# **Targeted patient positioning**

## not only guided by

# Electrical Impedance Tomography

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YES



Our cooperation with LINET began in the year 2013 Joint research project sponsored by the Technology Agency of the Czech Republic, together with TIMPEL

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## Why is positioning protective? Because of GRAVITY FORCE!



## **Optimizing of MV – BE protective?**

- Prevention of PSILI, VILI, diafragma injury
- Minimaze mechanical power, driving pressure, assynchrony
- Optimizing of PEEP
  - PEEP titration using imaging CT, ultraso
  - Global parameters compliance, oxygenatic
  - By Volumetric CO2
  - Titration of transpulmonary pressure by me pressure
  - By EIT Electrical Impedance Tomogr



By homogenization of ventilation, RM, POSITIONING



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## **Effect of PRONE on ARDS mortality?**



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



Sud, ICM, 2010



## **PROSEVA trial**

Prone Positioning in Severe Acute Respiratory Distress Syndrome

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</li>

PEEP (cm H <sub>2</sub> O)	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





Guerin, NEJM, 2013

## Effect of SEMI-PRONE 135° / lateral 90° 🖶 GENERAL UNIVERSITY HOSPITAL IN PRAGUE



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## Effect of SEMI-PRONE 135° / lateral 9 Seneral UNIVERSITY HOSPITAL IN PRAGUE





#### Effect of SEMI-PRONE 135° / lateral 90° 🖶 GENERAL UNIVERSITY HOSPITAL IN PRAGUE





Lachmann B, ICM, 1992

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## **PEEP** optimalization



# hyperdistension = volumotrauma **RM** in **PRONE** GENERAL UNIVERSITY HOSPITAL IN PRAGUE reareation homogenization





#### **EIT PEEP titration – GLOBAL parameters**

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PEEP (cmH <sub>2</sub> O)	Compliance (mL/cmH <sub>2</sub> O)	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 titration – REGIONAL**

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## **ALT – Automatic Lateral Therapy**



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## PEEP titration by EIT -> targeted ALT

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 PEEP:
 12.2 cmH<sub>2</sub>O

 Hyperdistension:
 15.5%

 Collapse:
 11.3%

 Compliance:
 31.2 mL/cmH<sub>2</sub>O

Hyperdistension

Cumulative Collapse



## start ALT on R 30° / back (60min/60min)



## after 15 hours of ALT on R 30° / back

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- 62%

## **PEEP titration by EIT -> targeted ALT**





**Compliance improvement** + 32% after 15 hours of ALT on R 30° / back







Roldán, Annals of Intensive Care, 2022



#### A Changes in EELI from supine to left decubitus

**B** Changes in EELI from supine to right decubitus



## **Targeted POSITIONING – long term ALT**

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## **Targeted POSITIONING – long term ALT**







## What is **PROTECTIVE**?..... **INDIVIDUALIZATION**

- Vt 6ml/kg/ PBW? ..... Ppeak < 30/27cm H2O
- Driving pressure <=15 (13?)</li>
- Mechanical power < 12j/min???
- Optimization of PEEP .... PEEP titration
- **HOMOGENIZATION** .... reareation / RM ?
- POSITIONING .... PRONE / EIT - targered ALT!!!





## What is **PROTECTIVE**?..... **INDIVIDUALIZATION**

# There is no optimize settings of mechanical ventilation

## without "right" position of patient



## ON THE POSITION MATTERS!

