

VII CONGRESSO NAZIONALE

2014
ECOCARDIOCHIRURGIA

L'ecografia polmonare: quali informazioni aggiuntive rispetto alla radiografia del torace. Vogliamo convincere i cardiologi che il polmone non è un buco nero degli ultrasuoni ma fonte di importanti elementi di diagnosi differenziale.

Un esame relativamente semplice ma che non si può improvvisare. Le informazioni utili nella diagnosi di edema polmonare, embolia polmonare, pneumotorace, versamento pleurico.

La diagnosi di atelettasia, edema interstiziale, paralisi del diaframma, polmonite, ARDS...

ROBERTO COPETTI

DIRETTORE S.O.C.

PRONTO SOCCORSO-MEDICINA D'URGENZA

OSPEDALE DI LATISANA (UDINE)

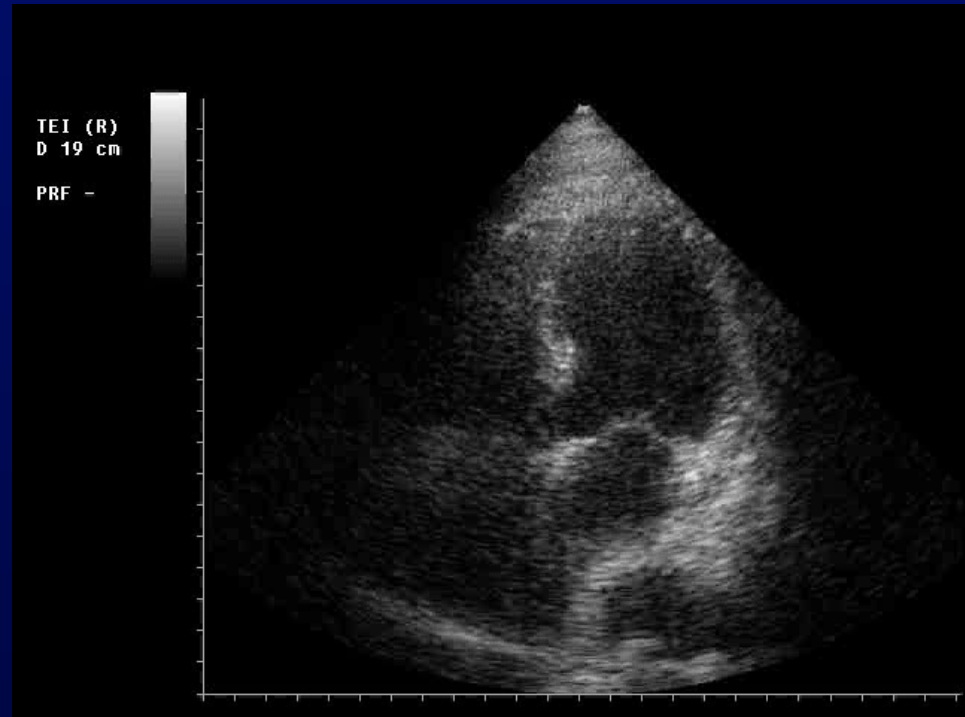
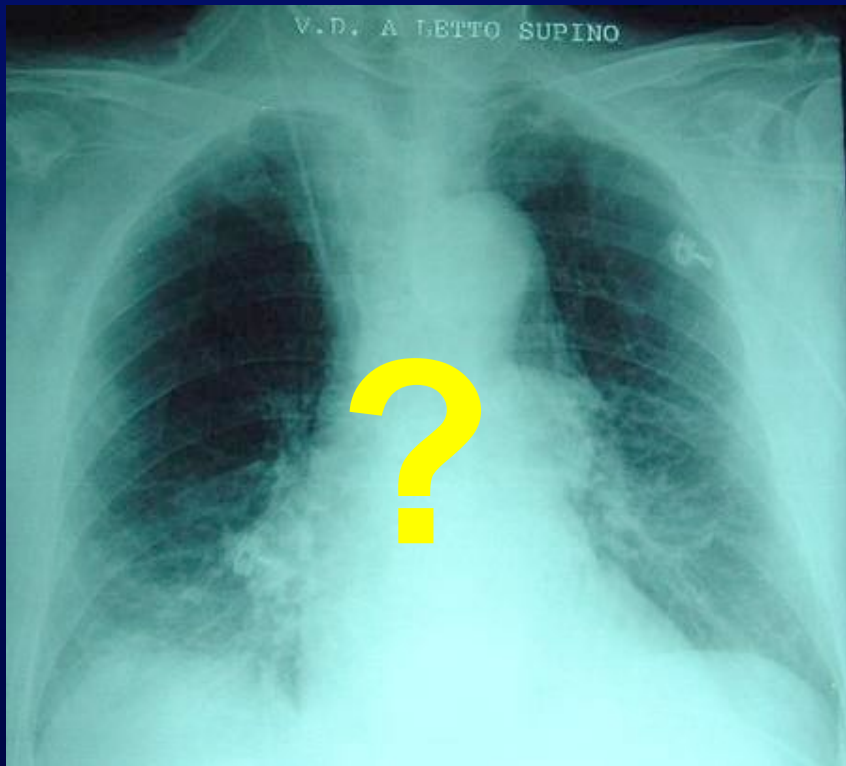
robcopet@tin.it

ACUTE DYSPNEA

**A diagnostic and therapeutic
dilemma for the clinician....**

Roberto Copetti

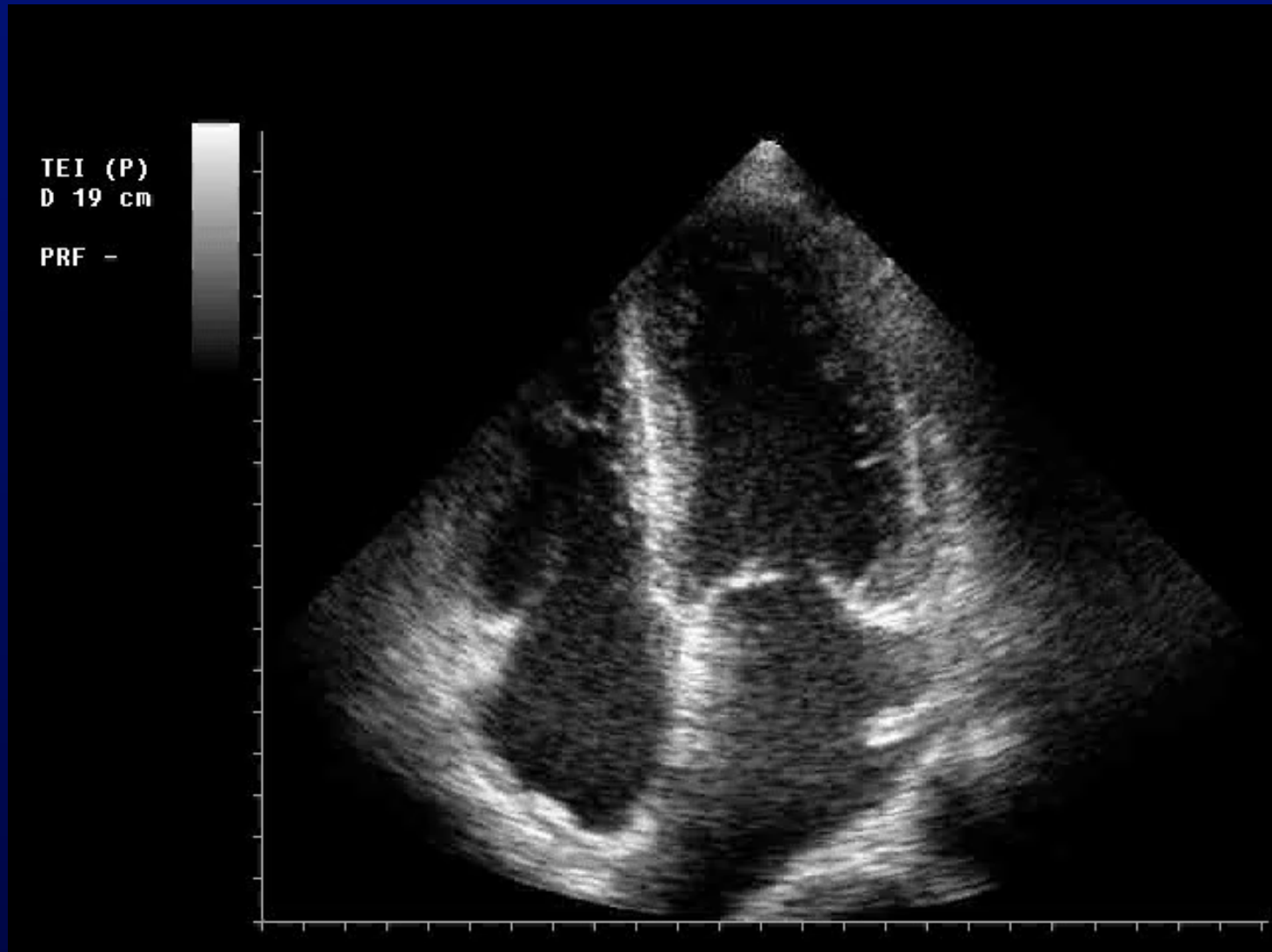
- ACUTE RESPIRATORY DISTRESS
- HYPERTENSION, CHRONIC A.F.
- RALES ON RIGHT LUNG BASE
- BP 180/115. HR 115 AF. Sat O₂ 90% (FiO₂ 0.4). TT 38.5°C



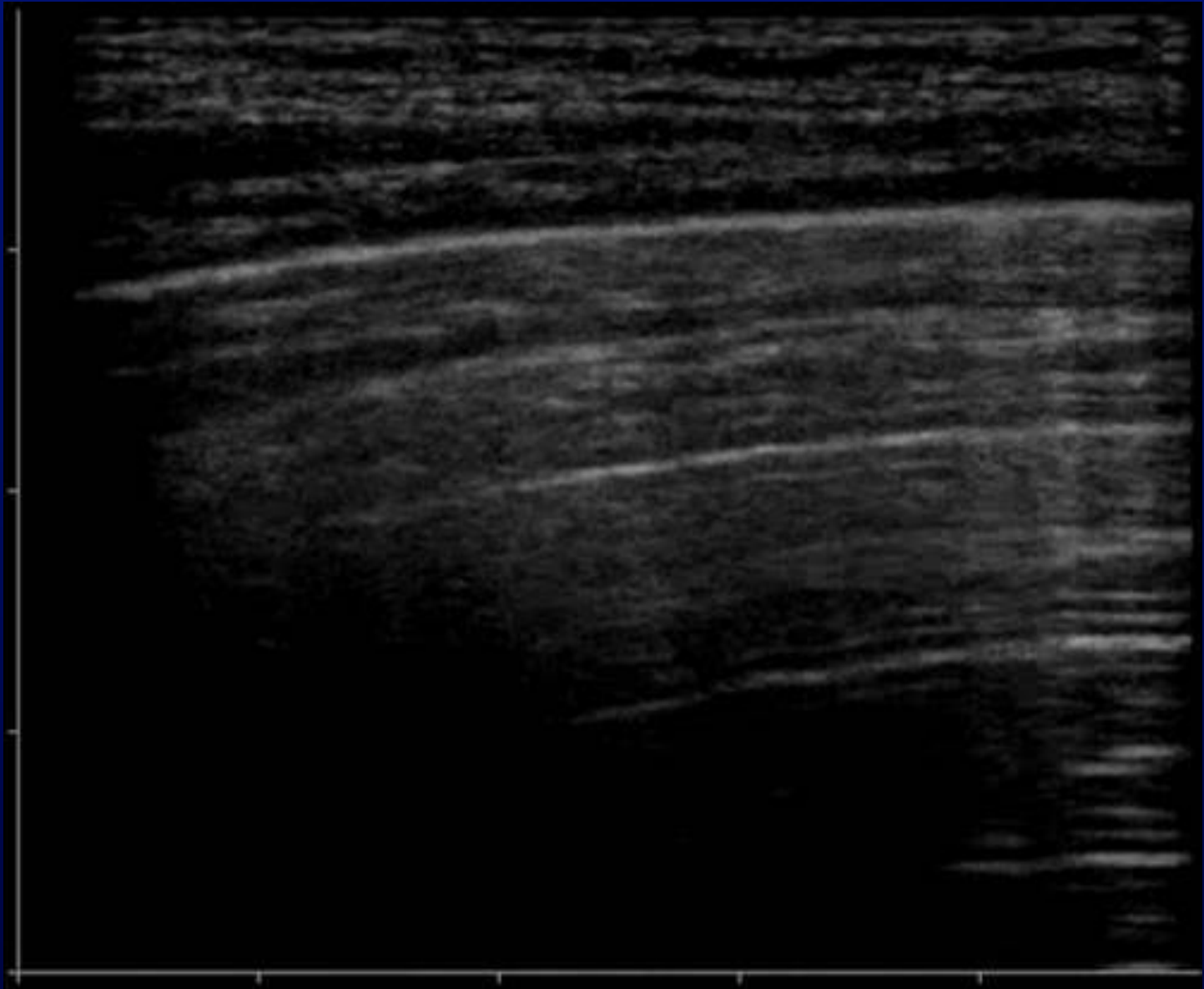
A REAL IMAGE



A REAL IMAGE



AN ARTIFACTUAL IMAGE



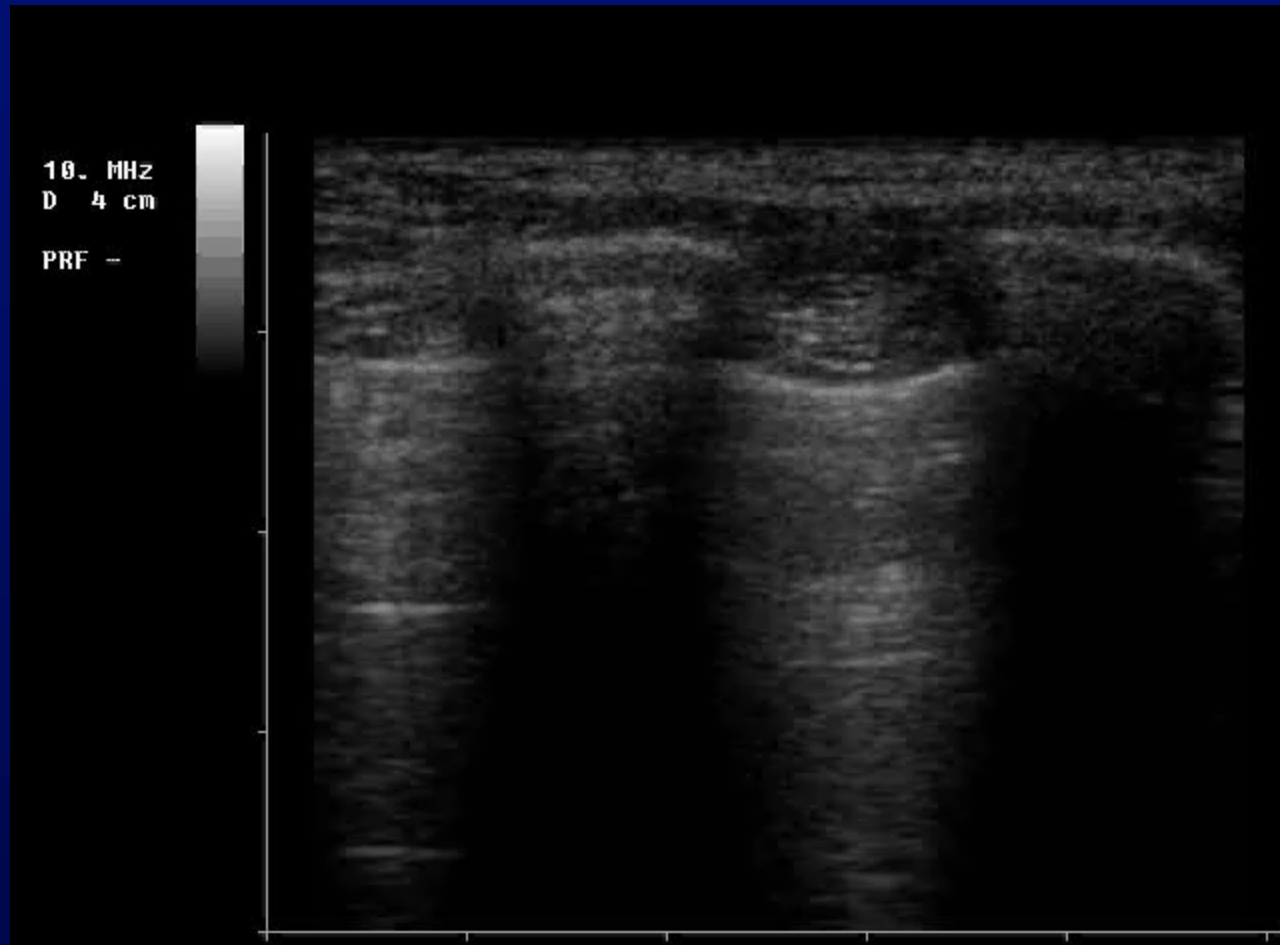
IMPEDENZA ACUSTICA

$$Z = D \cdot V ; V = Z/D$$

	<i>Velocità (V)</i> (m/s)	<i>Impedenza acustica (Z)</i> (kg/m ² x s)	<i>Densità (D)</i> (kg/m ³)
Aria	330	0,04	1,2
Vapore acqueo	405	24	600
Acqua	1430	143	1000
Grasso	1460	135	920
Sangue	1560	162	1060
Muscolo	1630	174	1070
Osso	4100	738	1810
<i>Tessuto medio</i>	<i>1540</i>		

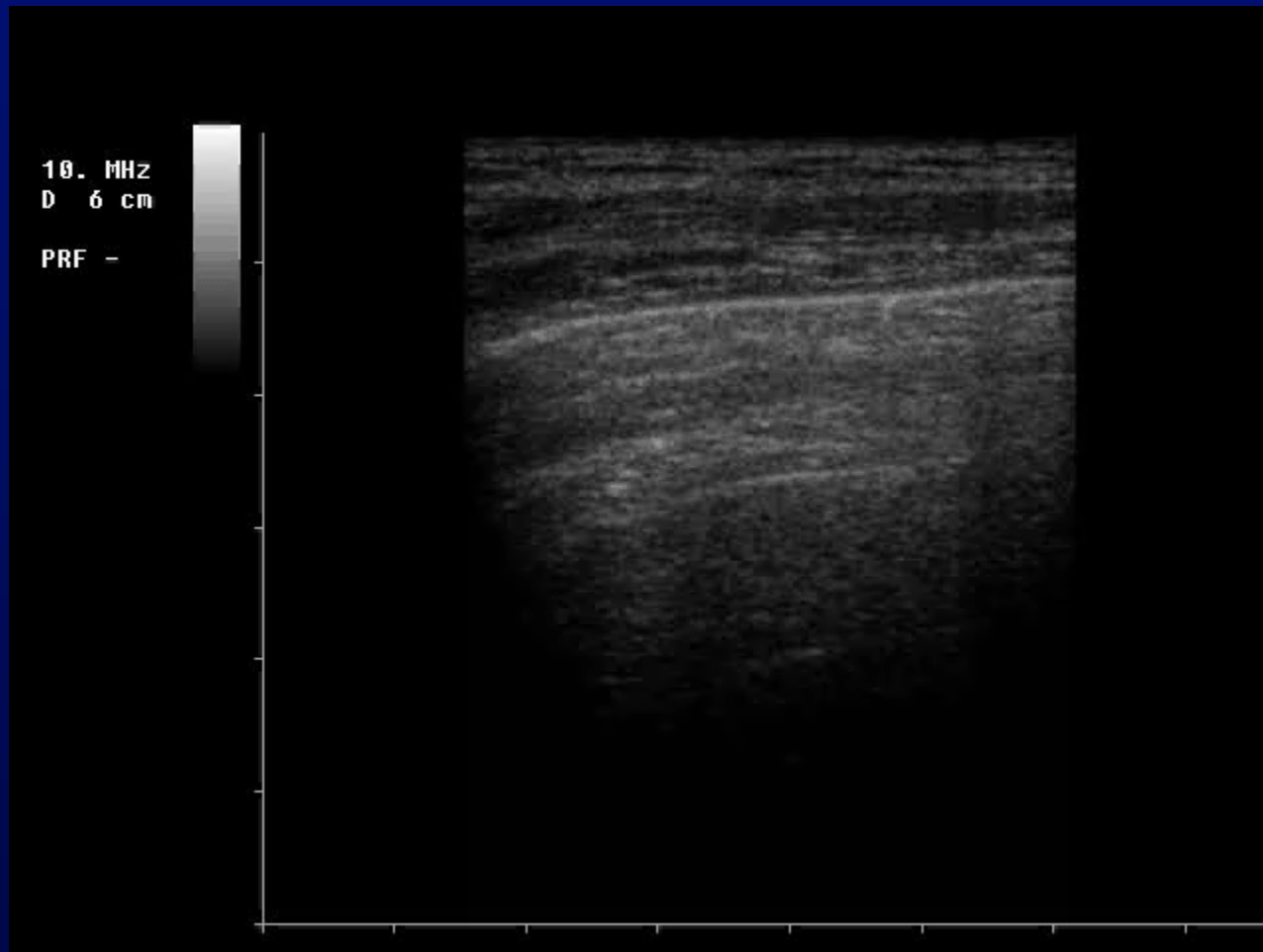


NORMAL LUNG



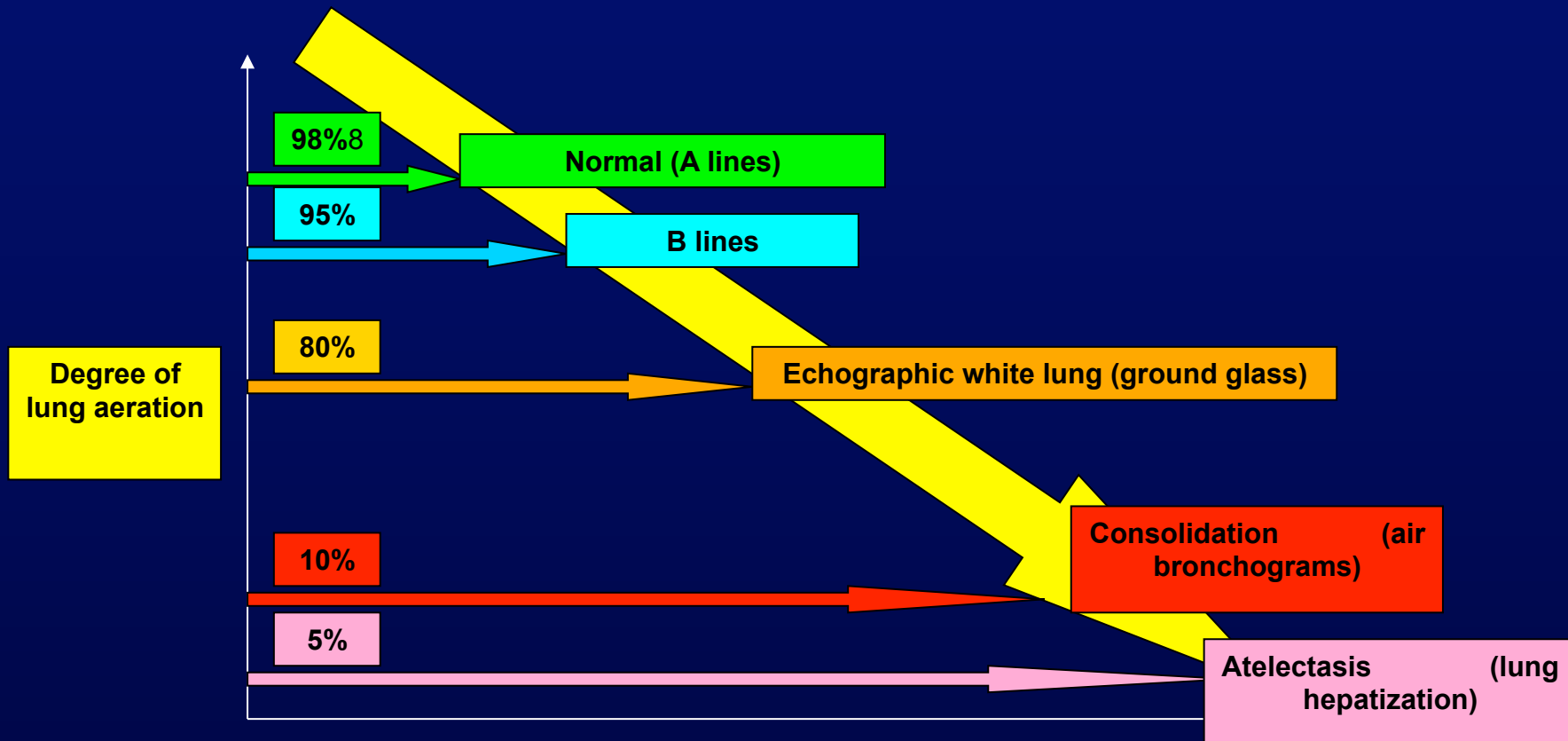
LONGITUDINAL SCAN

NORMAL LUNG

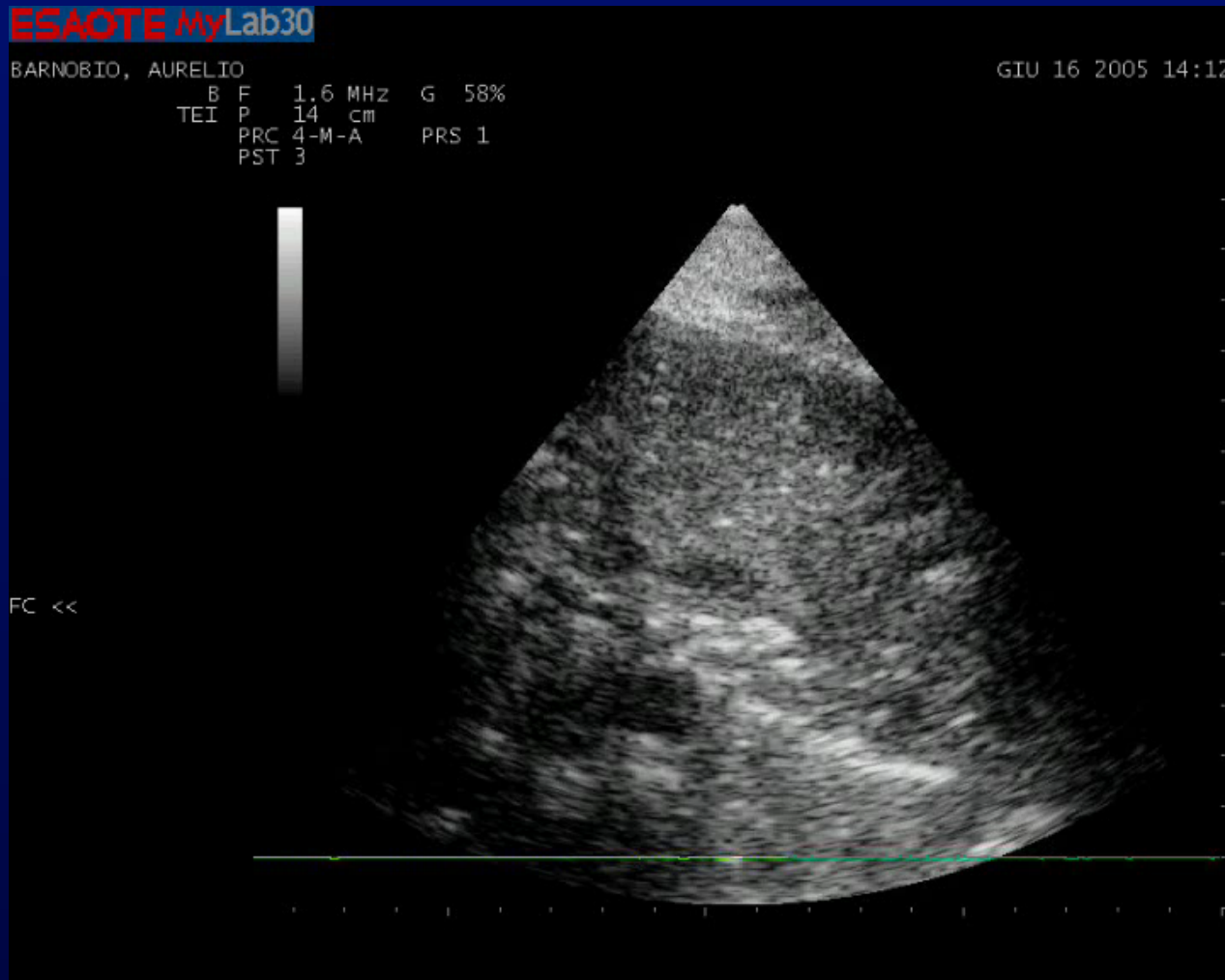


TRANSVERSAL SCAN

DEGREE OF LUNG AERATION, INCREASE OF INTERSTITIAL TISSUE OR BOTH: ARTIFACTS AND REAL IMAGES

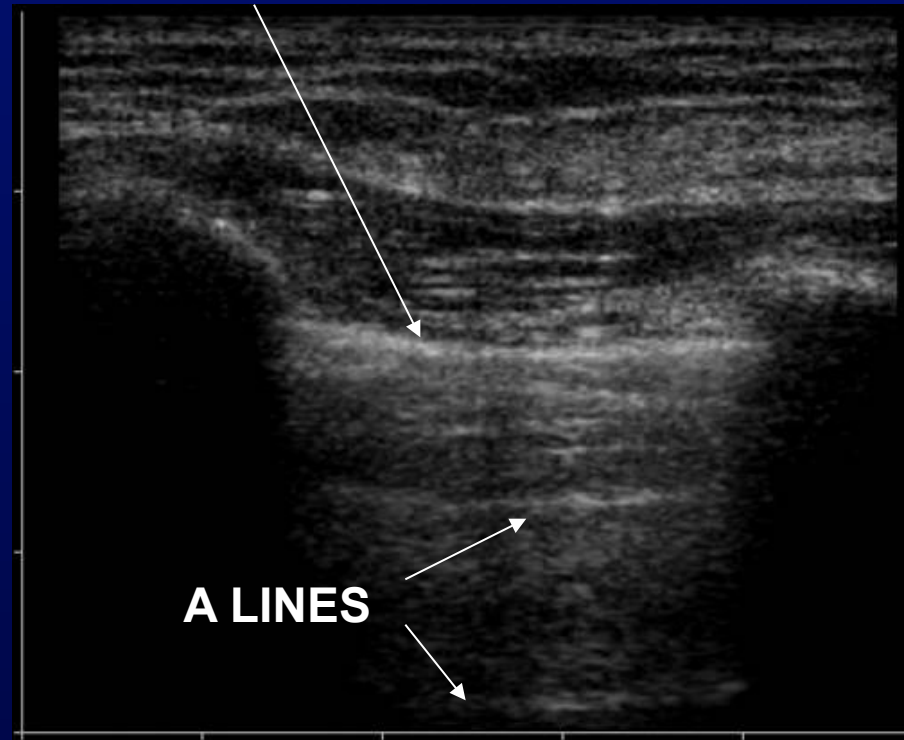
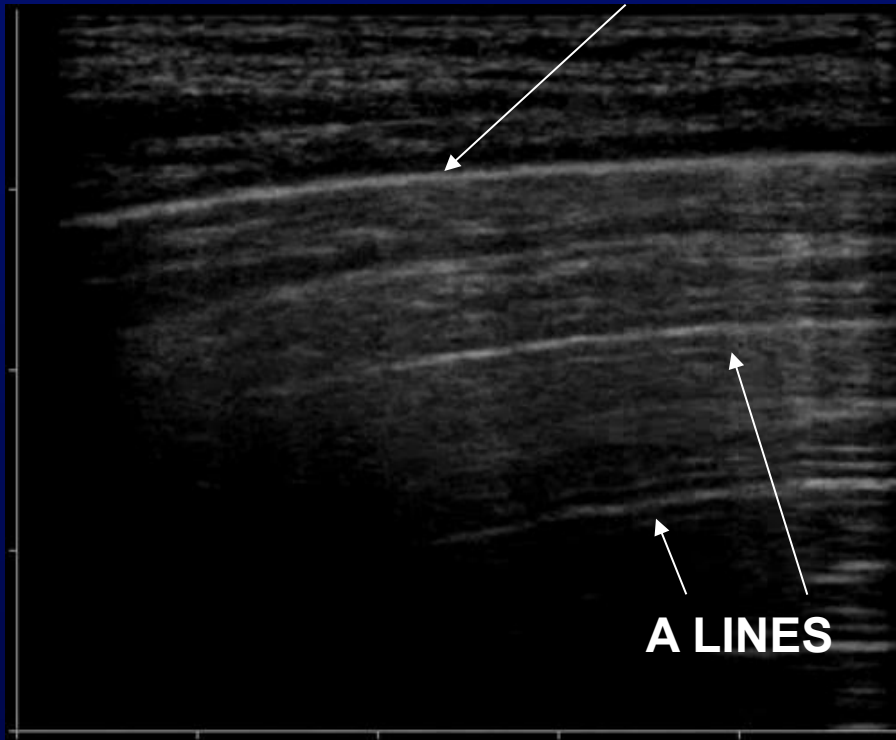


EXPANSION OF THE LUNG AFTER CORRECT TUBE PLACEMENT



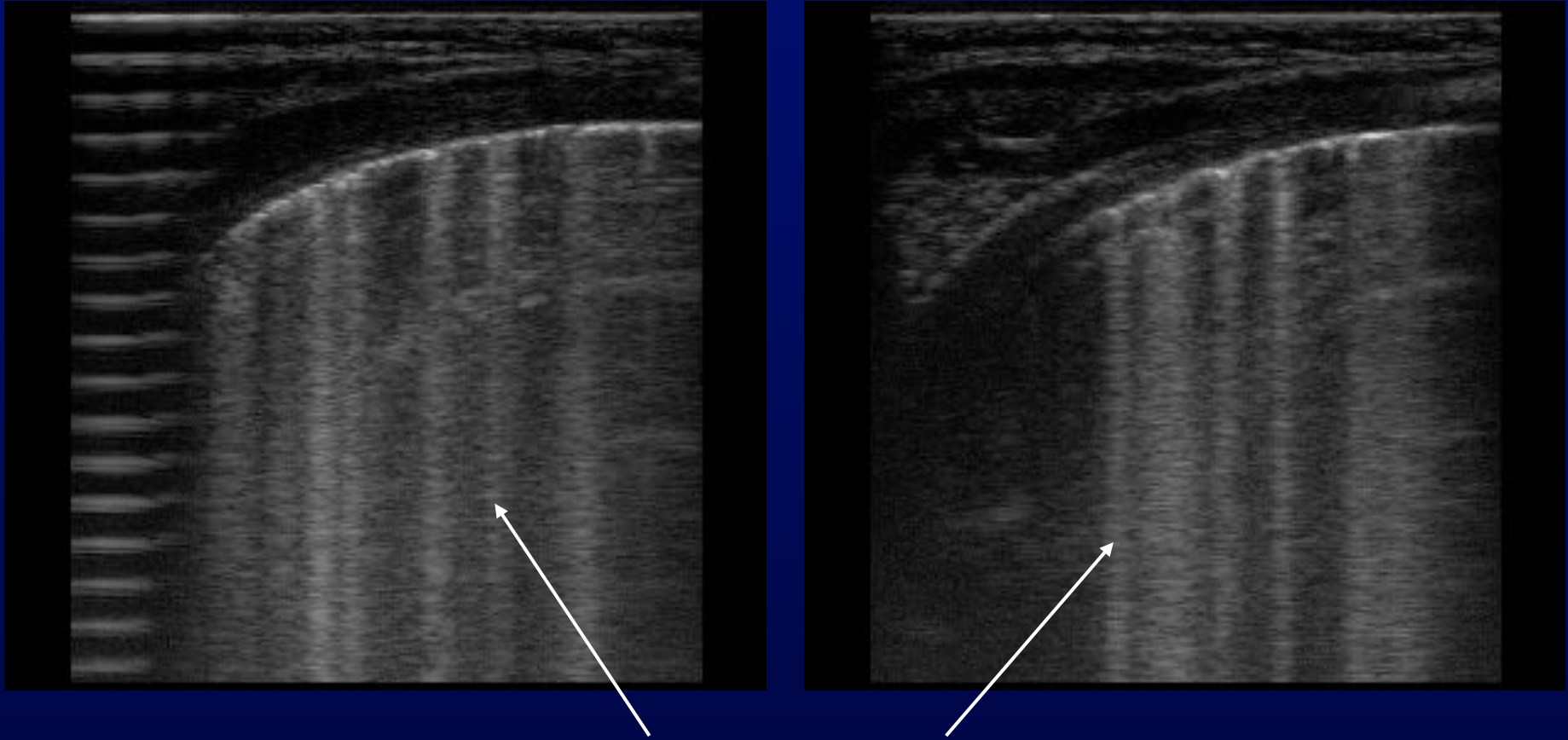
NORMAL LUNG

REGULAR PLEURAL LINE



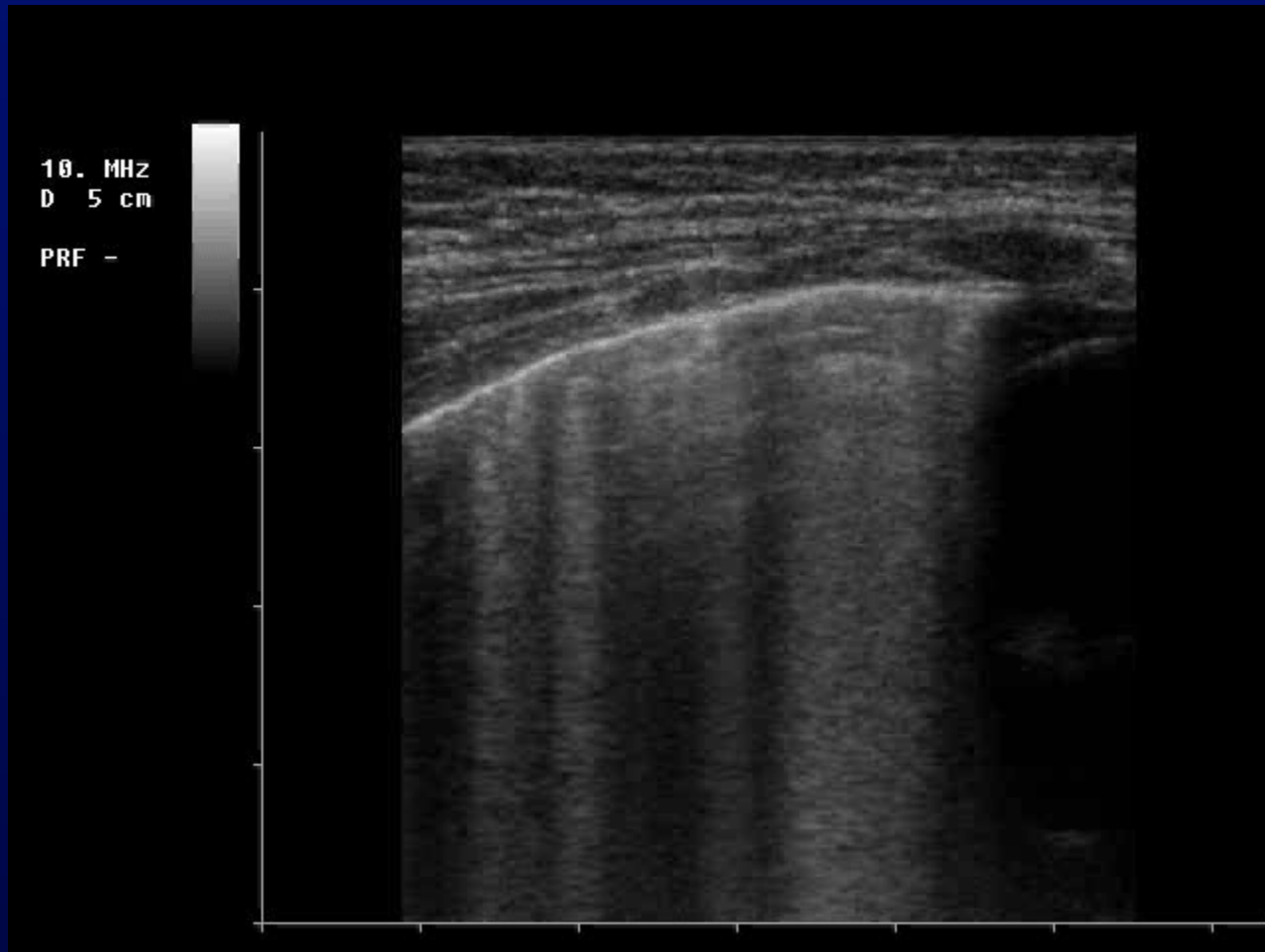
REGULAR PLEURAL LINE – A LINES – "LUNG SLIDING"

INTERSTITIAL SYNDROME



B LINES

INTERSTITIAL SYNDROME – WET LUNG



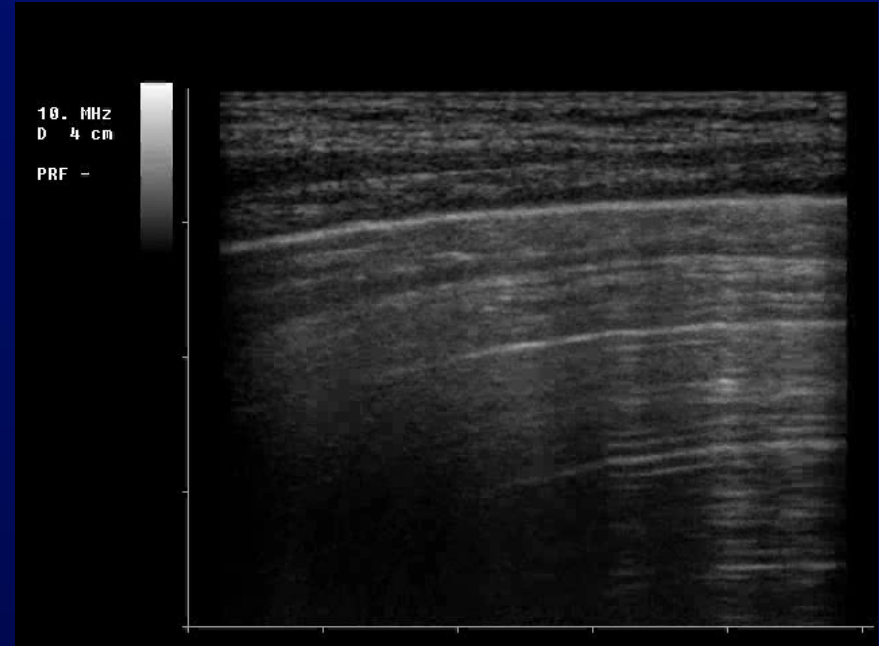
GLI ARTEFATTI

In termini fisici di imaging ultrasonoro, un artefatto è un errore di percezione o di rappresentazione di una informazione acustica introdotto dall'apparecchiatura impiegata ed indotto da fenomeni di interazione tra energia e tessuto.

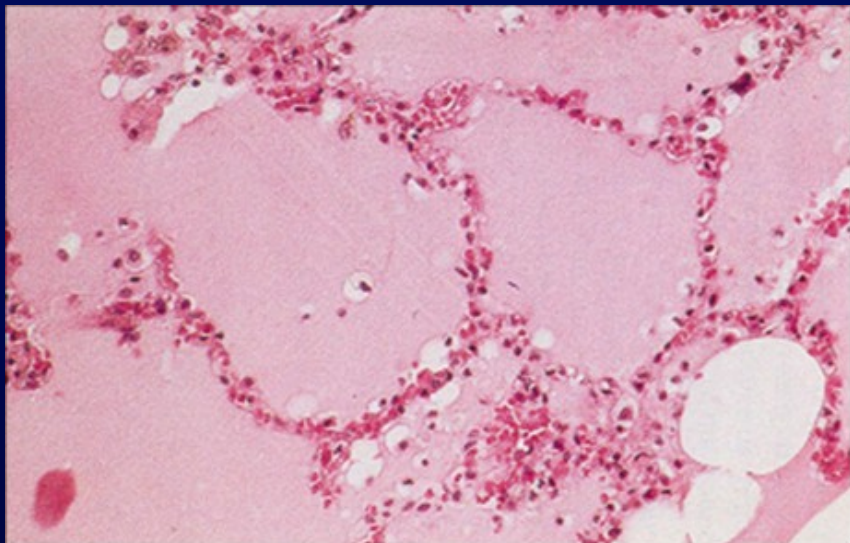
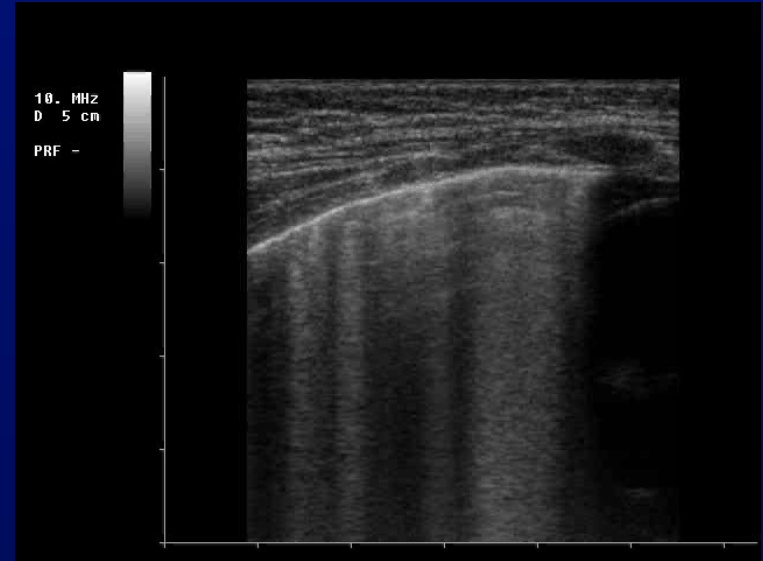
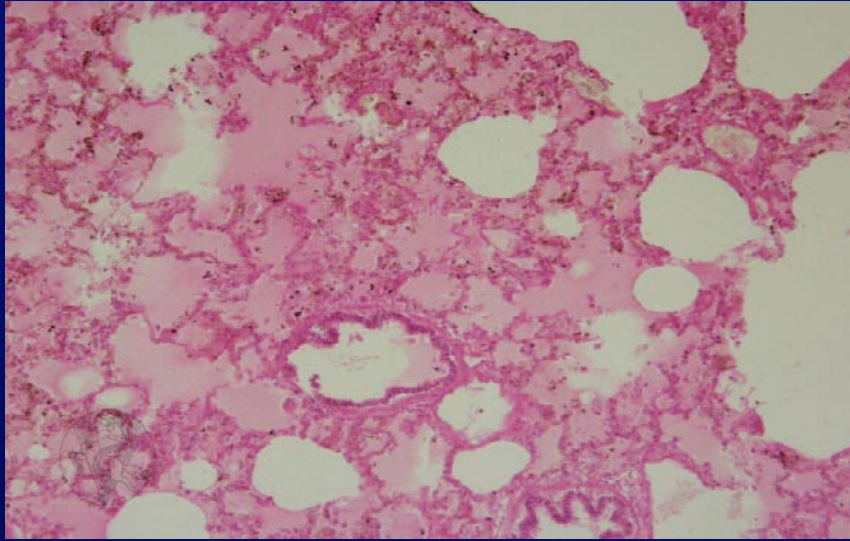
Kremkau FW, Taylor KJW. **Artifacts in ultrasound imaging.**
J Ultrasound Med 1986;5:227-37

**L'ARTEFATTO NON IDENTIFICA
UNA STRUTTURA
ANATOMICA REALE**

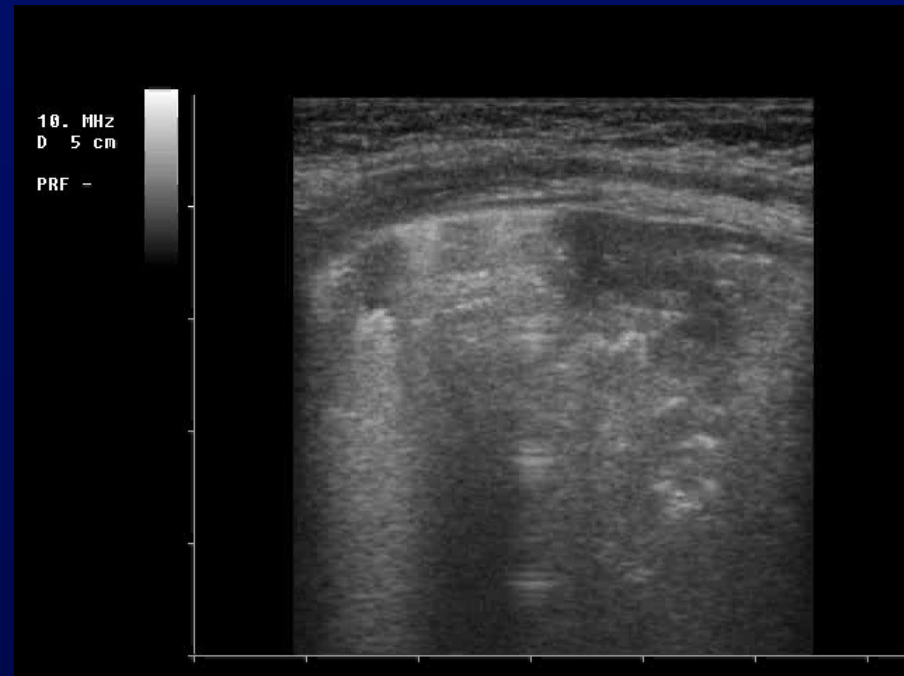
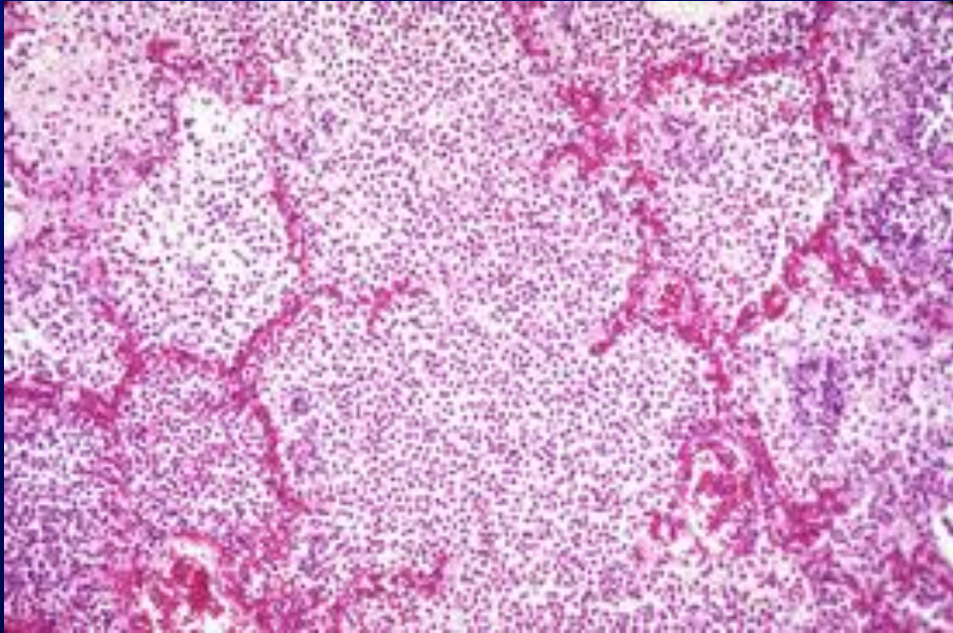
NORMAL LUNG



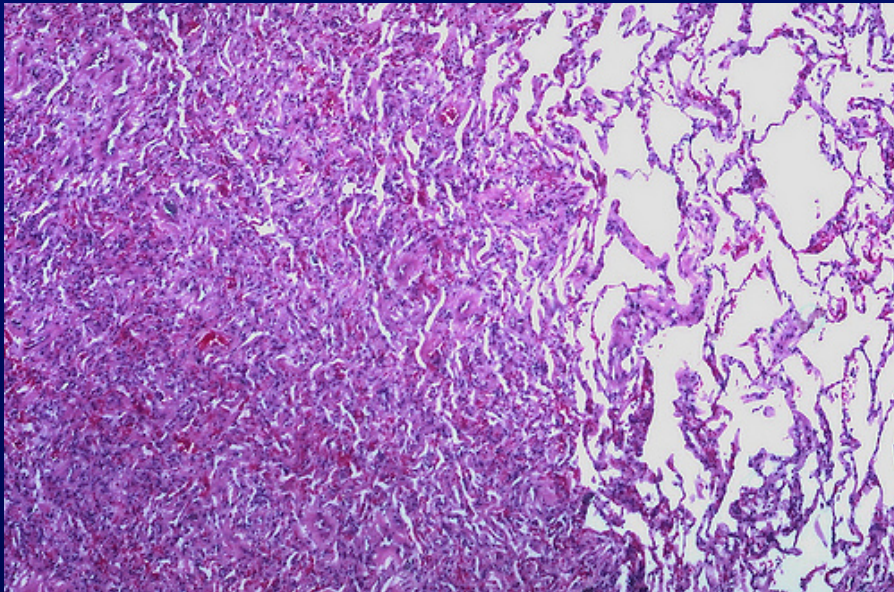
CARDIOGENIC PULMONARY EDEMA



PNEUMONIA



ATELECTASIS



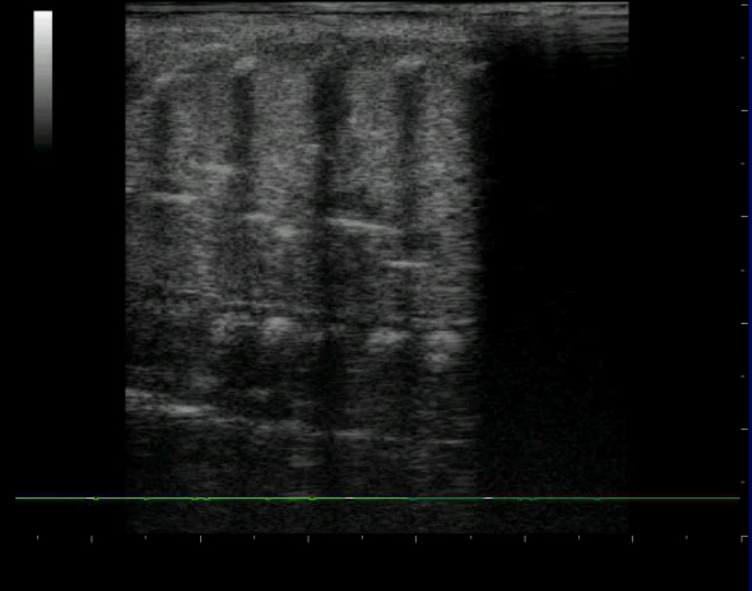
ESAOTE MyLab30

GRIECO GIUSEPPE

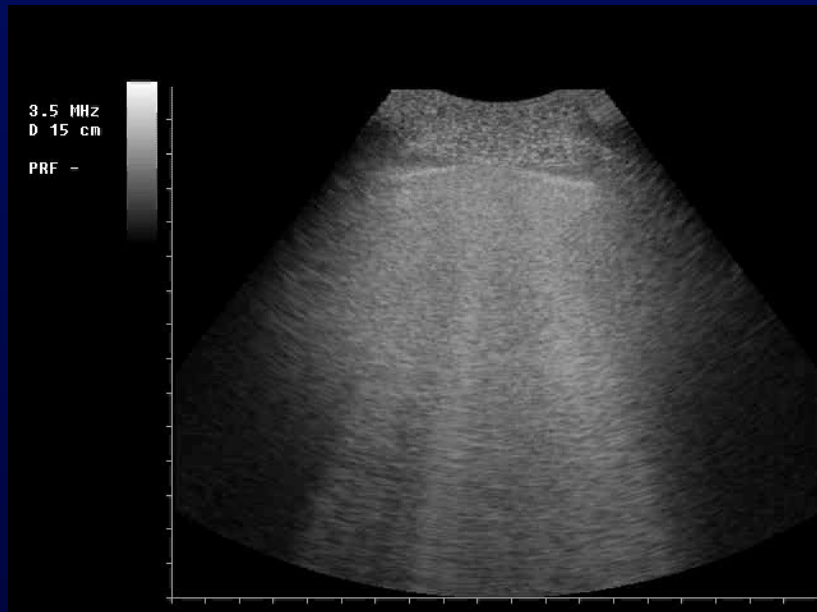
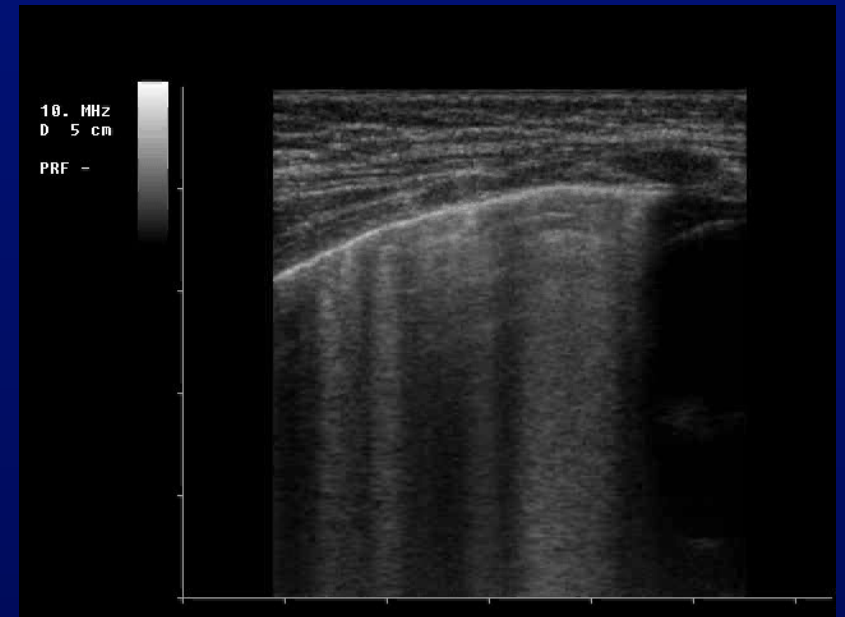
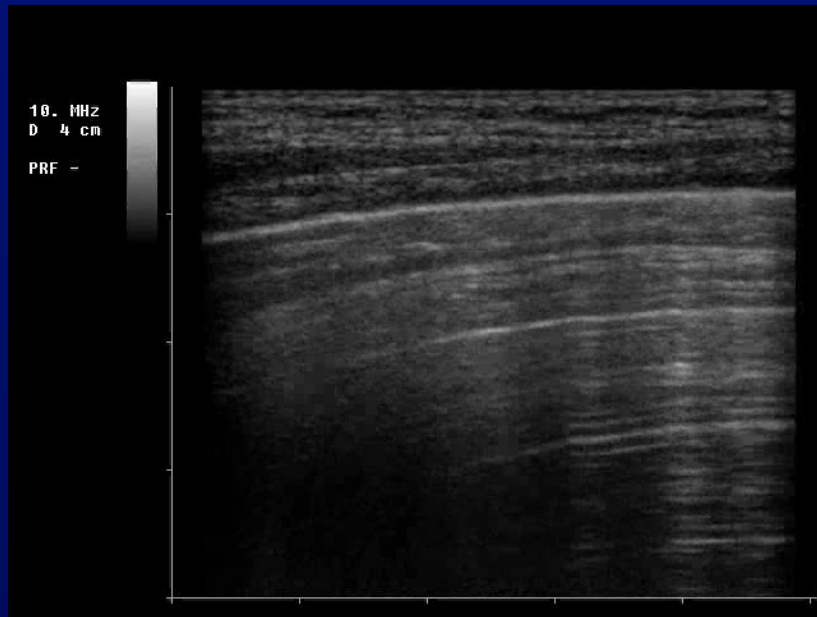
AGO 24 2005 16:14

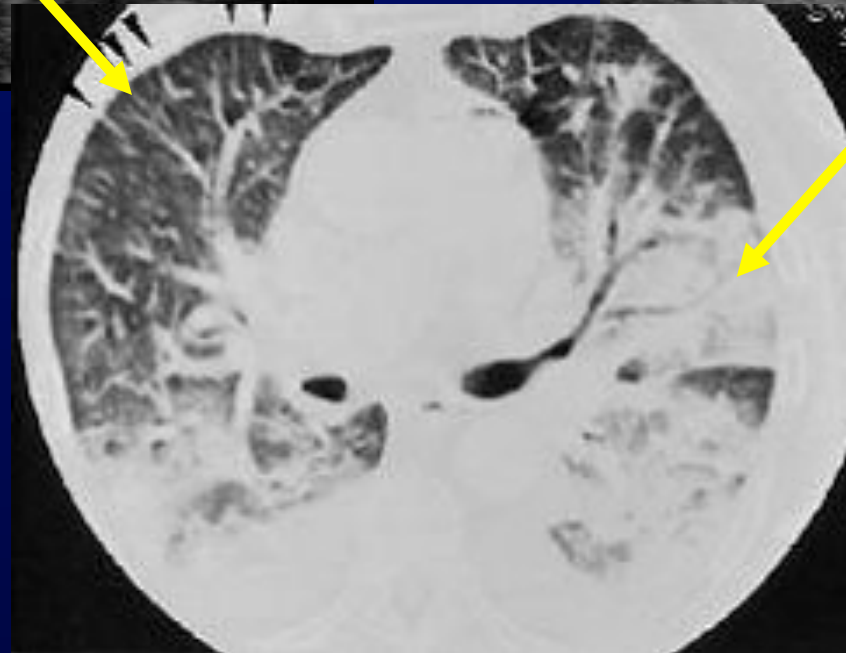
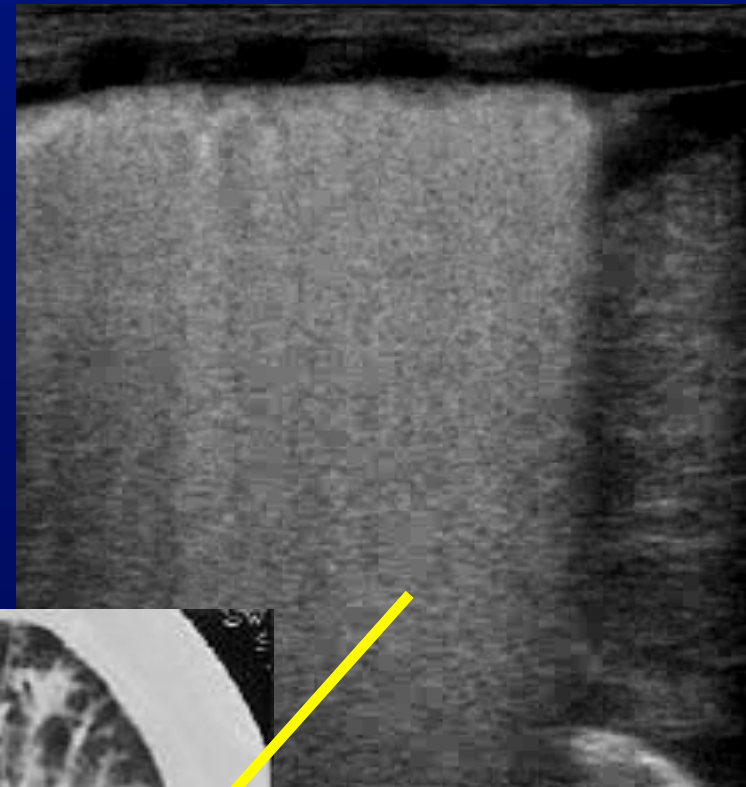
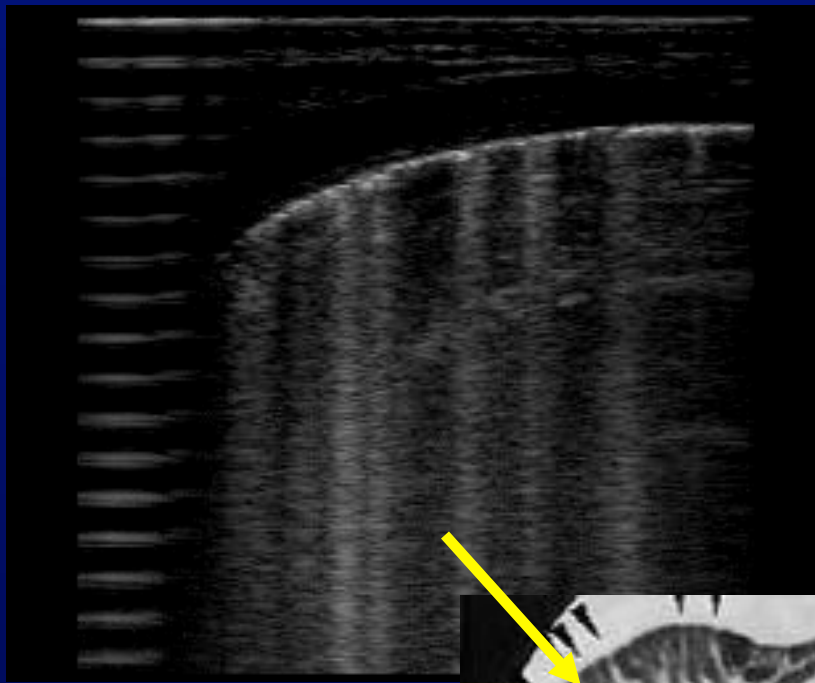
B F 12 MHz G 85%
P 5 cm
PRC 6-B-A PRS 1
PST 2

FC <<



FROM ARTIFACTS TO REAL AND VICE VERSA





Lichtenstein D. et al. The comet-tail artifact. An ultrasound sign of alveolar-interstitial syndrome. Am J Respir Crit Care Med. 1997 Nov;156(5):1640-6.

LUNGS ULTRASOUND IN ADULTS

- PLEURAL EFFUSION
- ALVEOLAR-INTERSTITIAL SYNDROME
- PNEUMOTHORAX
- PNEUMONIA
- ATELECTASIS
- ARDS
- PULMONARY EMBOLISM
- PULMONARY CONTUSION

CLINICAL INTEGRATED EMERGENCY ULTRASOUND

LUNG : wet-dry, pnx, pneumonia, pleural effusion, ALI/
ARDS, contusion, atelectasis, pulmonary embolism

HEART: systolic function, diastolic function, valvular
disorders, pericardium, aorta

INFERIOR VENA CAVA: evaluation of volume status

ABDOMEN: free fluid, AAA, etc..

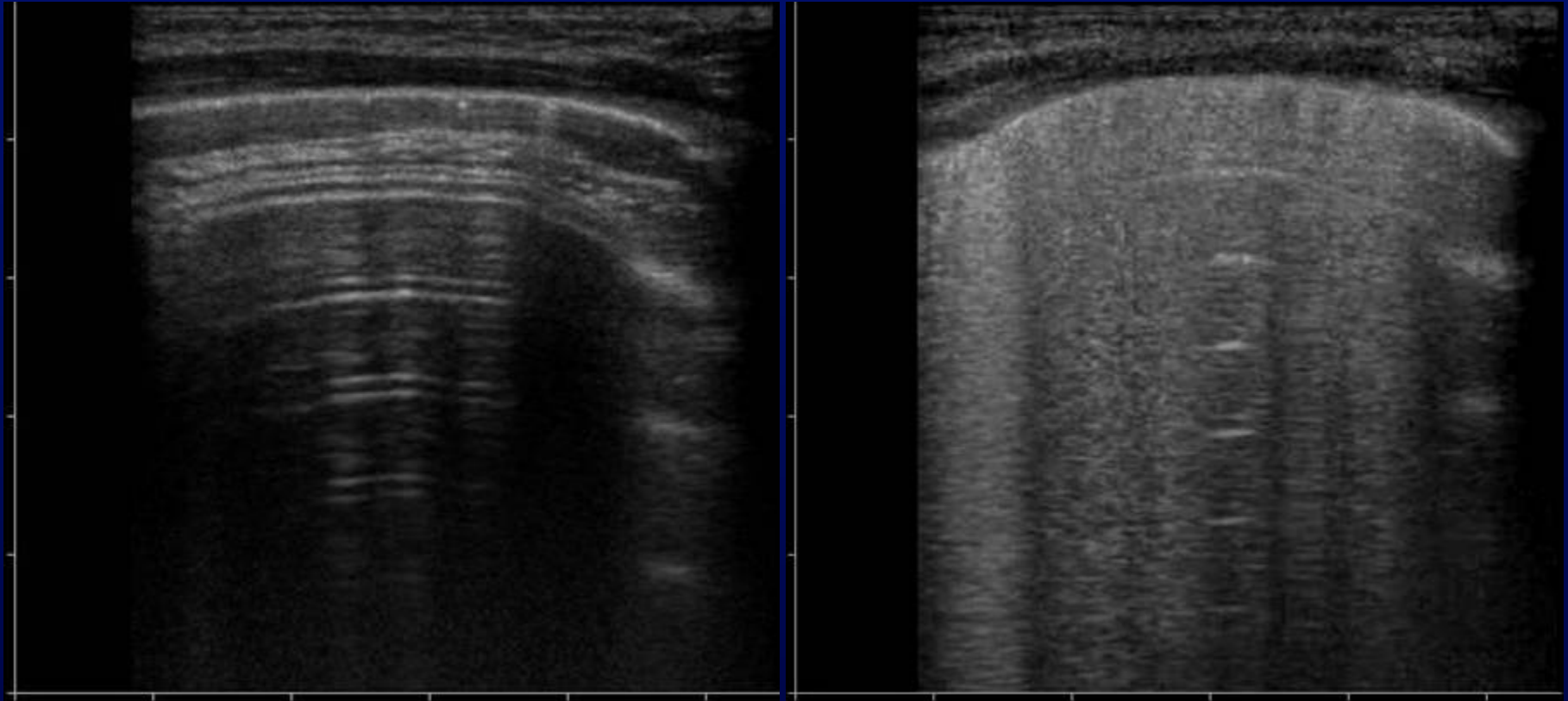
LEGS: DVT

ULTRASOUND GUIDED PROCEDURES

FLUID AND DRUG THERAPY MANAGEMENT

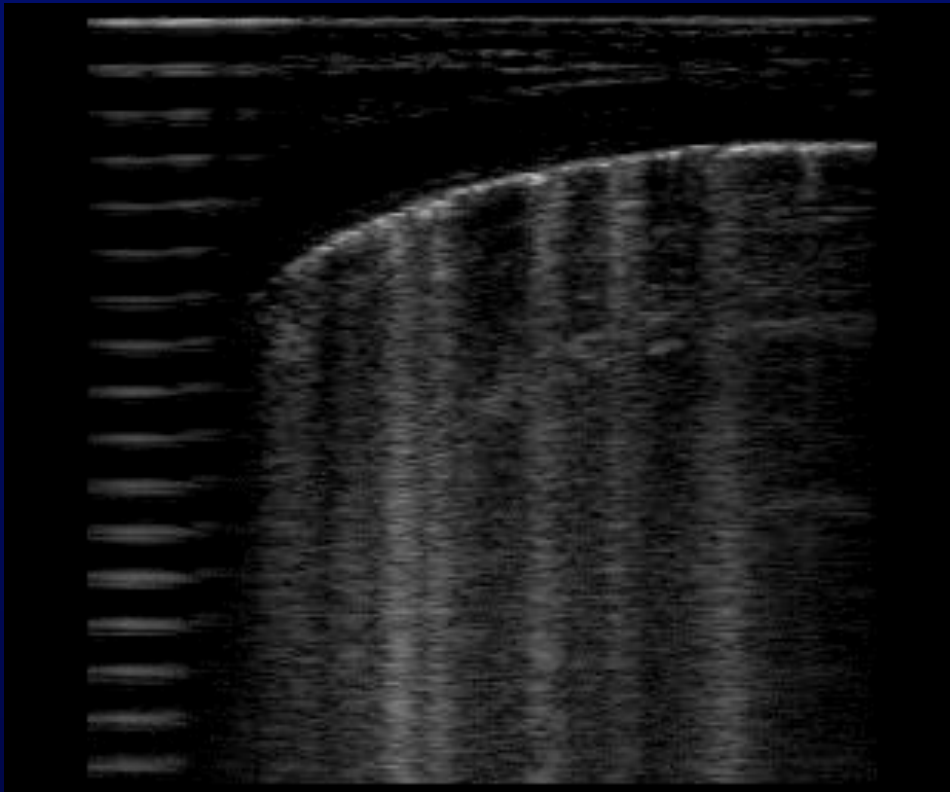
NORMAL

WET

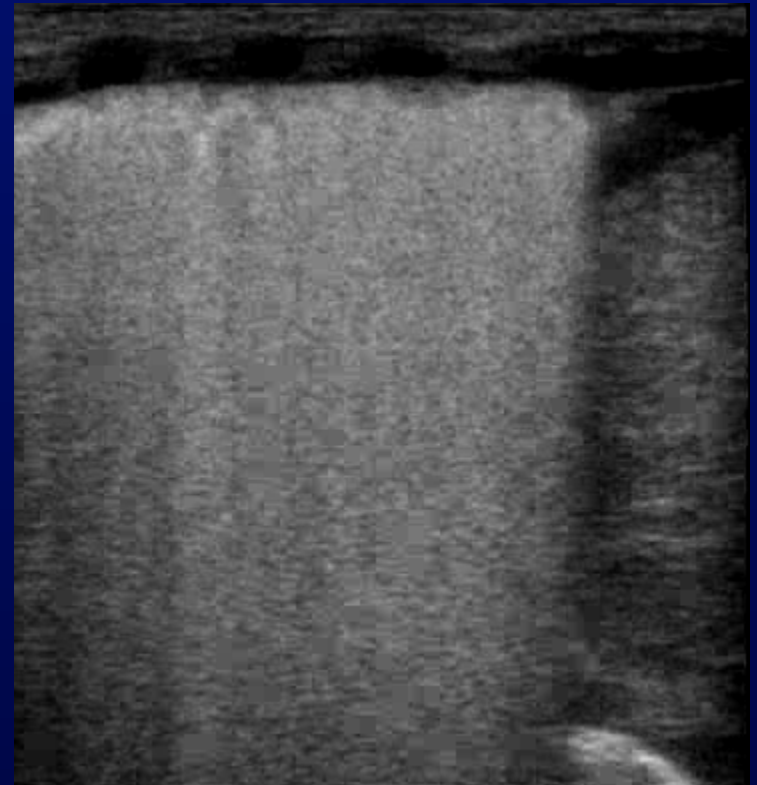


TRANSVERSAL SCAN

DEGREE OF THE INTERSTITIAL SYNDROME

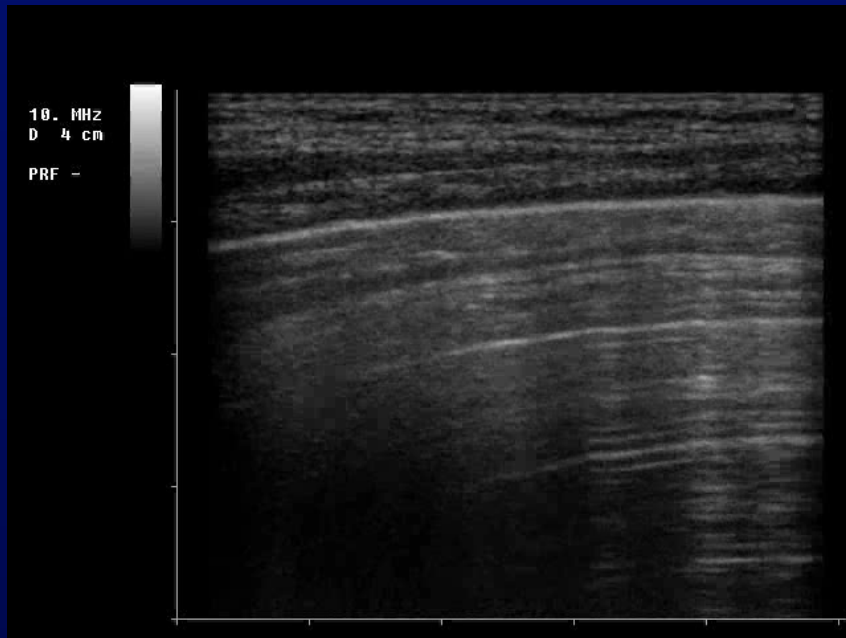


FEW B LINES

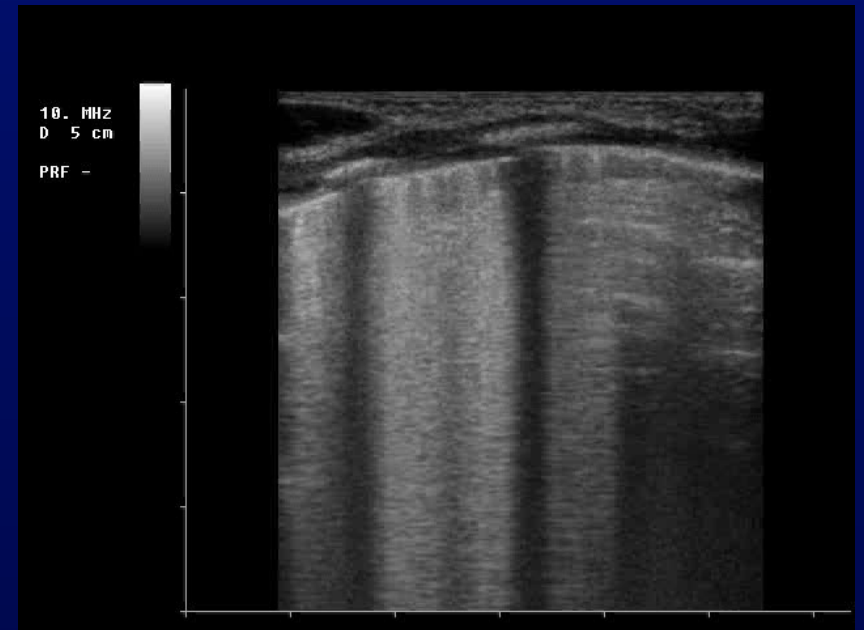


ECHOGRAPHIC "WHITE LUNG"

WHICH ONE IS NORMAL?

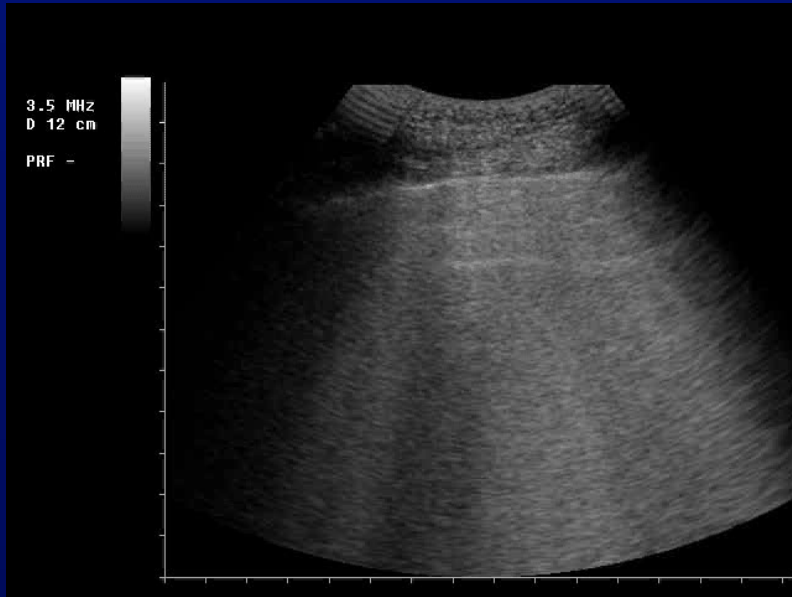


A

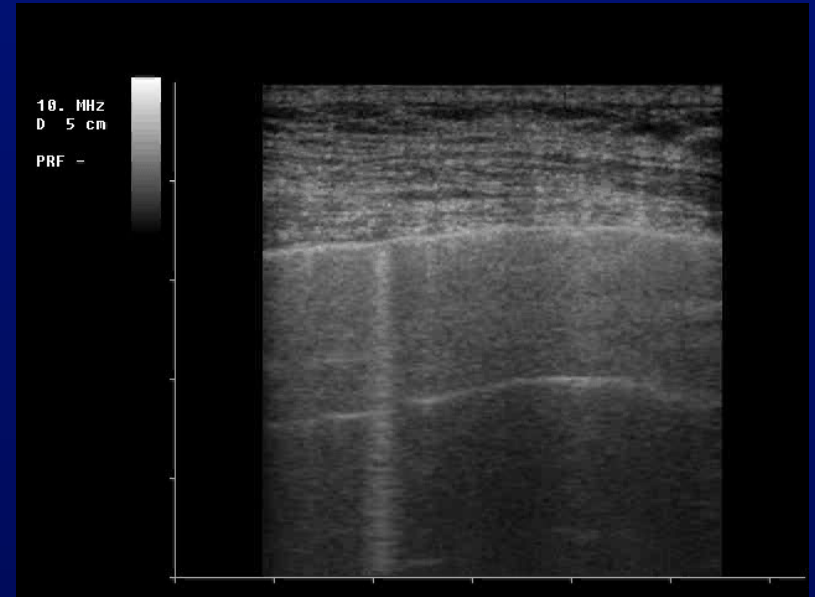


B

ACUTE PULMONARY EDEMA

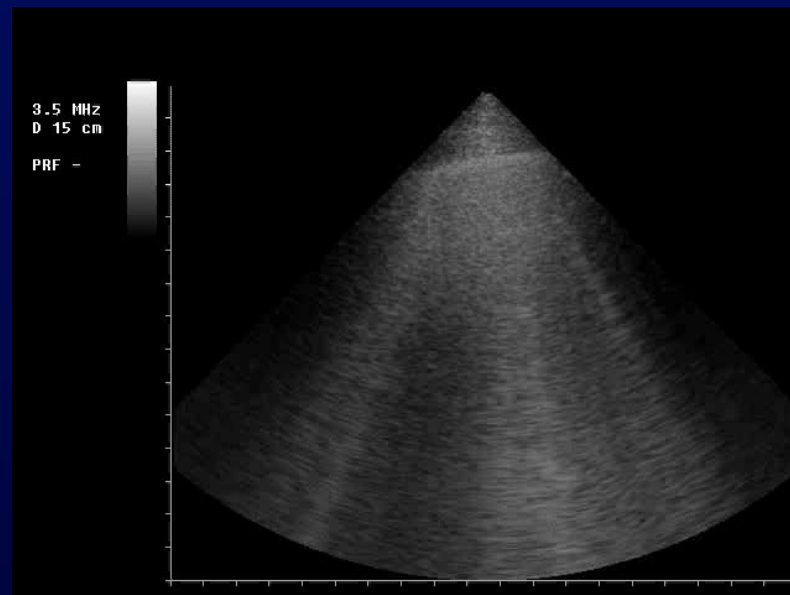


CONVEX

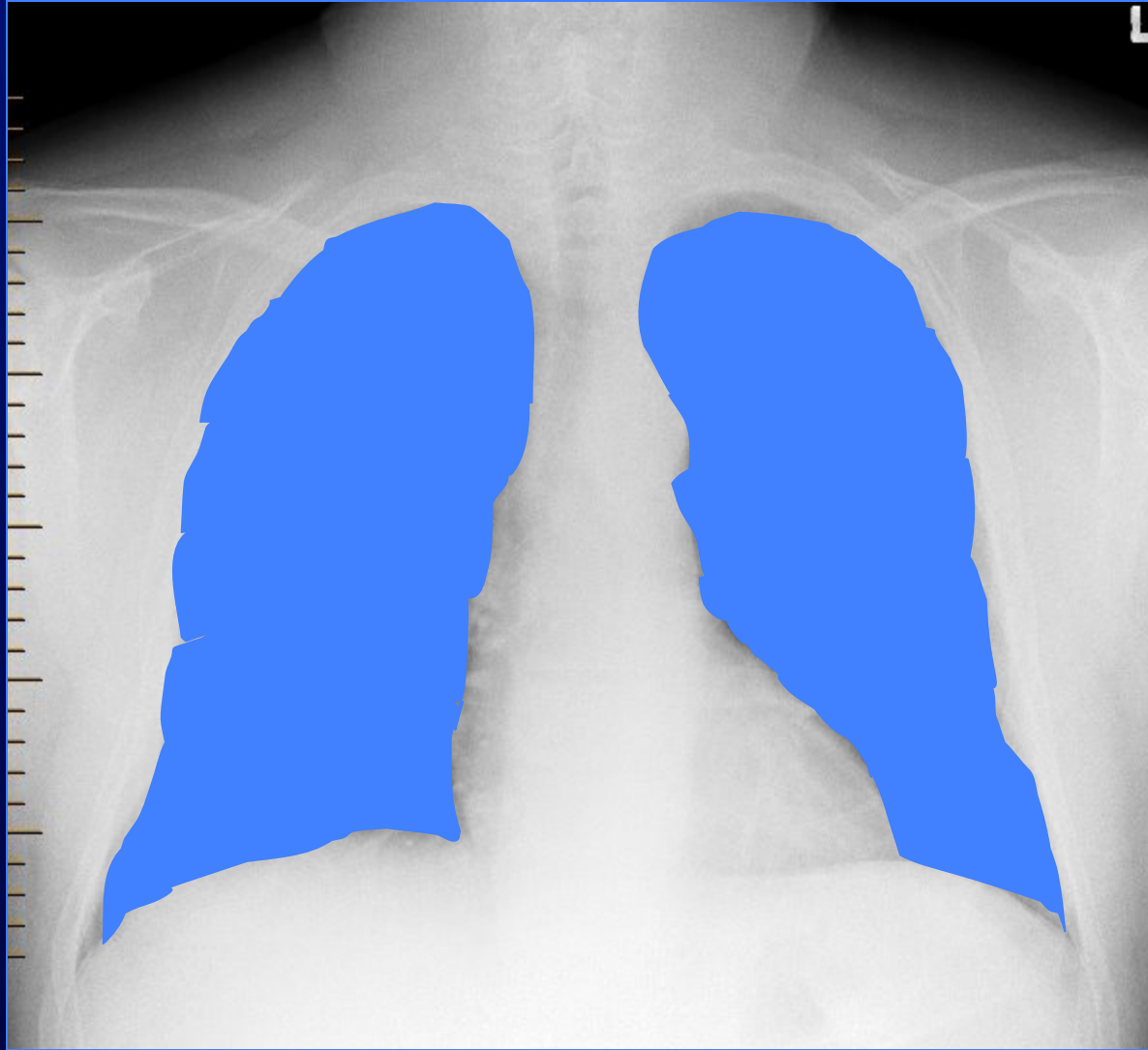


LINEAR

SECTOR



CARDIOGENIC PULMONARY EDEMA



WET OR DRY LUNG ?

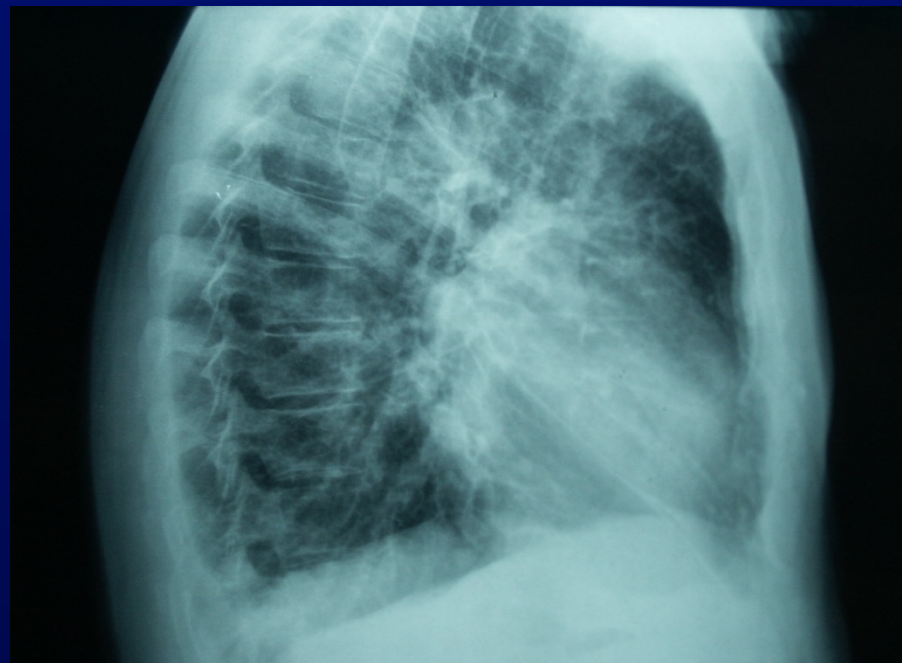
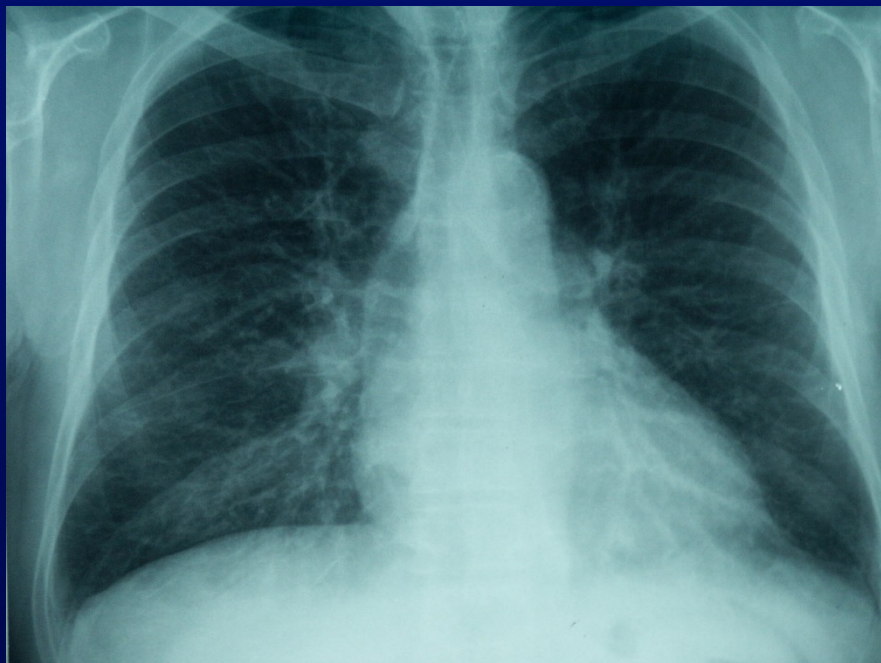


- **Normally, extra vascular lung water is 500 mL**
- **CXR is negative for increases < 30%**
- **Alveolar flooding usually appears when the extravascular lung water is 75% above the normal limit**

Takeda A, Okumura S, Miyamoto T, Hagio M, Fujinaga T. Comparison of extravascular lung water volume with radiographic findings in dogs with experimentally increased permeability pulmonary edema. J Vet Med Sci 1995; 57(3):481-5

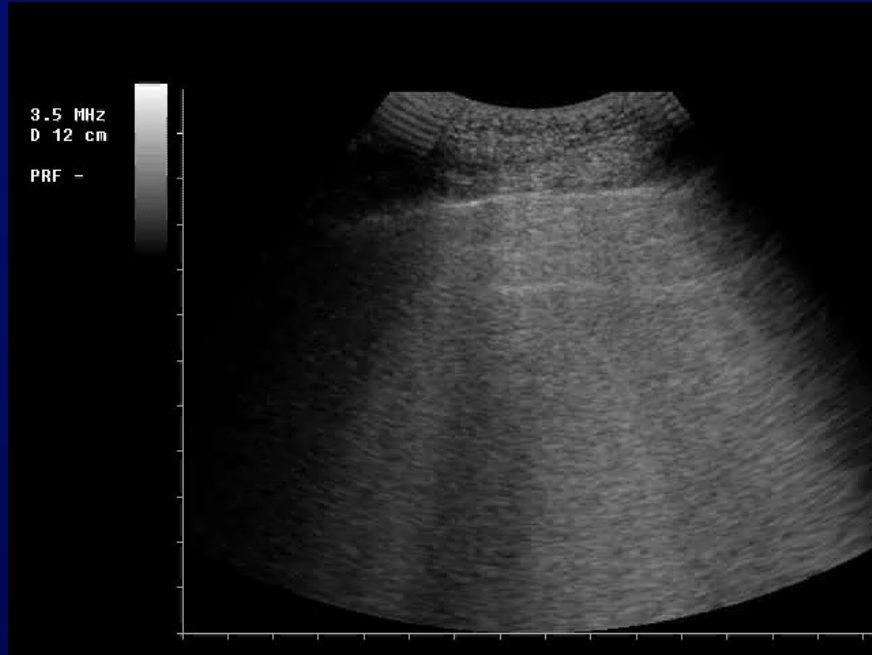
Stapczynski JS. Congestive heart failure and pulmonary edema. In: Tintinalli JE, Krome RL, Ruiz E, editors. Emergency medicine: a comprehensive study guide. New York: McGraw-Hill; 1992. p. 216-9.

**M. 58 y. Exertional dyspnea in the last 7 days. Clear lungs. Sat O₂ in a.r. 96%.
BP 180/105. ECG SR, LVH.**

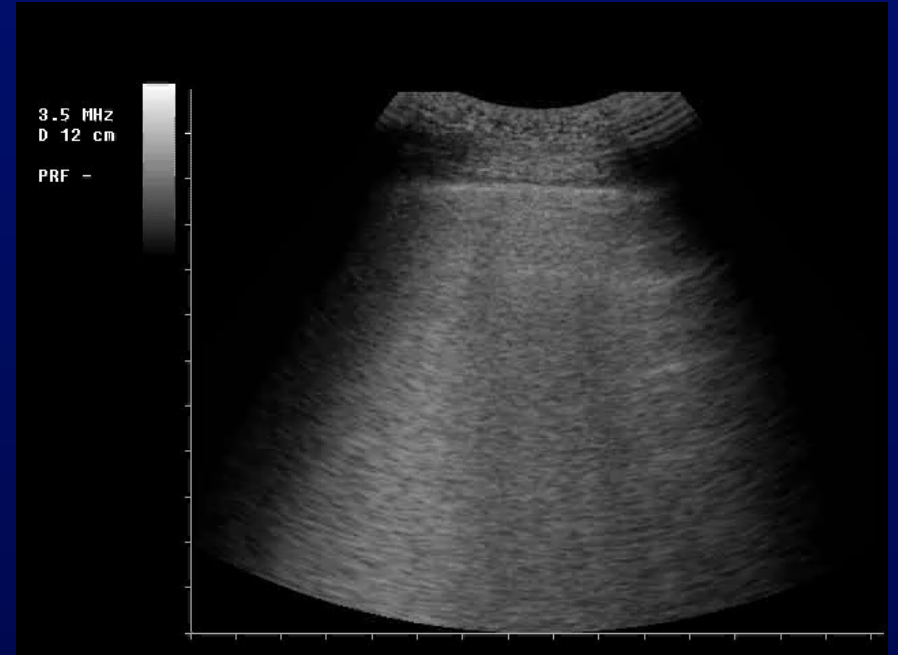


CXR

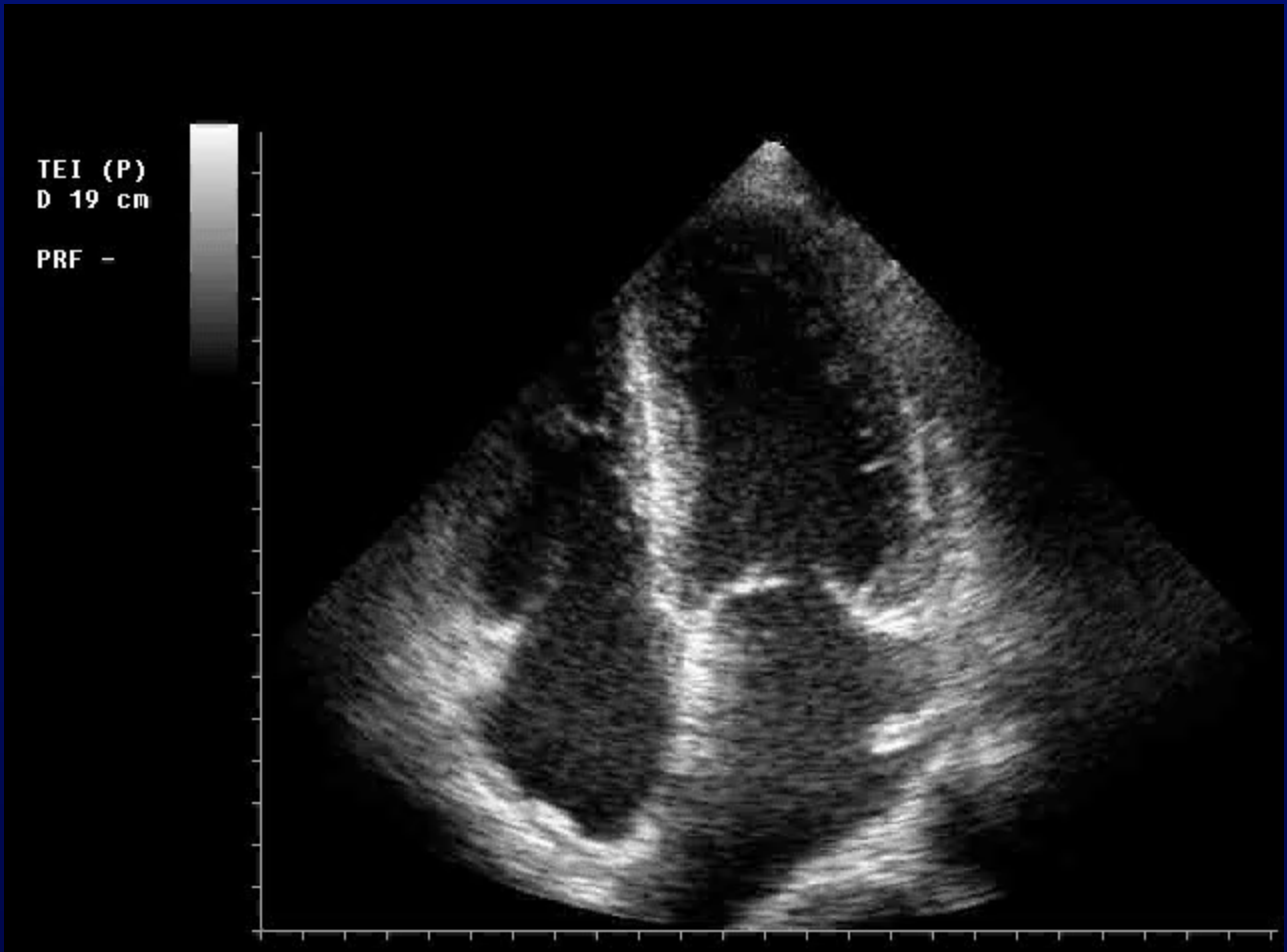
LUNG ULTRASOUND



RIGHT LUNG

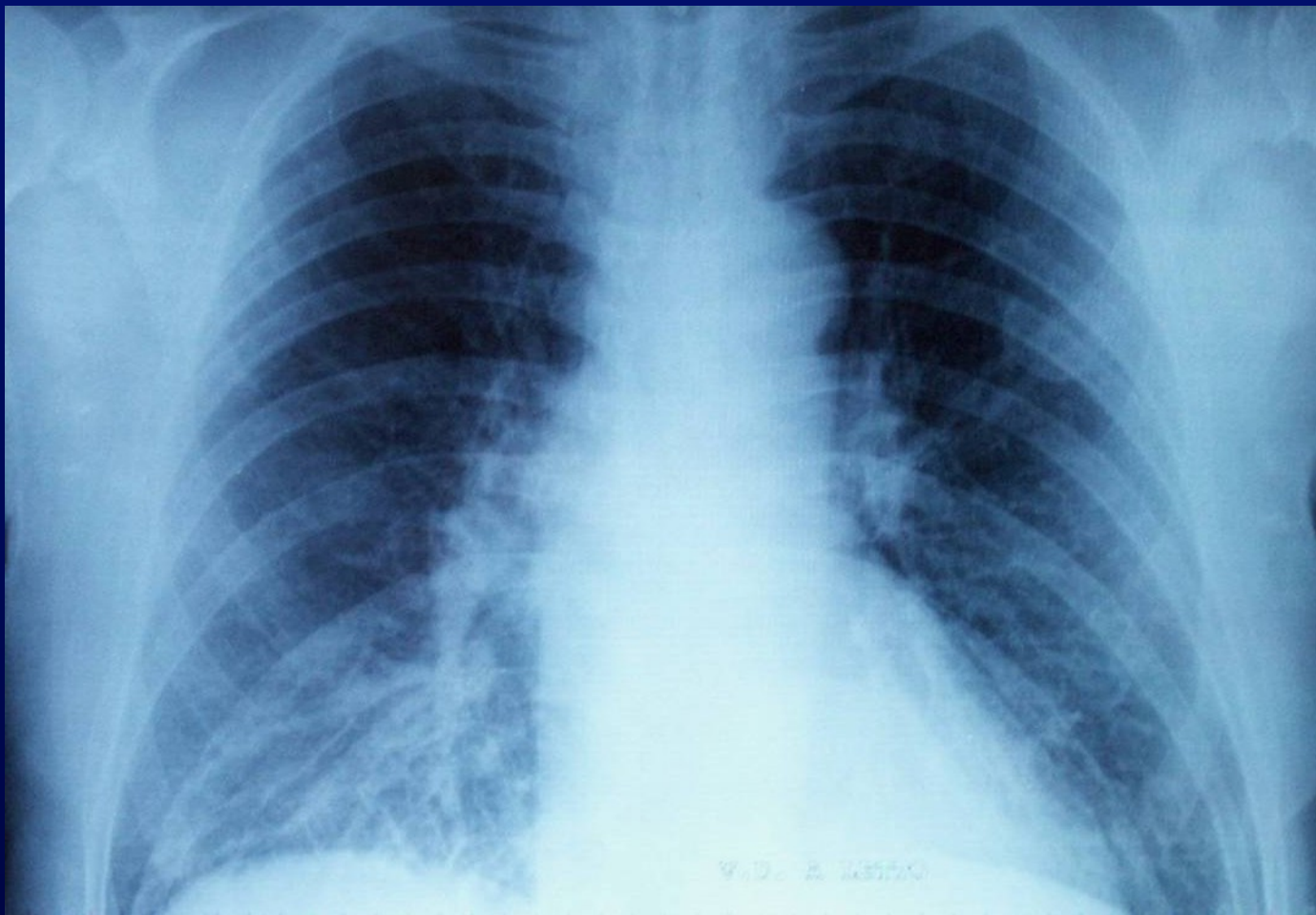


LEFT LUNG

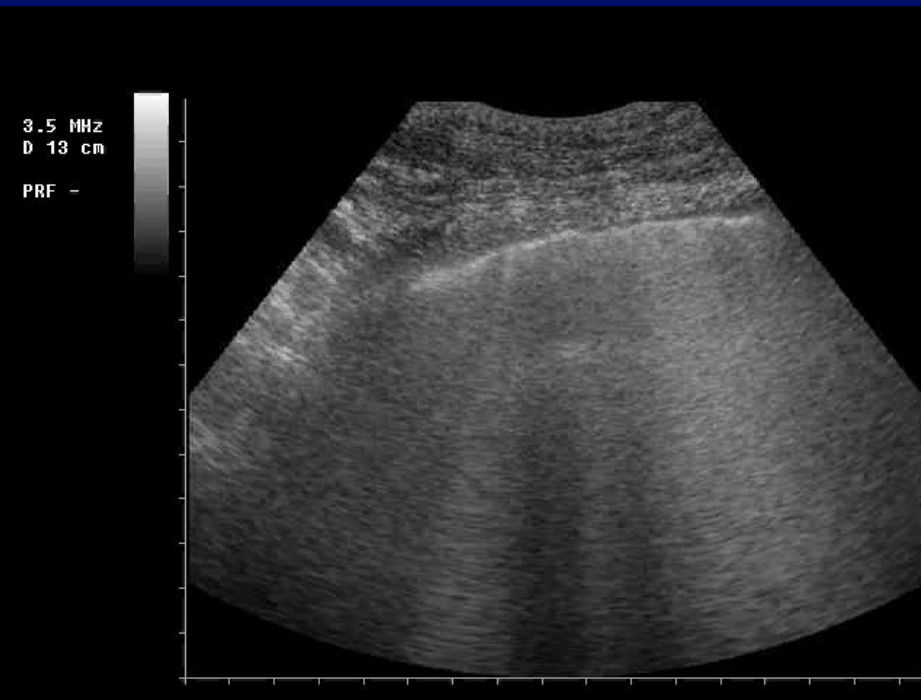


ECHOCARDIOGRAPHY

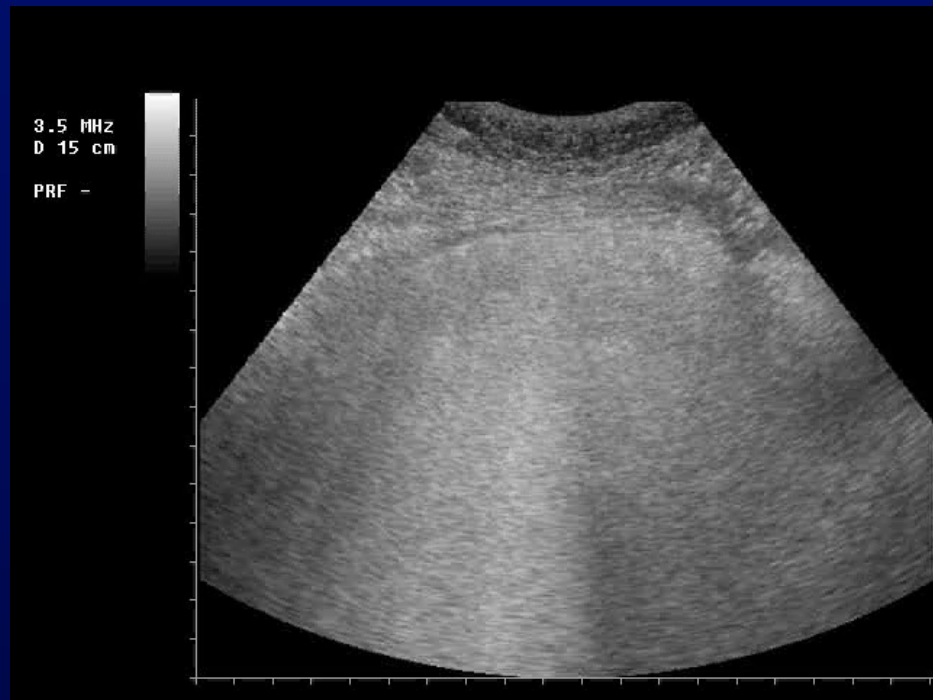
- **DYSPNEA IN THE LAST 2 H**
- **BP 140/50, NORMAL ECG, BILATERAL BRONCHOSPASM**



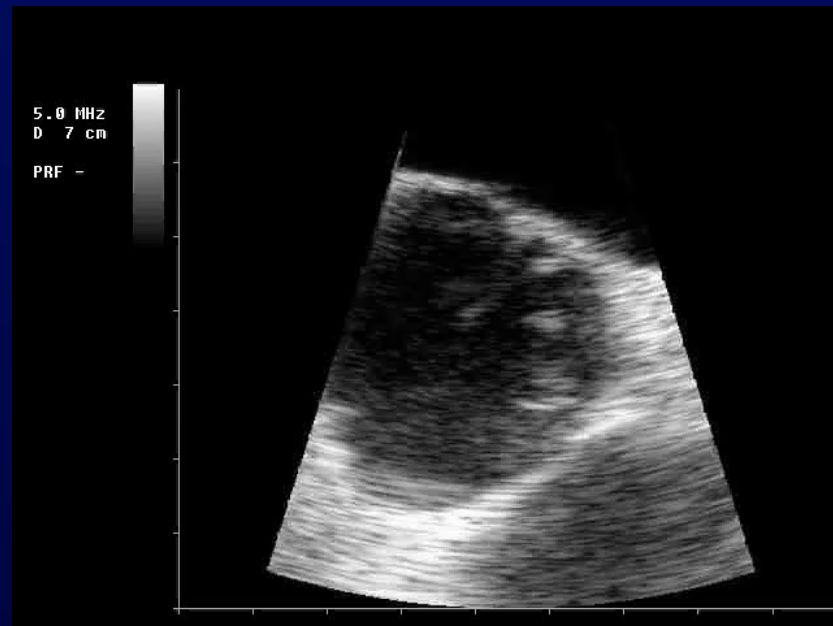
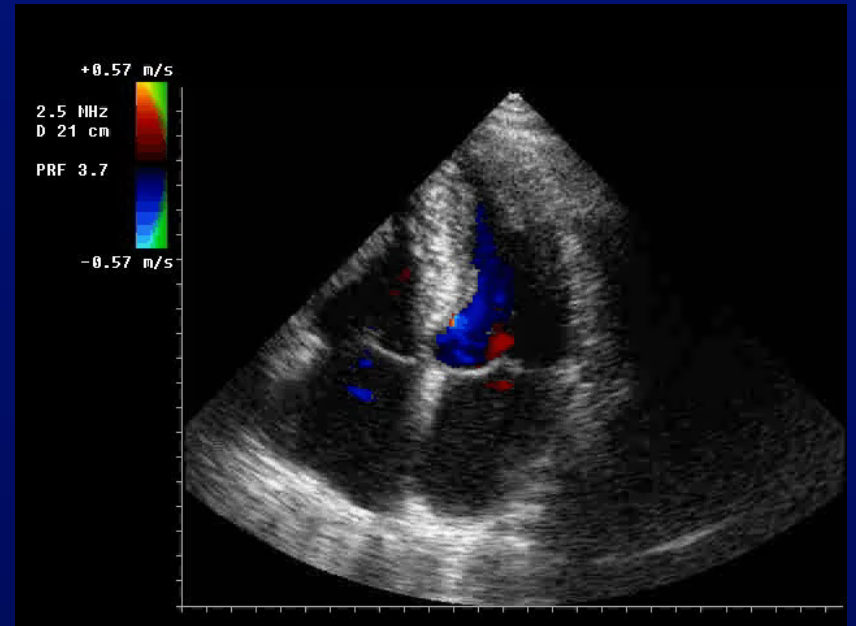
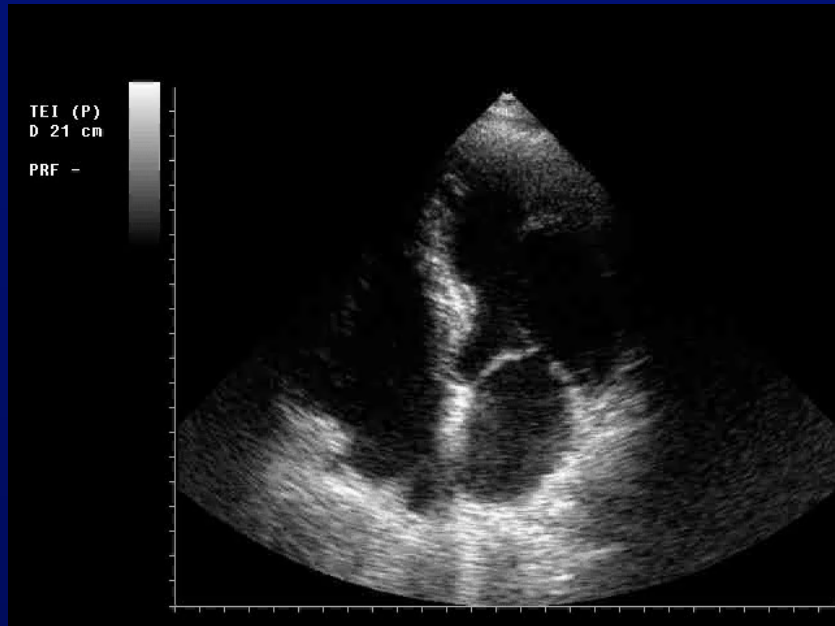
LUNG ULTRASOUND



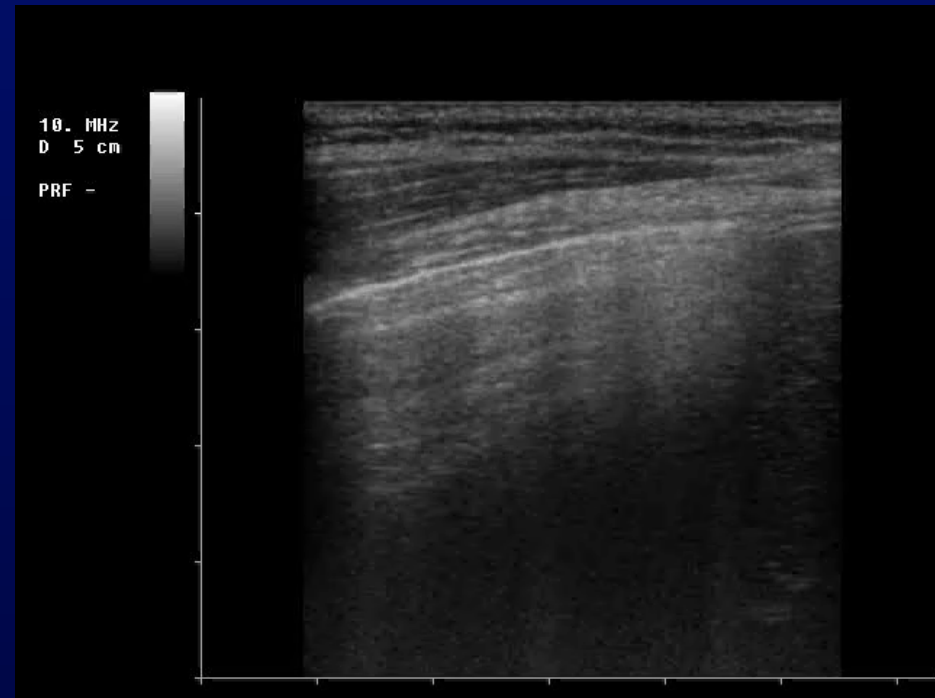
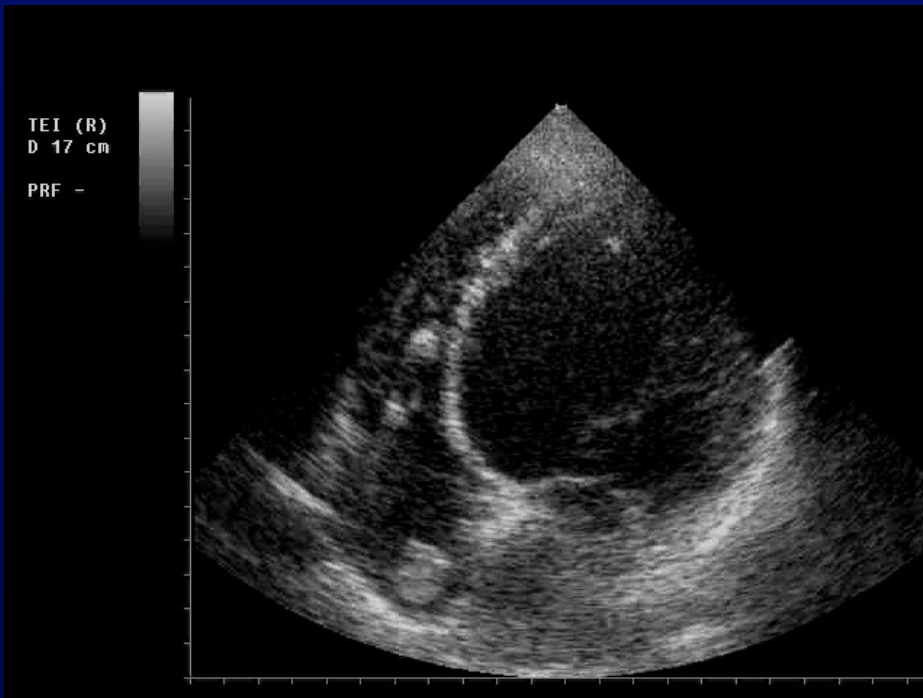
RIGHT LUNG

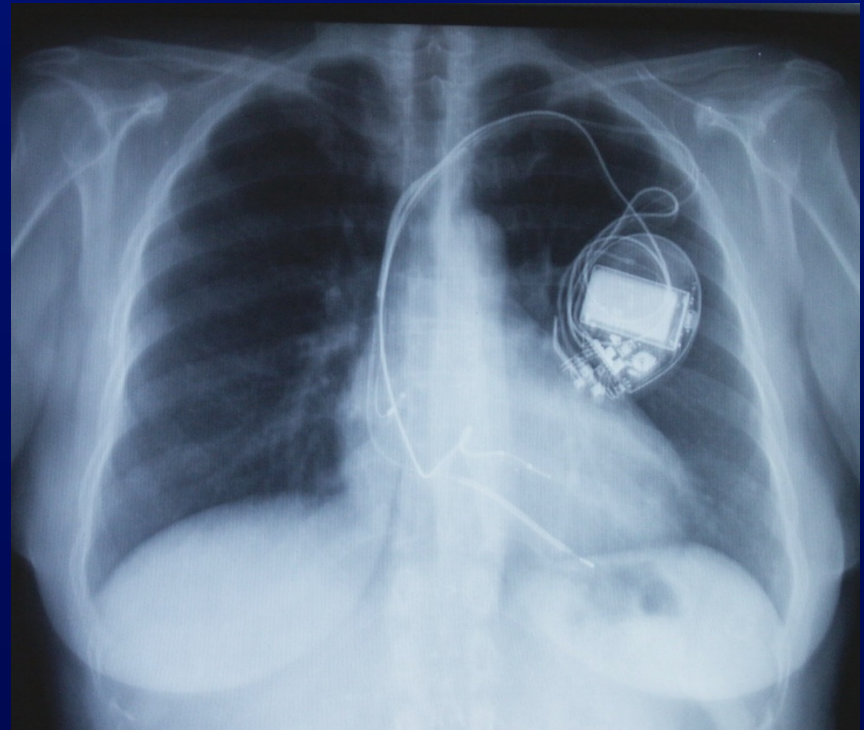
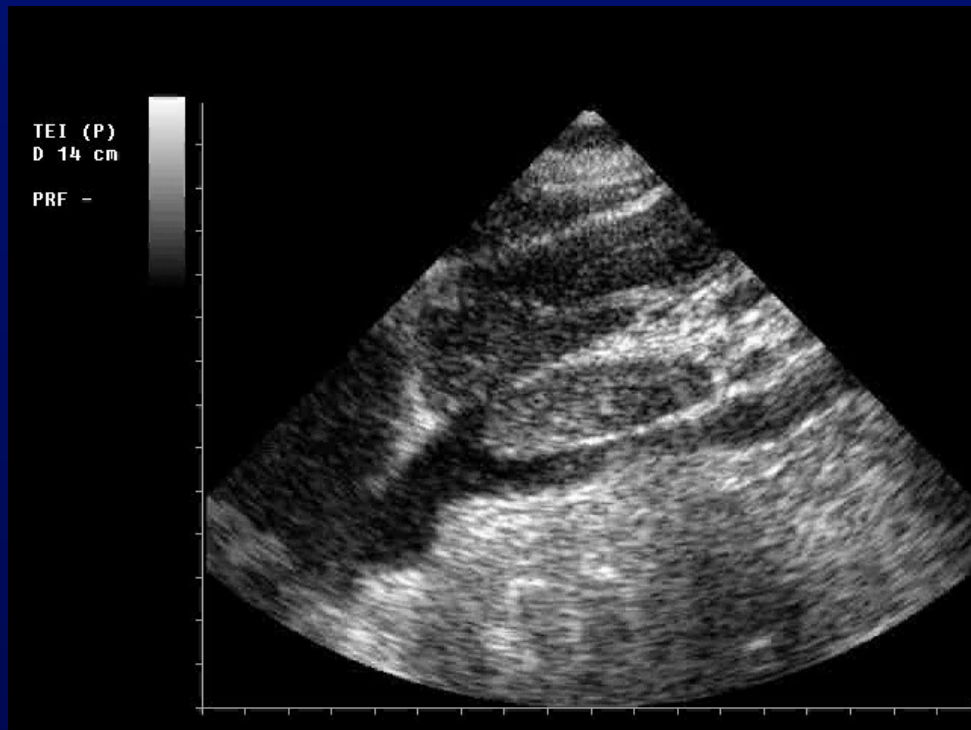


LEFT LUNG



- M. 57 AA
- DCM – ICD
- EXERTIONAL DYSPNEA IN THE LAST 2 DAYS





US / APE

SENSITIVITY

100%

The NEW ENGLAND JOURNAL of MEDICINE

EDITORIALS



Lung ultrasound: an open window on dyspnoic patients

Roberto Copetti, M.D.

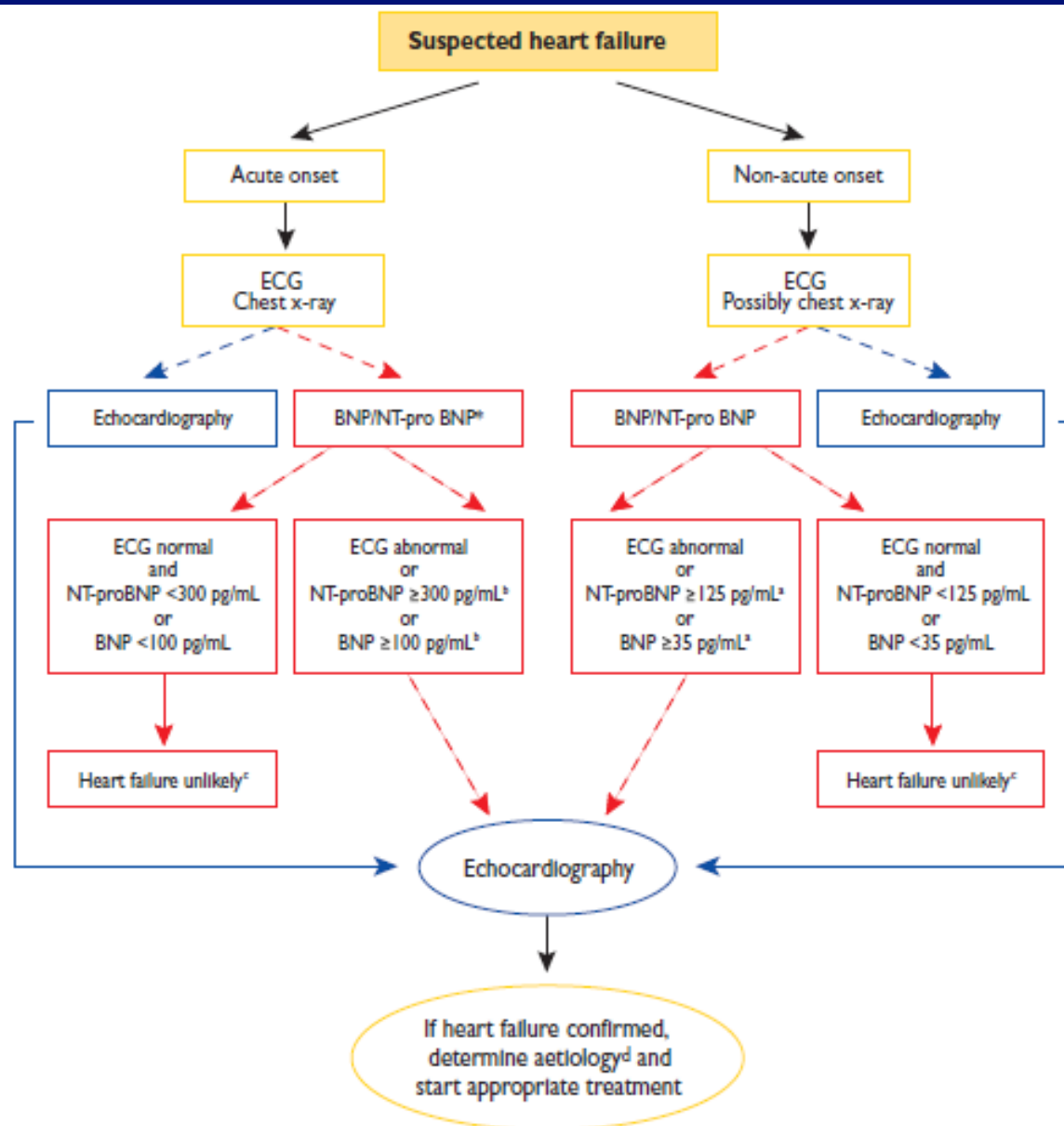
LATISANA GENERAL HOSPITAL – LATISANA (ITALY)

ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: The Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC.

Eur Heart J. 2012 May 19

THE PHYSICIAN AND DYSPNOIC PATIENT





Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Gordon C S Smith and Jill P Pell

BMJ 2003;327:1459-1461
doi:10.1136/bmj.327.7429.1459

Abstract

Objectives To determine whether parachutes are effective in preventing major trauma related to gravitational challenge.

Design Systematic review of randomised controlled trials.

Data sources: Medline, Web of Science, Embase, and the Cochrane Library databases; appropriate internet sites and citation lists.

Study selection: Studies showing the effects of using a parachute during free fall.

Main outcome measure Death or major trauma, defined as an injury severity score > 15 .

Results We were unable to identify any randomised controlled trials of parachute intervention.

Conclusions As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using randomised controlled trials. Advocates of evidence based medicine have criticised the adoption of interventions evaluated by using only observational data. We think that everyone might benefit if the most radical protagonists of evidence based medicine organised and participated in a double blind, randomised, placebo controlled, crossover trial of the parachute.

accepted intervention was a fabric device, secured by strings to a harness worn by the participant and released (either automatically or manually) during free fall with the purpose of limiting the rate of descent. We excluded studies that had no control group.

Definition of outcomes

The major outcomes studied were death or major trauma, defined as an injury severity score greater than 15.⁶

Meta-analysis

Our statistical approach was to assess outcomes in parachute and control groups by odds ratios and quantified the precision of estimates by 95% confidence intervals. We chose the Mantel-Haenszel test to assess heterogeneity, and sensitivity and subgroup analyses and fixed effects weighted regression techniques to explore causes of heterogeneity. We selected a funnel plot to assess publication bias visually and Egger's and Begg's tests to test it quantitatively. Stata software, version 7.0, was the tool for all statistical analyses.

Results

Our search strategy did not find any randomised controlled trials of the parachute.

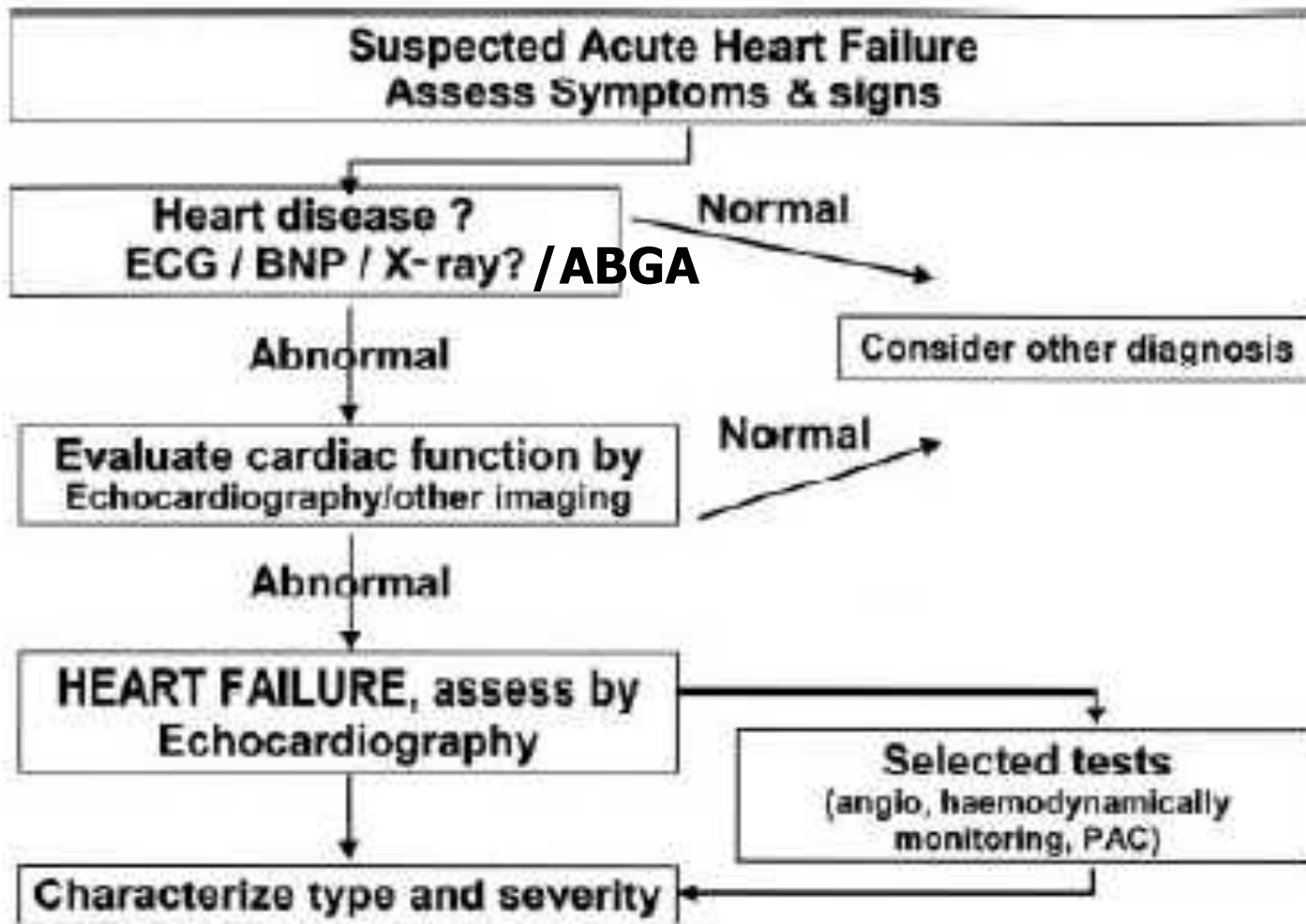
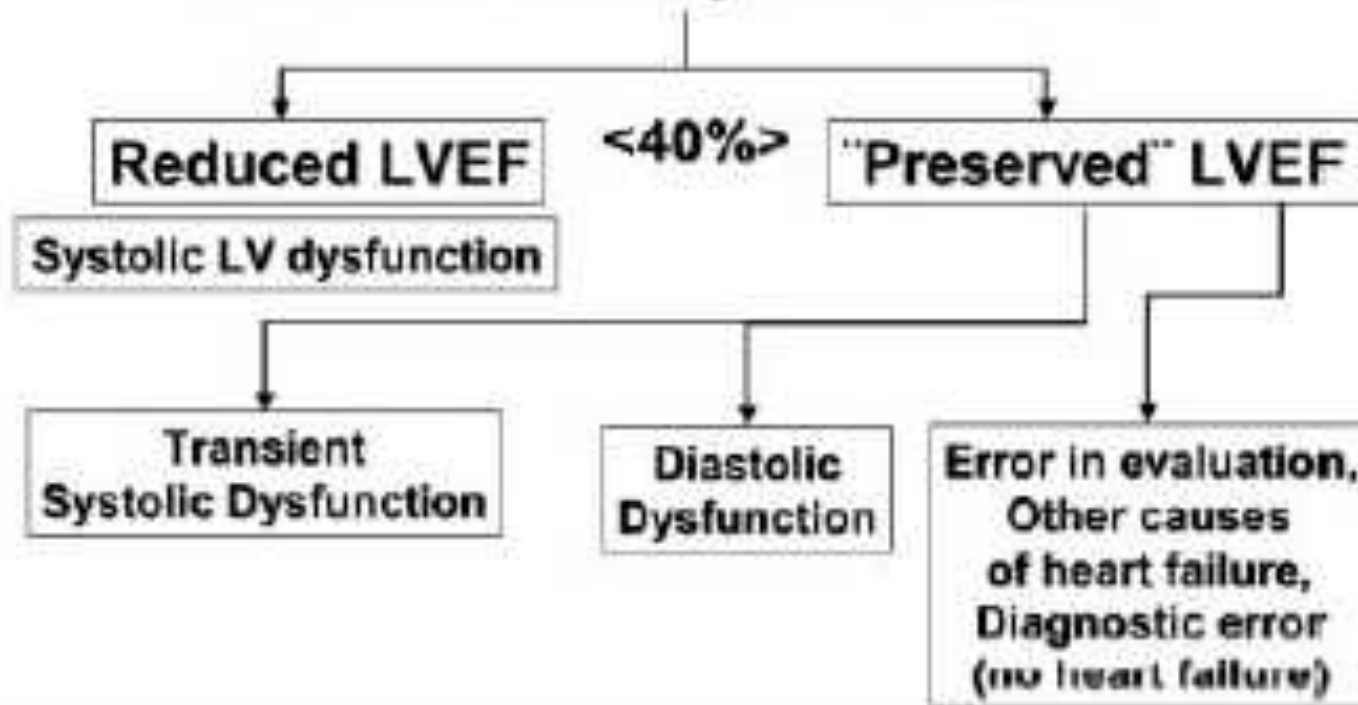


Figure 3 Diagnosis of AHF.

Assessment of Ventricular Function Left Ventricular Ejection Fraction



PERFORMANCE OF THE CLINICAL EVALUATION DIAGNOSING INCREASED FILLING PRESSURE

Left atrial pressure \geq 20 mm Hg

	SENSIBILITY	SPECIFICITY	PPV	NPV
NECK VEIN DISTENTION	50	66	40	74
HEPATOJUGULAR REFLUX	69	61	45	81
PERIFERAL EDEMA	25	77	33	69
RALES	25	77	33	69
S3	25	90	57	70
ORTHOPNEA	84	46	41	86

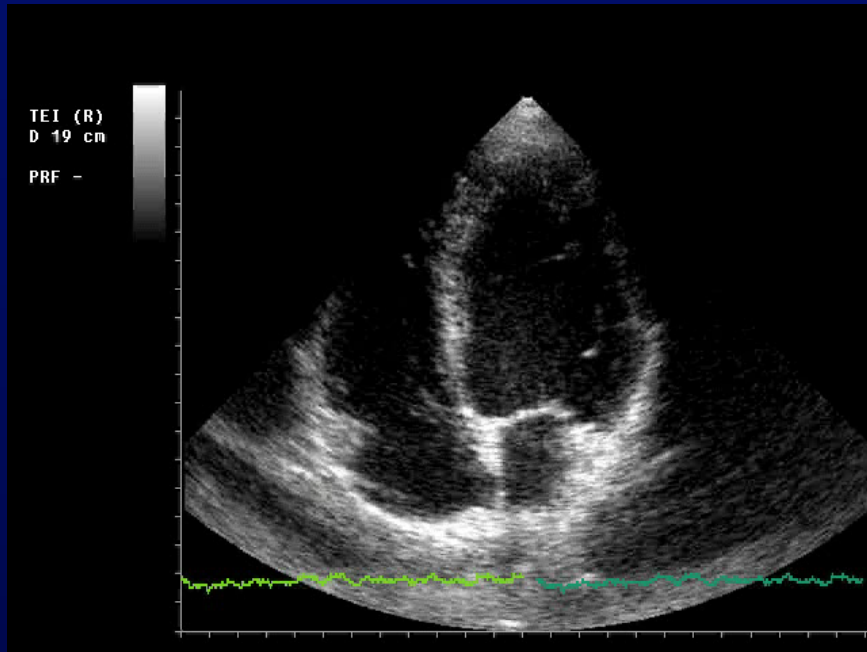
Table 3.—Performance of the Clinical Evaluation for Detecting an Increased Filling Pressure or a Decreased Ejection Fraction

Author	Sensitivity, %	Specificity, %	Likelihood Ratios		Level of Evidence	Prevalence of Disease, %
			Positive	Negative		
Increased filling pressure						
Patients referred for elective evaluation						
Harlan et al ¹²	52	85	3.5	0.6	I	21
Carlson et al ¹⁸	90	85	5.9	0.1	III	31
Postinfarction patients						
Forrester et al ¹⁹	85	85	5.7	0.2	II	64
Intensive care unit patients						
Fein et al ²¹	91	47	2.0	0.2	II	49
Eisenberg et al ²³	57	35	1.0	1.2	III	67
Tuchschmidt et al ²²	53	94	8.8	0.5	III	55
Connors et al ²⁴	51	67	2.0	0.7	III	61
Connors et al ²⁵	50	78	2.0	0.6	III	45
Steingrub et al ²⁶	35	85	3.0	0.7	III	31
Summary	54	69	1.7	0.7

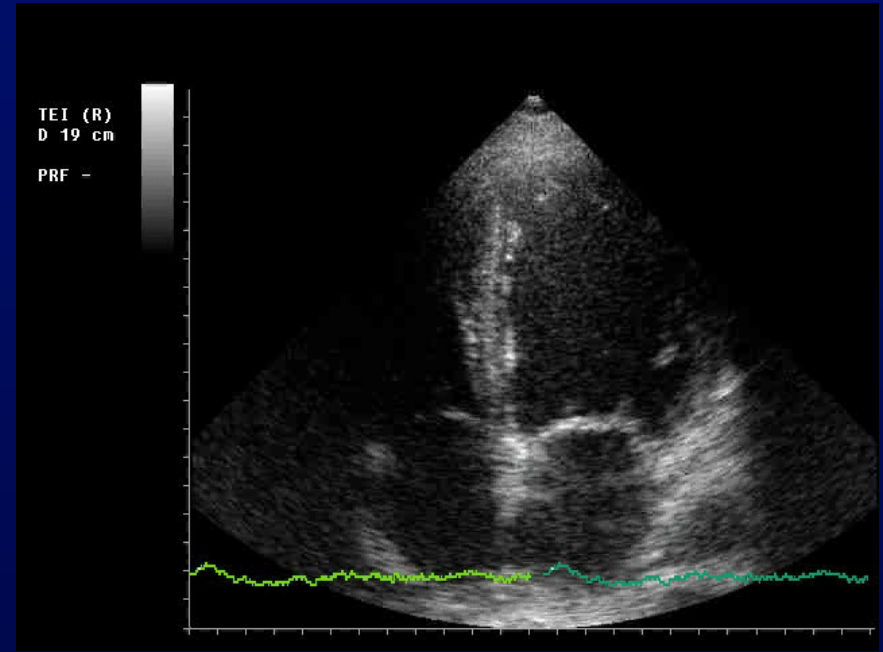
**“...E GUIDARE COME UN PAZZO
A FARI SPENTI NELLA NOTTE
PER VEDERE SE POI E’ TANTO
DIFFICILE MORIRE...”**

MOGOL, BATTISTI L. – RICORDI - ALBUM “EMOZIONI” - 1970

WHICH ONE IS NORMAL?

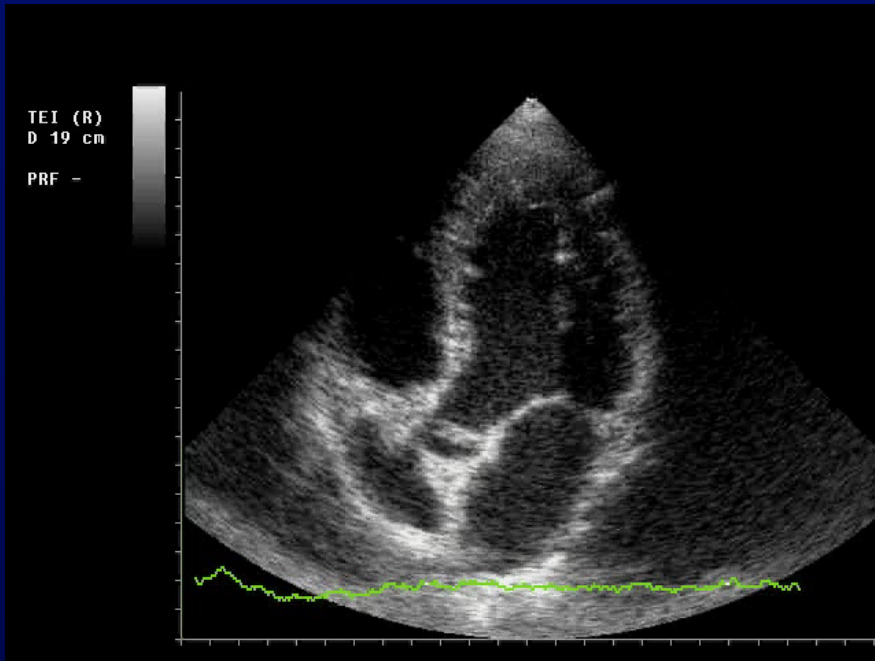


A

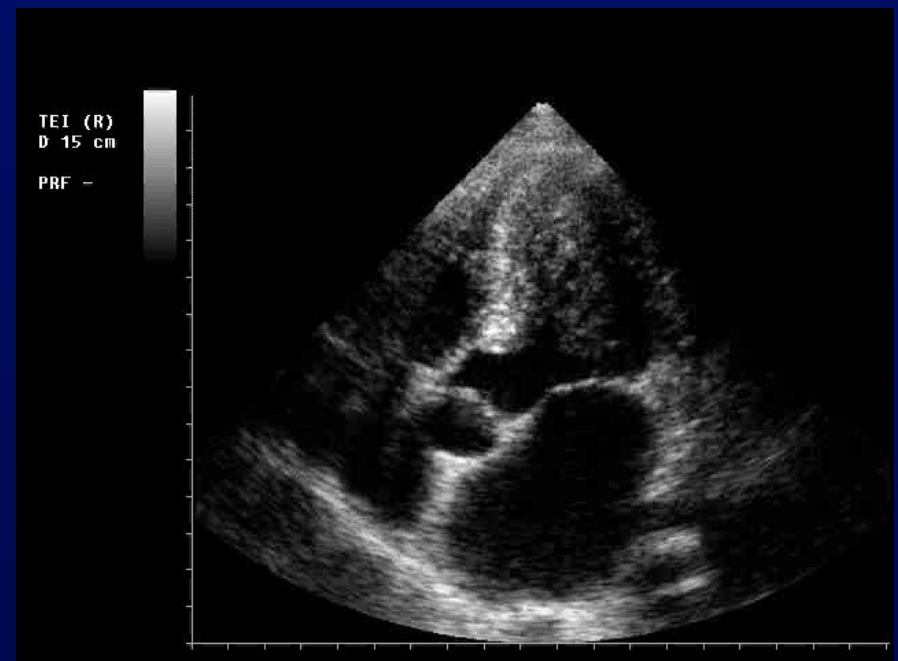


B

WHICH ONE IS NORMAL?



A



B

DIASTOLIC DYSFUNCTION

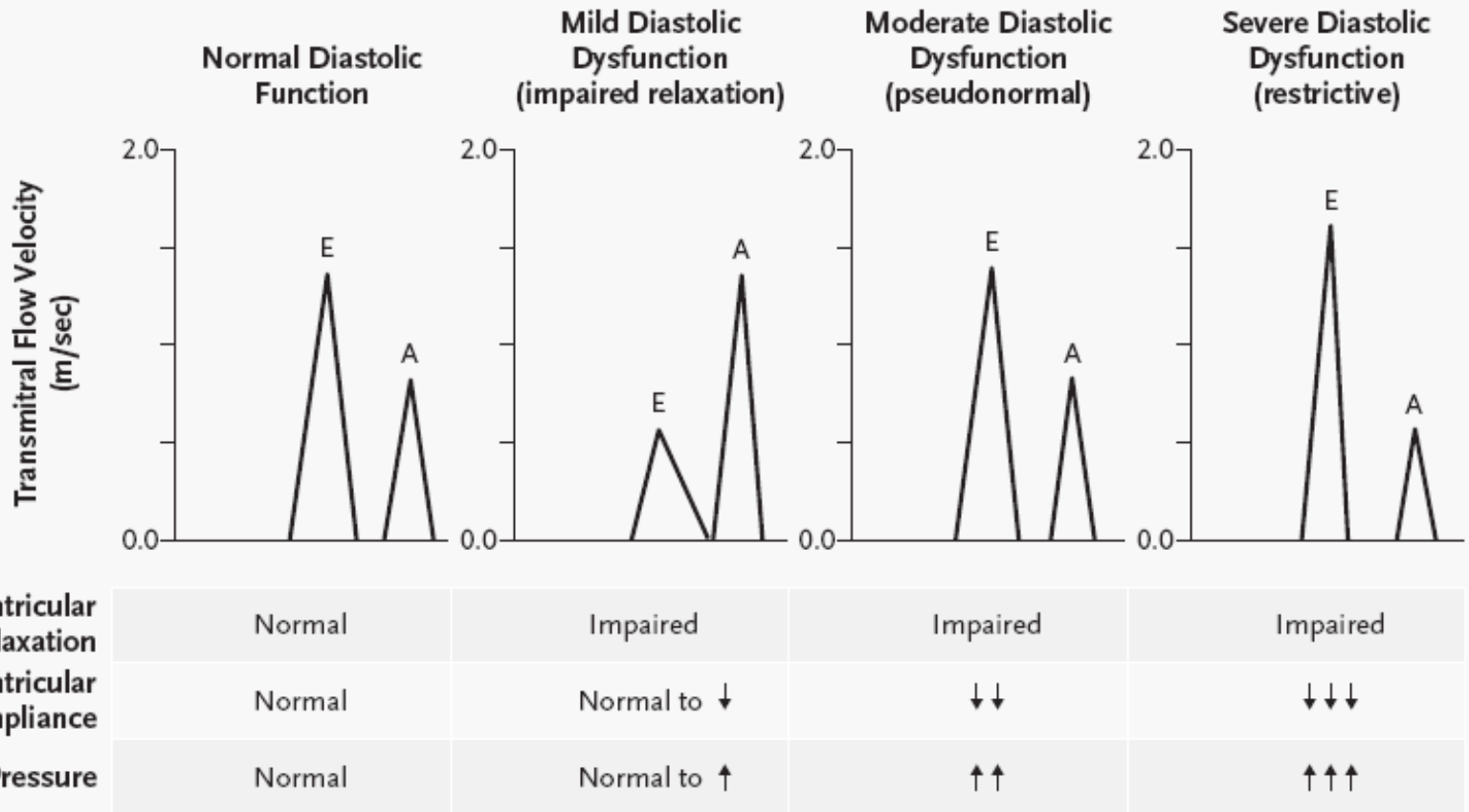
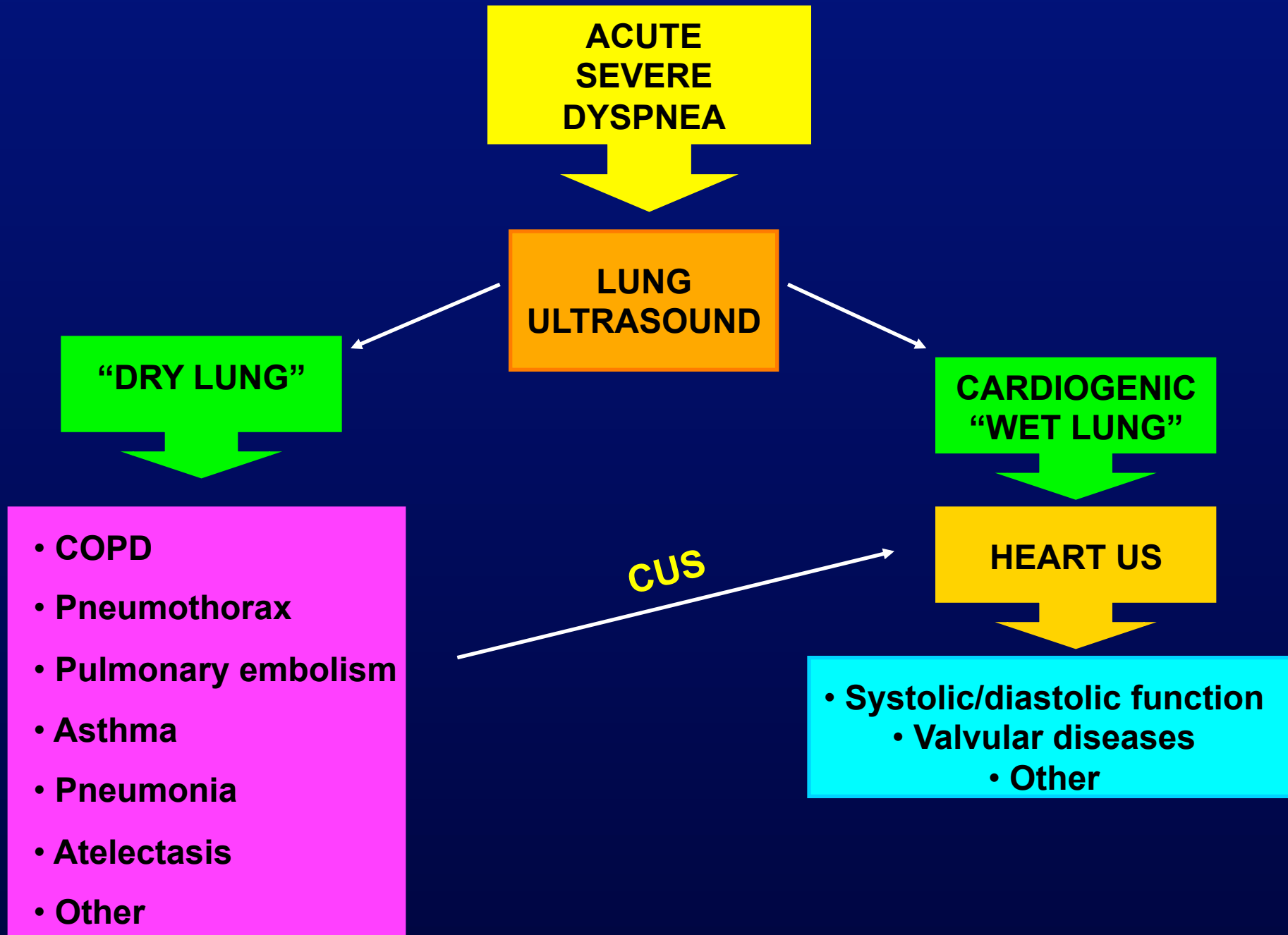


Figure 3. Patterns of Left Ventricular Diastolic Filling as Shown by Standard Doppler Echocardiography.

N Engl J Med. 2004; 351:1097-105



**ACUTE
SEVERE
DYSPNEA**

**LUNG
ULTRASOUND**

“DRY LUNG”

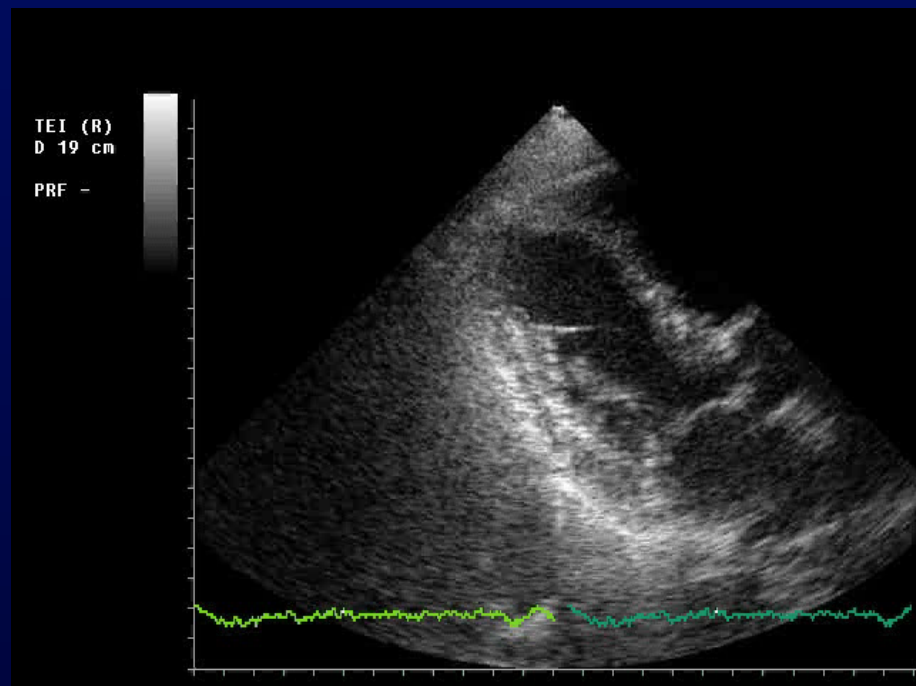
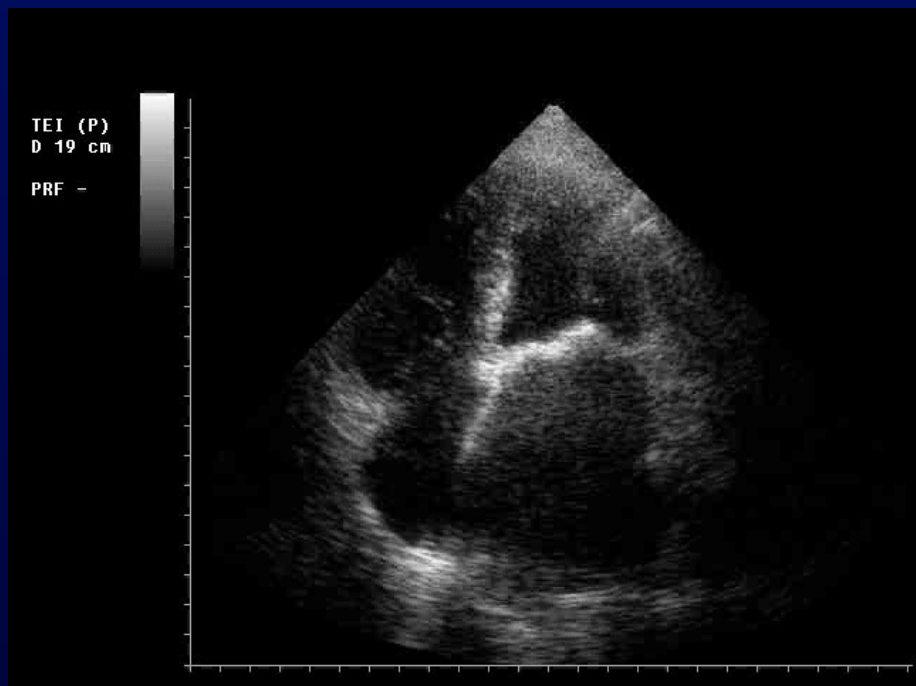
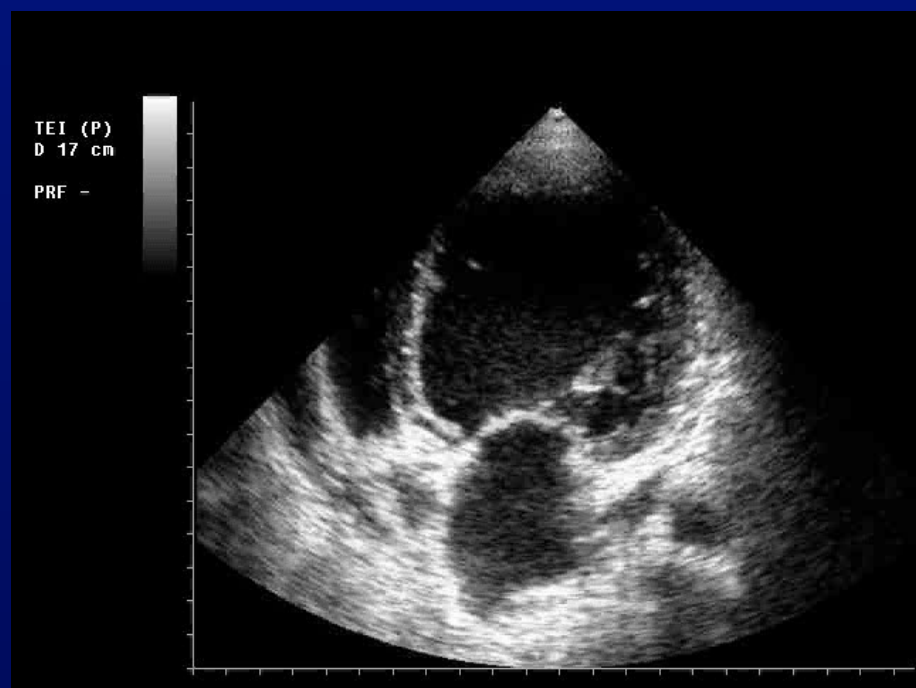
**CARDIOGENIC
“WET LUNG”**

- COPD
- Pneumothorax
- Pulmonary embolism
- Asthma
- Pneumonia
- Atelectasis
- Other

CUS

HEART US

- Systolic/diastolic function
- Valvular diseases
- Other



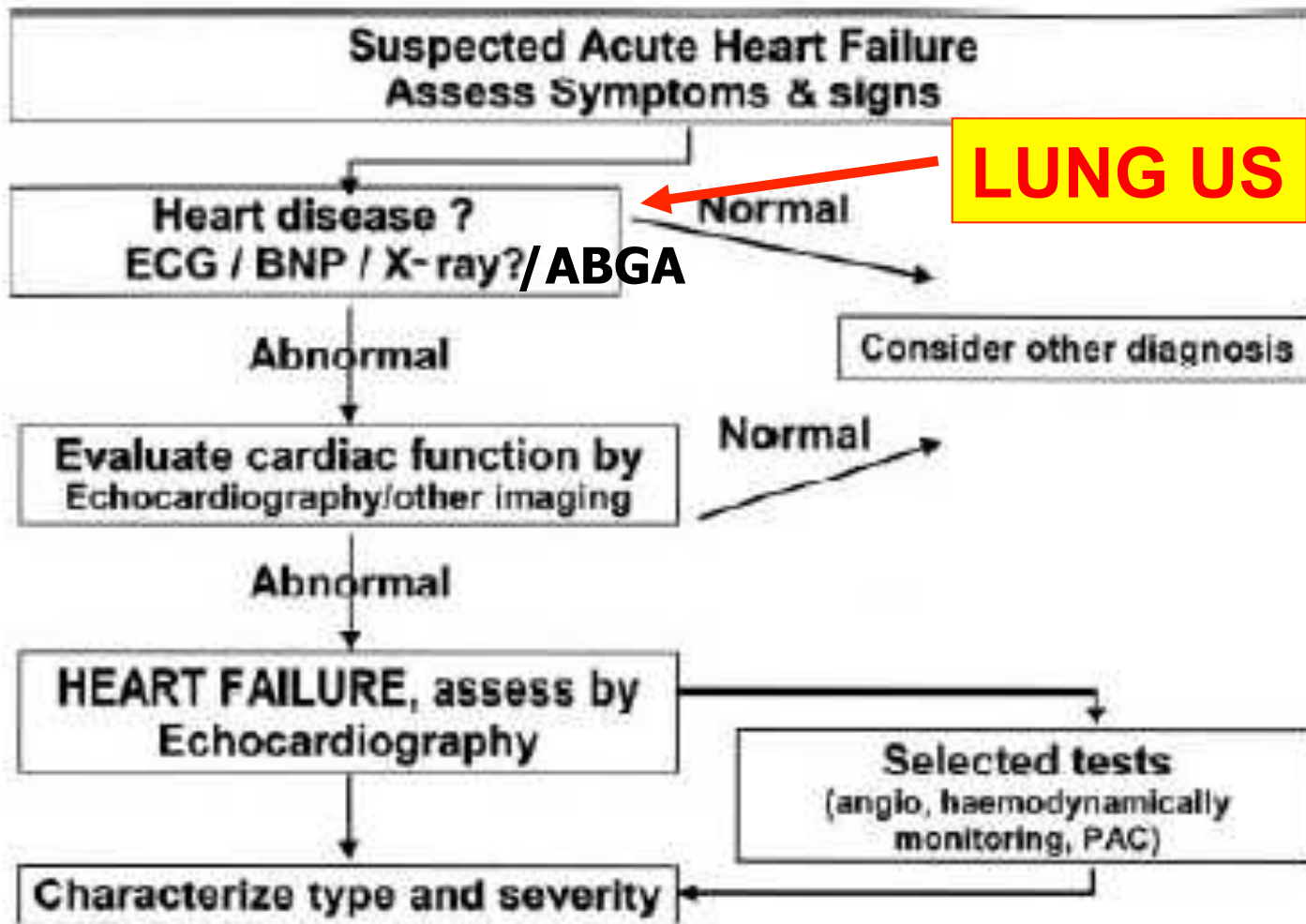
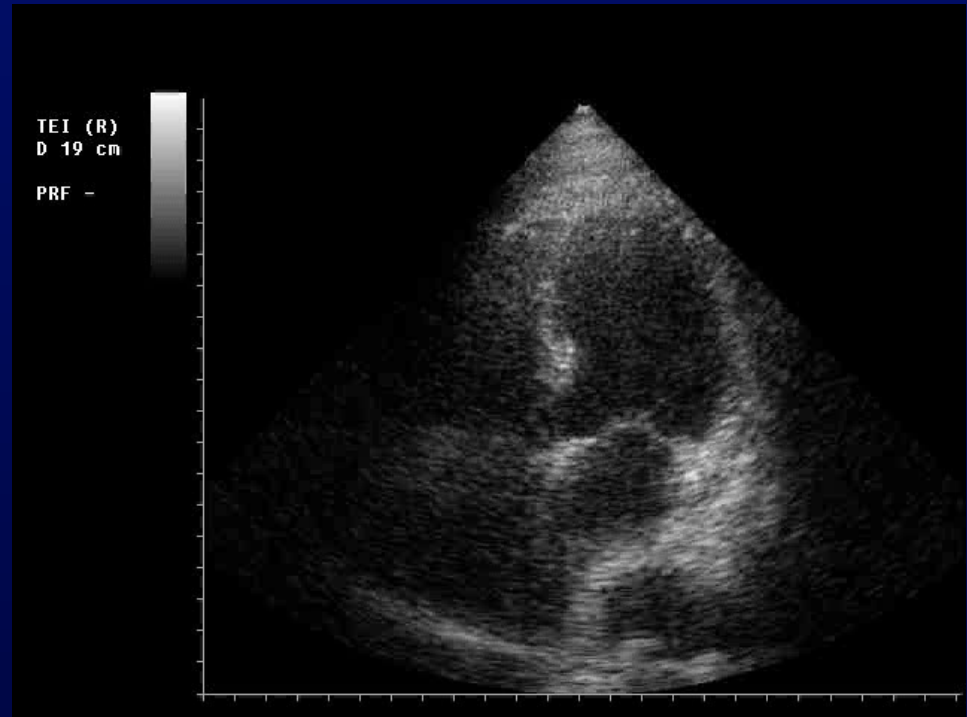
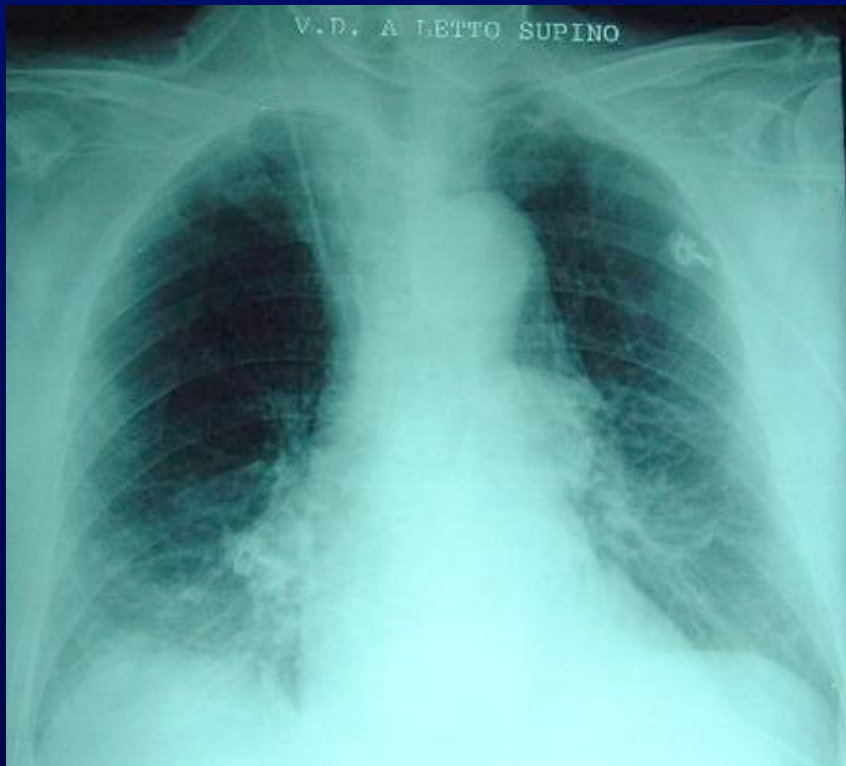
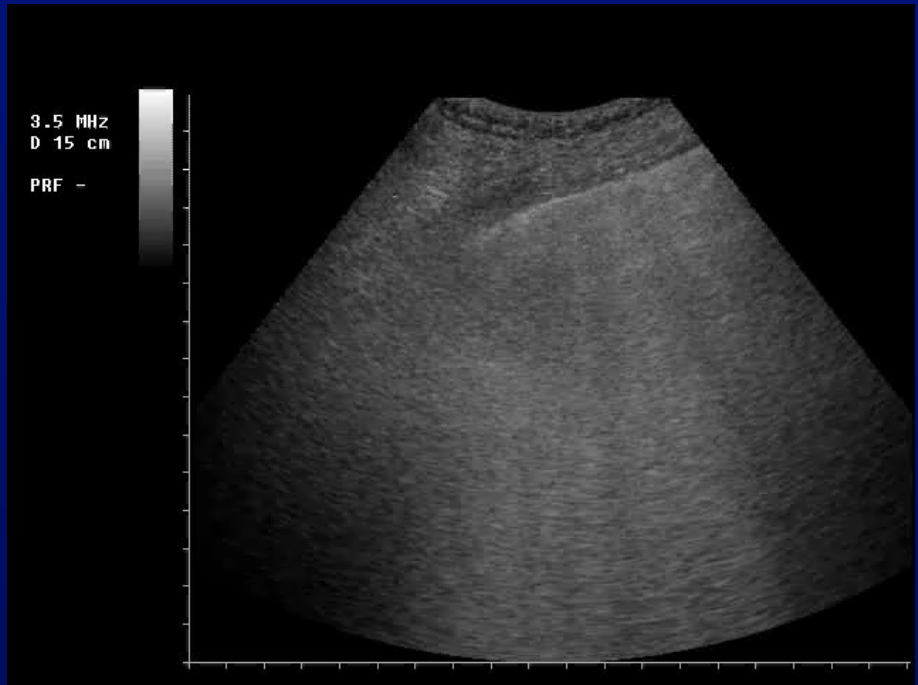
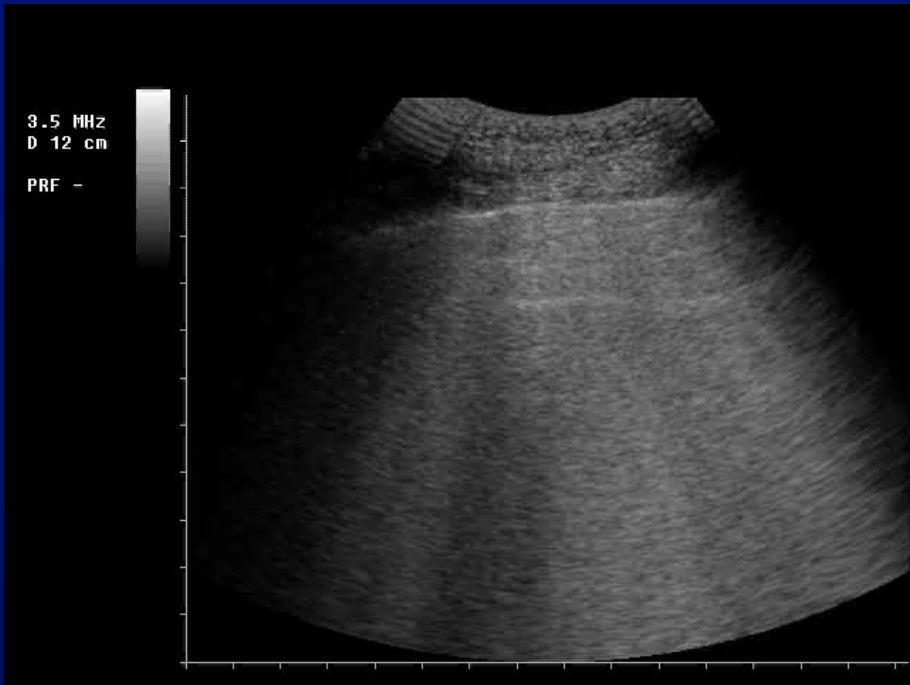


Figure 3 Diagnosis of AHF.

- ACUTE RESPIRATORY DISTRESS
- HYPERTENSION, CHRONIC A.F.
- RALES ON RIGHT LUNG BASE
- BP 180/115. HR 115 AF. Sat O₂ 90% (FiO₂ 0.4). TT 38.5°C





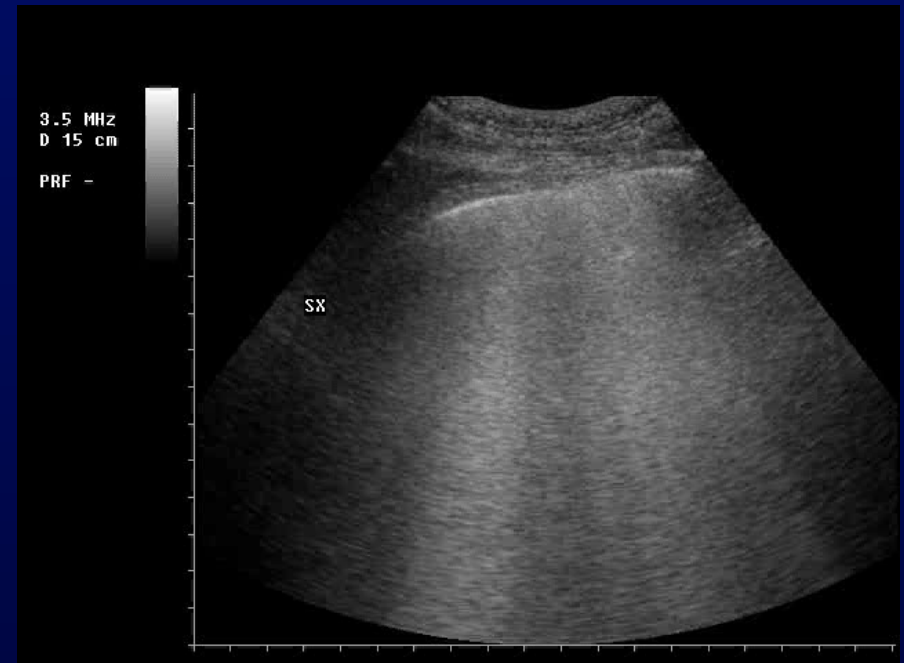
- “FLASH” PULMONARY EDEMA
- DIASTOLIC DYSFUNCTION

DIURETICS ?

**RESPIRATORY DISTRESS. SURGERY FOR FRACTURE OF THE FEMUR. T.T.
39.C°. ECG: S.T.120/m. SAT O₂ 87% (FiO₂ 0.6).**

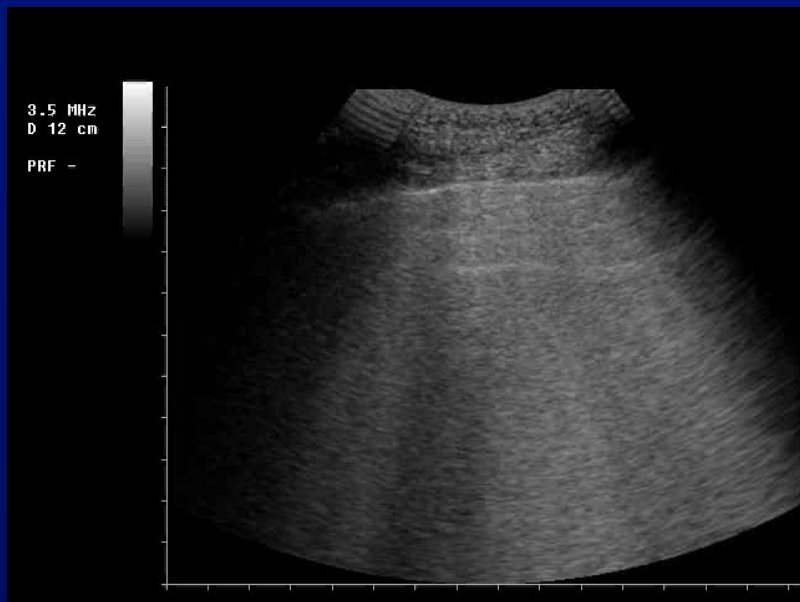
RCP 300

LUNG ULTRASOUND

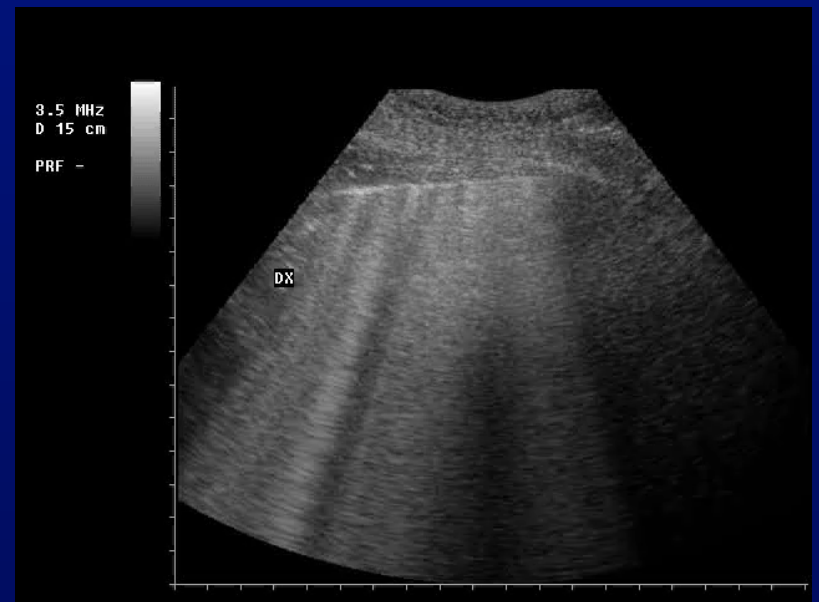


ULTRASOUND INTERSTITIAL SYNDROME

- PULMONARY EDEMA
- PULMONARY FIBROSIS
- INTERSTITIAL PNEUMONIA
- ARDS



APE



INTERSTITIAL PNEUMONIA



PULMONARY FIBROSIS



ARDS

LUNG ULTRASOUND



ARDS

ALI/ARDS



APE

Research

Open Access

Chest sonography: a useful tool to differentiate acute cardiogenic pulmonary edema from acute respiratory distress syndrome

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Email: Roberto Copetti* - robcopet@tin.it; Gino Soldati - g.soldati@usl2.toscana.it; Paolo Copetti - paolo.cop@libero.it

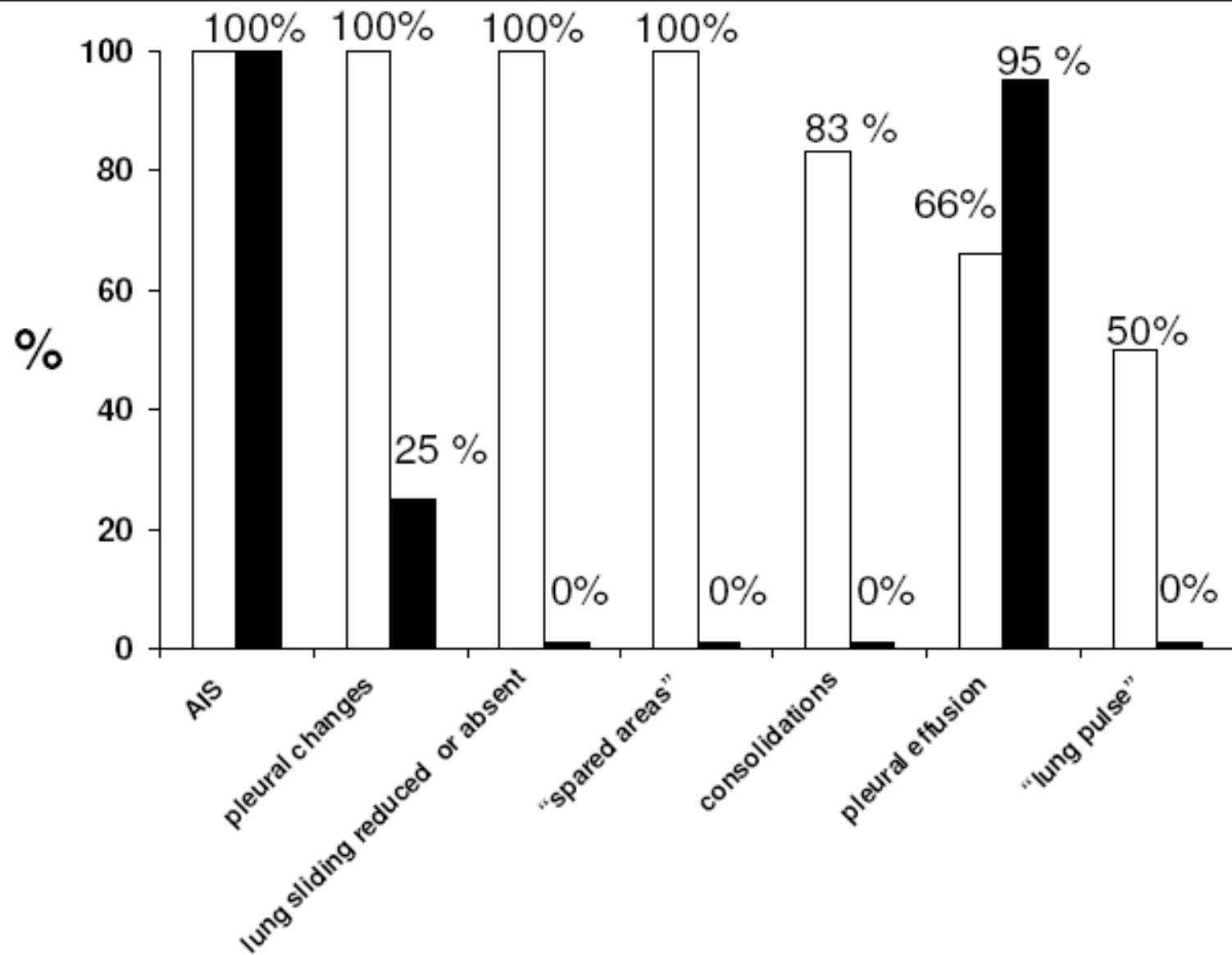
* Corresponding author

Published: 29 April 2008

Received: 25 February 2008

Cardiovascular Ultrasound 2008, **6**:16 doi:10.1186/1476-7120-6-16

Accepted: 29 April 2008



Copetti R. et al. Chest sonography: a useful tool to differentiate acute cardiogenic pulmonary edema from acute respiratory distress syndrome. Cardiovascular Ultrasound 2008, 6:16

Table 4: Sensitivity and specificity of each ultrasonographic sign in the two groups.

SONOGRAPHIC SIGNS	SENSITIVITY		SPECIFICITY	
	ALI/ARDS	APE	ALI/ARDS	APE
AIS	100%	100%	0%	0%
Pleural line abnormalities	100%	25%	45%	0%
Reduction or absence of lung sliding	100%	0%	100%	0%
"Spared areas"	100%	0%	100%	0%
Consolidations	83.3%	0%	100%	0%
Pleural effusion	66.6%	95%	5%	33.3%
"Lung pulse"	50%	0%	100%	50%

Copetti R. et al. Chest sonography: a useful tool to differentiate acute cardiogenic pulmonary edema from acute respiratory distress syndrome. Cardiovascular Ultrasound 2008, 6:16

ALI/ARDS DIAGNOSIS

A three-criteria system including chest radiograph, oxygenation score, and exclusion of cardiogenic causes.

- Acute onset, bilateral infiltrates on chest radiography
- Pulmonary-artery wedge pressure of < 18 mm Hg or the absence of clinical evidence of left atrial hypertension
- Acute lung injury considered present if $\text{PaO}_2/\text{FiO}_2$ is ≤ 300 and the ARDS subset was defined with a more severe oxygenation deficit, $\text{PaO}_2/\text{FiO}_2 \leq 200$

Bernard GR, Artigas A, Brigham KL, Carlet J, Falke K, Hudson L, Lamy M, Legall JR, Morris A, Spragg R. The American European consensus conference on ARDS: definitions mechanisms, relevant outcomes and clinical trial coordination. *Am J Respir Crit Care Med* 1994;149:818–824.

Acute Respiratory Distress Syndrome

The Berlin Definition

JAMA. 2012;307(23):2526-2533

Published online May 21, 2012. doi:10.1001/jama.2012.5669

Table 3. The Berlin Definition of Acute Respiratory Distress Syndrome

Acute Respiratory Distress Syndrome	
Timing	Within 1 week of a known clinical insult or new or worsening respiratory symptoms
Chest imaging ^a	Bilateral opacities—not fully explained by effusions, lobar/lung collapse, or nodules
Origin of edema	Respiratory failure not fully explained by cardiac failure or fluid overload Need objective assessment (eg, echocardiography) to exclude hydrostatic edema if no risk factor present
Oxygenation ^b	
Mild	200 mm Hg < PaO ₂ /Fio ₂ ≤ 300 mm Hg with PEEP or CPAP ≥5 cm H ₂ O ^c
Moderate	100 mm Hg < PaO ₂ /Fio ₂ ≤ 200 mm Hg with PEEP ≥5 cm H ₂ O
Severe	PaO ₂ /Fio ₂ ≤ 100 mm Hg with PEEP ≥5 cm H ₂ O

Abbreviations: CPAP, continuous positive airway pressure; Fio₂, fraction of inspired oxygen; PaO₂, partial pressure of arterial oxygen; PEEP, positive end-expiratory pressure.

^aChest radiograph or computed tomography scan.

^bIf altitude is higher than 1000 m, the correction factor should be calculated as follows: [PaO₂/Fio₂ × (barometric pressure/760)].

^cThis may be delivered noninvasively in the mild acute respiratory distress syndrome group.

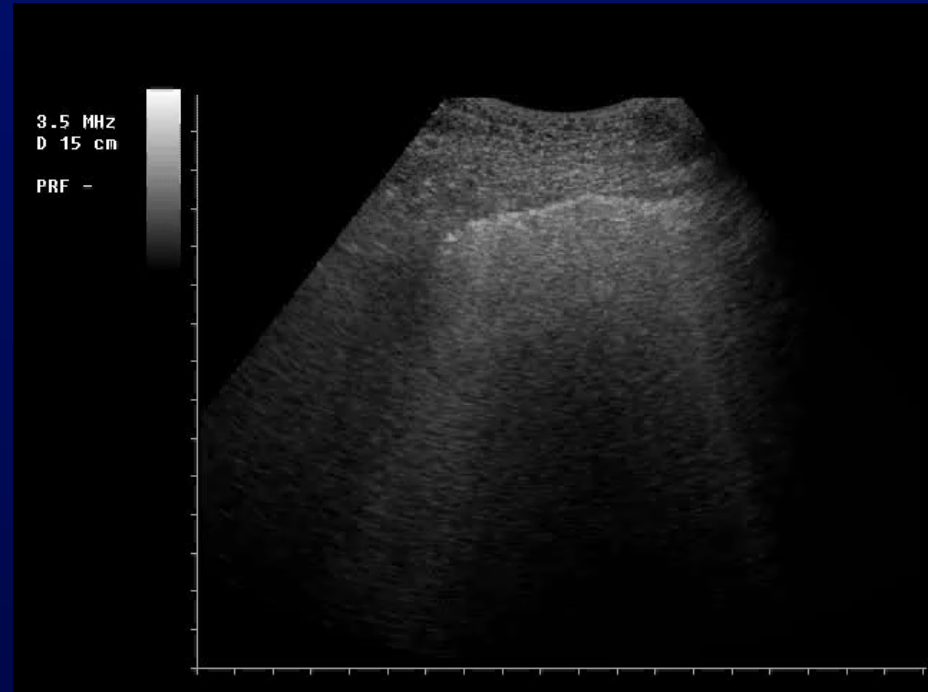
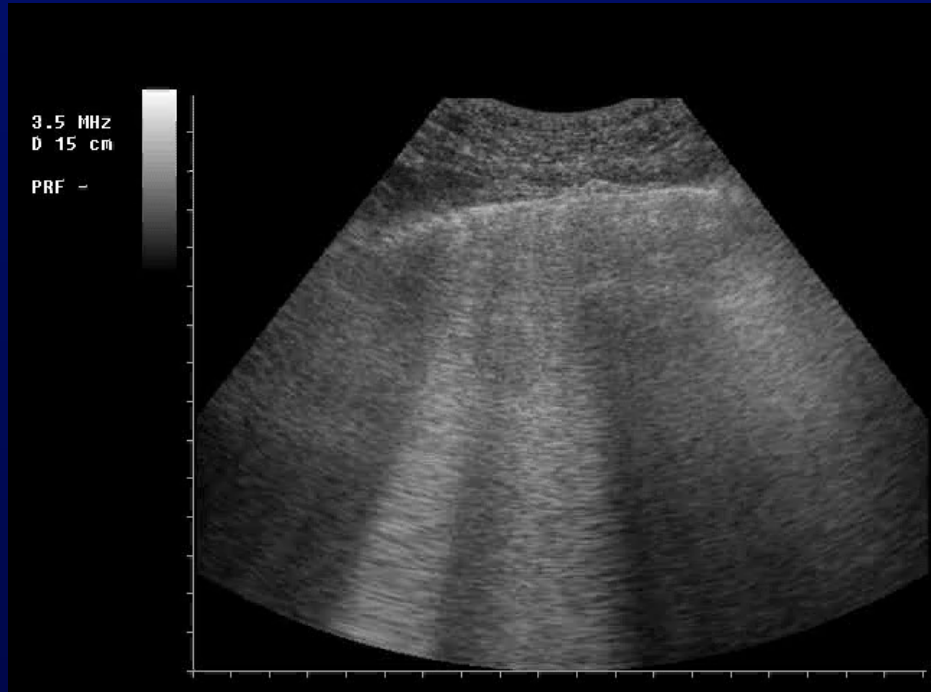
Radiographically, the findings are indistinguishable from those of cardiogenic pulmonary edema. Bilateral infiltrates may be patchy or asymmetric and may include pleural effusions.

- The CT has shown us that the lung was not uniformly involved. There are areas of the lung that are severely affected by an injury, areas that are mildly involved, and areas that are not involved at all.
- Alveolar filling, consolidation, and atelectasis occur predominantly in dependent lung zones, whereas other areas may be relatively spared.
- CT scan useful for to investigate the “potential for recruitment”
- CT scan useful in detecting complications (occult pneumothorax, pneumomediastinum, pneumatocele, septic emboli)

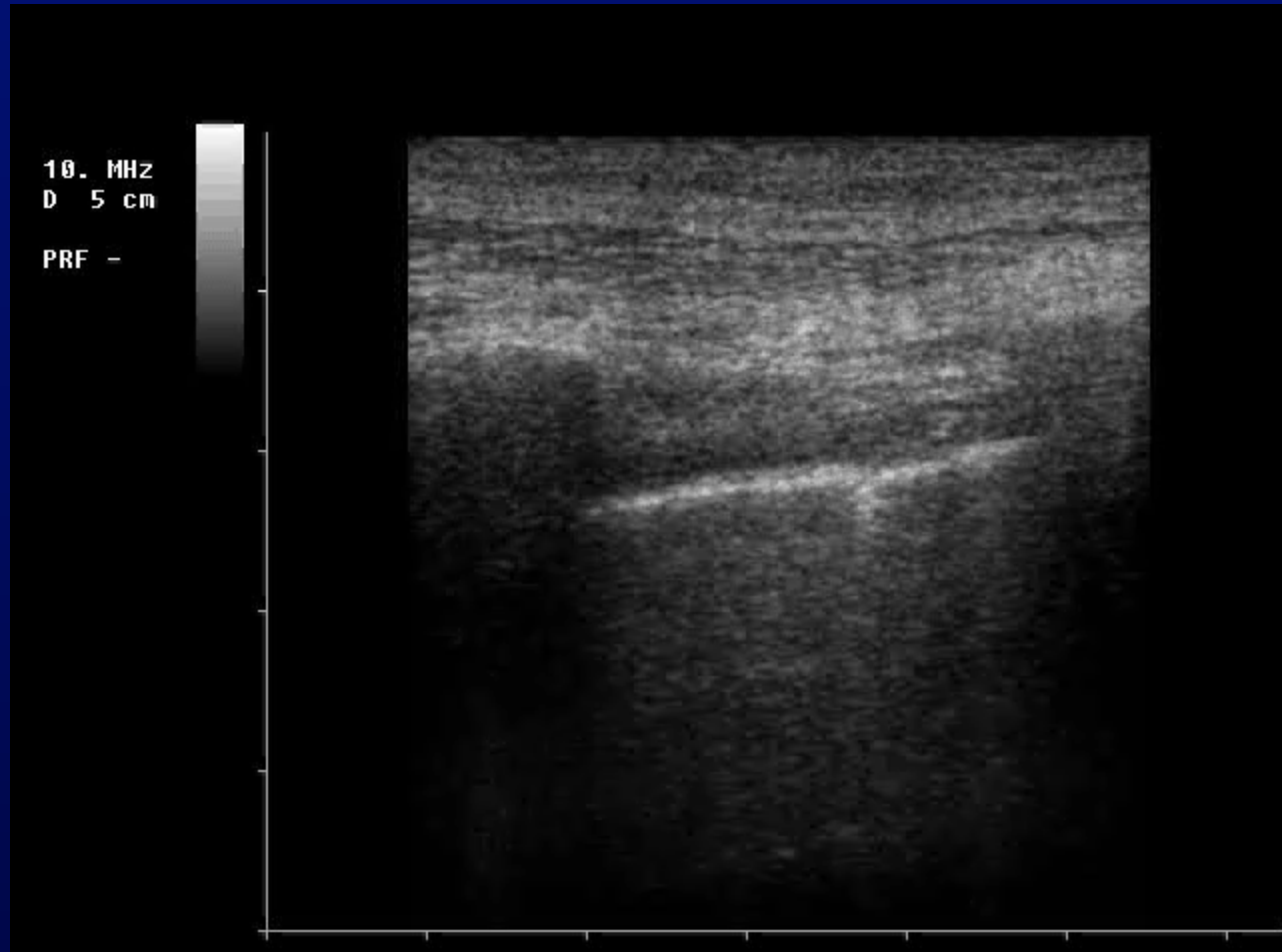
DISADVANTAGES OF CT SCAN

- **Costly resource of limited availability**
- **Exposes the patient to a high amount of radiation**
- **Exposes the patient to the risk of transfer to the CT suite**
- **CT specificity is not 100%**

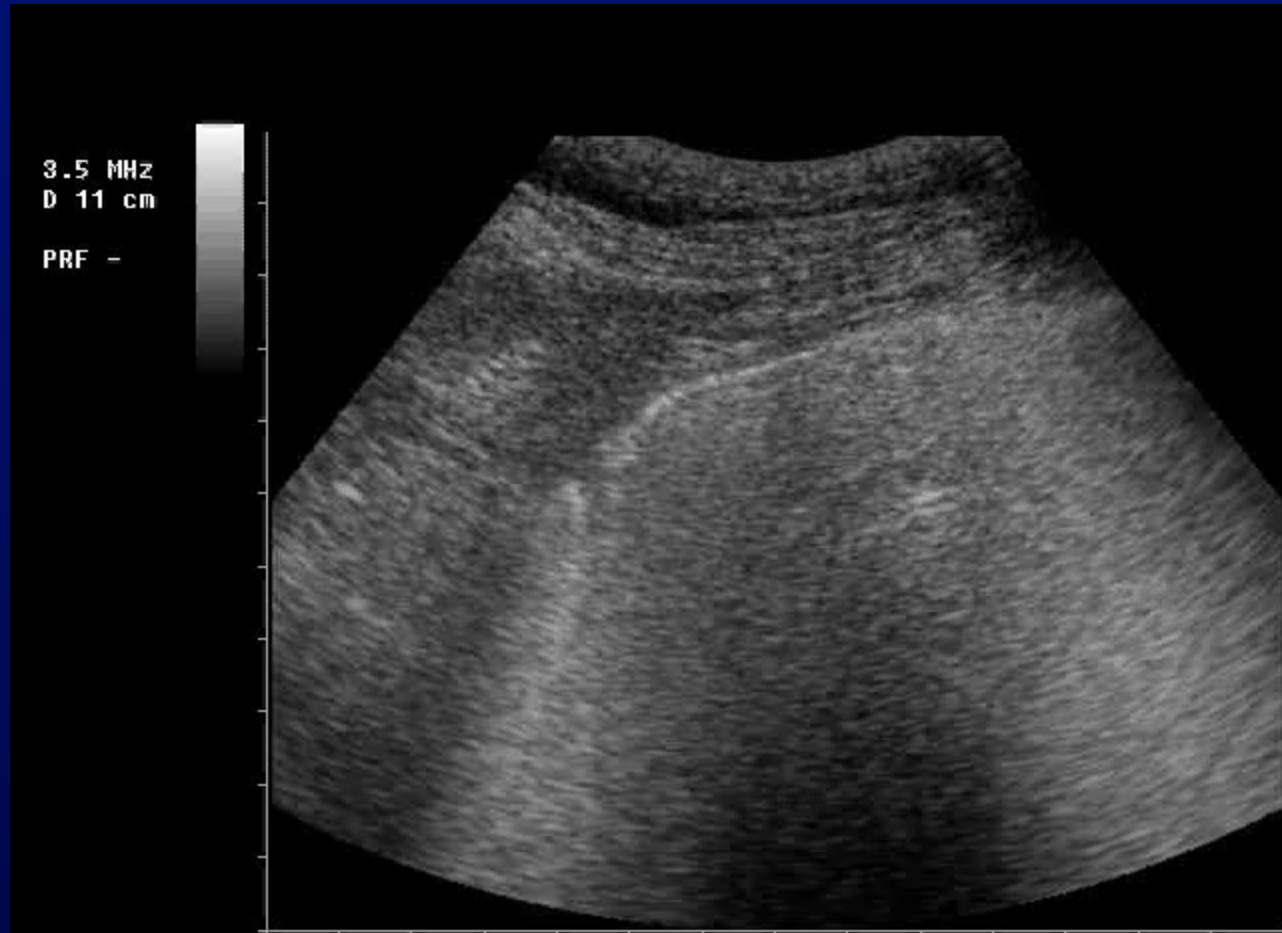
ARDS



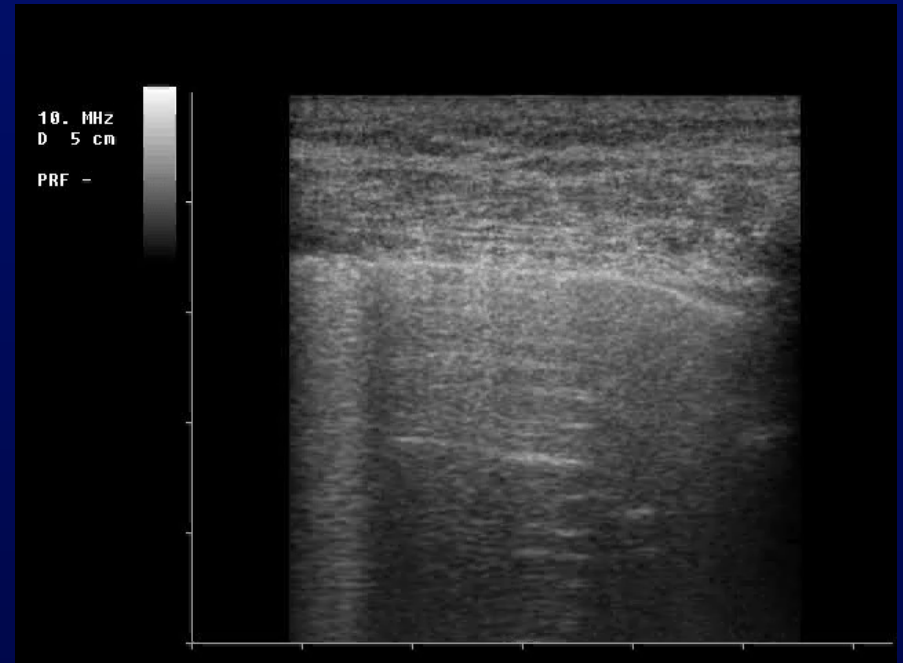
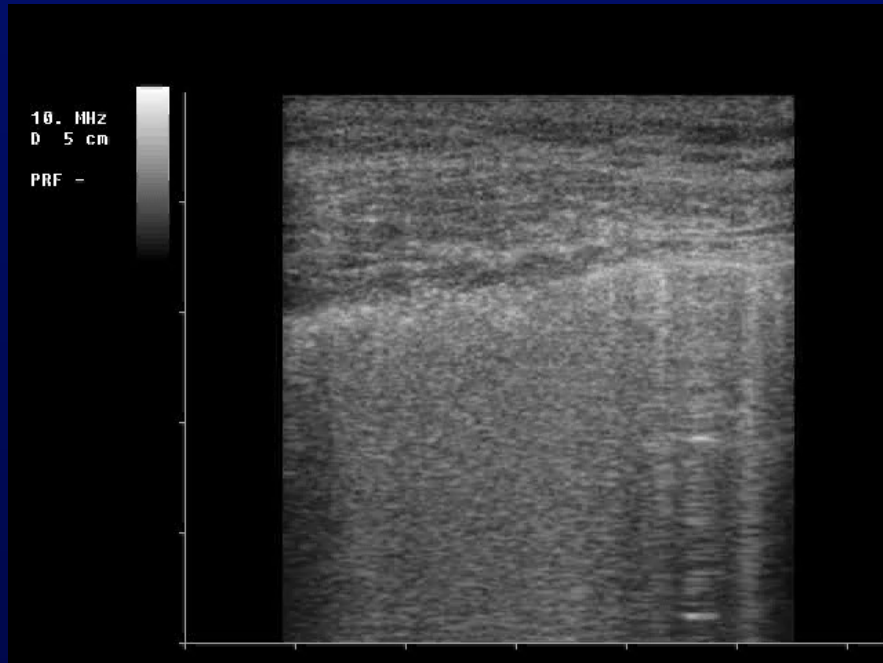
ARDS



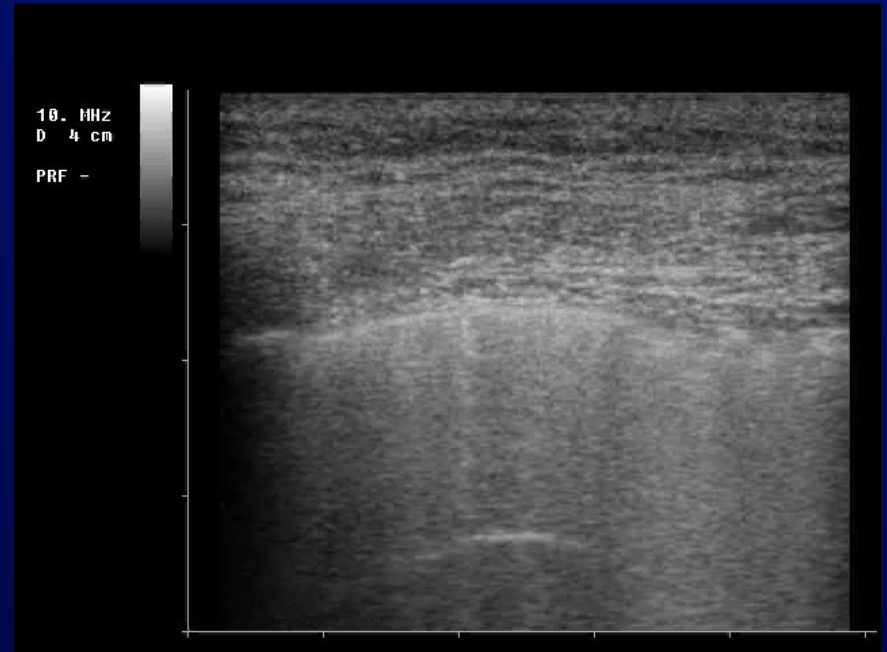
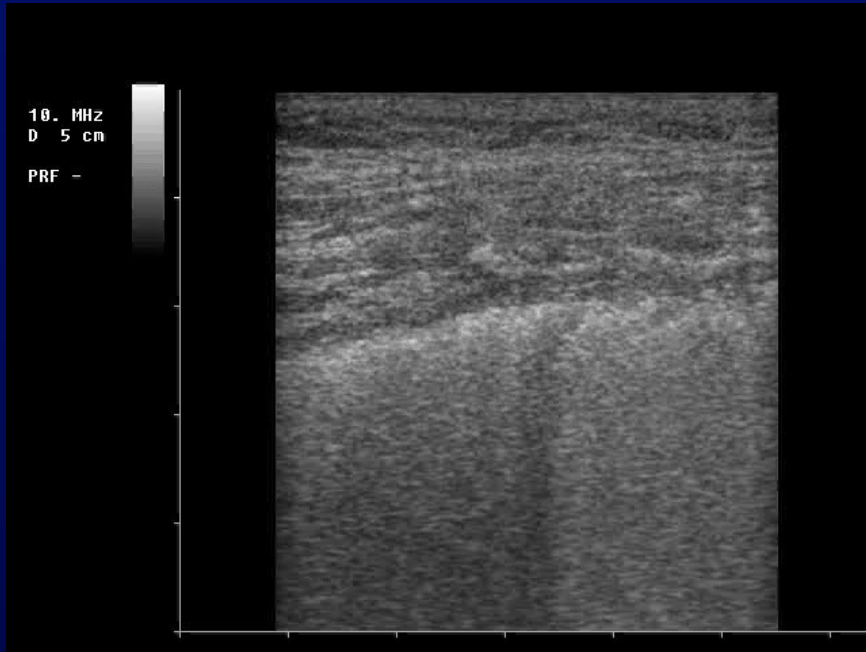
ARDS



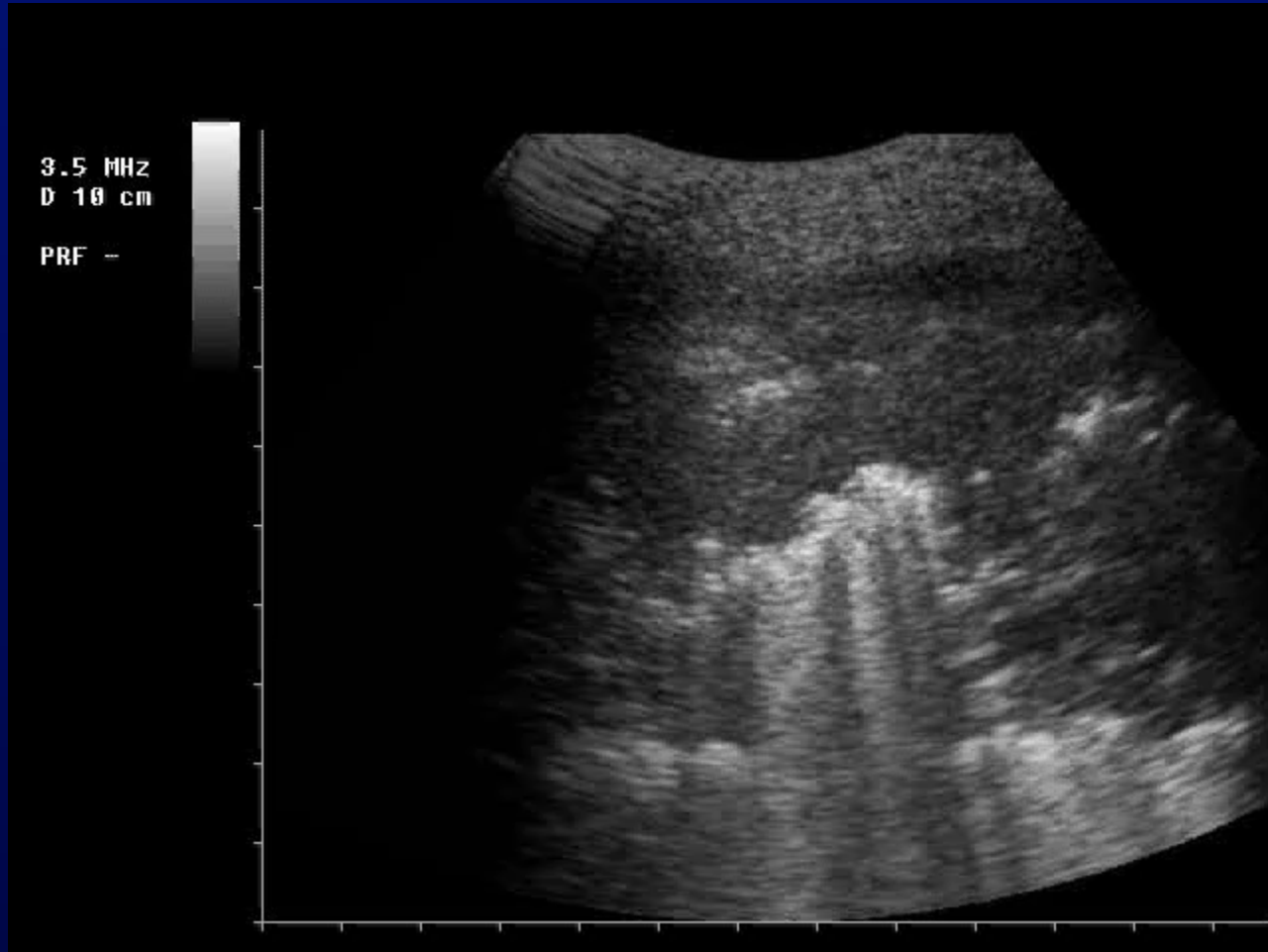
ARDS



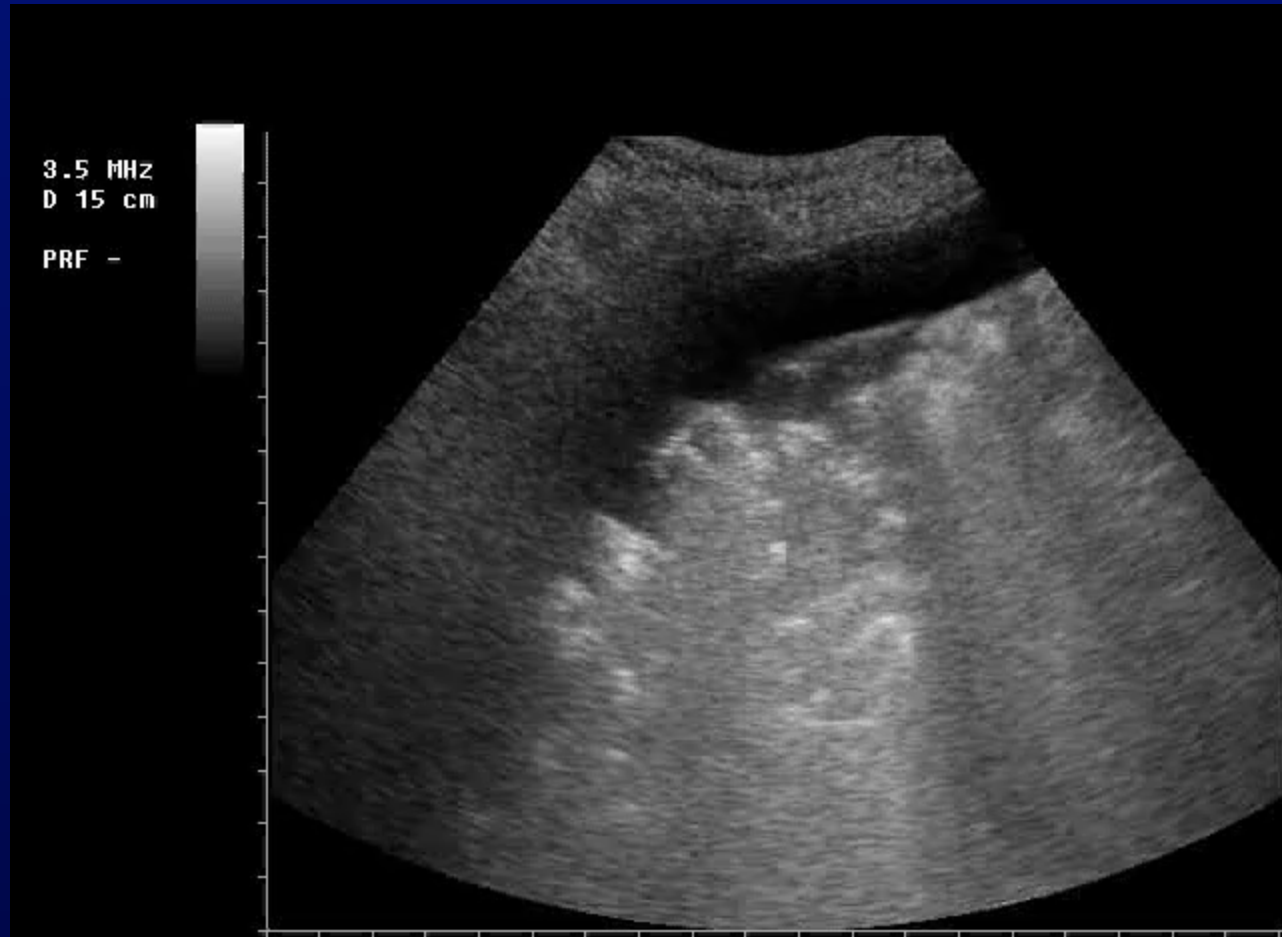
ARDS



ARDS

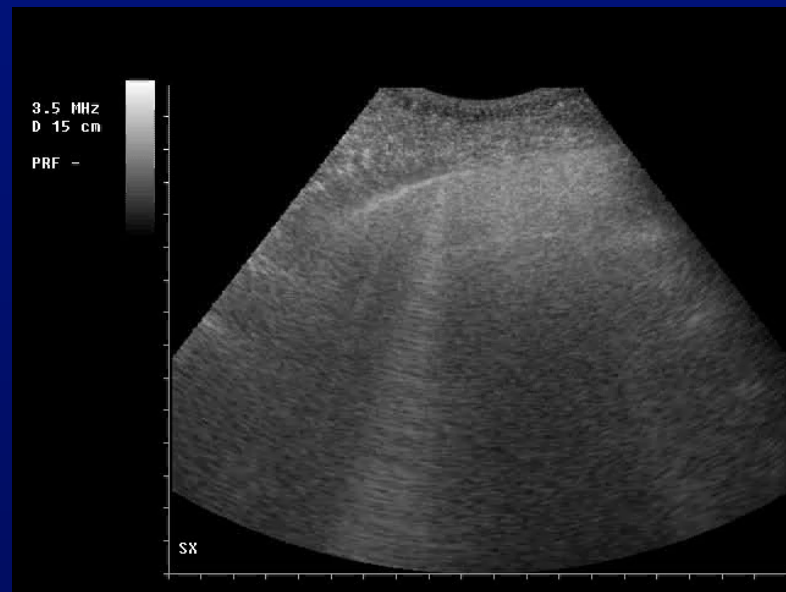


ARDS





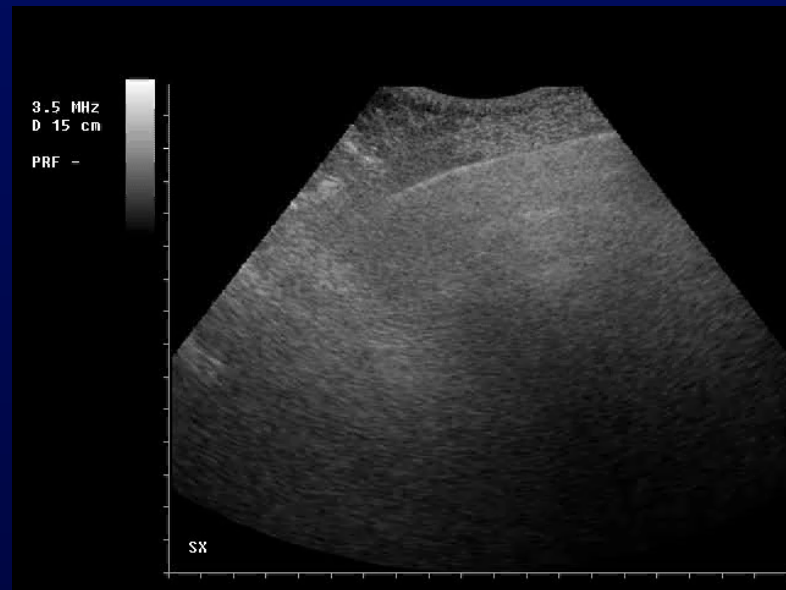
H 9.40



H 10.45



H 11.19



H 11.45

The NEW ENGLAND
JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

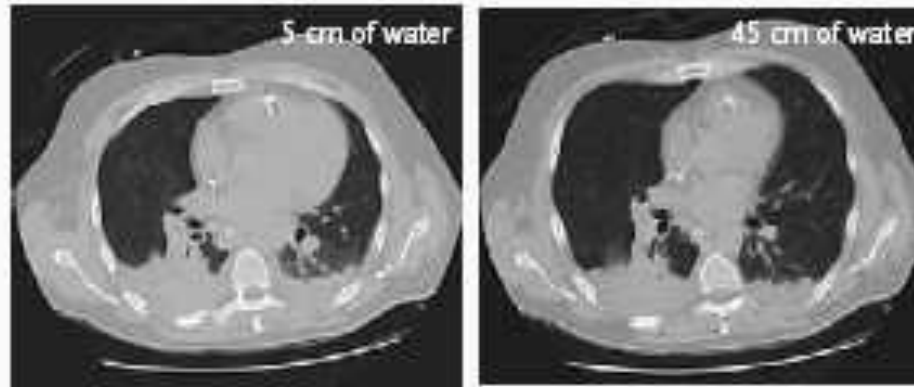
APRIL 27, 2006

VOL. 354 NO. 17

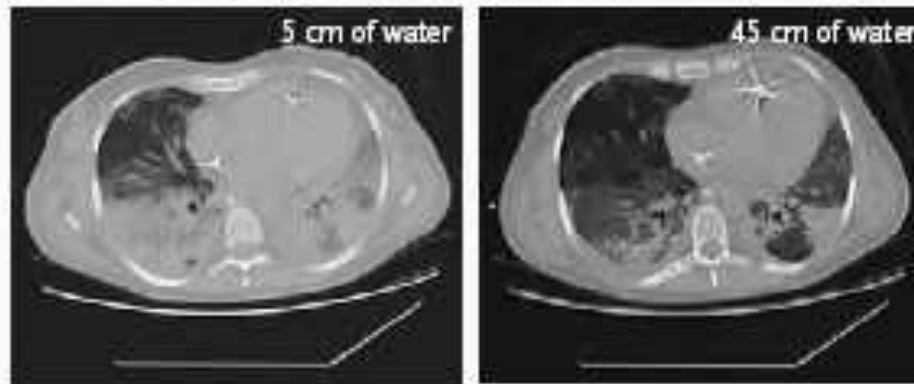
Lung Recruitment in Patients
with the Acute Respiratory Distress Syndrome

Luciano Gattinoni, M.D., F.R.C.P., Pietro Caironi, M.D., Massimo Cressoni, M.D., Davide Chiumello, M.D.,
V. Marco Ranieri, M.D., Michael Quintel, M.D., Ph.D., Sebastiano Russo, M.D., Nicolò Patroniti, M.D.,
Rodrigo Cornejo, M.D., and Guillermo Bugeo, M.D.

B Lower Percentage of Potentially Recruitable Lung



C Higher Percentage of Potentially Recruitable Lung



The NEW ENGLAND JOURNAL of MEDICINE

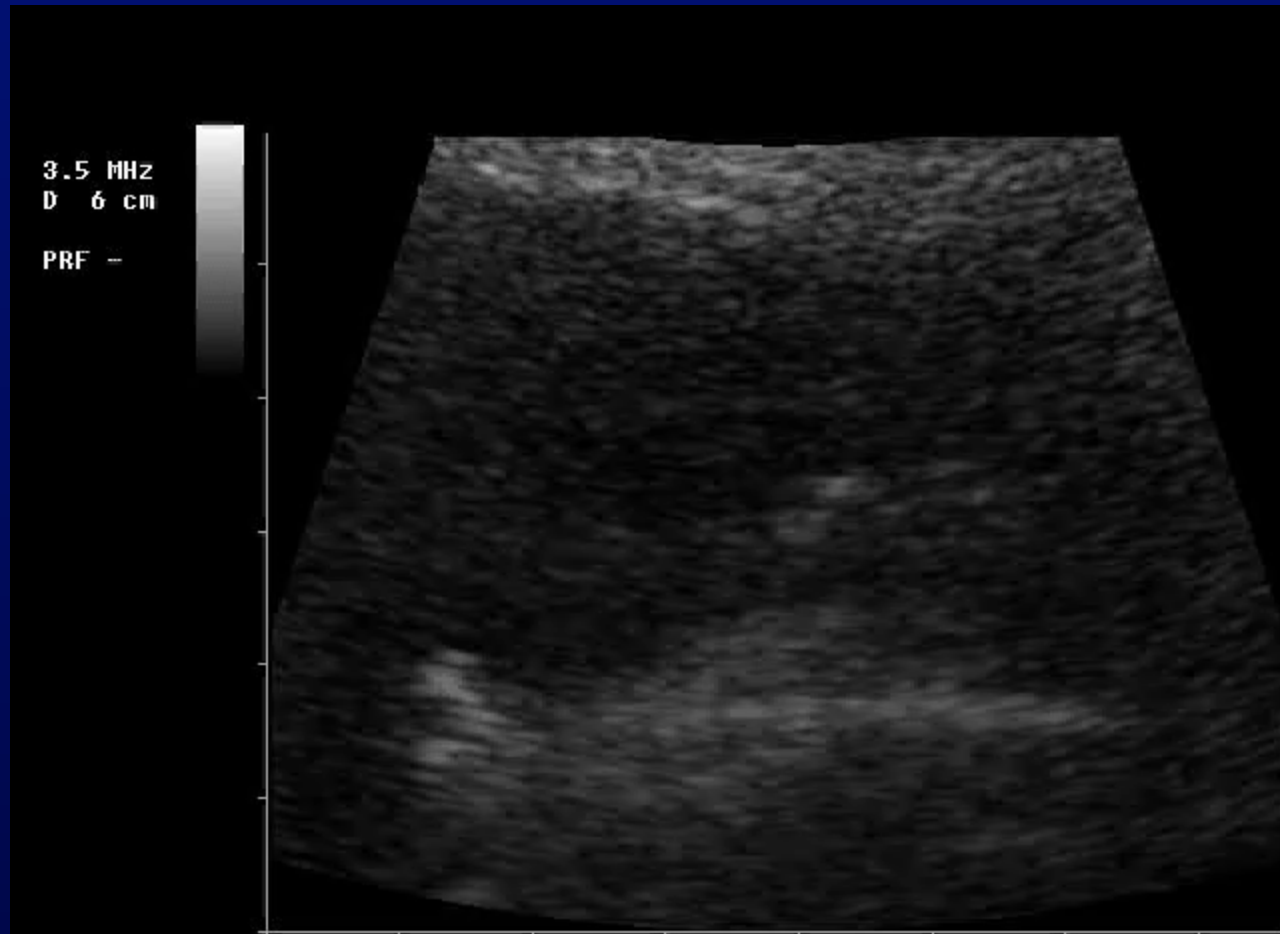
EDITORIALS



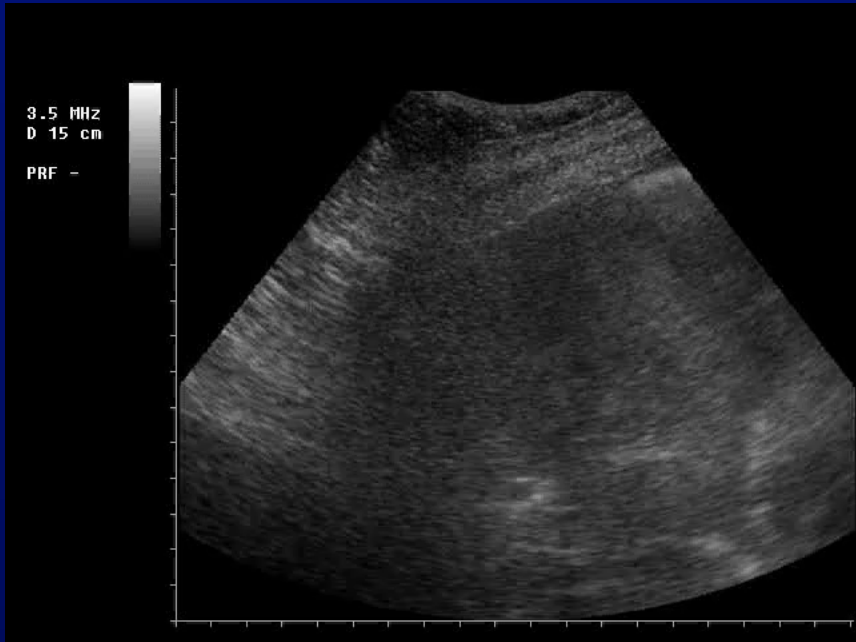
PEEP or No PEEP — Lung Recruitment May Be the Solution

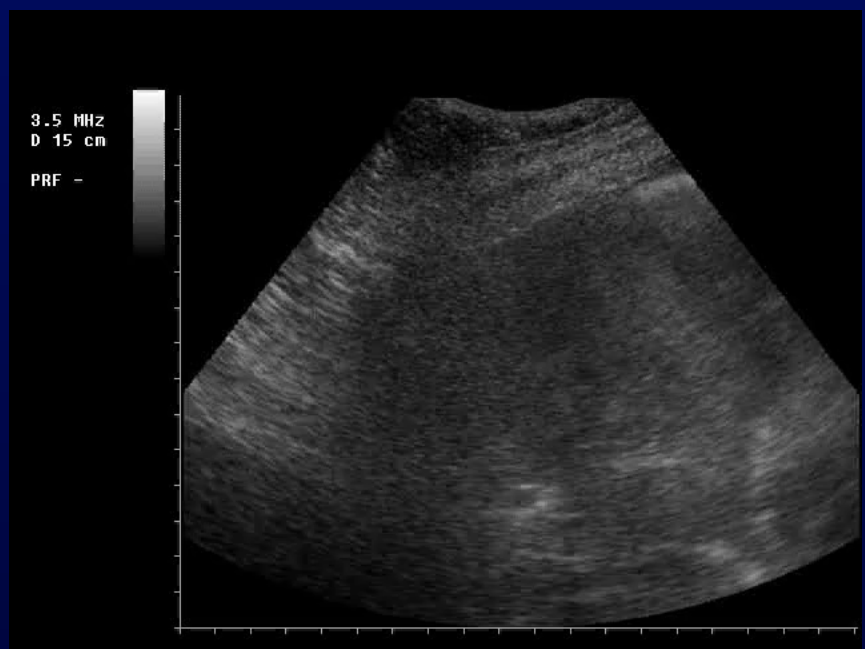
Arthur S. Slutsky, M.D., and Leonard D. Hudson, M.D.

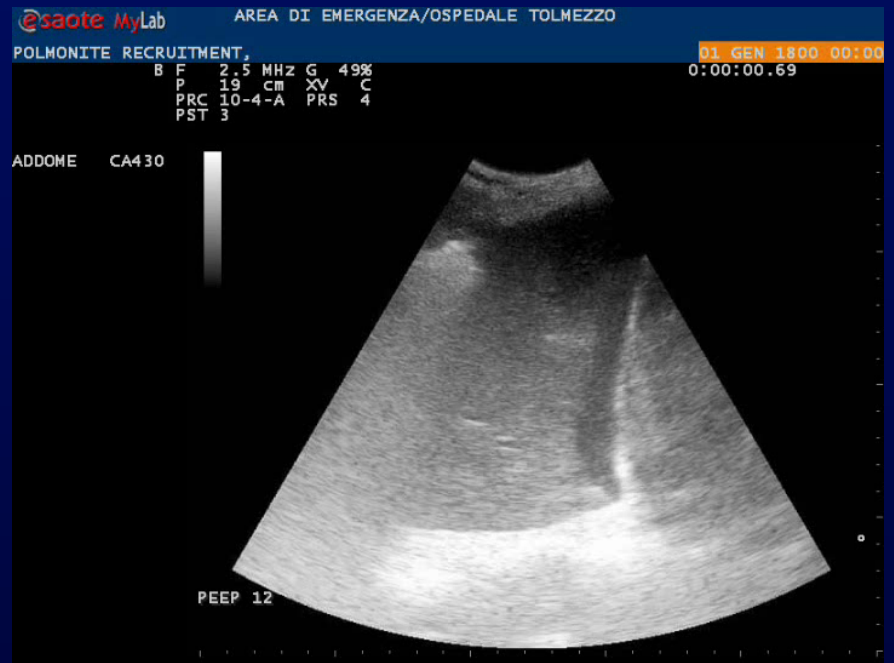
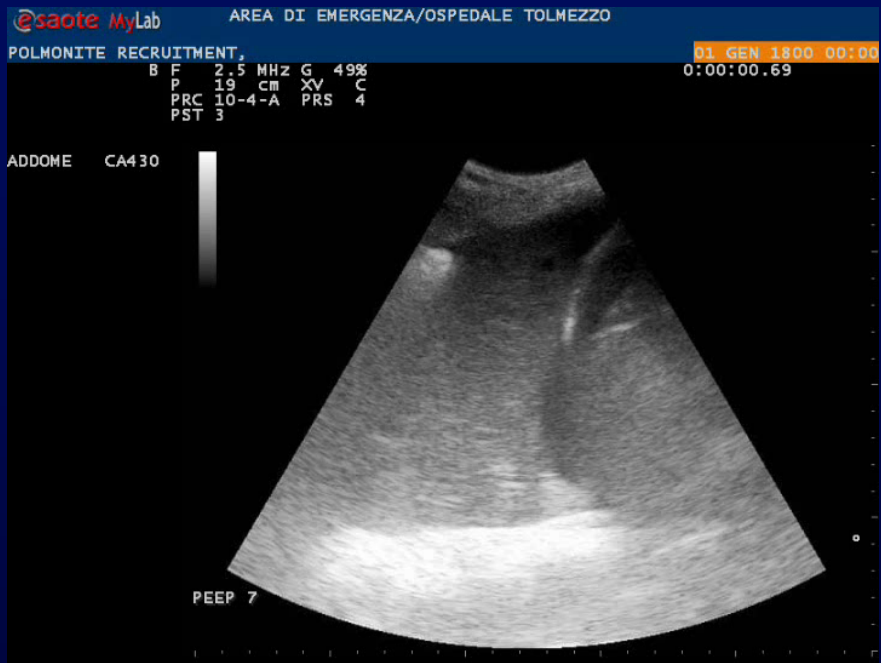
ARDS

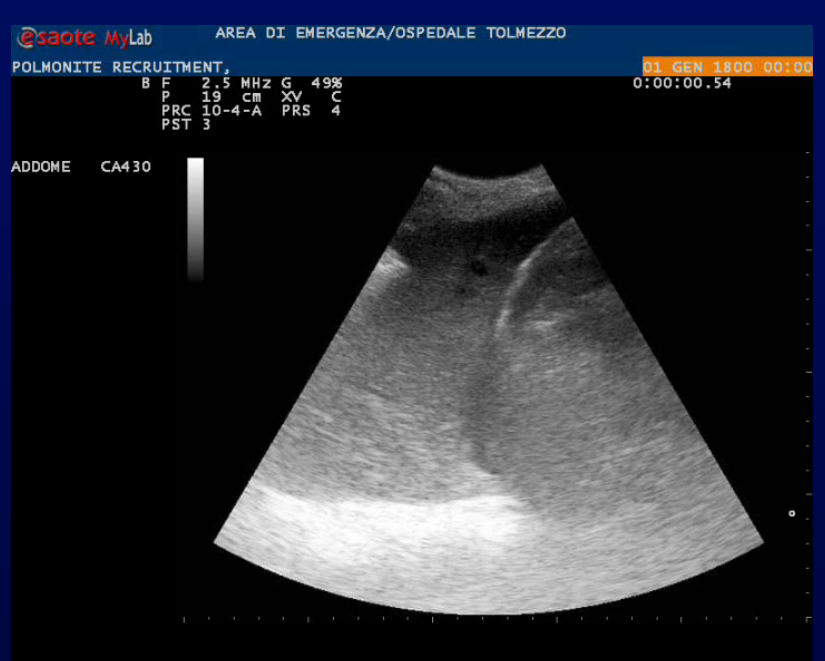
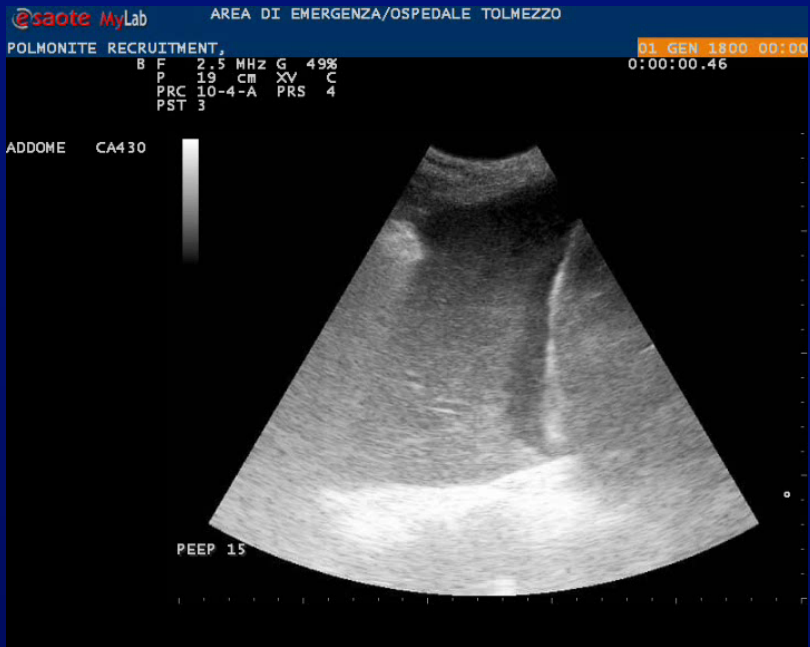


DYNAMIC AIR BRONCHOGRAMS DURING MECHANICAL VENTILATION IN ADULT WITH ARDS









RECRUITMENT,

B F 2.5 MHz G 73%
P 15 cm XV C
PRC 13-3-B PRS 4
PST 4

06 APR 2011 13:07
0:00:00.41

ADDOME CA430



RECRUITMENT,

B F 2.5 MHz G 73%
P 15 cm XV C
PRC 13-3-B PRS 4
PST 4

06 APR 2011 13:10
0:00:00.37

ADDOME CA430



RECRUITMENT,

B F 2.5 MHz G 73%
P 15 cm XV C
PRC 13-3-B PRS 4
PST 4

06 APR 2011 13:11
0:00:00.32

ADDOME CA430



RECRUITMENT,

B F 2.5 MHz G 73%
P 15 cm XV C
PRC 13-3-B PRS 4
PST 4

06 APR 2011 13:11
0:00:00.45

ADDOME CA430



LEFT DIAPHRAGM PALSY

@saote MyLab A.D.E. P.S. OSP. DI LATISANA

PARALISI EMIDIAFRAMMA SX,
B F G G 58%
TEI P 17 cm XV C
PRC 8-4-A PRS M
PST 4

29 LUG 2013 14:13
0:00:00.43



@saote MyLab A.D.E. P.S. OSP. DI LATISANA

PARALISI EMIDIAFRAMMA SX,
B F G G 73%
TEI P 19 cm XV C
PRC 8-4-A PRS M
PST 4

29 LUG 2013 14:13
0:00:00.42

CARDIO PA240



MONITORING MECHANICAL VENTILATION

saote MyLab30

PERC 1 NAVA,

FEB 26 2011 12:26

B F P G 58%
TEI P 23 cm
PRC 10-3-A PRS M
PST 3

0:00:00.24

CARDIO PA230



saote MyLab30

PERC 1 NAVA,

FEB 26 2011 12:26

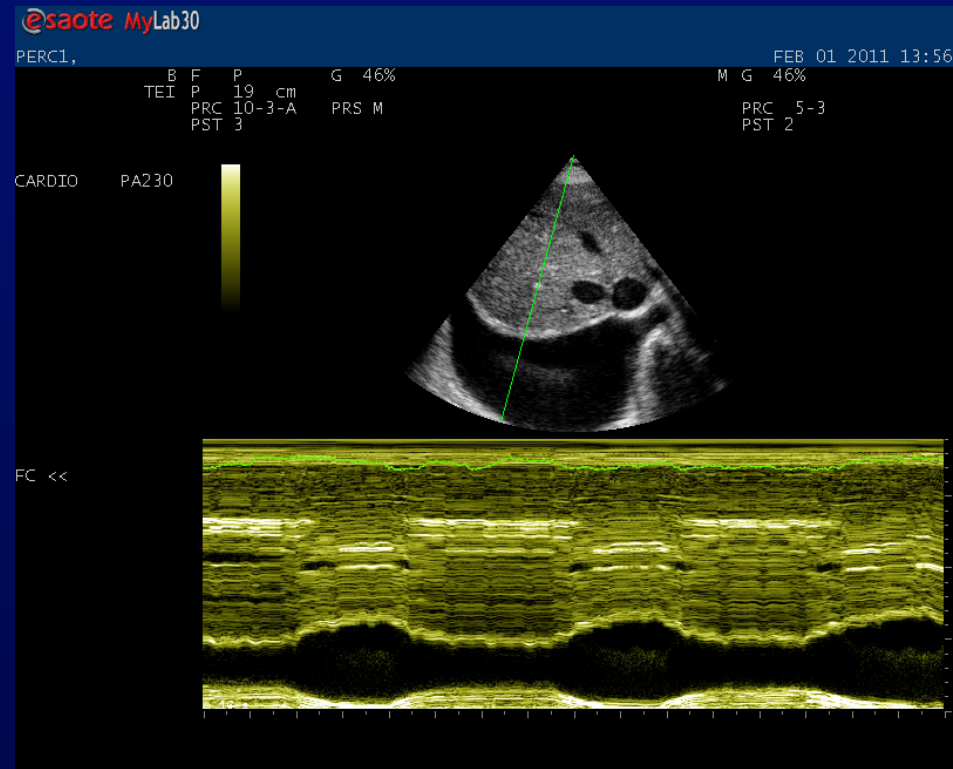
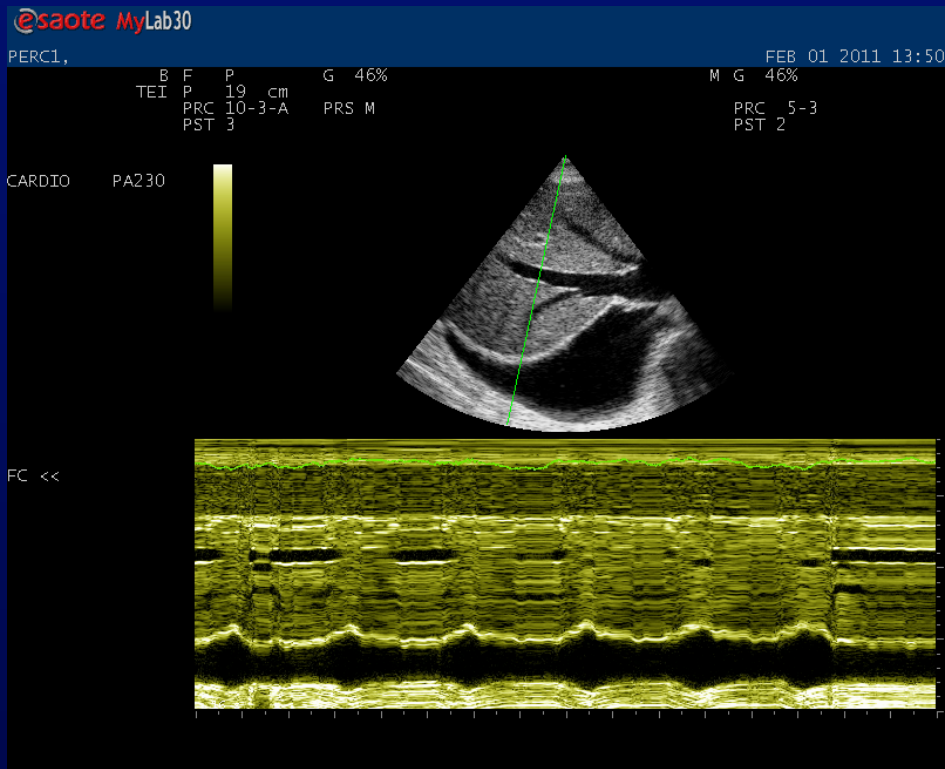
B F P G 58%
TEI P 23 cm
PRC 10-3-A PRS M
PST 3

0:00:00.42

CARDIO PA230



MONITORING MECHANICAL VENTILATION



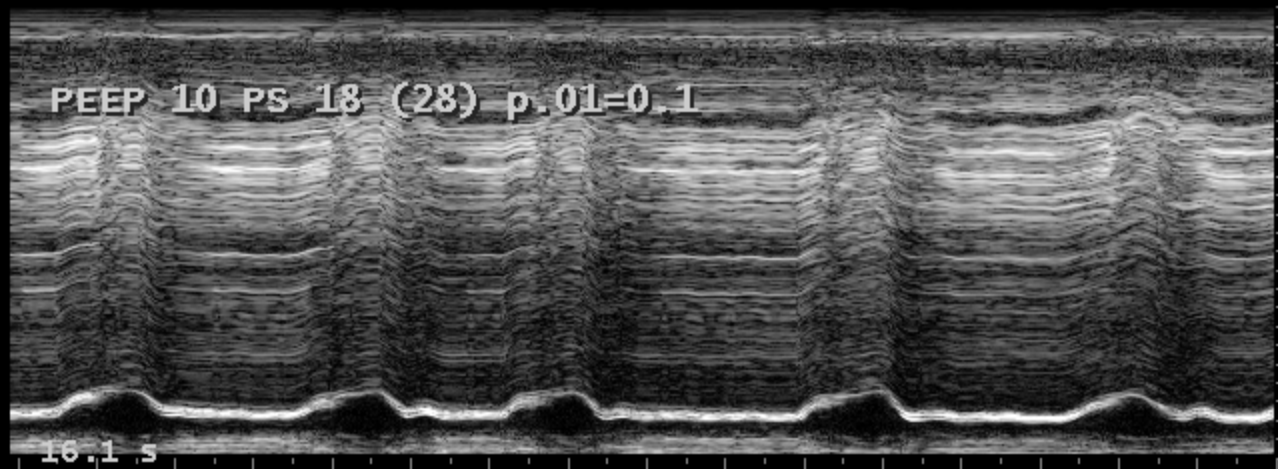
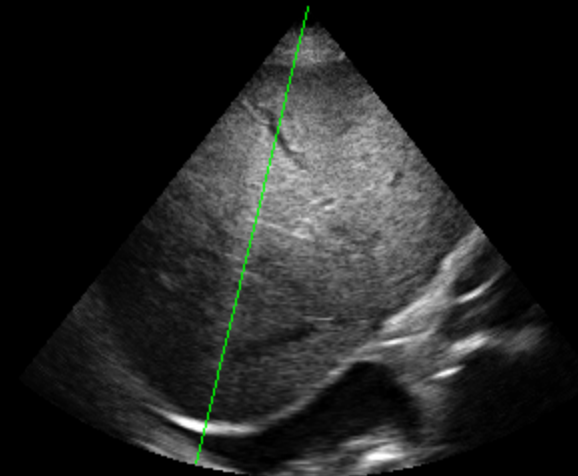
NAVA - "Neurally Adjusted Ventilatory Assist"

PO1 0.1,

B F G G 52%
TEI P 25 cm XV C
PRC 8-4-A PRS M
PST 4

M G 52%
PRC 8-3
PST 4

CARDIO PA240



PEEP 10 PS 18 (28) p.01=0.1

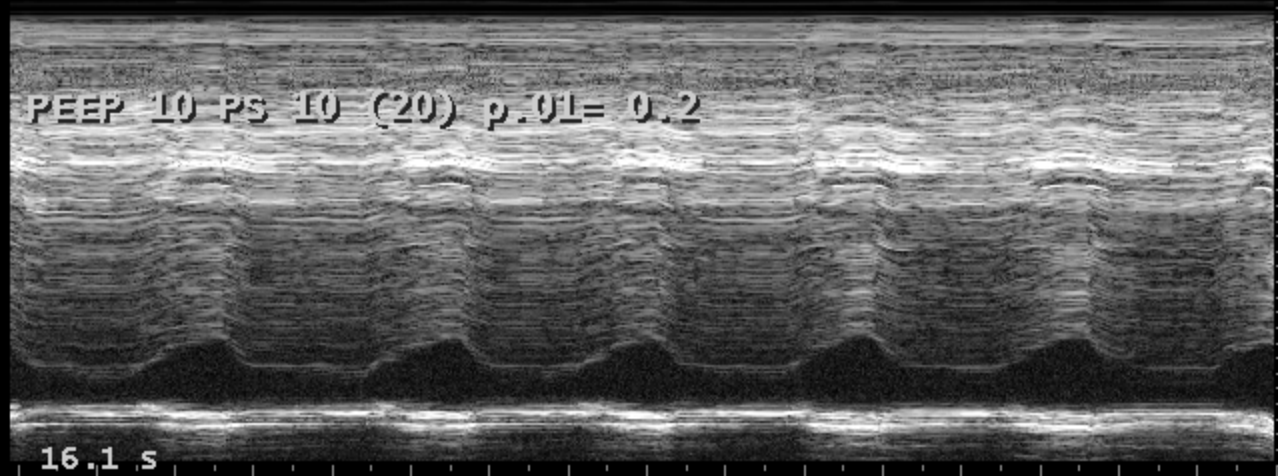
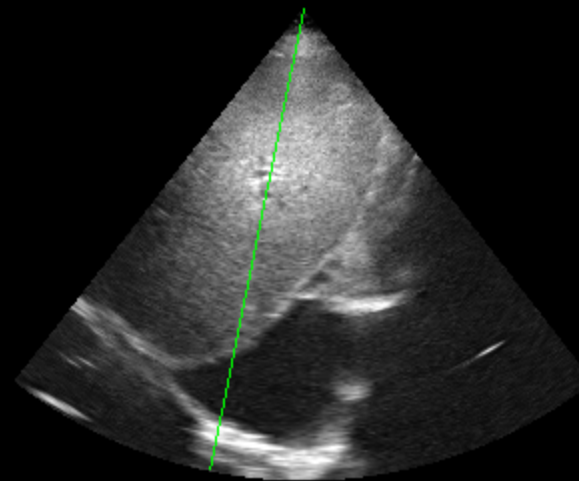
16.1 s

PO1 0.1,

B F G G 64%
TEI P 30 cm XV C
PRC 8-4-A PRS M
PST 4

M G 64%
PRC 8-3
PST 4

CARDIO PA240

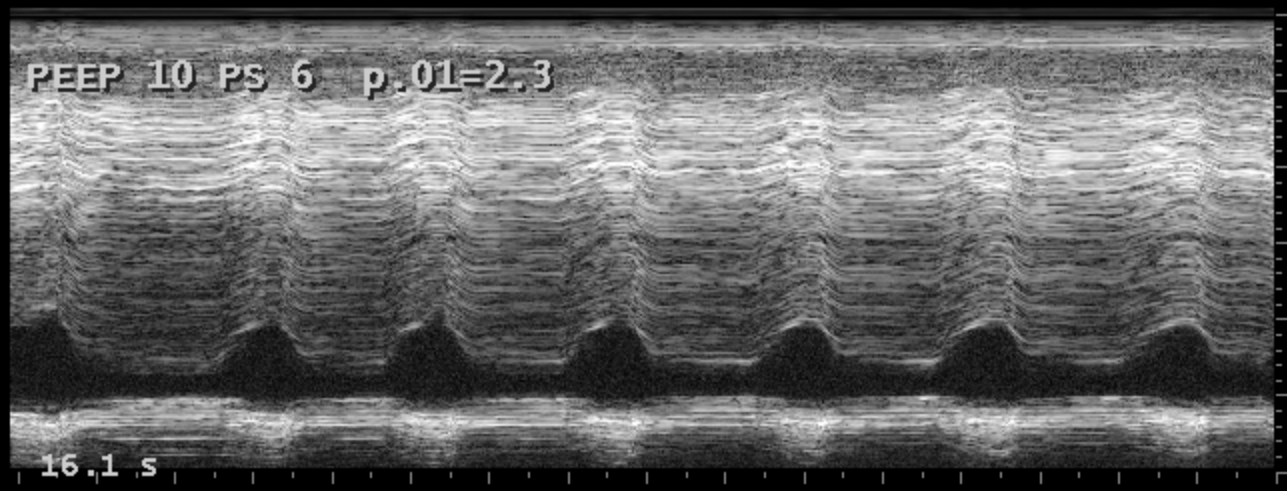
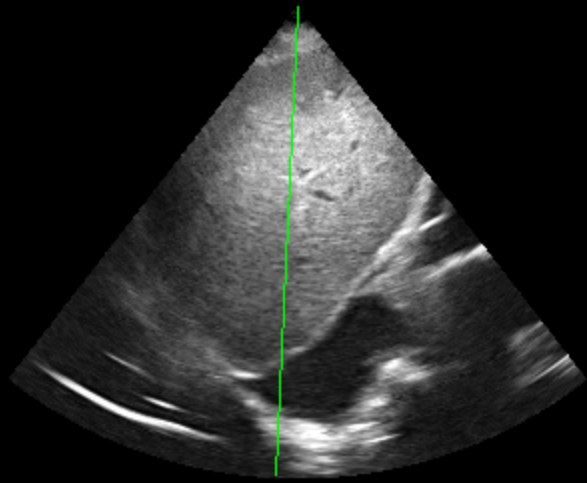


PO1 0.1,

B F G G 64%
TEI P 30 cm XV C
PRC 8-4-A PRS M
PST 4

M G 64%
PRC 8-3
PST 4

CARDIO PA240

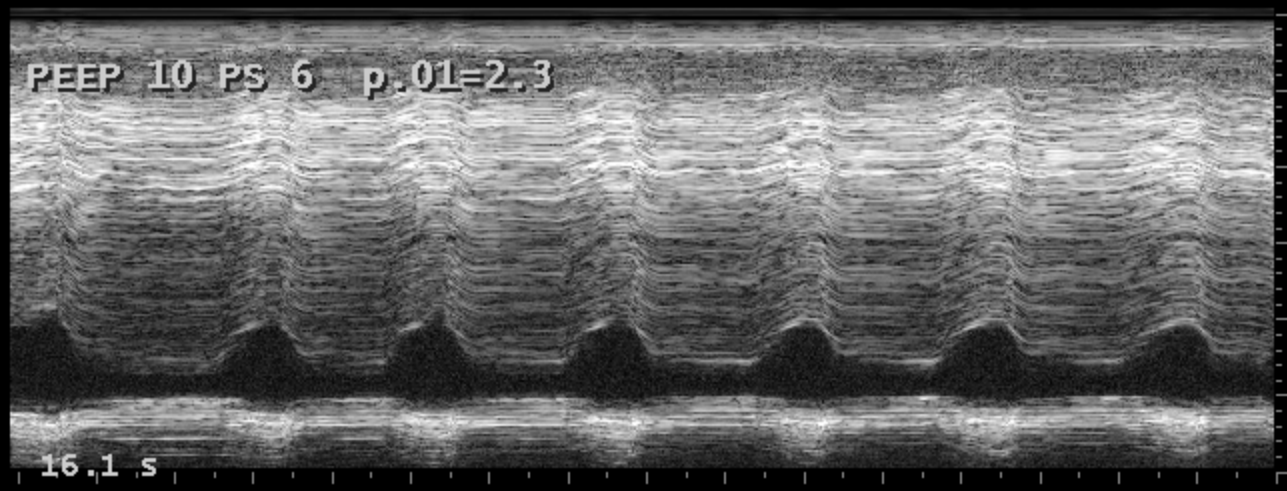
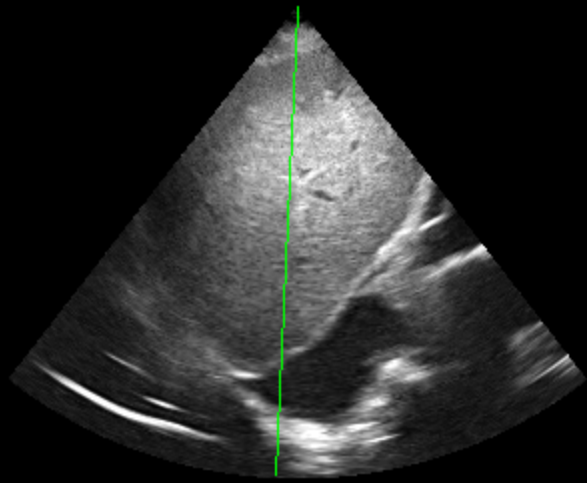


PO1 0.1,

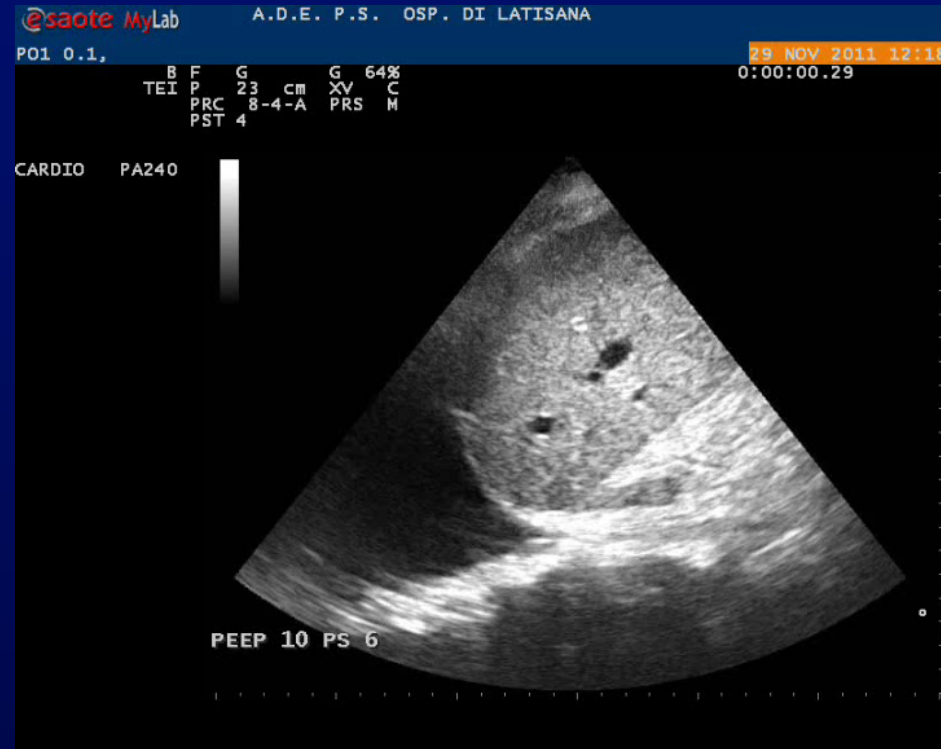
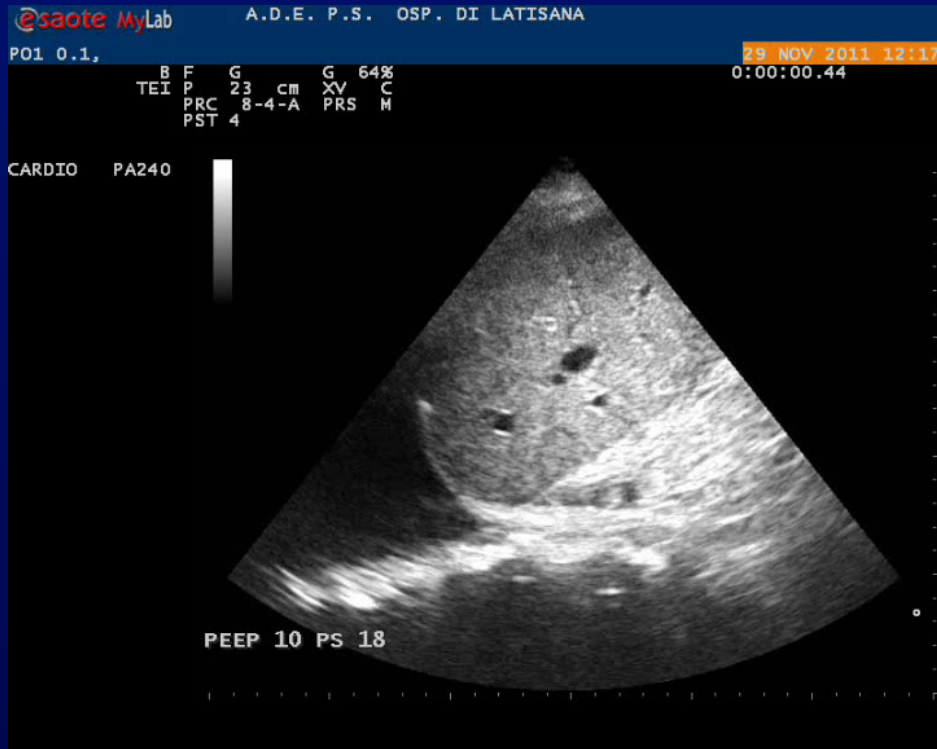
B F G G 64%
TEI P 30 cm XV C
PRC 8-4-A PRS M
PST 4

M G 64%
PRC 8-3
PST 4

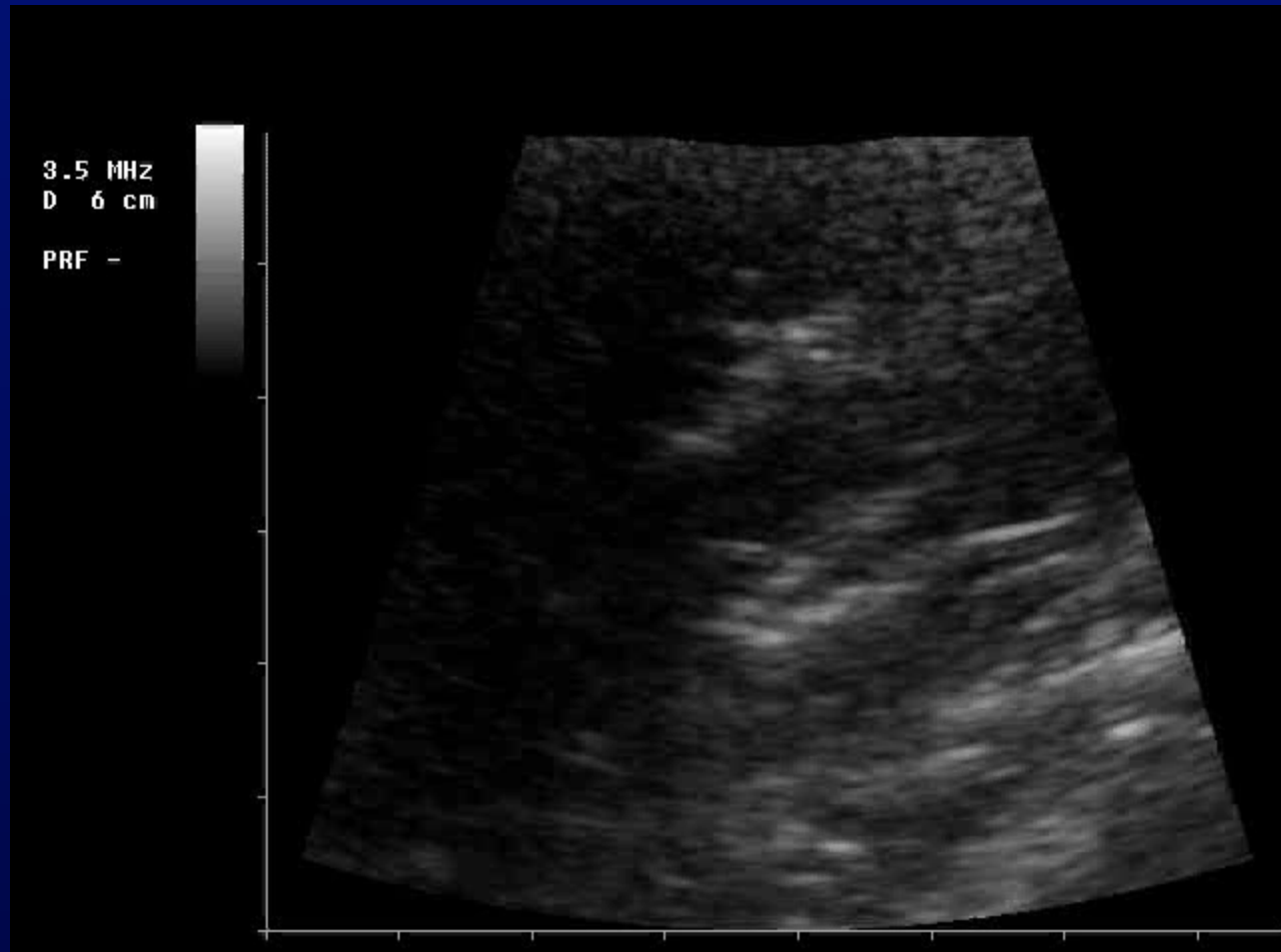
CARDIO PA240



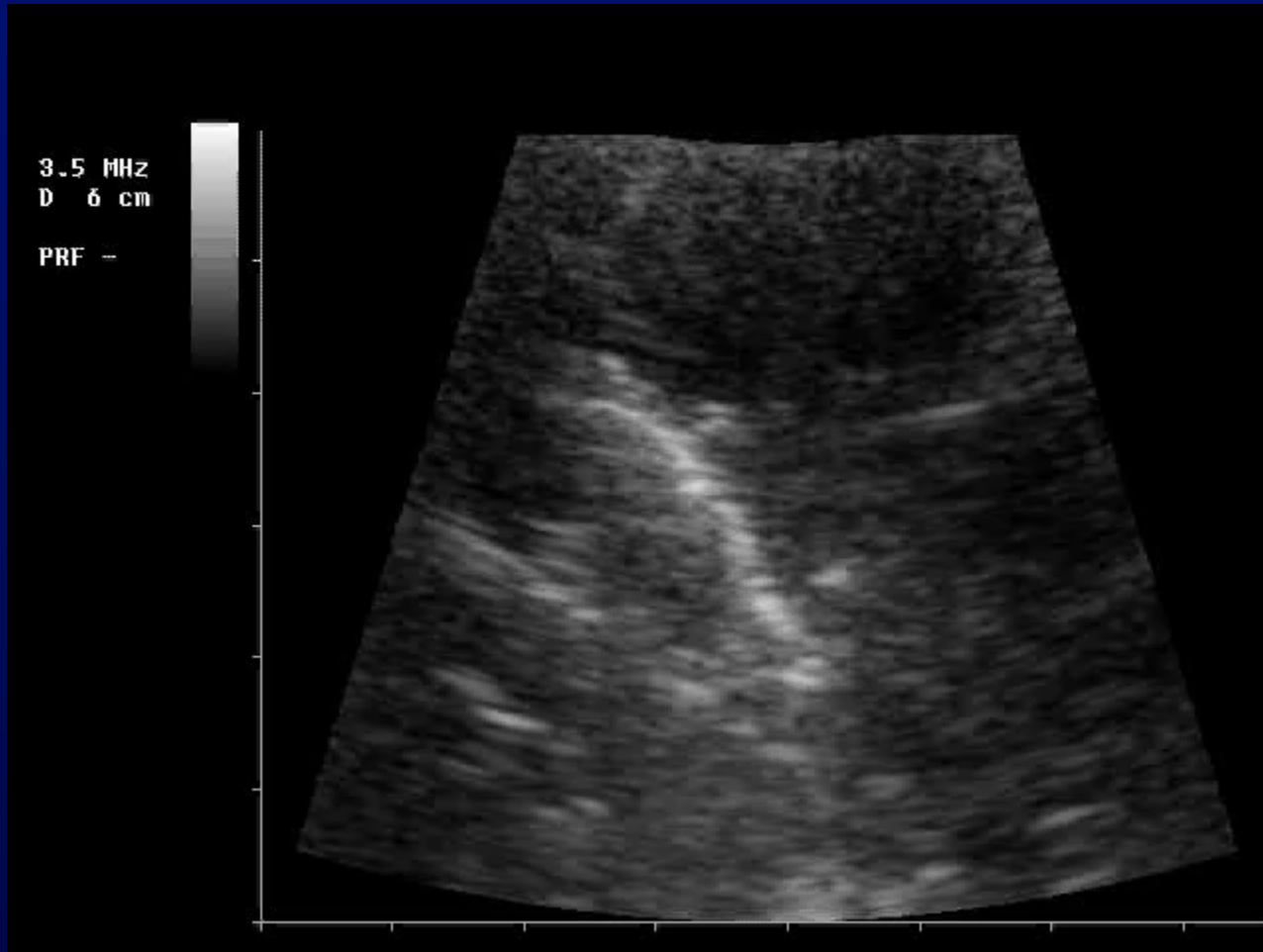
MONITORING MECHANICAL VENTILATION



DYNAMIC AIR BRONCHOGRAMS



DYNAMIC AIR BRONCHOGRAMS



Chest. 2009 Jun;135(6):1421-5.

The dynamic air bronchogram. A lung ultrasound sign of alveolar consolidation ruling out atelectasis.

Lichtenstein D, Mezière G, Seitz J.

Service de Réanimation Médicale, Hôpital Ambroise-Paré, 92100 Boulogne (Paris-Ouest), France.

80 patients

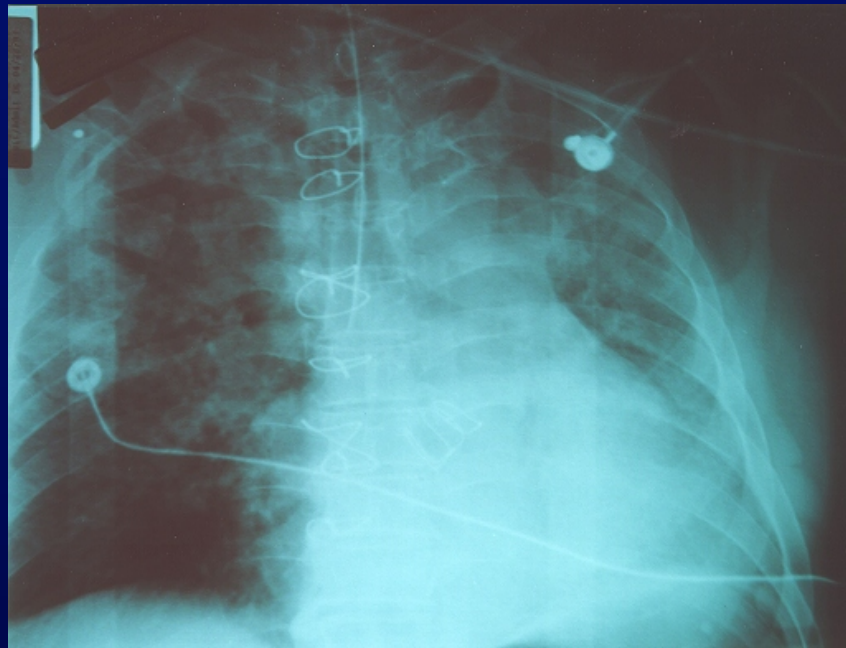
56 pneumonia (fibroscopy+positive bacteriology)

24 atelectasis (fibroscopy+obstacle)

The "lung pulse": an early ultrasound sign of complete atelectasis.

Lichtenstein DA, Lascols N, Prin S, Meziere G.

Intensive Care Med. 2003 Dec;29(12):2187-92. Epub 2003 Oct 14.



- **ABSENCE OF LUNG SLIDING**
- **PERCEPTION OF HEART ACTIVITY AT THE PLEURAL LINE**

“LUNG PULSE”

ESAOTE MyLab25

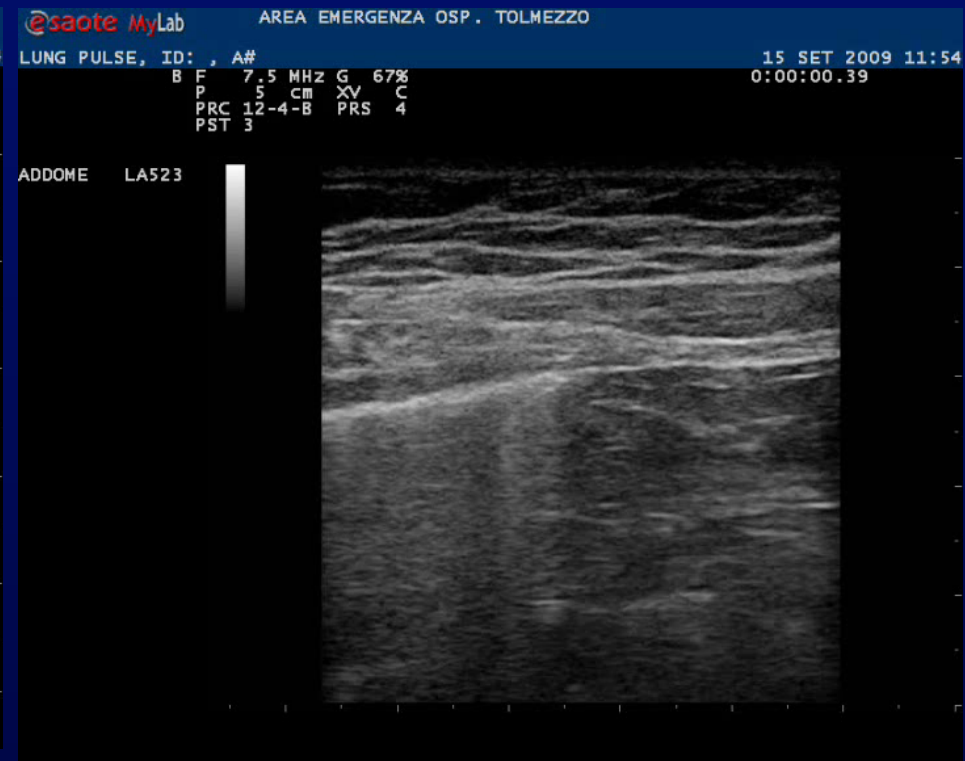
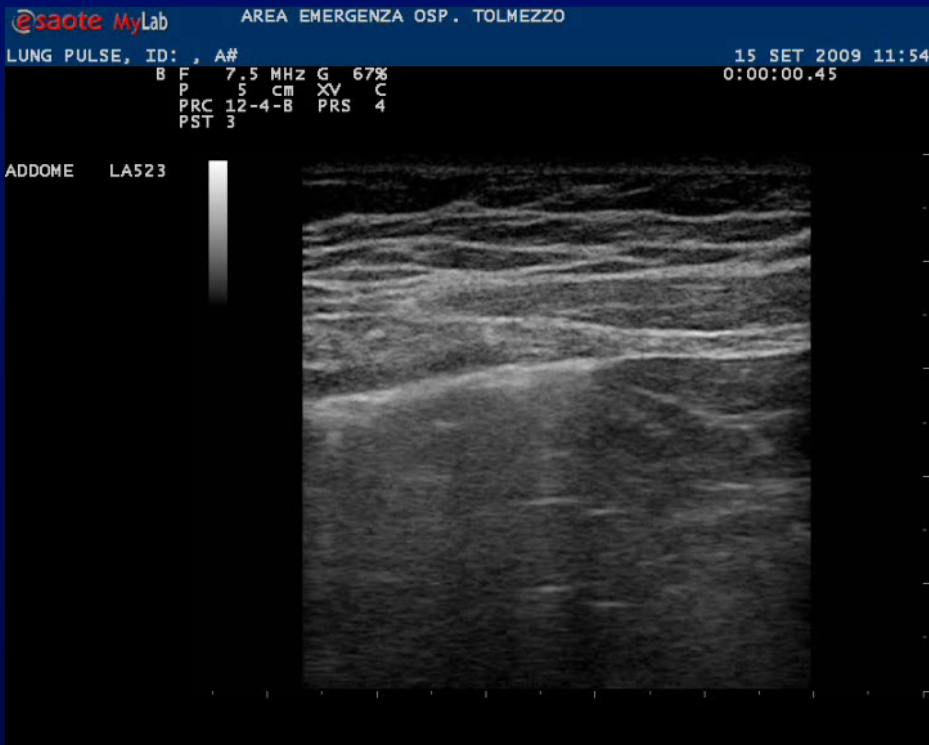
BARNOBI, AURELIO

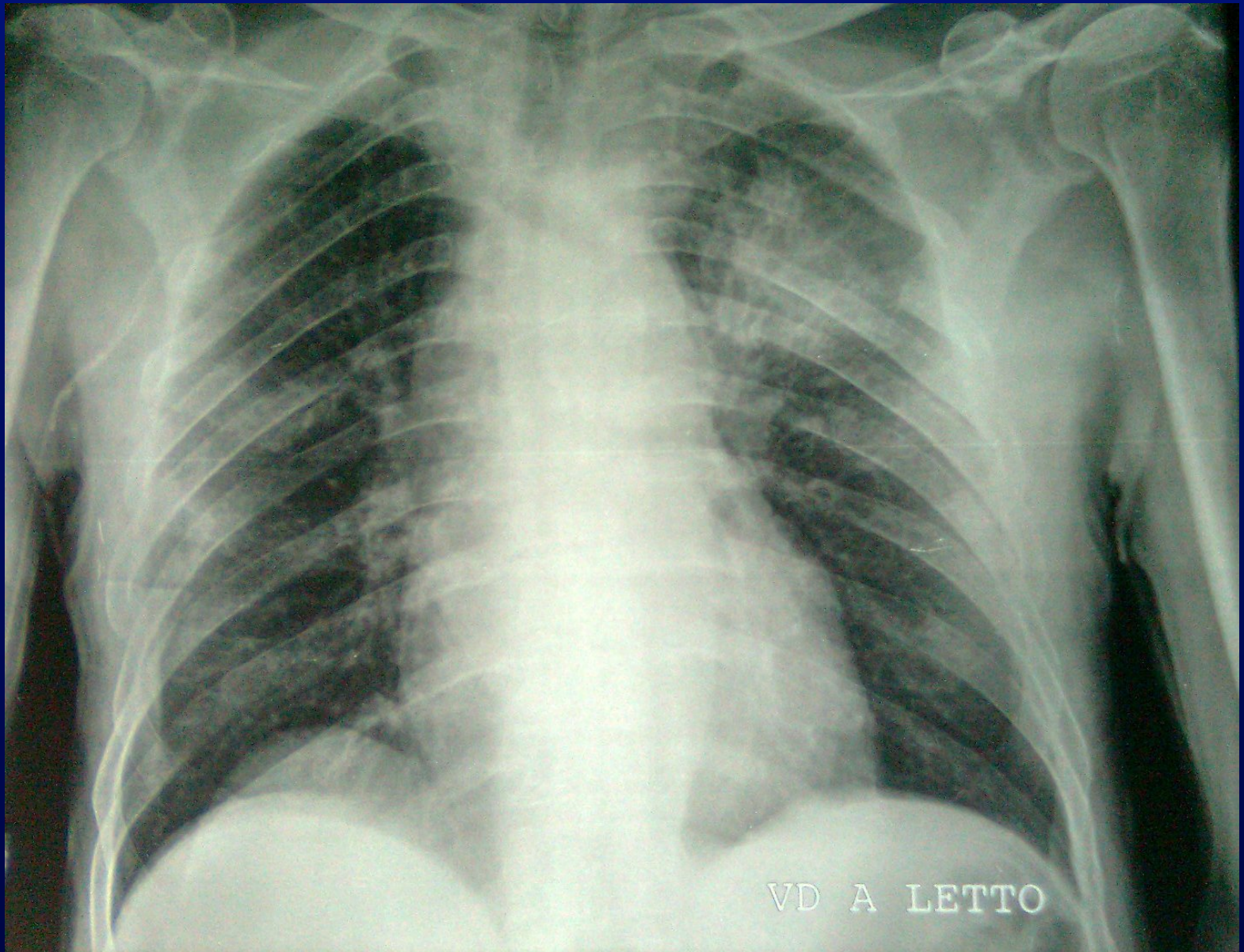
24 MAG 2005 10:27

B F 3.5 MHz G 40%
P 8 cm
PRC 5-M-A PRS 3
PST 2



RIGHT MAINSTEM BRONCHUS INTUBATION





VD A LETTO

ATELETTASIA POLMONARE, ID: , A# 05 GIU 2009 10:42

B F 2.5 MHZ G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

0:00:00.56

ADDOME CA430

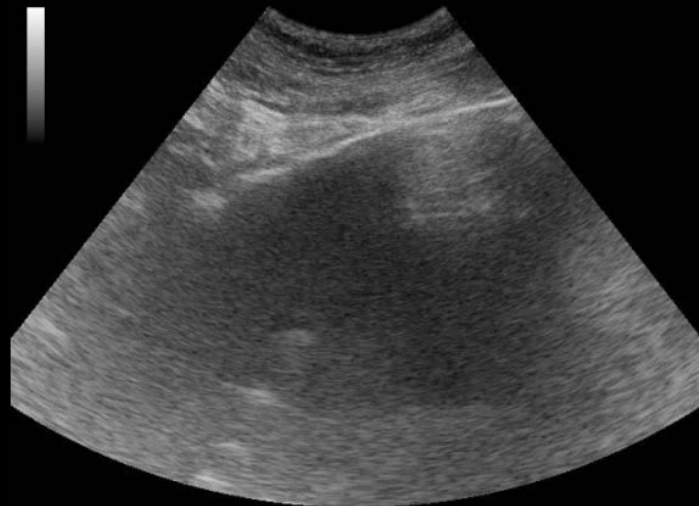


ATELETTASIA POLMONARE, ID: , A# 05 GIU 2009 10:43

B F 2.5 MHZ G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

0:00:00.48

ADDOME CA430



ATELETTASIA POLMONARE, ID: , A# 05 GIU 2009 10:43

B F 2.5 MHZ G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

0:00:00.72

ADDOME CA430



ATELETTASIA POLMONARE, ID: , A# 05 GIU 2009 10:43

B F 2.5 MHZ G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

0:00:00.48

ADDOME CA430



@saote MyLab

AREA EMERGENZA OSP. TOLMEZZO

ATELETTASIA POLMONARE, ID: , A#

05 GIU 2009 10:47
0:00:00.48

B F 2.5 MHz G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

ADDOME CA430



@saote MyLab

AREA EMERGENZA OSP. TOLMEZZO

ATELETTASIA POLMONARE, ID: , A#

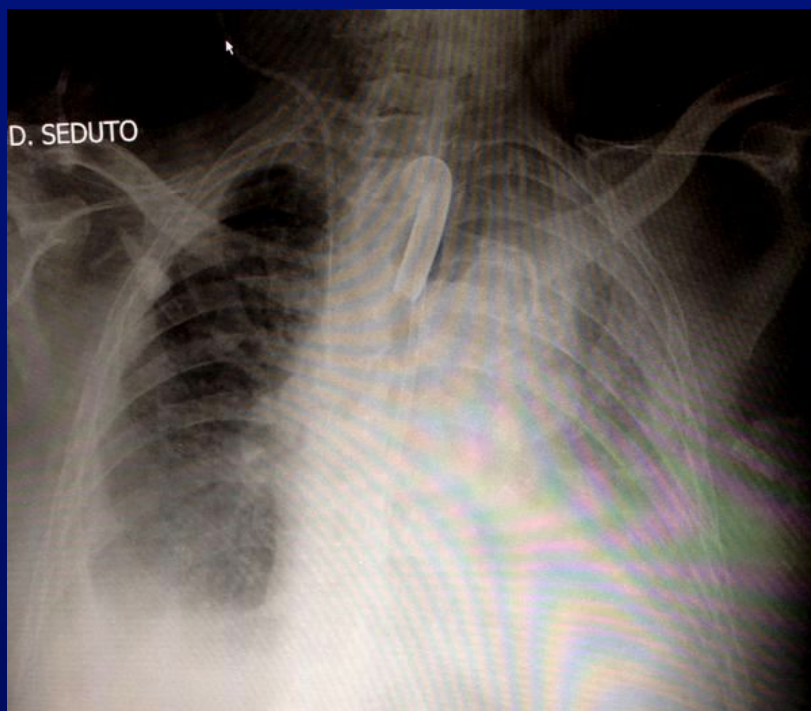
05 GIU 2009 10:50
0:00:00.40

B F 2.5 MHz G 70%
P 15 cm XV C
PRC 12-4-A PRS 4
PST 3

ADDOME CA430



D. SEDUTO



ATELETTASIA, 28 GEN 2014 13:51
0:00:00.51

B	F	G	G	76%	
TEI	P	19	CM	XV	C
	PRC	15-3-A	PRS	4	
	PST	4	MV	1	

ADDOME CA431

A B-mode ultrasound image of the abdomen. The image shows a dark, anechoic area, likely representing a fluid-filled structure or a collapsed lung segment. The text 'ATELETTASIA' and 'ADDOME CA431' are visible at the top.

ATELETTASIA, 28 GEN 2014 13:51
0:00:00.46

B	F	G	G	76%	
TEI	P	19	CM	XV	C
	PRC	15-3-A	PRS	4	
	PST	4	MV	1	

ADDOME CA431

A B-mode ultrasound image of the abdomen, similar to the one above. It shows a dark area with some internal texture, possibly representing a different view or a different part of the same structure. The text 'ATELETTASIA' and 'ADDOME CA431' are visible at the top.

ATELETTASIA, 28 GEN 2014 13:54
0:00:00.43

B	F	G	G	79%	
TEI	P	15	CM	XV	C
	PRC	15-3-A	PRS	4	
	PST	4	MV	1	

ADDOME CA431

A B-mode ultrasound image of the abdomen, showing a dark area with some internal texture. The text 'ATELETTASIA' and 'ADDOME CA431' are visible at the top.

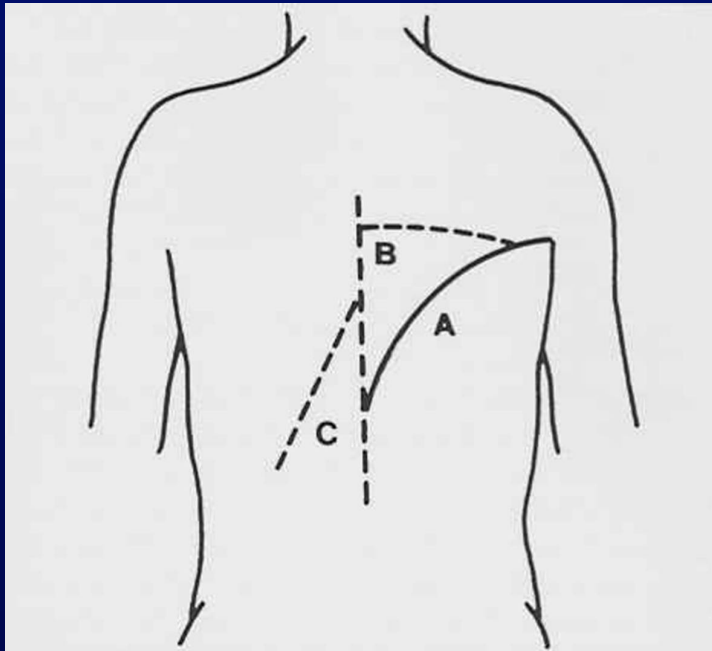
CAUTION
THIS MACHINE
HAS NO BRAIN
USE YOUR OWN



DA

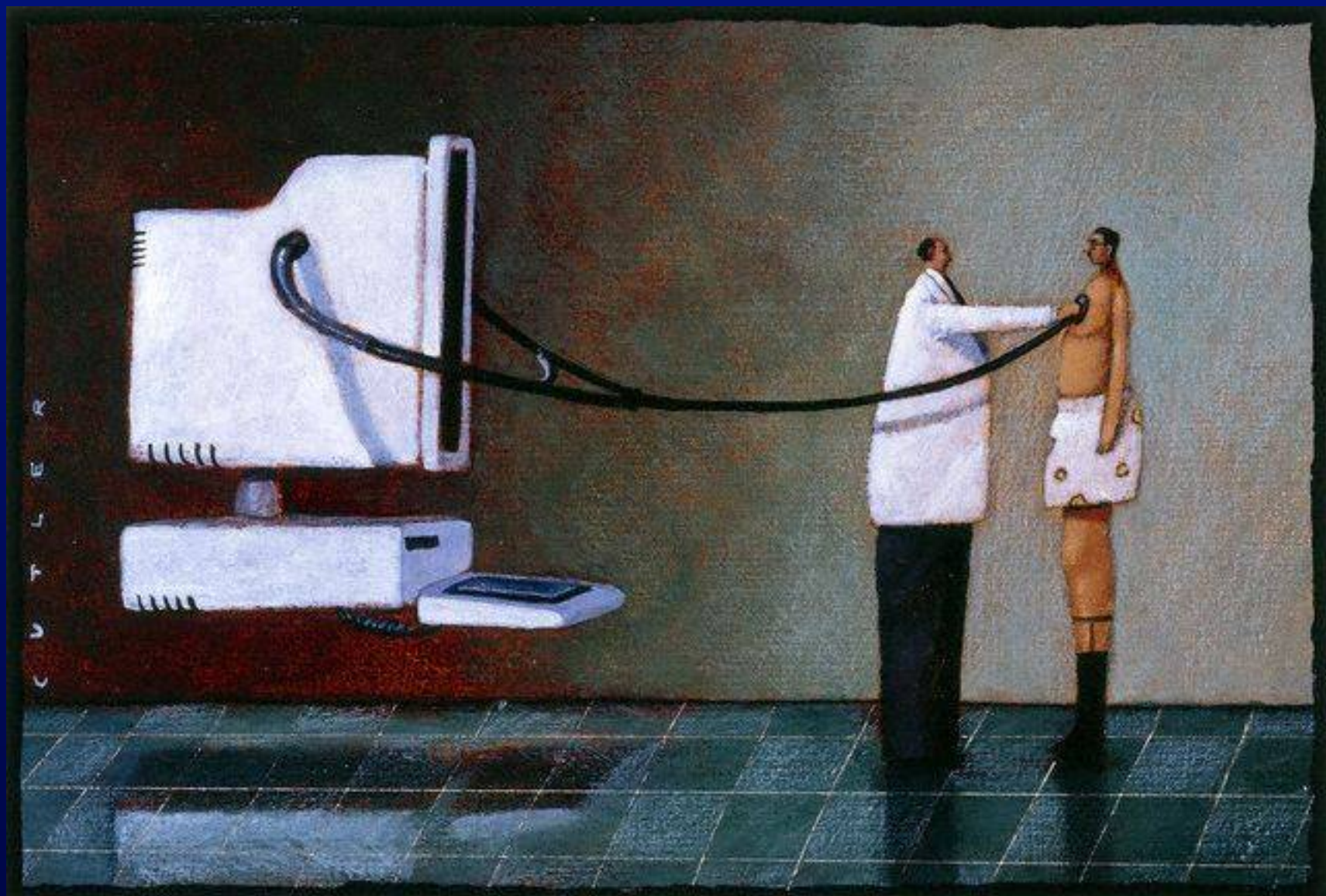
7219
NEW YORK
BUILT
DISCOVERED
NEW YORK

DIAGNOSIS OF PLEURAL EFFUSION ?



A: linea di Damoiseau-Ellis; **B:** triangolo di Garland; **C:** triangolo paravertebrale opposto di Grocco





CUTLER

11111: Mr. Beap



**GRAZIE PER LA VOSTRA
ATTENZIONE**

