



CORSO PRE-CONGRESSUALE DI  
ECOGRAFIA TORACICA  
NELL'ANZIANO

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Gruppo di Ricerca  
Ecografia Toracica nell'Anziano **SIGG**

70<sup>o</sup> CONGRESSO  
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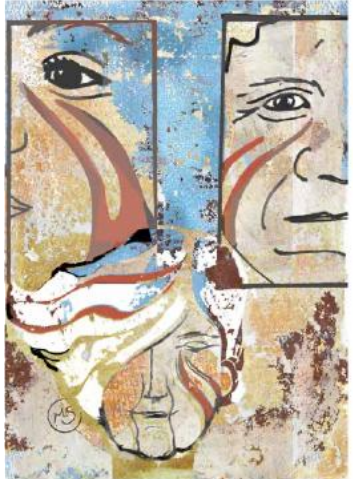
LIBERI E LONGEVI

17-20  
Dicembre  
2025  
Napoli

Università degli  
Studi di Napoli  
Federico II  
Polo Didattico  
di **SCAMPIA**



SOCIETÀ ITALIANA  
DI GERONTOLOGIA  
E GERIATRIA



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**CORSO PRE-CONGRESSUALE IN ECOGRAFIA TORACICA NELL'ANZIANO**

**CASI CLINICI DI SINDROME INTERSTIZIALE**

Chukwuma Okoye  
Università degli Studi di Milano-Bicocca






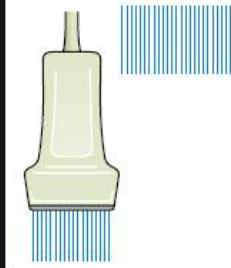
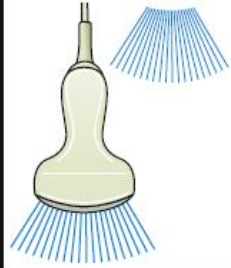
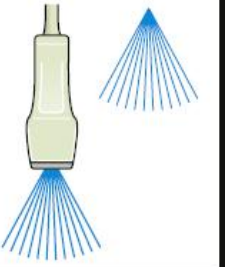



# PRIMA



## Sindrome interstiziale su RX

- C'è versamento?
  - *«possibile»*
- Quanto?
  - *«Abbondante, modesto, lieve...»*
- E' scompenso o ARDS?
  - *«Da correlare con quadro clinico anamnestico»*
- Monitoraggio del quadro clinico?
  - *«Rimandamelo giù tra 2 giorni, possibilmente ACCOMPAGNATO»*

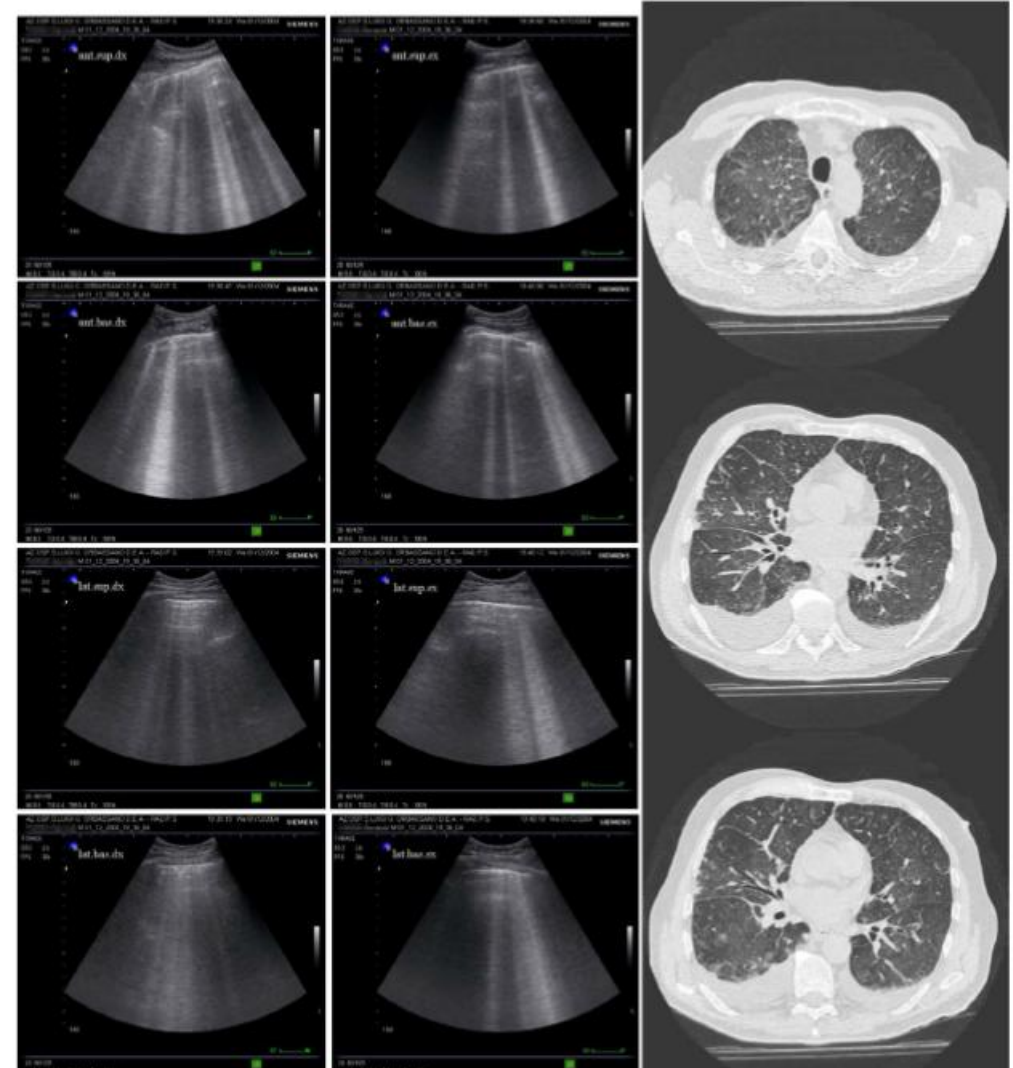
# Interstiziopatia: QUALE SONDA UTILIZZARE?

Transducer type	Linear	Curvilinear	Phased array
			
Frequency range	5–10 MHz	2–5 MHz	1–5 MHz
Imaging depth	9 cm	30 cm	35 cm
Footprint			
Image			
Applications	Arteries/veins Procedures Pleura Skin/soft tissues Musculoskeletal Testicles/hernia Eyes Breast	Gallbladder Liver Kidney Bladder Abdominal aorta Abdominal free fluid Uterus/ovaries	Heart Inferior vena cava Lungs Pleura Abdomen

# Sindrome interstiziale polmonare

La sindrome alveolo-interstiziale polmonare comprende molte condizioni patologiche eterogenee che hanno in comune un diffuso coinvolgimento dell'interstizio con riduzione della capacità di scambio alveolo-capillare.

Tali condizioni sono sia croniche (la fibrosi polmonare) sia acute (l'ARDS, l'edema polmonare, la polmonite interstiziale).



## The Comet-tail Artifact An Ultrasound Sign of Alveolar-Interstitial Syndrome

DANIEL LICHTENSTEIN, GILBERT MÉZIÈRE, PHILIPPE BIDERMAN, AGNÈS GEPNER, and OLIVIER BARRÉ

Service de Réanimation Médicale and Service de Radiologie, Hôpital Ambroise-Paré, Boulogne (Paris), and Service de Réanimation Polyvalente, Centre Hospitalier Général, Saint-Cloud (Paris), France

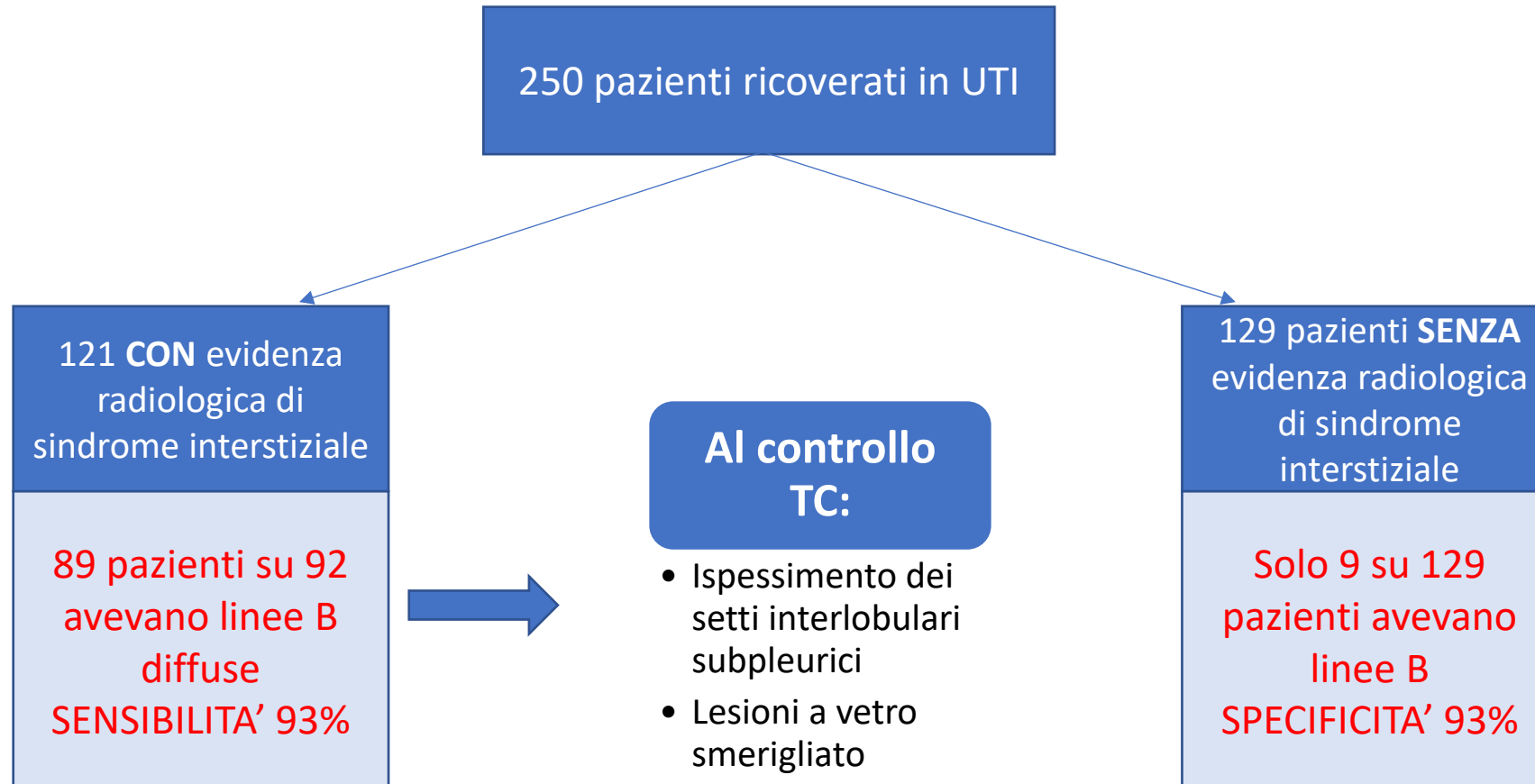
Can ultrasound be of any help in the diagnosis of alveolar-interstitial syndrome? In a prospective study, we examined 250 consecutive patients in a medical intensive care unit: 121 patients with radiologic alveolar-interstitial syndrome (disseminated to the whole lung,  $n = 92$ ; localized,  $n = 29$ ) and 129 patients without radiologic evidence of alveolar-interstitial syndrome. The antero-lateral chest wall was examined using ultrasound. The ultrasonic feature of multiple comet-tail artifacts fanning out from the lung surface was investigated. This pattern was present all over the lung surface in 86 of 92 patients with diffuse alveolar-interstitial syndrome (sensitivity of 93.4%). It was absent or confined to the last lateral intercostal space in 120 of 129 patients with normal chest X-ray (specificity of 93.0%). Tomodensitometric correlations showed that the thickened sub-pleural interlobular septa, as well as ground-glass areas, two lesions present in acute pulmonary edema, were associated with the presence of the comet-tail artifact. In conclusion, presence of the comet-tail artifact allowed diagnosis of alveolar-interstitial syndrome. **Lichtenstein D, Mézière G, Biderman P, Gepner A, Barré O. The comet-tail artifact: an ultrasound sign of alveolar-interstitial syndrome.**

AM J RESPIR CRIT CARE MED 1997;156:1640-1646.



# Linee B (1)

Lichtenstein D, The comet-tail artifact: an ultrasound sign of alveolar-interstitial syndrome. AM J Respir Crit Care Med 1997.

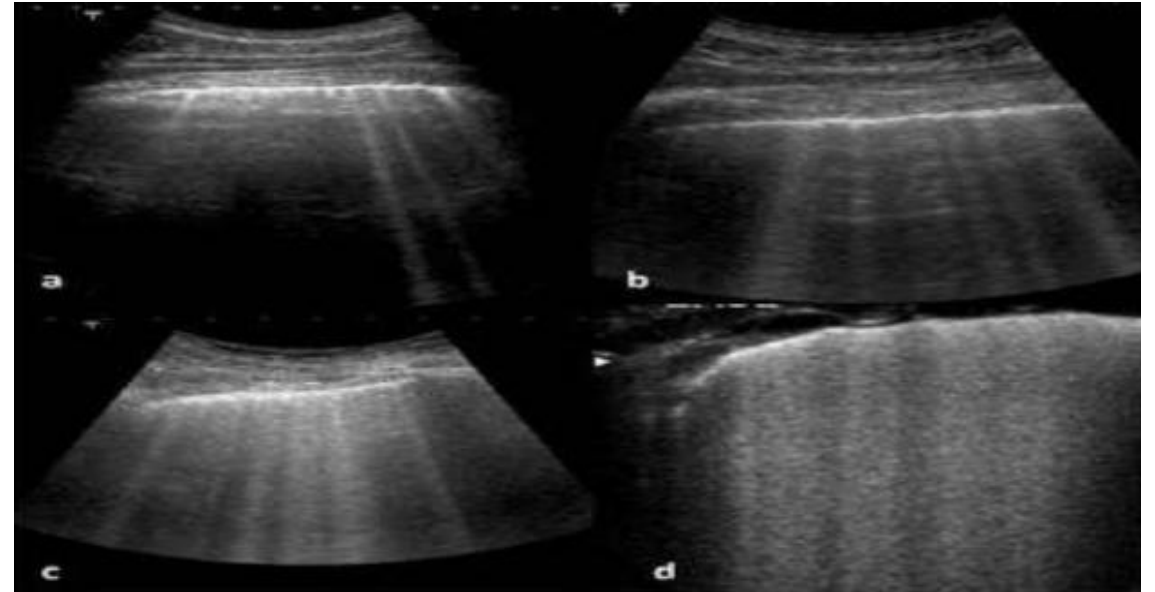


## Linee B (2)

*“The comet-tail artifact does not exist. The comet-tail artifact is an oxymoron. I described 16 different comet-tail artifacts. The B line was one of them, defined using standardized criteria.”*

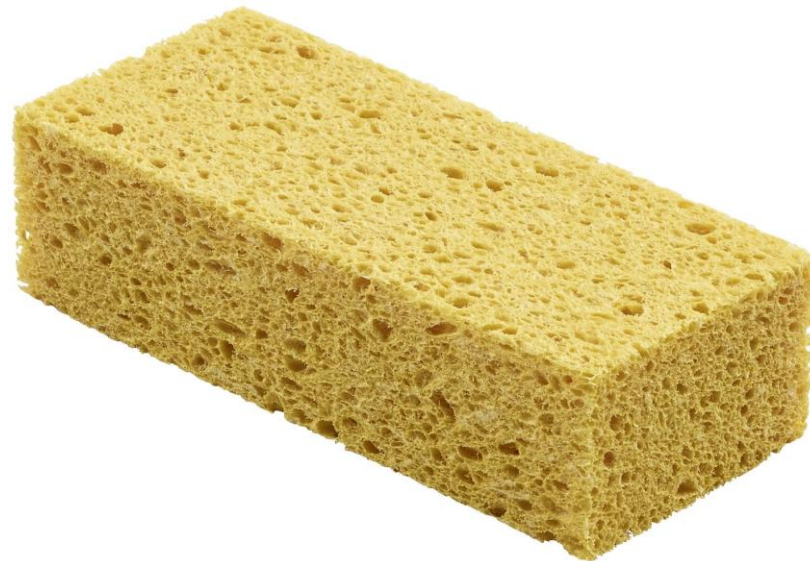
*Current Misconceptions in Lung Ultrasound: A Short Guide for Experts, Chest 2019*

L'origine di questo artefatto è dibattuta, e sarebbe verosimilmente da ascrivere non ad una particolare e singola struttura anatomica (ad esempio il setto interlobulare) quanto alle mutate interazioni tra ultrasuoni incidenti ed interfaccia aria/interstizio

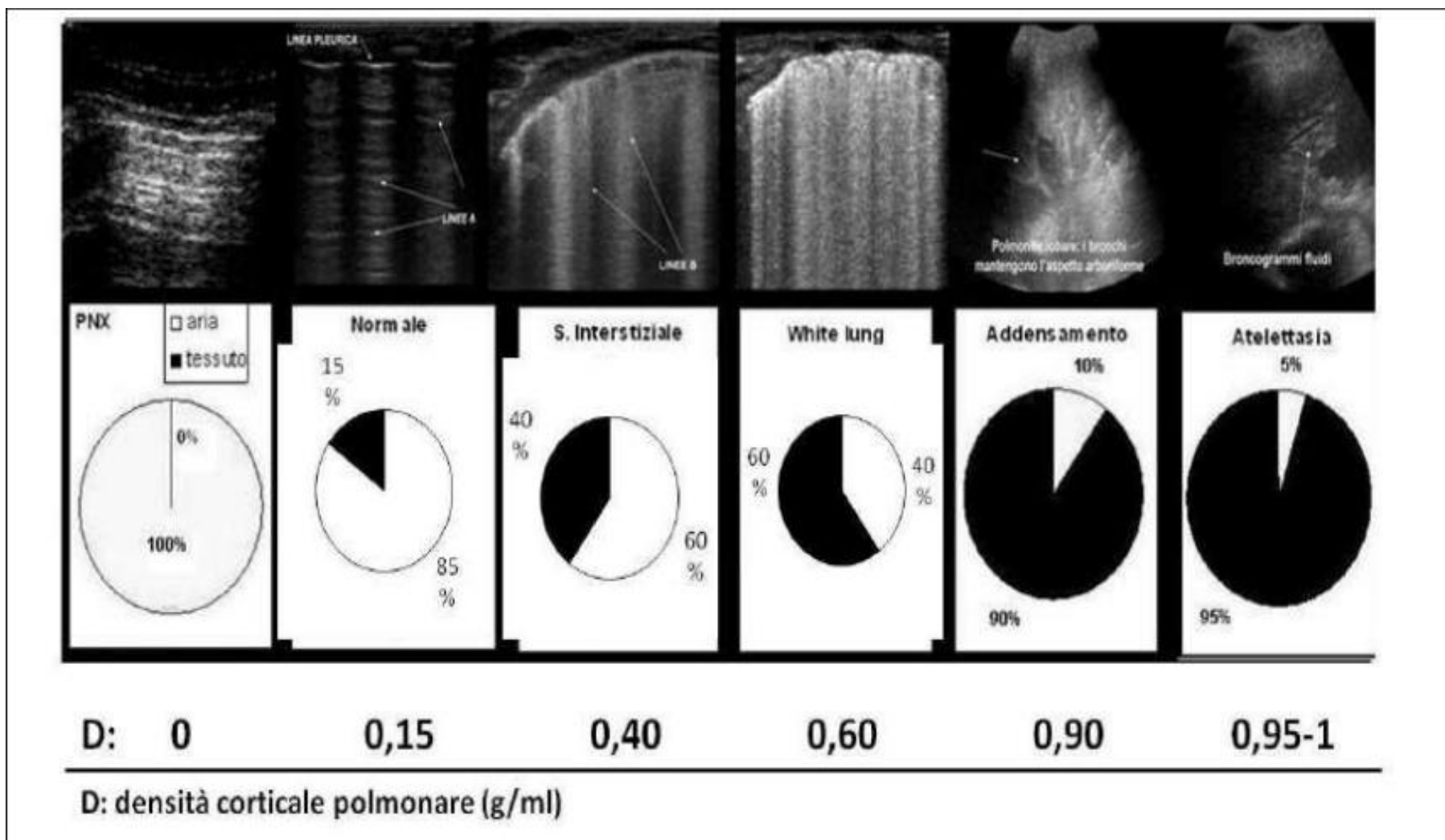


## Linee B (3)

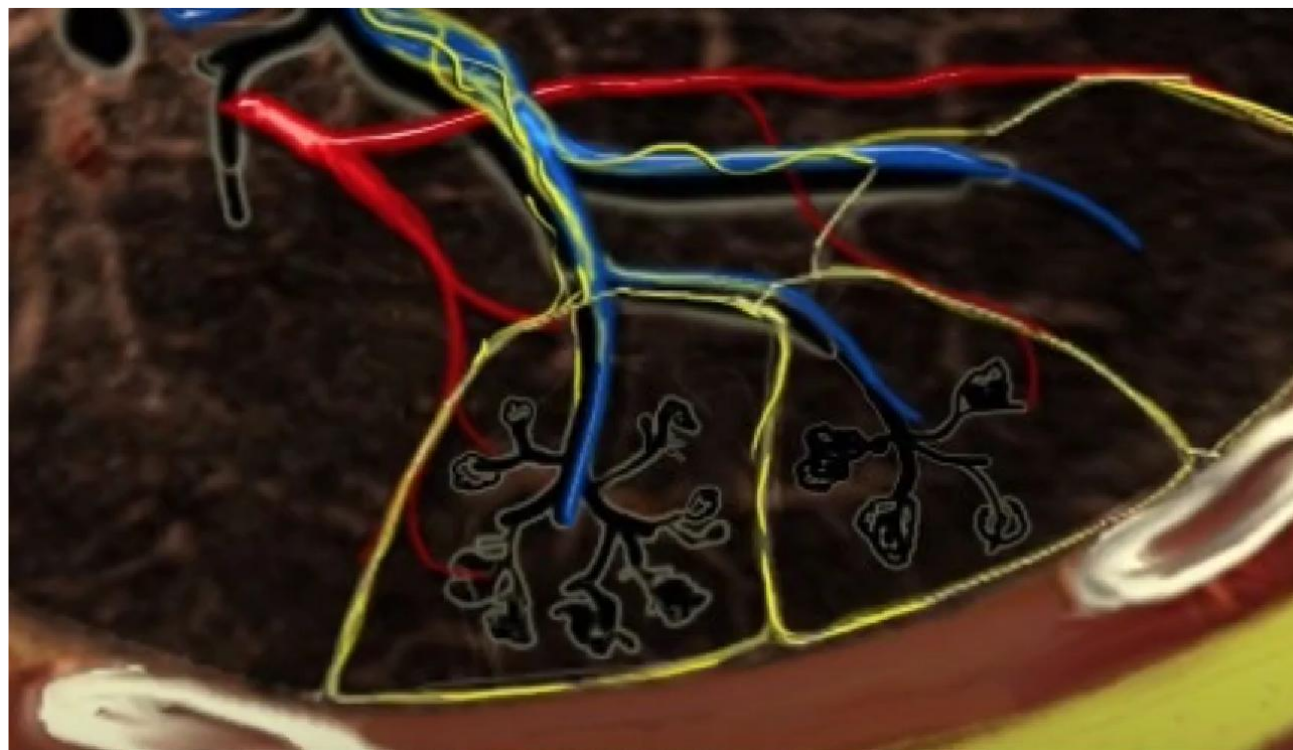
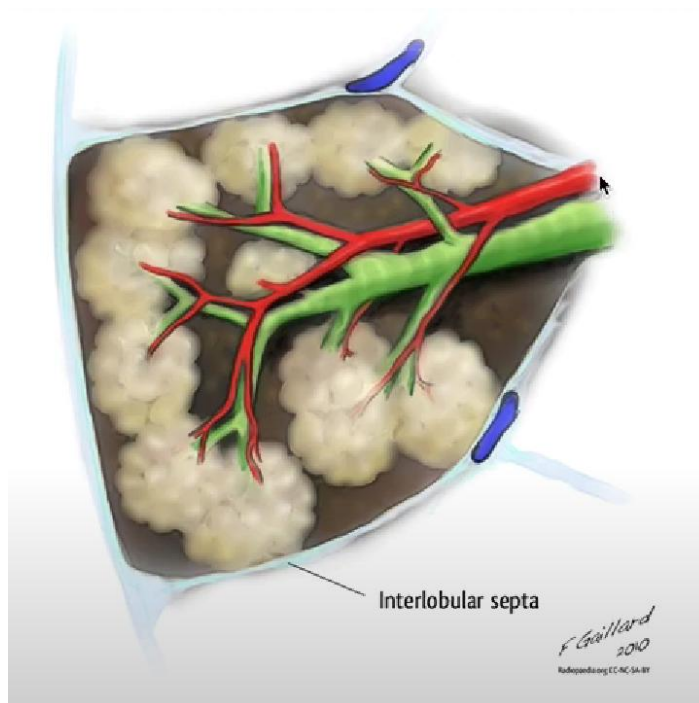
In questo senso le linee B sarebbero semplicemente l'epifenomeno dell'aumentata densità del polmone sottopleurico. Un aumento di densità si può avere per aumento del peso del tessuto (interstizio) o per riduzione del volume (componente aerea) o per combinazione dei due meccanismi



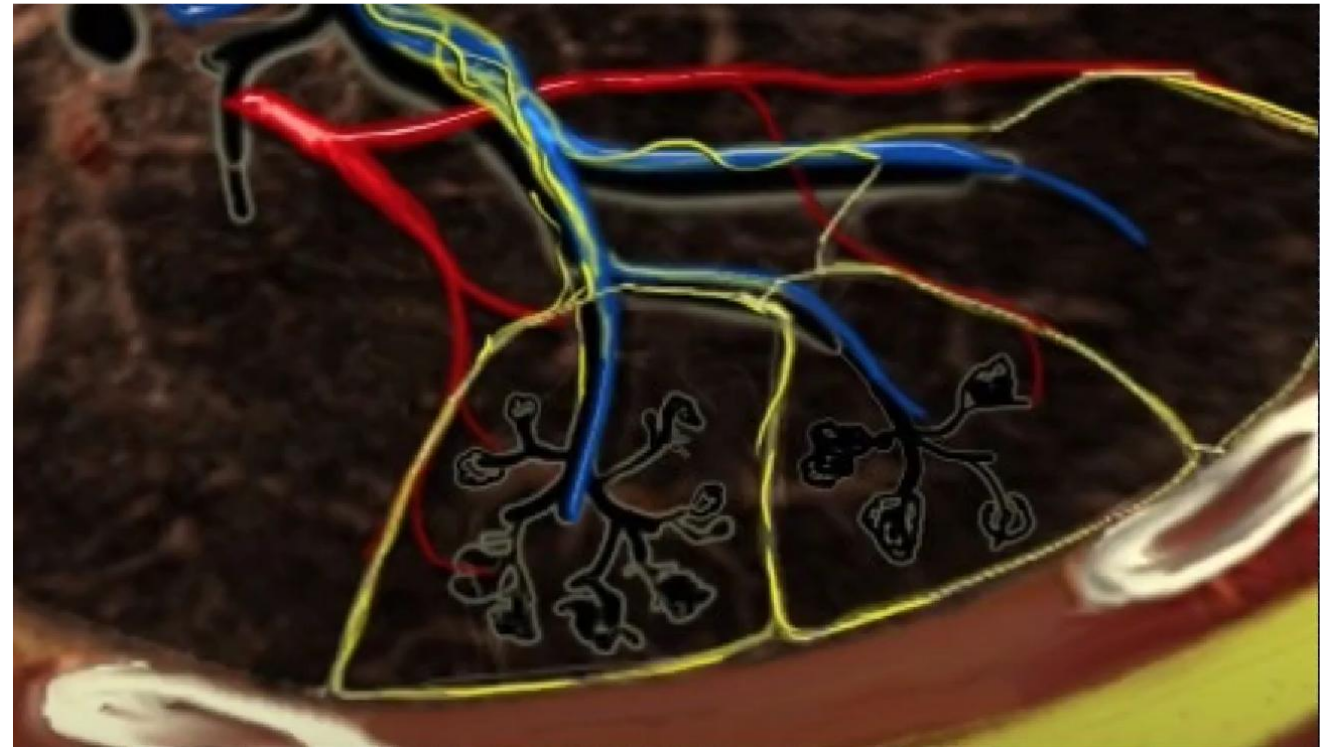
# Linee B (3)



## Lobulo polmonare secondario

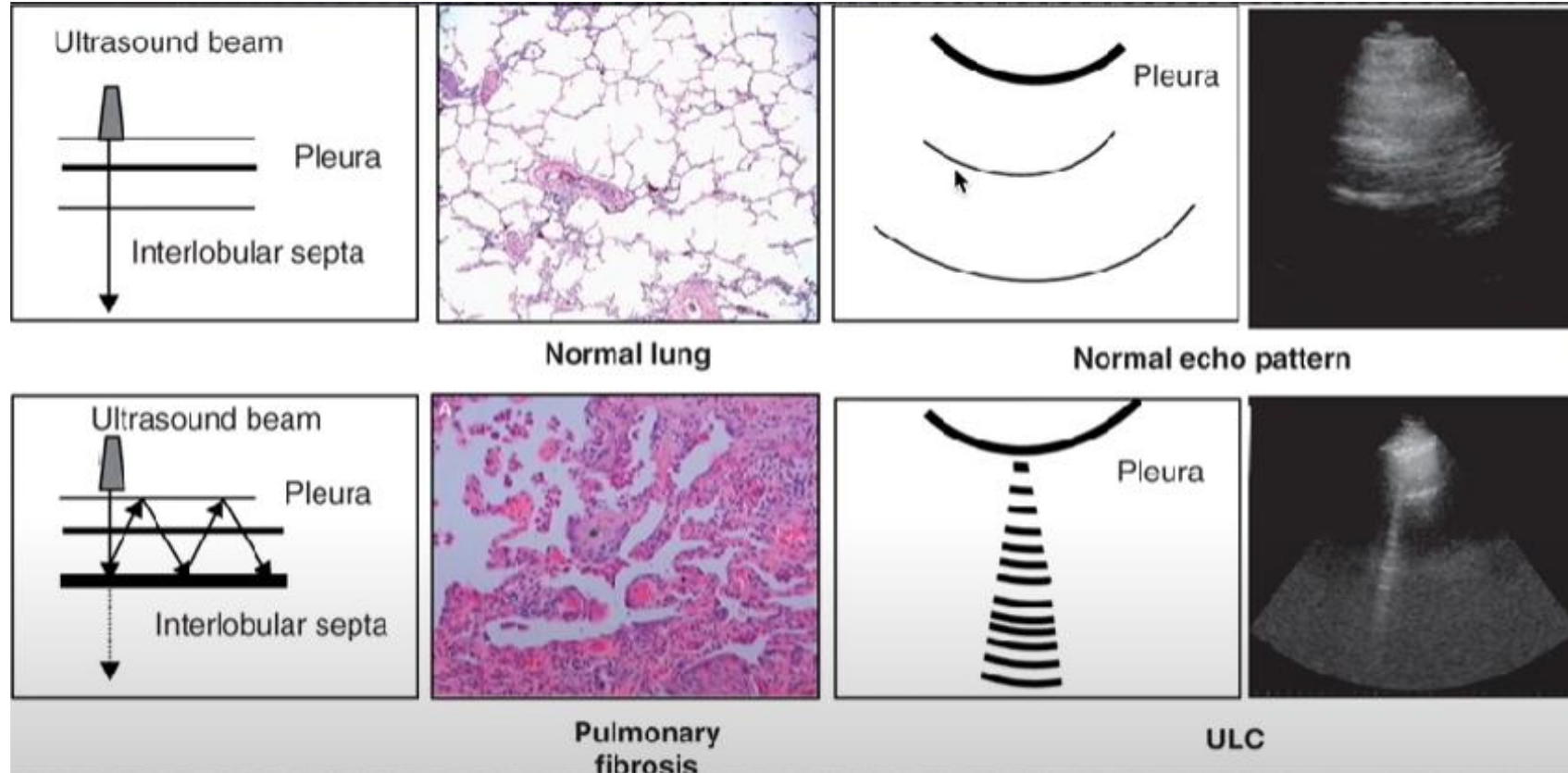


# sindrome interstiziopatica polmonare

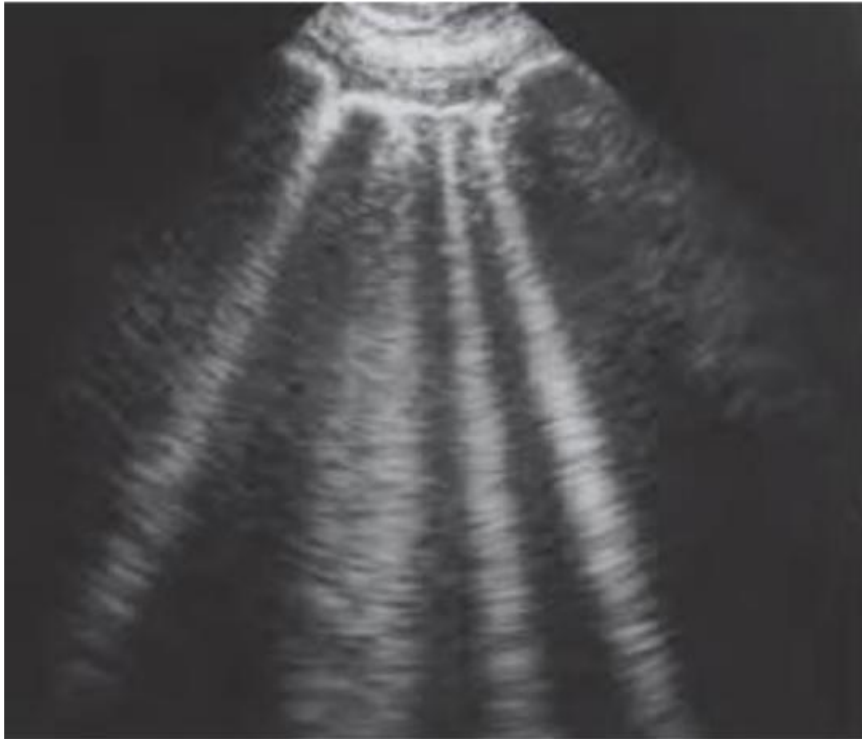


Silva CI. JBP 2010 38(1)99:256

# Sindrome interstiziopatia polmonare



## Linee B (4)

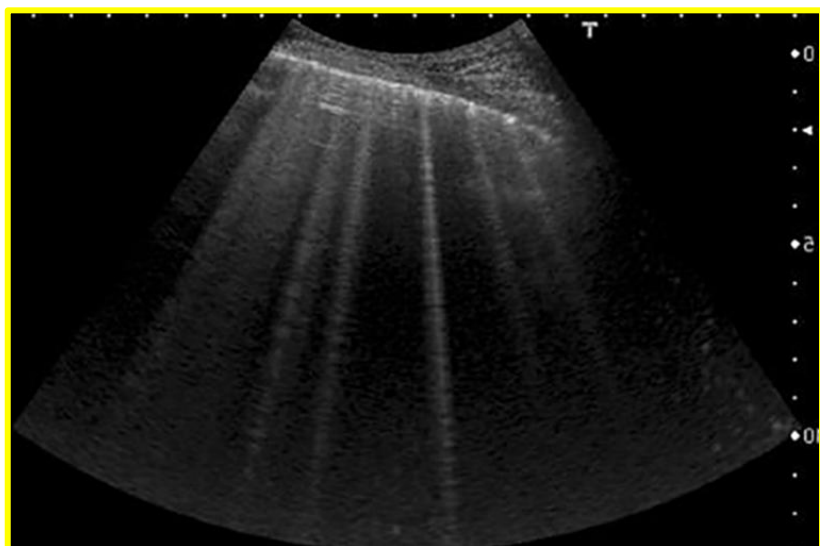
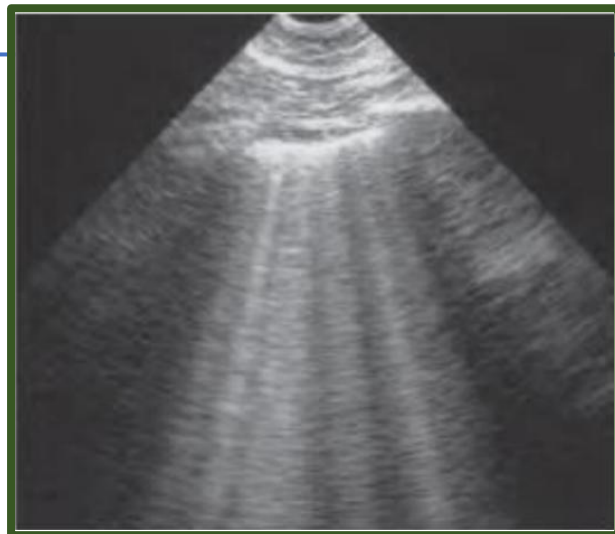


Three/four B lines between two ribs are called **septal-rockets**, correlating with thickened subpleural interlobular septa

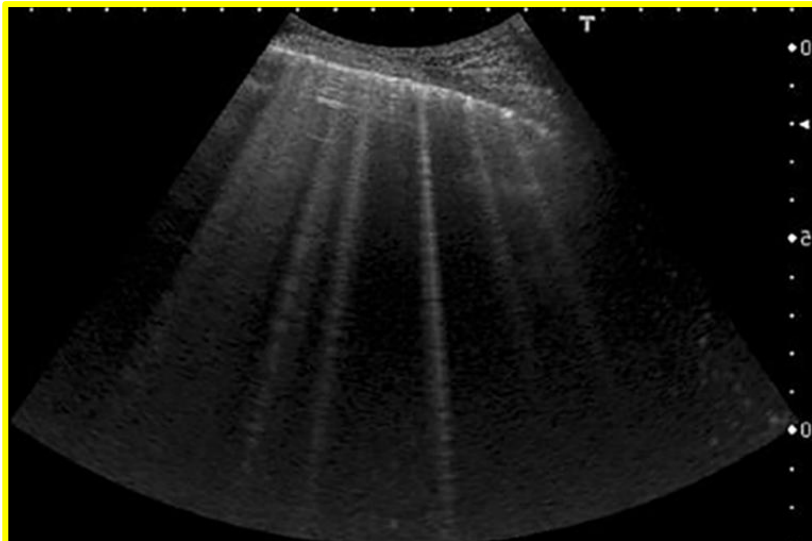
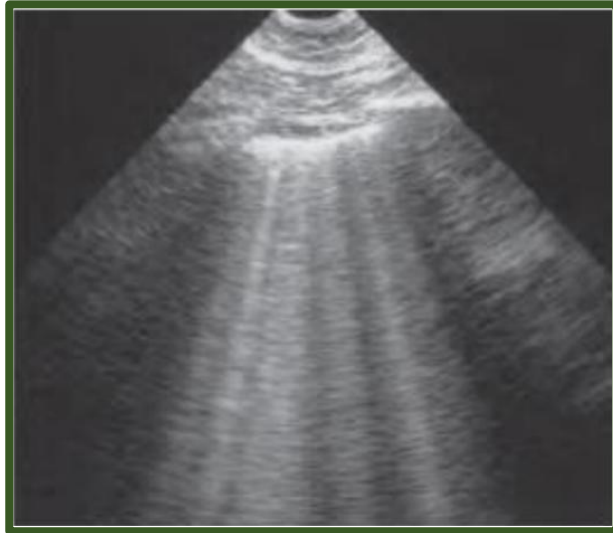


Five B lines or more are called **glass rockets**, correlating with CT **ground-glass opacities**, indicating, severe interstitial syndrome. The label coalescent B lines, twice as long to say, is less descriptive.

## Linee B (4)



	ADHF	ILD o polmonite atipiche	ARDS	FIBROSI
<b>Aspetto delle Linee B</b>	Fini>>>Coalescenti	Fini	Coalescenti	Fini
<b>Distribuzione</b>	Diffuse con andamento gravitazionale	Diffuse senza a.g. Multifocali>>Focali con aree di risparmio	Diffuse senza a.g/ con aree di risparmio	Sparses con aree di risparmio
<b>Simmetria</b>	Bilaterali	Monolaterali /Bilaterali	Bilaterali	Asimmetriche
<b>Linea pleurica</b>	Linea pleurica sottile	Linea pleurica frastagliata	Linea pleurica frastagliata con nodularità	Linea pleurica frastagliata con nodularità e placche
<b>Versamento pleurico</b>	Associate a versamento pleurico	Non associate a versamento pleurico	Non associate a versamento pleurico	Non associate a versamento pleurico



Okoye et al. *BMC Geriatrics* (2022) 22:166  
<https://doi.org/10.1186/s12877-022-02837-7>

BMC Geriatrics

RESEARCH

Open Access



## Computed tomography findings and prognosis in older COVID-19 patients

Chukwuma Okoye<sup>1</sup>, Panaiotis Finamore<sup>2\*</sup>, Giuseppe Bellelli<sup>3</sup>, Alessandra Coin<sup>4</sup>, Susanna Del Signore<sup>5</sup>, Stefano Fumagalli<sup>6</sup>, Pietro Gareri<sup>7</sup>, Alba Malara<sup>8</sup>, Enrico Mossello<sup>6</sup>, Caterina Trevisan<sup>4</sup>, Stefano Volpato<sup>9</sup>, Gianluca Zia<sup>5</sup>, Fabio Monzani<sup>1</sup> and Raffaele Antonelli Incalzi<sup>2</sup>

### Abstract

**Background:** In older and multimorbid patients, chronic conditions may affect the prognostic validity of computed tomography (CT) findings in COVID-19. This study aims at assessing to which extent CT findings have prognostic implications in COVID-19 older patients.

**Methods:** Hospitalized COVID-19 patients aged 60 years or more enrolled in the multicenter, observational and longitudinal GeroCovid study who underwent chest CT were included. Patients were stratified by tertiles of age and pneumonia severity to compare CT findings. Hierarchical clustering based on CT findings was performed to identify CT-related classificatory constructs, if any. The hazard ratio (HR) of mortality was calculated for individual CT findings and for clusters, after adjusting for potential confounders.

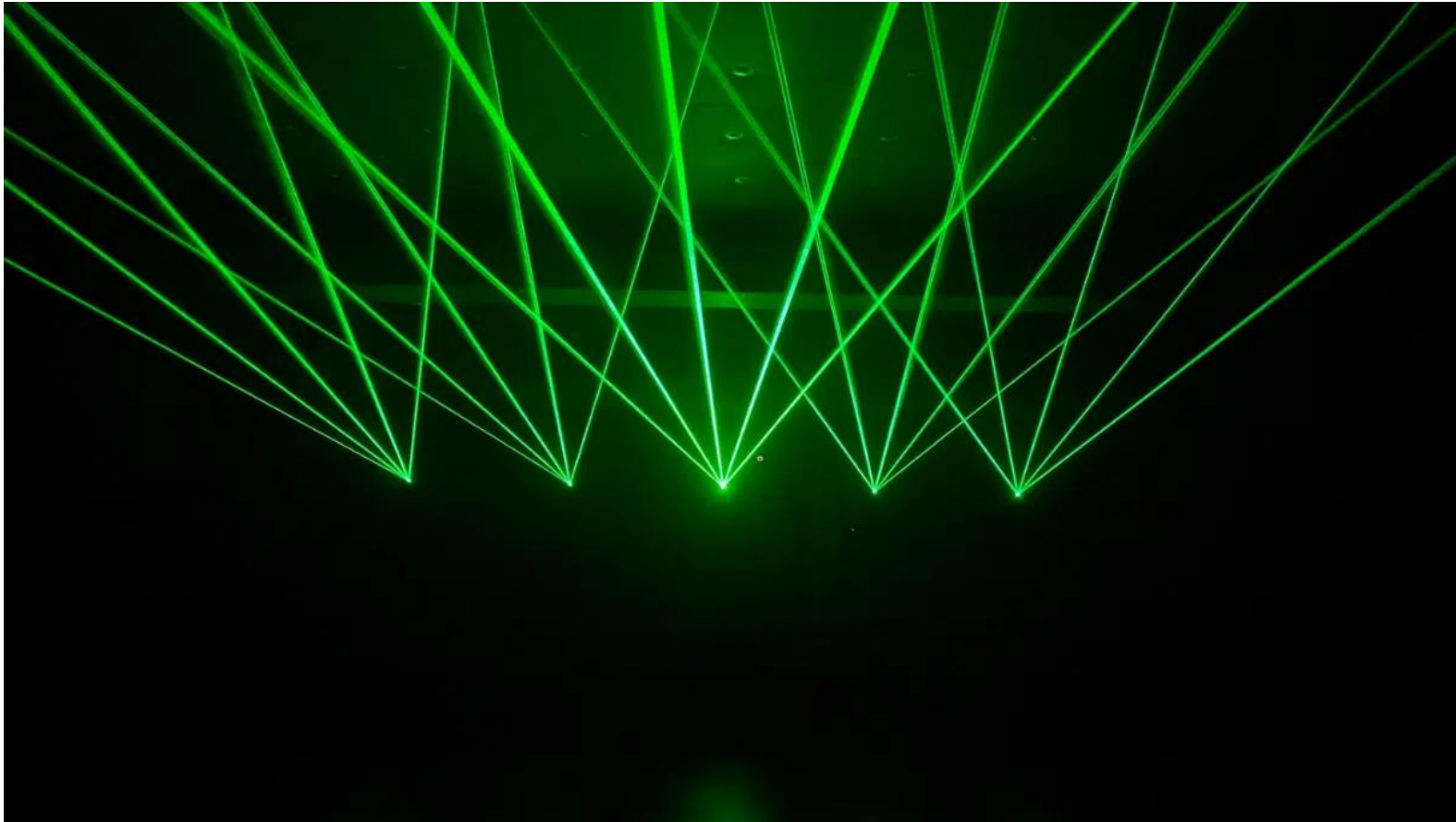
**Results:** 380 hospitalized COVID-19 patients, with a mean age of 78 (SD:9) years, underwent chest CT scan. Ground glass opacity (GGO), consolidation, and pleural effusion were the three most common CT findings, with GGO prevalence decreasing from younger to older patients and pleural effusion increasing. More severe the pneumonia more prevalent were GGO, consolidation and pleural effusion. HR of mortality was 1.94 (95%CI 1.24–3.06) for pleural effusion and 13 (95%CI 6.41–27) for cluster with a low prevalence of GGO and a high prevalence of pleural effusion ("LH"), respectively. Out of the three CT-based clusters, LH was the only independent predictor in the multivariable model.

**Conclusions:** Pleural effusion qualifies as a distinctive prognostic marker in older COVID-19 patients. Research is needed to verify whether pleural effusion reflects COVID-19 severity or a coexisting chronic condition making the patient at special risk of death.

**Trial registration:** ClinicalTrials.gov: NCT04379440

**Keywords:** SARS-CoV-2, Oldest, Old, Tomography, X-ray computed, Pleural

# Caso clinico



B-lines in disco

# Caso clinico

**E.M. 80 ANNI**

**VMDG:**

Professione: Professore medico-chirurgo in pensione.

Coniugato, abita con la moglie in un appartamento al quarto piano con ascensore. Ha 2 figli (1M, 1F), entrambi presenti nel quotidiano. Autonomo nelle ADL e IADL (non guida la macchina). Deambulazione autonoma senza ausili per piccoli tratti. Clinical Frailty Scale 4.

Completato ciclo vaccinale per SARS-CoV-2 3 dosi e antinfluenzale.



## Anamnesi Patologica Remota:

\* Sindrome di Lynch (hereditary nonpolyposis colon cancer or HNPCC) trattata chirurgicamente. Nel 1991 emicolectomia dx, 1995 emicolectomia sx, 1999 resezione trasverso, gastrectomia e DCP con residua fistola pancreatica e DM insulino-dipendente, 2008-2009 segmentectomia.

Insulino-dipendente post-chirurgico per DCP.

\* Ipertensione arteriosa in terapia con ACEI

\* Enfisema polmonare (mai fumatore)

- Ultimo ECD cardiaco del settembre 2020: AS dilatato, E/a invertito, IVS con aspetto a sperone del setto, FE 59%, non anomalie della cinesi
- Dimesso in data 18/2/2022 dalla nostra UO con **diagnosi di Settichemia da Streptococco Sanguinis in recente orchiepididimite** in paziente affetto da DM insulino-dipendente in seguito a pregressa DCP.
- Dimesso in data 17/3/2022 da UO Emodinamica con diagnosi di **Stenosi aortica severa sintomatica per dispnea da sforzo trattata mediante impianto transcateretere di bioprotesi aortica**. Albero coronarico indenne da stenosi significative.
- Ultimo ricovero c/o la nostra UO a Marzo 2022 "Scompenso cardiaco acuto e settichemia da Staphylococcus haemolyticus in paziente con recente TAVI per stenosi aortica severa.« Completata a domicilio terapia antibiotica con linezolid. Eseguita in dimissione PET riferita negativa. Da allora non più recidive di febbre. Riferita bonifica dentaria a Aprile us per cui ha assunto terapia antibiotica e colica renale circa un mese fa.

# Caso clinico

**Il paziente veniva condotto in PS in data 01.09 per febbre con brivido in assenza di sintomatologia specifica. il paziente riferisce febbre da 7 giorni, non ha assunto alcuna terapia antibiotica a domicilio.**

EO all'ingresso: Paziente vigile e orientato, Tachipnoico, Piretico. ACR tachifrequente. Sudato pallido. Addome trattabile, non dolente né dolorabile

PV: PA 180/80 mmHg, FC; 82 bpm, TC 39°C, SO2 98%  
TNF SARS-CoV-2 (01.09) non rilevato



# Esami ematici

## Esami ematici di ingresso

Emoglobina	10,6 g/dL	Potassio	3,5
Gl. Bianchi	16720	Cloro	97
Neutrofili	82%	NT-proBNP	1504
Piastrine	262.000	TnHs 0	50
Creatinina	1.08	TnHs 1 h	49
Sodio	137	AST	12
PCR	16,8	ALT	13

## Emogasanalisi di ingresso

pH	7,41
pO2	66
pCO2	33
HCO3-	25,2
BE	2.1
Lac	1,5
SpO2	94.5%

# RX torace



«Diffuso ispessimento dell'interstizio peri-vascolare in assenza di addensamenti polmonari»

## CONSULENZA INFETTIVOLOGICA:

«Attualmente febbrile da 7 giorni senza sintomatologia di richiamo, esegua emocolture ambulatoriali negative. Per persistenza della febbre accedeva quindi in DEA. Agli EE GB circa 16.000, anemia nota, PCR circa 16.

Eseguita RX torace ed ecografia addome sostanzialmente nei limiti salvo ipertrofia prostatica.

Il quadro febbrile necessita in prima istanza **esclusione pertinenza cardiologica** (endocardite) e secondariamente **studio focolaio prostatico/genitourinario** (precedente orchiepididimite qualche anno fa). Già prelevati 2 set di emocolture. Paziente emodinamicamente stabile.

## Consiglio quindi:

- prelevare emocolture se  $t > 37.5$  (2 set) - esame chimico fisico urine ed urinocoltura
- **ETE** per escludere endocardite protesica a cui associare eventualmente **PET** che potrebbe essere comunque impiegata nello studio della "FUO"
- se esclusa endocardite, **RM PELVI SENZA E CON MDC** per escludere focolaio prostatico
- esami ematici comprensivi emocromo+f, funzionalità epatorenale, PCR, coagulazione
- non introdurre terapia antibiotica salvo variazione del quadro clinico»

# In reparto

Paziente vigile, orientato S-T, collaborante, eupnoico in 1.5 lt/min (saturazione periferica 93%).

**Cuore:** ACR normofrequente toni parafonici, pause apparentemente libere.

**Torace:** RRN ridotto su tutto l'ambito con crepitii bibasali maggiori alla base destra.

**Addome:** globoso per adipe, meteorico, trattabile, non dolente né dolorabile alla palpazione superficiale e profonda, peristalsi lievemente ridotta, Blumberg negativo.

**Arti inferiori:** Lieve Succulenza arti inferiori bilaterale con cute desquamata ed iperemica. Presenza di discromie da insufficienza venosa cronica.

CV DP circa 500 cc di urine normocromiche. EON: non deficit stenici né segni di lato.

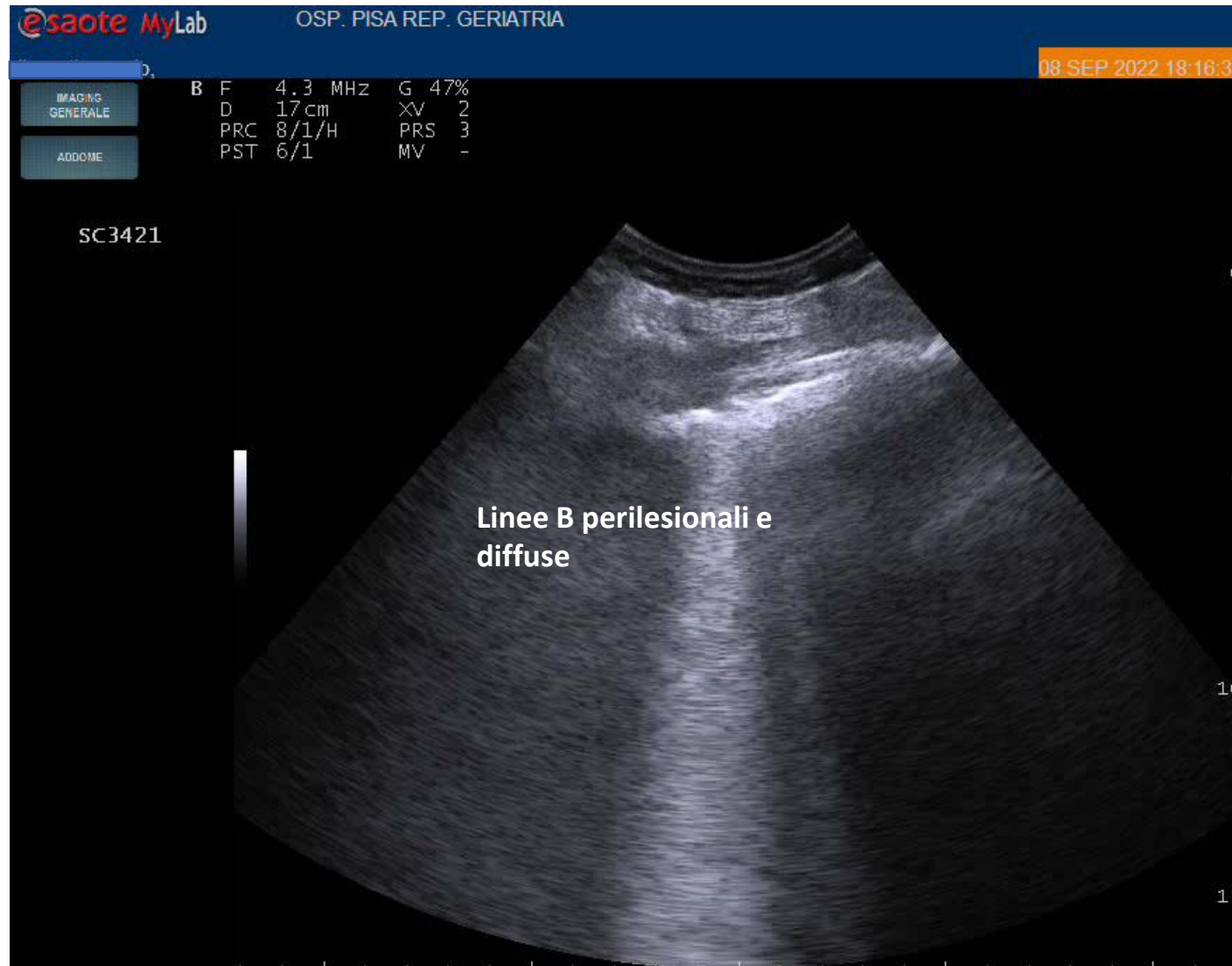


Posizione R1



# Eseguita ecografia toracica

Posizione R3



# Eseguita ecografia toracica

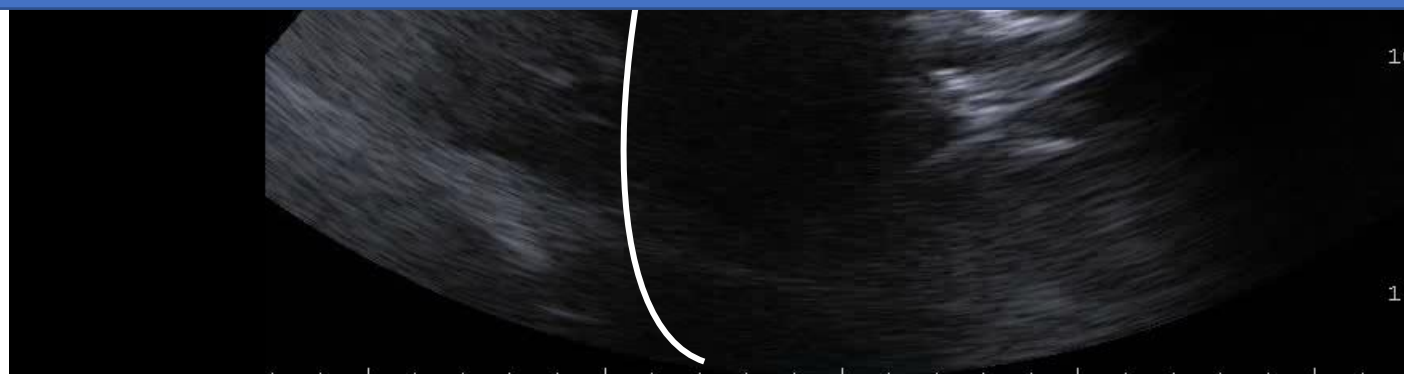
Posizione R4



**REFERTAZIONE:** Normale sliding pleurico su tutti i campi di insonazione. Linea pleurica ispessita con micronodularità. Esame eseguito su 4 quadranti.

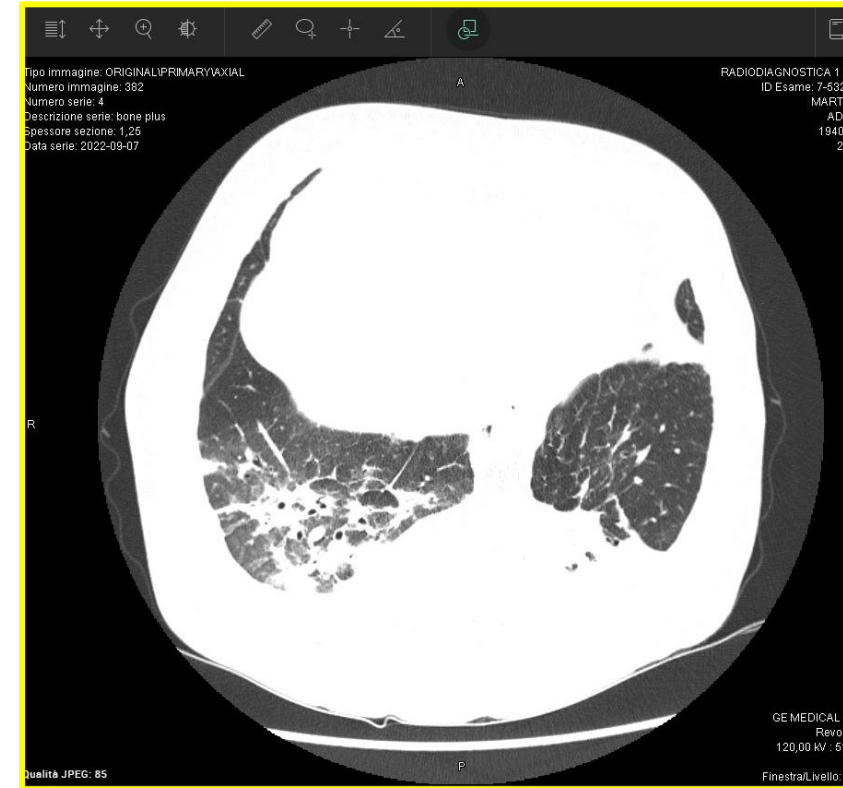
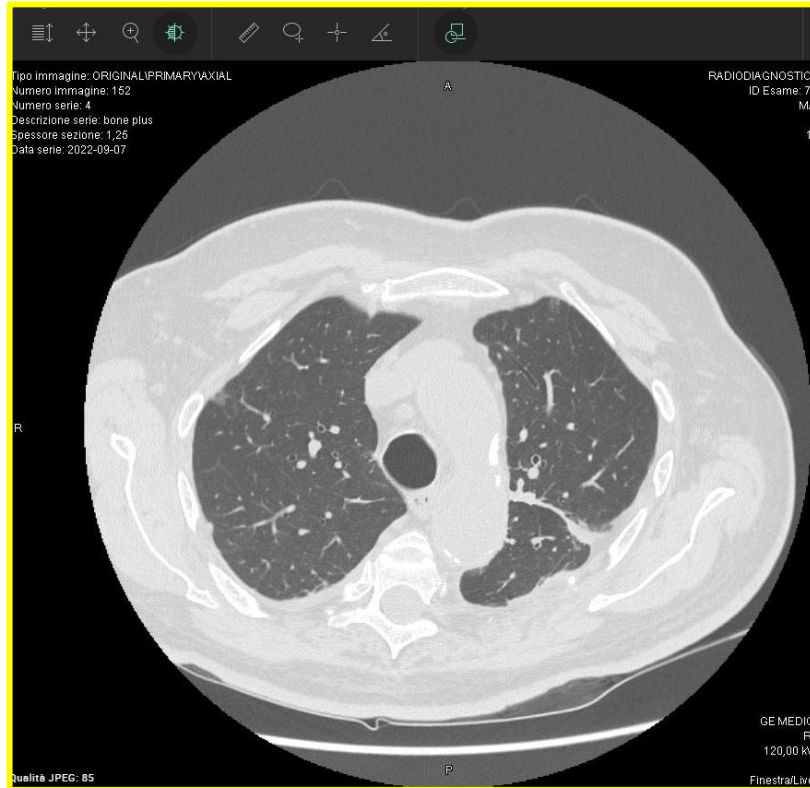
In R1 ispessimento pleurico irregolare con sparse linee B = 3 con aree di risparmio. R2 Pattern di tipo A. R3: addensamento polmonare con linee B perilesionali. R4: addensamento polmonare con broncogramma aereo dinamico, lieve versamento parapneumonico.

L1 presenza di linee B = 3, Pattern di tipo in A in L2,L3. Versamento pleurico di grado lieve con atelettasia del parenchima in L4.



# Eseguita ecografia toracica

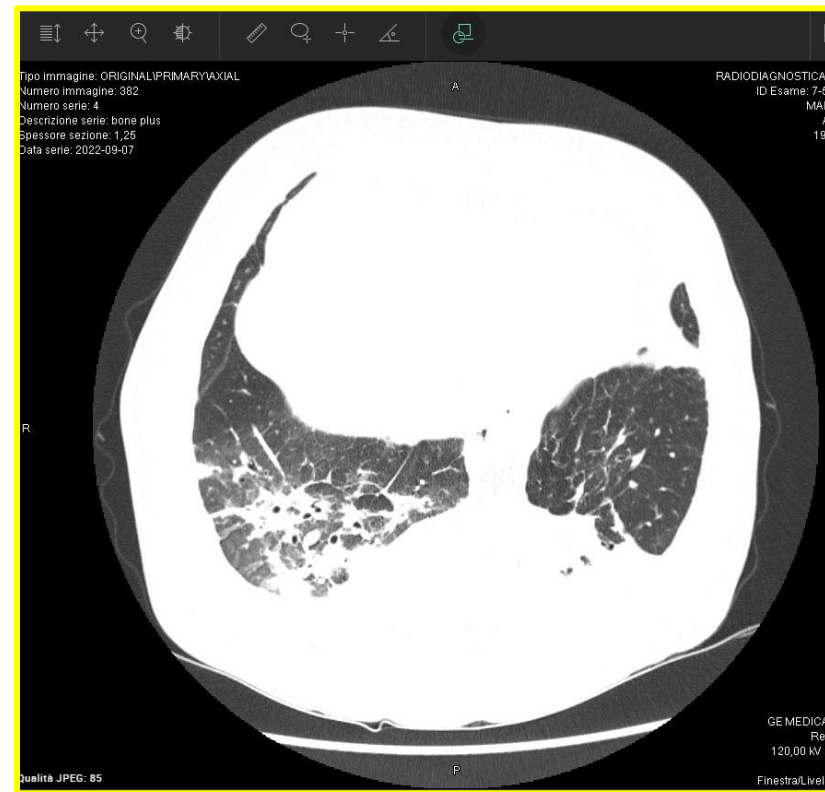
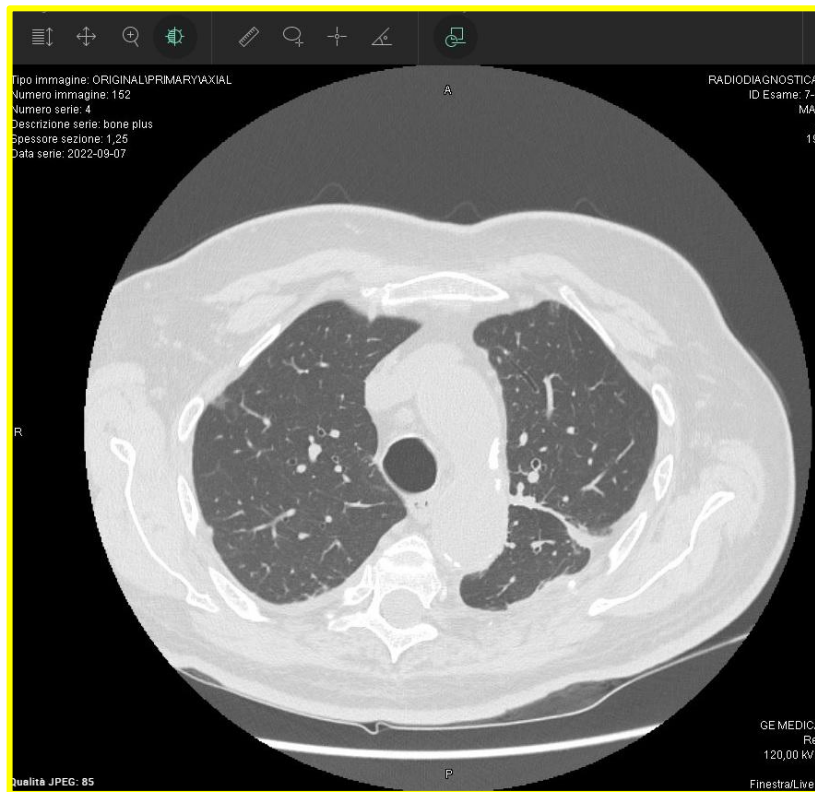
## TC Torace



- Presenza di focale area di aumentata densità parenchimale a tipo ground-glass in sede DX ed ulteriore focale area di aumentata densità parenchimale sfumatamente a carattere pseudonodulare in sede periferica mantellare nel segmento anteriore del LSDX referibile, in prima ipotesi, ad impegno di malattia flogistico-infettiva
- Presenza di addensamento parenchimale peribronchiale nel LIDX che si porta in stretta contiguità con il decorso della scissura omolaterale che appare retratta ed ispessita; concomita incremento densitometrico a tipo ground-glass del parenchima polmonare limitrofo periferico.

# Eseguita ecografia toracica

## TC Torace



Antigene urinario positivo!



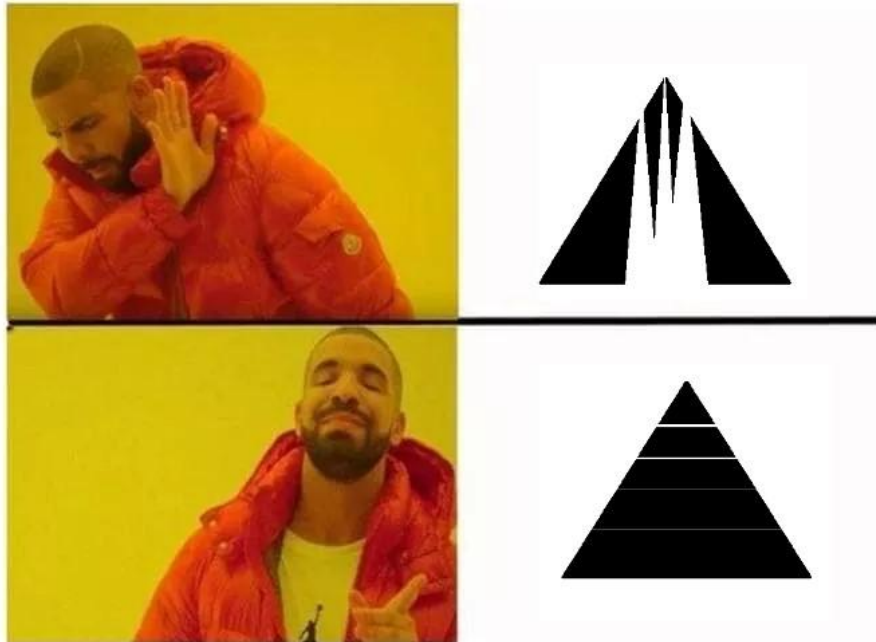
**Diagnosi di Polmonite da Legionella**

# Facile. O No?

## In sintesi:

Linee Orizzontali: **Buono**

Linee Verticali Triangolariformi: **no buono**



# Comuni errori nell'esecuzione dell'esame

## ● Original Contribution

### SOURCES OF VARIABILITY IN THE DETECTION OF B-LINES, USING LUNG ULTRASOUND

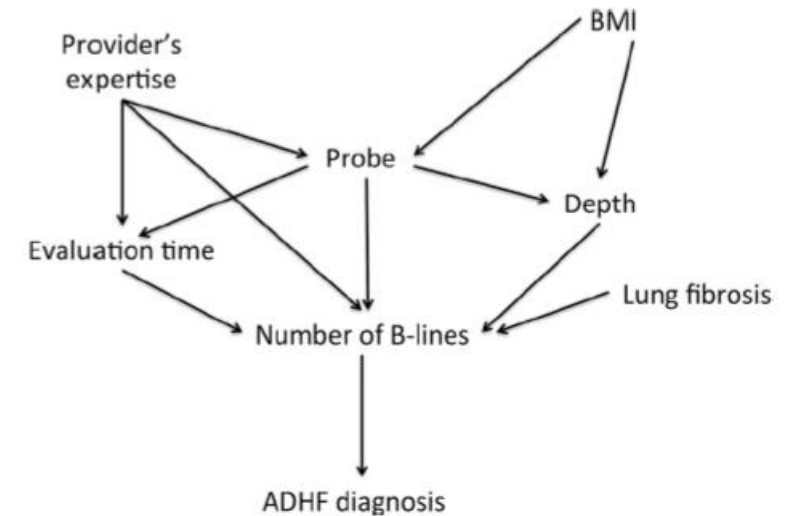
EMANUELE PIVETTA,<sup>\*,†</sup> FEDERICO BALDASSA,<sup>†,‡</sup> SERENA MASELLIS,<sup>†,‡</sup> FEDERICA BOVARO,<sup>†,§</sup>  
ENRICO LUPIA,<sup>†</sup> and MILENA M. MAULE<sup>\*</sup>

<sup>\*</sup> Cancer Epidemiology Unit and CRPT, Department of Medical Sciences, University of Turin, Turin, Italy; <sup>†</sup> Division of Emergency Medicine, Department of Medical Sciences, University of Turin, Turin, Italy; <sup>‡</sup> School of Medicine, University of Turin, Turin, Italy; and <sup>§</sup> Residency Program in Emergency Medicine, University of Turin, Turin, Italy

(Received 22 November 2017; revised 23 February 2018; in final form 27 February 2018)

## METHODS

«Two operators (F.B. and E.P.) collected LUS videos for each patient, using a 4-zones-for-hemitorax scanning protocol, as suggested by the international recommendations for POC LUS (Volpicelli et al. 2012). Each patient was evaluated with a curvilinear and a phased array probe, at scanning depths of 10 and 19 cm, and a 7-s sonographic clip was recorded. After enrollment, two copies of each clip were made, which were then cut at 2 and 4 s from the beginning of the recording (which occurred randomly in the diagnostic process) to investigate the diagnostic value of various recording lengths.»



## DISCUSSION

To our knowledge, this is the first study evaluating several sources of LUS variability, using both qualitative and quantitative approaches, including multilevel regression models, to assess their relative importance. We found that the operator's expertise, the type of probe and the clip duration affect the detection of B-lines in a cohort of dyspneic patients suspected of suffering from acute heart failure.

# Comuni errori nell'esecuzione dell'esame

## EXPERTS' OPINION

### Ten conditions where lung ultrasonography may fail: limits, pitfalls and lessons learned from a computer-aided algorithmic approach

Francesco CORRADI <sup>1,2 \*</sup>, Luigi VETRUGNO <sup>3,4</sup>, Alessandro ISIRDI <sup>1</sup>,  
Elena BIGNAMI <sup>5</sup>, Patrizia BOCCACCI <sup>6</sup>, Francesco FORFORI <sup>1</sup>

TABLE I.—*Ten conditions potentially affecting lung ultrasound reliability.*

Condition affecting LUS reliability	Cause of inaccuracy	Type of inaccuracy
Different acquisition protocols	Single frame vs. multi-frame evaluation	Over/Underestimation
Multiple scoring systems	Scores based on the number of B-lines	Over/Underestimation
	Scores based on the assessment of the screen occupied by B-lines	Over/Underestimation
	Scores based on the detection of coalescent B-lines	Overestimation
Inter- and intra-observer variability	Poor to moderate reproducibility	FP/FN
Ventilator settings	Mechanical ventilation with high PEEP	FN
Lung hyperinflation	Cannot be assessed and quantified	FN
Chronic pulmonary diseases	Asthma/COPD: peripheral bullae, hyperinflation, auto-PEEP	FN
Interstitial pulmonary fibrosis	Cannot differentiate increased lung water from increased tissue content in lung disorders	FP
Consolidations in deep parenchyma	Interposition of aerated parenchyma between pleural line and consolidations	FN
Chronic heart failure	Alveolar basal membrane thickening leads to reduced capillary filtration and increased lymphatic drainage causing higher threshold for the development of pulmonary edema despite elevated cardiac filling pressure	FN
Different types of pulmonary edema	Unable to differentiate the etiology	FP/FN

PEEP: positive end-expiratory pressure; COPD: chronic obstructive pulmonary disease; FN: false negative results; FP: false positive results

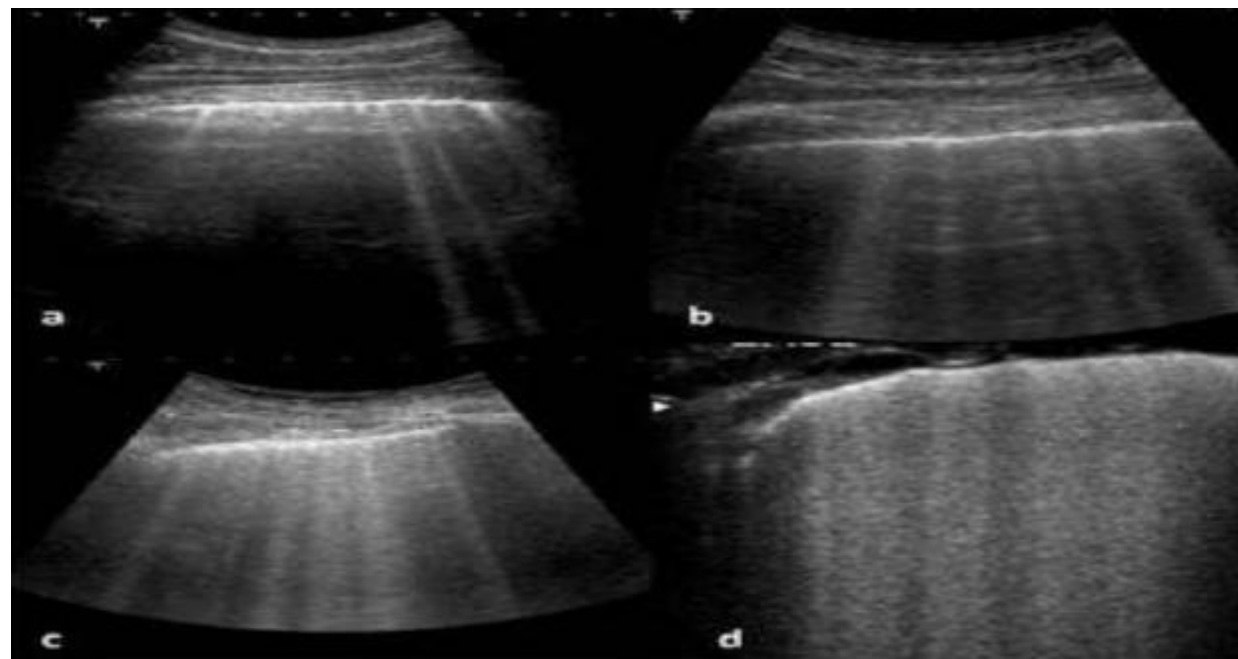
# E se coesiste una polmonite?

## Diagnostic and Prognostic Value of Lung Ultrasound B-Lines in Acute Heart Failure With Concomitant Pneumonia

Matteo Mazzola<sup>1,2</sup>, Nicola Riccardo Pugliese<sup>2</sup>, Martina Zavagli<sup>3</sup>, Nicolò De Biase<sup>2</sup>, Giulia Bandini<sup>3</sup>, Giorgia Barbarisi<sup>3</sup>, Gennaro D'Angelo<sup>1</sup>, Michela Sollazzo<sup>3</sup>, Chiara Piazzai<sup>3</sup>, Simon David<sup>4</sup>, Stefano Masi<sup>2</sup>, Alberto Moggi-Pignone<sup>3</sup> and Luna Gargani<sup>1\*</sup>

**Methods:** We enrolled 86 AHF patients with (31 pts, AHF/PNM) and without (55 pts, AHF) concomitant PNM. LUS B-lines were evaluated using a combined antero-lateral (AL) and posterior (POST) approach at admission (T0), after 24 h from T0 (T1), after 48 h from T0 (T2) and before discharge (T3). B-lines score was calculated at each time point on AL and POST chest, dividing the number of B-lines by the number of explorable scanning sites. The decongestion rate (DR) was calculated as the difference between the absolute B-lines number at discharge and admission, divided by the number of days of hospitalization. Patients were followed-up and hospital readmission for AHF was considered as adverse outcome.

**Results:** At admission, AHF/PNM patients showed no difference in AL B-lines score compared with AHF patients [AHF/PNM: 2.00 (IQR: 1.44–2.94) vs. AHF: 1.65 (IQR: 0.50–2.66),  $p = 0.0721$ ], whereas POST B-lines score was higher [AHF/PNM: 3.76 (IQR:



**Conclusions:** Assessing AL B-lines alone is adequate for diagnosis, pulmonary congestion (PC) monitoring and prognostic stratification in AHF patients, despite concomitant PNM.

# E se coesiste una polmonite?

## CLINICAL INVESTIGATION

### Pneumonia Lung Ultrasound Score (PLUS): A New Tool for Detecting Pneumonia in the Oldest Patients

Giuseppe Linsalata,\* Chukwuma Okoye,\* Rachele Antognoli,\* Daniela Guarino,\*  
Virginia Ravenna,† Eugenio Orsitto,† Valeria Calsolaro,\* and Fabio Monzani\*

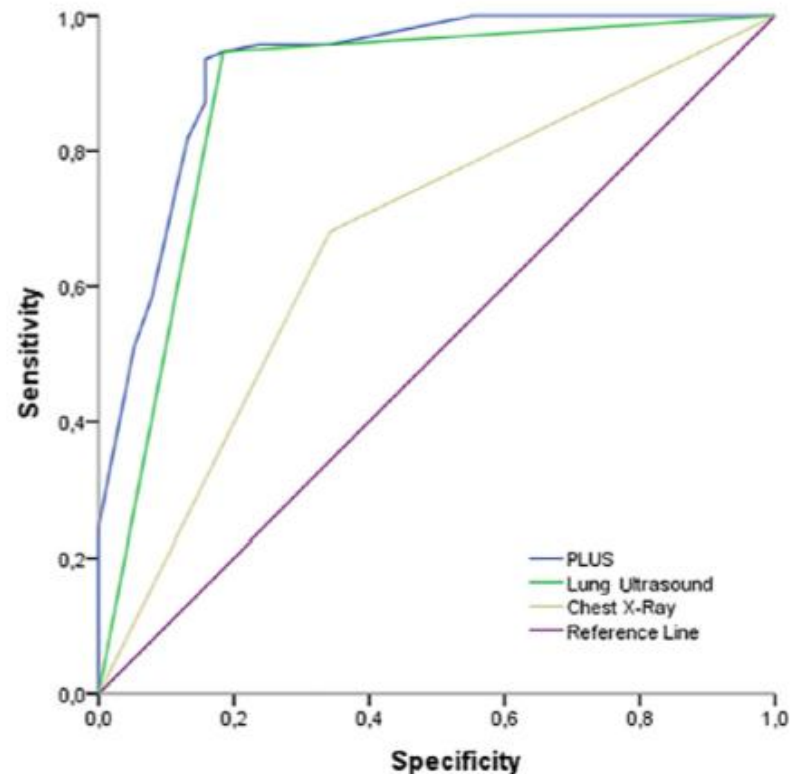


Table 2. Multivariate Backward Stepwise Analysis

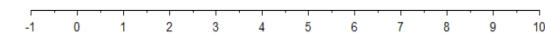
Variable	Univariate		Multivariate 1-Step 7		Multivariate 2-Step 6		Weight
	OR (95% CI)	$\beta$	OR (95% CI)	$\beta$	OR (95% CI)	$\beta$	
Age	0.82 (0.59–1.14)	-0.51					
Sex	0.76 (0.24–2.35)	-0.27					
ADL	1.43 (0.90–2.28)	-0.21					
IADL	0.94 (0.66–1.32)	-0.61					
SPMSQ	1.27 (0.97–1.66)	0.24	1.30 (1.04–1.65)	0.27			
CIRS-C	0.73 (0.19–2.68)	-0.31					
Amount of medications	0.76 (0.36–1.61)	-0.27					
ESS	3.47 (0.88–13.6)	1.25					
MNA	1.40 (0.48–4.10)	0.34					
WBC count	1 (1.01–1.01)	0					
BNP	0.99 (0.99–1)	-0.01			0.99 (0.98–1.01)	-0.001	-1
hs-CRP	1.09 (1.01–1.19)	0.10			1.11 (1.02–1.20)	0.10	1
PaO <sub>2</sub> /FIO <sub>2</sub> ratio	0.98 (0.98–0.99)	-0.11			0.98 (0.98–0.99)	-0.10	1
Pulmonary consolidation	0.27 (0.06–0.11)	3.63			0.27 (0.06–0.11)	3.63	4

Note. Multivariate 1 model included: age, sex, ADL, IADL, SPMSQ, CIRS-C, amount of medications, ESS, MNA, and history of chronic obstructive pulmonary disease. Multivariate 2 model included: age, sex, white blood cell count, BNP, hs-CRP, PaO<sub>2</sub>/FIO<sub>2</sub> ratio, and pulmonary consolidation.

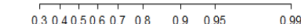
Abbreviations: ADL, Activity of Daily Living; BNP, brain natriuretic peptide; CI, confidence interval; CIRS-C, Cumulative Illness Rating Scale-Comorbidity; ESS, Exton-Smith Scale; hs-CRP, high-sensitivity C-reactive protein; IADL, Instrumental ADL; MNA, Mini Nutritional Assessment; OR, odds ratio; PaO<sub>2</sub>/FIO<sub>2</sub> ratio, partial pressure arterial oxygen/fraction of inspired oxygen ratio; SPMSQ, Short Portable Mental Status Questionnaire.

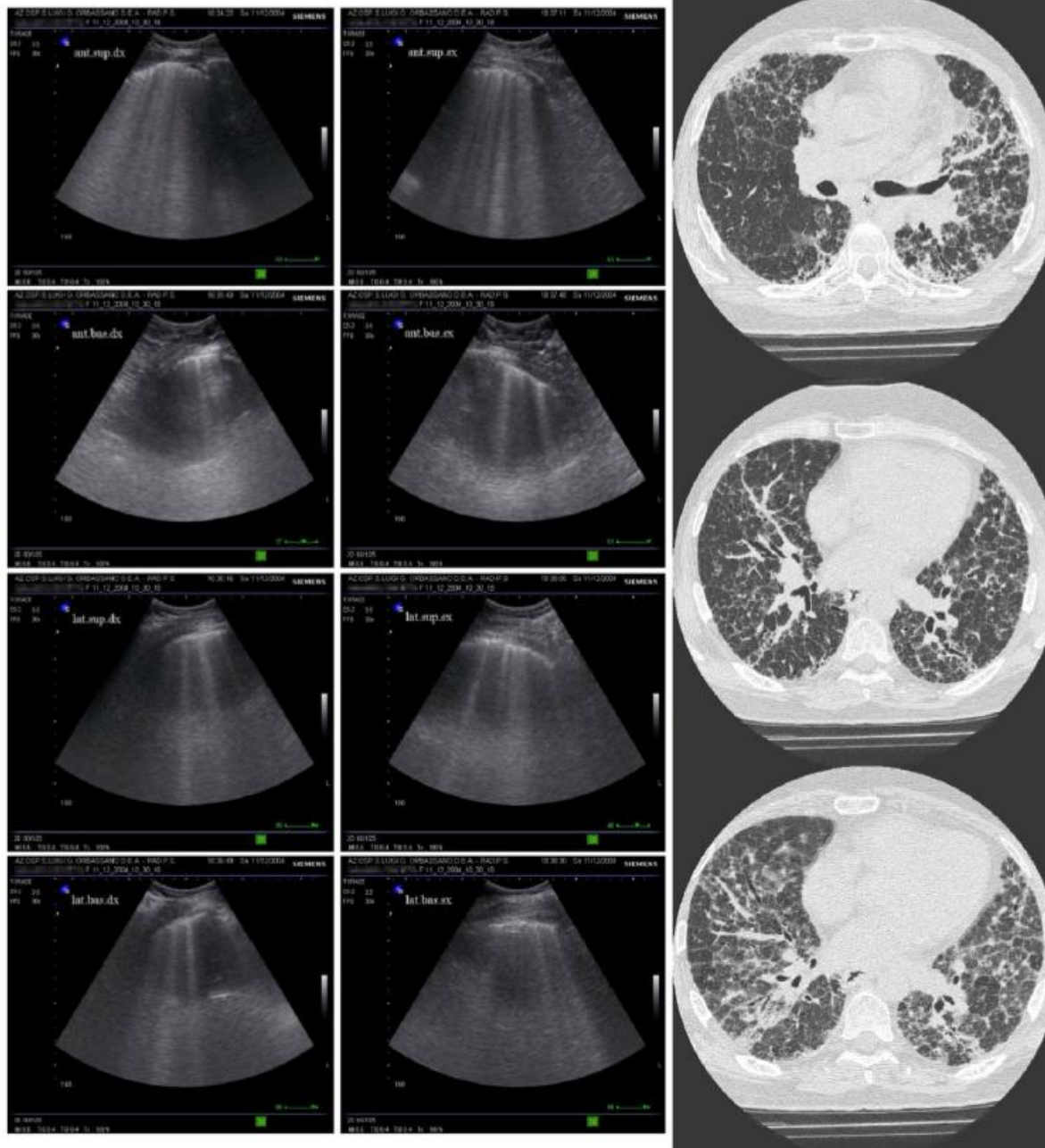


PLUS score



Likelihood of Acute Pneumonia





## FIBROSI POLMONARE:

- Differenza qualitativa delle linee B  
Appaiono più fini, discrete
- Associate a irregolarità pleuriche
- Con aree di risparmio

Fig. 5 Idiopathic pulmonary fibrosis. (Left panel) Diffuse presence of B lines at lung ultrasound, together with thickened and irregular pleural line. (Right panel) Corresponding high-resolution CT showing bilateral thickened interlobular septa reaching the whole surface of the lung, with some right-sided and peripheral honeycomb patterns.

# Caso clinico



Sacred B-lines

# Caso clinico

## G.B. Paziente anziano, 88 aa

Ex muratore. Vive con la moglie. Necessita di parziale aiuto nelle BADL (4/6), IADL (2/8).

### Anamnesi Patologica remota

Ipertensione arteriosa. Ipoacusia bilaterale, ipertrofia prostatica benigna, pregressa tromboflebite, iniziale declino cognitivo, scompenso cardiaco a FE preservata, obesità.

**In data 8 Febbraio 2020 accesso in PS per persistenza di stato confusionale associato a febbre non responsiva a terapia empirica con Ceftriaxone e trattamento psicoattivo.**

In PS eseguita: esami ematochimici (da segnalare Leucociti 11310, 82,4%, Hb 10 g/dl. PCT 1,25, PCR 6,8), BNP 230.

EGA all'ingresso (aa): pH 7,41 pO<sub>2</sub> 88 mmHg pCO<sub>2</sub> 30 mmHg SO<sub>2</sub> 97% HCO<sub>3</sub><sup>-</sup> 25,5 mMol/L BE 10 mMol/L lattato 2,2 mMol/L.

*Prima dell'invio in reparto per persistenza di stato confusionale, somministrato aloperidolo 1f + talofen 1 fl + midazolam ½ fl.*

### Anamnesi farmacologica:

Avodart 0,5 mg, Barnidipina/HCT, Ranitidina 300, Rocefin 2g (da 5 giorni), Simvastatina

# Caso clinico

G.B. Paziente anziano, 88 aa

**All' arrivo in reparto il paziente viene trovato agitato, marcatamente dispnoico.**

**SpO2 70% in aa.**

***Al torace rumore respiratorio ridotto con rumori discontinui tipo rantoli a medie bolle a partenza dai campi medi. Respiro addominale, addome trattabile non dolente né dolorabile peristalsi valida. Non edemi declivi***



# Caso clinico

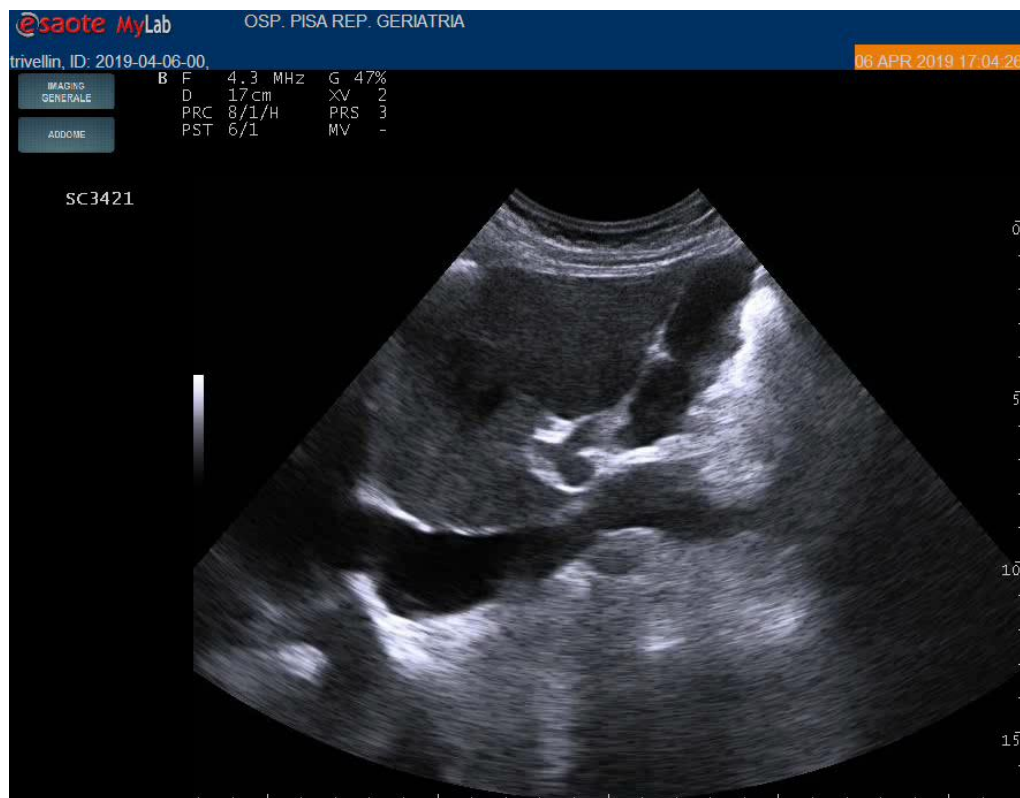


Posizione R2

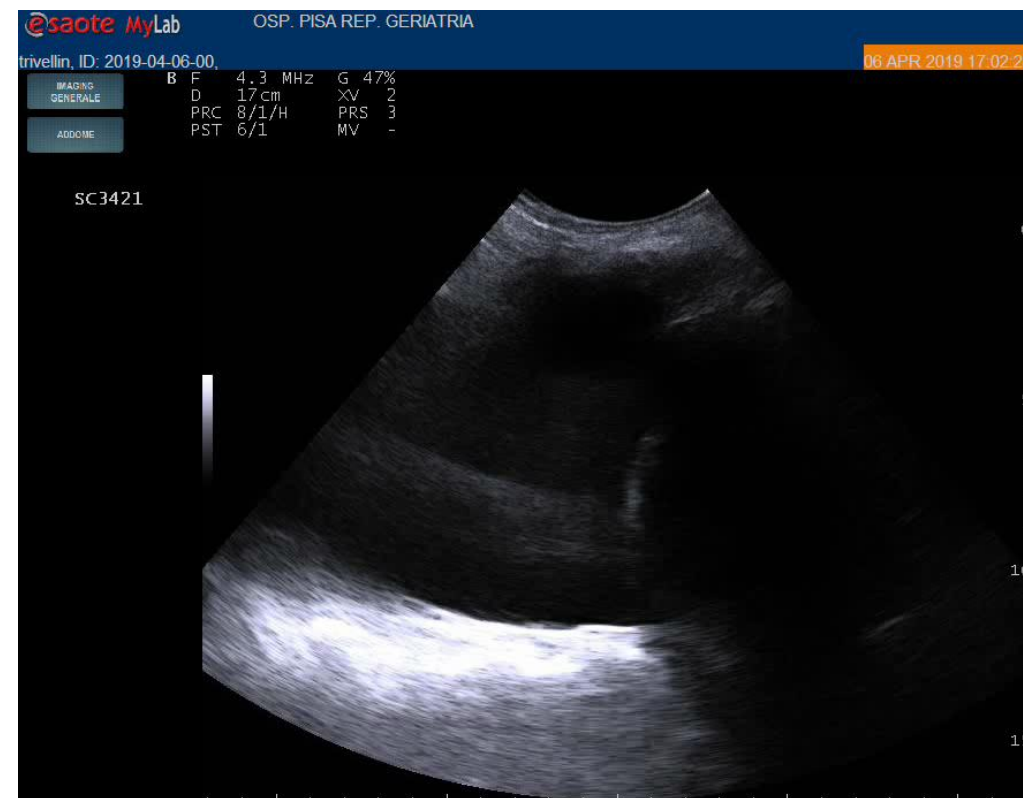


Posizione L2

# Caso clinico



Proiezione longitudinale vena cava inferiore



Posizione PLAPS dx (e sx)

# Valutazione integrata nel paziente scompensato

ESC HEART FAILURE  
ESC Heart Failure (2020)  
Published online in Wiley Online Library (wileyonlinelibrary.com) DOI: 10.1002/ehf2.12842

ORIGINAL RESEARCH ARTICLE

## Prevalence and prognostic impact of subclinical pulmonary congestion at discharge in patients with acute heart failure

Mercedes Rivas-Lasarte<sup>1</sup>, Alba Maestro<sup>1</sup>, Juan Fernández-Martínez<sup>1</sup>, Laura López-López<sup>1</sup>, Eduard Solé-González<sup>2</sup>, Miquel Vives-Borrás<sup>3</sup>, Santiago Montero<sup>3</sup>, Nuria Mesado<sup>1</sup>, Maria J. Pirla<sup>1</sup>, Sonia Mirabet<sup>1</sup>, Paula Fluvia<sup>4</sup>, Vicens Brossa<sup>1</sup>, Alessandro Sionis<sup>1</sup>, Eulàlia Roig<sup>1</sup>, Juan Cinca<sup>1</sup> and Jesús Álvarez-García<sup>1\*</sup>

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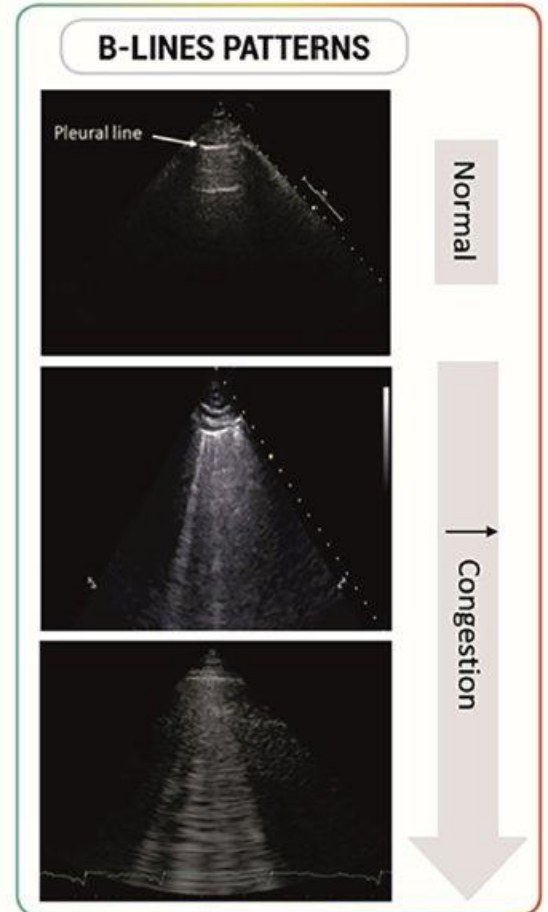
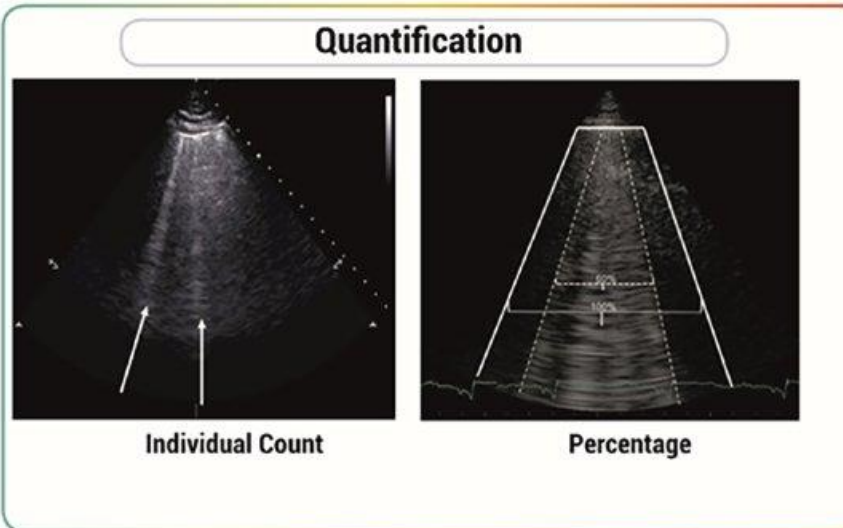
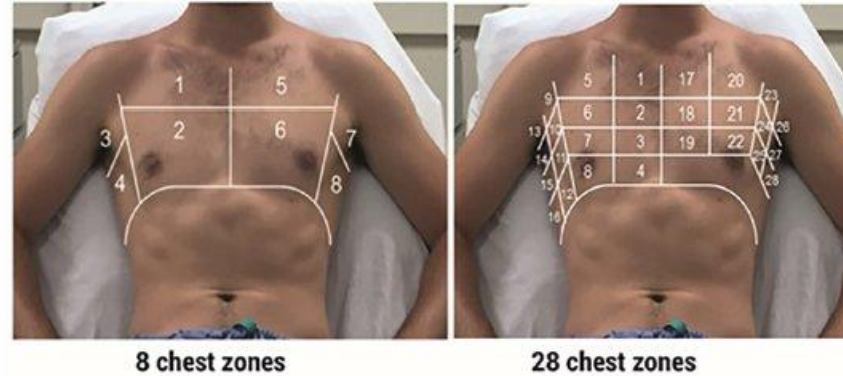
### Abstract

**Aims** Residual pulmonary congestion at hospital discharge can worsen the outcomes in patients with heart failure (HF) and can be detected by lung ultrasound (LUS). The aim of this study was to analyse the prevalence of subclinical pulmonary congestion at discharge and its impact on prognosis in patients admitted for acute HF.

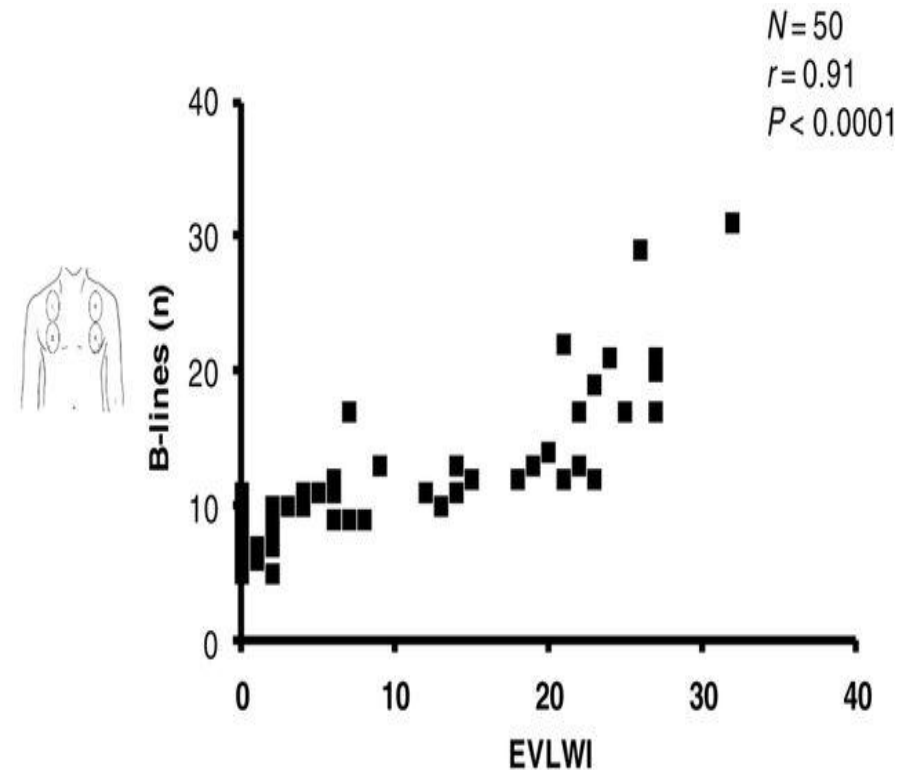
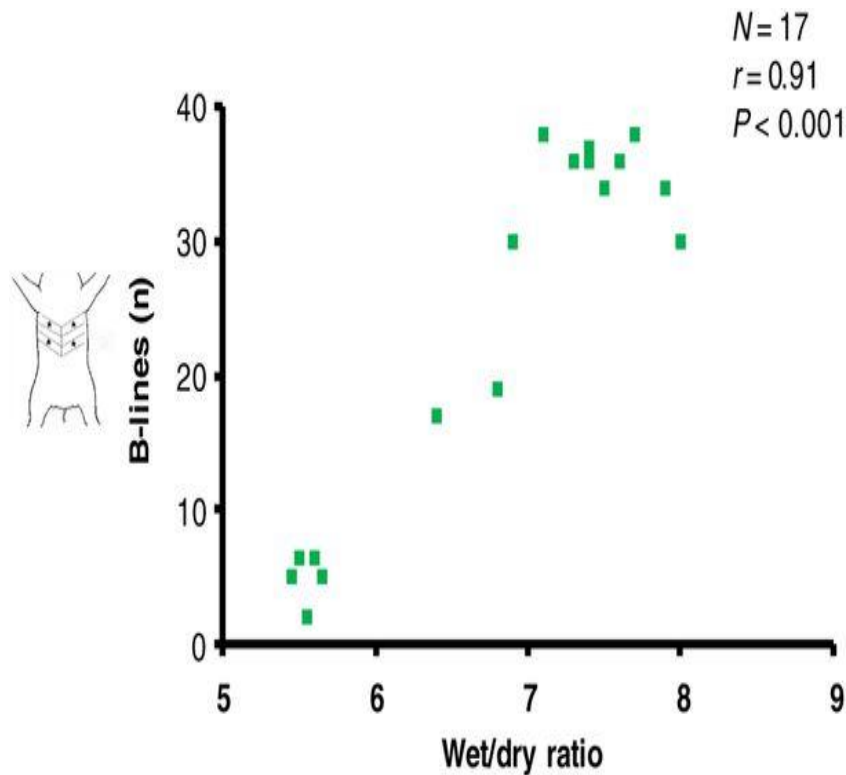
**Methods and results** This is a post-hoc analysis of the LUS-HF trial. LUS was performed by the investigators in eight chest zones with a pocket device. Physical exam was subsequently performed by the treating physicians. Primary outcome was a combined endpoint of rehospitalization, unexpected visit for HF worsening or death at 6-month follow-up. Subclinical pulmonary congestion at discharge was defined as the presence of  $\geq 5$  B-lines in LUS in absence of rales in the auscultation employing the area under the ROC curve. At discharge, 100 patients (81%) did not show clinical signs of pulmonary congestion. Of these, 41 had  $\geq 5$  B-lines. Independent factors related with the presence of subclinical pulmonary congestion were anaemia, higher New York Heart Association (NYHA) class, and N terminal pro brain natriuretic peptide (NT-proBNP). After adjusting by propensity score analysis including age, renal insufficiency, atrial fibrillation, NYHA class, NT-proBNP levels, clinical congestion, and the trial intervention, the presence of subclinical pulmonary congestion at discharge was a risk factor for the occurrence of the primary outcome (hazard ratio 2.63; 95% confidence interval: 1.08–6.41;  $P = 0.033$ ).

**Conclusions** Up to 40% of patients considered 'dry' according to pulmonary auscultation presents subclinical congestion at hospital discharge that can be detected by LUS and implies a worse prognosis at 6-month follow-up. Comorbidities, high values of natriuretic peptides, and higher NYHA class are the factors related with its presence.

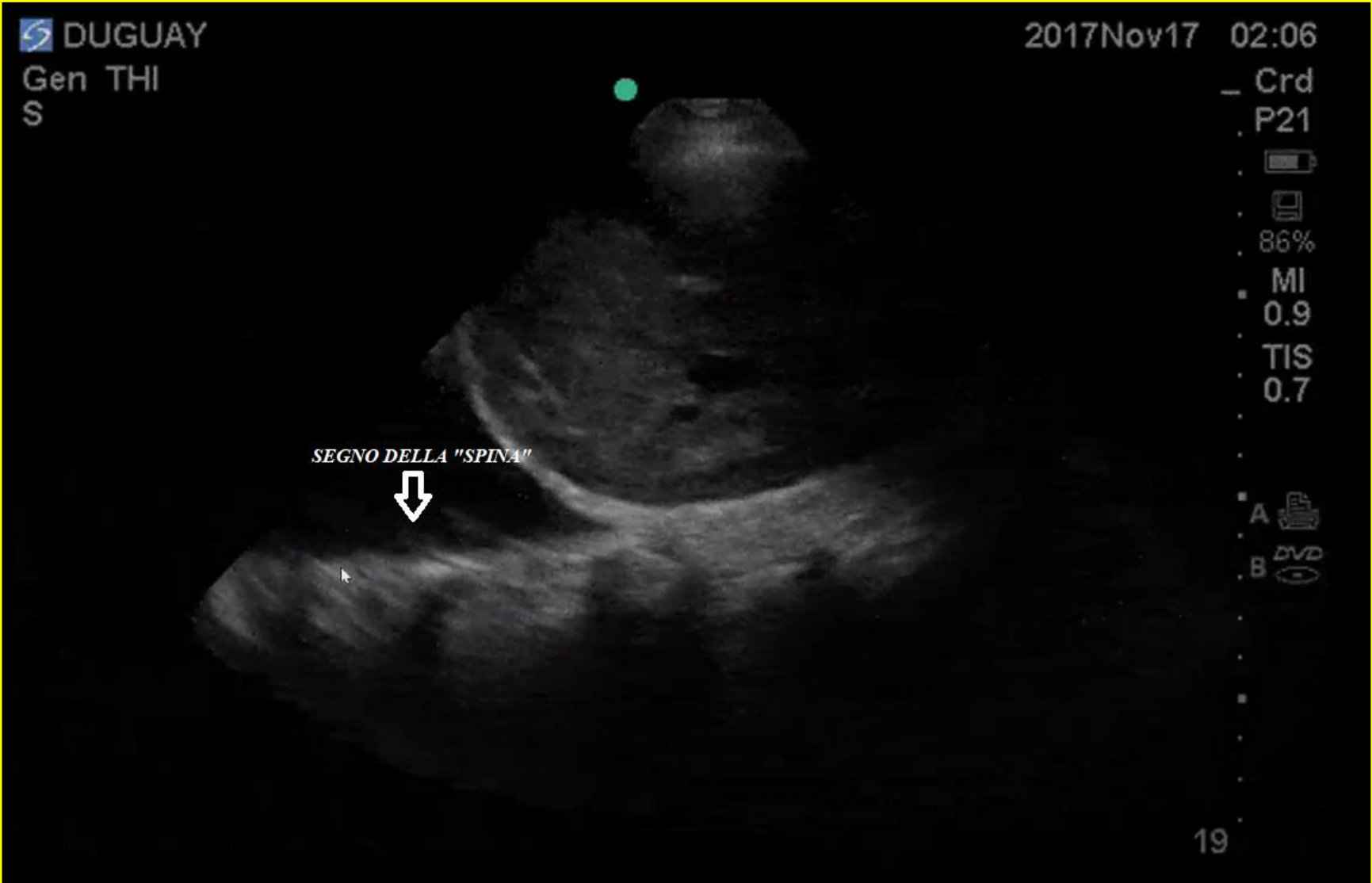
## LUNG ULTRASOUND



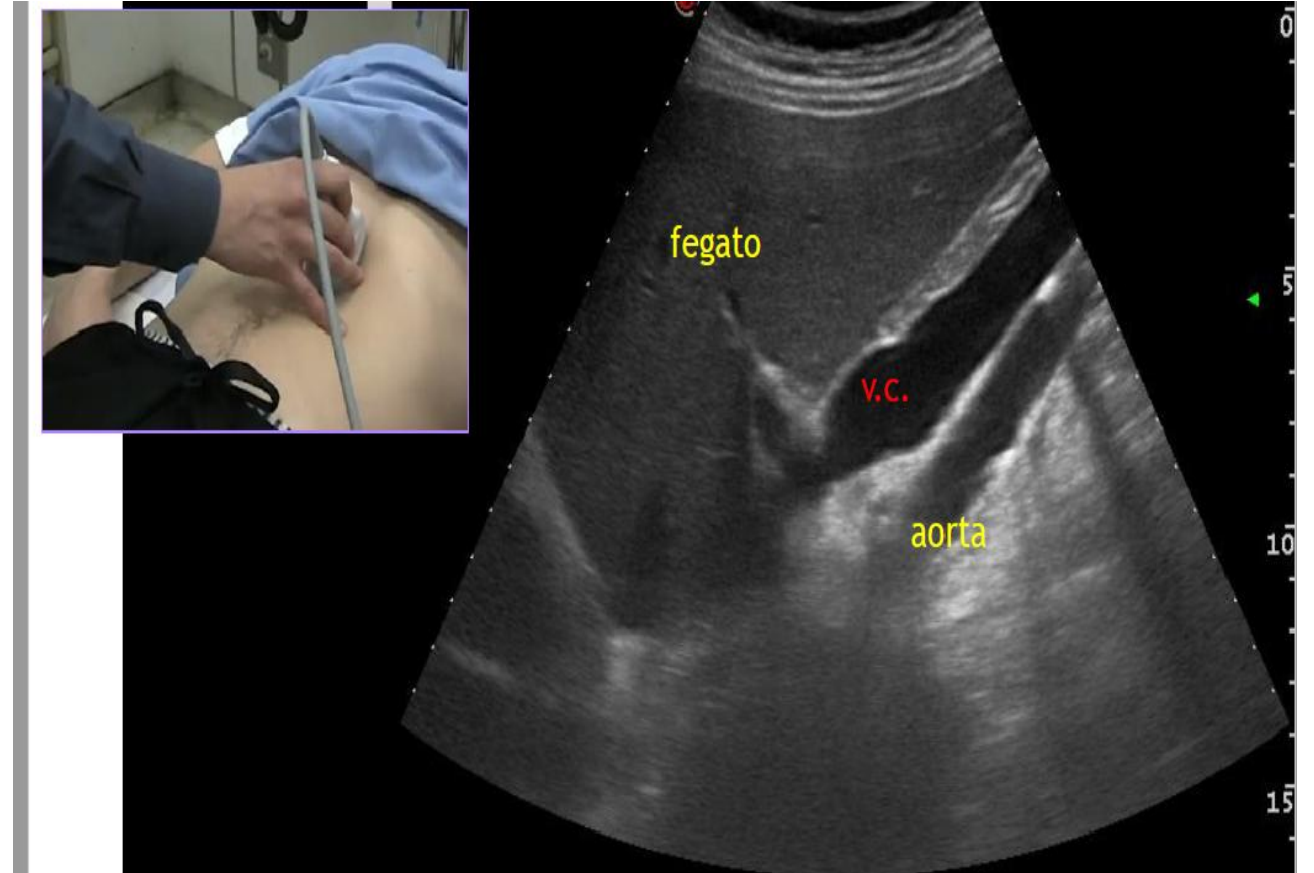
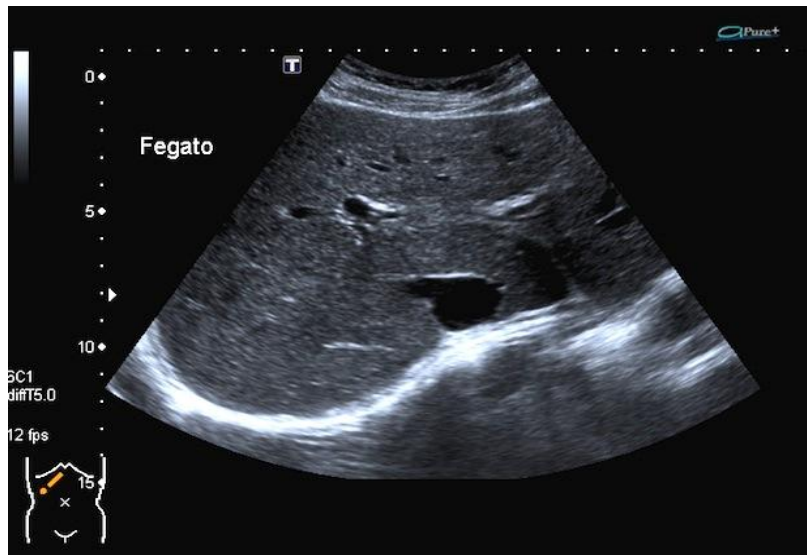
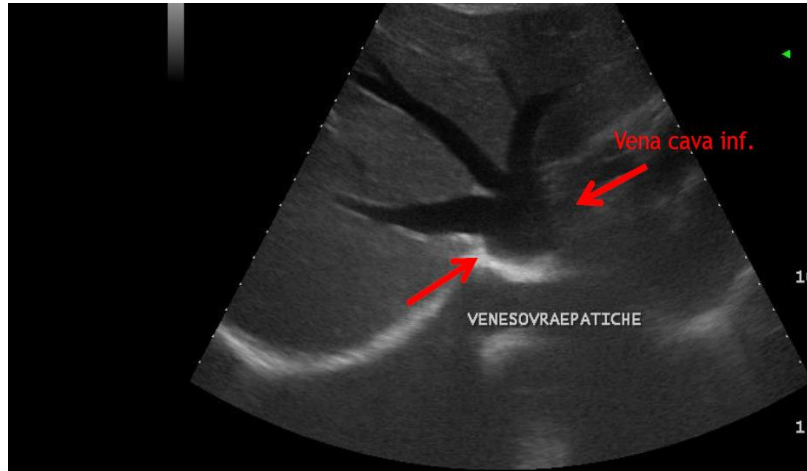
# Valutazione integrata nel paziente scompensato



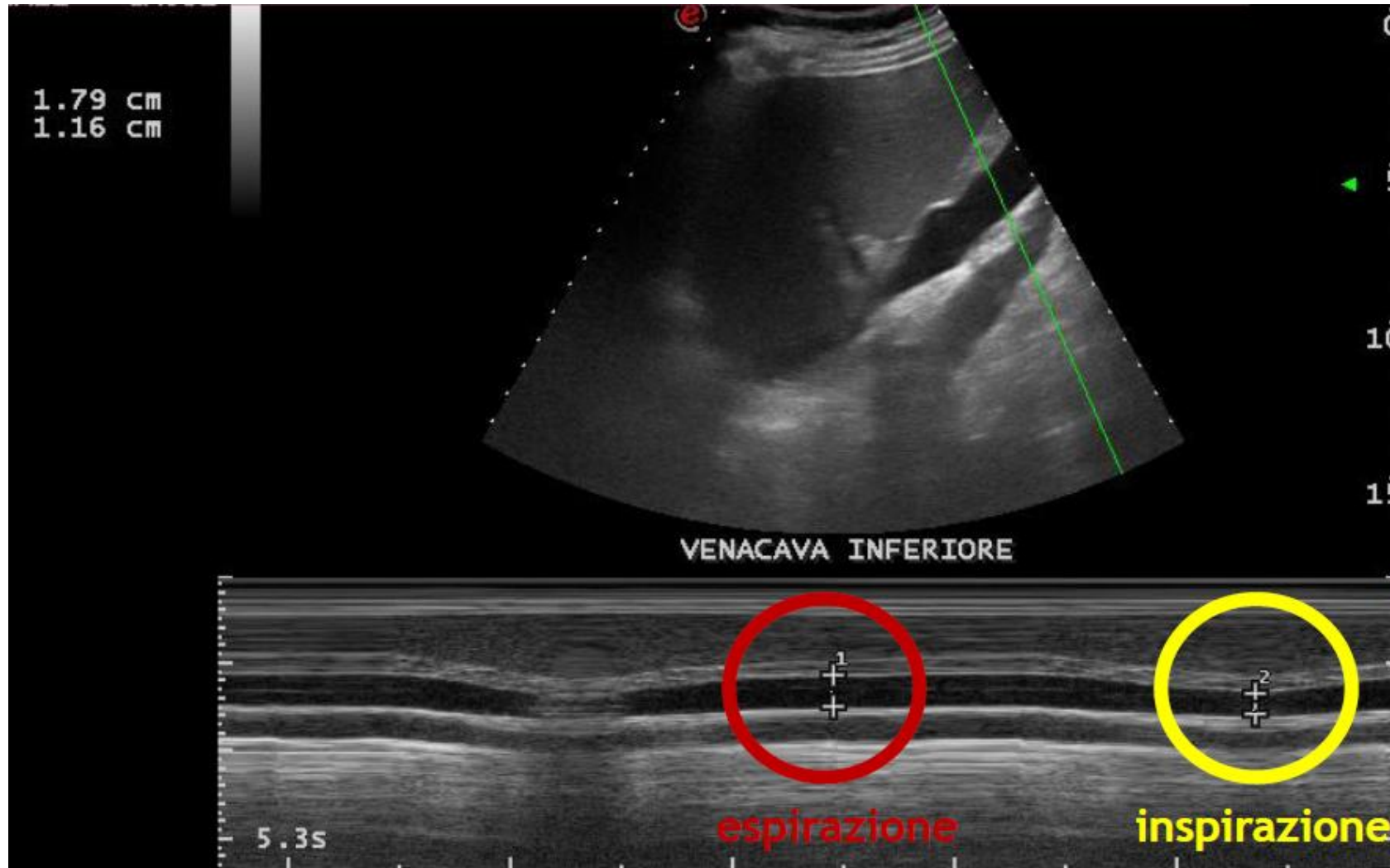
# Versamento pleurico



# Valutazione vena cava











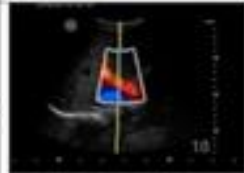



# Valutazione vena cava



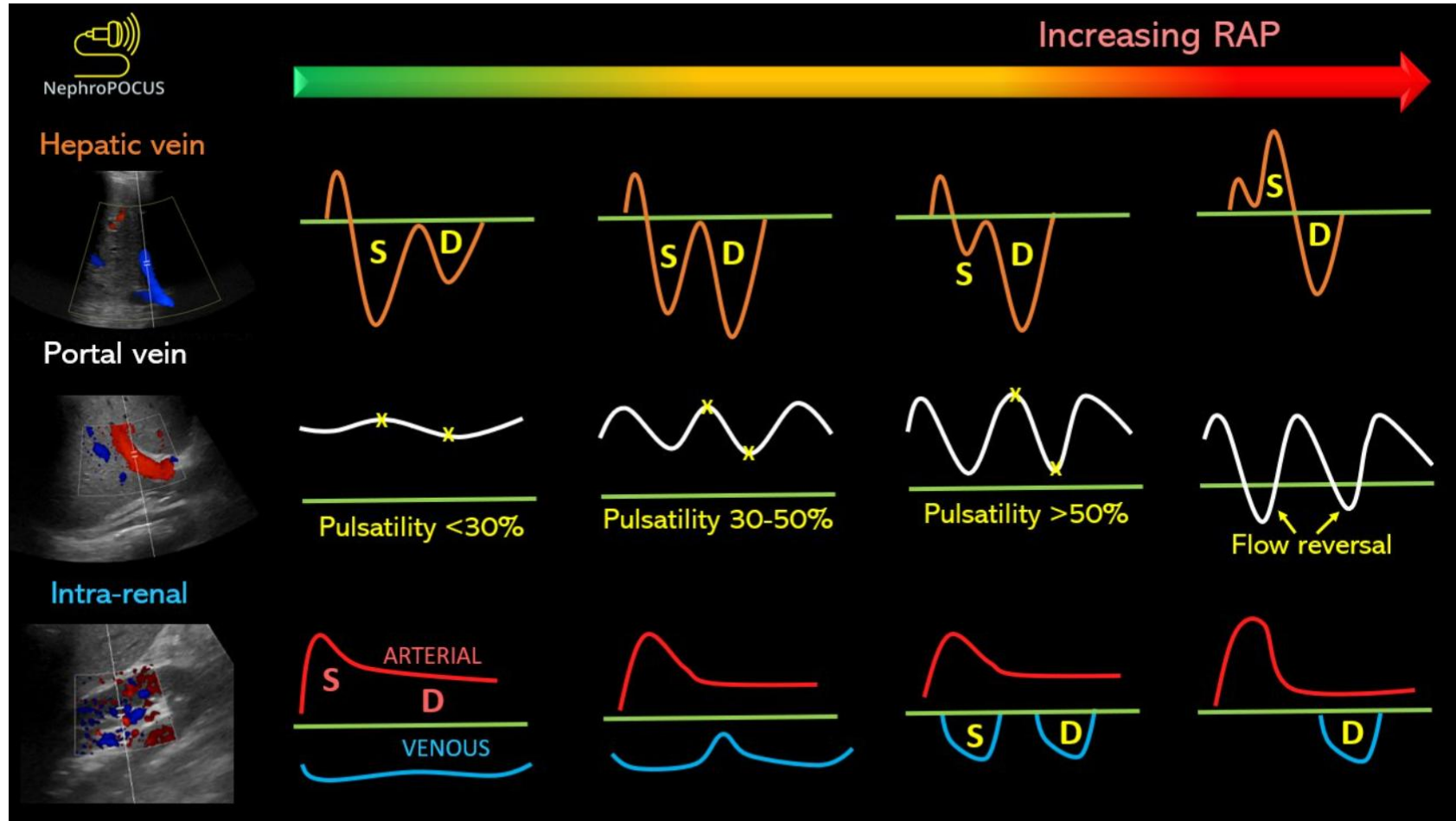
# Valutazione vena cava: caso clinico

## VExUS Image Acquisition

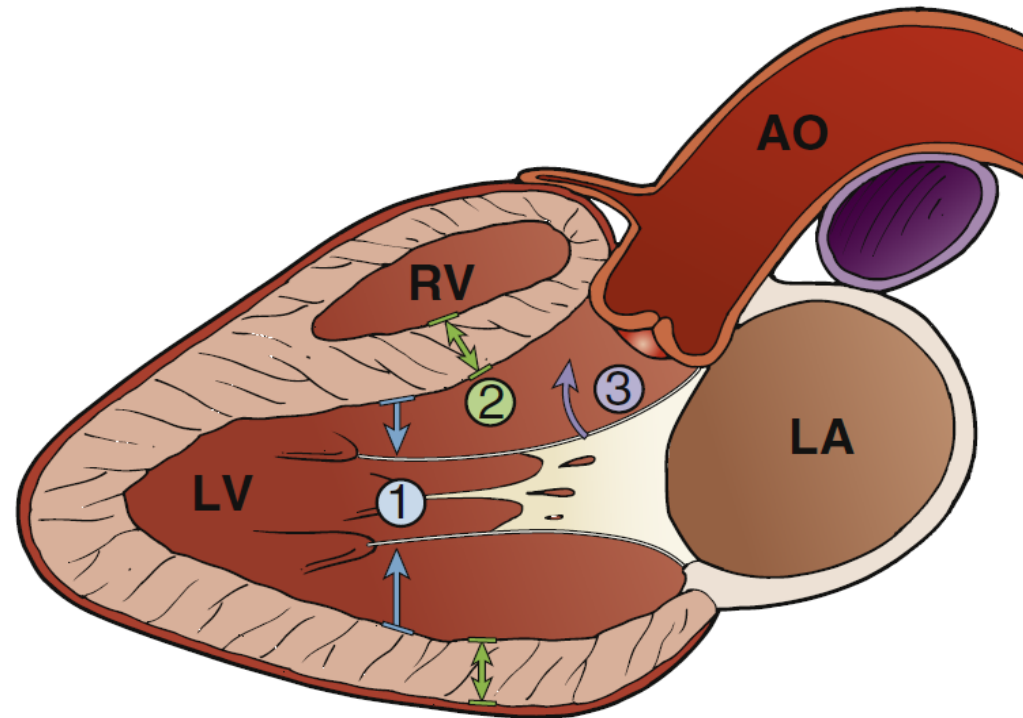


View	Scanning Technique/Tips	Anatomic Diagram	Sample Ultrasound Image
IVC (B-Mode)	<p>Place the probe longitudinally slightly to the right of the subphoid region. The diameter of the IVC should be measured approximately 2-3 cm from the junction of the IVC and right atrium.</p> <p>Tip: Can begin initially with transverse subphoid (saxic) view with right atrium centered before rotating 90 degrees to obtain IVC.</p>  <p>[Image sourced from (55)]</p>	 <p>Liver: Caudate lobe(C), Portal vein Umbilical porton, IJ, Inferior vena cava, IVC, Pancreas, Pn, Stomach, St, Heart, Hn</p> <p>[Image sourced from (55)]</p>	 <p>(S. Chen)</p>
Hepatic Vein	<p>Place the probe along the right sub-costal margin and continue fanning through the liver until hepatic veins visible. Any hepatic vein can be used for doppler gating.</p> <p>Proceed with colour flow doppler to ensure that flow direction is BLUE before proceeding with pulse wave doppler.</p> <p>Tip: The right hepatic vein may often not demonstrate doppler flow since it can be perpendicular to probe, which will require adjustments with probe positioning</p>  <p>[Image sourced from (55)]</p>	 <p>Liver: Right portal vein, (PS), Right hepatic vein, RHV, Middle hepatic vein, MHV, Inferior vena cava, IVC</p> <p>[Image sourced from (55)]</p>	 <p>(S. Chen) Note: colour had been turned off during this screen-capture, the vein should be BLUE (flow away from probe)</p>
Hepatic Portal Vein	<p>Place the probe on the right and continue scanning within each intercostal region fanning to best visualize the portal veins.</p> <p>Proceed with colour flow doppler to ensure that flow direction is RED before proceeding with pulse wave doppler.</p> <p>Tip: The portal veins are distinguished from hepatic veins by heterogeneous (bright) tissue surrounding the vessel.</p>  <p>[Image sourced from (55)]</p>	 <p>Liver: Right portal vein, (PS), (PH), Right hepatic vein, RHV, Middle hepatic vein, MHV</p>	 <p>(S. Chen)</p>
Intrarenal Vein	<p>Begin at the posterior axillary line at the level of the subphoid. Visualize the long axis view of the right kidney in its right dorsal aspect.</p> <p>Proceed with colour flow doppler to ensure that there is some venous intrarenal blood flow being picked up by the transducer (you are looking for BLUE).</p> <p>Tip: These parenchymal vessels are SMALL and difficult to acquire. You may need to experiment with patient positioning (rolling to lateral decubitus or prone) depending on patient body habitus.</p>  <p>[Image sourced from (55)]</p>	 <p>Right kidney, R.K</p> <p>[Image sourced from (55)]</p>	 <p>(S. Chen)</p>

# Valutazione vena cava: caso clinico

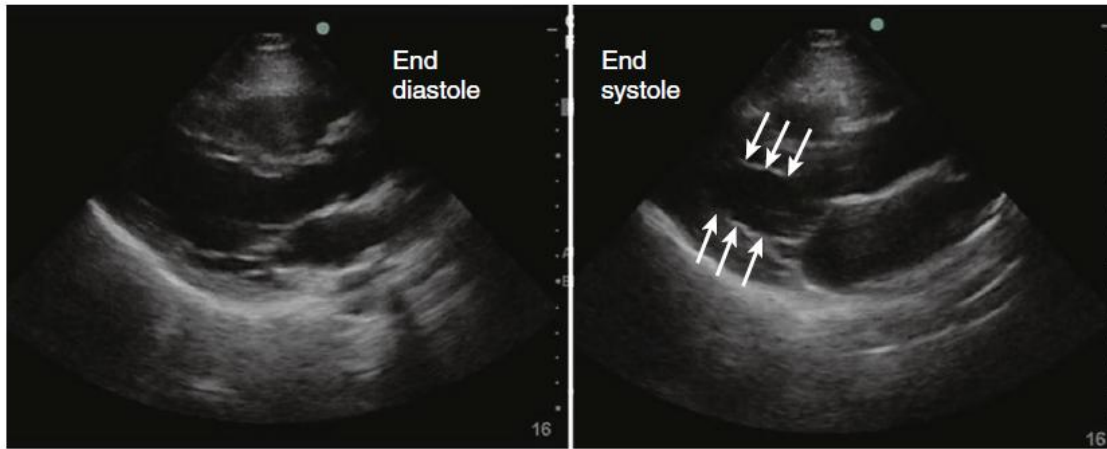


# Cenni di FOCUS

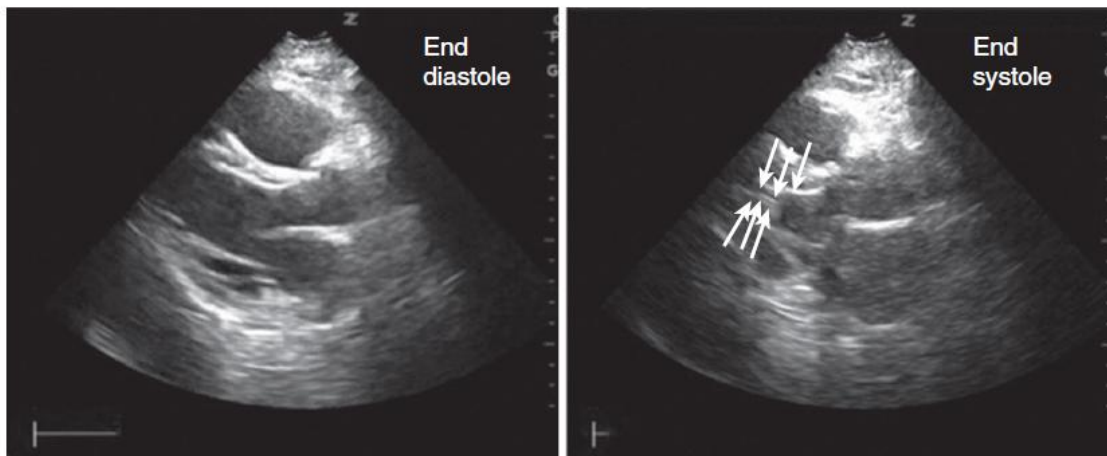


- 1 - Endocardial excursion
- 2 - Myocardial thickening
- 3 - Septal motion of anterior leaflet of mitral valve

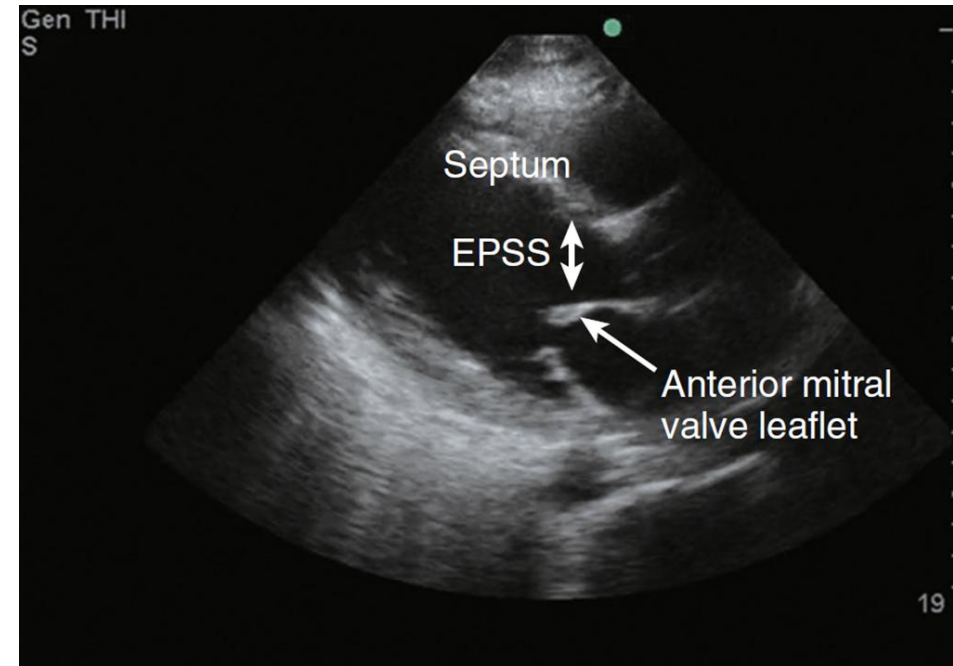
# Cenni di FOCUS



**Figure 14.3** Parasternal long-axis view showing normal excursion of the left ventricular (LV) walls during systole. Endocardial resolution is excellent in this view, and thickening and excursion of LV walls can easily be appreciated.



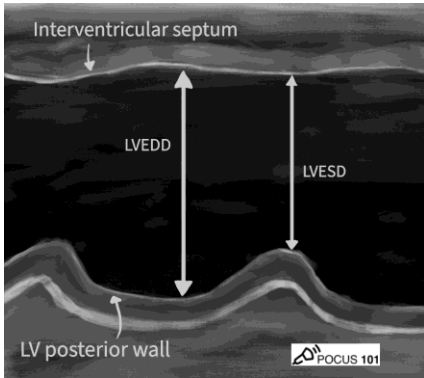
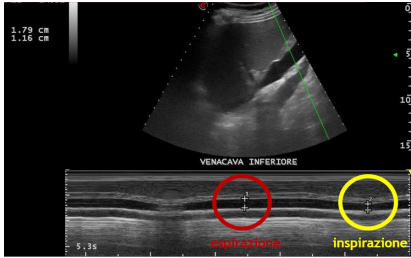
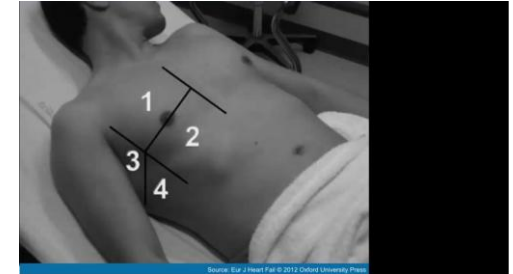
**Figure 14.4** Parasternal long-axis view showing increased myocardial thickening and endocardial excursion during systole with obliteration of the left ventricular cavity.



**PAZIENTE RICOVERATO PER SCOMPENSO CARDIACO O CON  
 COMPLICANZA DI SCOMPENSO**

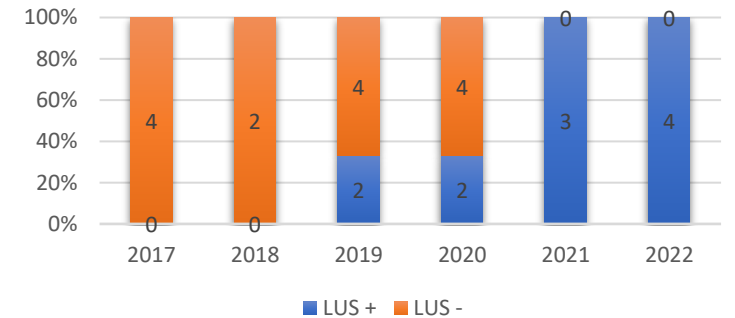
**VALUTAZIONE CARDIO-GERIATRICA**

- CONTEGGIO LINEE B LUS 8 QUADRANTI
  - VALUTAZIONE VENA CAVA
    - FOCUS con EF
- VALUTAZIONE x EVTL ECOCARDIOGRAMMA DEDICATO IN AMBULATORIO



**TIMING PRIMA VISITA  
 AMBULATORIALE**

Percentuale di specializzandi con LUS eseguite > 60



FA TACHIFREQUENTE

CFS 7-8 + BNP ↑

CFS 4-6 + ↑ BNP

CFS 4-6 + ↓ BNP

CFS 2-3 + ↑ BNP

CFS 2-3 + ↓ BNP

CFS 7-8 + ↓ BNP

7 DAYS

10-14 DAYS

10-14 DAYS

> 21 DAYS

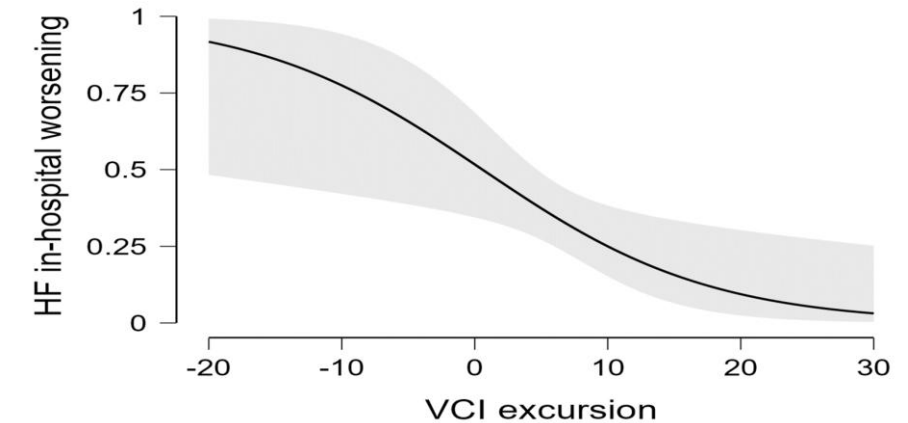
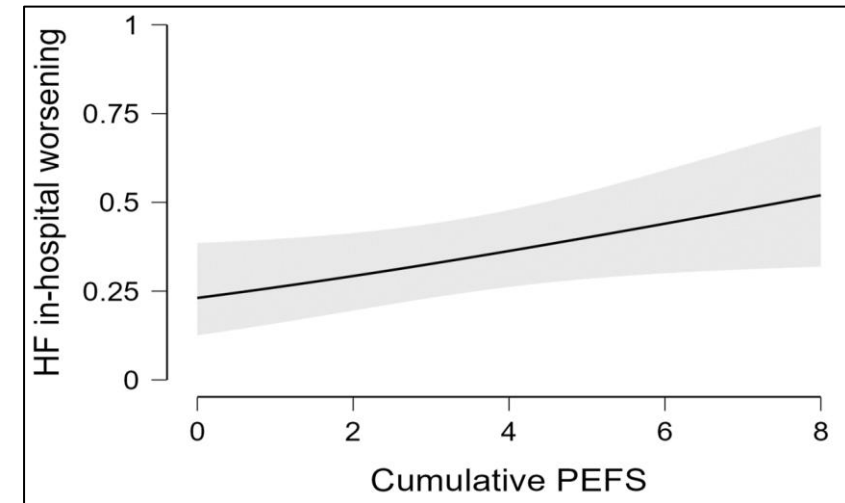
TELEVISITA

# Utilità della POCUS durante il ricovero per SC

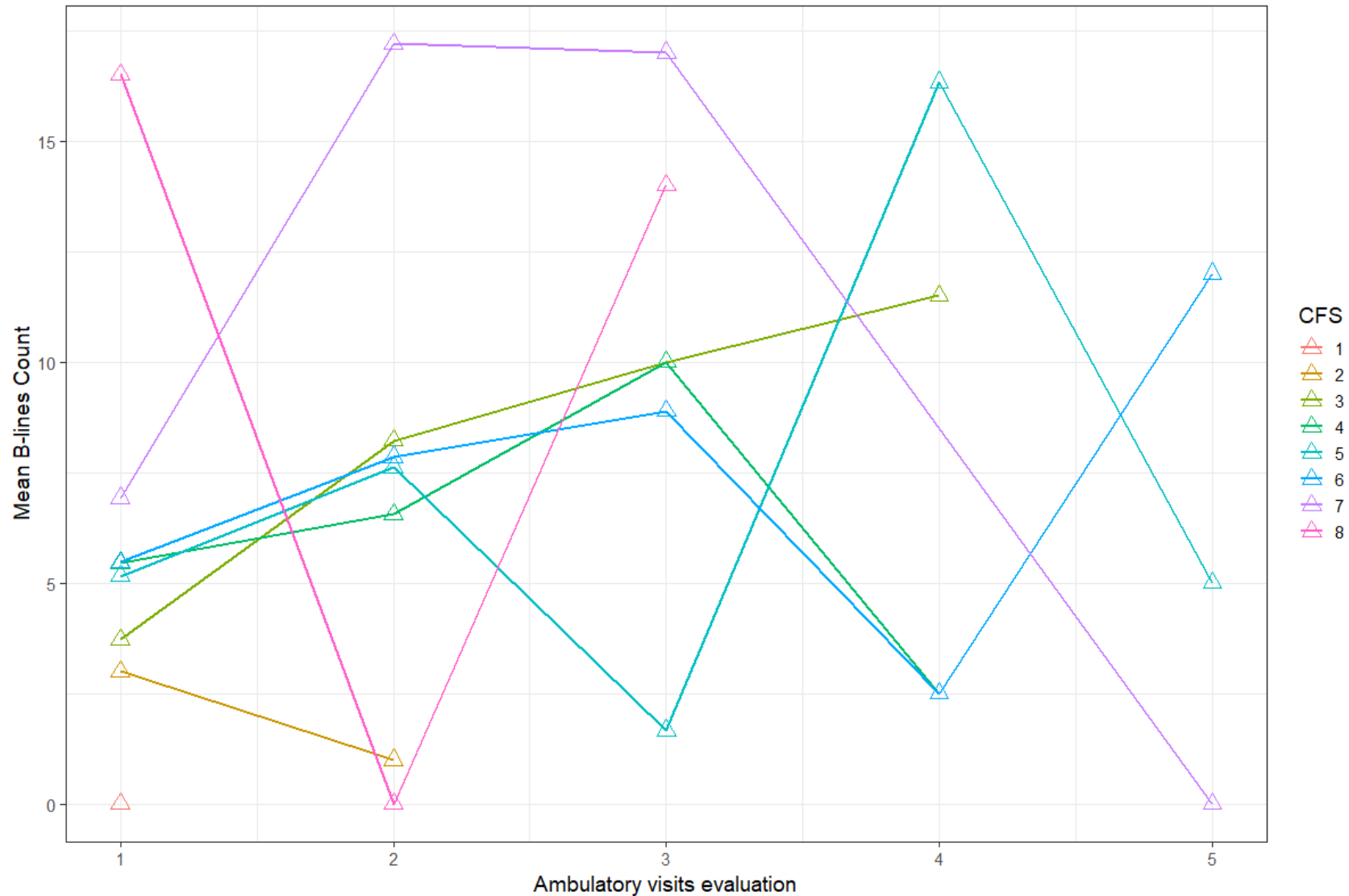
Article

## Predicting In-Hospital Acute Heart Failure Worsening in the Oldest Old: Insights from Point-of-Care Ultrasound

Tessa Mazzarone <sup>1</sup>, Virginia Morelli <sup>1</sup>, Andrea Giusti <sup>1</sup>, Maria Giovanna Bianco <sup>1</sup>, Lorenzo Maccioni <sup>1</sup>, Cristina Cargioli <sup>1</sup>, Daniela Guarino <sup>1</sup>, Agostino Virdis <sup>1</sup> and Chukwuma Okoye <sup>1,2,3,\*</sup>

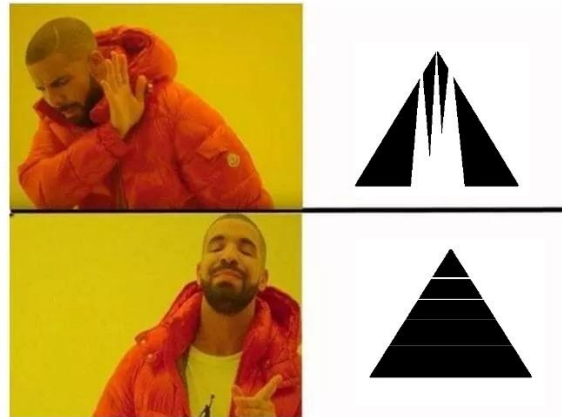


# Utilità della POCUS dopo il ricovero per SC



# Conclusioni

- Le Linee B sono il segno cardine, ma non l'unico di interstiziopatia polmonare
- Rimangono comunque un Segno ASPECIFICO riconducibile a diverse condizioni cliniche
- Tuttavia vi sono alterazioni tipiche a seconda del tipo di interstiziopatia che possono aiutare nella diagnosi differenziale
- La corretta definizione della interstiziopatia congestizia da HF necessita una valutazione clinica ma anche ultrasonografica integrata
- Lo studio delle linee B può avere un significato clinico in termini di follow-up





CORSO PRE-CONGRESSUALE DI  
ECOGRAFIA TORACICA  
NELL'ANZIANO

**gret**  
Gruppo di Ricerca  
Ecografia Toracica nell'Anziano **SIGG**

70<sup>o</sup> CONGRESSO  
NAZIONALE

**SIGG**

LIBERI E LONGEVI

17-20  
Dicembre  
2025  
Napoli

Università degli  
Studi di Napoli  
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