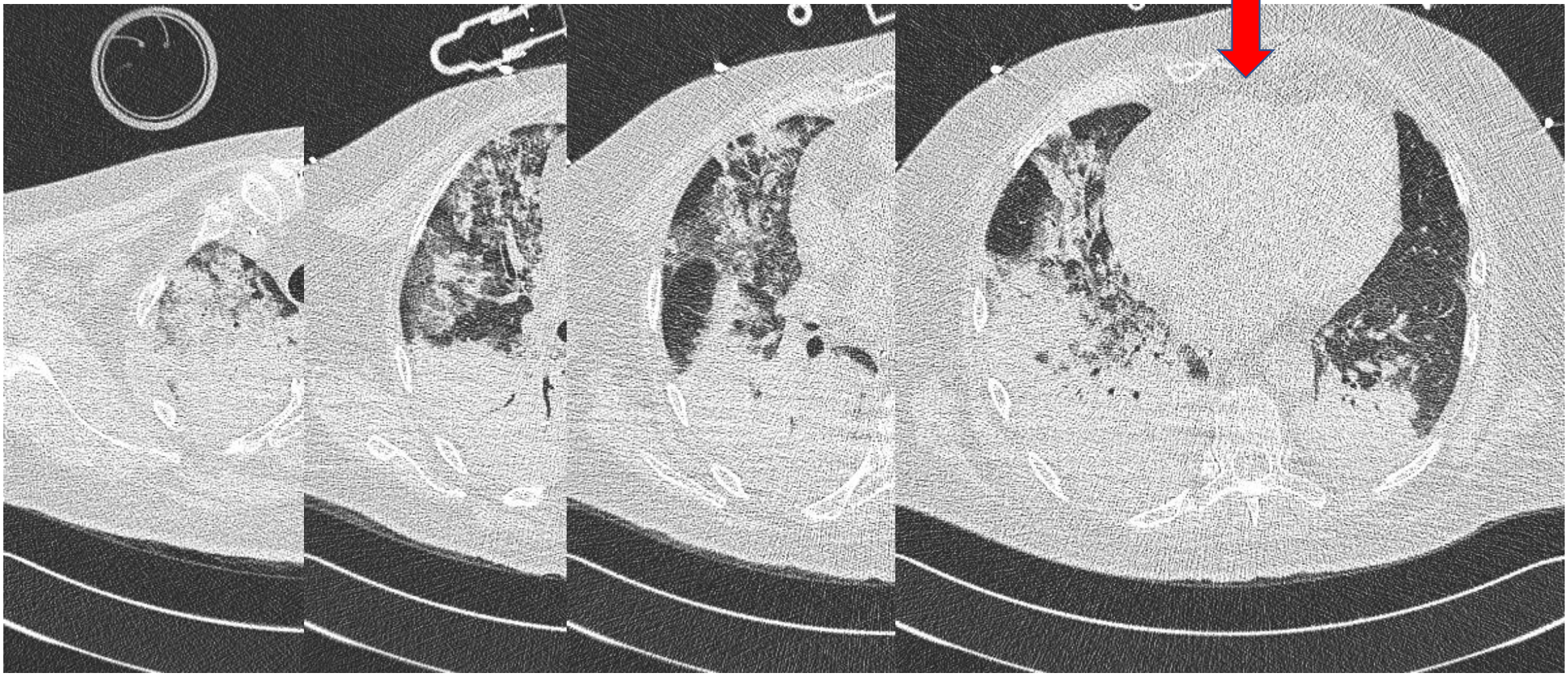
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



Efekt SEMI-PRONE 135° / lateral 90°

KARIM
1.LF UK A VFN V PRAZE

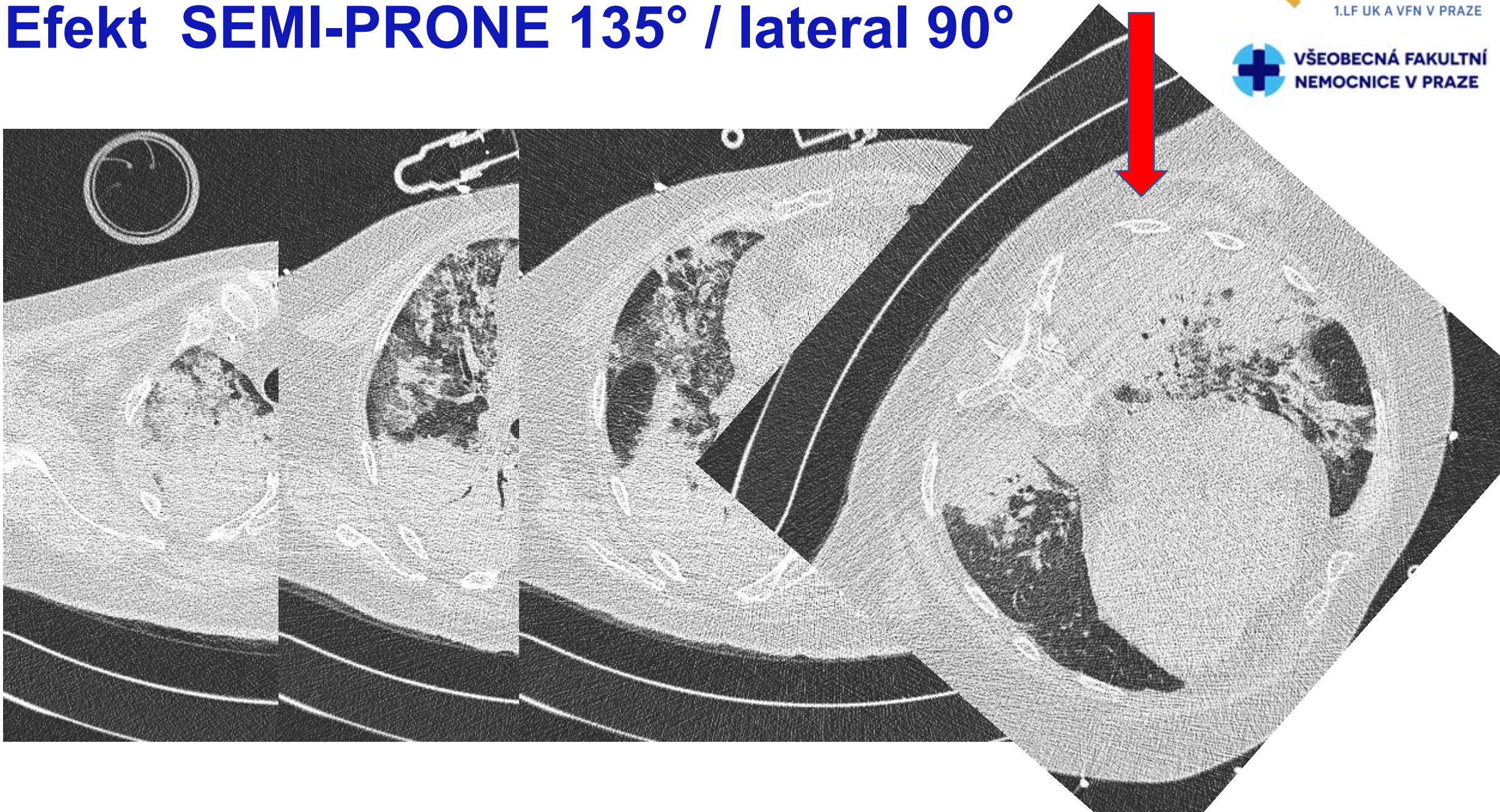
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



Efekt SEMI-PRONE 135° / lateral 90°

KARIM
1.LF UK A VFN V PRAZE

VŠEOBECNÁ FAKULTNÍ
NEMOCNICE V PRAZE



Efekt SEMI-PRONE 135° / lateral 90°

na luzku

za 48 hodin

Optimalizace UPV pomocí CÍLENÉHO POLOHOVÁNÍ

EIT monitorace

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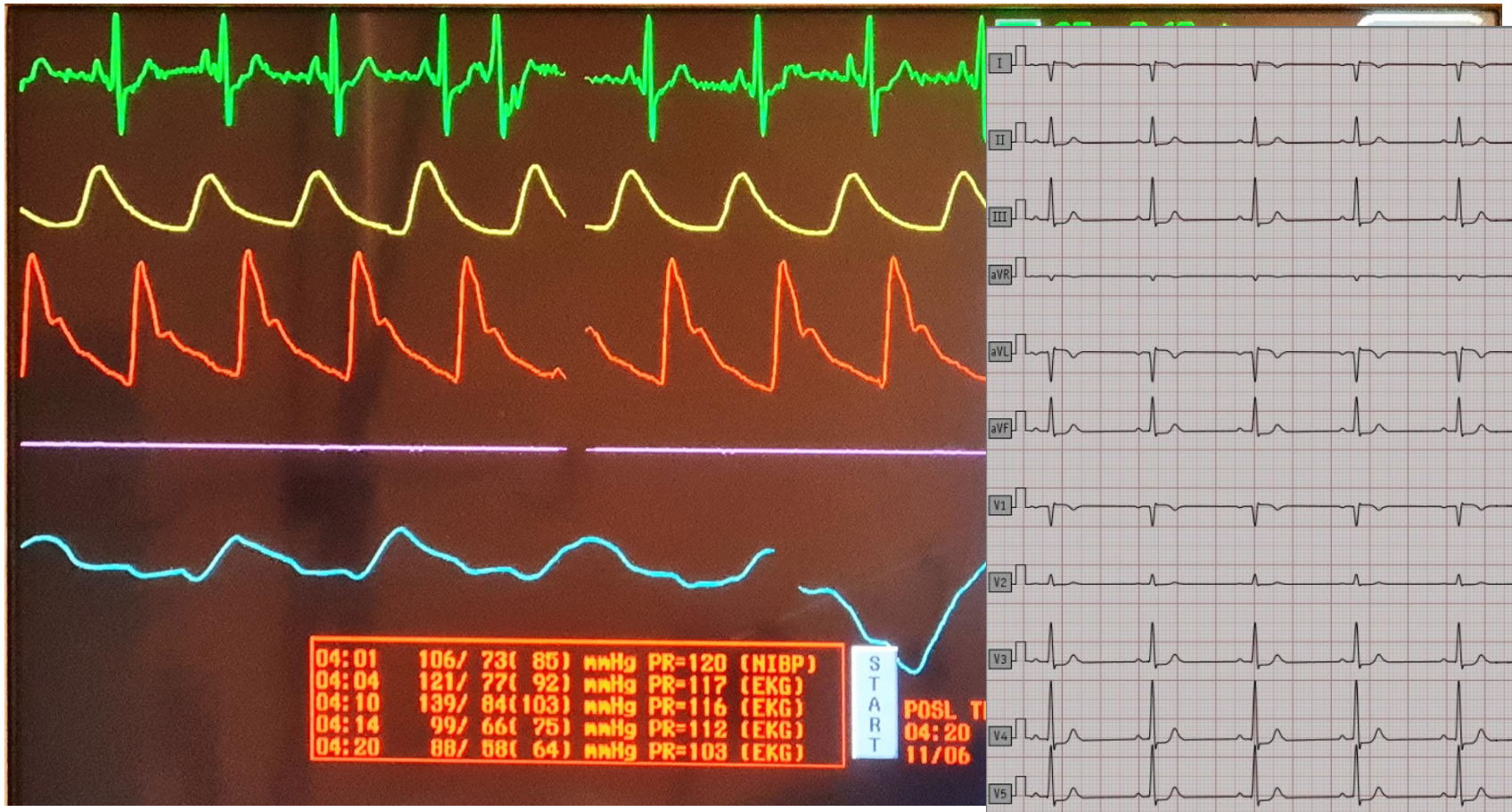
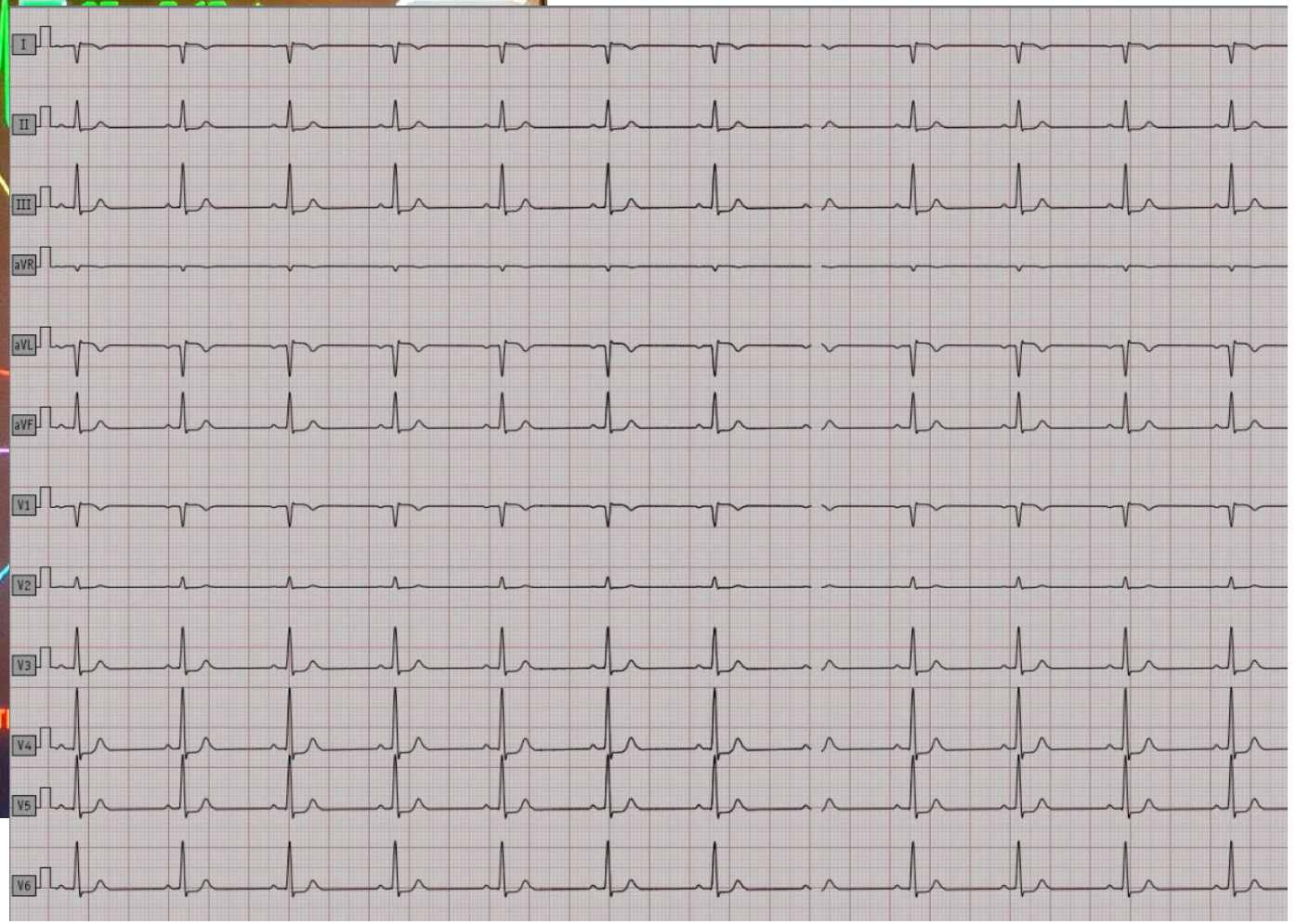
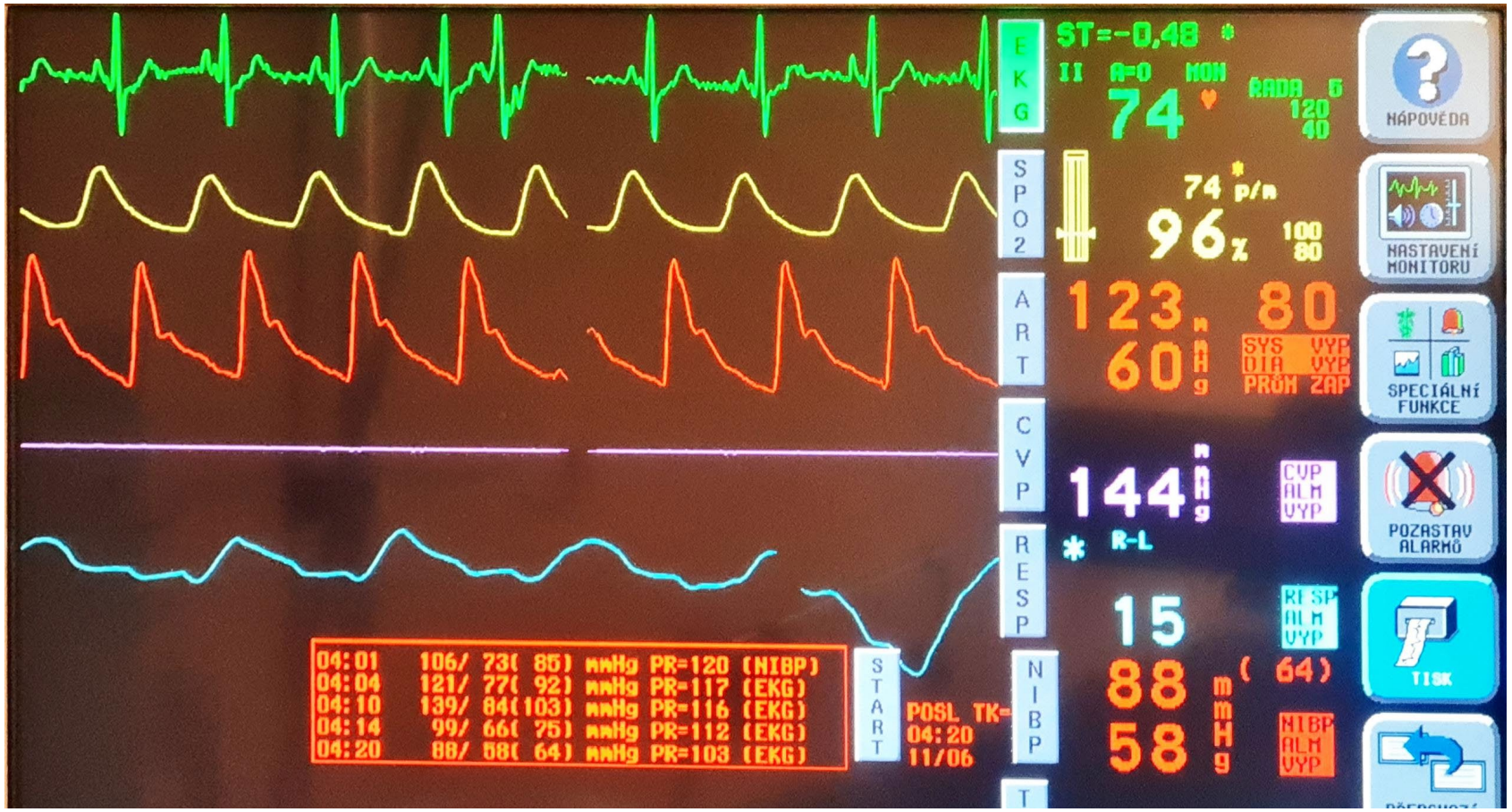
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

Potřebujeme EIT???

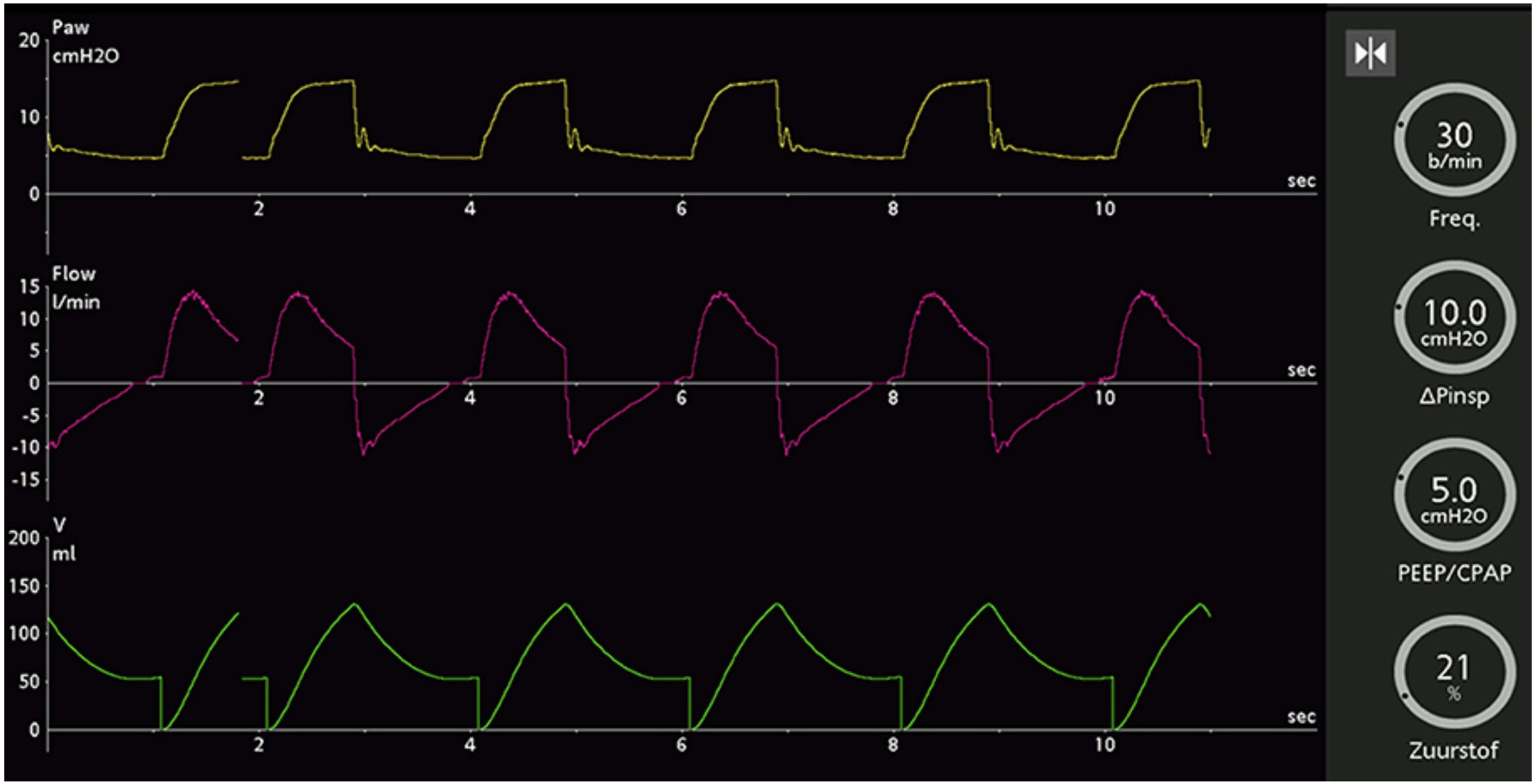




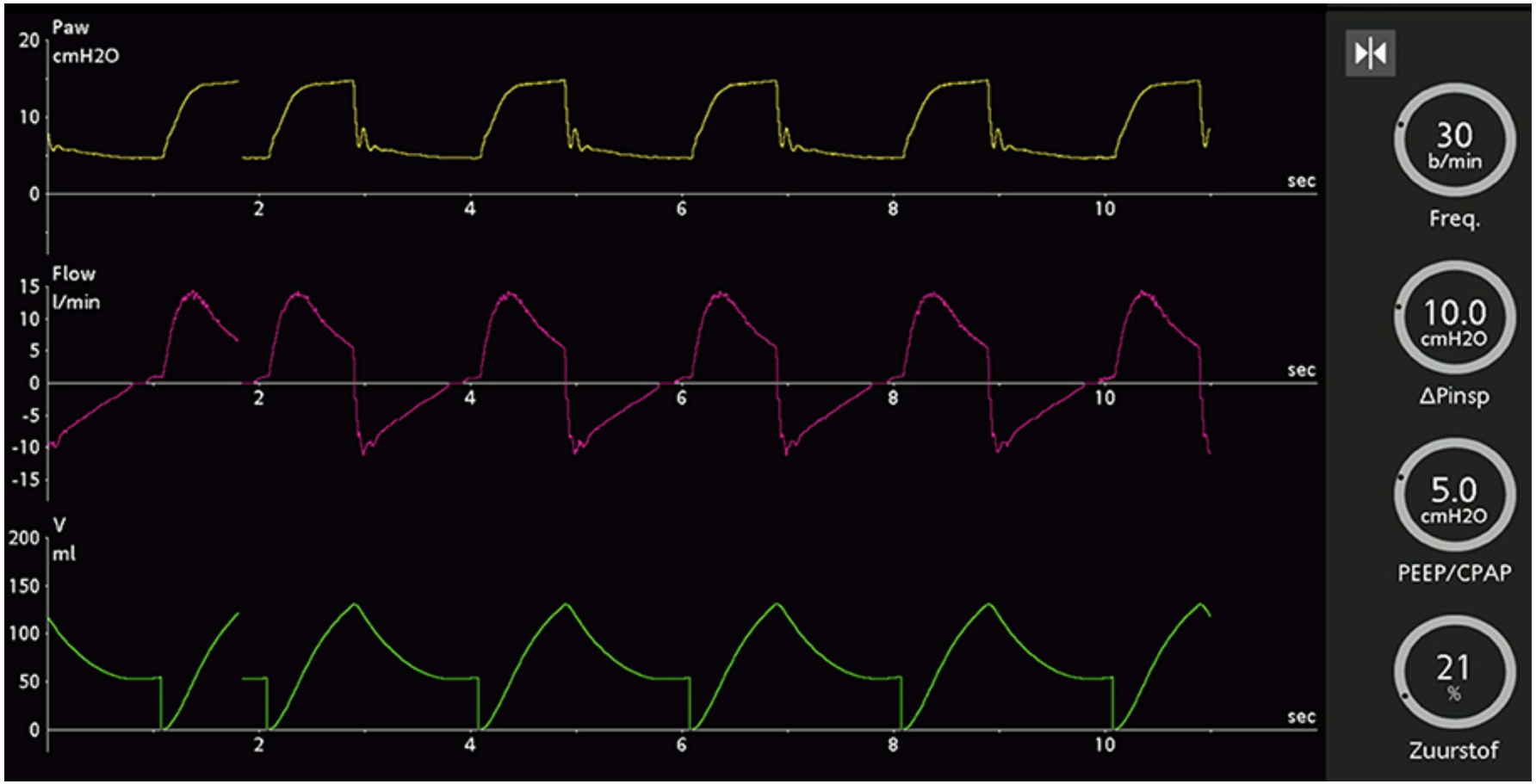
Potřebujeme EIT???



Potřebujeme EIT???



Potřebujeme EIT???



Electrical Impedance Tomography

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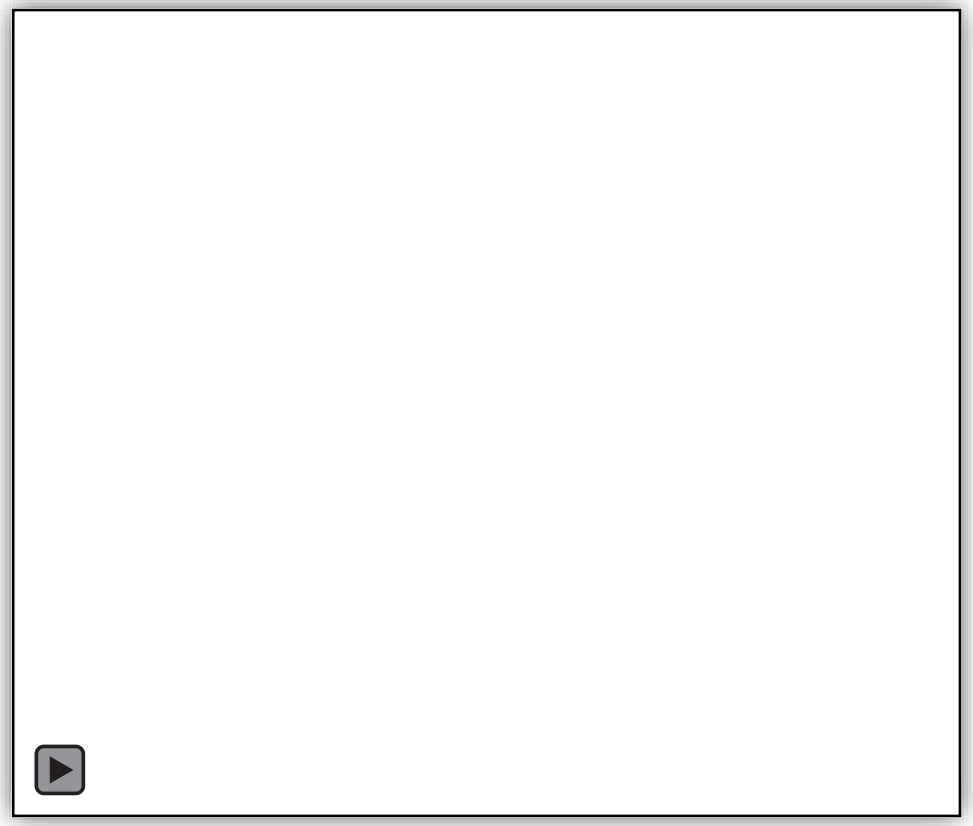
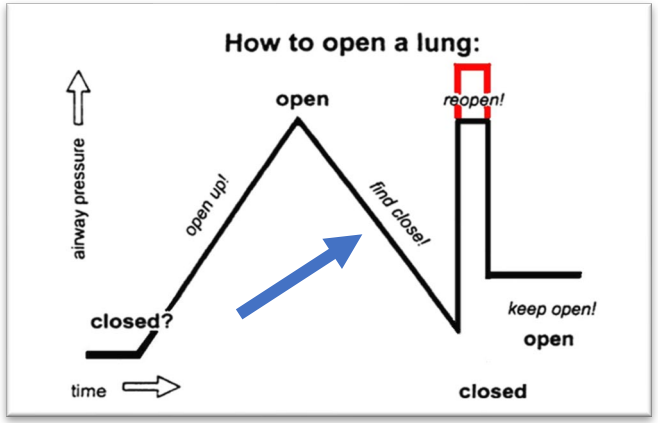
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

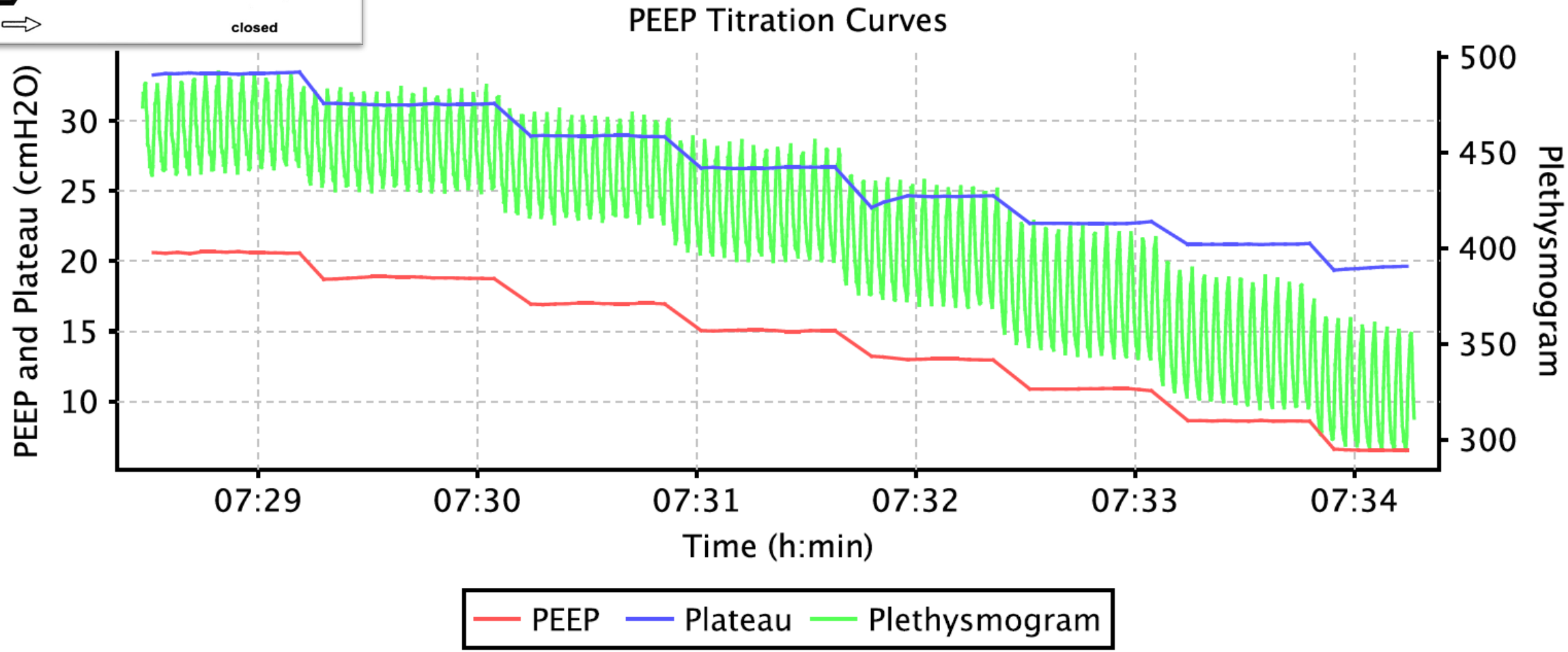
CT image – estatic, anatomical, radiation, transport



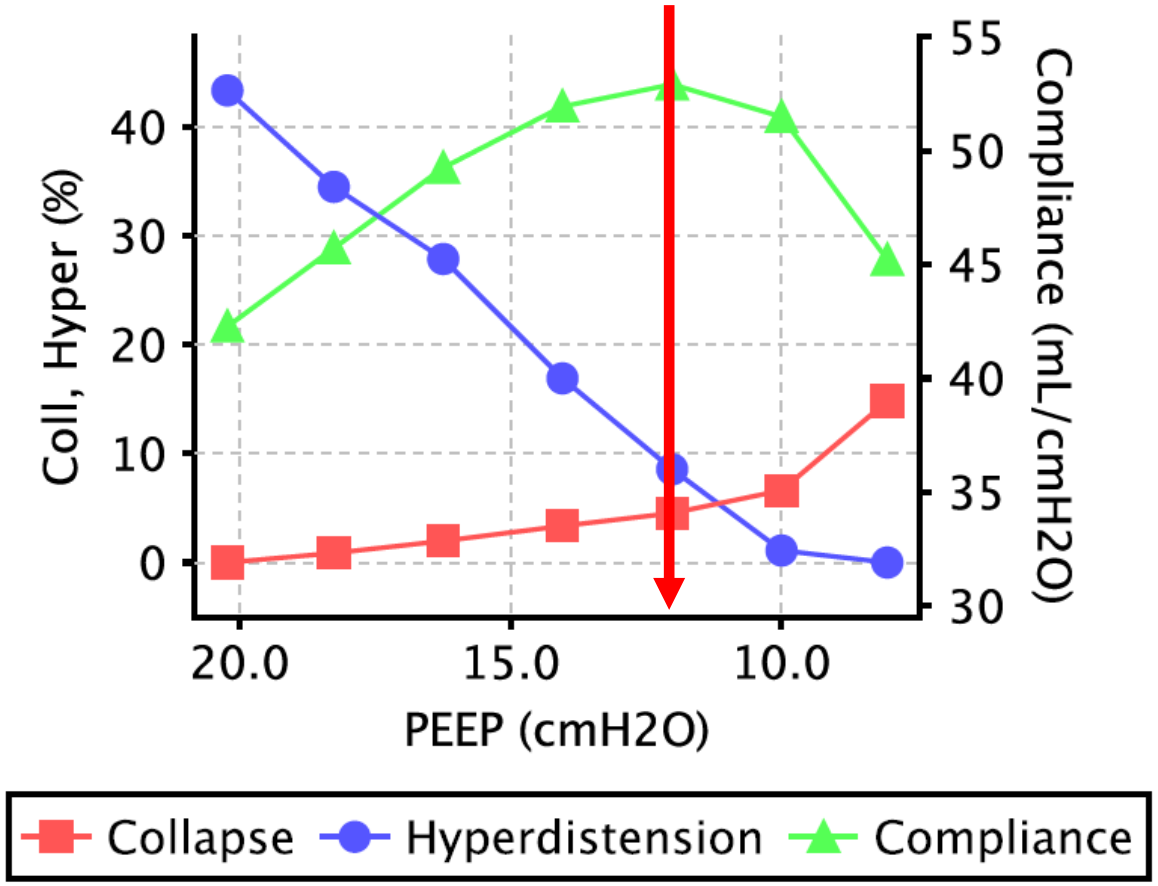
EIT image – dynamics (50Hz), functional, real time, radiation free, bedside - 24/7

PEEP titrace





PEEP titrace – GLOBÁLNÍ parametry



PEEP (cmH_2O)	Compliance (mL/cmH_2O)	Hyperdist. (%)	Collapse (%)
20.2	42	43.3	0.0
18.3	46	34.5	0.9
16.2	49	27.9	2.0
14.0	52	16.9	3.4
12.0	53	8.6	4.5
10.0	51	1.1	6.6
8.0	45	0.0	14.8

EIT - PEEP titrace – REGIONÁLNÍ distribuce

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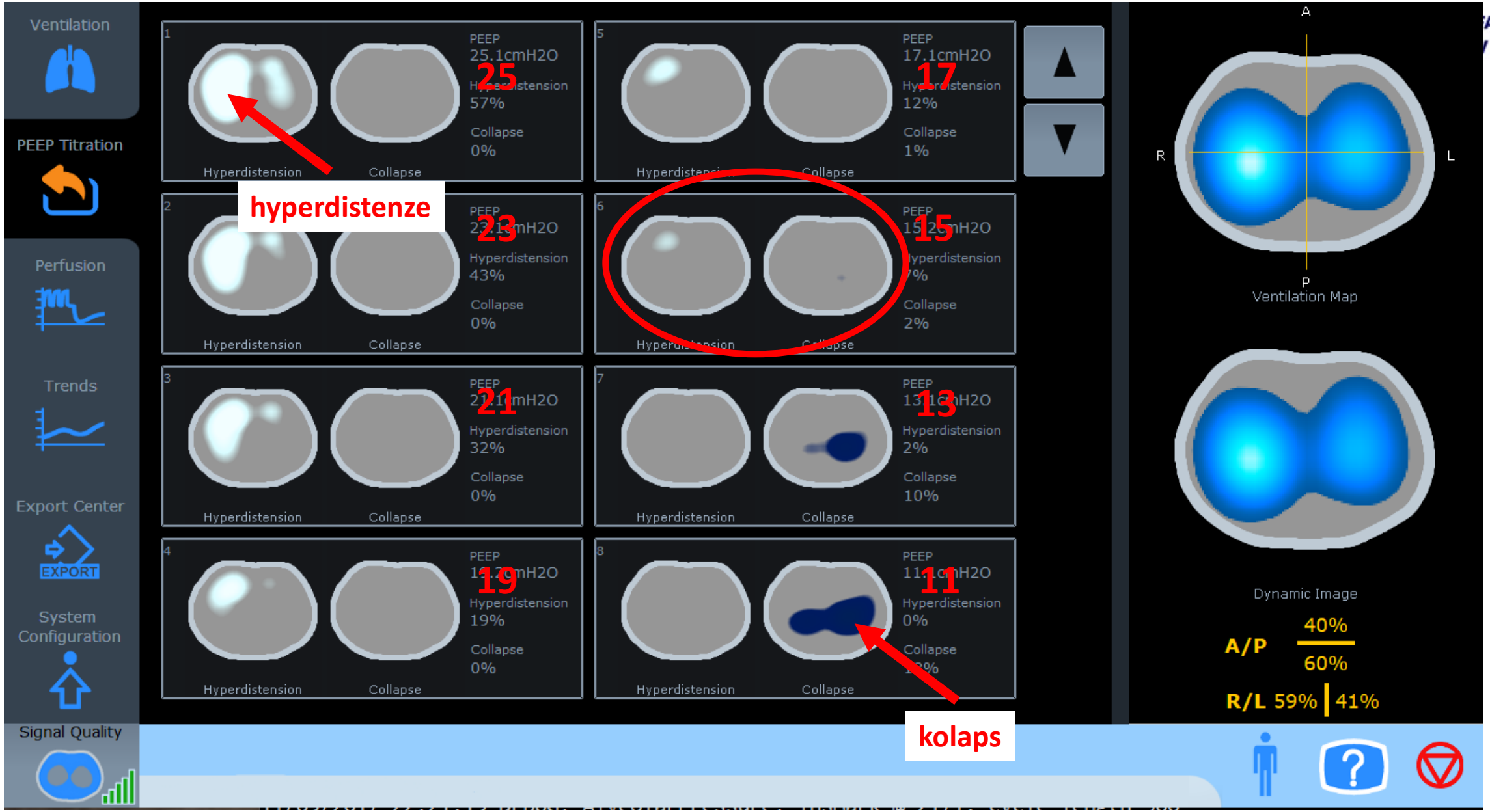
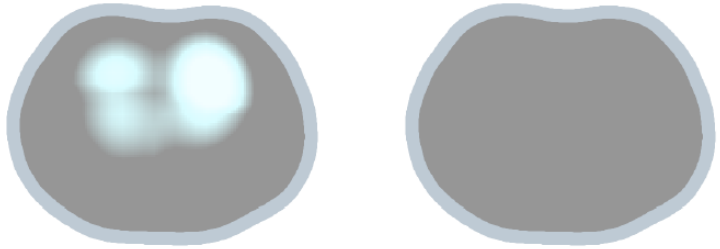


PEEP titrace pomocí EIT

KARIM
1.LF UK A VFN V PRAZE

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

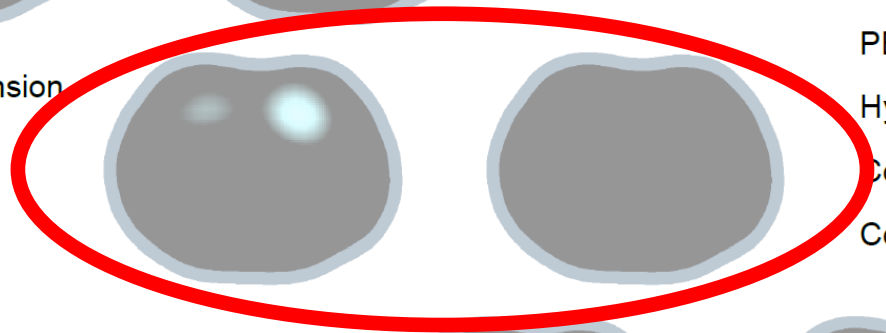


Hyperdistension

PEEP: 18.4 cmH_2O
Hyperdistension: 27.8% **18**
Collapse: 0.1%
Compliance: 32.2 mL/cmH_2O

Hyperdistension

PEEP: 16.2 cmH_2O
Hyperdistension: 20.1% **16**
Collapse: 0.1%
Compliance: 35.9 mL/cmH_2O

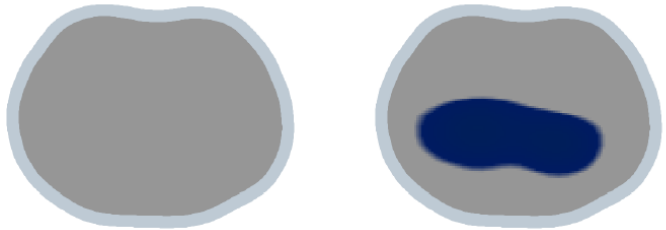


Hyperdistension

PEEP: 14.2 cmH_2O
Hyperdistension: 9.7% **14**
Collapse: 0.3%
Compliance: 40.2 mL/cmH_2O

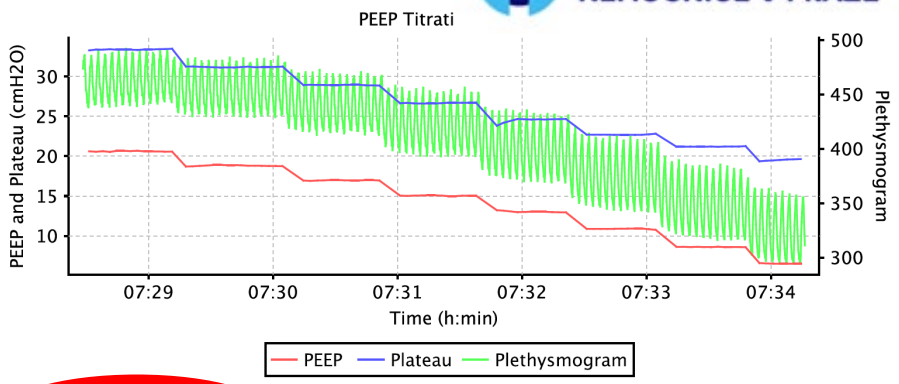
Hyperdistension

PEEP: 12.1 cmH_2O
Hyperdistension: 7.5% **12**
Collapse: 9.6%
Compliance: 41.0 mL/cmH_2O



Hyperdistension

PEEP: 10.1 cmH_2O
Hyperdistension: 3.4% **10**
Collapse: 17.5%
Compliance: 38.7 mL/cmH_2O



Optimal PEEP:
Minimální hyperdistenze
Minimální kolaps (do 5%)

PEEP titrace pomocí EIT tentýž pacient

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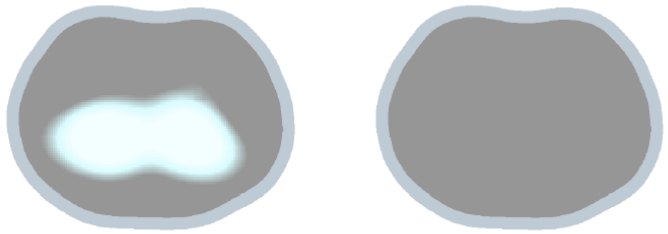
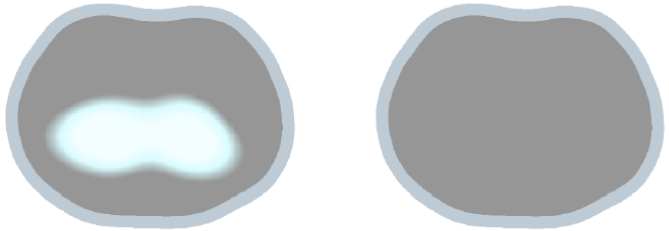
VŠEOBECNÁ FAKULTNÍ



Hyperdistension

PEEP: 18.2 cmH_2O
Hyperdistension: 36.9%
Collapse: 1.0%
Compliance: 28.8 mL/cmH_2O

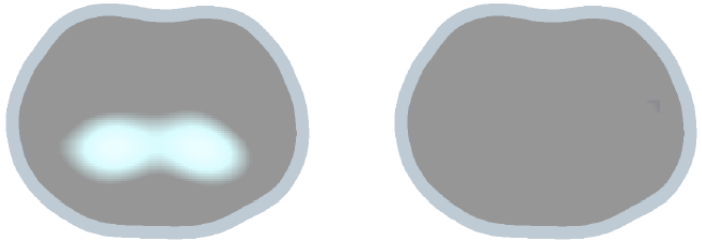
18



Hyperdistension

PEEP: 16.2 cmH_2O
Hyperdistension: 31.6%
Collapse: 1.5%
Compliance: 32.3 mL/cmH_2O

16



Hyperdistension

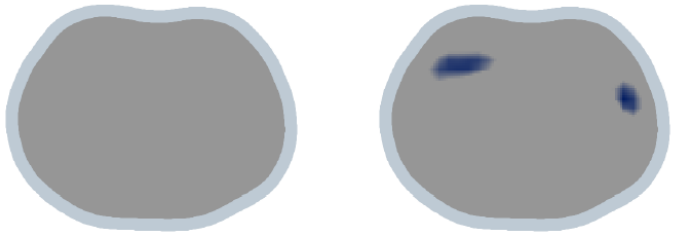
PEEP: 14.3 cmH_2O
Hyperdistension: 19.5%
Collapse: 2.3%
Compliance: 36.5 mL/cmH_2O

14

Hyperdistension

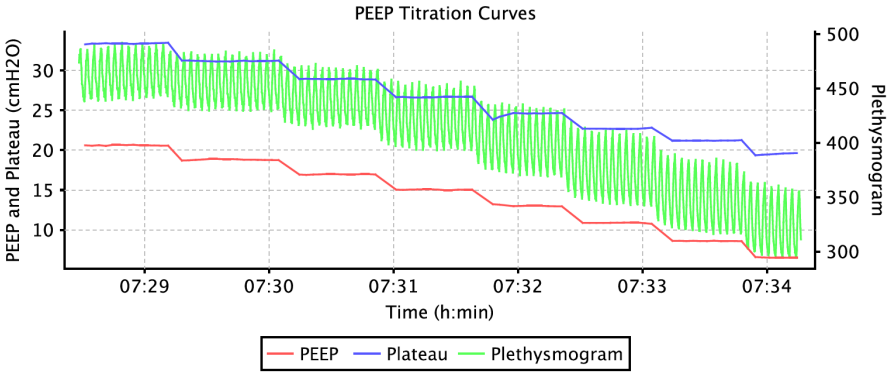
PEEP: 12.4 cmH_2O
Hyperdistension: 13.0%
Collapse: 3.7%
Compliance: 38.5 mL/cmH_2O

12



PEEP: 10.6 cmH_2O
Hyperdistension: 6.2%
Collapse: 5.7%
Compliance: 42.1 mL/cmH_2O

10



PRONACE

Homogenizace

PRONACÍ

PEEP titrace pomocí EIT

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PEEP: 16.0 cmH_2O
Hyperdistension: 15.5%
Collapse: 0.0%
Compliance: 42.4 mL/cmH_2O

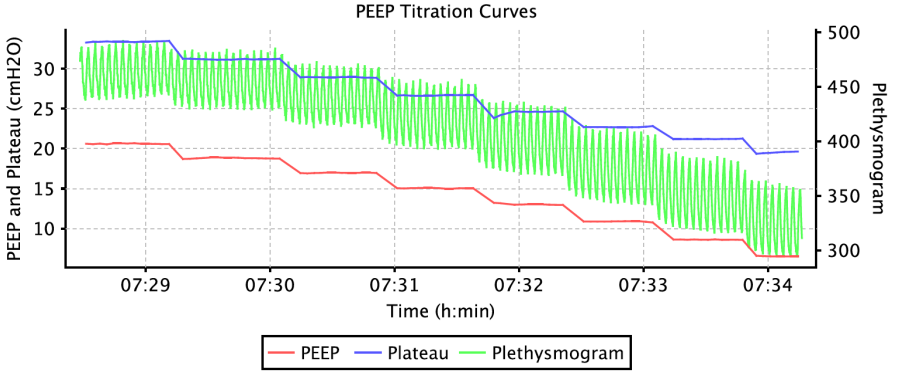
16

Hyperdistension

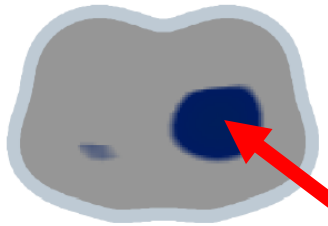
PEEP: 14.1 cmH_2O
Hyperdistension: 14.2%
Collapse: 1.4%
Compliance: 41.8 mL/cmH_2O

14

Hyperdistensic



hyperdistenze

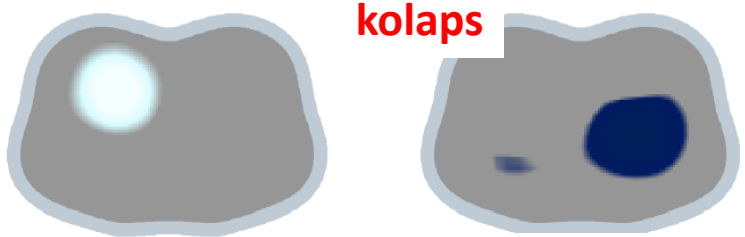


kolaps

PEEP: 11.9 cmH_2O
Hyperdistension: 14.2%
Collapse: 8.8%
Compliance: 40.7 mL/cmH_2O

12

Hyperdistension



PEEP: 10.3 cmH_2O
Hyperdistension: 13.2%
Collapse: 10.7%
Compliance: 109.7 mL/cmH_2O

10

Optimal PEEP:
Nejmíň hyperdistenze
Nejmíň kolapsu (do 5%)

Hyperdistension

Hyperdistension

Cumulative Collapse

PEEP: 8.1 cmH_2O
Hyperdistension: 12.9%
Collapse: 17.3%
Compliance: 37.7 mL/cmH_2O

8

PEEP titrace pomocí EIT tentýž pacient

KARIM
1.LF UK A VFN V PRAZE

Hyperdistension

PEEP: 16.0 cmH_2O
Hyperdistension: 12.2% **16**
Collapse: 0.5%
Compliance: 42.7 mL/cmH_2O

Hyperdistensio

PEEP: 14.0 cmH_2O
Hyperdistension: 9.6% **14**
Collapse: 1.9%
Compliance: 40.6 mL/cmH_2O

Hyperdistension

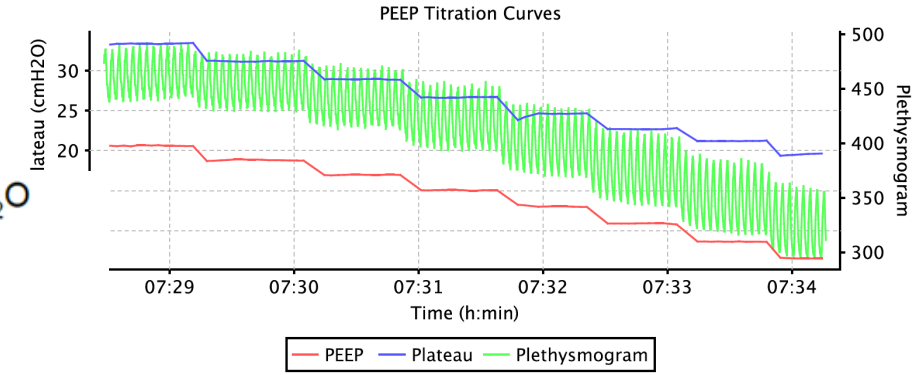
PEEP: 12.1 cmH_2O
Hyperdistension: 4.4%
12
Collapse: 4.3%
Compliance: 41.4 mL/cmH_2O

Hyperdistension

PEEP: 9.9 cmH_2O
Hyperdistension: 4.1% **10**
Collapse: 6.5%
Compliance: 40.3 mL/cmH_2O

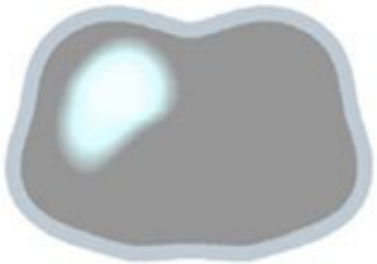
Hyperdistension Cumulative Collapse

PEEP: 8.1 cmH_2O
Hyperdistension: 0.1% **8**
Collapse: 13.2%
Compliance: 41.4 mL/cmH_2O



Homogenizace pomocí ALT

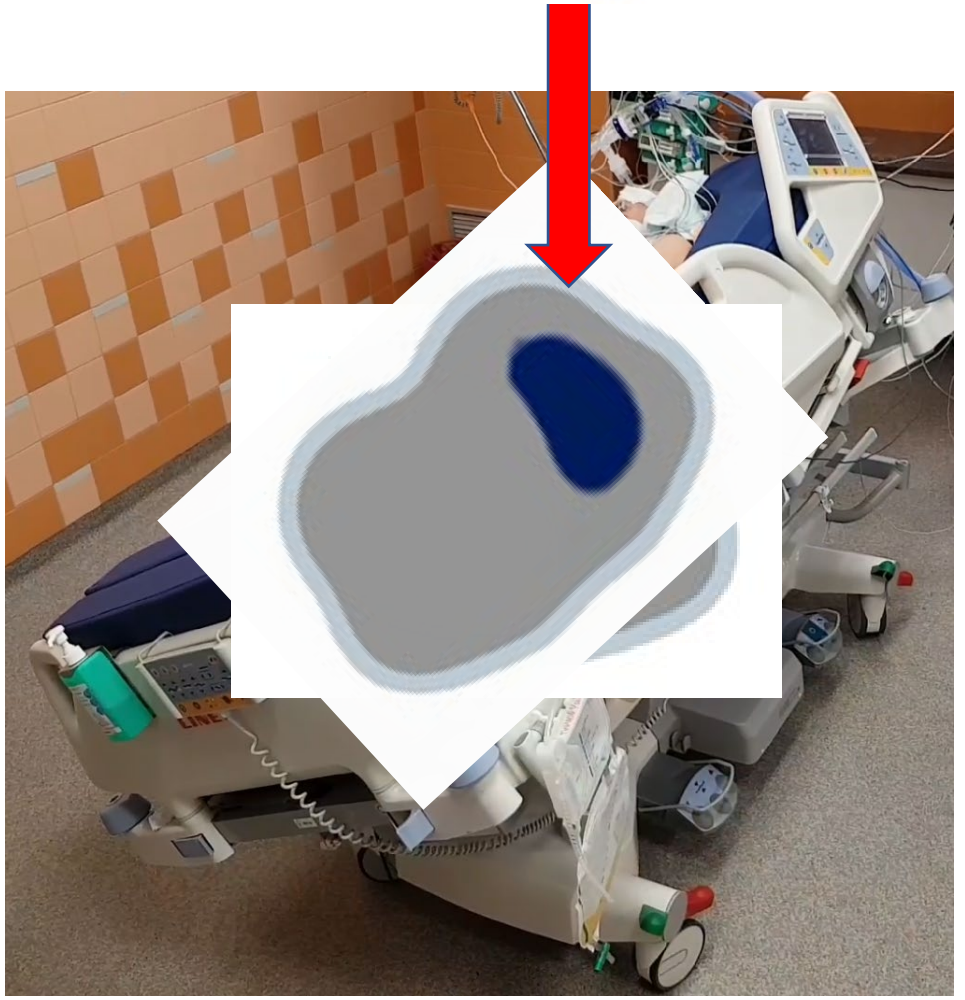
PEEP titrace EIT −► cílená ALT



Hyperdistension

Cumulative Collapse

PEEP:	12.2 cmH_2O
Hyperdistension:	15.5%
Collapse:	11.3%
Compliance:	31.2 mL/cmH_2O



PEEP titrace EIT −► cílená ALT

Hyperdistension

Cumulative Collapse

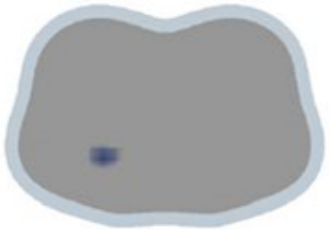
PEEP: 12.2 cmH_2O

Hyperdistension: 15.5%

Collapse: 11.3%

Compliance: 31.2 mL/cmH_2O

Hyperdistension



Cumulative Collapse

PEEP: 12.1 cmH_2O

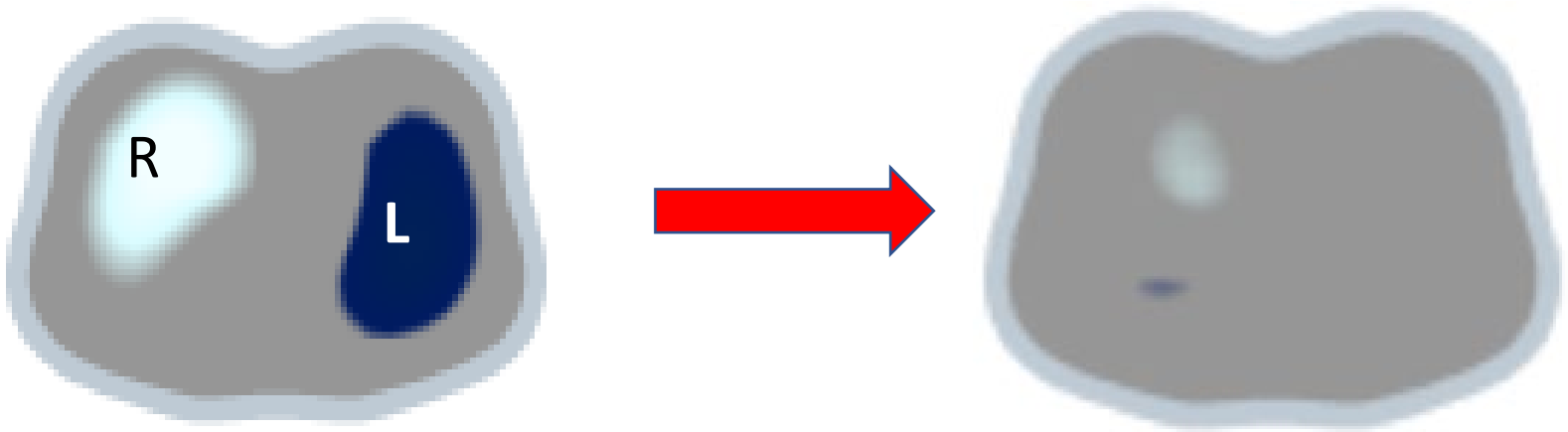
Hyperdistension: 4.4%

Collapse: 4.3%

Compliance: 41.4 mL/cmH_2O

po 15 hodinách ALT - R 30° / záda

PEEP titrace EIT −► cílená ALT



na stejném PEEPu:

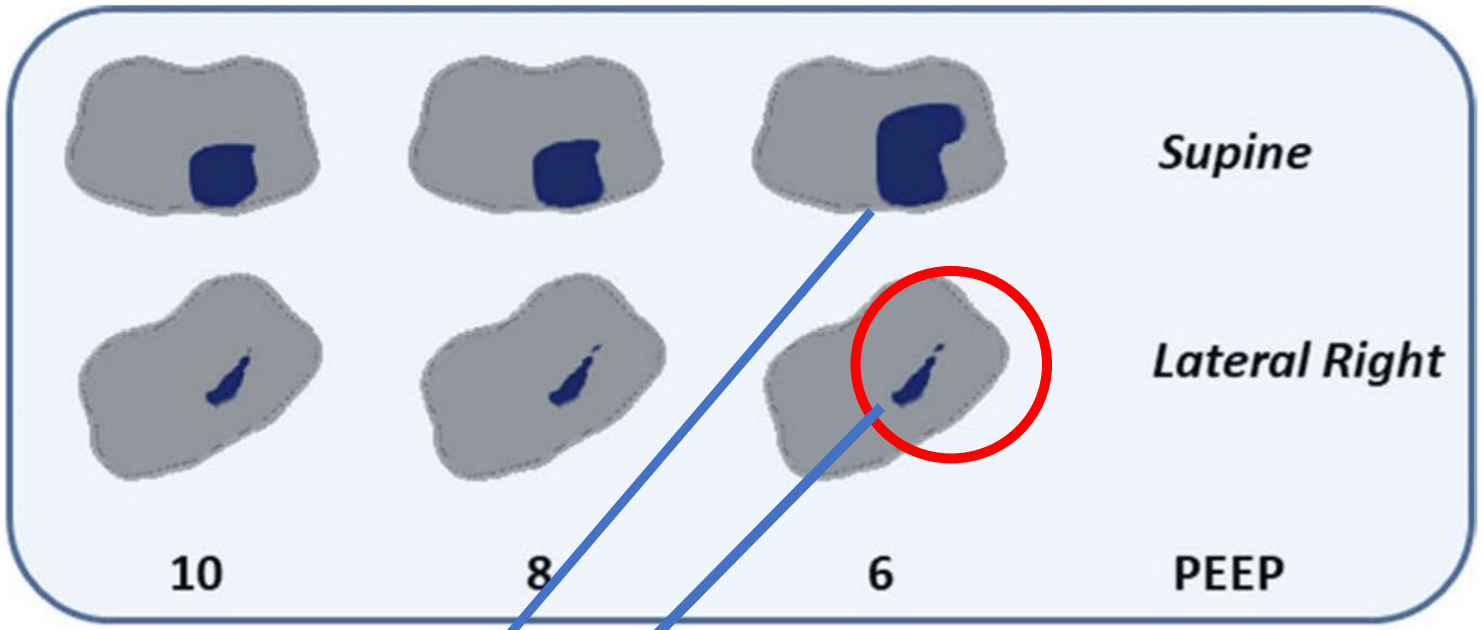
redukce hyperdistenze
71%

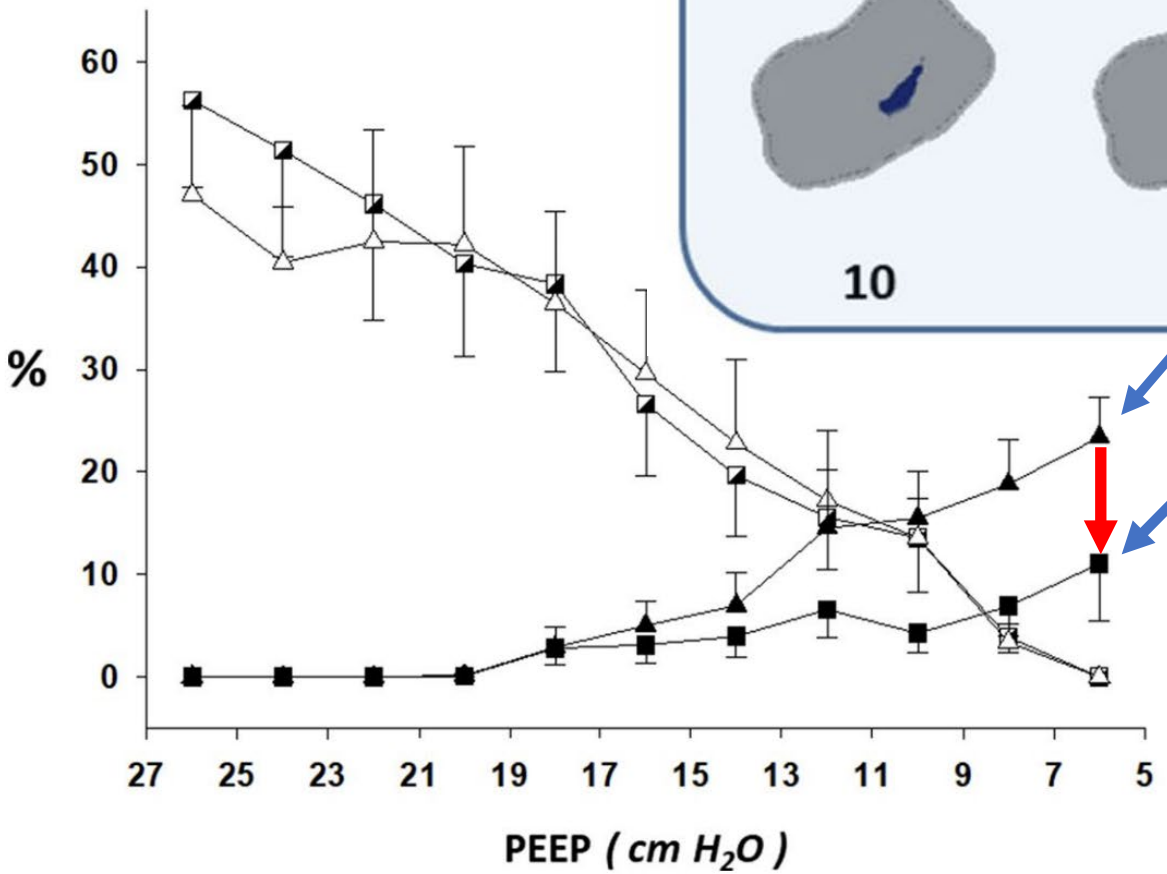
redukce kolapsu
82%

zvýšení kompliance
28%

po 15 hodinách ALT - R 30° / záda

Cílené POLOHOVÁNÍ – ALT





Left Lung

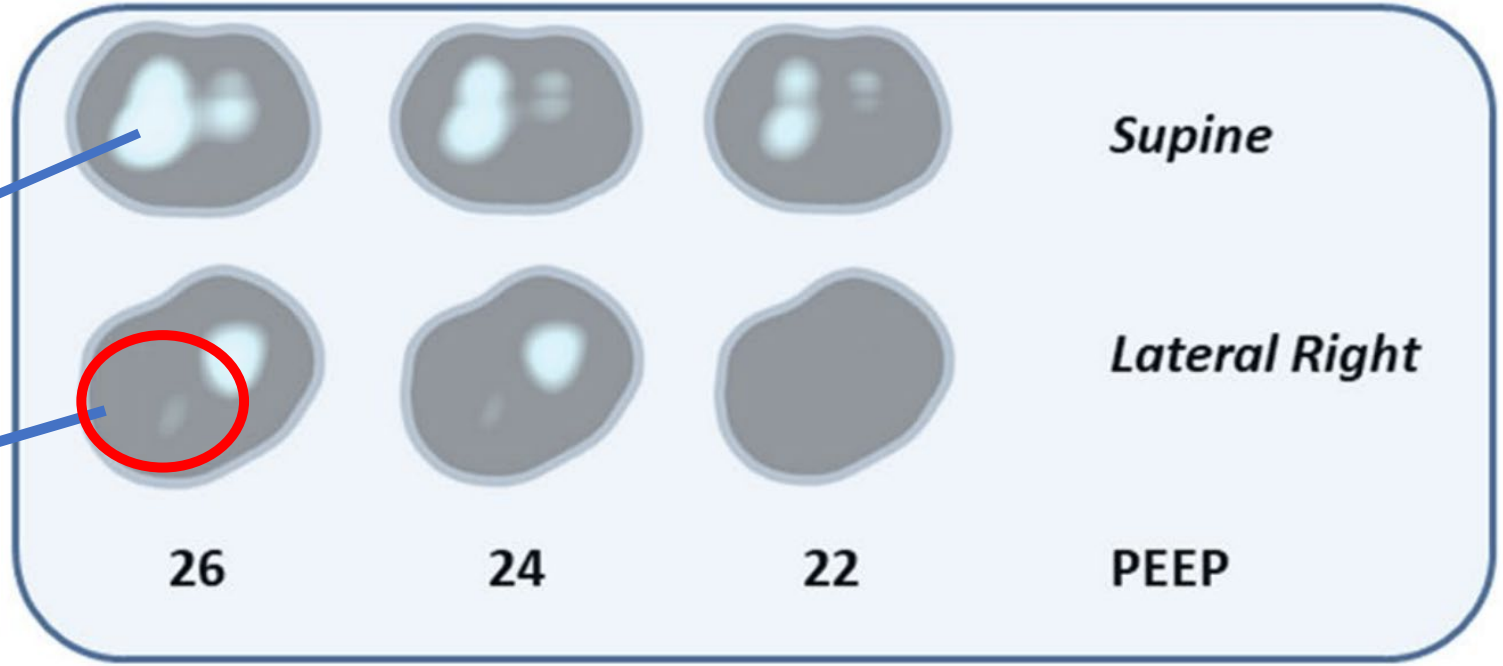
less collapse P=0.014

g decreases
ension
DS

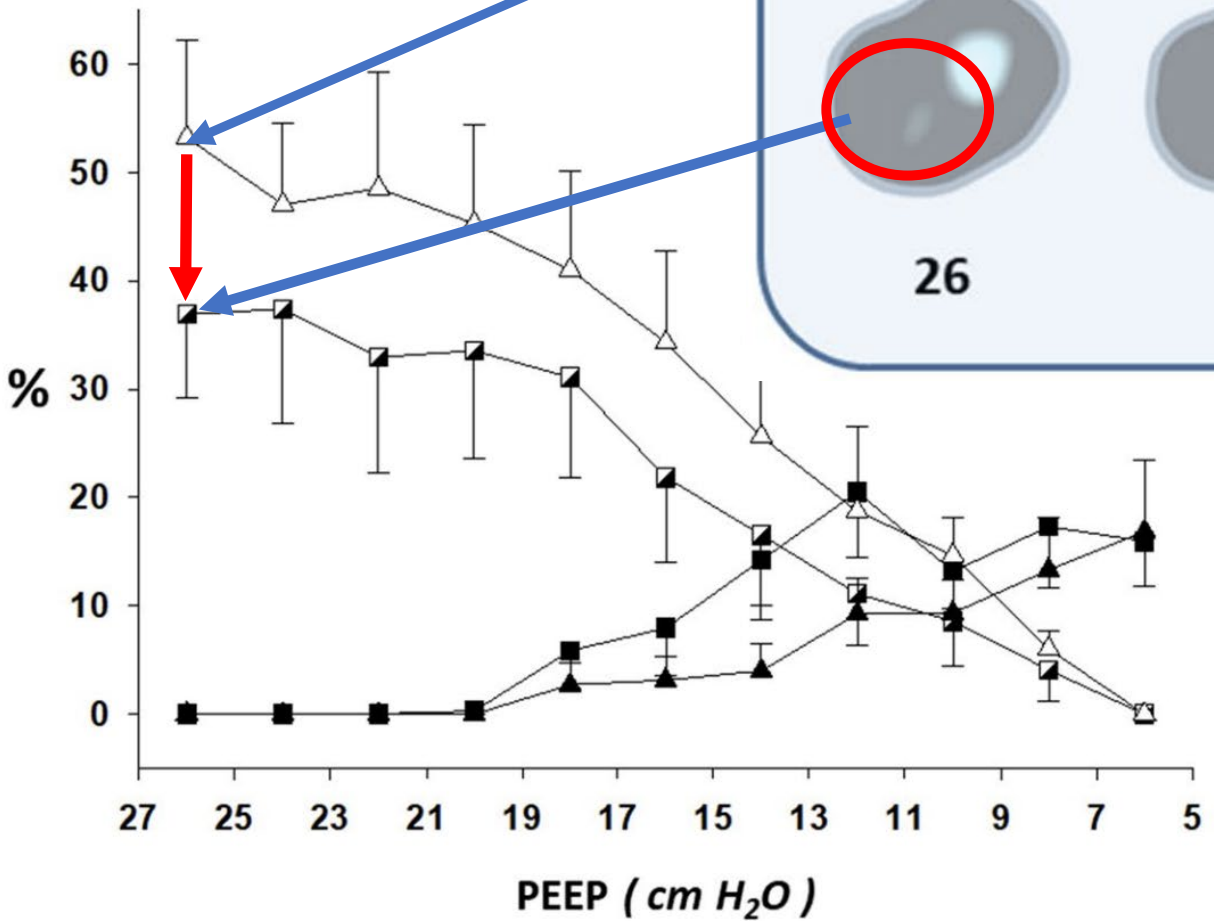
le Cristina Alcala[3].
to[3] and Otomar Kittnar[1]
l. BMC Pulm Med *(2021) 21:133*

Mlček, BMC Pulm Med, 2021

Cílené POLOHOVÁNÍ – ALT



Right Lung

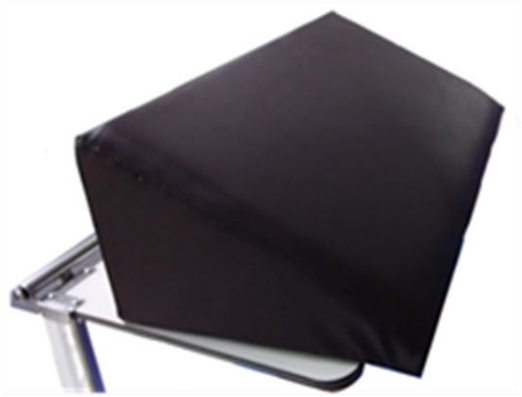


less overdistension P=0.005

Mlček, BMC Pulm Med, 2021

KARIM
1.LF UK A VFN V PRAZE

30° support cushion



equential lateral positioning as a new lung
cruitment maneuver: an exploratory study
early mechanically ventilated Covid-19 ARDS
atients

Annals of Intensive Care

lin Roldán[1,2,3], Shalim Rodriguez[1,2], Fernando Barriga[1,2], Mauro Tucci[3], Marcus Victor[3,4], Glasiele Alcala[3],
nán Villamonte[1,2], Fernando Suárez-Sipmann[5,6,7], Marcelo Amato[3], Laurent Brochard[8,9*] and
rardo Tusman[10]

to SpO2 92–97%

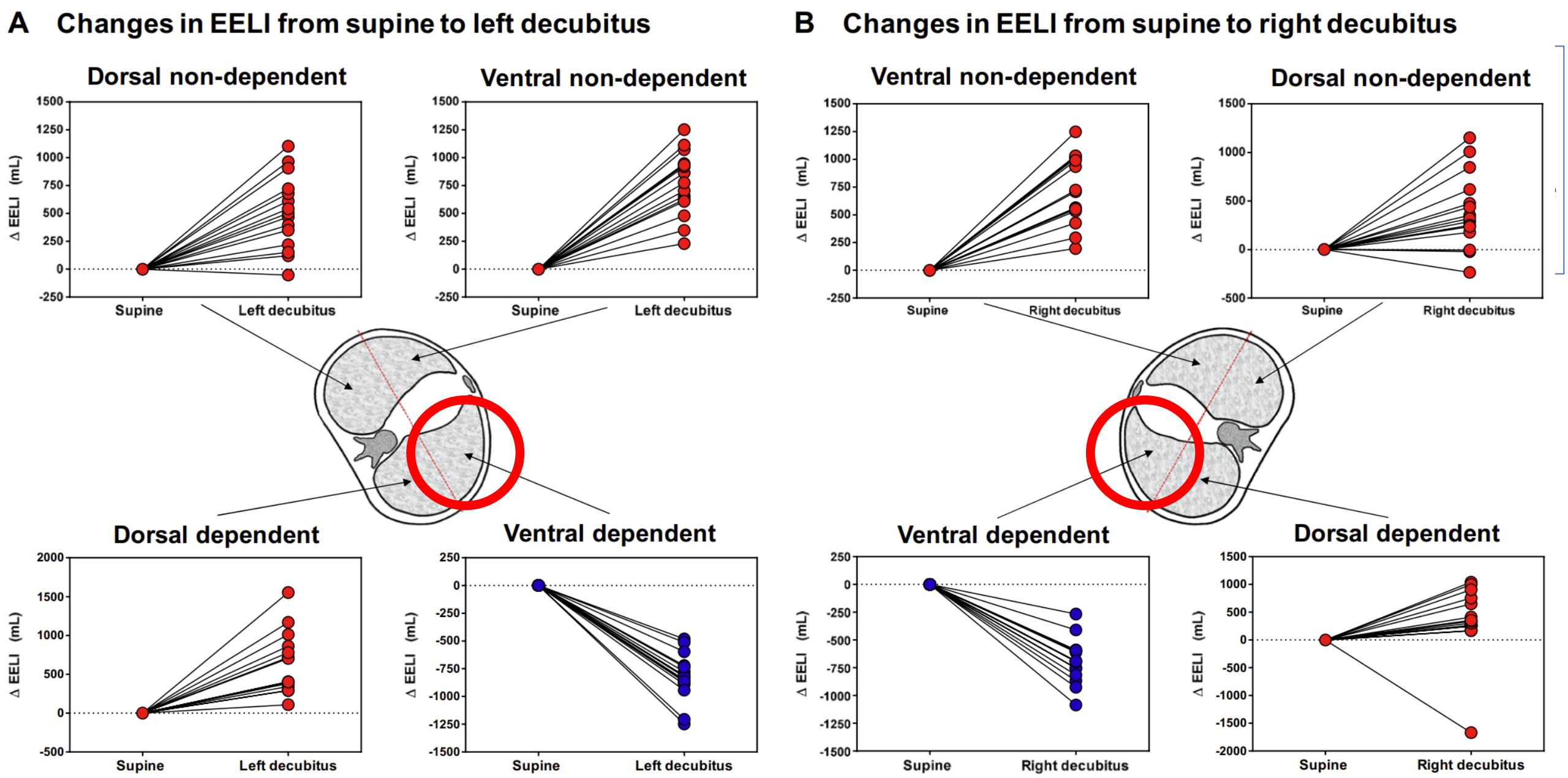
re ≤15 cmH2O,

which patients received
O for R/I ratio>0.5

- **five sequentially** applied positions for 30 min each:

  Supine-baseline; Lateral-1st side; 2nd Supine; Lateral-2nd side; Supine-fnal

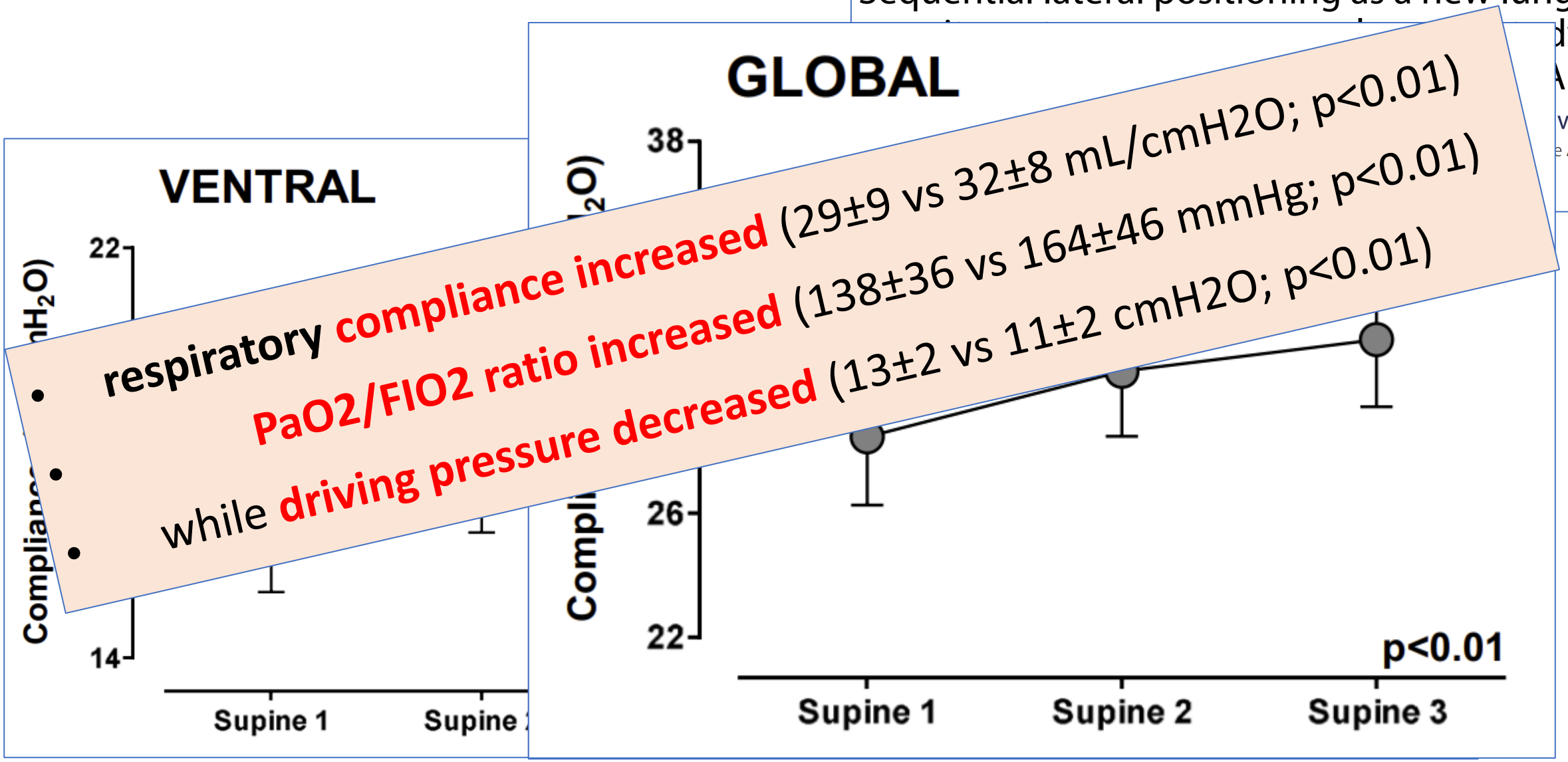
Roldán, Annals of Intensive Care, 2022



Roldán, Annals of Intensive Care, 2022

Polohování jako forma RM

Sequential lateral positioning as a new lung
dy
ARDS
ve Care
e Alcala[3],



- respiratory **compliance increased** (29±9 vs 32±8 mL/cmH2O; p<0.01)
- **PaO2/FIO2 ratio increased** (138±36 vs 164±46 mmHg; p<0.01)
- while **driving pressure decreased** (13±2 vs 11±2 cmH2O; p<0.01)

Roldán, Annals of Intensive Care, 2022

Cílené POLOHOVÁNÍ – ALT

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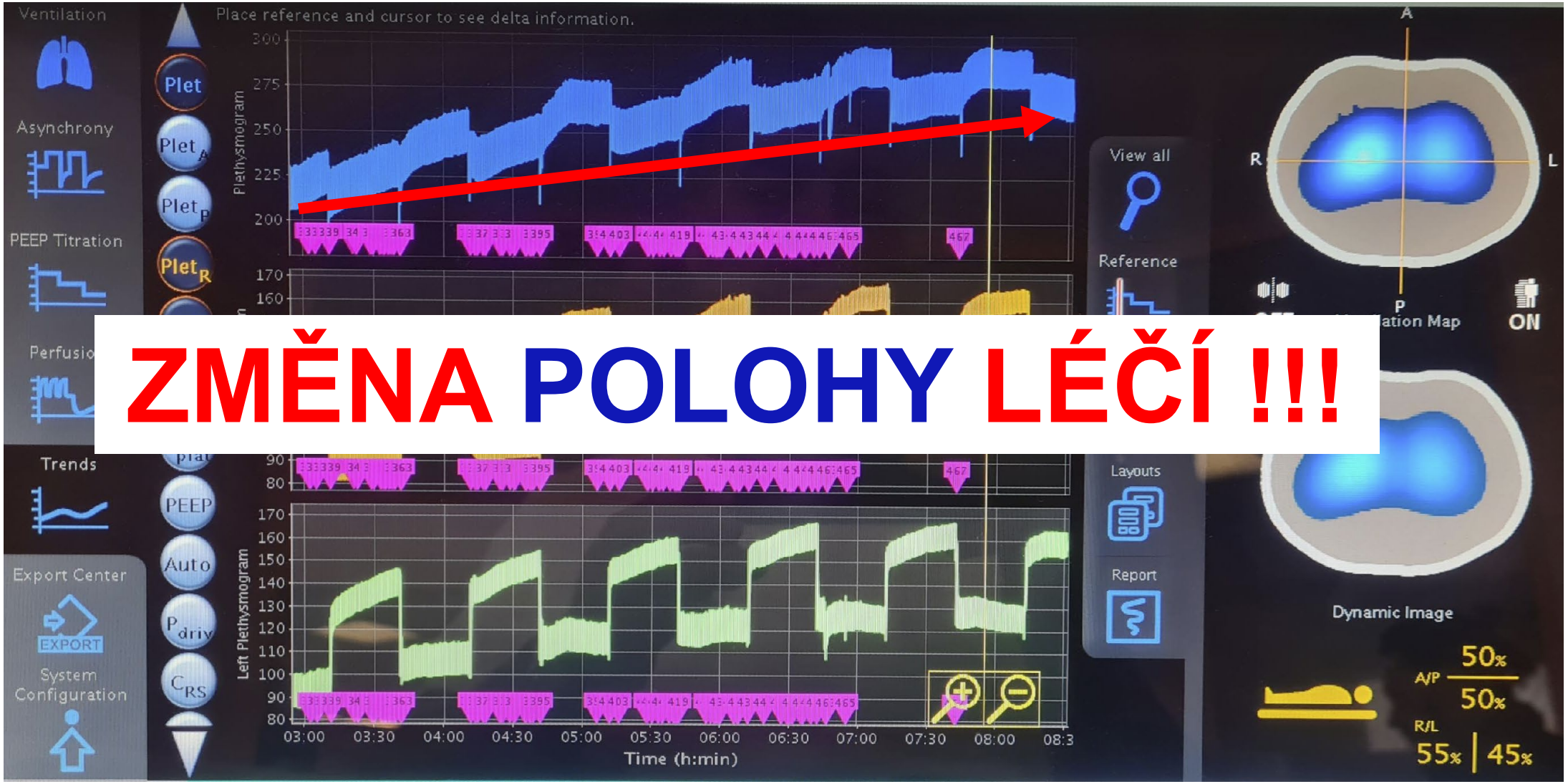
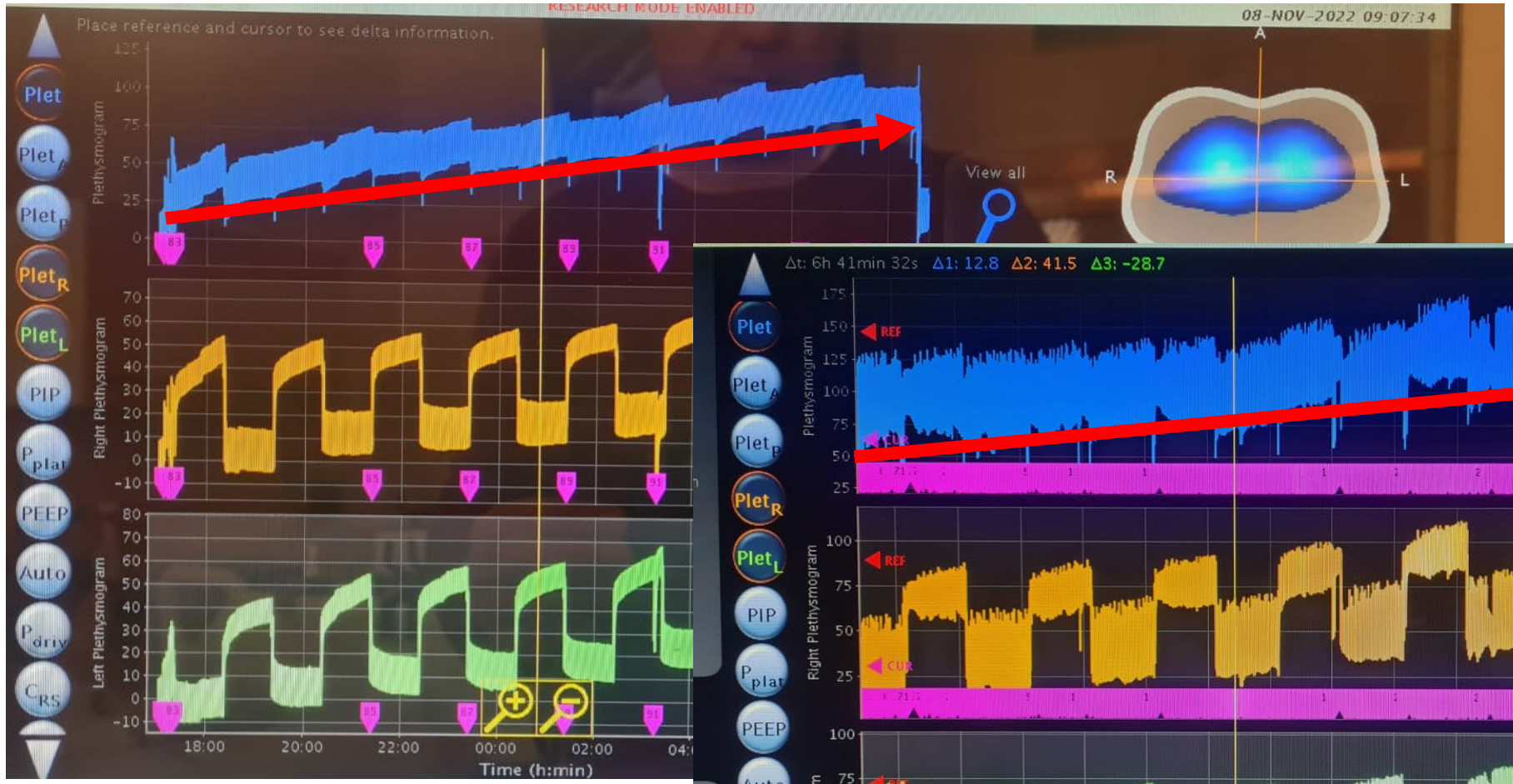
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



ZMĚNA POLOHY LÉČÍ !!!

Cílené POLOHOVÁNÍ – ALT



COMPLETE care … co musíme udělat před RM?

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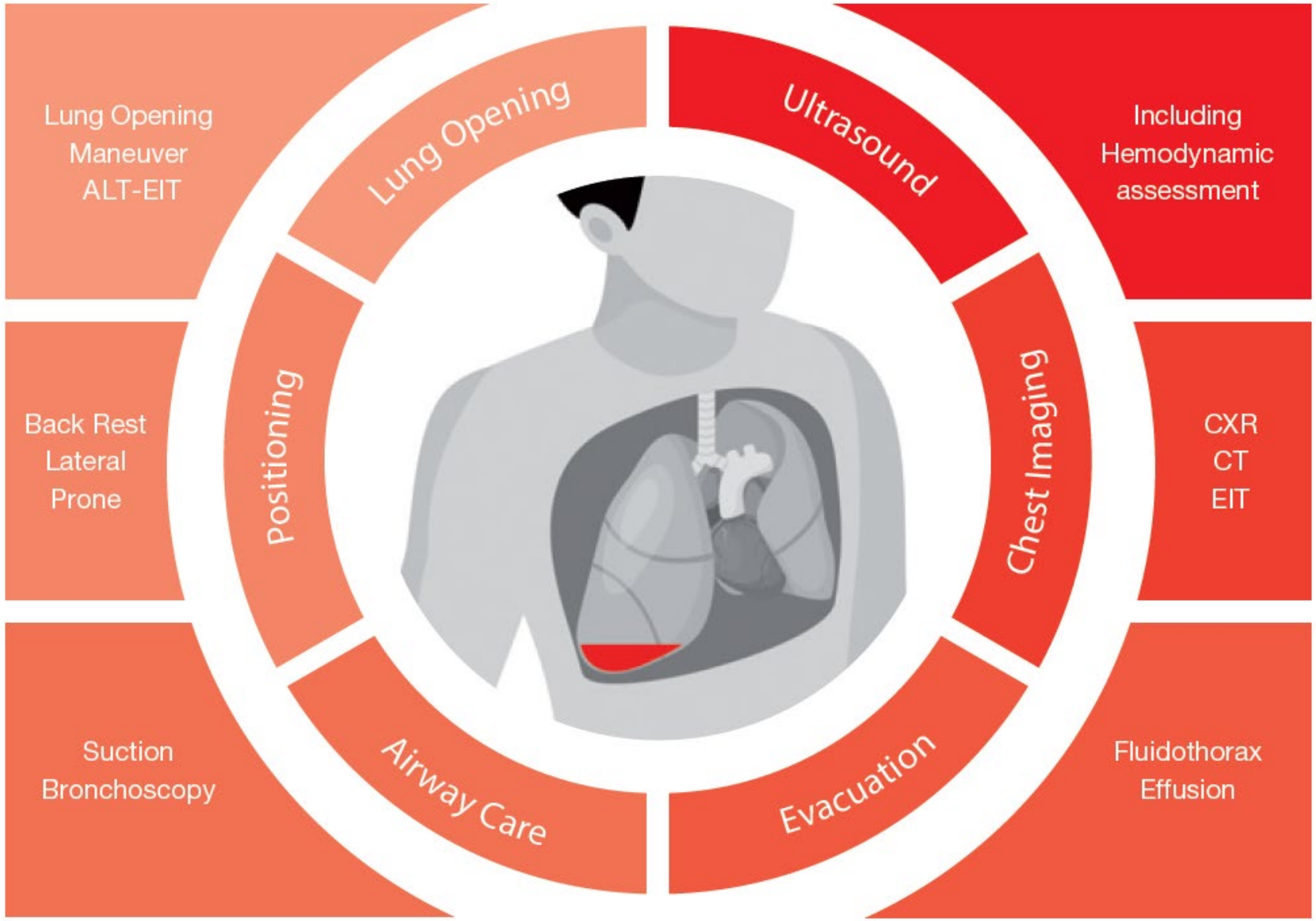
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

RM

POZICE

FOB

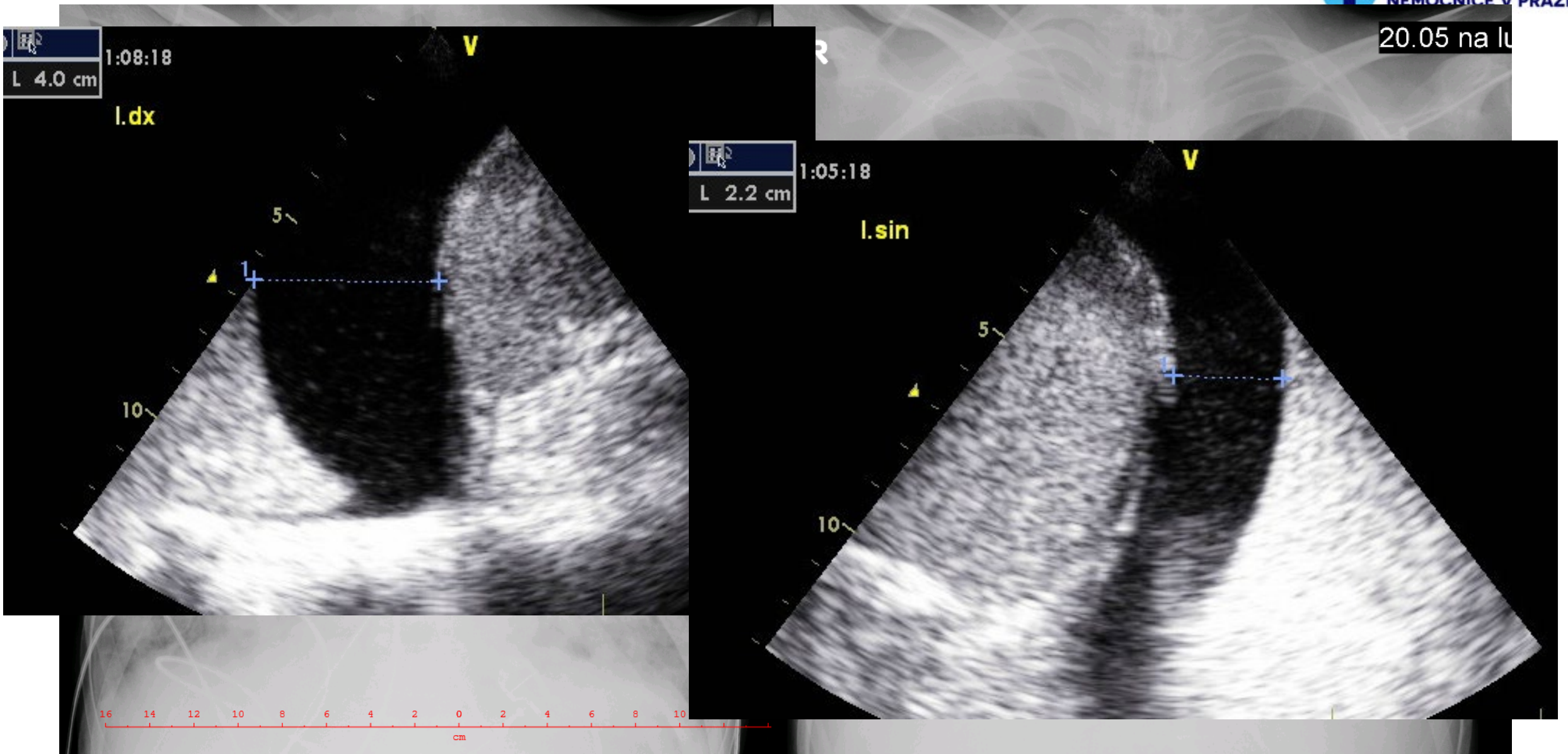


HEMO

FLUIDO

PCV RM - VIZUALIZACE monitorace UZ

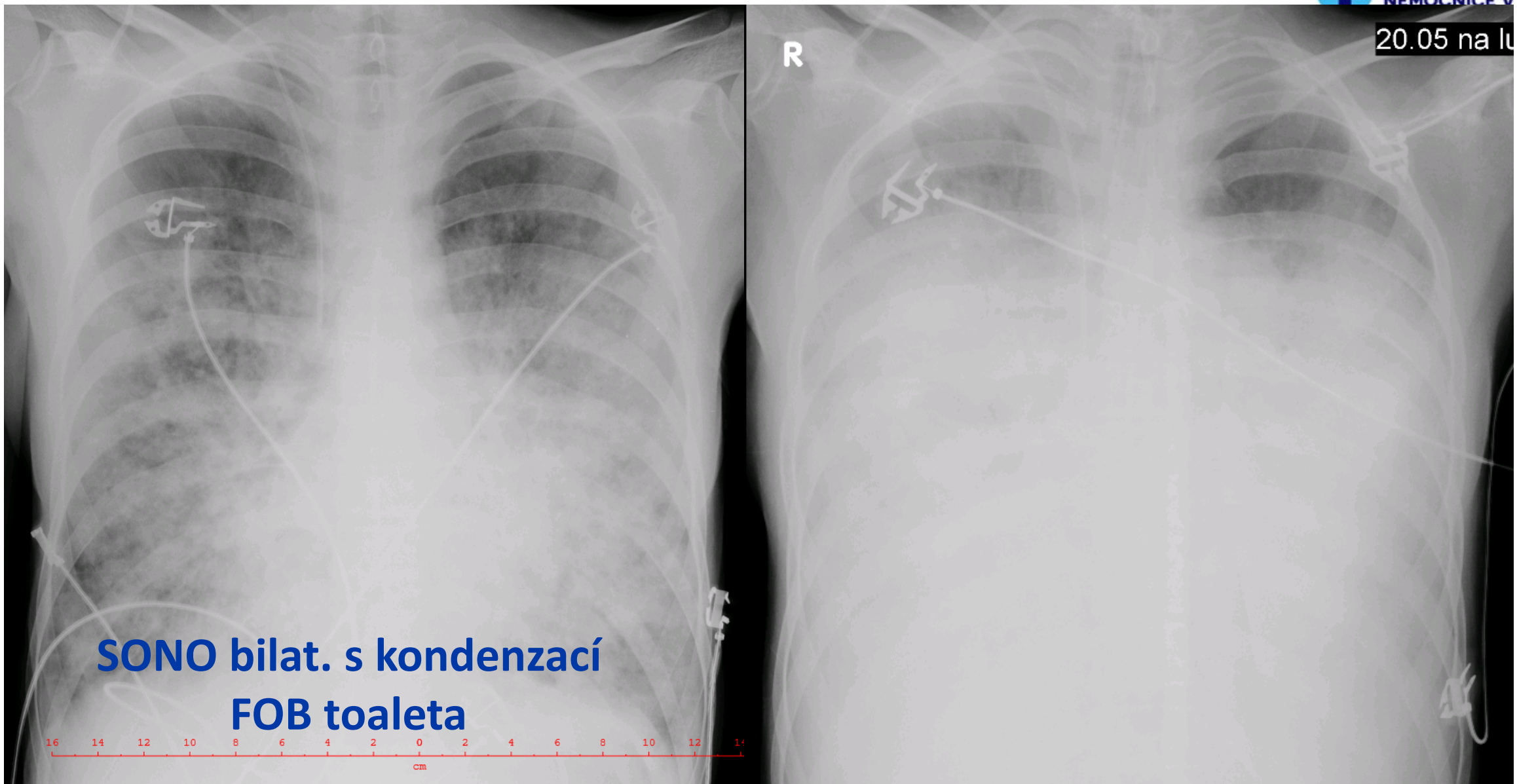
PCV RM - VIZUALIZACE monitorace UZ



PCV RM - VIZUALIZACE monitorace UZ

KARIM
1.LF UK A VFN V PRAZE

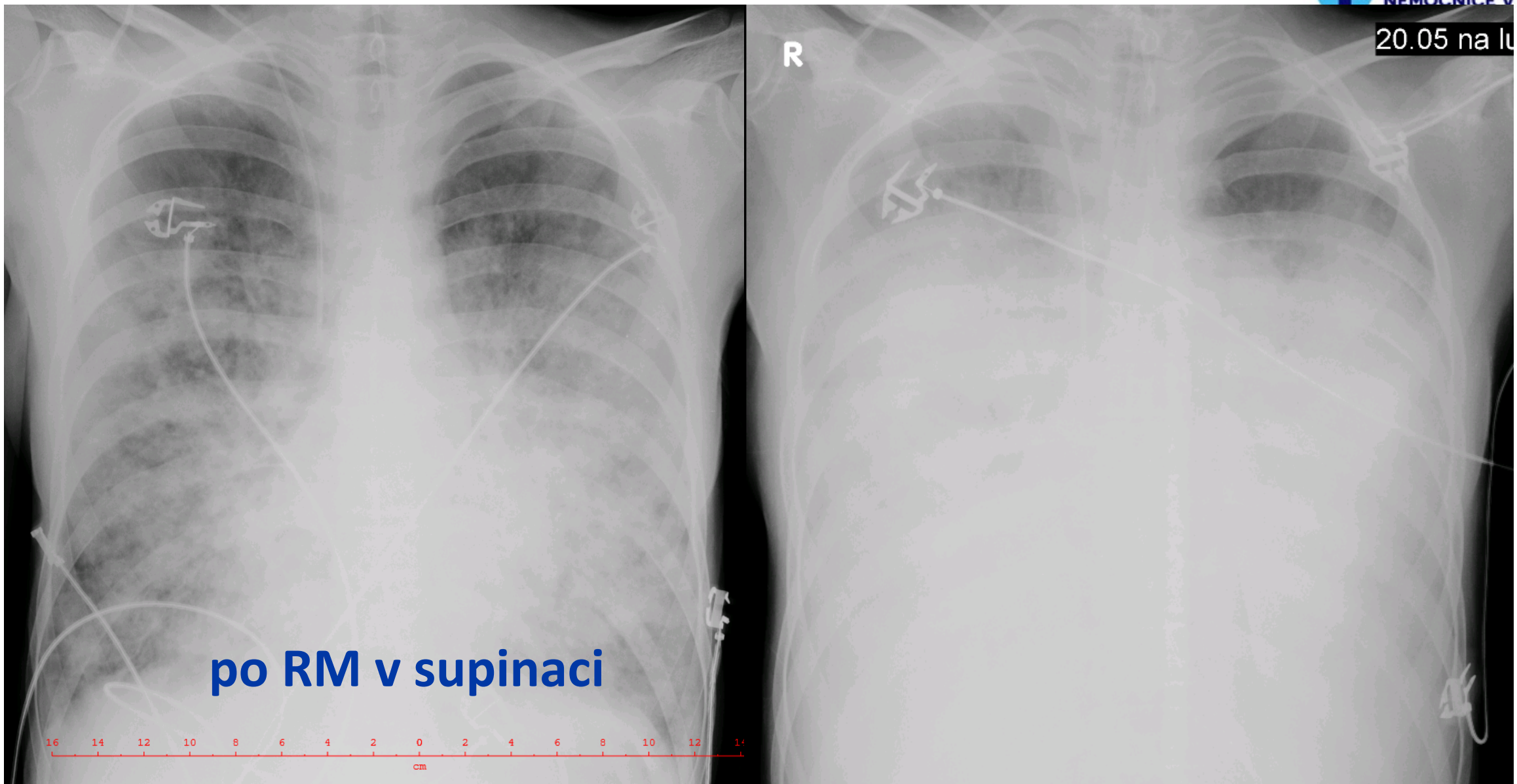
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



PCV RM - VIZUALIZACE monitorace UZ

KARIM
1.LF UK A VFN V PRAZE

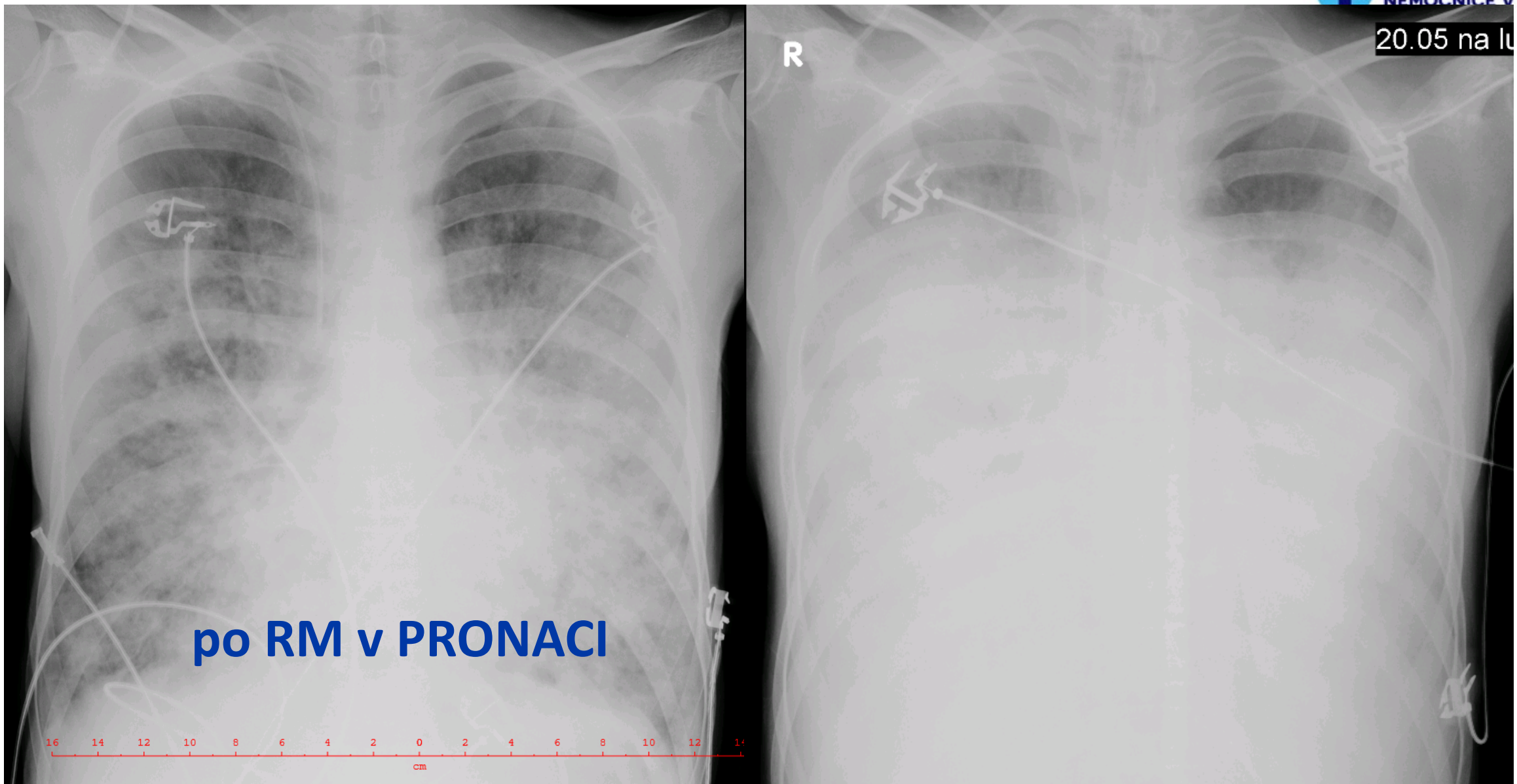
VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



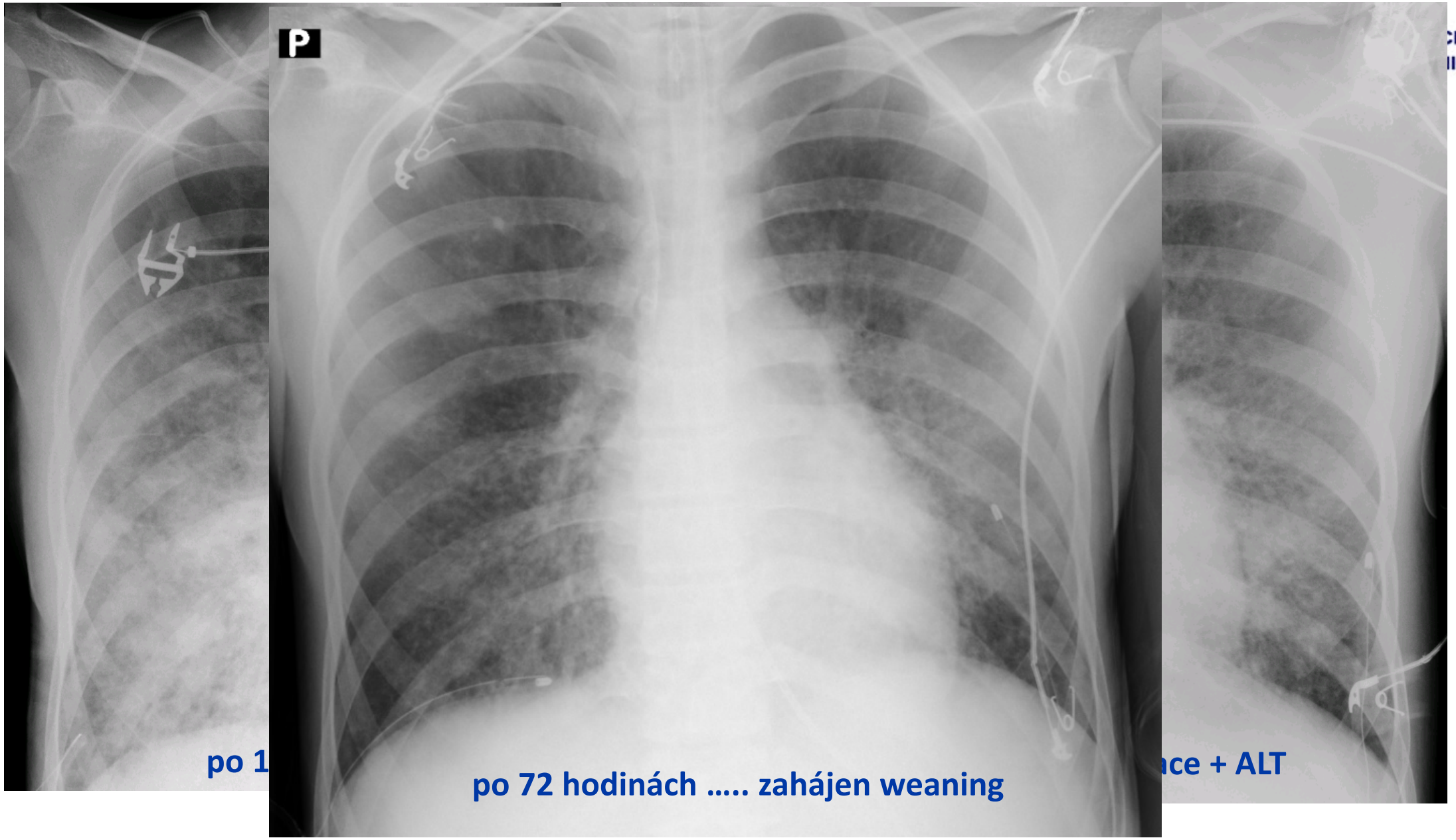
PCV RM - VIZUALIZACE monitorace UZ

KARIM
1.LF UK A VFN V PRAZE

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE



PCV RM monitorace UZ



po 1

po 72 hodinách ….. zahájen weaning

ce + ALT

Polohování jako součást nastavení UVP / INDIVIDUALIZACE péče

KARIM
1.LF UK A VFN V PRAZE

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

- Prevence **PSILI – časná intubace / weaning**

- **PROTEKTIVNÍ ventilace – prevence VILI**

  Vt 6ml/kg/ PBW ….. ΔP<=15 (13) ….. Ppeak < 30/27cm H2O

  Mechanical power < 12j/min??? ……. **lepší zvyšovat DF**

- **Optimalizace PEEPu**
  homogenizace / RM? …. reareace / minimalizace overdistenze

- **POLOHOVÁNÍ …. PRONACE symetrické**
  / asymetrické …. CÍLENÉ ….. EIT/ALT

Protektivní UVP / INDIVIDUALIZACE

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VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

Není optimální / protektivní nastavení UPV

bez optimální POLOHY

KARIM
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VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

Na POLOZE

ZÁLEŽÍ

ZMĚNA POLOHY LÉČÍ !!!


Děkuji za pozornost