



PulmoVista® 500 Fent visible la ventilació



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A hand is shown using a blue stylus to interact with a tablet. The tablet displays a 3D anatomical model of a liver, which is highlighted in blue. The background is dark, and the overall scene suggests a medical or educational context. The text is overlaid on the right side of the image.

1 El Problema

2 La Tecnologia

3 Pendre Decisions

4 Experiències reals

§ La VM està **associada amb lesions pulmonars¹** regionals:

- **Sobre-distensió**
- **Colapse**

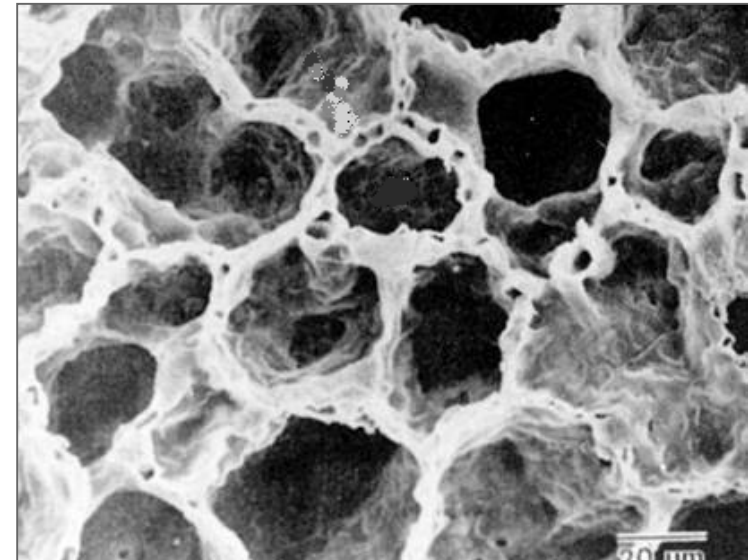
§ La lesió pulmonar causa **resposta inflamatoria²** associada amb:

- Allargament de la **estada hospitalaria**.
- Augment de la **morbi-mortalidad**.

Alveol al final de la inspiració



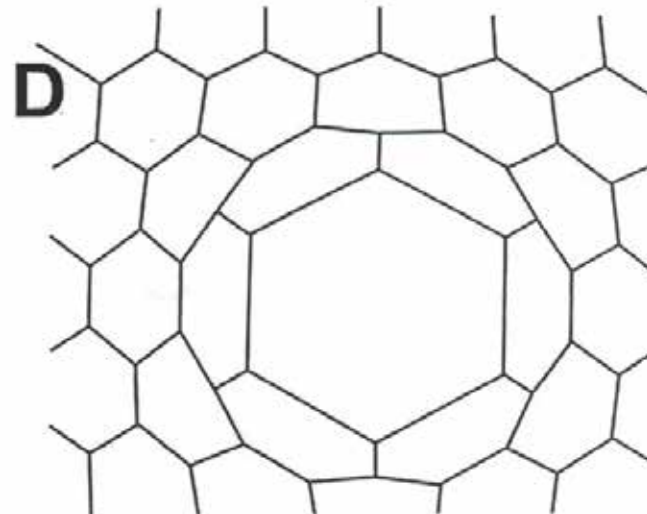
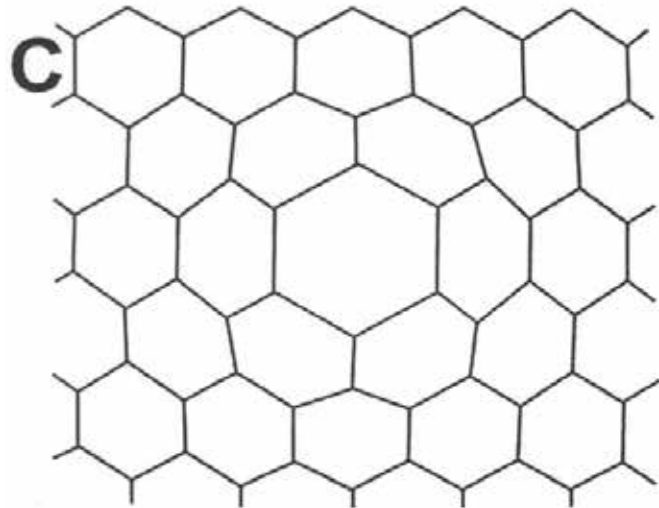
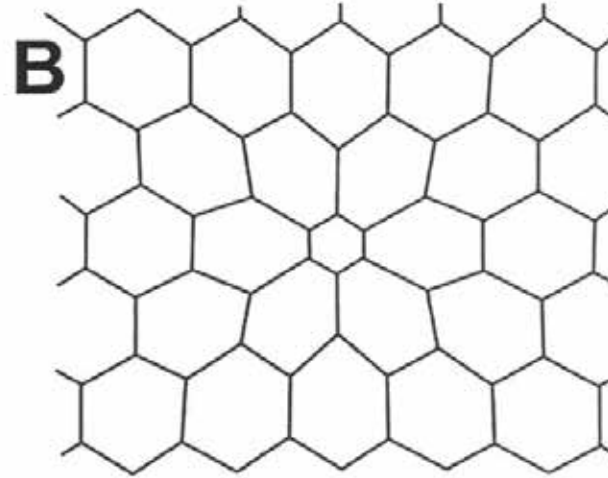
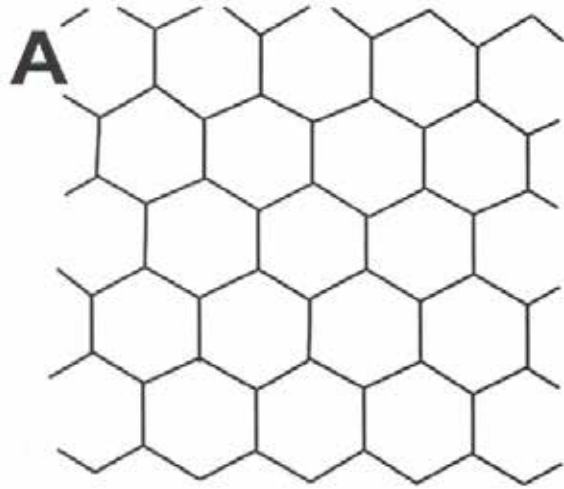
Alveol al final de l'expiració



¹ Whitehead, T., Slutsky, A. S. (2002); Thorax; 57:635–642

² Ranieri, V.M., Suter, P.M., Tortorella, C. et al (1999); JAMA; 282:54–61

Interdependencia alveolar



Stress Tensió

Strain Deformació

Stretch Estirament

Shear Cisallament

Regions ventrals amb **Sobredistensió**

Causa: excessiu volum alveolar?

Regions dorsals subjectes a **Colapse**

Causa: Insuficient nivell de PEEP?

Homogeneïtat pulmonar?

Sobredistensió alveolar



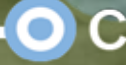
A

Normoventilació



B

Reclutament Tidal

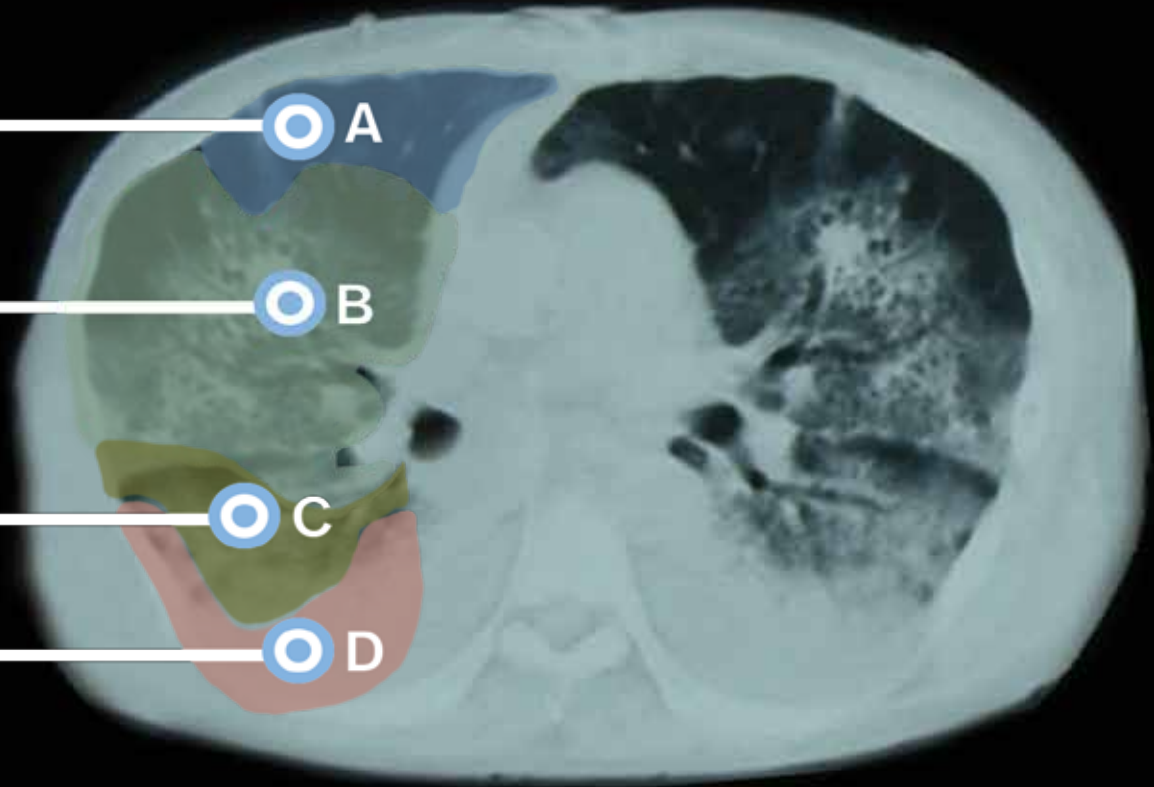


C

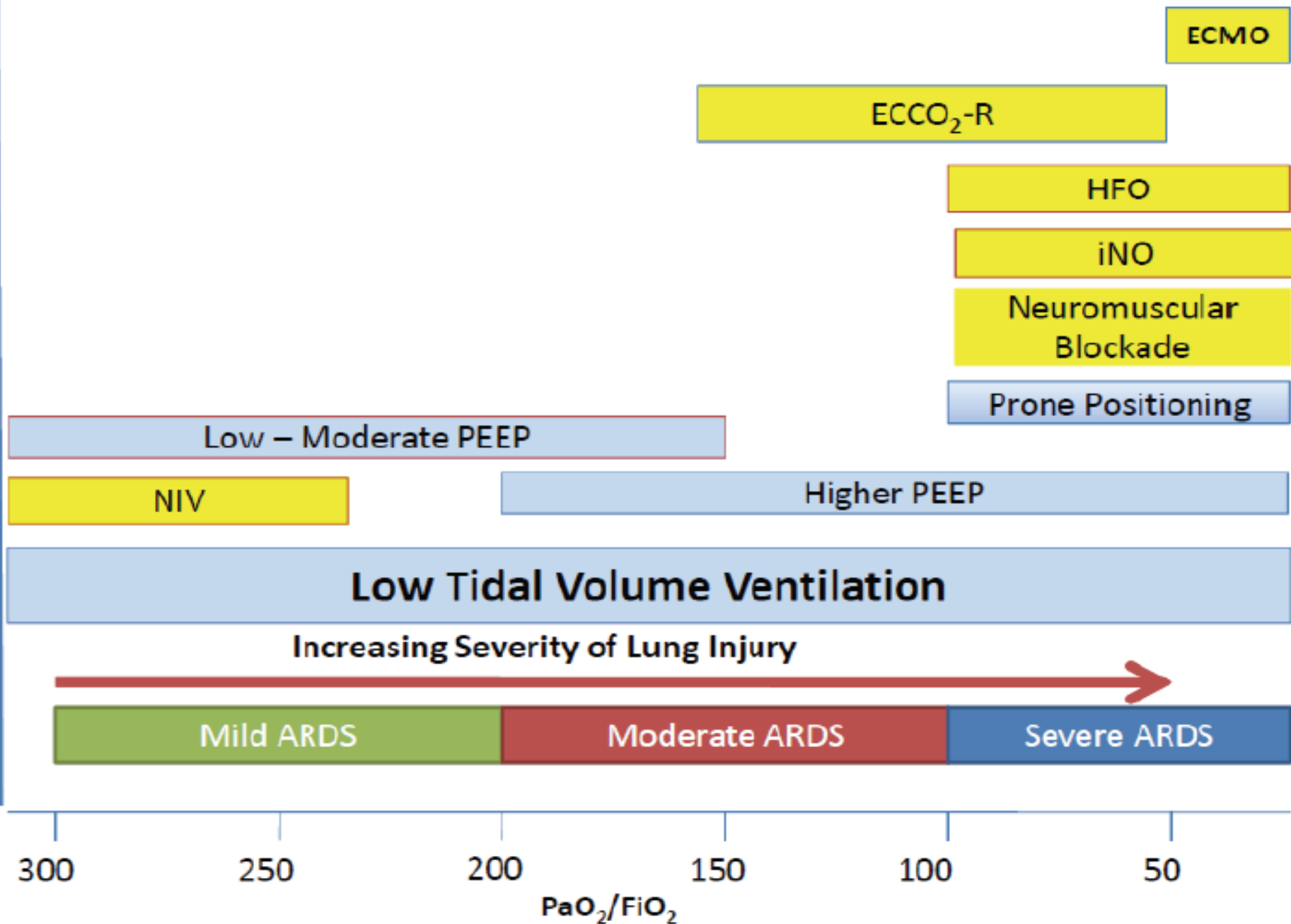
Colapse Alveolar



D



Increasing Intensity of Intervention

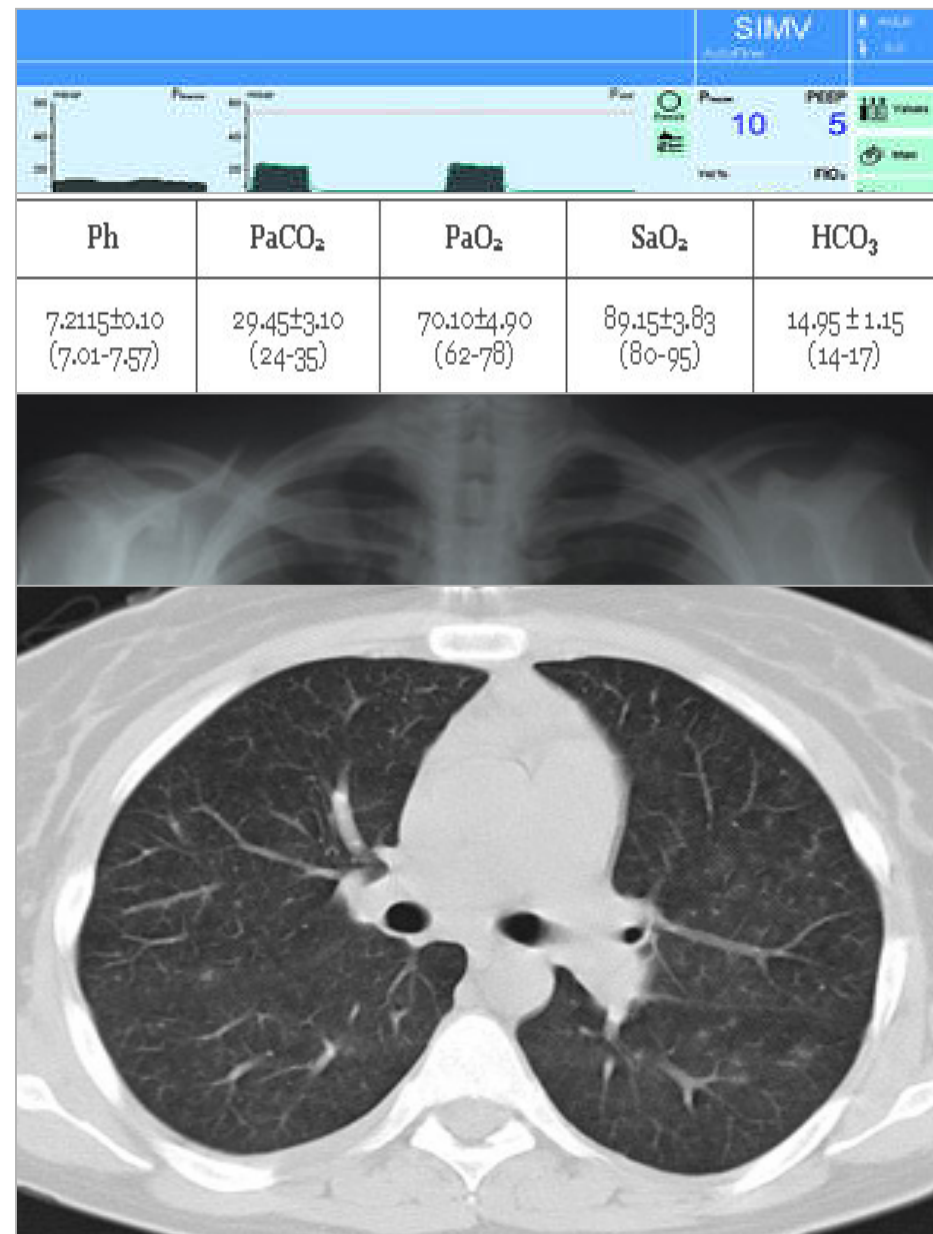


§ **Individualitzar la PEEP** per cada pacient³

§ La Lesió Pulmonar Aguda (LPA) és **heterogènia**.

– Els paràmetres convencionals reflexen el **pulmó en conjunt**^{4, 5}

§ Per gestionar atelectasies i sobredistensió es necessita conèixer la **distribució de la ventilació** a les zones ventrals i dorsals^{6, 7}



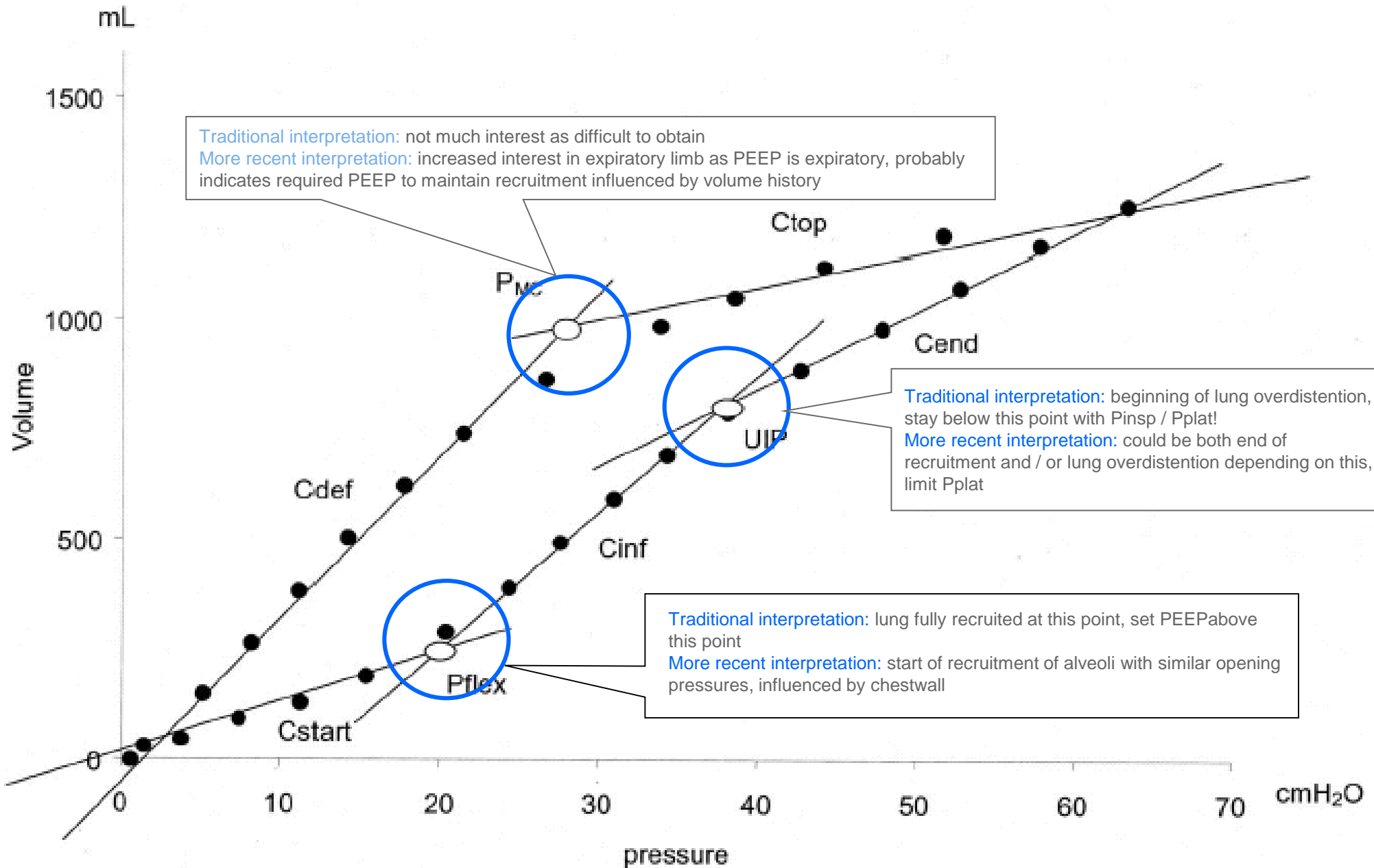
3 Hickling, K., (2002) Unpublished protocol

4 Crotti, S., Mascheroni, D., Caironi, P. et al. (2001); Am J Respir Crit Care Med 164: 131–140

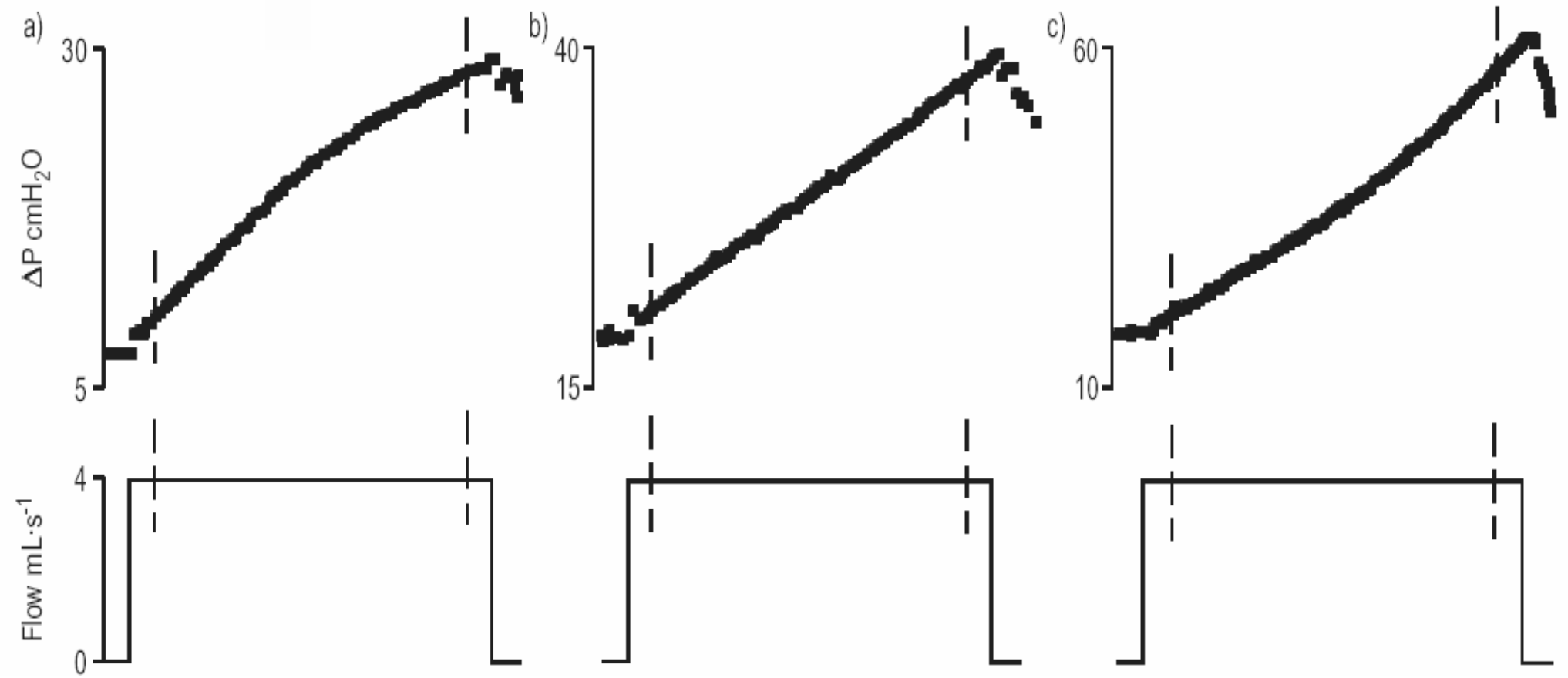
5 Pelosi, P., Goldner, M., McKibben, A. et al. (2001); Am J Respir Crit Care Med 164: 122–130

6 Harris, R.S. (2009); Intensive Care Med 35:740–747

7 Caramez, P. M., Kacmarek, R. M., Helmy, M. et al (2009); Intensive Care Med 35:740–747



Nishida T, Suchodolski K, Schettino GP, Sedeek K, Takeuch M, Kacmarek RM. Peak volume history and peak pressure-volume curve pressures independently affect the shape of the pressure-volume curve of the respiratory system. Crit Care Med. 2004 Jun;32(6):1358-64.



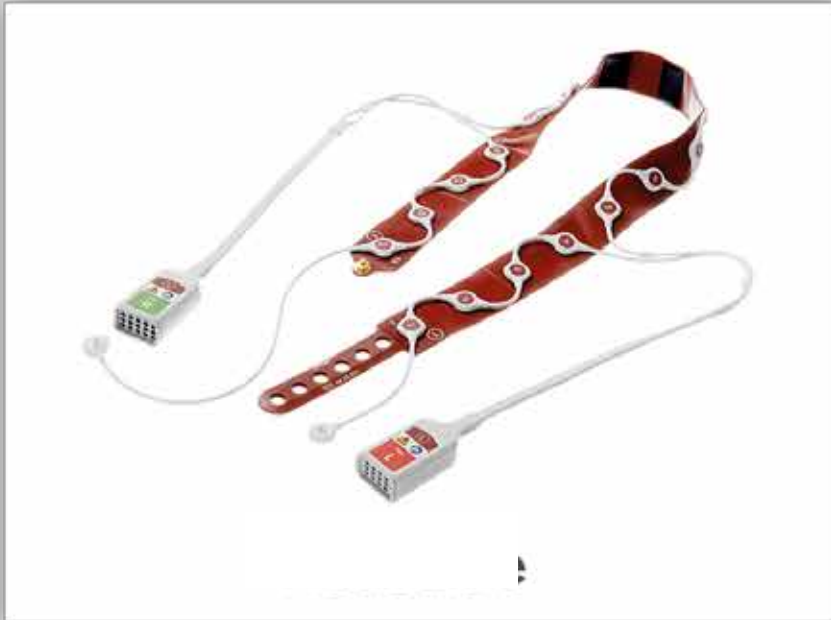
*How respiratory system mechanics may help in minimizing ventilator induced lung injury in ARDS patients.
Eur. Respir. J. 2003; 22; Suppl 42, 15s-221s*

¿Qué es la TIE?

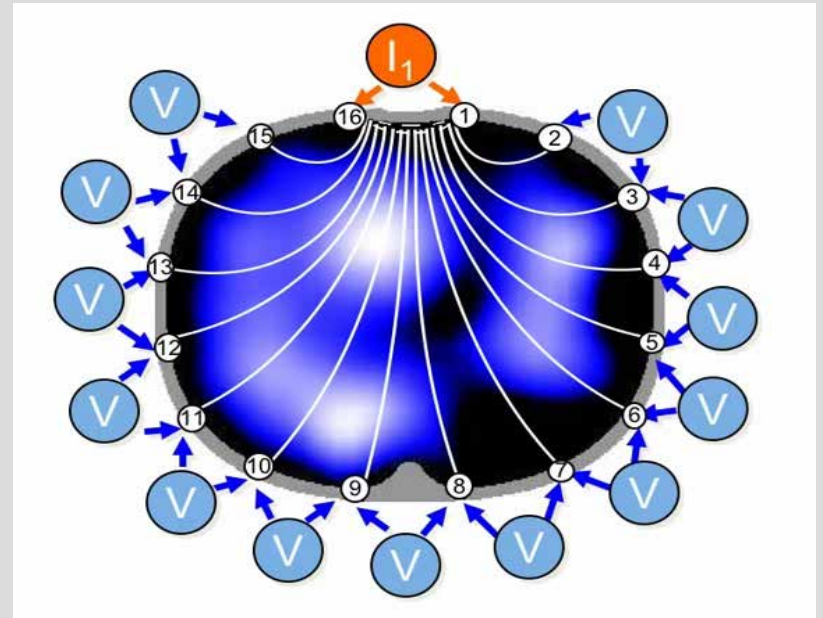
2 La tecnología



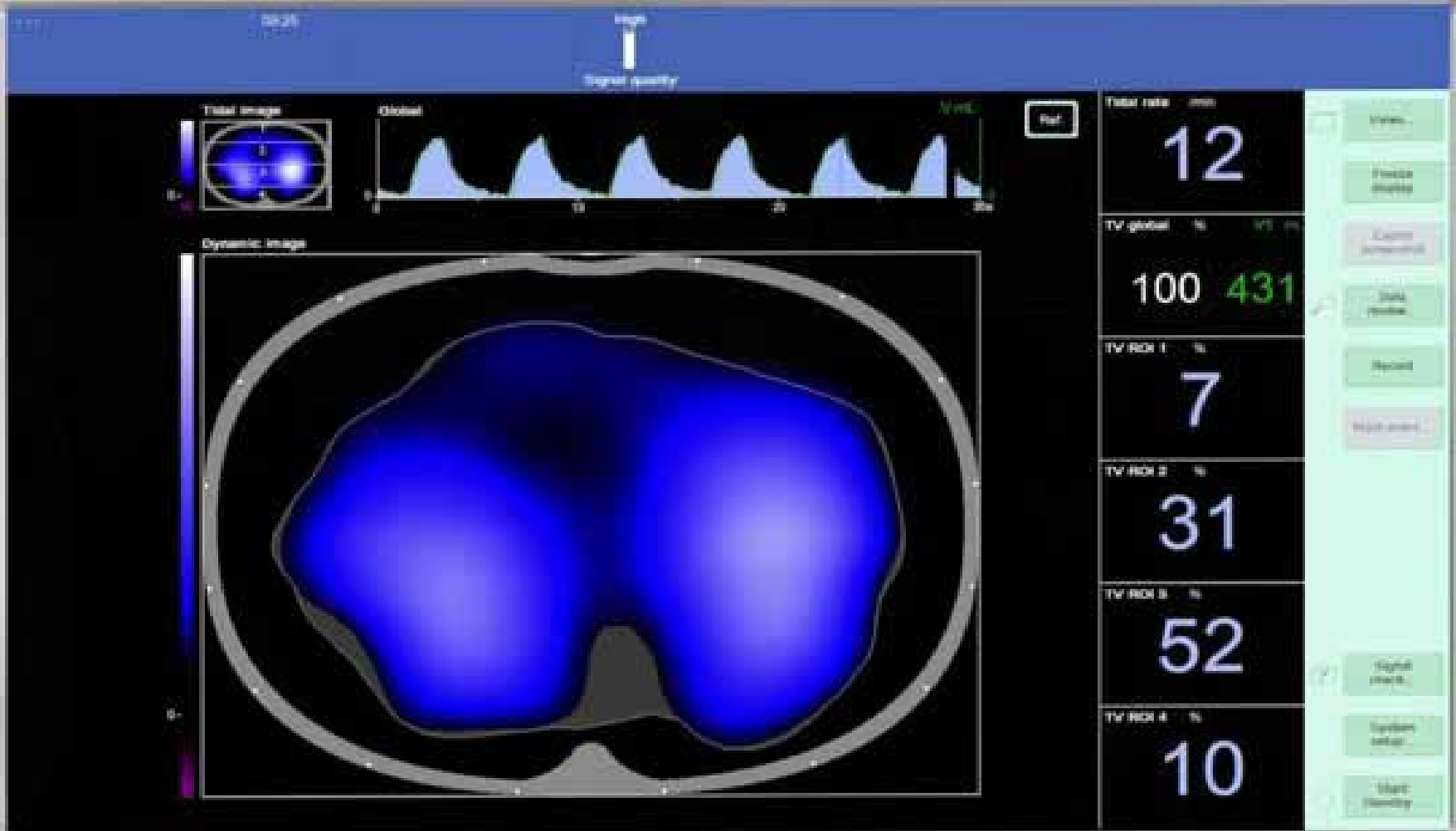
cinturó de 16 electrodos



cada sensor és emisor i receptor de petits corrents elèctrics



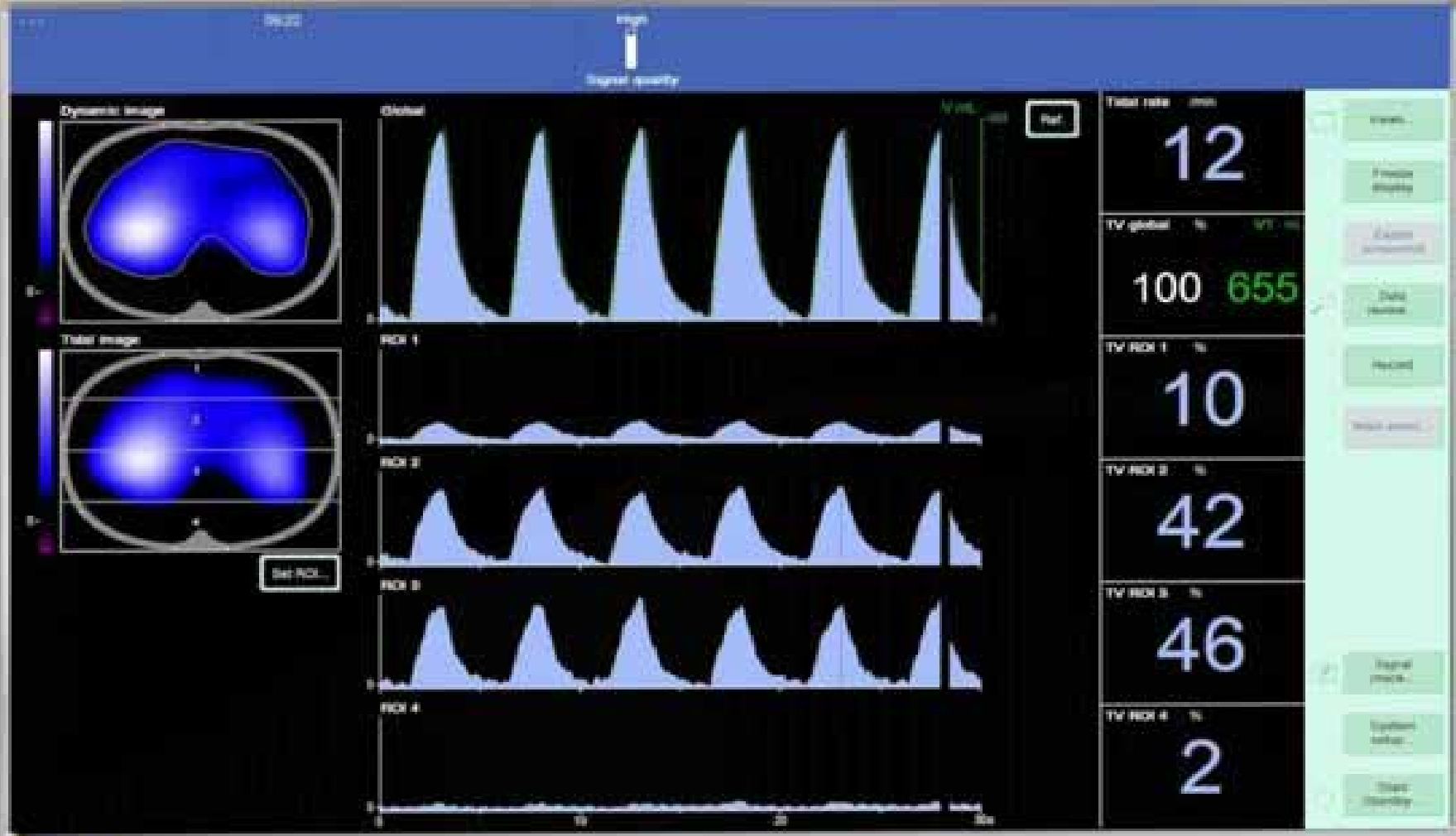
Dräger



Infinity C500



Dräger



Infinity C500



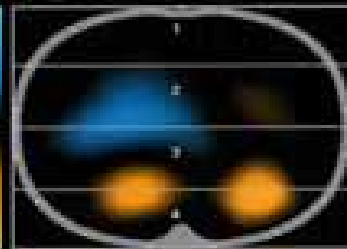
Dräger

09:41

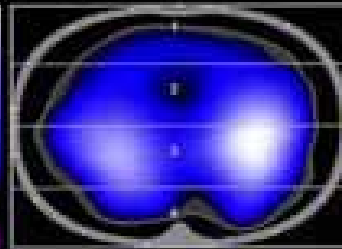
High

Signal quality

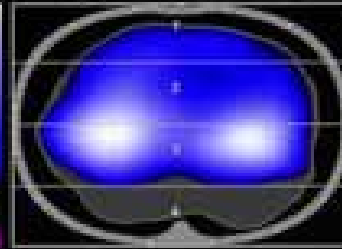
Change: O2 minus C1



Total image C1



Total image C2

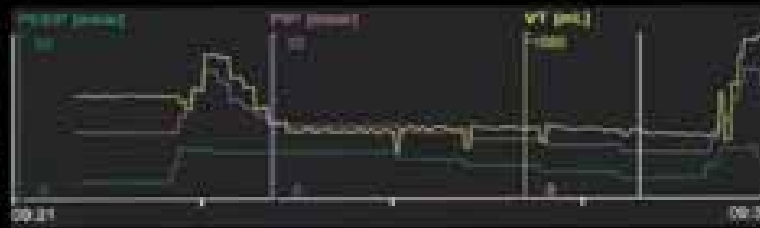
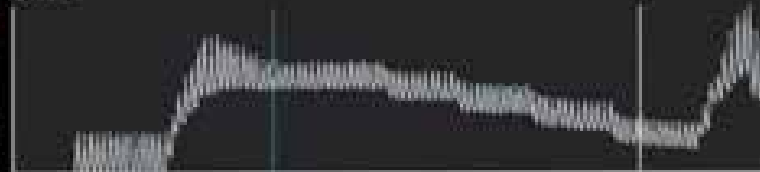


Cursor 1

Cursor 2

	Cursor 1	Cursor 2
TV (ml)	100	100
TV ROI 1 (%)	7	10
TV ROI 2 (%)	31	39
TV ROI 3 (%)	62	51
TV ROI 4 (%)	11	0
PEEP (mmHg)	14	6
PiP (mmHg)	23	14
VT (ml)	428	427
Time	09:24:26	09:24:15
Date	02-Sep-2015	02-Sep-2015

Global



Time scale

10 min

Refresh

System

Print image

Print waveform

Clear screen

Reset

Back screen

Help screen

Signal status

System status

Start recording

Infinity C500

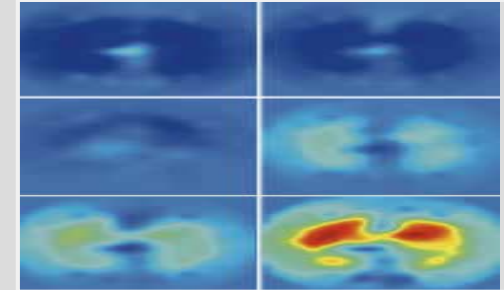
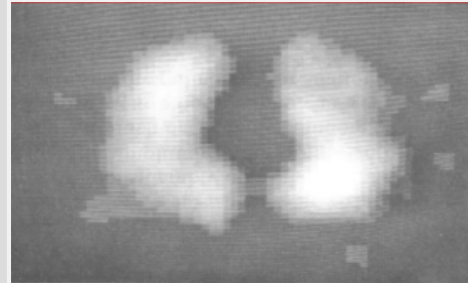


canvis a la impedancia que apareixen durant la ventilació a temps real

Tejido	Impedancia / Resistividad	
Sangre		150 Ω * cm
Pulmón	espiración	700 Ω * cm
	inspiración	2400 Ω * cm
Grasa		2000-2700 Ω * cm
Huesos		16600 Ω * cm
Músculo	longitudinal	125 Ω * cm
	transversal	1800 Ω * cm
Músculo del corazón	longitudinal	160-575 Ω * cm
	transversal	420-5200 Ω * cm

evolució tecnològica

1.985 - First relative EIT images
Performed at Sheffield University (UK)



1.991 - Dräger purchased GOE MF II
(1st generation) from Goettingen University



2.006 - EIT Evaluation Kit 2 (3rd generation)
only 15 devices produced



Integrative
Medicine

Complementary
Medicine

Orthodox
Medicine

3

Pendre Decisions

MAKE THE **RIGHT** CHOICE

Results

regional V/Q

ARDSnet PEEP

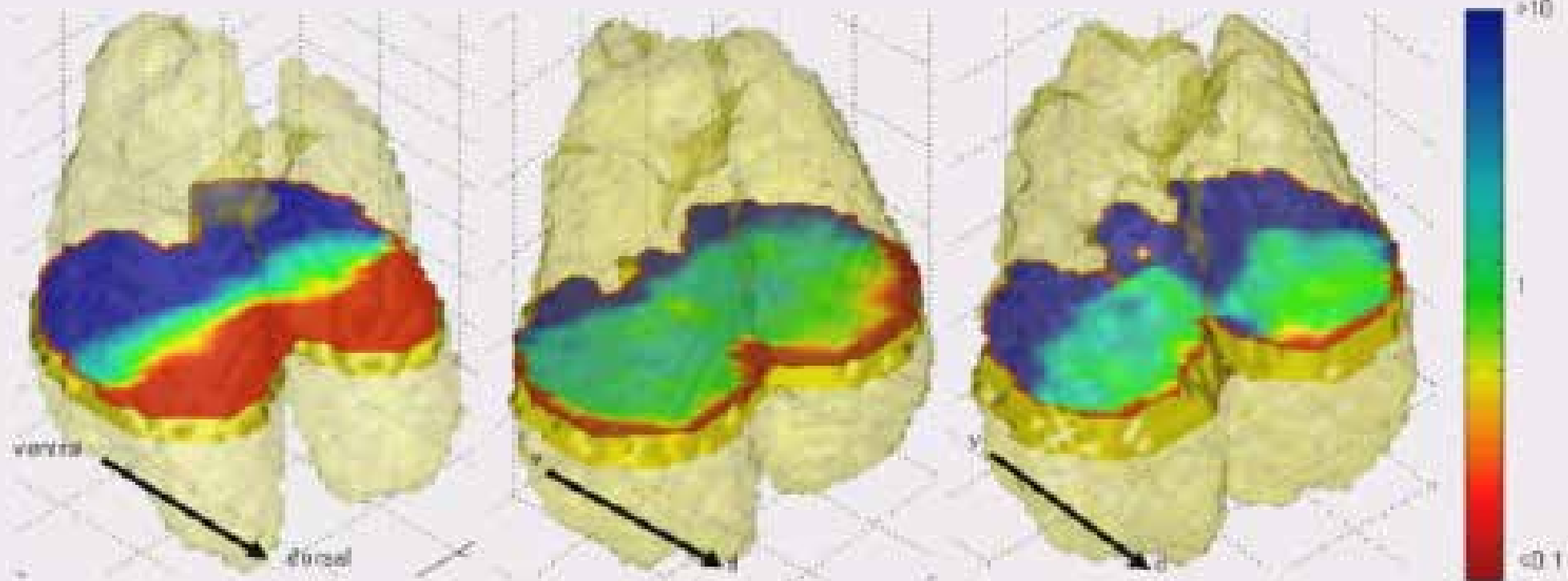
EIT PEEP

Open Lung PEEP

PEEP 10 cm H₂O

PEEP 20 cm H₂O

PEEP 24 cm H₂O

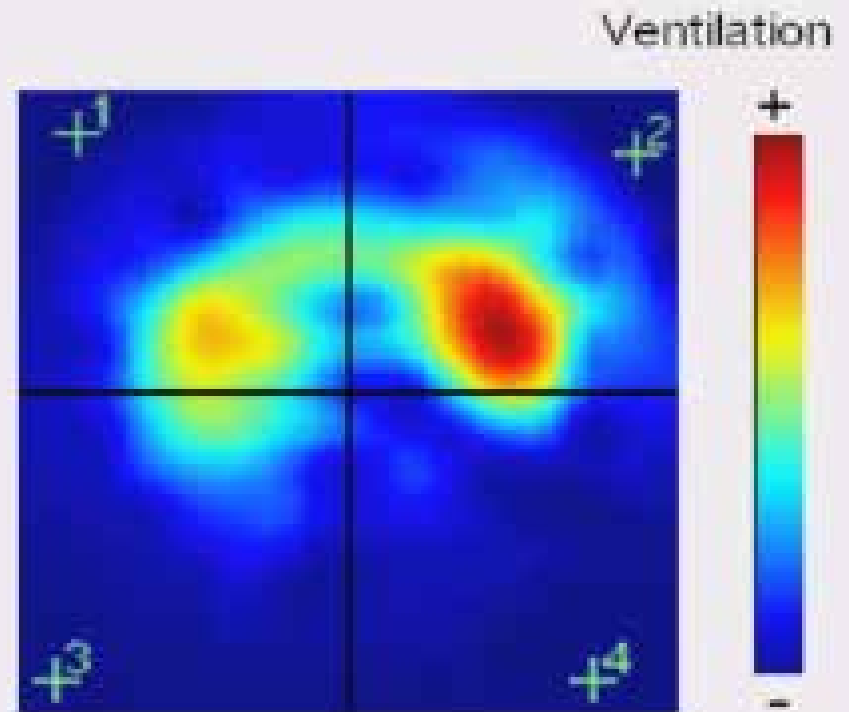


Regional Gascontent

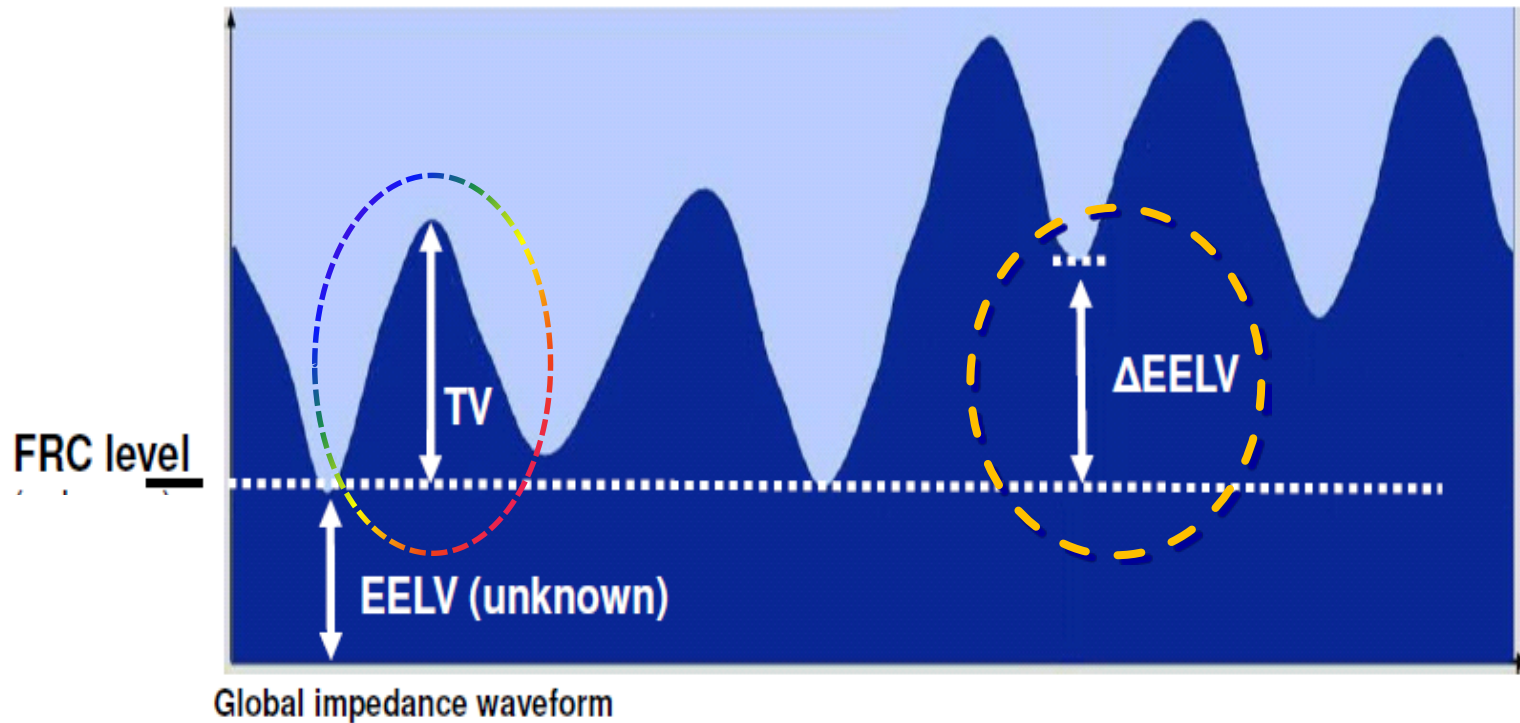
Computertomography and Electroimpedance Tomography



CT
Not at the bedside
radiation
Intermittently applicable



EIT
at the bedside
non invasive
continuously applicable



Els paràmetres TIE representen canvis en el volum pulmonar:

- **VT** (Variació Tidal)... **Distribució del Volum Tidal**
- **EELV** (End-Expiratory Lung Impedance)... **nivell de la CRF**
- **▲EELV** (Canvis al EELV)... **Canvis al final de la espiració**

INDIVIDUALITZAR LA ESTRATEGIA RESPIRATORIA

métode inocuu - no invasiu - a la capçalera del pacient





4 Experiències

Pneumotòrax

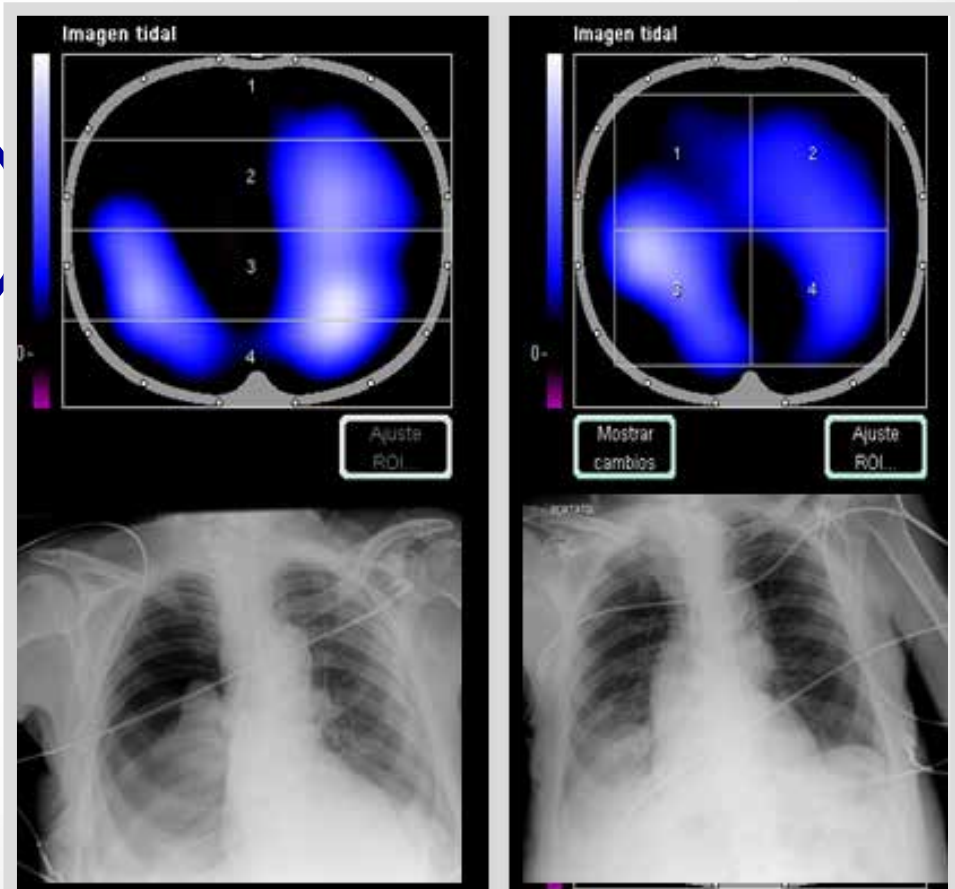
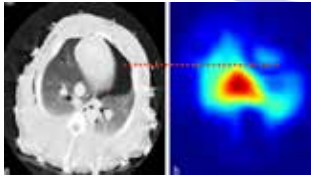
CLINICAL APPLICATIONS OF THORACIC ELECTRICAL IMPEDANCE TOMOGRAPHY

H. Luepschen^a, T. Meier^b, M. Grossher^b, T. Leibecke^c, H. Gehring^b,
S. Leonhardt^b

^aMedical Information Technology, Helmholtz-Institute, RWTH Aachen University, Germany

^bDepartment of Anaesthesiology, University of Luebeck, Germany

^cDepartment of Radiology, University of Luebeck, Germany

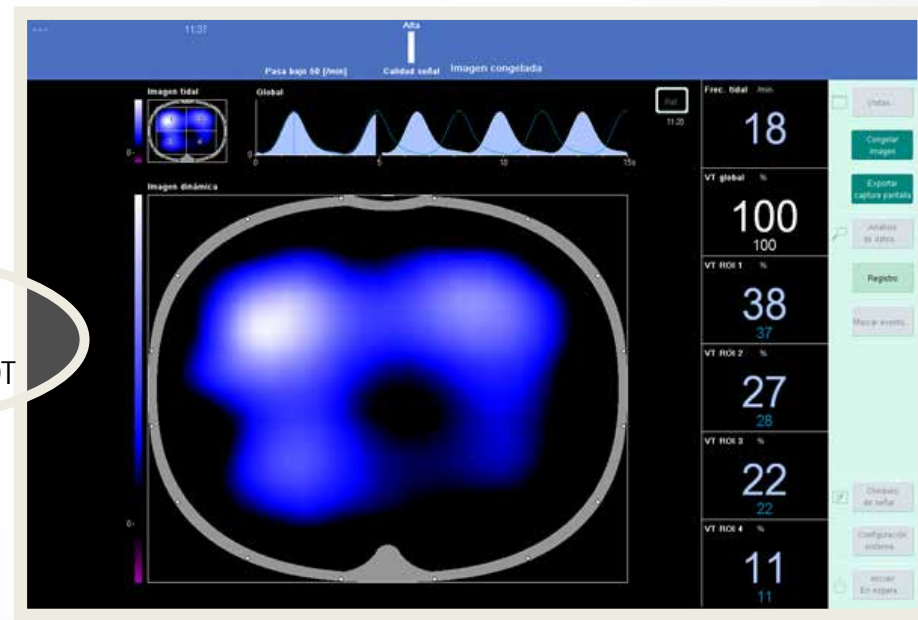


Atelectasia lòbul inferior

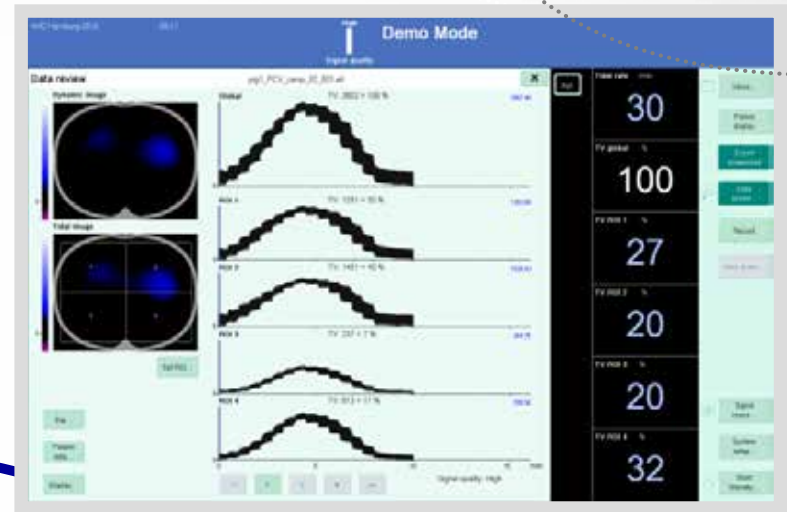
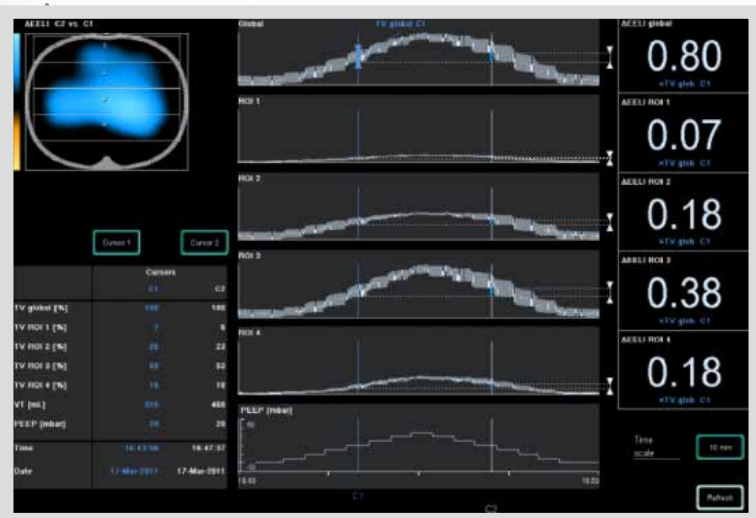


Etiologia

Excessiva introducció TOT



Reclutament Alveolar



Búsqueda PEEP ideal

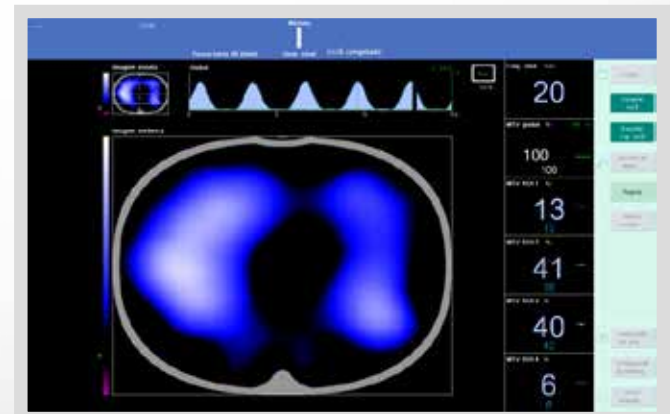
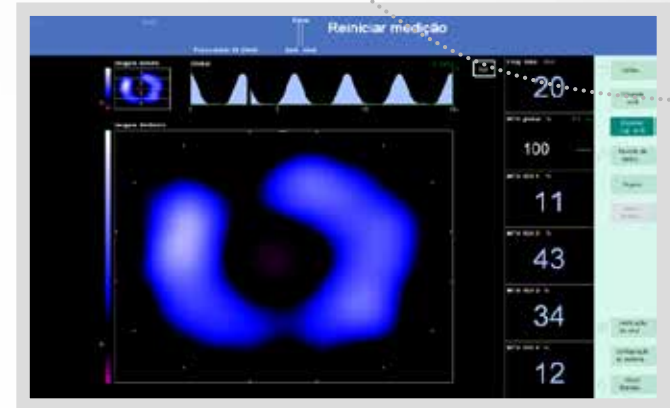
Análisis del Efecte Pendelluft

Tractament Postural



Monitorització a llarg plaç

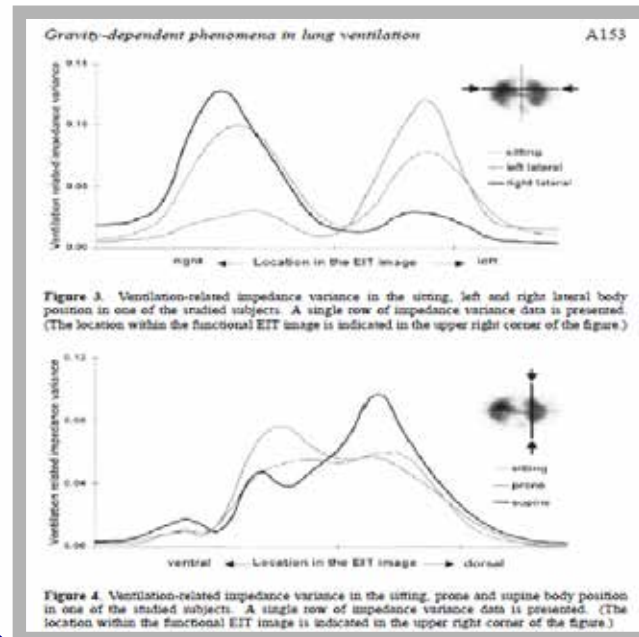
2 hores de diferència



Responedors vs No Responedors

Predicció

Decúbit Pro







**Moltes gràcies
per la vostra atenció**