

HASTA CUANDO VOLEMIZAR..... ¿ ES ÚTIL LA ECOGRAFIA?



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Presidente Rama Cuidados Intensivos Pediátricos
Chile

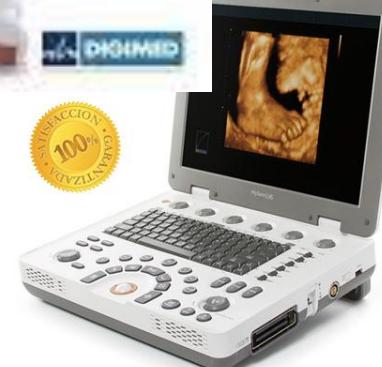
Conflictos de intereses



Tutorial
mindray
M7



MySono



15" Monitor
3D / 4D

Specke Reduction

T

Tissue Harmonic Imaging

SAMSUNG

SAMSUNG MEDISO

REVIEW ARTICLE

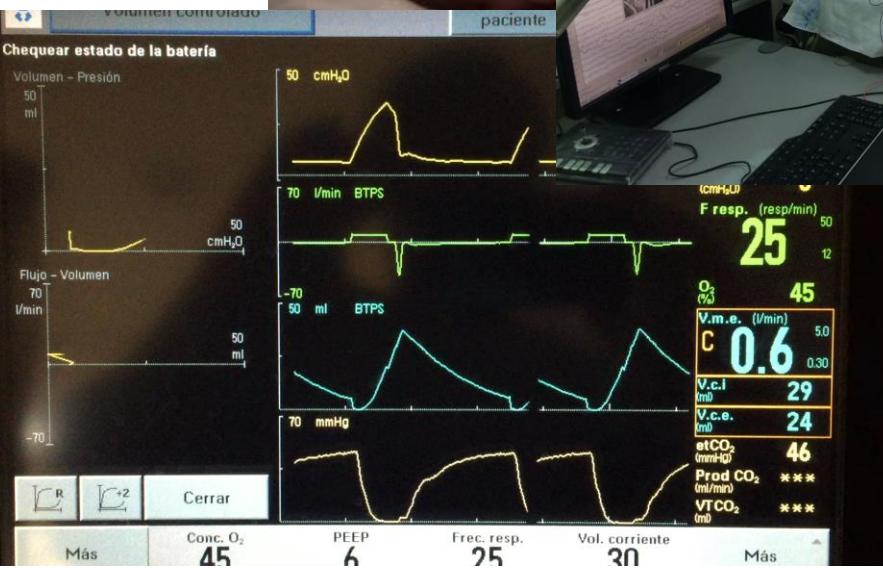
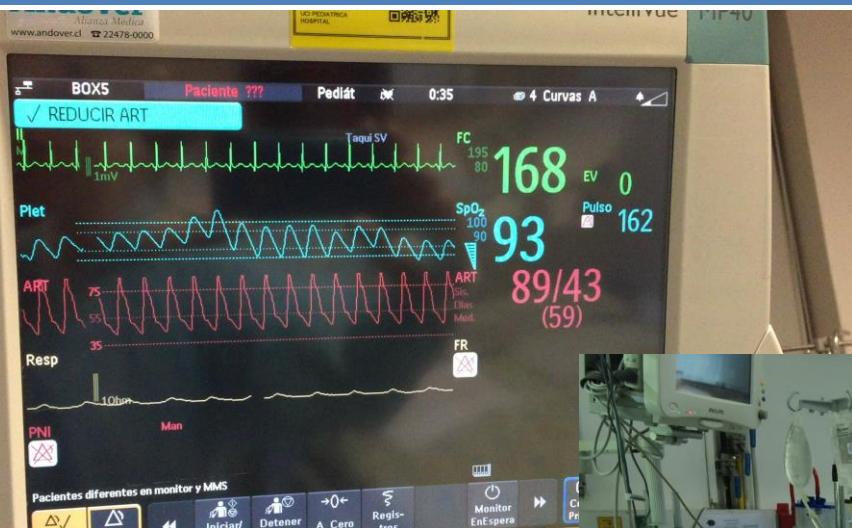
CRITICAL CARE MEDICINE

Simon R. Finfer, M.D., and Jean-Louis Vincent, M.D., Ph.D., *Editors*

Circulatory Shock

Jean-Louis Vincent, M.D., Ph.D., and Daniel De Backer, M.D., Ph.D.





A rational approach to fluid therapy in sepsis

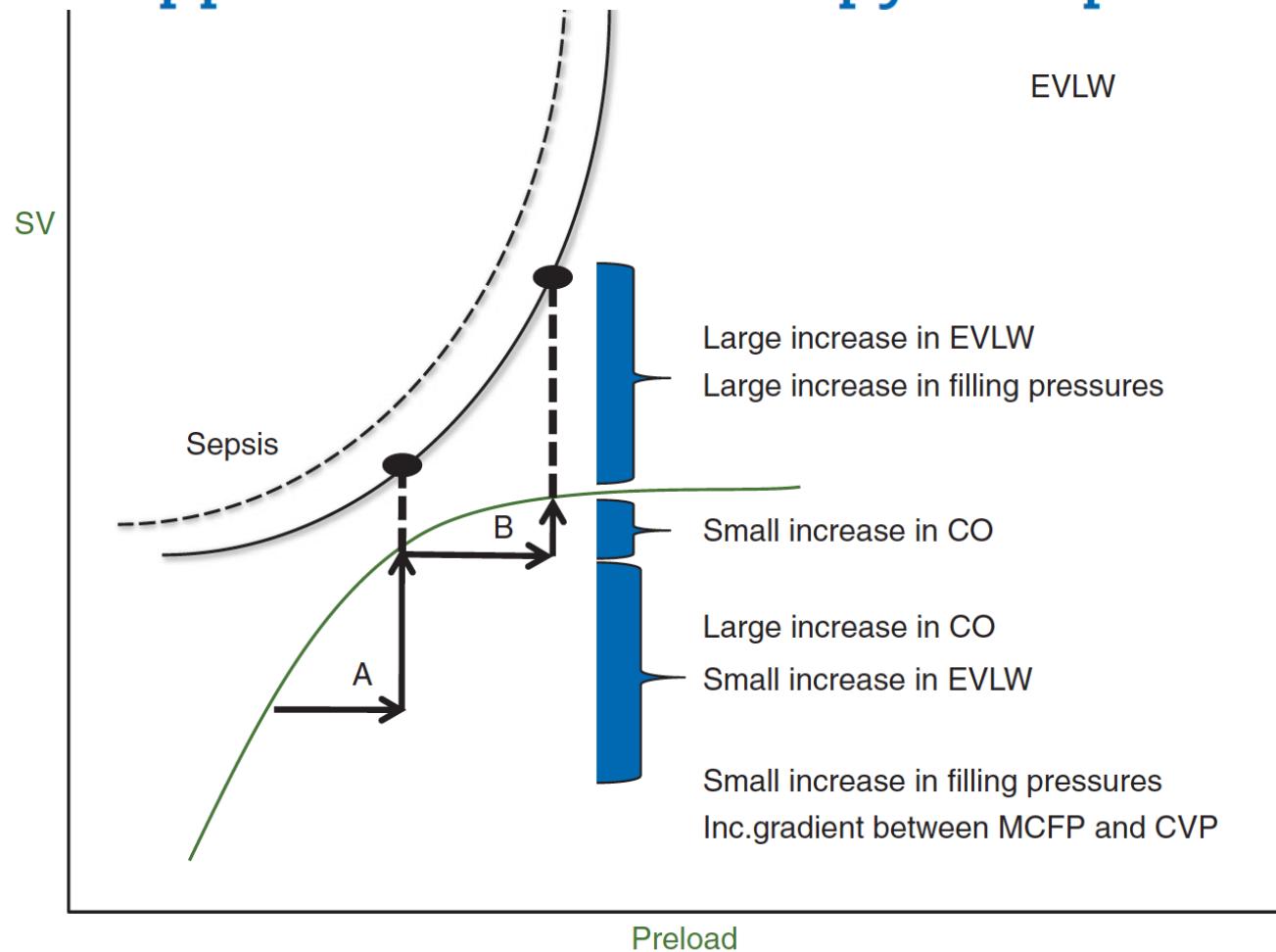
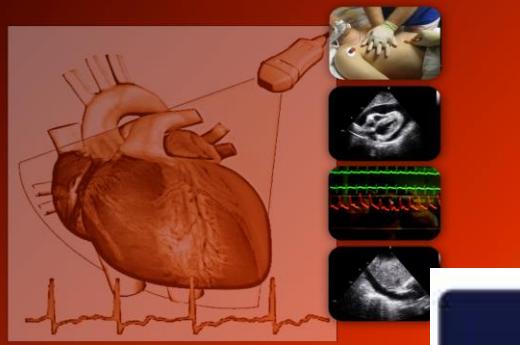
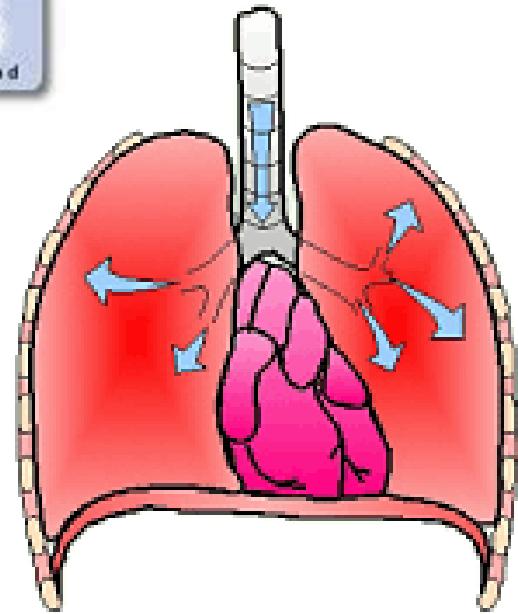
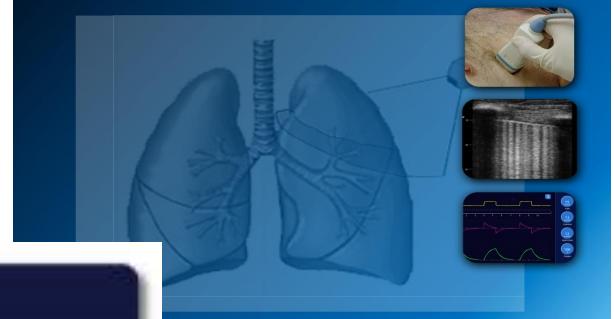


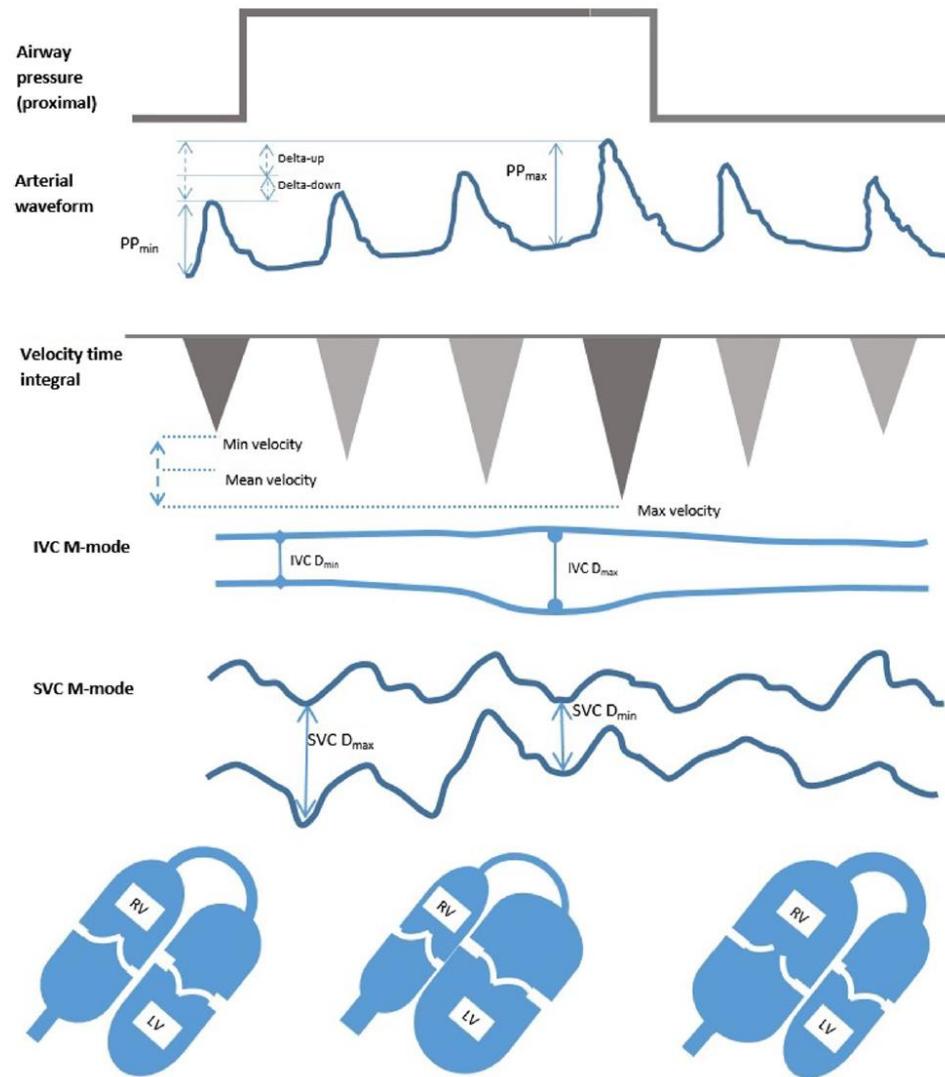
Fig 1 Superimposition of the Frank-Starling and Marik-Phillips curves demonstrating the effects of increasing preload on stroke volume and lung water in a patient who is pre-load responsive (A) and non-responsive (B). With sepsis the EVLW curve is shifted to the left.⁵¹ EVLW=extra-vascular lung water; CO=cardiac output; SV=stroke volume. MCFP=mean circulating filling pressure. Reproduced with permission from the British Journal Anaesthesia; 2014;12:620–622.

WINFOCUS' FOCUSED CARDIAC ULTRASOUND (WBE)



WINFOCUS' LUNG ULTRASOUND FOR ANESTHESIA & INTENSIVE CARE (WLUS-AIC)





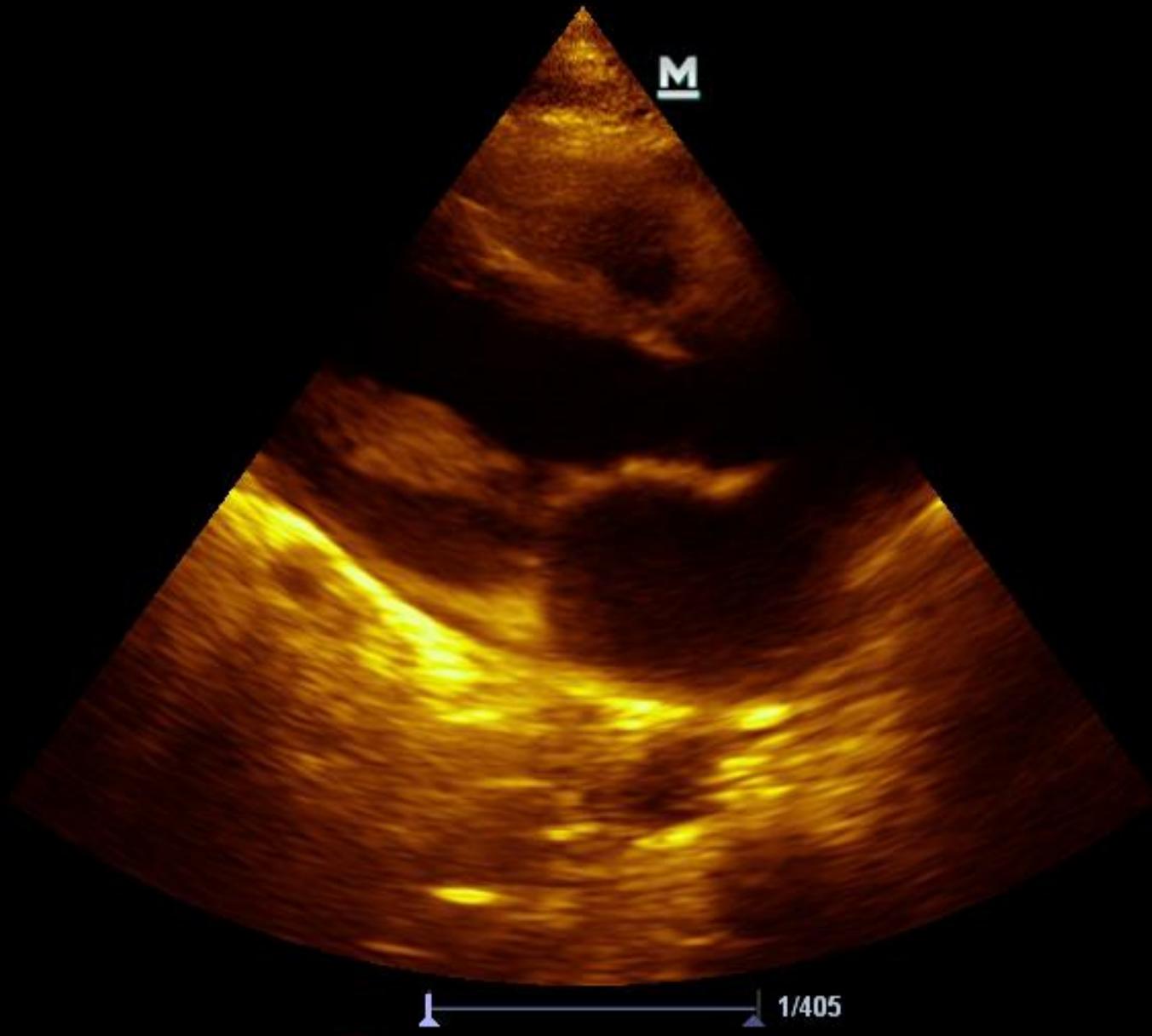
M7

B1

FH7.0 /D8.3

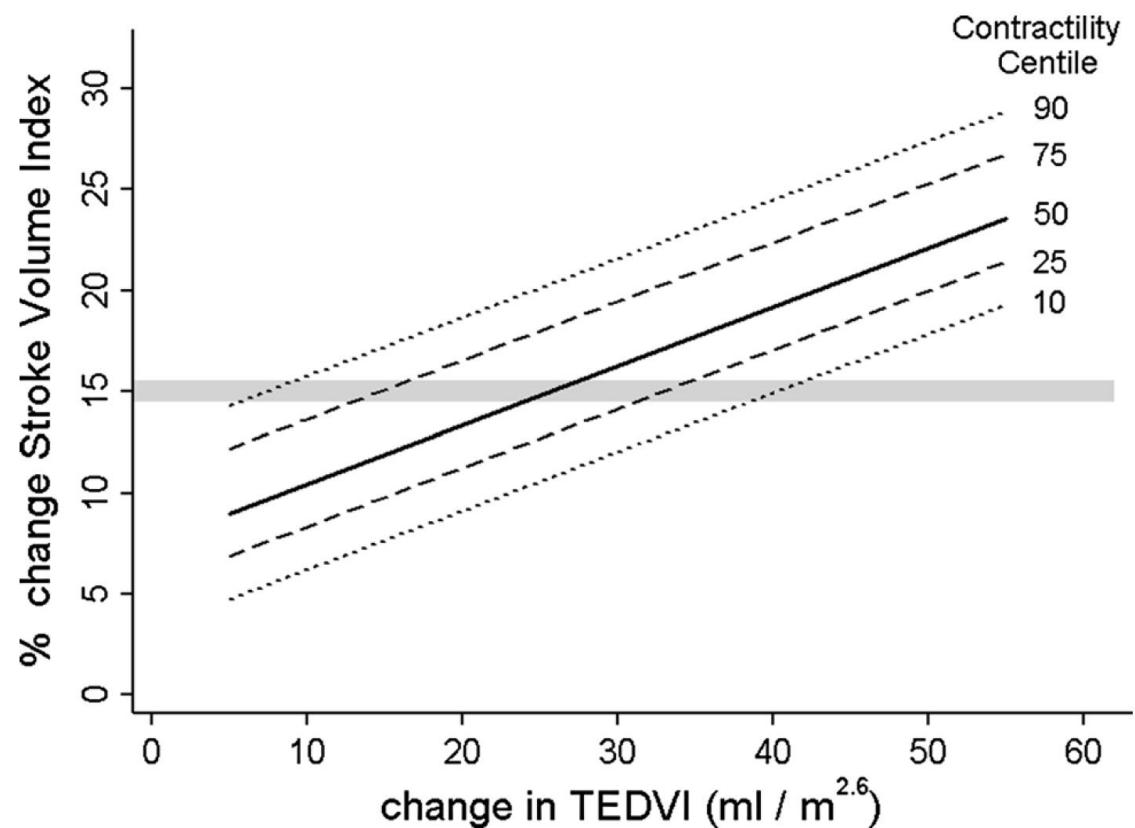
G52 /FR117

IP6 /DR85

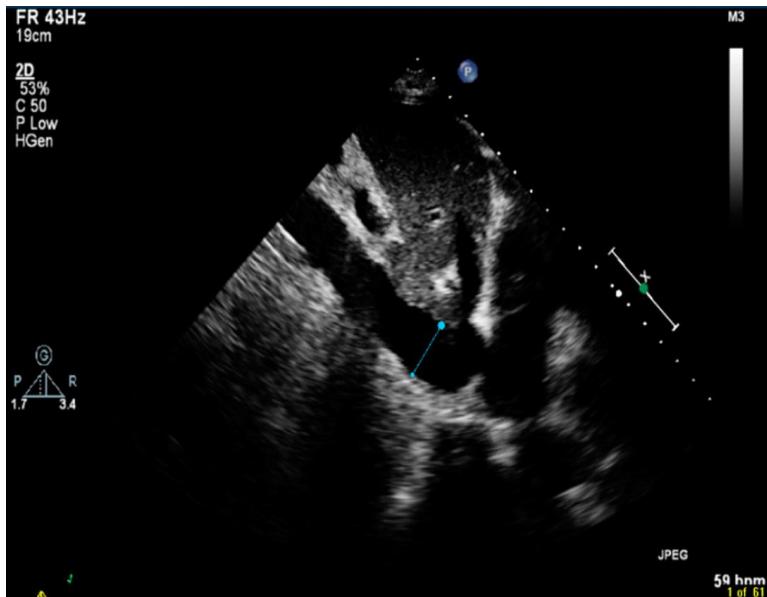


Rohit Saxena
Andrew Durward
Sarah Steeley
Ian A. Murdoch
Shane M. Tibby

Predicting fluid responsiveness in 100 critically ill children: the effect of baseline contractility



Respuesta a Volumen / VCI



$$\text{DI}_{\text{IVC}} = \frac{(D_{\max} - D_{\min})}{D_{\min}}$$

> 18%

WHAT'S NEW IN INTENSIVE CARE



Ten situations where inferior vena cava ultrasound may fail to accurately predict fluid responsiveness: a physiologically based point of view

G. Via^{1*}, G. Tavazzi^{1,2,3} and S. Price³

Increased abdominal pressure	1. Intra-abdominal hypertension	5. IVC size, IVC or IVC occlusion (depending on type respiration/ventilation mode)	TP and FN
Other factors	9. Local mechanical factors	Venous return hindrance, IVC dilatation (stenosis, thrombosis)	FN
		IVC compression (masses)	FP
		Hindrance to IVC size change (ECMO cannulae, cava filters)	FN
	10. Patients with pronounced IVC inspiratory lateral displacement	Migration of IVC imaging plane, false inspiratory size reduction	FP

Ventilator settings	1. Mechanical ventilation with high PEEP and/or low tidal volumes	Larger IVC size, potentially with systemic venous congestion and low respiratory variations, but coexisting with FR	FN
Patient's inspiratory efforts	2. Assisted ventilation modalities, NIV, CPAP 3. Varying respiratory pattern in spontaneous breathing	Spontaneous breathing activity makes IVC variation unpredictable Significant inspiratory effort, producing markedly negative intrathoracic pressures may induce IVCc in absence of FR Shallow breathing, with small intrathoracic pressure changes, may induce absence of IVCc in presence of FR	FP and FN FP FN
Lung hyperinflation	4. Asthma/COPD exacerbation	Lung hyperinflation and auto-PEEP simultaneously reduce venous return and induce IVC distension: this may mimic absence of FR	FN
Cardiac conditions impeding venous return	5. Chronic RV dysfunction, severe TR 6. RV myocardial infarction 7. Cardiac tamponade	Chronic enlargement of IVC and reduced IVCc may erroneously rule out FR RV dilatation and systemic venous congestion (large IVC) may be associated with FR Marked venous return hindrance: fluid challenge may be a beneficial haemodynamic intervention despite IVC plethora	FN FN FN
Increased abdominal pressure	8. Intra-abdominal hypertension	Smaller IVC size, IVCd or IVCc abolition (depending on type respiration/ventilation mode)	FP and FN
Other factors	9. Local mechanical factors 10. Patients with pronounced IVC inspiratory lateral displacement	Venous return hindrance, IVC dilatation (stenosis, thrombosis) IVC compression (masses) Hindrance to IVC size change (ECMO cannulae, cava filters) Migration of IVC imaging plane, false inspiratory size reduction	FN FP FN FP

The Baseline Diameter of the Inferior Vena Cava Measured by Sonography Increases With Age in Normovolemic Children

Table 2. Mean and Median Vascular Measurements Within the Different Study Groups

Measurement	0–2 y	2–7 y	7–13 y	13–22 y
Mean, cm				
Minimum sagittal IVC diameter	0.4	0.7	1.1	1.8
Maximum sagittal IVC diameter	0.7	1.1	1.6	2.4
Maximum transverse IVC diameter	0.7	1.0	1.3	2.1
Maximum transverse aortic diameter	0.8	1.0	1.2	1.8
Median, cm				
Minimum sagittal IVC diameter	0.3	0.7	1.0	1.8
Maximum sagittal IVC diameter	0.7	1.1	1.7	2.5
Maximum transverse IVC diameter	0.7	0.9	1.2	2.1
Maximum transverse aortic diameter	0.8	0.9	1.1	1.8

Figure 5. Minimum sagittal IVC diameter as a function of age.

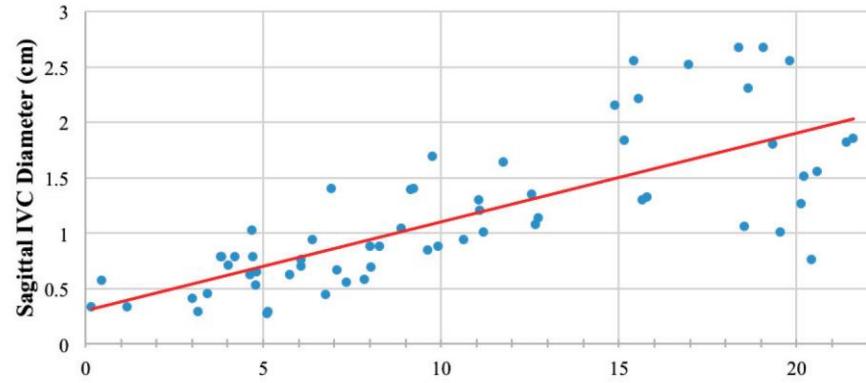
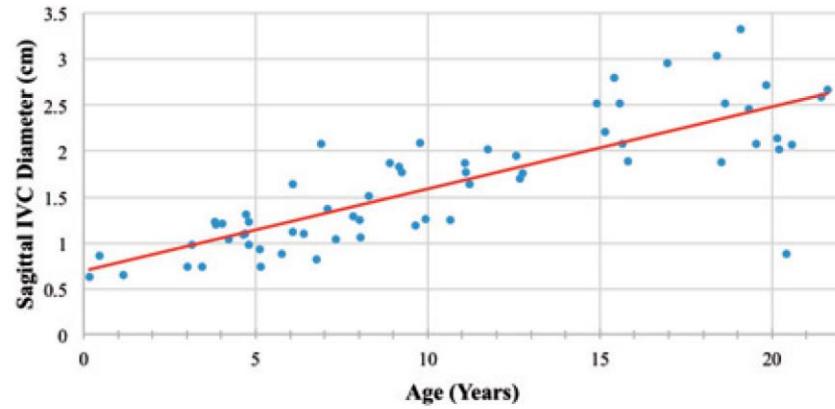


Figure 4. Maximum sagittal IVC diameter as a function of age.



Predicting Fluid Responsiveness in Children: A Systematic Review

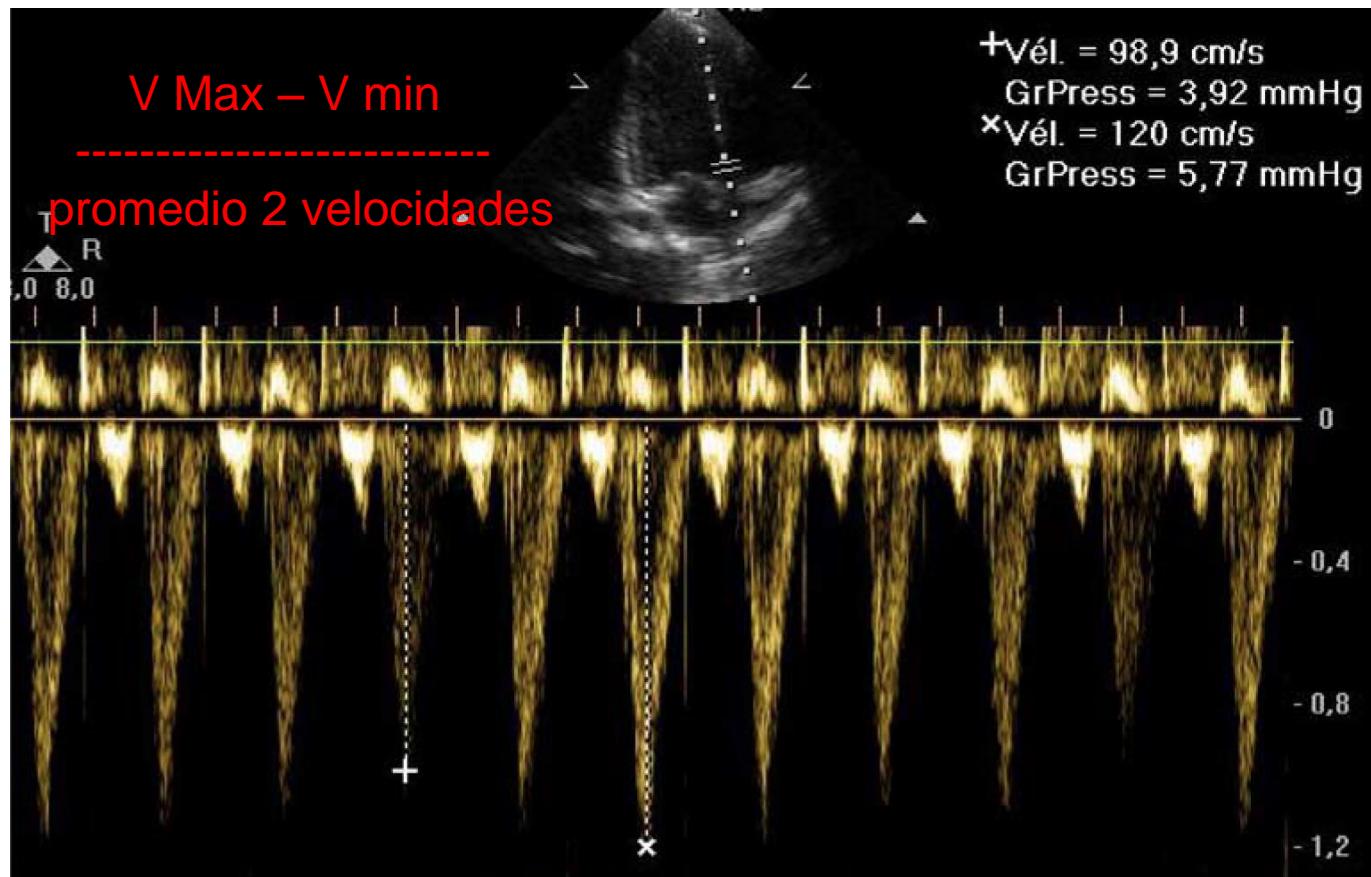
Heng Gan, MBBCh, MRCPCH, FRCA,*† Maxime Cannesson, MD, PhD,‡
 John R. Chandler, MBBCh, FCARCSI, FDSRDS,§ and
 J. Mark Ansermino, MBBCh, MSc (Inf), FFA (SA), FRCPC*†

Potential predictor	Area under ROC with 95% CI (numerical value on right, vertical line is 0.5)	Fluid bolus, n	Setting	Study
Echocardiography & Doppler	 0.80	33	Neuro OR, TTE	Byon ²⁴
	 0.83	21	Cardiac PICU, TTE	Choi ²
	 0.85	26	General PICU, TTE	Durand ¹
	 1.00	19	Neuro OR, 0-6 yrs, TTE	Pereira de Souza Neto ⁶
	 1.00	11	Neuro OR, 6-14 yrs, TTE	Pereira de Souza Neto ⁶
	 0.92	27	Cardiac OR, TEE	Renner 2011 ⁸
PLR	 0.84	27	Cardiac OR, TEE	Renner 2011 ⁸
	 0.37	33	Neuro OR, TTE	Byon ¹
		 0.85	21	Cardiac PICU, TTE
ΔCl _{PLR}	 0.71	40	General PICU, TTE	Lukito ⁴
ΔSV _{PLR}	 0.75	40	General PICU, TTE	Lukito ⁴

Philippe Durand
Laurent Chevret
Sandrine Essouri
Vincent Haas
Denis Devictor

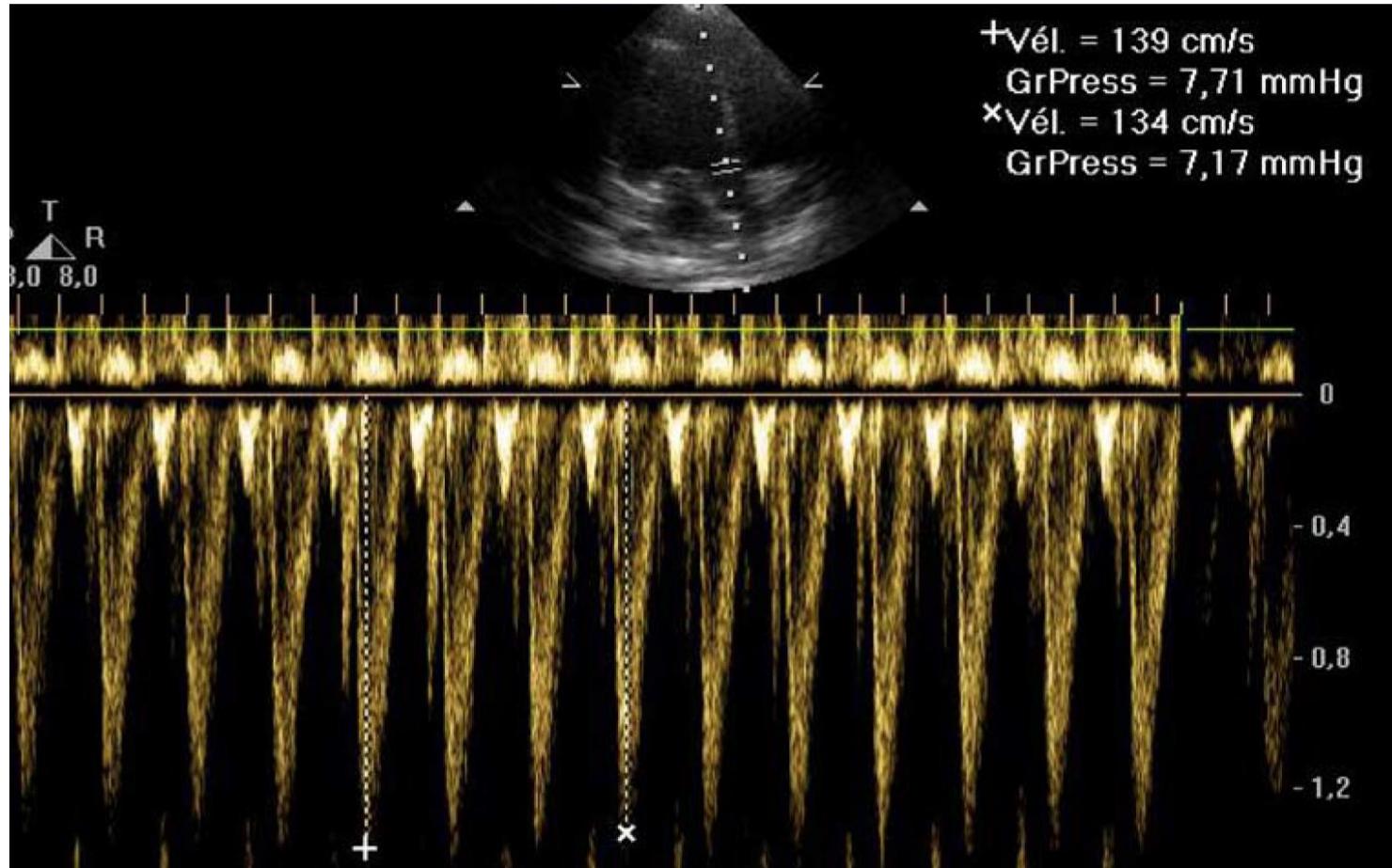
Respiratory variations in aortic blood flow predict fluid responsiveness in ventilated children

20%



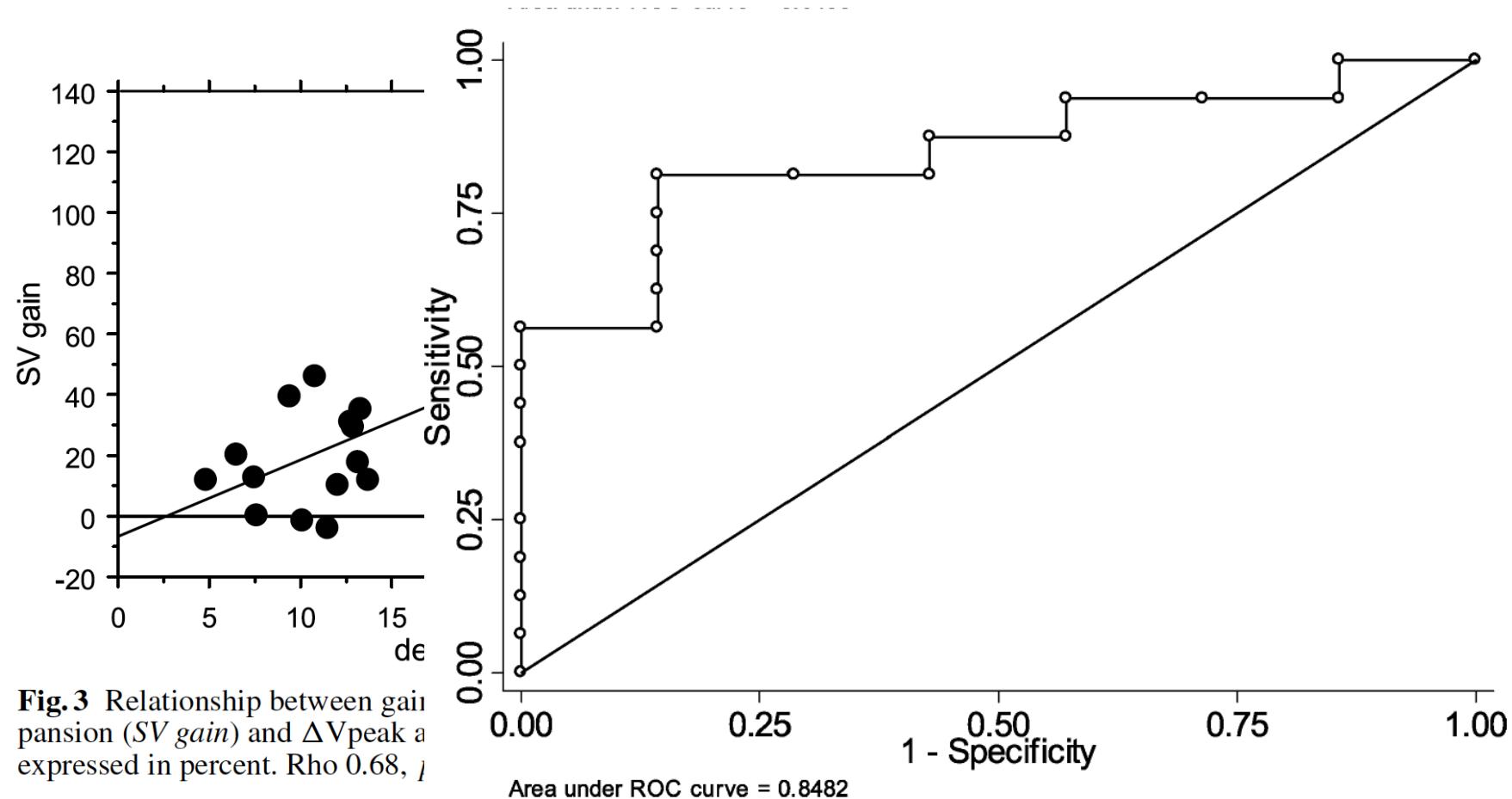
Philippe Durand
Laurent Chevret
Sandrine Essouri
Vincent Haas
Denis Devictor

Respiratory variations in aortic blood flow predict fluid responsiveness in ventilated children

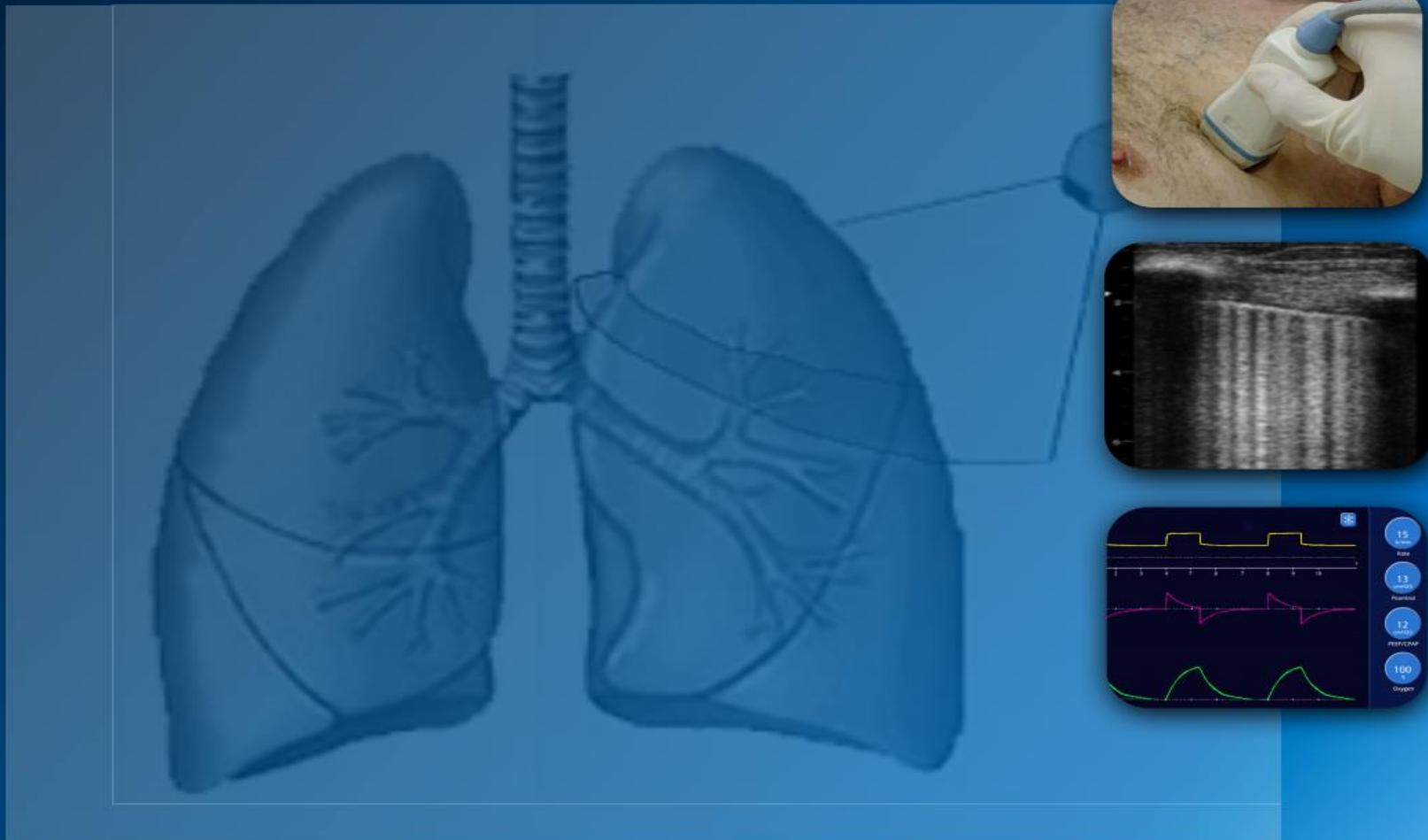


Philippe Durand
Laurent Chevret
Sandrine Essouri
Vincent Haas
Denis Devictor

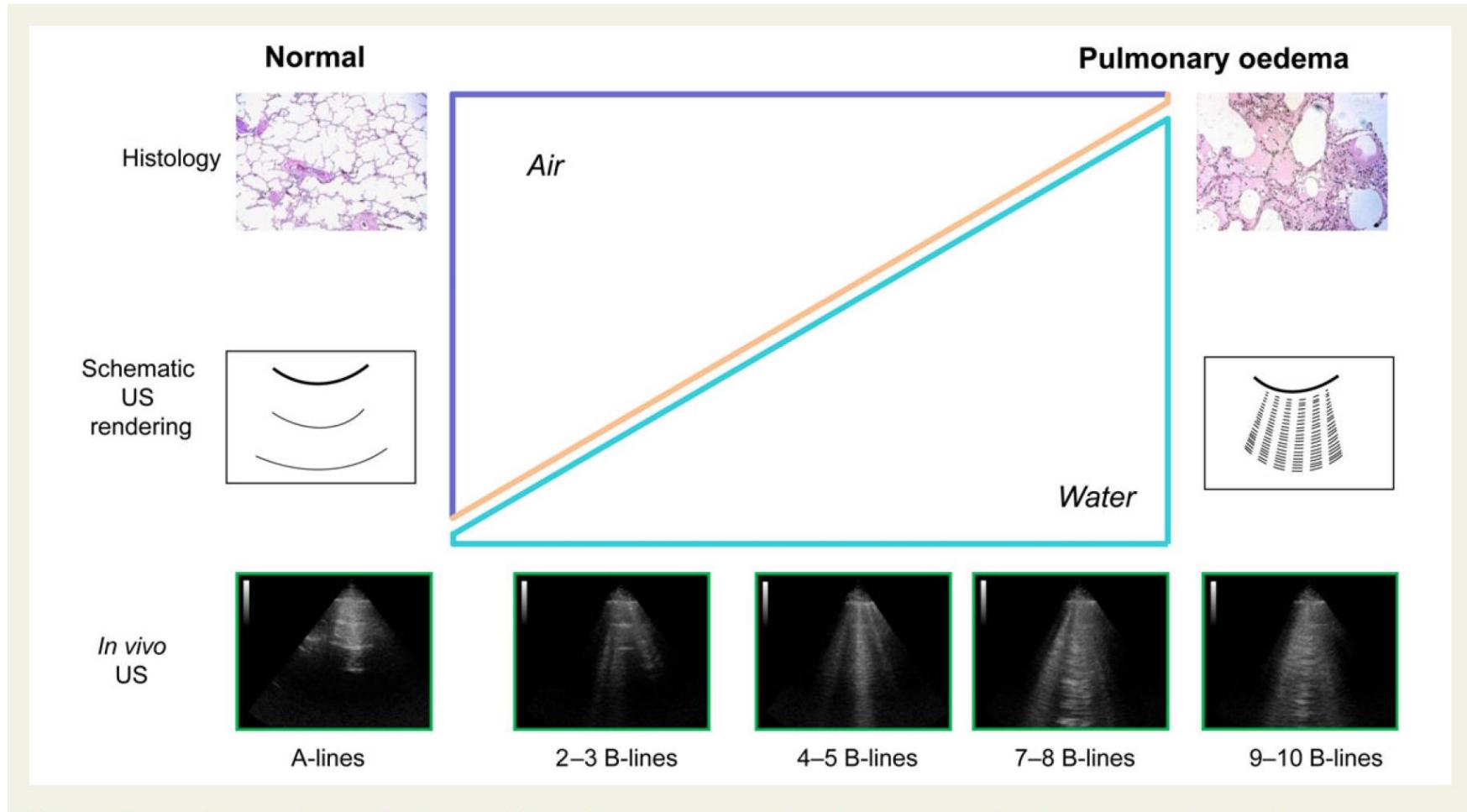
Respiratory variations in aortic blood flow predict fluid responsiveness in ventilated children



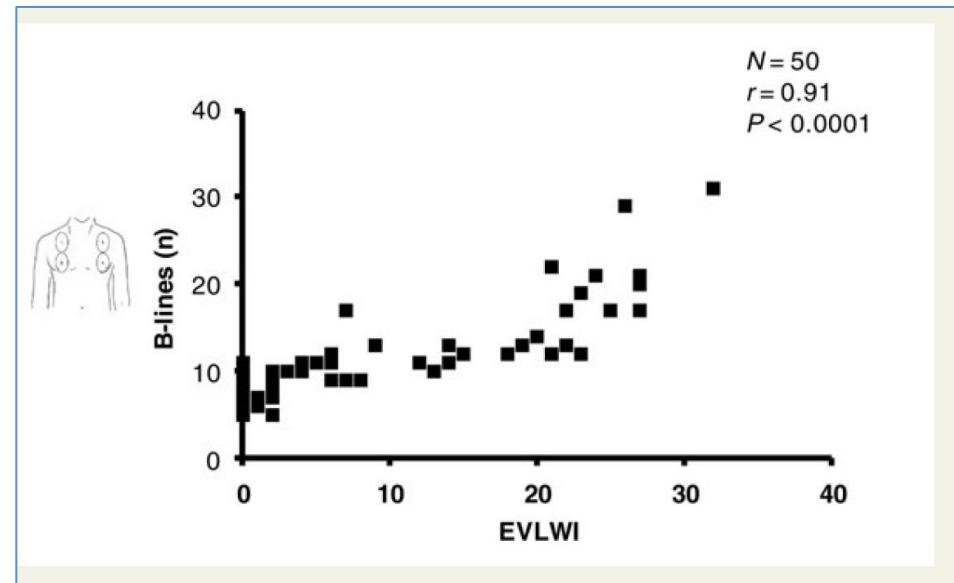
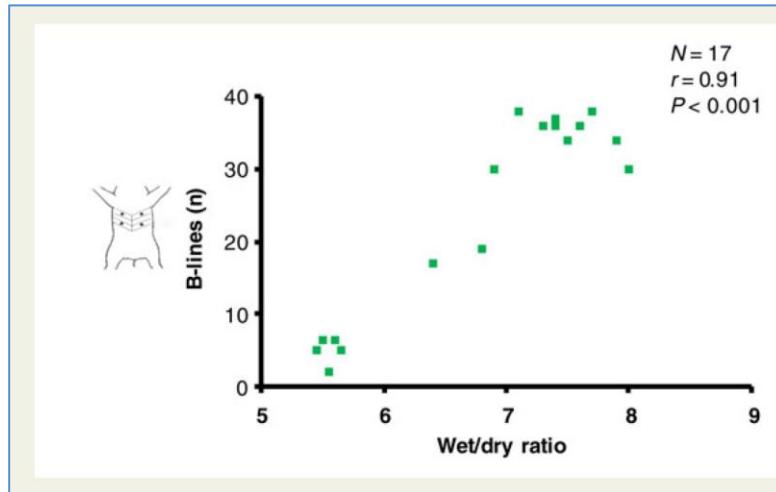
WINFOCUS' LUNG ULTRASOUND FOR ANESTHESIA & INTENSIVE CARE (WLUS-AIC)



Ultrasound of extravascular lung water: a new standard for pulmonary congestion



Ultrasound of extravascular lung water: a new standard for pulmonary congestion



M7

B1

F12.0 /D3.7

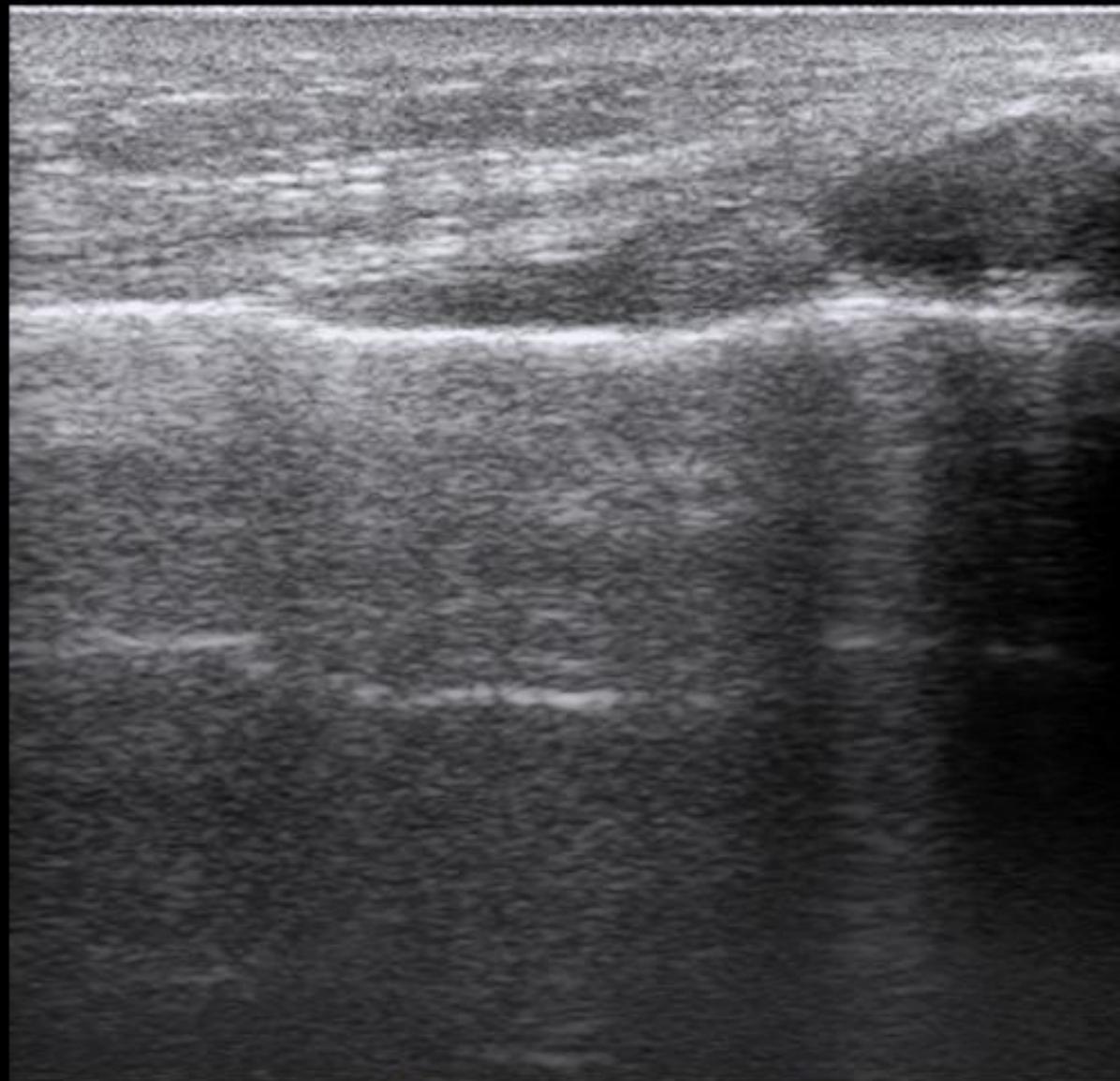
G64 /FR99

IP5 /DR90

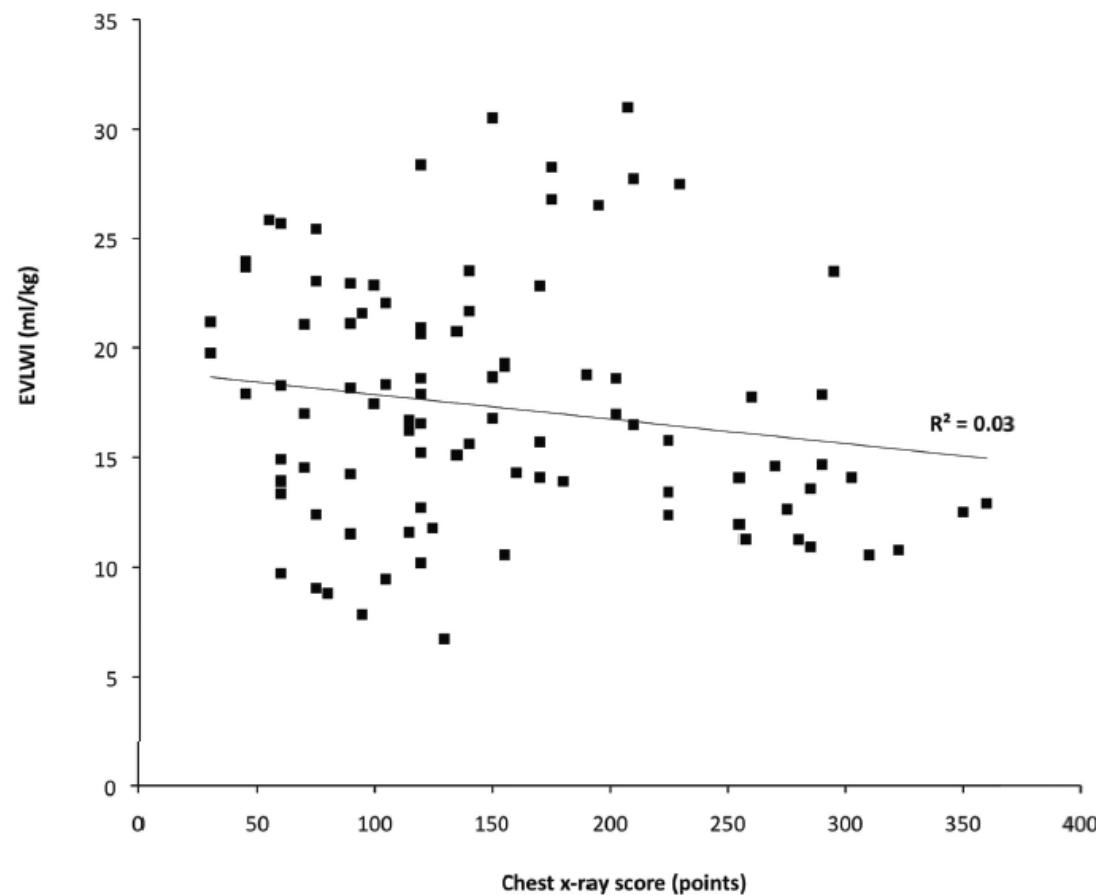


M

DERT1



Extravascular lung water index measurement in critically ill children does not correlate with a chest x-ray score of pulmonary edema



Giacomo Baldi
Luna Gargani
Antonio Abramo
Luigia D'Errico
Davide Caramella
Eugenio Picano
Francesco Giunta
Francesco Forfori

Lung water assessment by lung ultrasonography in intensive care: a pilot study

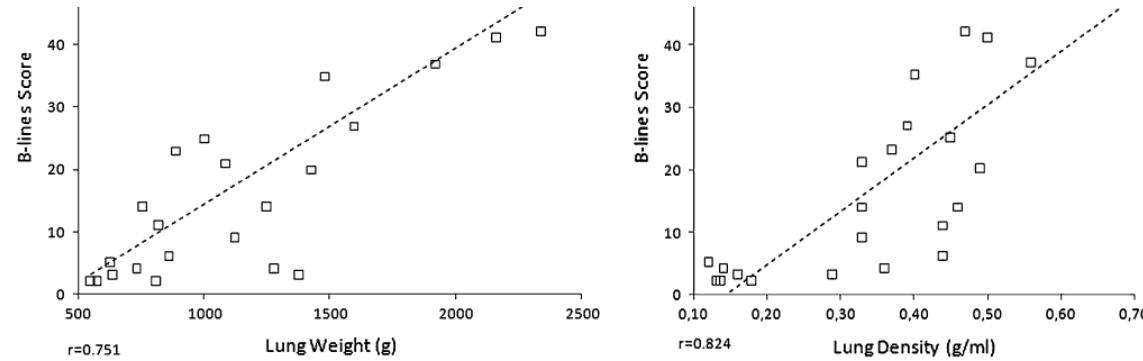
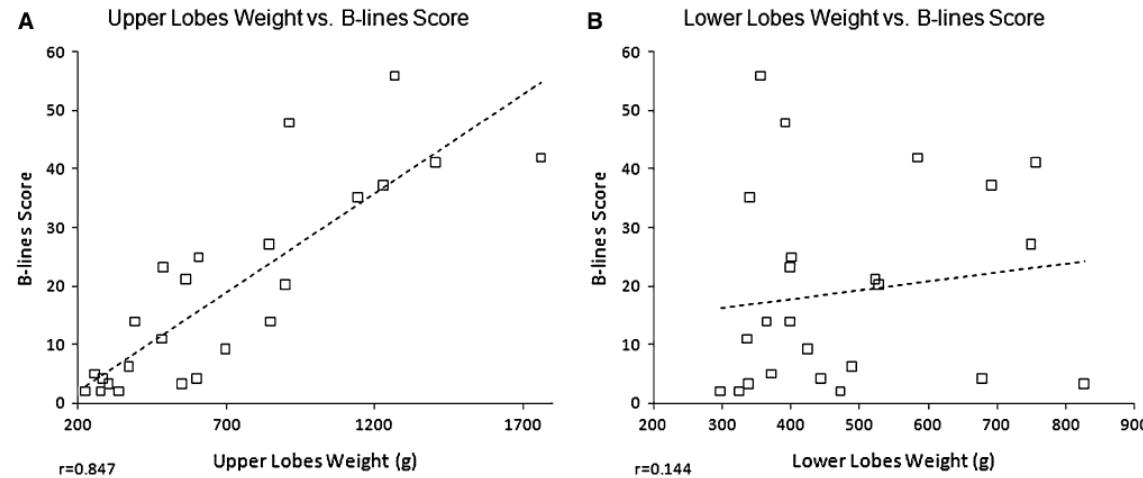


Fig. 4 Positive linear correlations between B-line score and lung weight (a) and lung density (b). There is a better correlation between B-line score and lung density. *Dashed lines* are the regression lines

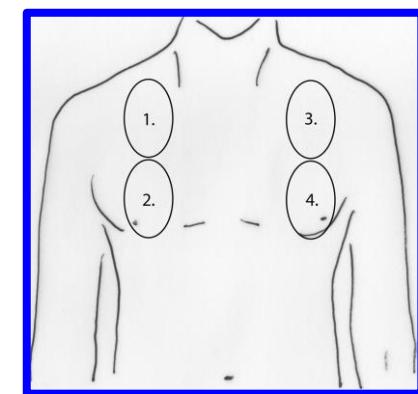


Simplified lung ultrasound protocol shows excellent prediction of extravascular lung water in ventilated intensive care patients

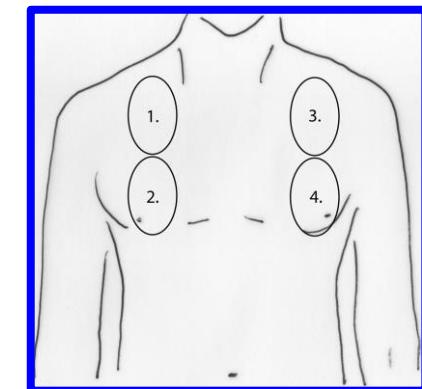
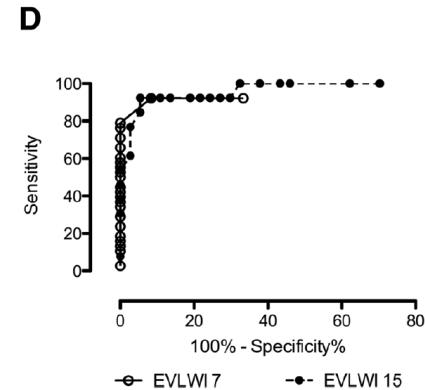
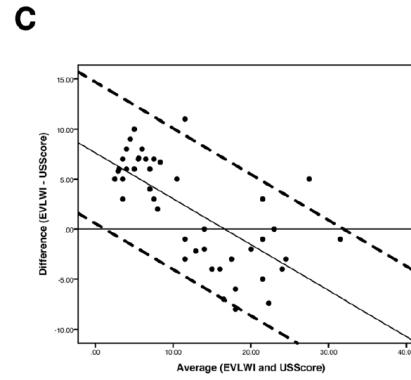
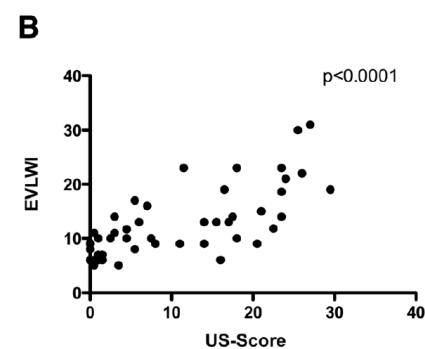
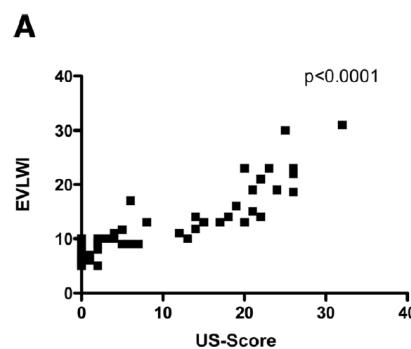
Table 2 Ultrasound scoring system

Ultrasound finding	Score
No B line/ICS ^a	0
One B line/ICS ^a	1
Two B lines/ICS ^a	2
Three B lines/ICS ^a	3
Four B lines/ICS ^a	4
Five B lines/ICS ^a	5
Confluent B lines >50% ICS ^a	6
Confluent B lines >75% ICS ^a	7
Confluent B lines 100% ICS ^a	8

^aICS, Intercostal space.



Simplified lung ultrasound protocol shows excellent prediction of extravascular lung water in ventilated intensive care patients



IVY

B1

F12.0 / D3.7

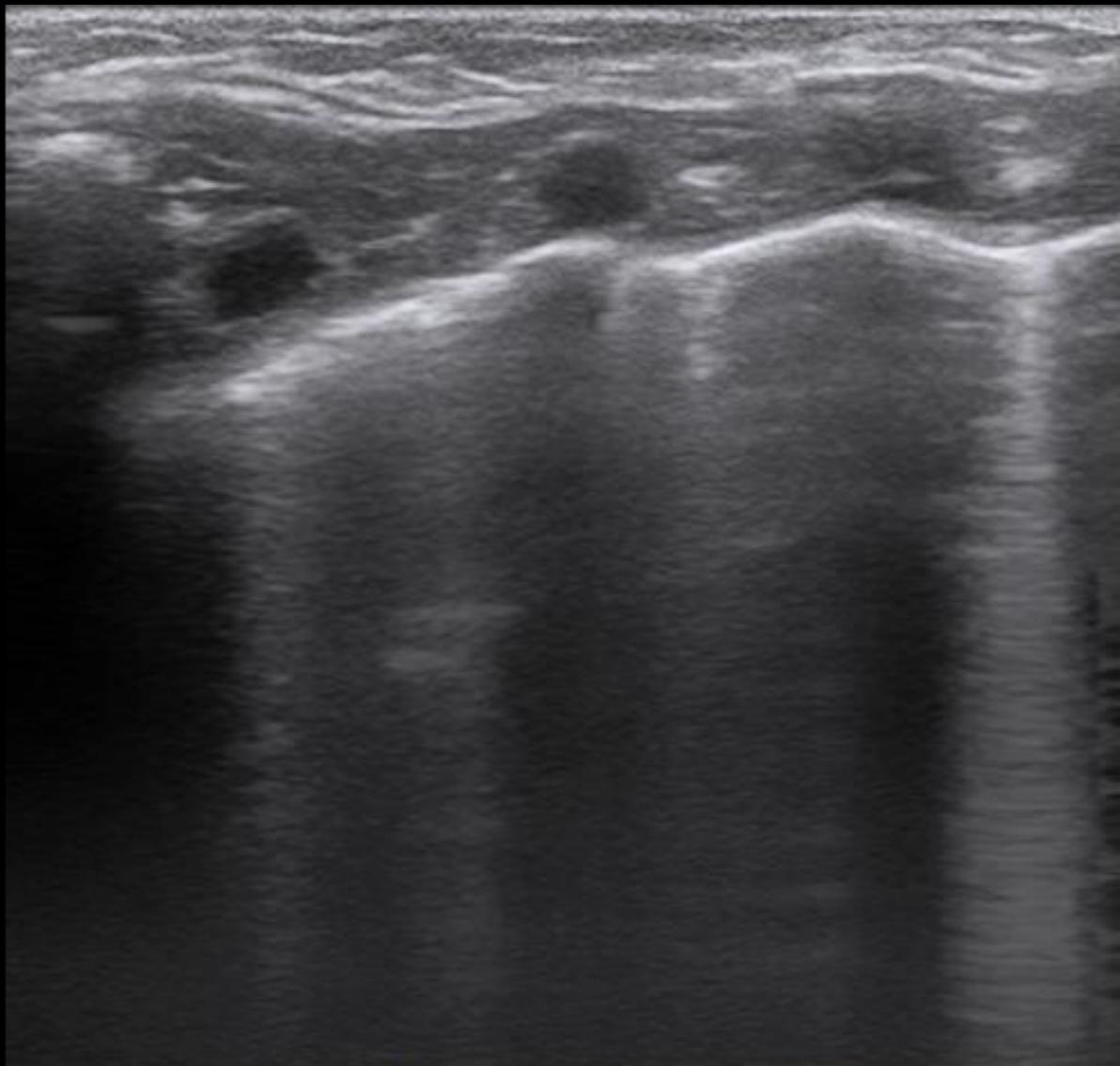
G66 / FR99

IP5 / DR90



M

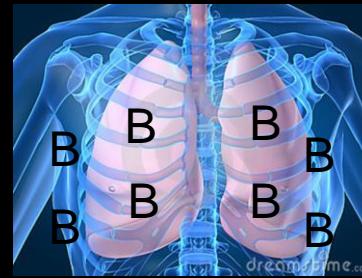
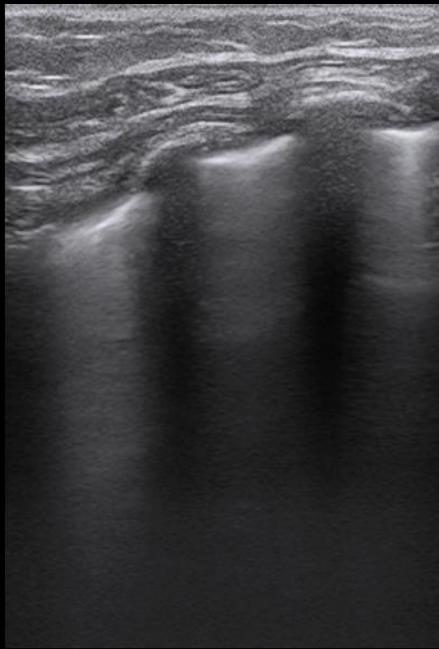
T1DER



M7
B1
F12.0 /D4.6
G66 /FR99
IP5 /DR90

M

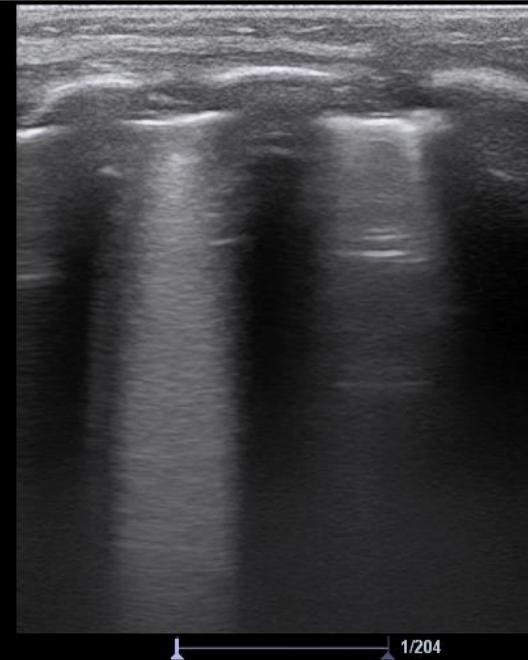
T1IZQ



-4
M7
B1
F12.0 /D4.6
G66 /FR99
IP5 /DR90

M

T4IZQ



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