
AM I
REVEALING?
AI-enhanced early diagnosis and referral of patients with unknown ATTR Amyloidosis
GIANFRANCO SINAGRA; MD FESC
ASUGI e Università di Trieste
Segni e sintomi dell'amiloidosi da Transtiretina ereditaria
• LE RED FLAGS CARDIOLOGICHE

Il sottoscritto **GIANFRANCO SINAGRA**
in qualità di (moderatore, relatore, formatore, tutor, docente)

ai sensi dell'art. 76 sul Conflitto di Interessi, comma 4 dell'Accordo Stato-Regioni del 2 febbraio 2017 e del paragrafo 4.5. del Manuale nazionale di accreditamento per l'erogazione di eventi ECM

dichiara
che negli ultimi due anni ha avuto i seguenti rapporti con soggetti portatori di interessi in campo sanitario:

Novartis, Bayer, Astrazeneca, Bruno Farmaceutici, Boston Scientific, Biotronik, Menarini, Amgen, Boehringer Ingelheim (**Relatore a congressi**)

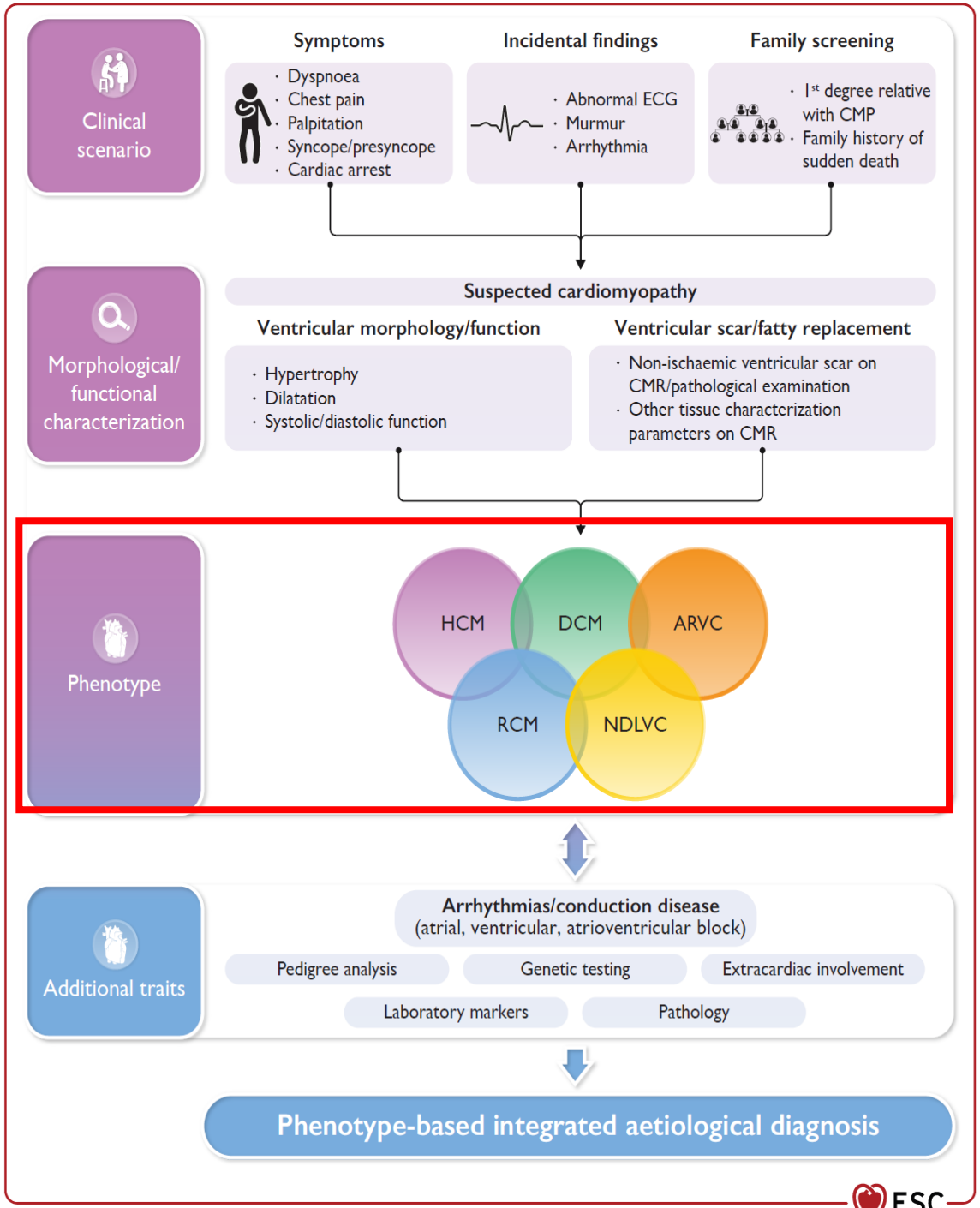
Novartis, Impulse Dynamics, BMS (**Consulenze e Collaborazione scientifica occasionale**)

2023 ESC Guidelines for the management of cardiomyopathies

Developed by the task force on the management of cardiomyopathies of the European Society of Cardiology (ESC)

ESC European Society of Cardiology

European Heart Journal (2023) **00**, 1–124
https://doi.org/10.1093/eurheartj/ehad194



The patient pathway and clinical method

Recommendation Table 2 — Recommendations for diagnostic work-up in cardiomyopathies

Recommendations	Class[a]	Level[b]
It is recommended that all patients with suspected or established cardiomyopathy undergo systematic evaluation using a multiparametric approach that includes clinical evaluation, pedigree analysis, ECG, Holter monitoring, laboratory tests, and multimodality imaging.[63]	I	C
It is recommended that all patients with suspected cardiomyopathy undergo evaluation of family history and that a three- to four-generation family tree is created to aid in diagnosis, provide clues to underlying aetiology, determine inheritance pattern, and identify at-risk relatives.[64–66]	I	C

The **cardiomyopathy-oriented approach** is based on *interpreting clinical and instrumental findings to suspect and ultimately generate a phenotype-based aetiological diagnosis* to guide disease-specific management.

The **identification of red flags** is a crucial aspect of the initial work-up.

The aims are:

(i) establishing and characterizing the presence of a cardiomyopathy phenotype;

(ii) identifying the underlying *aetiological diagnosis.*

ESC European Society of Cardiology
European Heart Journal (2023) **00**, 1–124
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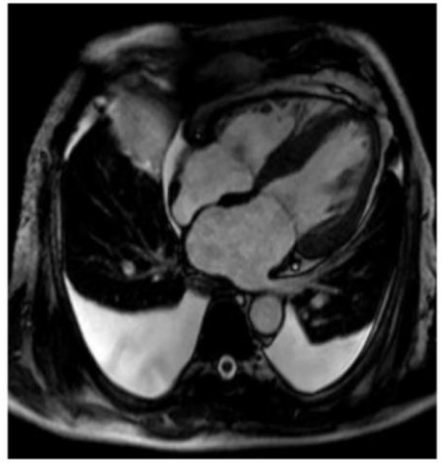
Transthyretin amyloid cardiomyopathy: An uncharted territory awaiting discovery

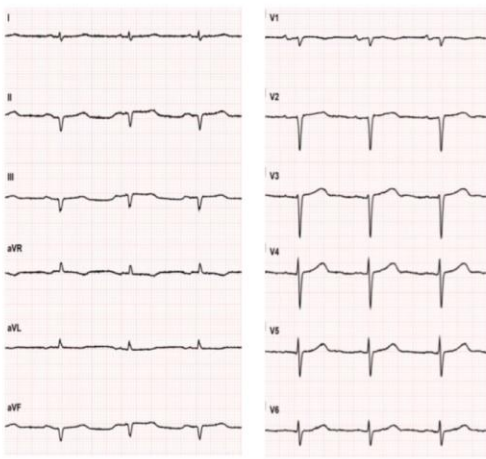
Aldostefano Porcari[a], Marco Merlo[a], Claudio Rapezzi[b,c], Gianfranco Sinagra[a,*]

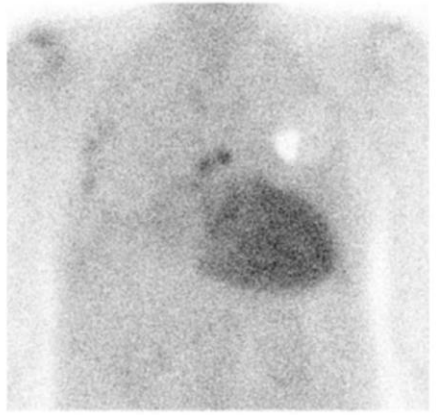
European Journal of Internal Medicine 82 (2020) 7–15

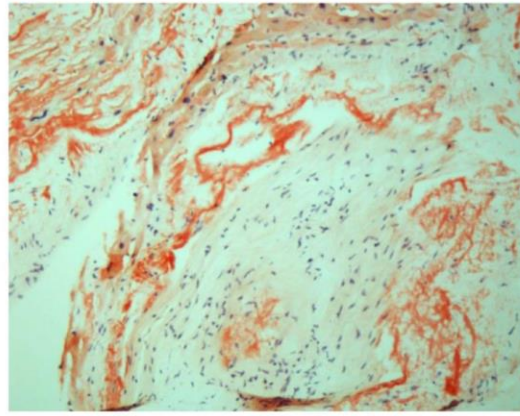
The comprehensive 'red flag' approach to TTR-AC.

Cardiological Evaluation	Findings of high suspicion for amyloid disease
	HCM diagnosed after the sixth decade of life
	Supposed 'hypertensive cardiomyopathy' in elderly patients with normal BP values and no valvular disease
	Recurrent syncope
	Need for down-titration or discontinuation of antihypertensive therapy due to poor tolerability
	Intolerance of ß-blockade in newly diagnosed HF
	Bowel dysfunction (constipation, diarrhoea)
Clinical Signs	HF with systemic venous congestion
	Aortic valve stenosis in the elderly
	Periorbital purpura
	Macroglossia
	Bilateral CTS, atraumatic rupture of biceps tendon and LS stenosis
	Unexplained neuropathic pain, mostly in non-diabetic patients
	Orthostatic hypotension and erectile dysfunction due to autonomic neuropathy
	Vitreous deposits
Laboratory	**Persistent elevation in serum troponin values**
	Increased NT-proBNP values (> 5000 pg/mL), disproportional to the clinical severity of HF
	Monoclonal gammopathy of undetermined significance (frequently coexisting)
ECG	Low QRS voltages (peripheral and/or precordial leads)
	Discrepancies between severity of LV wall thickness and QRS voltages
	AV delay and/or blocks
	Pseudonecrosis
Echocardiography	Diffuse LV cardiac hypertrophy with non-dilated LV
	Coexisting RV hypertrophy
	Restrictive diastolic filling pattern
	Paradoxical low-flow low-gradient aortic valve stenosis
	Pericardial effusion
	Increased thickness of the interatrial septum and AV valves
	Granular sparkling appearance of the myocardium
	Reduced LV longitudinal strain with 'apical sparing' pattern

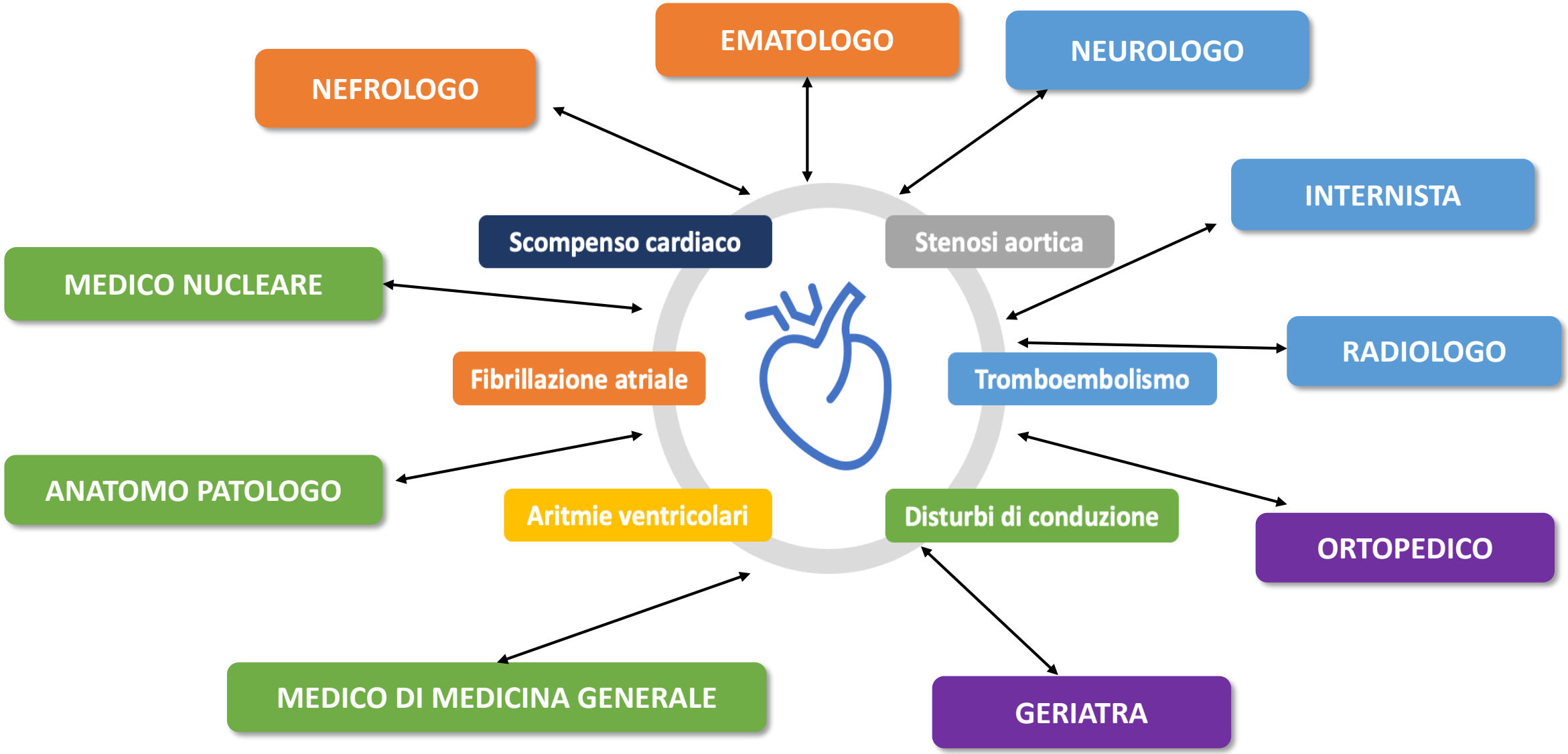








L'APPROCCIO ALL'AMILOIDOSI CARDIACA E' FONDATO SUL "SOSPETTO" DI MALATTIA E RICHIEDE UN LAVORO DI SQUADRA



Uomo 57->64 anni

APR: ipercolesterolemia, IRC (**GFR 53 ml/min**), **tendinopatia** capo lungo del bicipite, sindrome del **tunnel carpale bilaterale** operato, **ipotensione ortostatica** (mai iperteso)

- **2016** Accesso in PS per **palpitazioni e discomfort toracico** → indagini «negative»;

*ECG: RS, **BAV I, EAS**; *Ecocardio: FE 60%, **SIV 13 mm**

- Successivamente sintomatico per **dispnea** da sforzo e astenia; non diagnosi eziologica;

- **01/2023** NYHA III, *Eco: **SIV 20 mm**, **PP 18 mm**, **FE 40%**, pattern restrittivo

64 anni

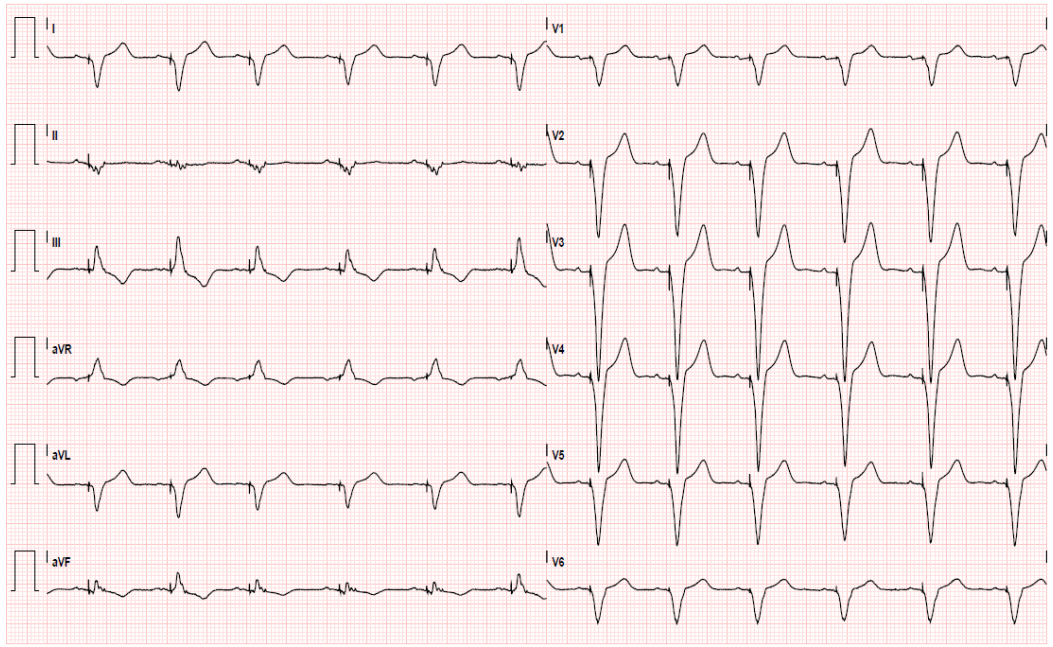
*CoroTC: NON malattia coronarica significativa (IVA media 40%, CDx prox 30%).

*CardioRM: **SIV 29 mm**, ipocinesia globale, LGE diffuso transmurale nei segmenti basali e subendocardico in sede medio-apicale e dei m. papillari → *suggestiva per AC*

*Scintigrafia con traccianti ossei: **Perugini 2** (NON componente monoclonale)

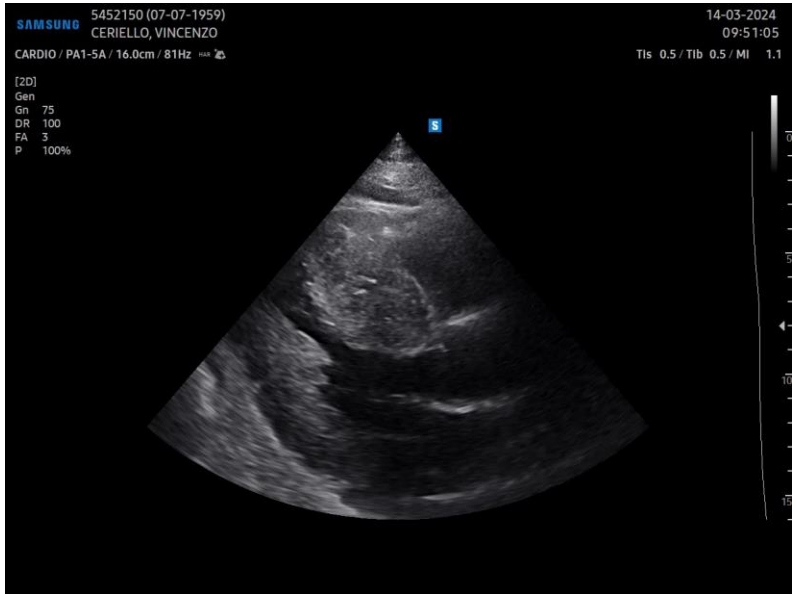
***** Test genetico: negativo per mutazioni TTR

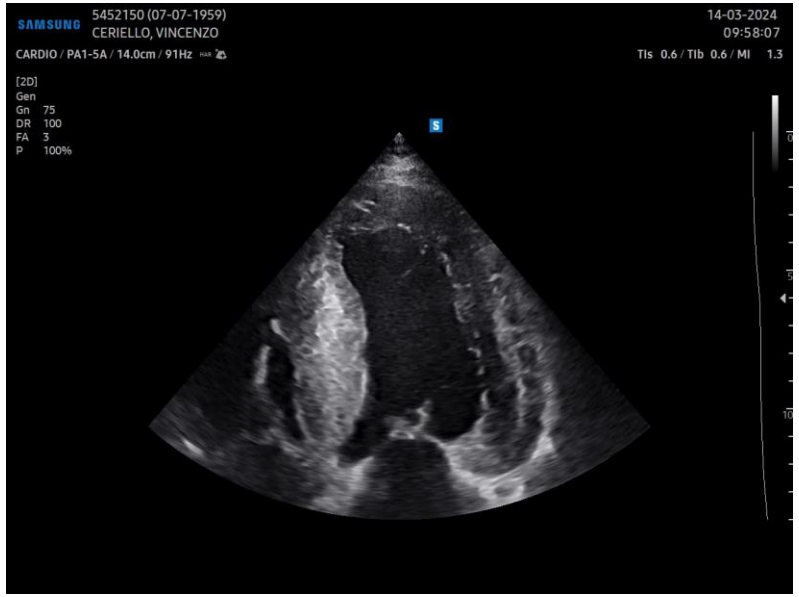
AMILOIDOSI DA TRANSTIRETINA WILD-TYPE

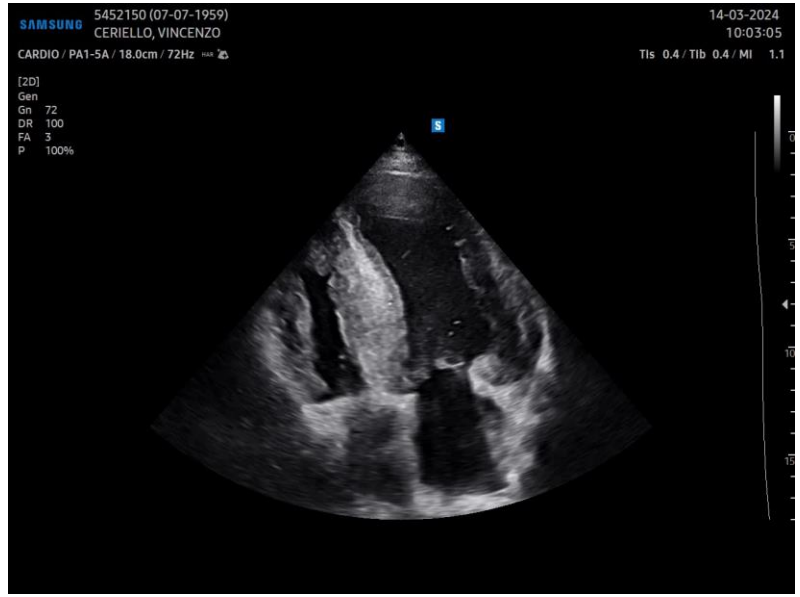


Scintigrafia: Perugini 2

SIV 30 mm







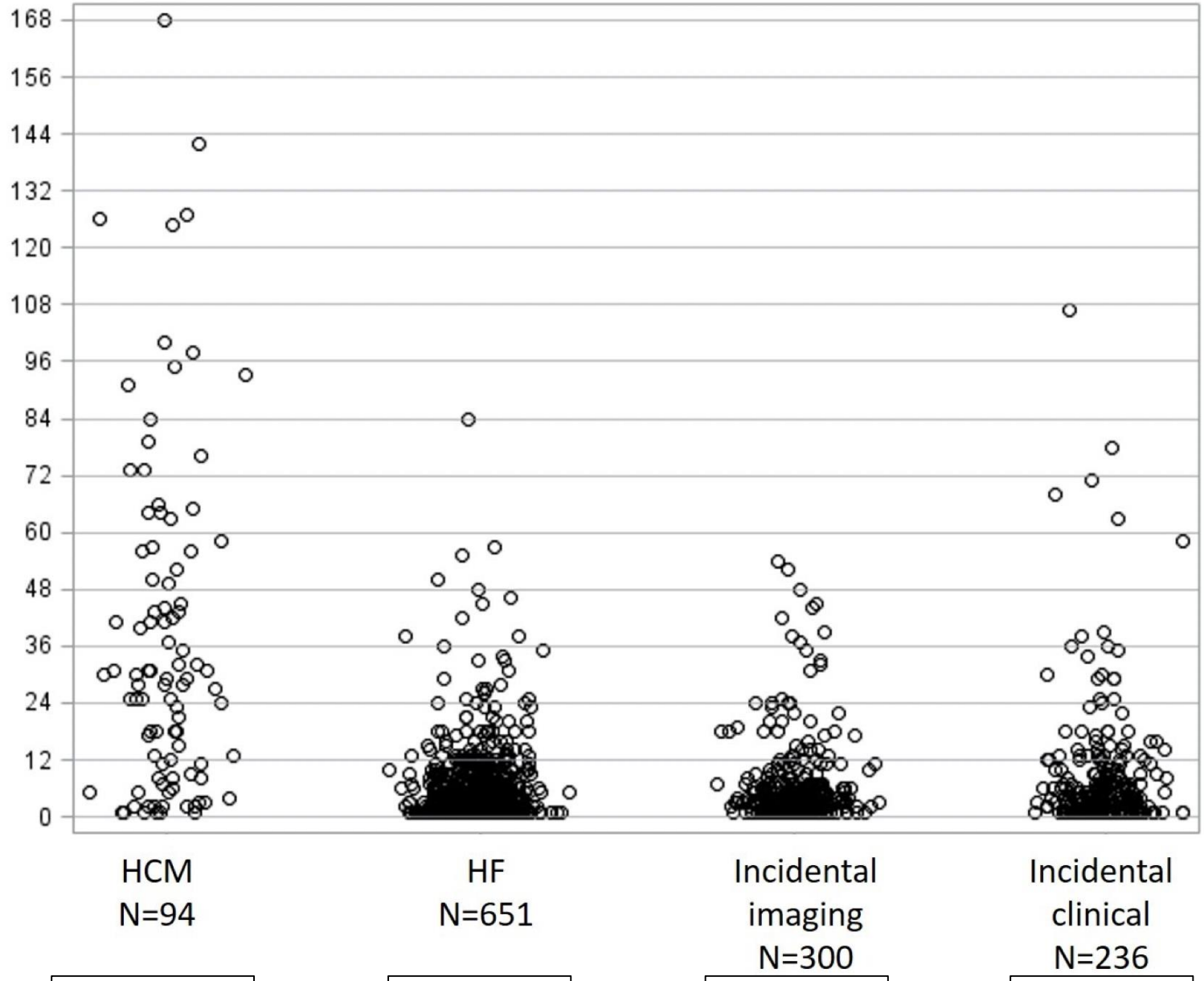
Severa disfunzione biventricolare, pattern restrittivo

Diagnostic pathways to wild-type transthyretin amyloid cardiomyopathy: a multicentre network study

Giacomo Tini[1,2], Paolo Milani[3,4], Mattia Zampieri[5], Angelo G. Caponetti[6,7], Francesca Fabris[3,4], Andrea Foli[4], Alessia Argirò[5], Carlotta Mazzoni[5], Christian Gagliardi[6,8], Simone Longhi[6,8], Giulia Saturi[6,7], Giuseppe Vergaro[9,10], Alberto Aimo[9,10], Domitilla Russo[2], Guerino G. Varrà[11], Matteo Serenelli[12], Gioele Fabbri[12], Laura De Michieli[13], Giuseppe Palmiero[14], Giuseppe Ciliberti[15,16], Samuela Carigi[17], Eugenio Sessarego[1], Giulia E. Mandoli[18], Giulia Ricci Lucchi[19], Valeria Rella[20], Enrico Monti[21], Elisa Gardini[21], Michela Bartolotti[22], Lia Crotti[20,23], Elisa Merli[19], Roberta Mussinelli[4], Pier Filippo Vianello[1], Matteo Cameli[18], Francesca Marzo[17], Federico Guerra[15,16], Giuseppe Limongelli[8,14], Alberto Cipriani[13,24], Stefano Perlini[3,4], Laura Obici[4], Federico Perfetto[5], Camillo Autore[2,25], Italo Porto[1,26], Claudio Rapezzi[12,27†], Gianfranco Sinagra[8,11], Marco Merlo[8,11], Beatrice Musumeci[2], Michele Emdin[9,10], Elena Biagini[6,8], Francesco Cappelli[5], Giovanni Palladini[3,4], and Marco Canepa[1,26*]

ESC European Society of Cardiology

European Journal of Heart Failure (2023)
doi:10.1002/ejhf.2823

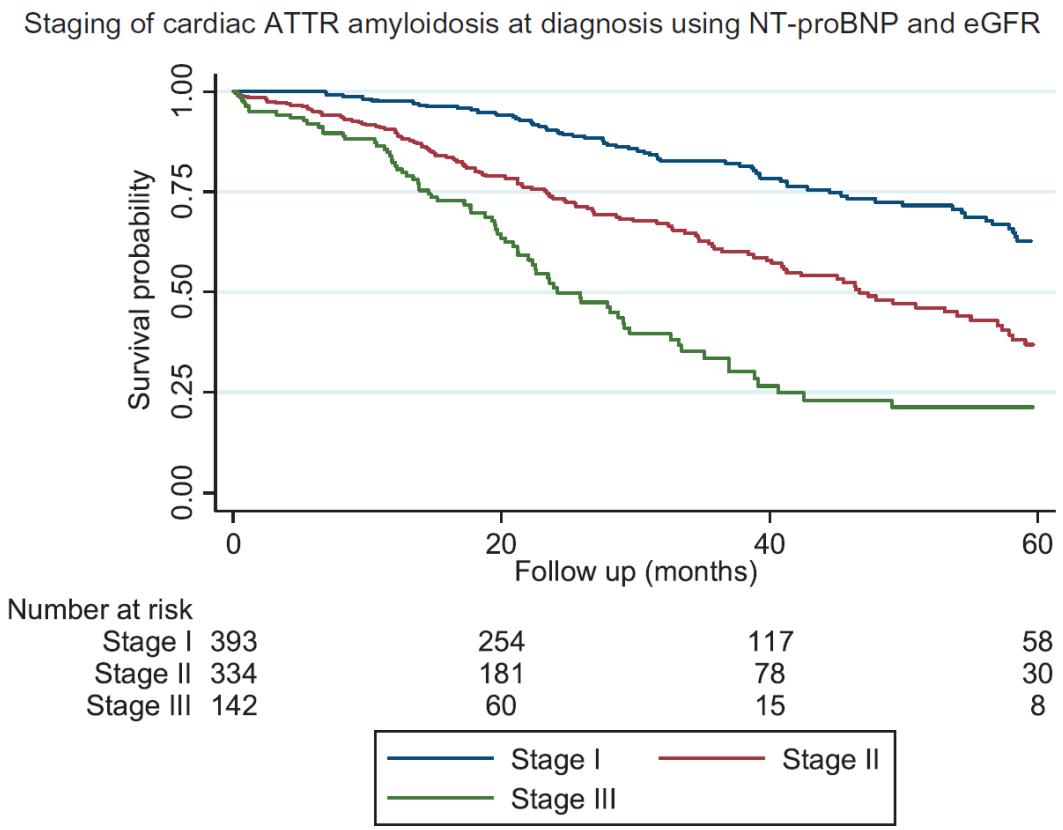


	HCM N=94	HF N=651	Incidental imaging N=300	Incidental clinical N=236
Time to diagnosis	**29 months**	**3 months**	**3 months**	**4 months**

ESC European Society of Cardiology
European Heart Journal (2018) 39, 2799–2806
doi:10.1093/eurheartj/ehx589
FASTTRACK CLINICAL RESEARCH
Heart failure/cardiomyopathy

VOLUME 30 · NUMBER 9 · MARCH 20 2012
JOURNAL OF CLINICAL ONCOLOGY
ORIGINAL REPORT

A new staging system for cardiac transthyretin amyloidosis



- eGFR < 45 ml/min/1.73m2
- NT-proBNP > 3000 ng/L

Revised Prognostic Staging System for Light Chain Amyloidosis Incorporating Cardiac Biomarkers and Serum Free Light Chain Measurements

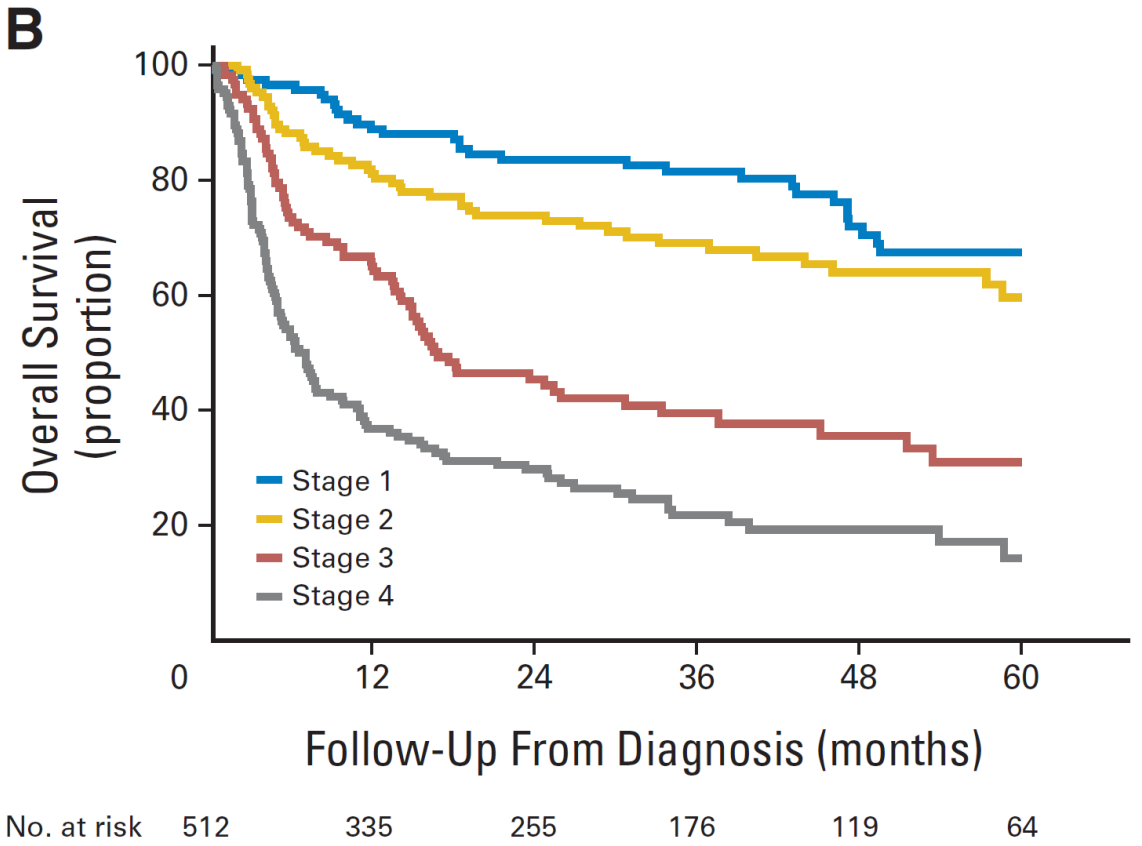


Table 2. Results of Univariate and Multivariate Analyses of Various Prognostic Factors

Prognostic Factor	Comparison	No. of Patients*	Univariate		Multivariate 1†		Multivariate 2‡	
			Risk Ratio	P	Risk Ratio	P	Risk Ratio	P
FLC-diff, mg/dL	> 18 v ≤ 18	758	1.6	< .001	1.4	.01	1.4	.002
Plasma cells, %	> 10 v ≤ 10	707	1.5	< .001	1.2	.2	NI	NA
PCLI, %	> 0 v 0	541	1.3	.009	1.3	.09	NI	NA
β2-microglobulin, mg/dL	> 3 v ≤ 3	720	1.9	< .001	1.5	< .01	NI	NA
Circulating plasma cells	Yes v no	293	1.5	.08	NI	NA	1.2	.1
cTnT, ng/mL	> 0.03 v ≤ 0.03	810	3.0	< .001	NI	NA	2.4	< .001
NT-proBNP, pg/mL	> 1,800 v ≤ 1,800	810	2.3	< .001	NI	NA	1.4	.004

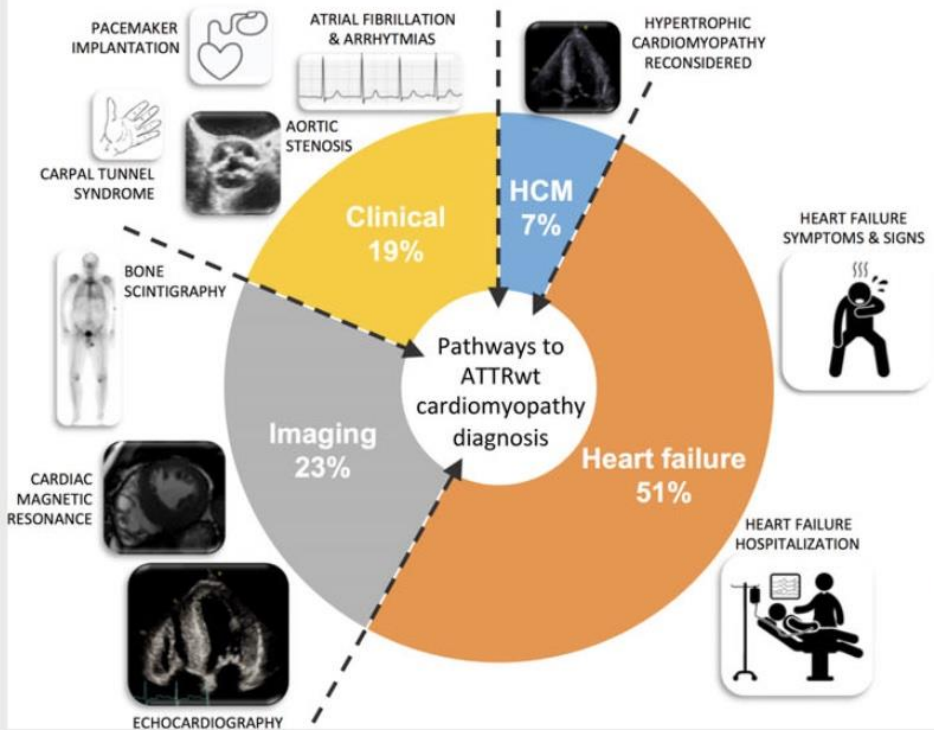
Diagnostic pathways to wild-type transthyretin amyloid cardiomyopathy: a multicentre network study

European Journal of Heart Failure (2023)
doi:10.1002/ejhf.2823

Giacomo Tini, ….., Claudio Rapezzi, Gianfranco Sinagra, …Marco Canepa

1,281 patients (mean age 78 years, 89% males) from 17 Italian centers between Jan 2017 and Dec 2021

1. Prevalence



2. Characteristics

HCM pathway (n=94):
- 75±7 years, 93% males
- Red flags lead to case re-evaluation
- 37% previous HF hospitalization
- 16% NYHA III-IV, 33% CKD, 64% AFib

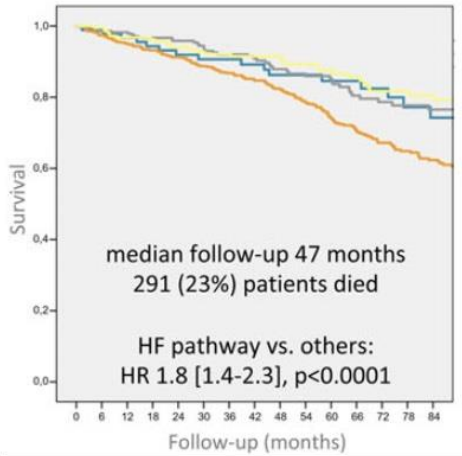
Heart failure pathway (n=651):
- 79±7 years, 87% males
- 61% during HF hospitalization
- 52% had LVEF≥50%
- 44% NYHA III-IV, 50 % CKD, 65% AFib

Incidental imaging pathway (n=300):
- 77±7 years, 92% males
- 74% during echocardiography for routine evaluation
- 13% NYHA III-IV, 38% CKD, 51% AFib

Incidental clinical pathway (n=236):
- 78±7 years, 90% males
- 94% cardiovascular evaluation including AFib, PM, arrhythmias
- 15% NYHA III-IV, 38% CKD, 70% AFib

3. Prognosis

UNIVARIATE ANALYSIS



MULTIVARIATE ANALYSIS

	HR	p value
HF vs. other pathways	-	-
Age at diagnosis	1.1 [1.0-1.1]	<0.0001
NYHA III-IV	2.2 [1.7-2.7]	<0.0001
Hypertension	1.4 [1.1-1.9]	0.01
Diabetes mellitus	1.5 [1.1-2.0]	0.01
CKD	1.4 [1.1-1.8]	0.01
Cancer (active)	1.9 [1.2-2.9]	0.01

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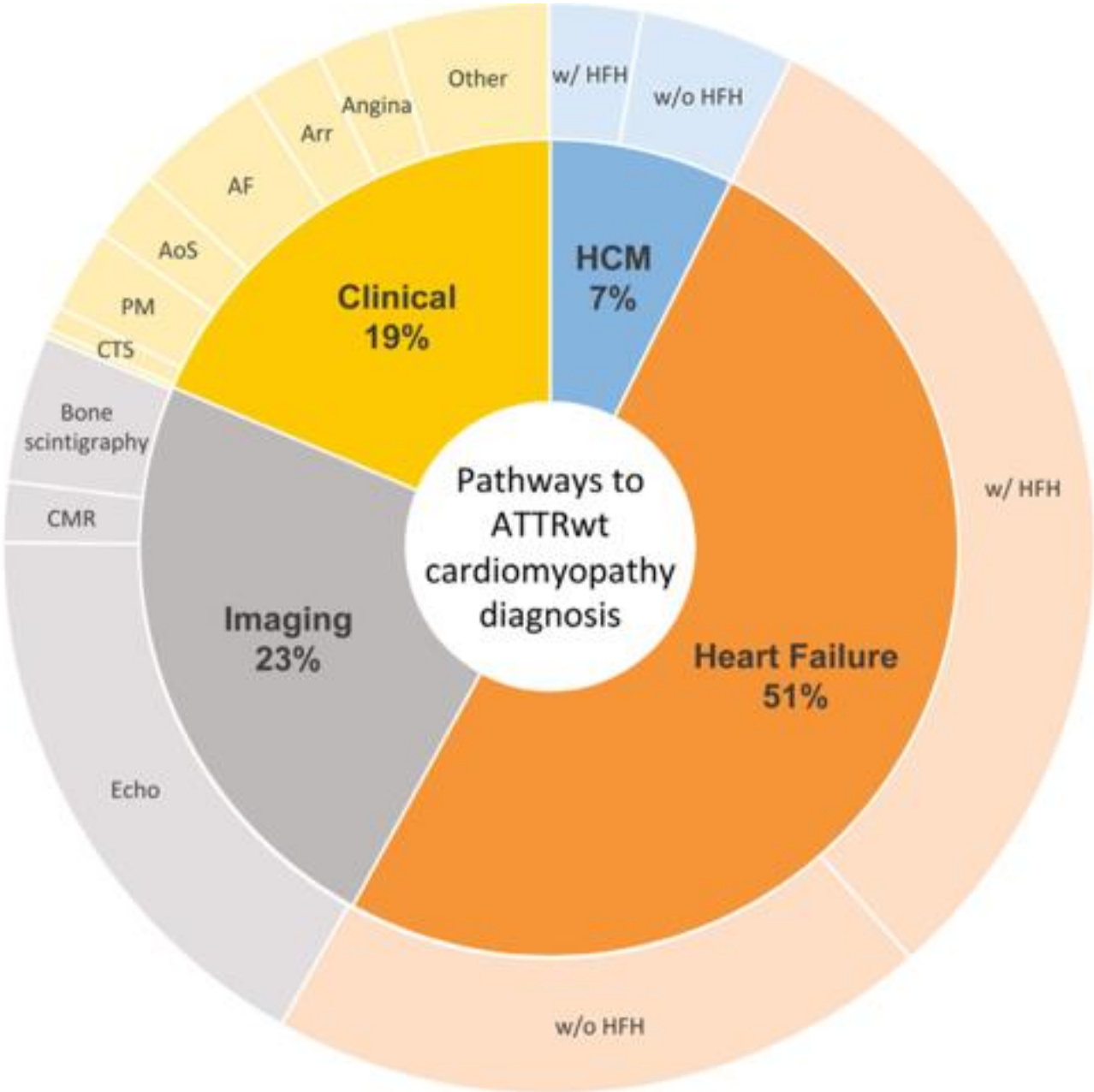

ESC European Society of Cardiology

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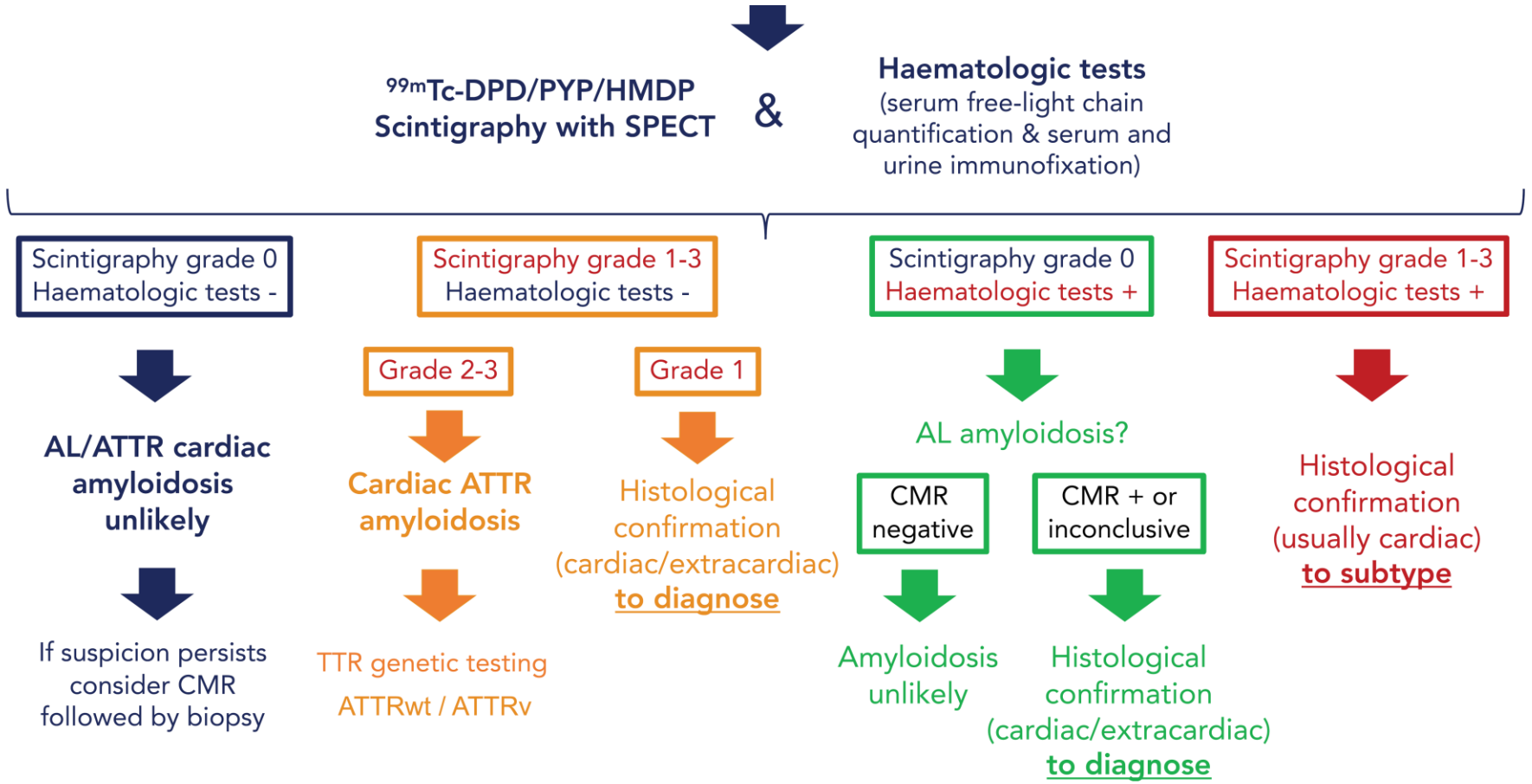
doi:10.1002/ejhf.2823

Diagnosis and treatment of cardiac amyloidosis: a position statement of the ESC Working Group on Myocardial and Pericardial Diseases

ESC European Society of Cardiology
European Heart Journal (2021) **42**, 1554–1568
doi:10.1093/eurheartj/ehab072

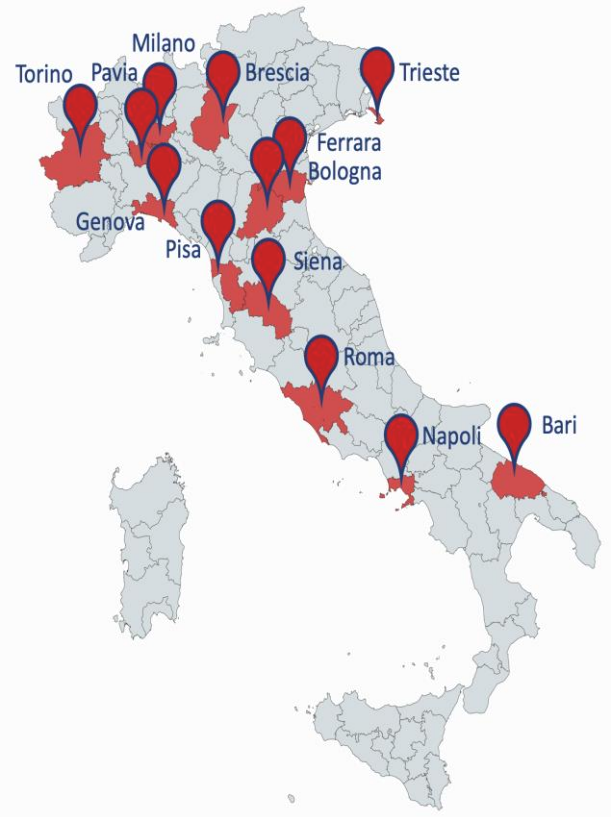


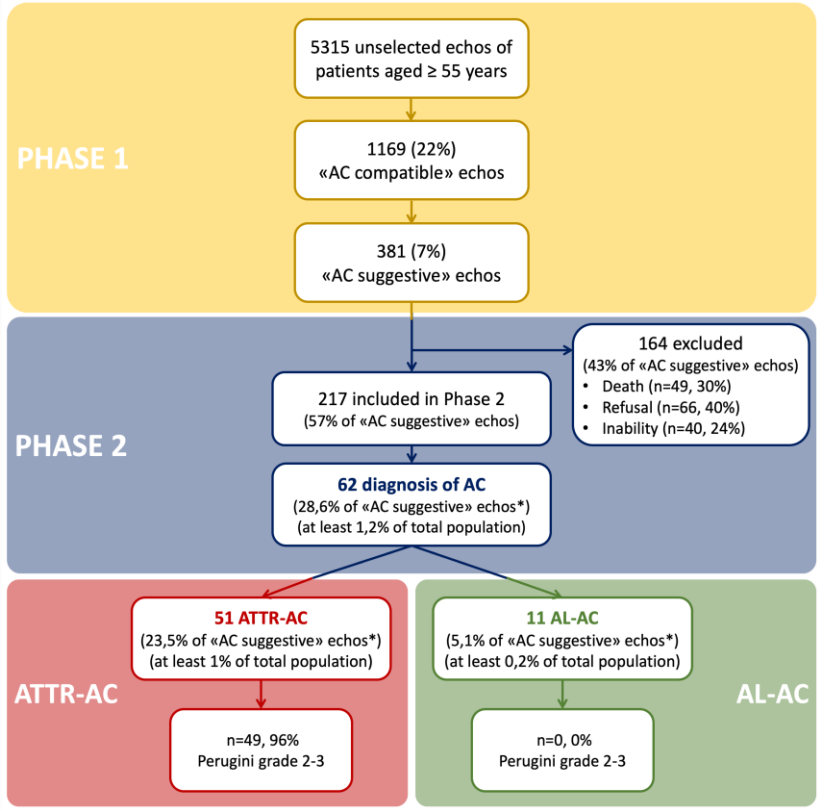
Unmasking the prevalence of amyloid cardiomyopathy in the real world: results from Phase 2 of the AC-TIVE study, an Italian nationwide survey

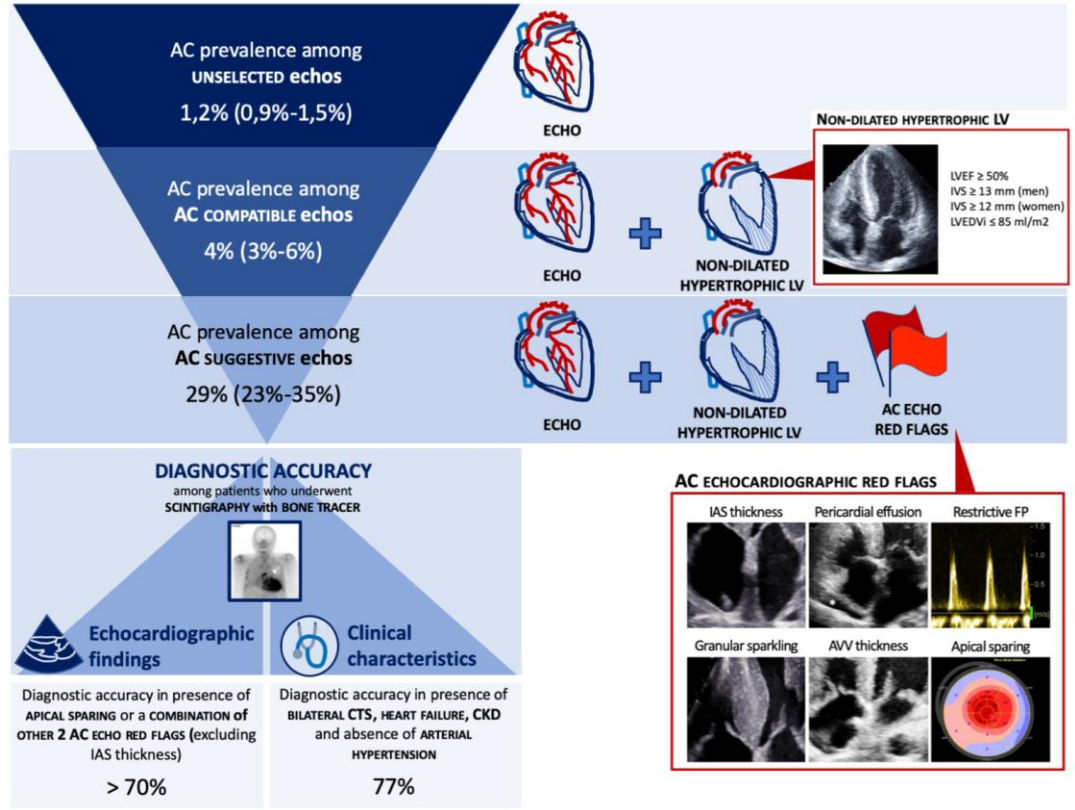
Marco Merlo, Aldostefano Porcari, …. Claudio Rapezzi, Gianfranco Sinagra

ESC European Society of Cardiology

European Journal of Heart Failure (2022)
doi:10.1002/ejhf.2504







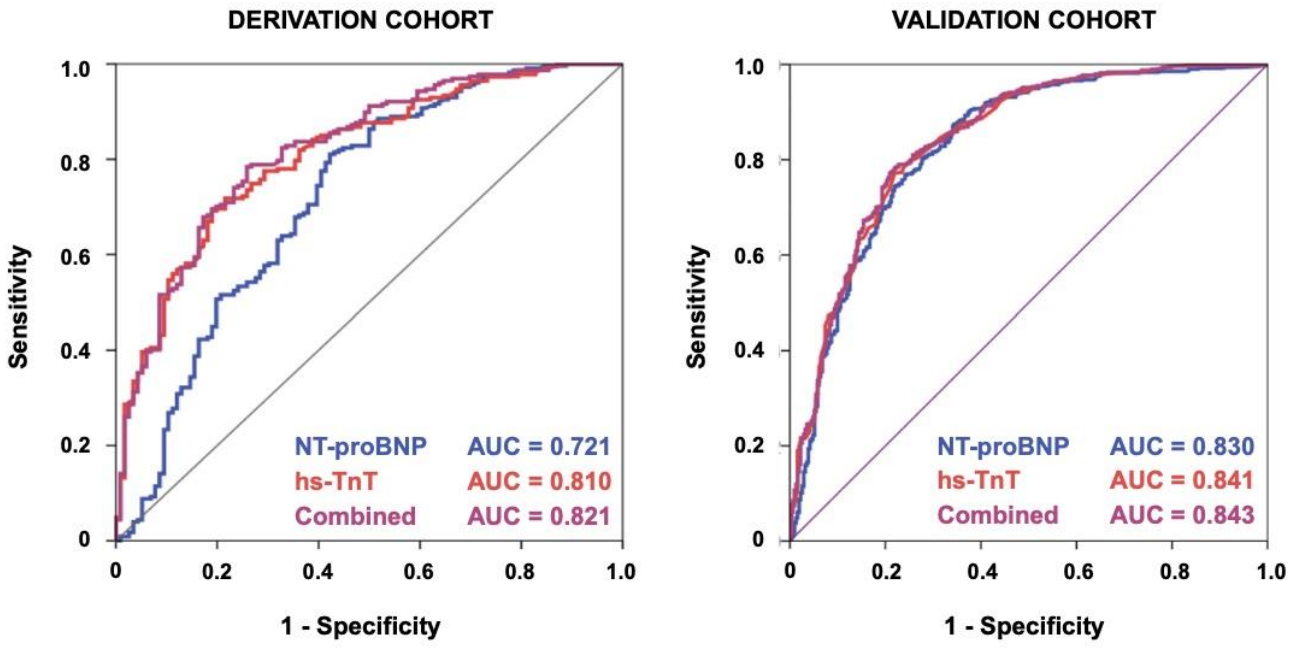
Prevalence of 29% in Italy among adults with echo red flags of AC

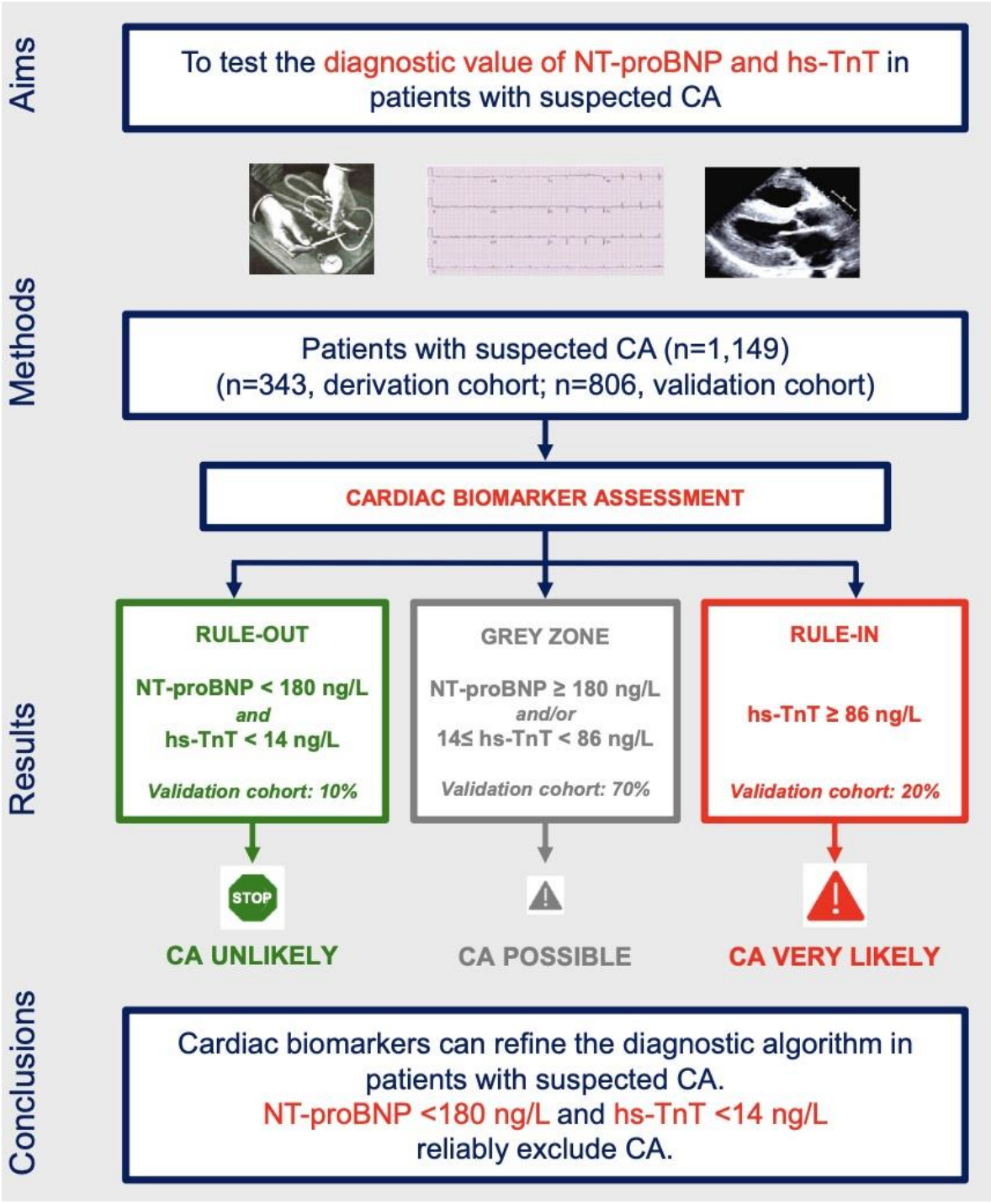
N-terminal pro-B-type natriuretic peptide and high-sensitivity troponin T hold diagnostic value in cardiac amyloidosis

Giuseppe Vergaro[1,2]*, Vincenzo Castiglione[1], Alberto Aimo[1,2], Concetta Prontera[2], Silvia Masotti[2], Veronica Musetti[2], Martin Nicol[3], Alain Cohen Solal[3], Damien Logeart[3], Georgios Georgiopoulos[4,5], Vladyslav Chubuchny[2], Alberto Giannoni[1,2], Aldo Clerico[1,2], Gabriele Buda[6], Kiara N. Patel[7], Yousuf Razvi[7], Rishi Patel[7], Ashutosh Wechalekar[7], Helen Lachmann[7], Philip N. Hawkins[7], Claudio Passino[1,2], Julian Gillmore[7], Michele Emdin[1,2], and Marianna Fontana[7]

European Journal of Heart Failure (2023)
doi:10.1002/ejhf.2769

Diagnosis of CA in patients with clinical suspicion





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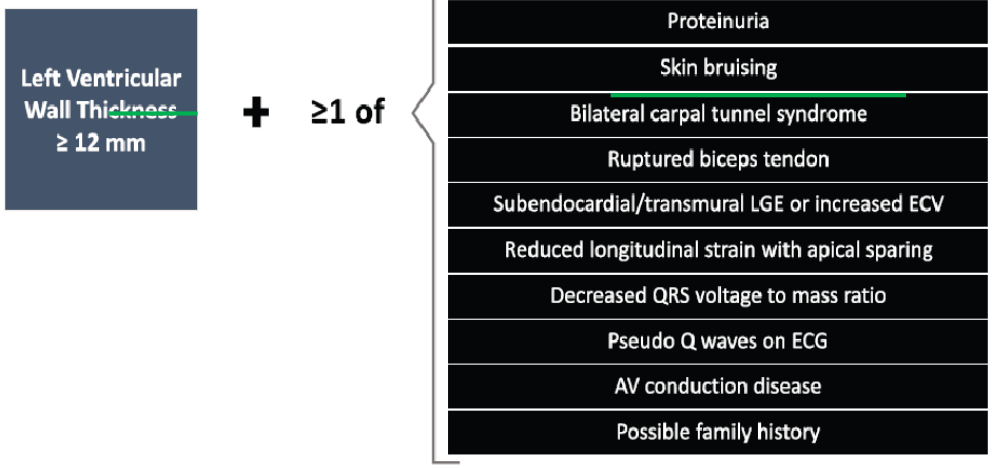

Figure 3 Screening for cardiac amyloidosis. AV, atrio-ventricular; ECG, electrocardiogram; ECV, extracellular volume; LGE, late gadolinium enhancement.

Type		Red flag
Extracardiac		
	Clinical	Polyneuropathy
		Dysautonomia
		Skin bruising
		Skin discoloration
		Cutis laxa
		Macroglossia
		Deafness
		Bilateral carpal tunnel syndrome
		Ruptured biceps tendon
		Lumbar spinal stenosis
		Vitreous deposits
		Corneal lattice dystrophy
		Family history
	Laboratory	Renal insufficiency
		Proteinuria
Cardiac		
	Clinical	Hypotension or normotensive if previous hypertensive
	ECG	Pseudoinfarct pattern
		Low/decreased QRS voltage to degree of LV thickness
		AV conduction disease
	Laboratory	Disproportionally elevated NT-proBNP to degree of HF
		Persisting elevated troponin levels
	Echocardiogram	Granular sparkling of myocardium
		Increased right ventricular wall thickness
		Increased valve thickness
		Pericardial effusion
		Reduced longitudinal strain with apical sparing pattern
	CMR	Subendocardial late gadolinium enhancement
		Elevated native T1 values
		Increased extracellular volume
		Abnormal gadolinium kinetics

Cardiac amyloidosis: do not forget to look for it

ESC European Society of Cardiology

European Heart Journal Supplements (2020) **22** (Supplement E), E142-E147
The Heart of the Matter
doi:10.1093/eurheartj/suaa080

Aldostefano Porcari[1], Luca Falco[1], Veronica Lio[2], Marco Merlo[1], Enrico Fabris[1], Rossana Bussani[3], and Gianfranco Sinagra[1]*

Table 1 Clinical manifestations of ATTR and AL amyloidosis

	ATTR	AL
Heart failure	+	+
Coronary disease (often microvascular)	+	++
Atrial fibrillation/flutter	+	+
Valvular leaflets thickening	++	+
Pericardial effusion	+	+
Decreased GLS (con apical sparing)	+	+
Low-voltage QRS	+	++
AVB	+	+
Capillary friability	+	+
Coagulation abnormalities (liver dysfunction)	+	+
Hepatomegalia	++	++
Splenomegalia	+	+
Macroglossia	+	++
Periorbital purpora	−	++
Dysfonia	+	+
Renal damage	+	++
Lymphadenopathy	−	++
Bone pain	−	++
Immune deficit	−	++
Urinary incontinence	+	+
Lower bowel dysfunction	+	+
Sensory neuropathy	++ (ATTRm)	+
Motor neuropathy	+	+
Carpal tunnel syndrome	++	+

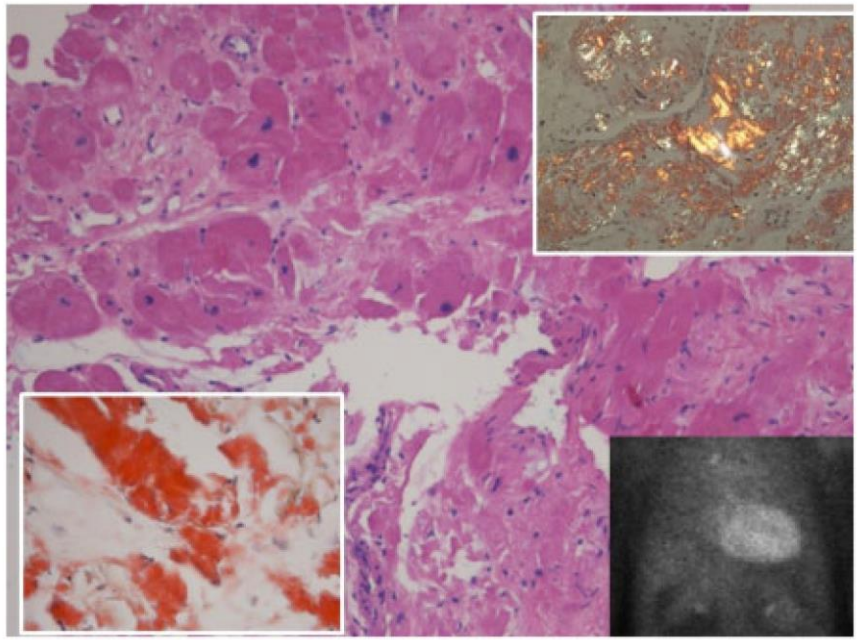

Table 2 'Red Flags' in the cardiac amyloidosis

The diagnosis of AC must always start from a high degree of clinical suspicion
In patients with heart failure with conserved systolic function and hypertrophy of the walls, the diagnosis of AC must be considered
Patients with suspected HCM should always be critically evaluated to search for clinical-instrumental elements that can direct them towards an accumulation of heart disease (VP, ABV, etc.)
Elderly patients with IVS in the absence of hypertension or aortic valve stenosis should be considered for AC
Low QRS voltages to the ECG in the presence of IVS are suspected for AC
AC from TTR and MGUS can coexist: an AC in the presence of monoclonal gammopathy is not necessarily AL
GLS in AC is often significantly reduced (typically with apical savings), even in the presence of normal LVEF
Magnetic resonance in both T1 signalling and extracellular oedema in IVS patients are very suggestive of AC. The distribution of the LGE is heterogeneous and the subendocardial distribution is not the only possible pattern
The history of bilateral carpal tunnel syndrome in a man with IVS is very suggestive of AC ATTRwt

Left ventricular wall thickness and severity of cardiac disease in women and men with transthyretin amyloidosis

European Journal of Heart Failure (2023)
doi:10.1002/ejhf.2824

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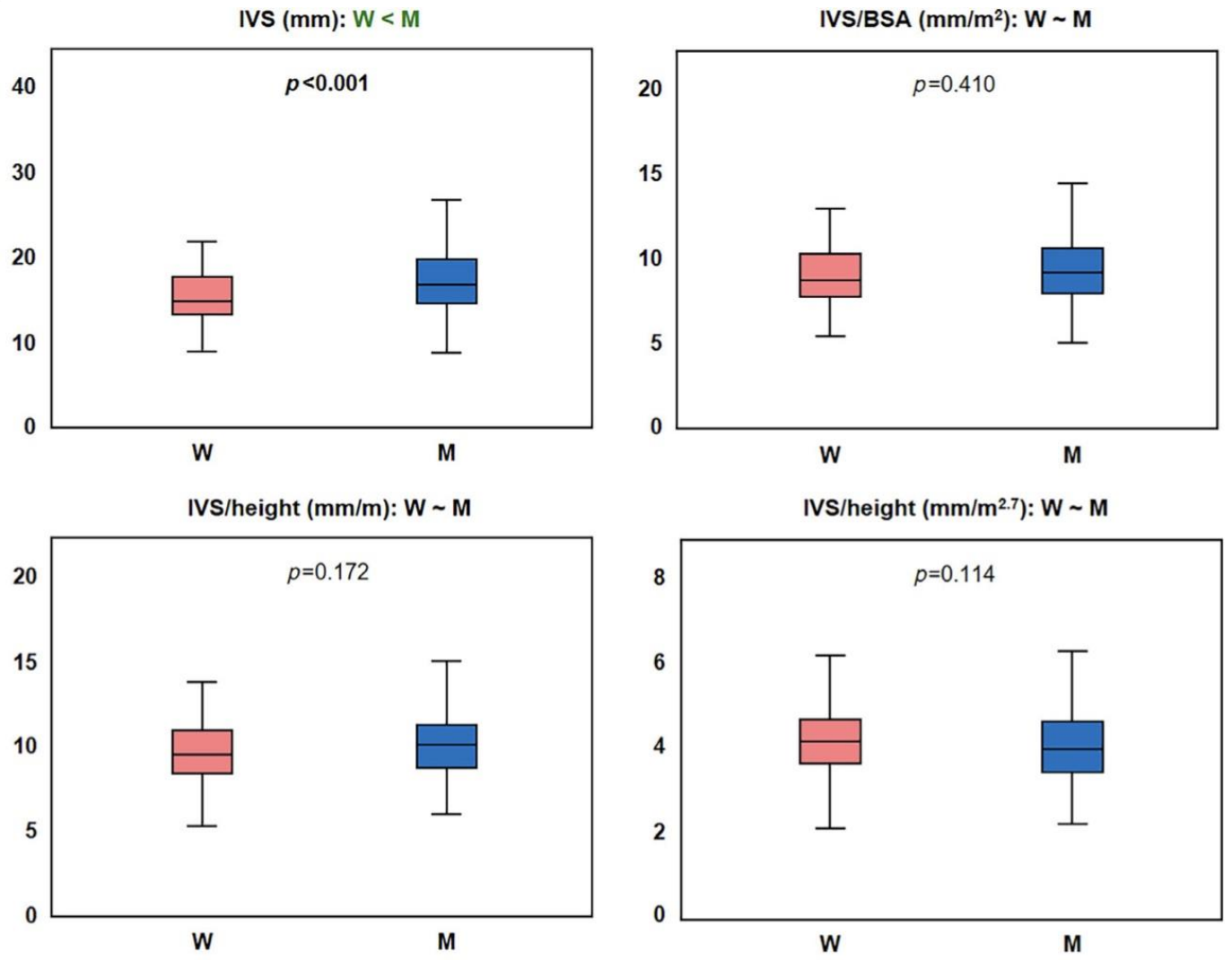
FINDING: Women may reach the 12 mm threshold when their **disease is more advanced**, possibly leading to underdiagnosis or delayed diagnosis.

PROPOSAL: To replace the single diagnostic cut-off of 12mm with **LV wall thickness values indexed by height$^{2.7}$.**

Alternative would be to calculate a cut-off for women based on the mean height of men and women in Europe (1.77m and 1.65m, respectively)

Given 12mm the cut-off for men, the corresponding cut-off for women would be 12mm*(1.65/1.77)=11mm.



ESC
European Society of Cardiology

Screening for Cardiac Amyloidosis 5 to 15 Years After Surgery for Bilateral Carpal Tunnel Syndrome

Oscar Westin, MD,[a] Emil L. Fosbøl, MD, PhD,[a] Mathew S. Maurer, MD,[b] Birgitte P. Leicht, MD,[c] Philip Hasbak, MD, DMSc,[d] Anne Kærsgaard Mylin, MD, PhD,[e] Sara Rørvig, MD,[f] Thomas Hartvig Lindkær Helle Hjorth Johannesen, MD,[d] Finn Gustafsson, MD, PhD, DMSc[a]

JACC Journal of the American College of Cardiology

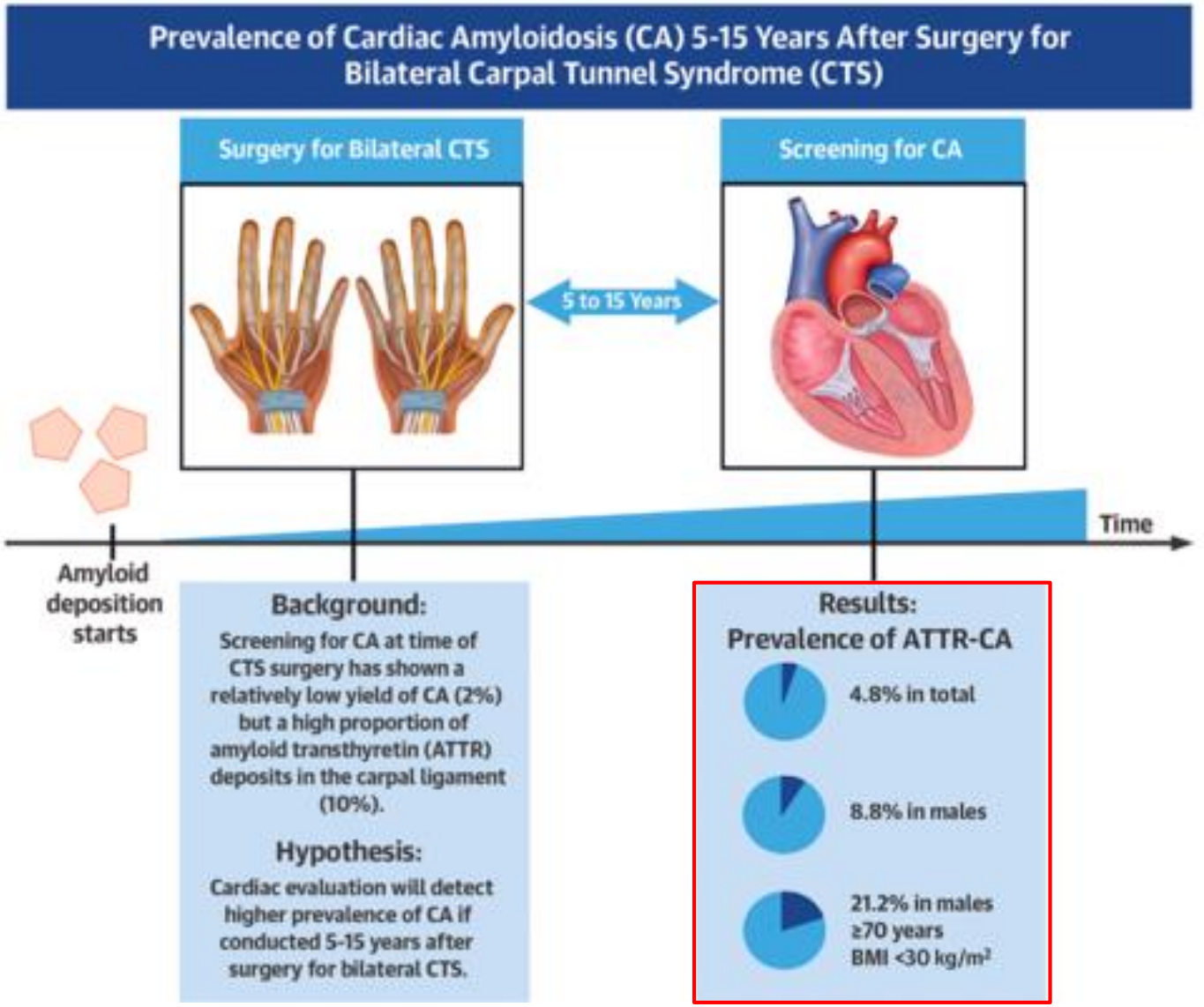
125 women and 125 men who had surgery for bilateral carpal tunnel syndrome in the previous 5 to 15 years underwent diagnostic work up for amyloidosis

Overall **4.8%** had ATTRwt-CM

8.8% of males aged 60 to 85 years had undiagnosed ATTRwt-CM

21.2% of men over 70 years with a BMI <30 Kg/m2 had undiagnosed ATTRwt-CM

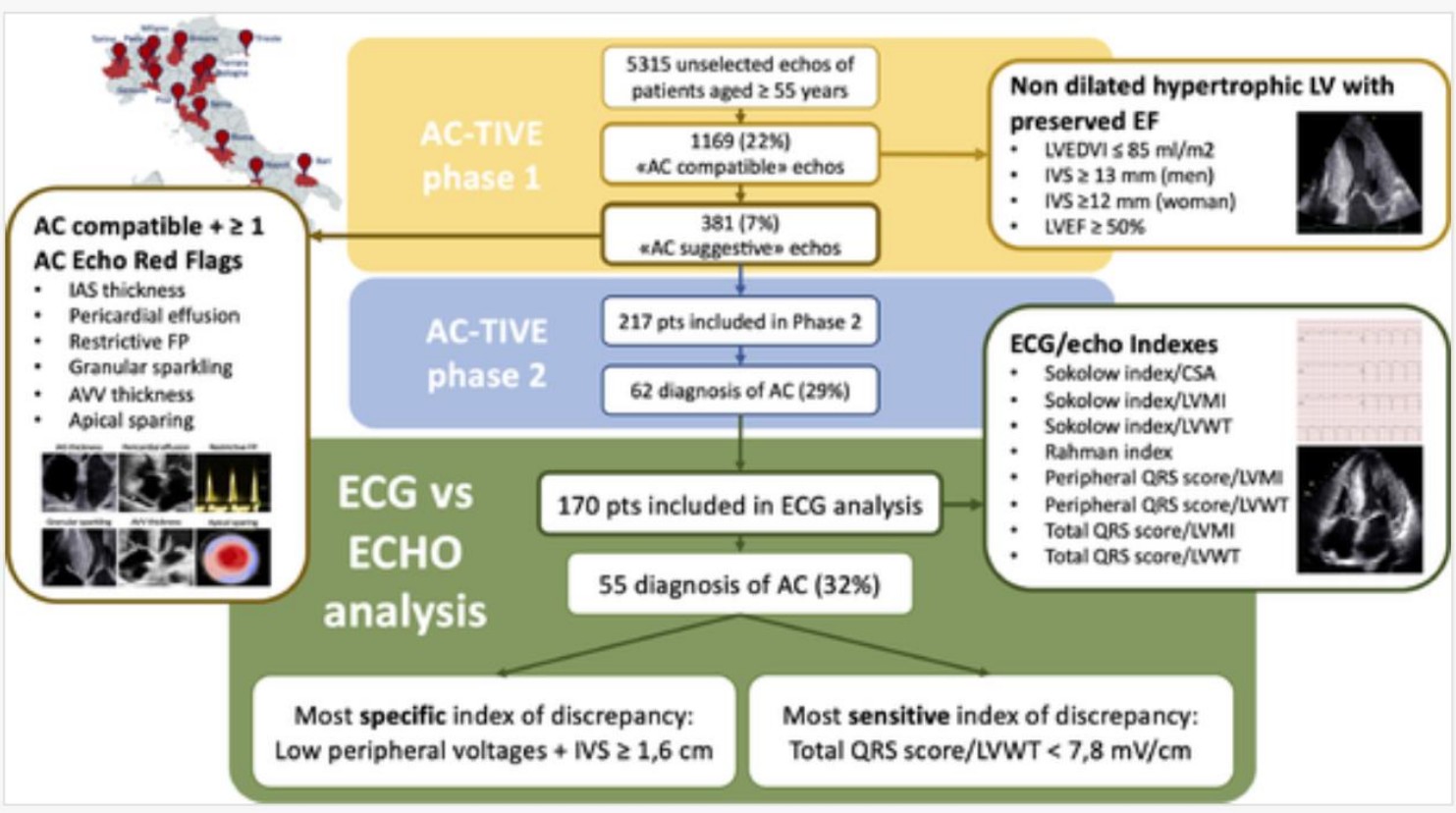
No case of AL amyloidosis was identified



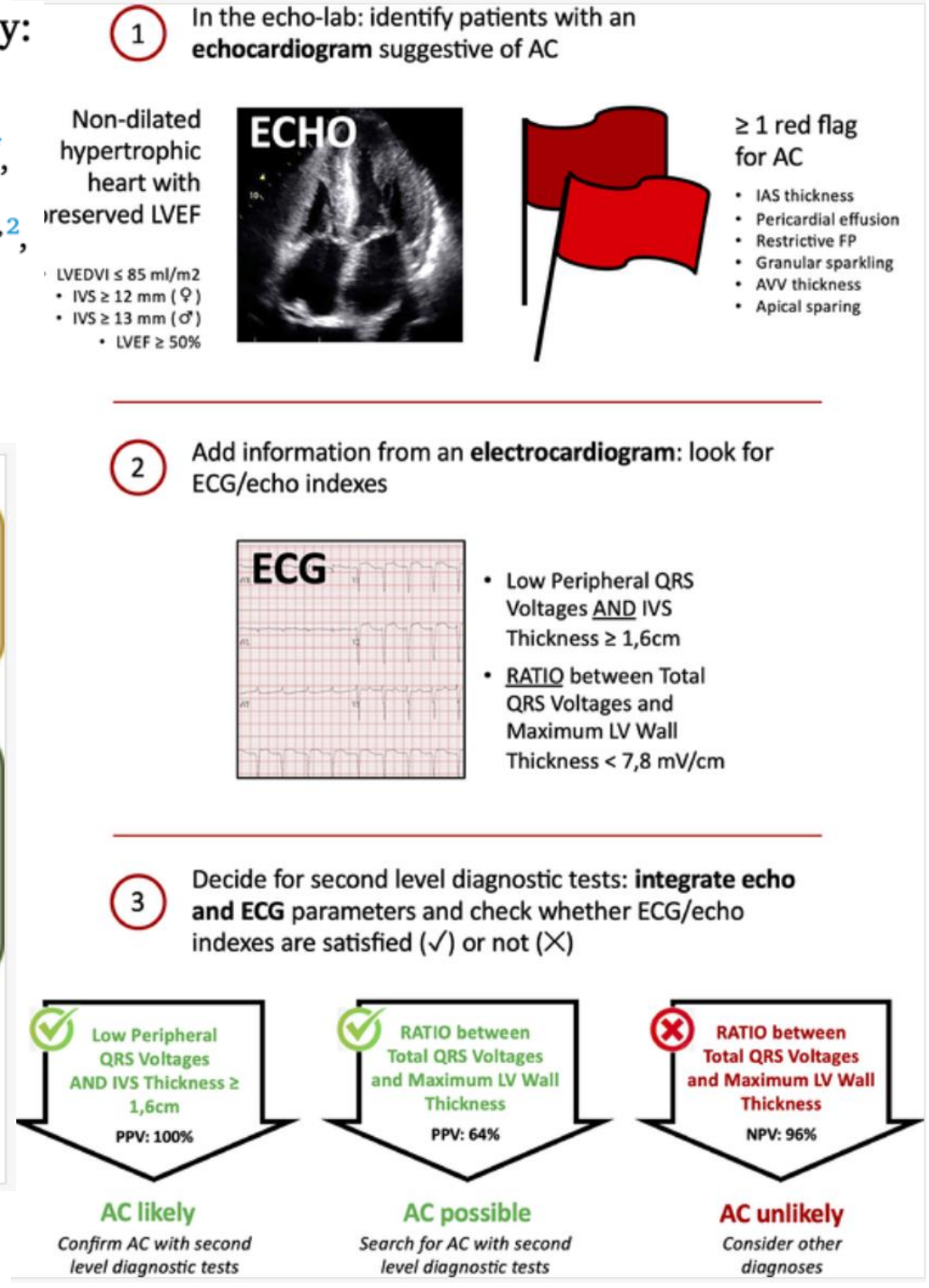
Westin O, et al. J Am Coll Cardiol. 2022;80(10):967-977.

ECG/echo indexes in the diagnostic approach to amyloid cardiomyopathy: A head-to-head comparison from the AC-TIVE study

Linda Pagura [a,b,1], Aldostefano Porcari [a], Matteo Cameli [c], Elena Biagini [d,1], Marco Canepa [e,f], Lia Crotti [g,h,1], Massimo Imazio [i,j], Cinzia Forleo [k], Rita Pavasini [l], Giuseppe Limongelli [m,1], Stefano Perlini [n,1], Marco Metra [o], Giuseppe Boriani [p], Michele Emdin [q], Gianfranco Sinagra [a,2], Marco Merlo [a,2,*], ACTIVE study group [3]



European Journal of Internal Medicine 122 (2024) 68–77



Low QRS Voltages in Cardiac Amyloidosis

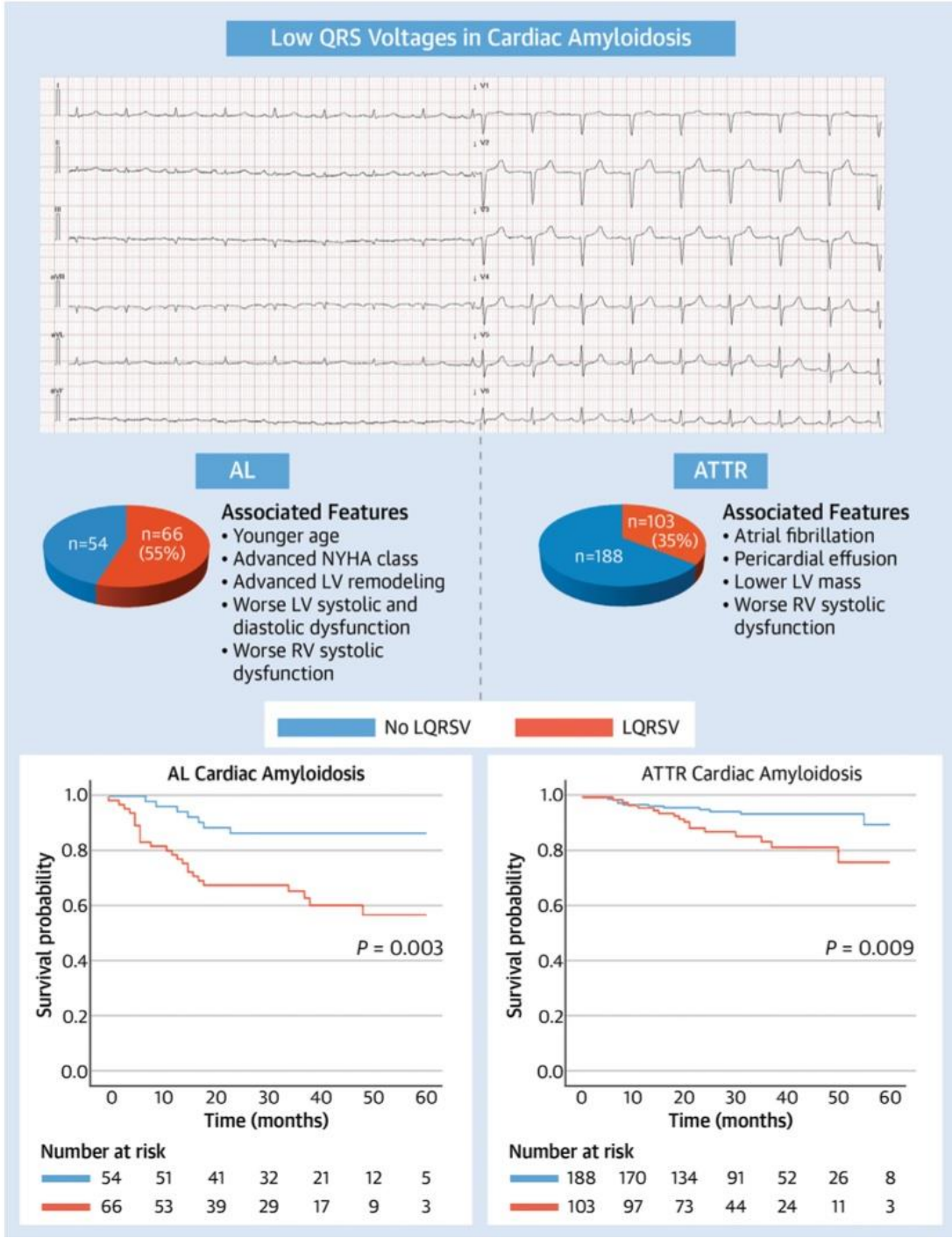
Clinical Correlates and Prognostic Value

Alberto Cipriani, MD,[a,*] Laura De Michieli, MD,[a,*] Aldostefano Porcari, MD, FISC,[b] Luca Licchelli, MD,[a] Giulio Sinigiani, MD,[a] Giacomo Tini, MD,[c] Mattia Zampieri, MD,[d] Eugenio Sessarego, MD,[e] Alessia Argirò, MD,[d] Carlo Fumagalli, MD,[d] Monica De Gaspari, MD,[a] Roberto Licordari, MD,[f] Domitilla Russo, MD,[c] Gianluca Di Bella, MD,[f] Federico Perfetto, MD,[d,g] Camillo Autore, MD,[c] Beatrice Musumeci, MD,[c] Marco Canepa, MD,[e,h] Marco Merlo, MD,[b] Gianfranco Sinagra, MD, FESC,[b] Dario Gregori, MD,[a] Sabino Iliceto, MD,[a] Martina Perazzolo Marra, MD, PhD,[a] Francesco Cappelli, MD,[d,g,†] Claudio Rapezzi, MD[i,j,†,‡]

Cipriani A, et al. J Am Coll Cardiol CardioOnc. 2022;4(4):458–470.

411 patients with CA: 120 AL-CA; 291 ATTR-CA

During a median FUP of 33 months (21-46), **LQRSVs independently predicted CV death** in both AL CA (HR: 1.76; P =0.031) and ATTR CA (HR: 2.64; P=0.005).

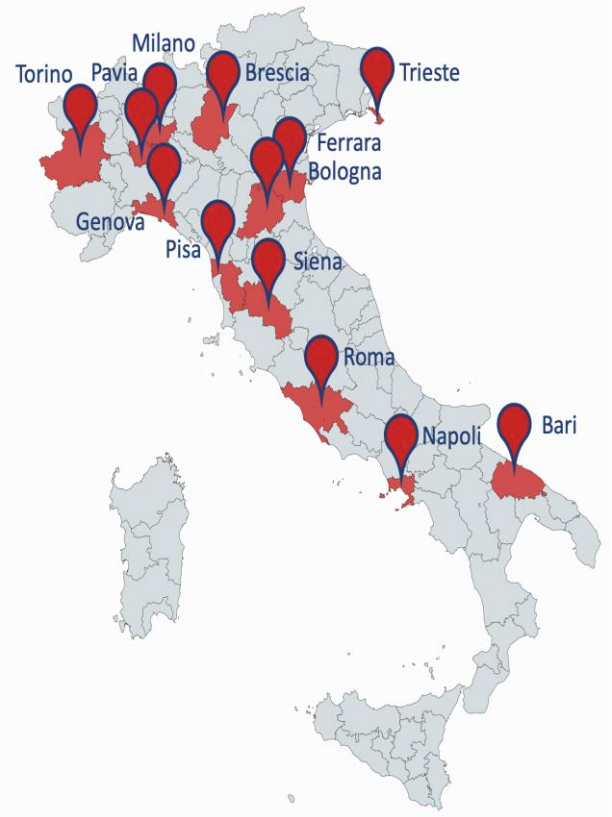


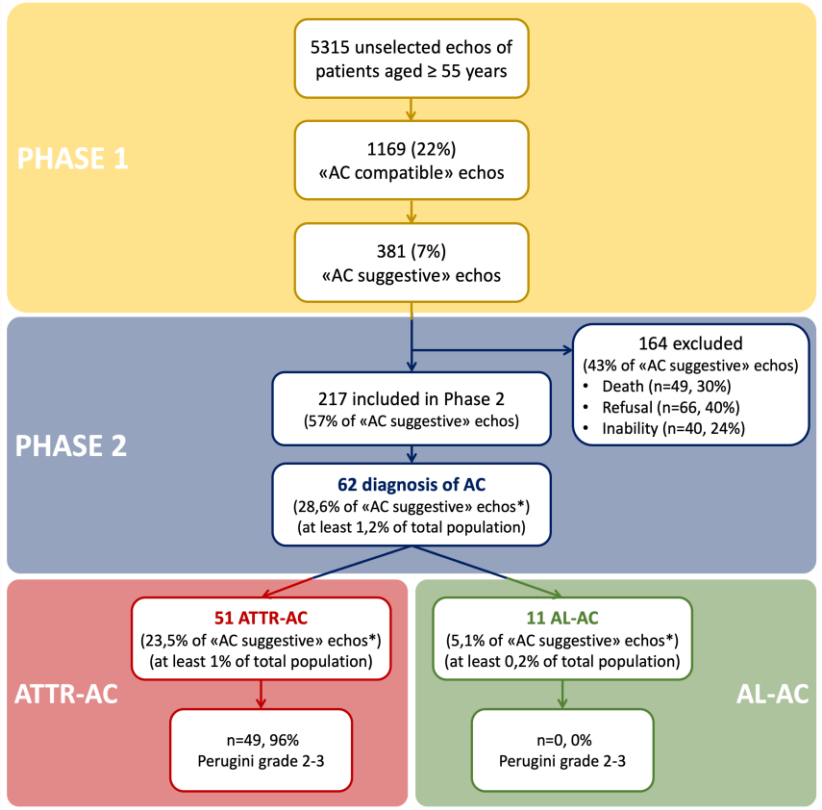
Unmasking the prevalence of amyloid cardiomyopathy in the real world: results from Phase 2 of the AC-TIVE study, an Italian nationwide survey

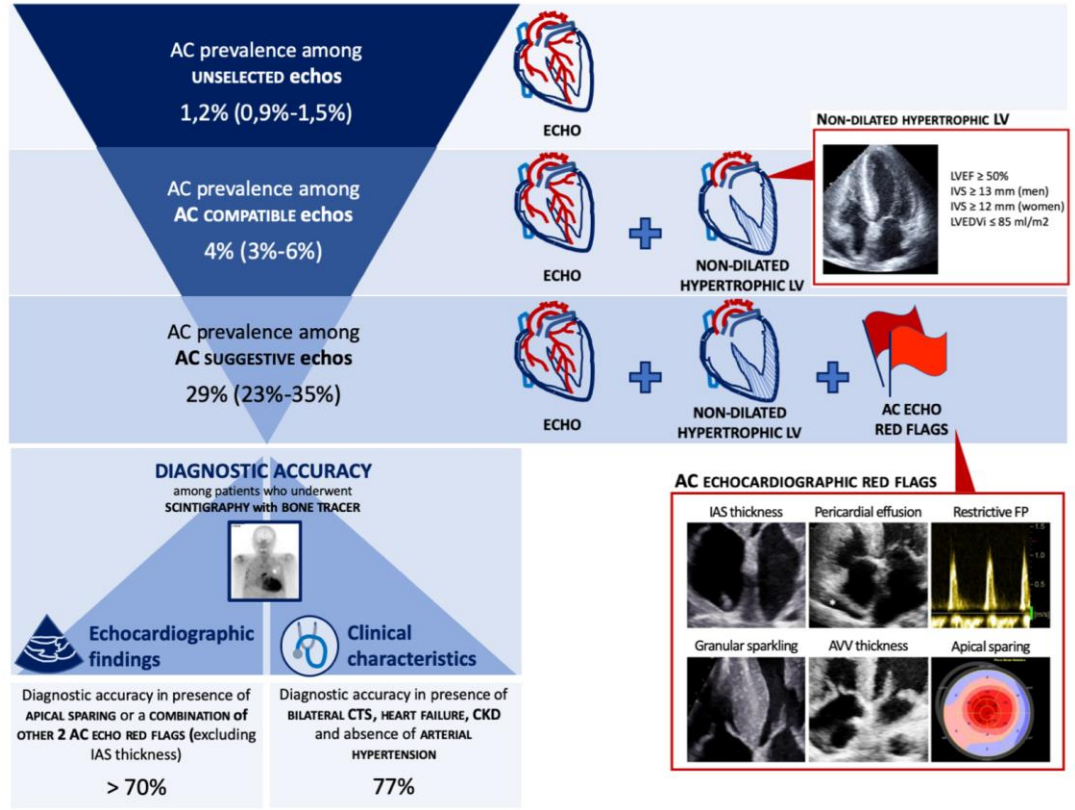
Marco Merlo, Aldostefano Porcari, …. Claudio Rapezzi, Gianfranco Sinagra

ESC European Society of Cardiology

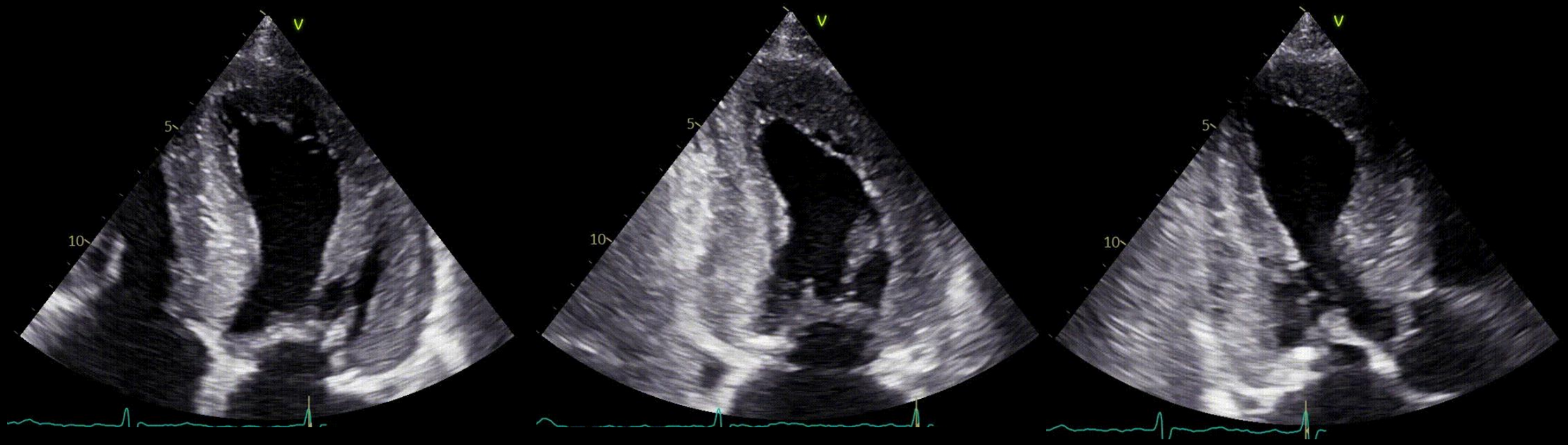
European Journal of Heart Failure (2022)
doi:10.1002/ejhf.2504





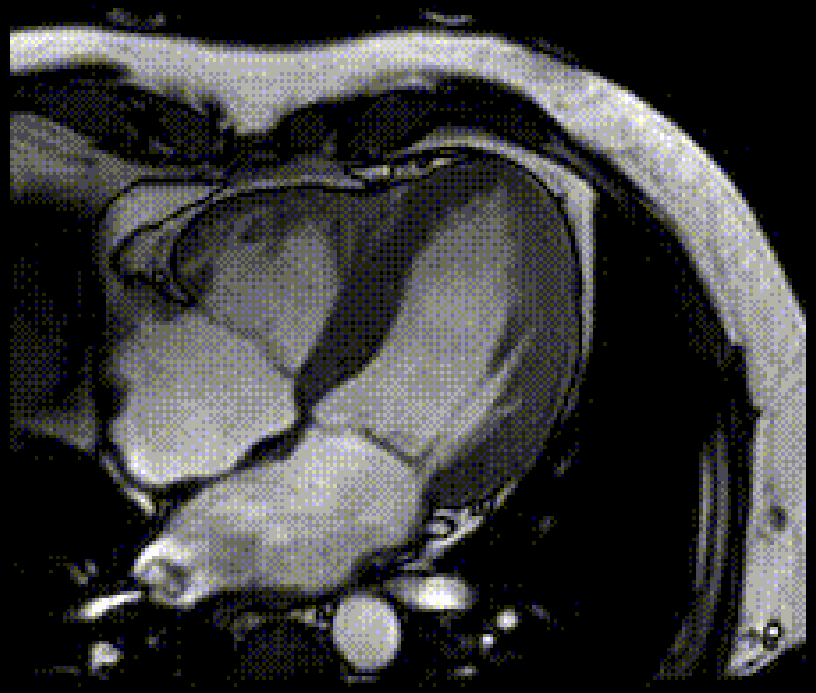


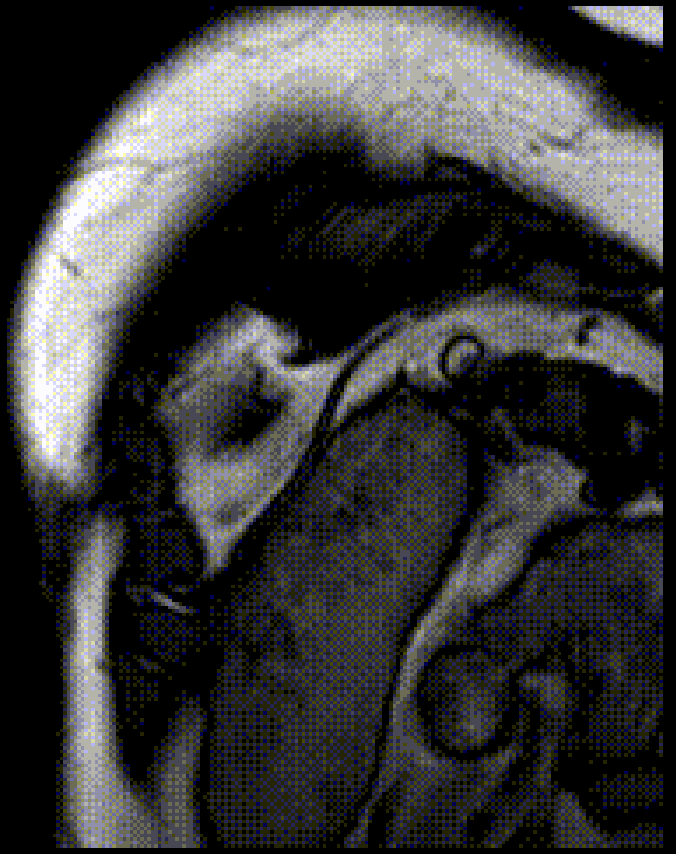
Prevalence of 29% in Italy among adults with echo red flags of AC

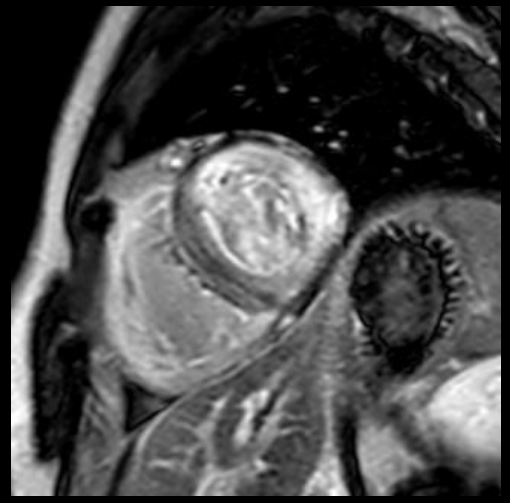


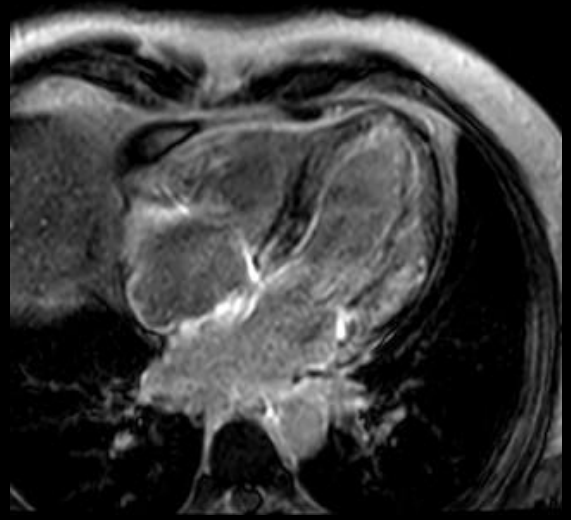
FE Vsin 45%.

Deposizione di amiloide secondo uno schema a ’’doppio gradiente’’: basale-apicale e subendocardico-subepicardico.









- VSin VTDi 57 ml/m², FE 53%
- SIV 17 mm
- VDx ipertrofico, FE 55%
- Diffuso incremento del segnale T2
- LGE subendocardico diffuso con inadeguato T.I., interessamento delle pareti atriali
- Incremento di T1 mapping e ECV (50%)

Razionale e valore fondamentale della Rete Italiana integrata dell'Amiloidosi Cardiaca

GIORNALE ITALIANO DI CARDIOLOGIA

Gianfranco Sinagra[1,2], Michele Emdin[3,4], Marco Merlo[1,2], Giuseppe Vergaro[3,4], Alberto Aimo[3,4], Elena Biagini[2,5], Massimo Imazio[6], Aldostefano Porcari[1,2], Giuseppe Limongelli[2,7], Alberto Cipriani[2,8], Marco Canepa[9], Beatrice Musumeci[10], Matteo Cameli[11], Lia Crotti[2,12,13], Gianluca Di Bella[14], Andrea Di Lenarda[15], Francesco Cappelli[16], Cristina Chimenti[17], Laura Obici[2,18], Massimo Iacoviello[19], Stefano Perlini[2,20], Maurizio Pieroni[21], Marco Metra[22], Fabrizio Oliva[23], Pasquale Perrone Filardi[24], Furio Colivicchi[25], Ciro Indolfi[26,27]

FINALITA' DELLA RETE ITALIANA DELL'AMILOIDOSI CARDIACA

- Creare **contatti stabili tra centri** disegnando e supportando **PDTA condivisi** che assicurino a tutti i pazienti **equità ed una diagnosi e cura allo stato dell'arte**;
- Garantire un **accesso dedicato alla diagnostica avanzata** con RM cardiaca, medicina nucleare, BEM (esecuzione e interpretazione), tipizzazione dei depositi di amiloide (immuno-microscopia elettronica e spettrometria di massa);
- **Promuovere la ricerca;**
- Facilitare i processi **di rimborsabilità dei nuovi farmaci** da parte degli enti regolatori (AIFA), consentendo alle **Società Scientifiche di divenire interlocutrici degli enti regolatori anche rispetto a scenari controversi (es NYHA III);** Redigere documenti nazionali finalizzati alla **standardizzazione dei processi di cura** e alla **descrizione dei modelli organizzativi** complessi legati alla malattia **(PDTA) elaborati con il contributo di Centri con consolidata esperienza di referenza ed attività in Rete**.

Razionale e valore fondamentale della Rete Italiana integrata dell'Amiloidosi Cardiaca

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