

Echographie pulmonaire

Stein SILVA



Introduction

IRA

Sevrage

SDRA

Conclusions

Point-of-Care Ultrasound in Medical Education — Stop Listening and Look

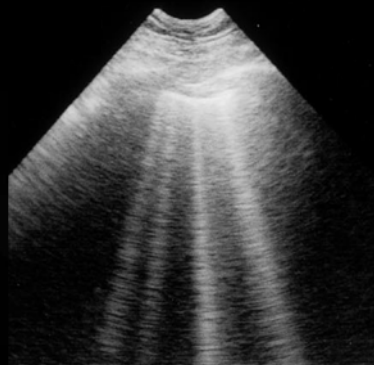
MED 370;12 NEJM.ORG MARCH 20, 2014

Scott D. Solomon, M.D., and Fidencio Saldana, M.D.



Syndrome interstitiel

Profil B



Condensation pulmonaire

Profil C



Pneumothorax

Pleurésie

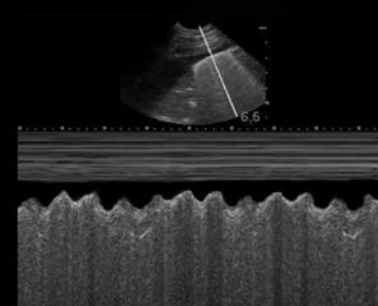
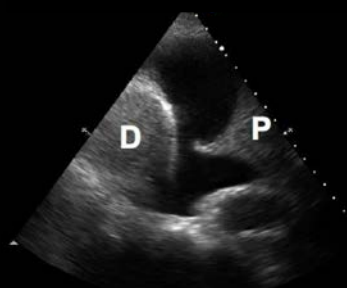
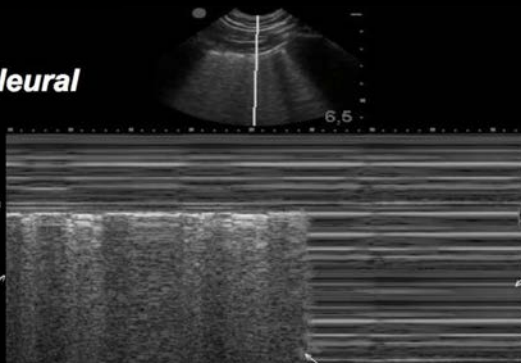
Glissement pleural

Pneumothorax
disparition image
en « front de mer »

Parenchyme pulmonaire en mode TM
Image en « bord de mer »

« Point poumon »

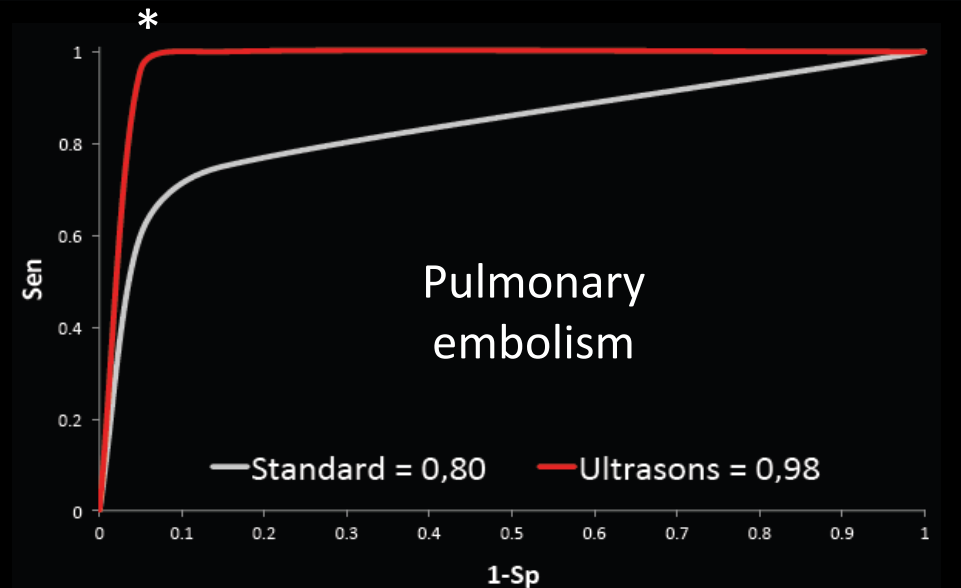
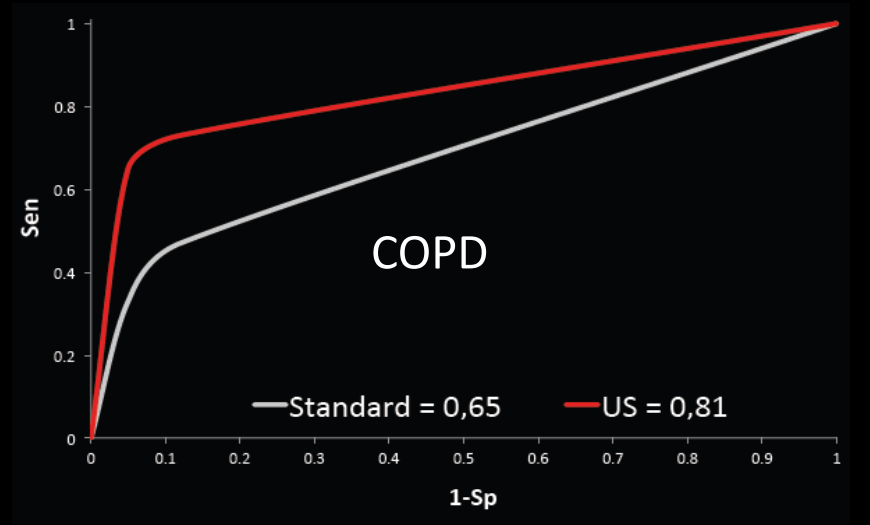
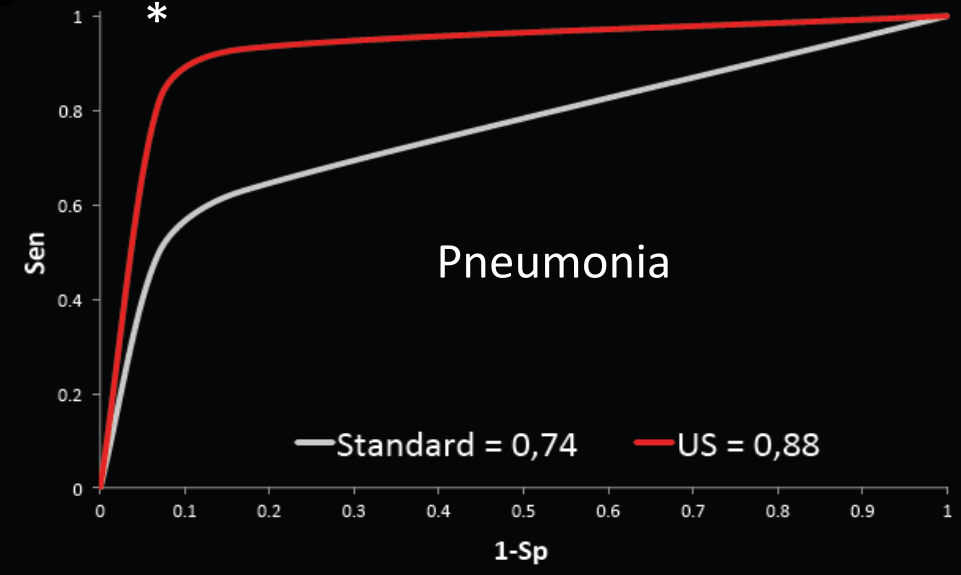
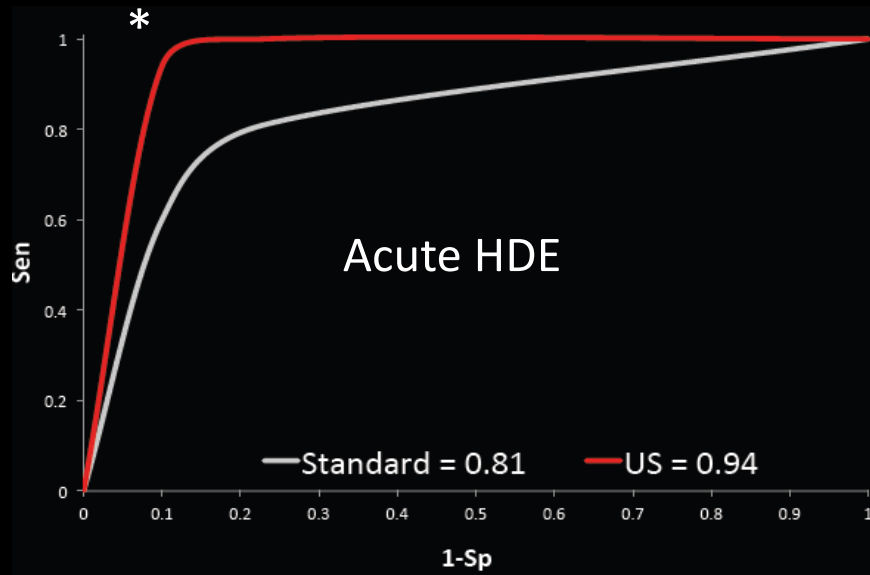
Signe du sinusöide mode TM



**Table 1—Ultrasound Profiles Used in the Bedside
General Chest Ultrasound Evaluation**

Condition	Lung	Heart
Pulmonary embolism	A profile with DVT	RV failure (acute)
Acute hemodynamic pulmonary edema	B profile	High end-diastolic LV pressure
Decompensated COPD	A profile	RV failure (chronic)
Pneumothorax	A' profile	Nonspecific
Pneumonia	C profile	Nonspecific
	A profile plus PLAPS	
	A/B profile	

LV = left ventricular; PLAPS = posterolateral alveolar and/or pleural syndrome;²² RV = right ventricular.



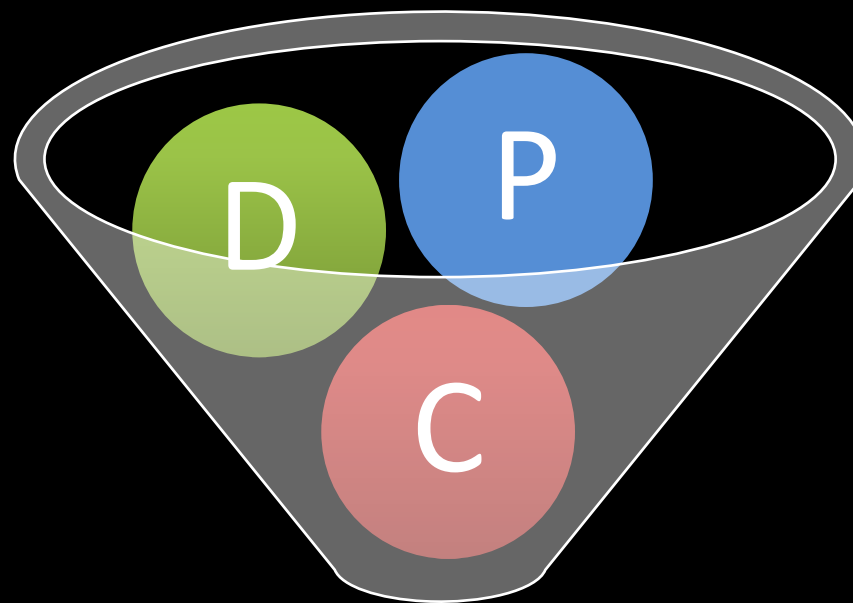
Introduction

IRA

Sevrage

SDRA

Conclusions



Analyse intégrée

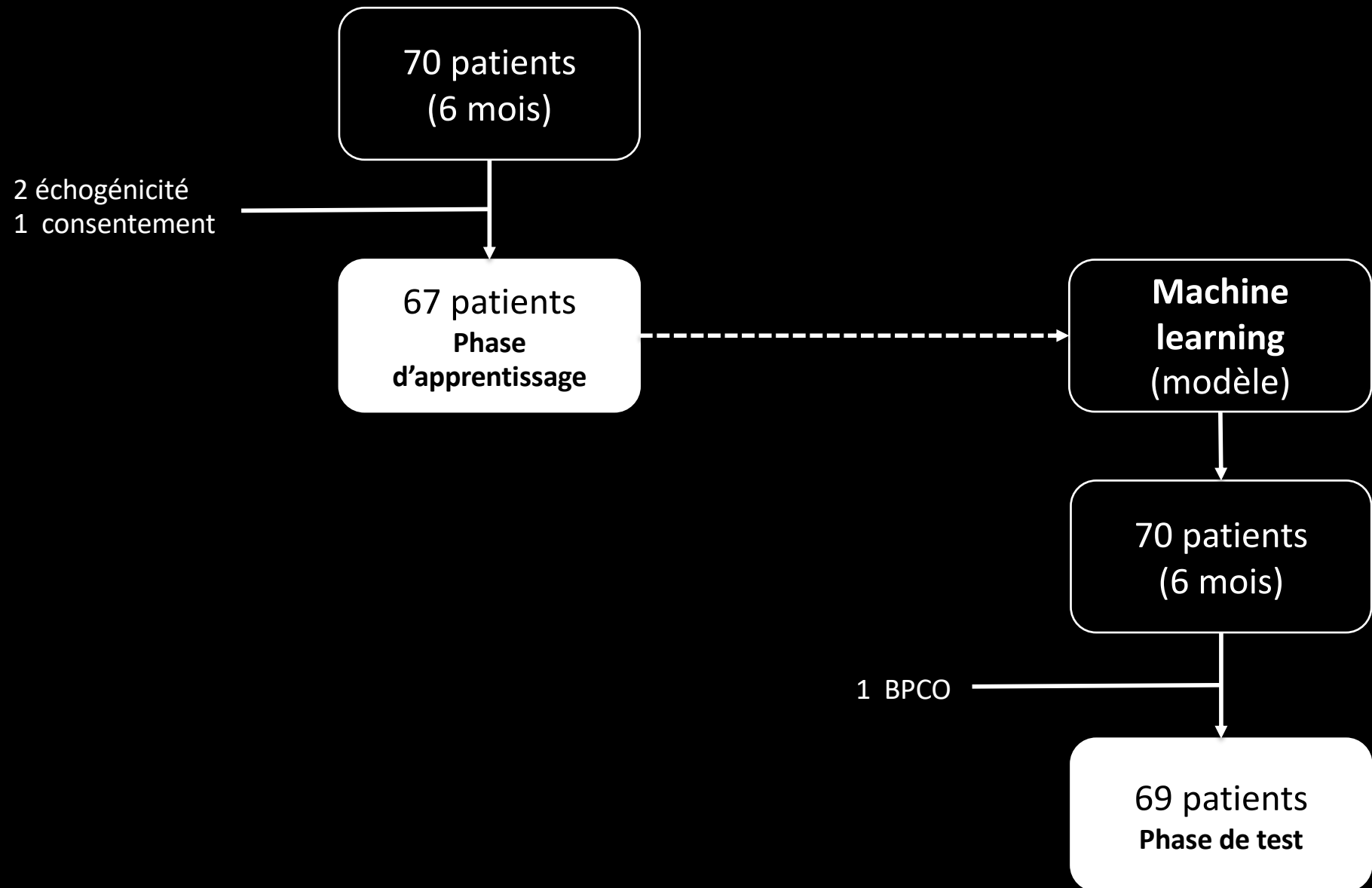
Introduction

IRA

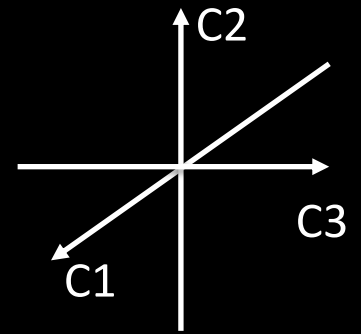
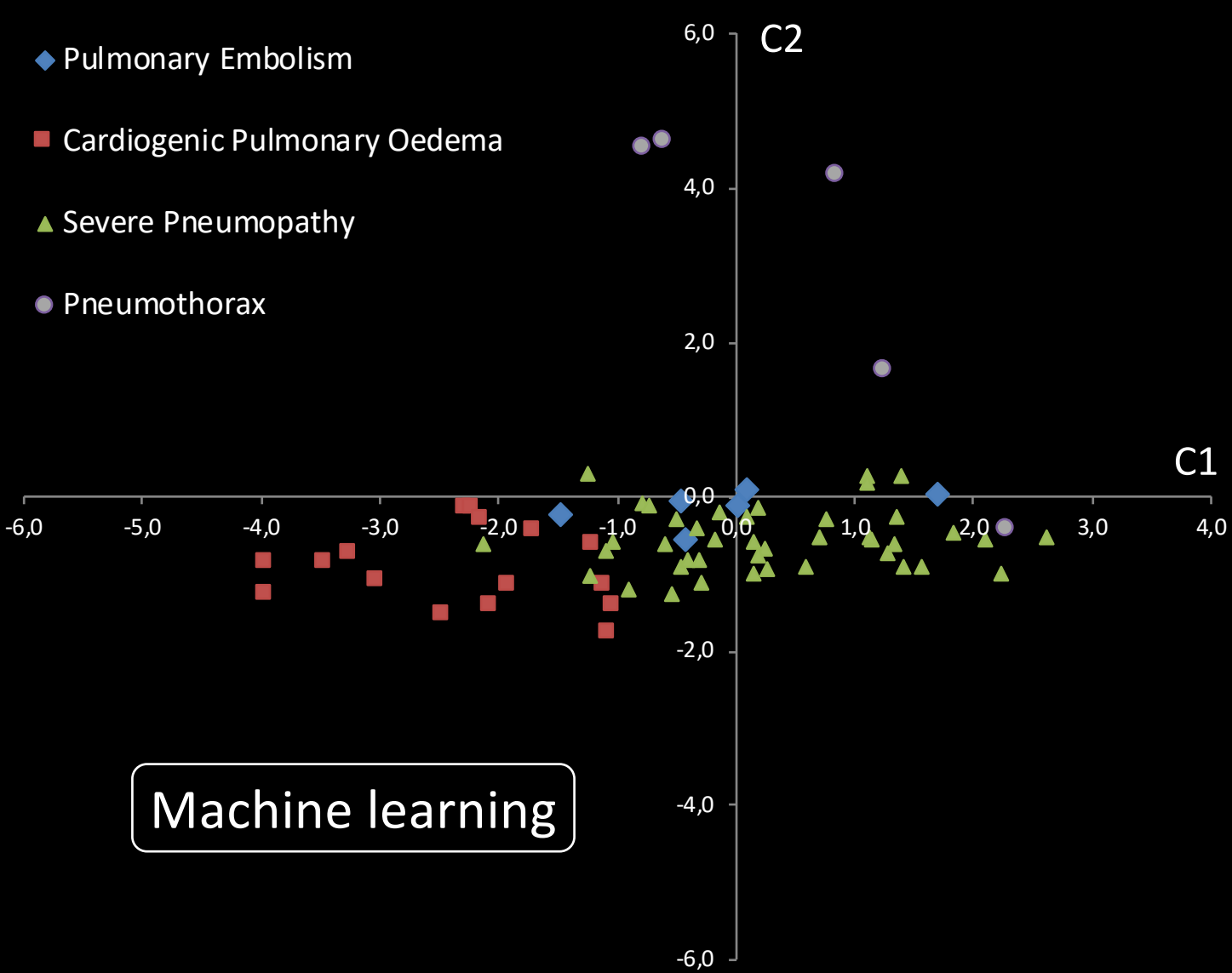
Sevrage

SDRA

Conclusions



- ◆ Pulmonary Embolism
- Cardiogenic Pulmonary Oedema
- ▲ Severe Pneumopathy
- Pneumothorax



Machine learning

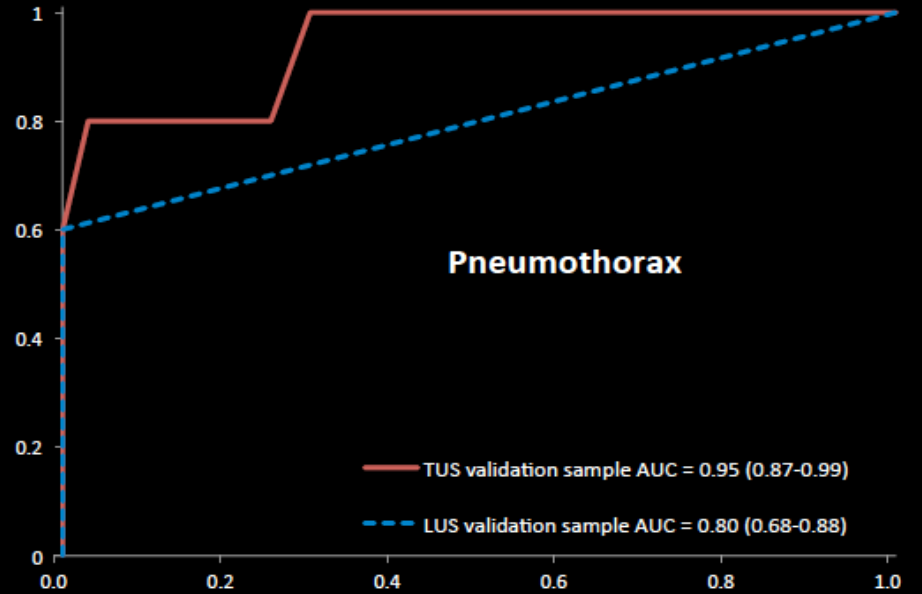
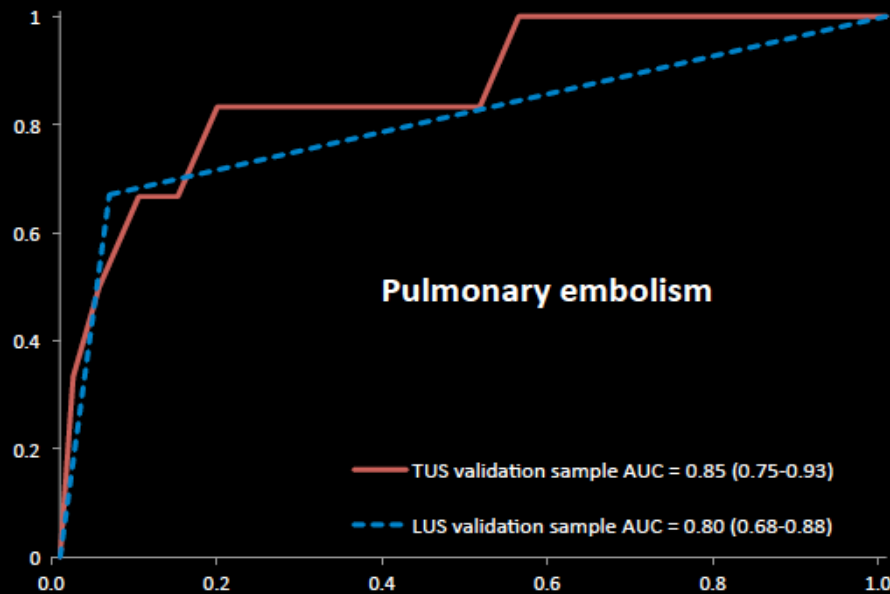
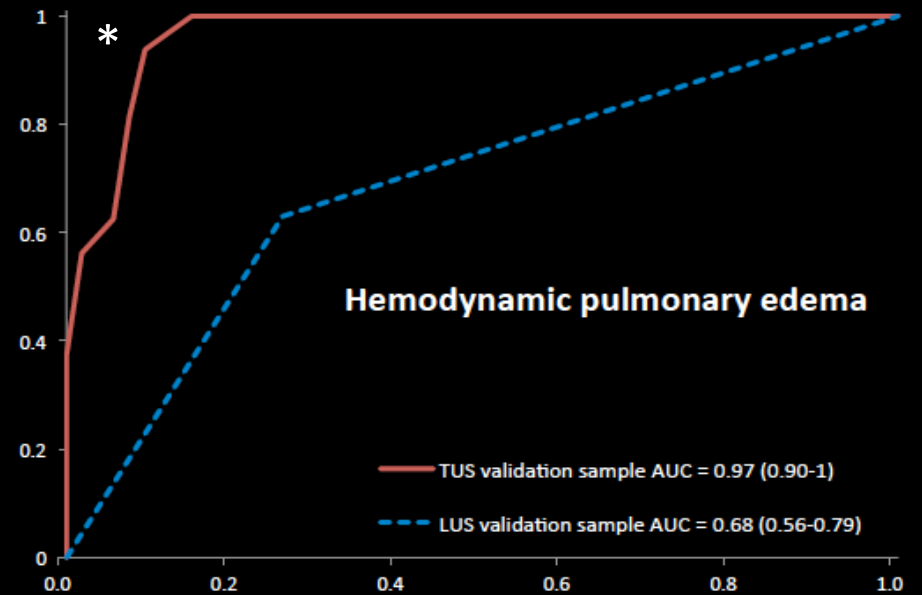
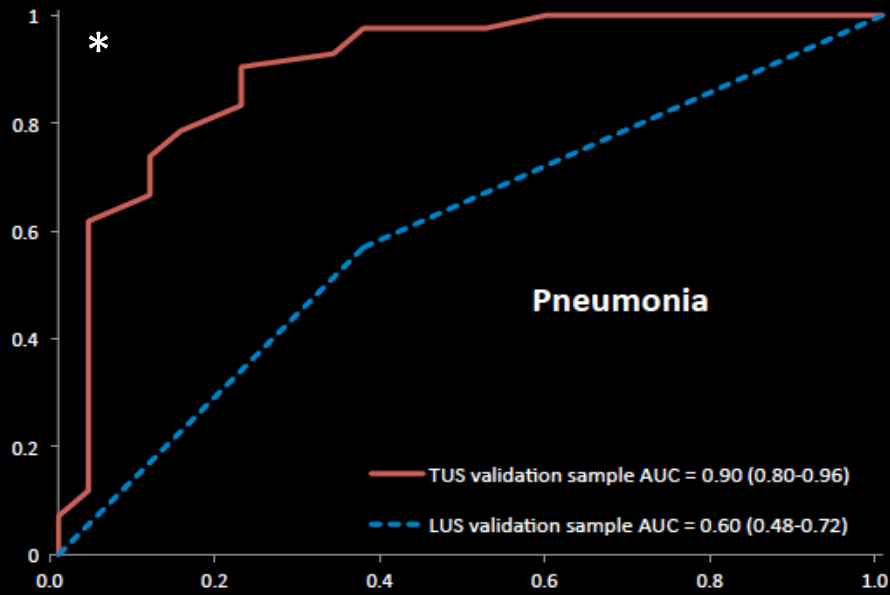
Introduction

IRA

Sevrage

SDRA

Conclusions



- Echec du sevrage ventilatoire invasif (48H): **30 %**

- Impact clinique
 - Durée de sejour.
 - Incidence des PAVM.
 - Syndrome de stress post-traumatique.
 - Morbidité et mortalité (20 à 36 %).

Introduction

IRA

Sevrage

SDRA

Conclusions

Prédiction

Caractérisation

T0

T1

T*

H48

[Epreuve de sevrage]

[Suivi clinique standardisé et indépendant]

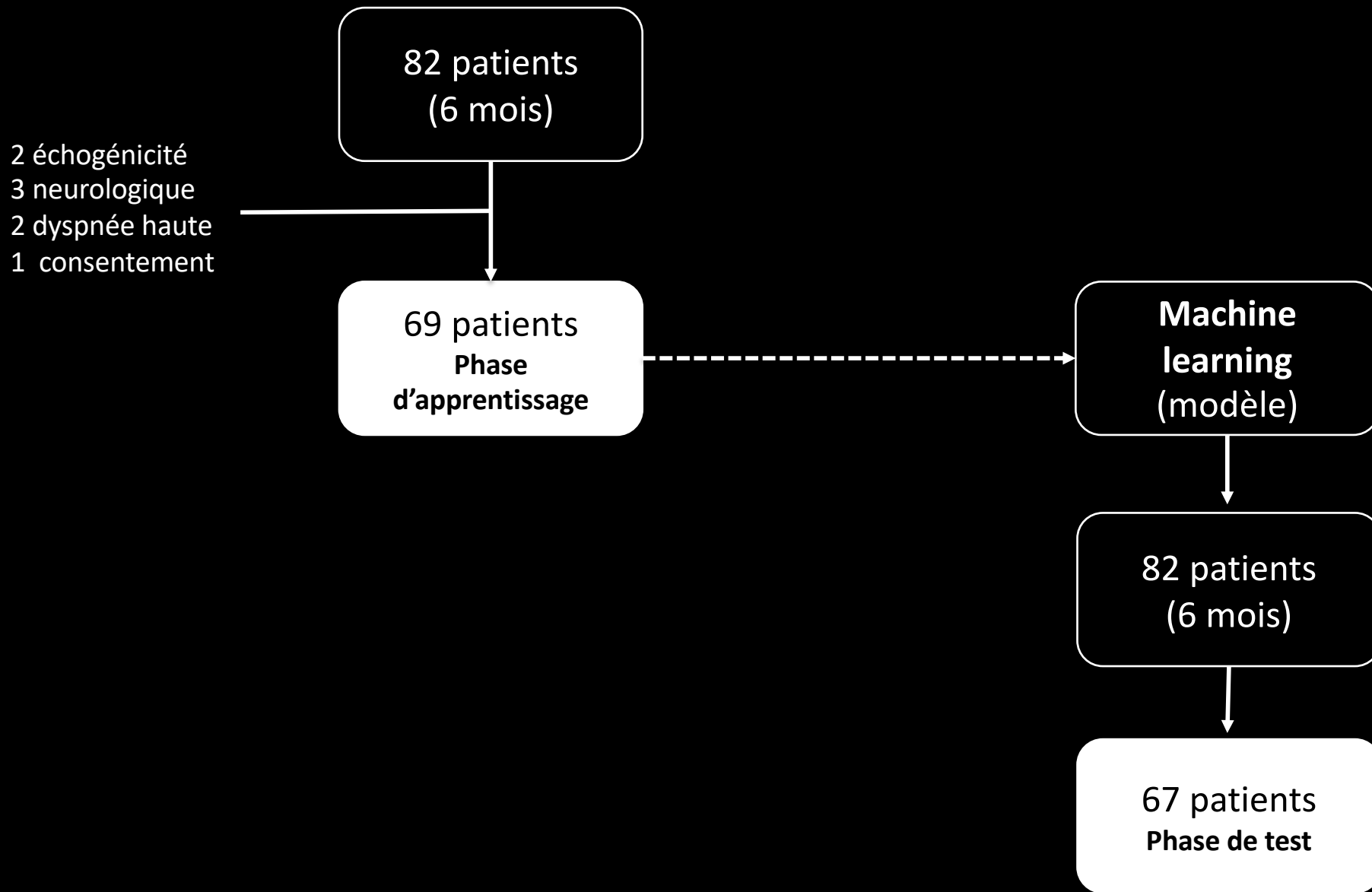
Introduction

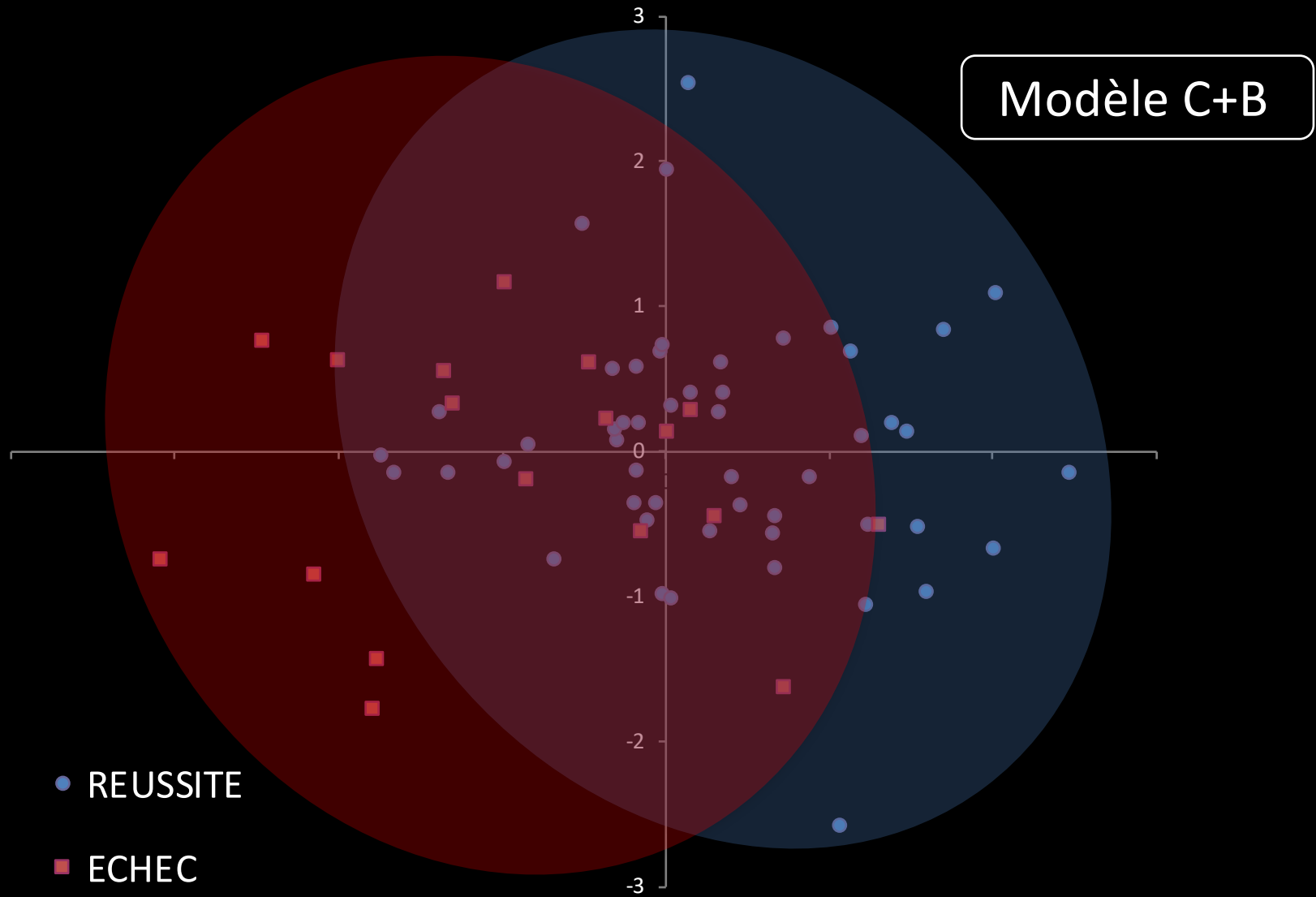
IRA

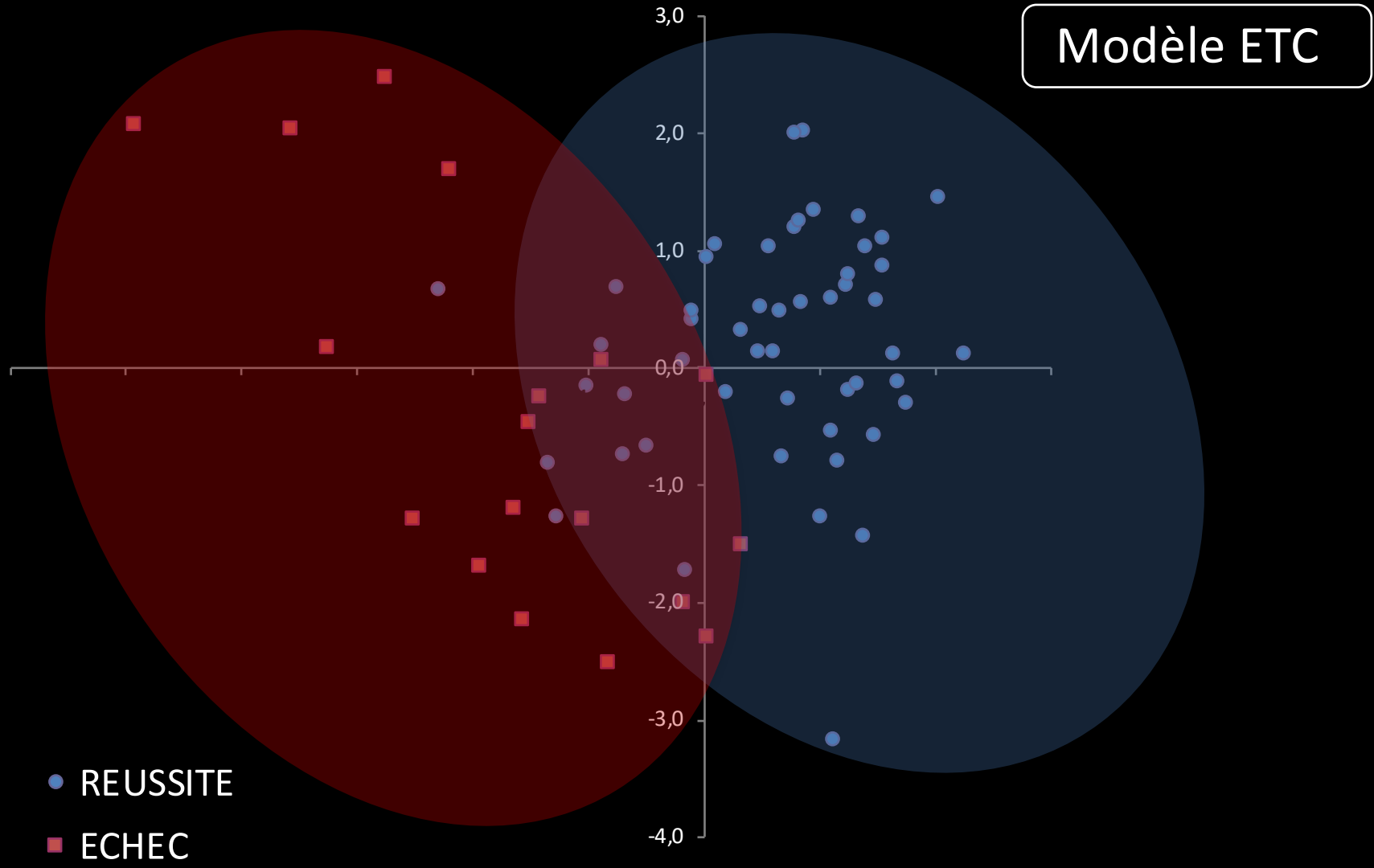
Sevrage

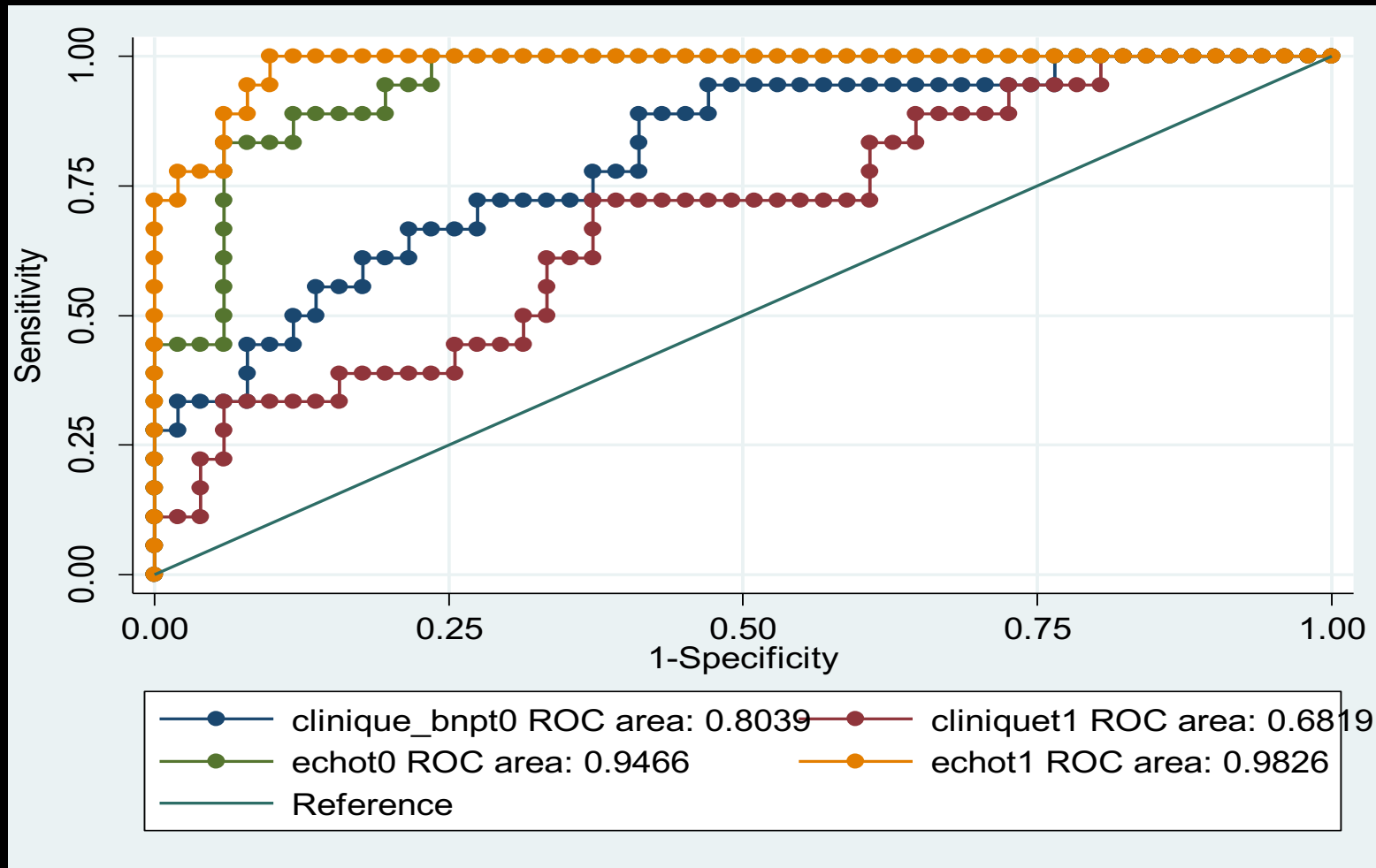
SDRA

Conclusions

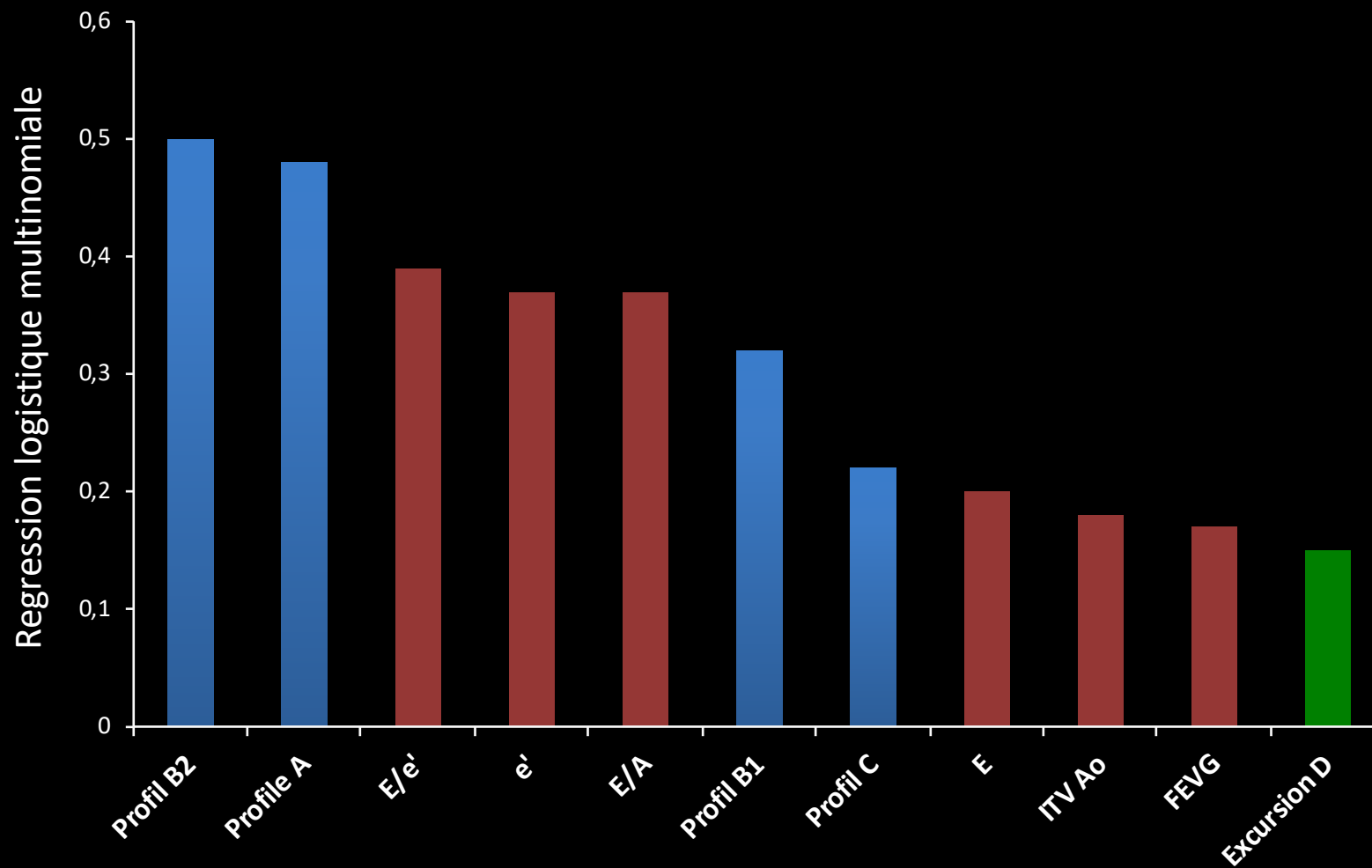


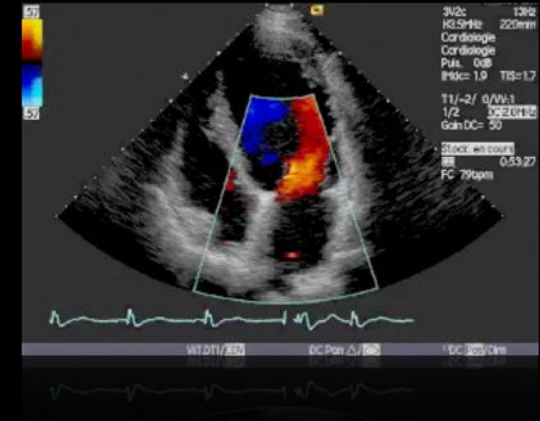
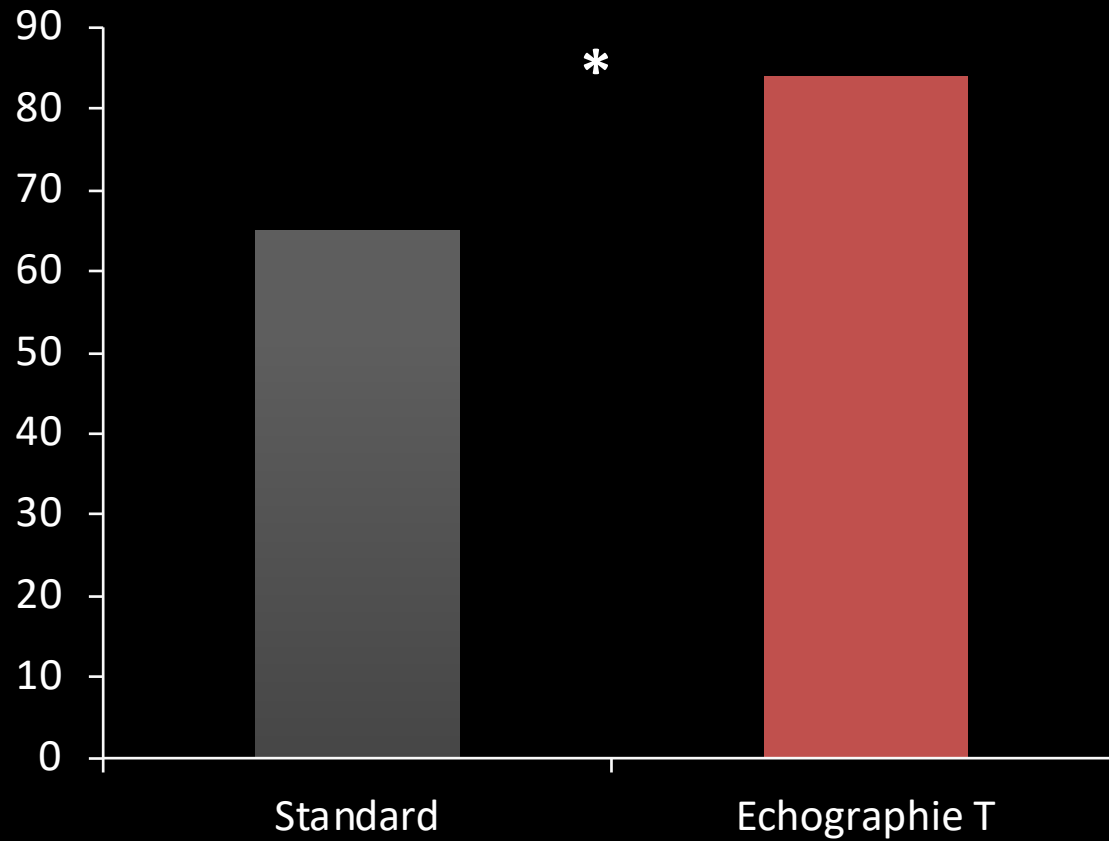






Modèle d'apprentissage automatique: *échographie thoracique*

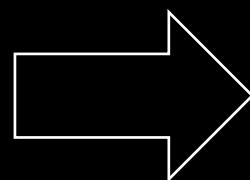
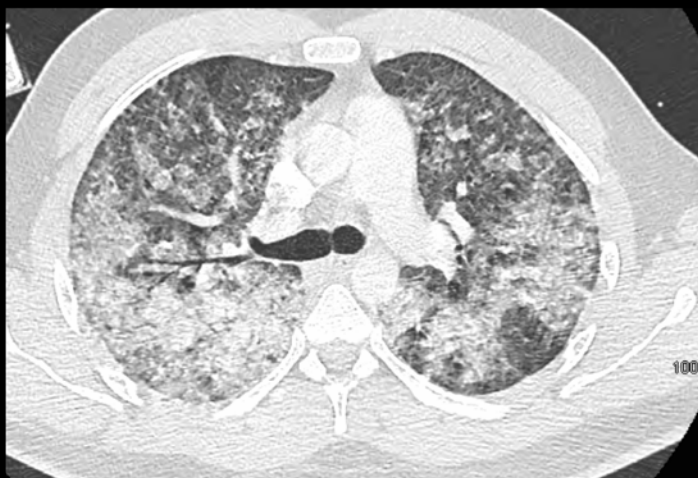




Diagnostiques mixtes **24 %**

* $p < 0.005$

Quantification de la ré-aération (recrutement alvéolaire)			Quantification de la perte d'aération (dérecrutement alvéolaire)		
1 point	3 points	5 points	1 point	3 points	5 points
B1 → N	B2 → N	C → N	N → C	N → B2	N → B1
B2 → B1	C → B1			B1 → C	B1 → B2
C → B2					B2 → C



Profis A, B, C

Hammad et al., *ICM* 2016

Wang et al., *Critical Care* 2016

Introduction

IRA

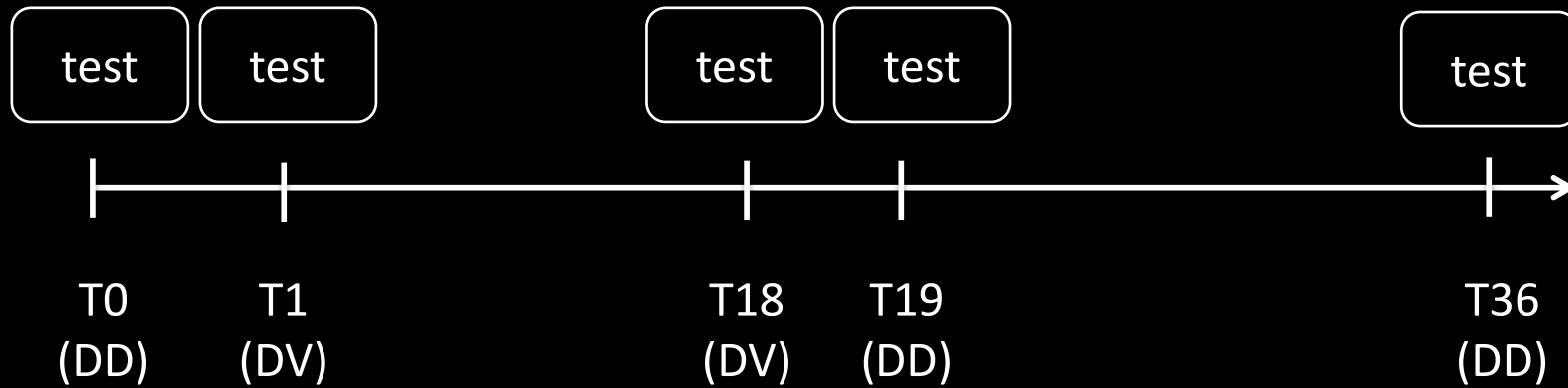
Sevrage

SDRA

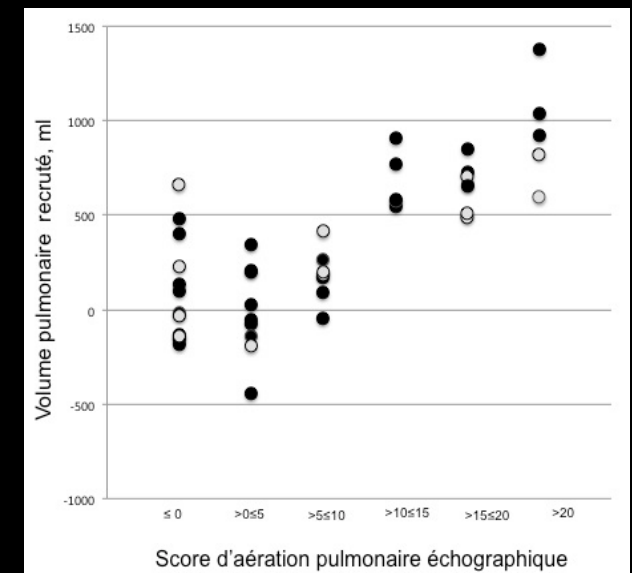
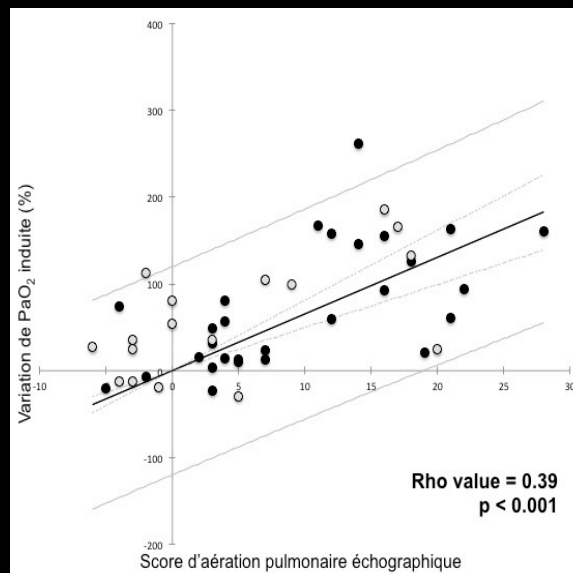
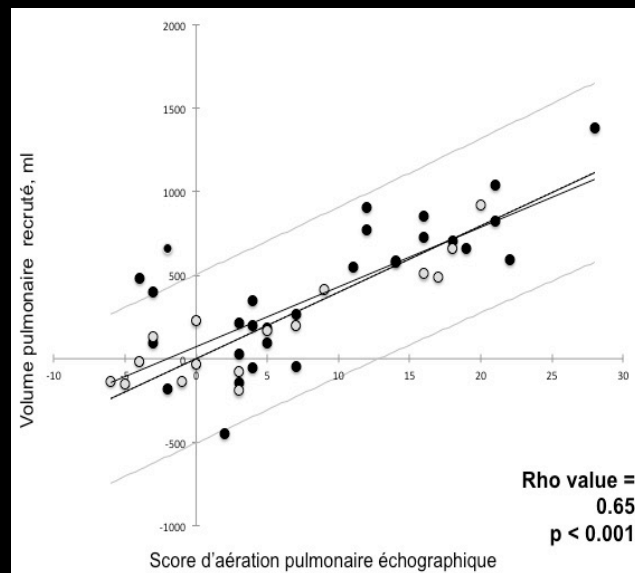
Conclusions

Recrutement

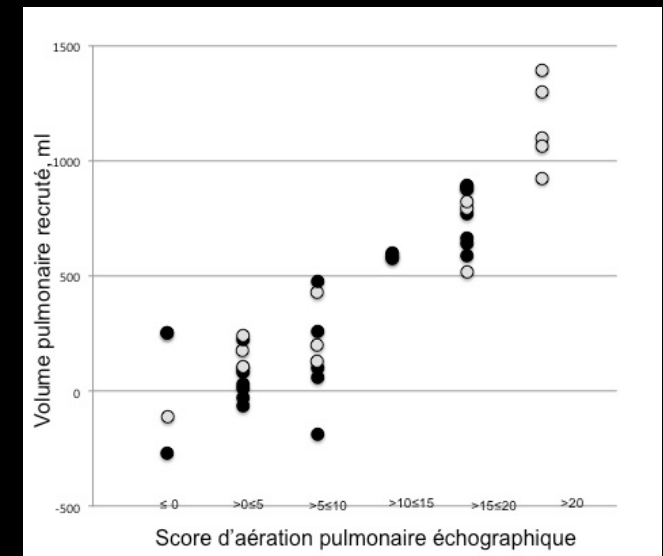
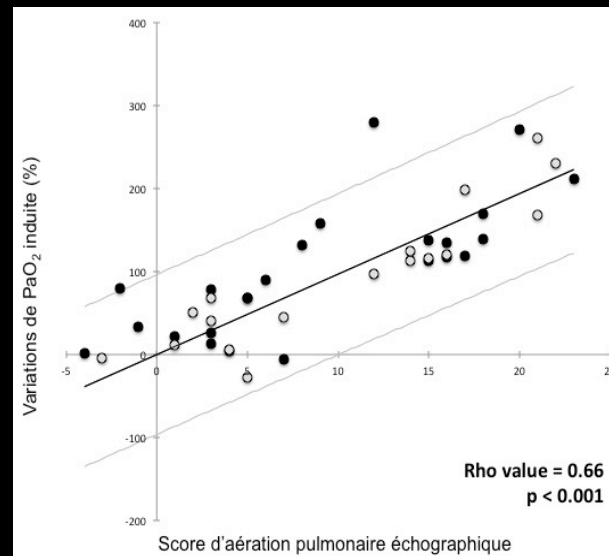
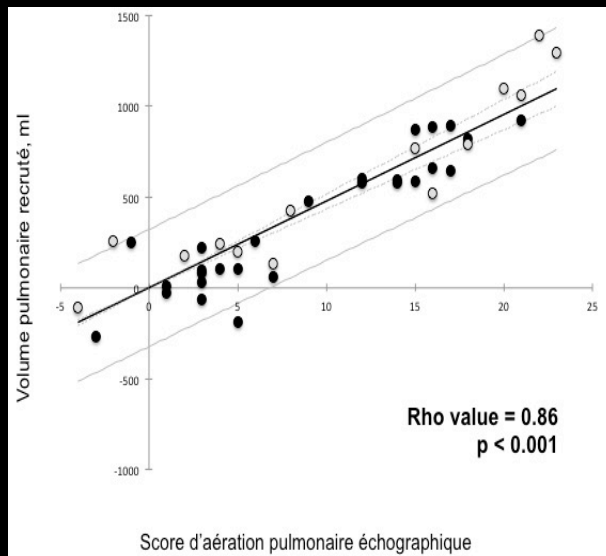
Derecrutement



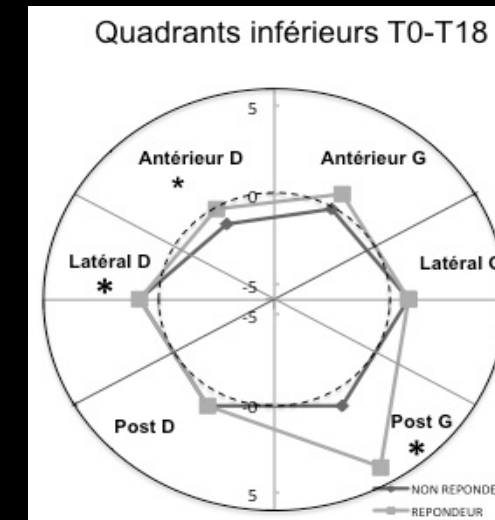
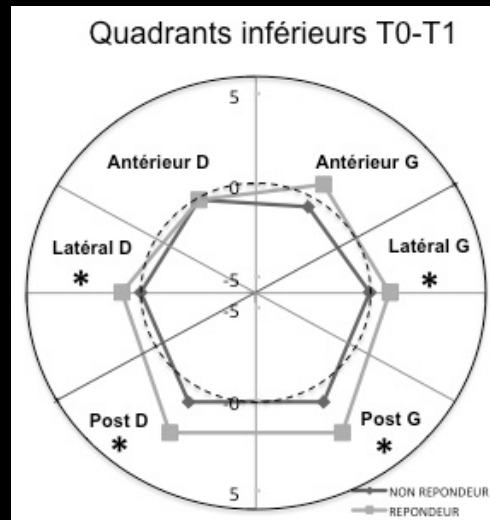
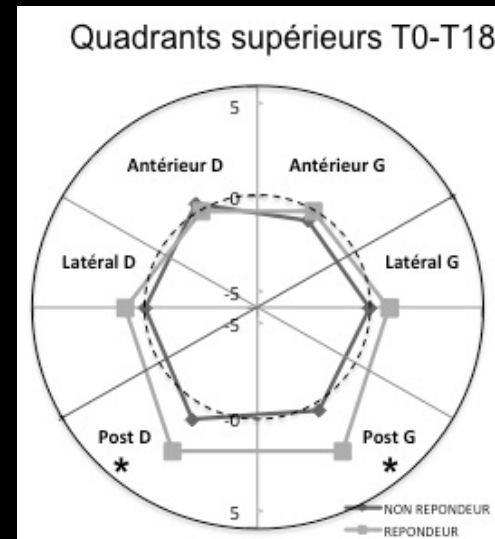
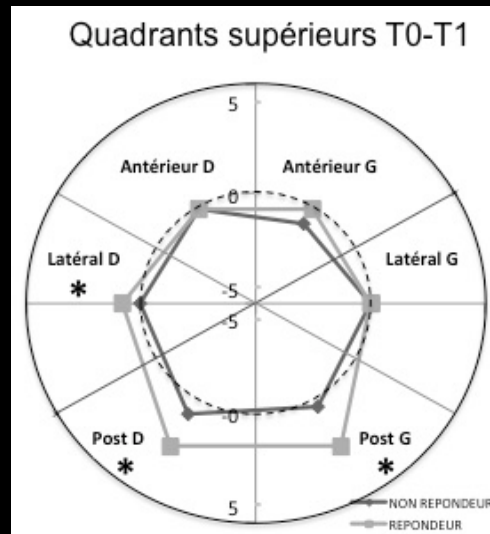
Projet eDV



Evolution entre H0 (DD) et H1 (DV)



Evolution entre H0 (DD) et H18 (DV)



- Ne donne pas accès aux rapports V/Q.
- Ne monitore pas la surdistension.
- Médecine de individualisée.

FORCES

- Au lit des patients.
- Innocuité.
- Répétée.
- Reproductibilité.
- Interactions.

FAIBLESSES

- Qualitatives.
- Besoin de formation.
- Difficultés d'acquisition.
- Simplification des algorithmes.

- Risque: le poids des images.
- Sémiologie / Algorithmes / Validation.
- Quantification.

Remerciements

Réanimation (CHU Toulouse)

B Riu

J Ruiz

V Ramonda

H Vinour

G Ducos

D Rousset

E Hourcastagnou

B Sarton

L Crognier

Imagerie (CHU Toulouse)

O Lairez

P Payoux

Méthodologie

B Bataille (CHR Narbonne)

K Boulanour (Inserm)

P Peran (Inserm)

F Aubry (CNRS)

A Nazorky (IRIT)

J Hernandez (IMT)