KOMPLEXNÍ KARDIO VASKULÁRNÍ CENTRUM VFN Praha

Tajemství diagnózy HFpEF

Aleš Linhart

II. interní klinika

kardiologie a angiologie

Komplexní kardiovaskulární centrum

VFN a 1. LF UK

Praha

VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

UNIVERSITAS CAROLI · FACULTAS MEDICA PRIMA · URBIS

CO JE VLASTNĚ HF-PEF?

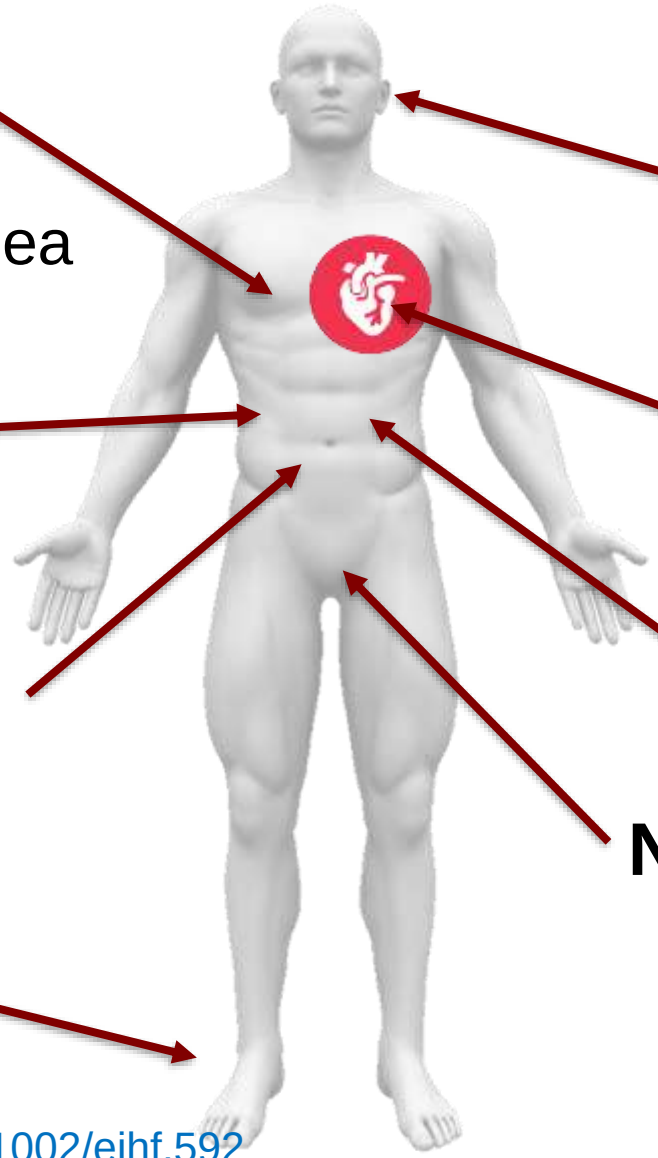
Heart failure signs and symptoms

Shortness of breath
Orthopnea
Paroxysmal nocturnal dyspnea

Bendopnea

Abdominal distension

Leg oedema



Fatigue
Depression
Confusion

Palpitations
Syncopy

Lack of apetite

Nycturia

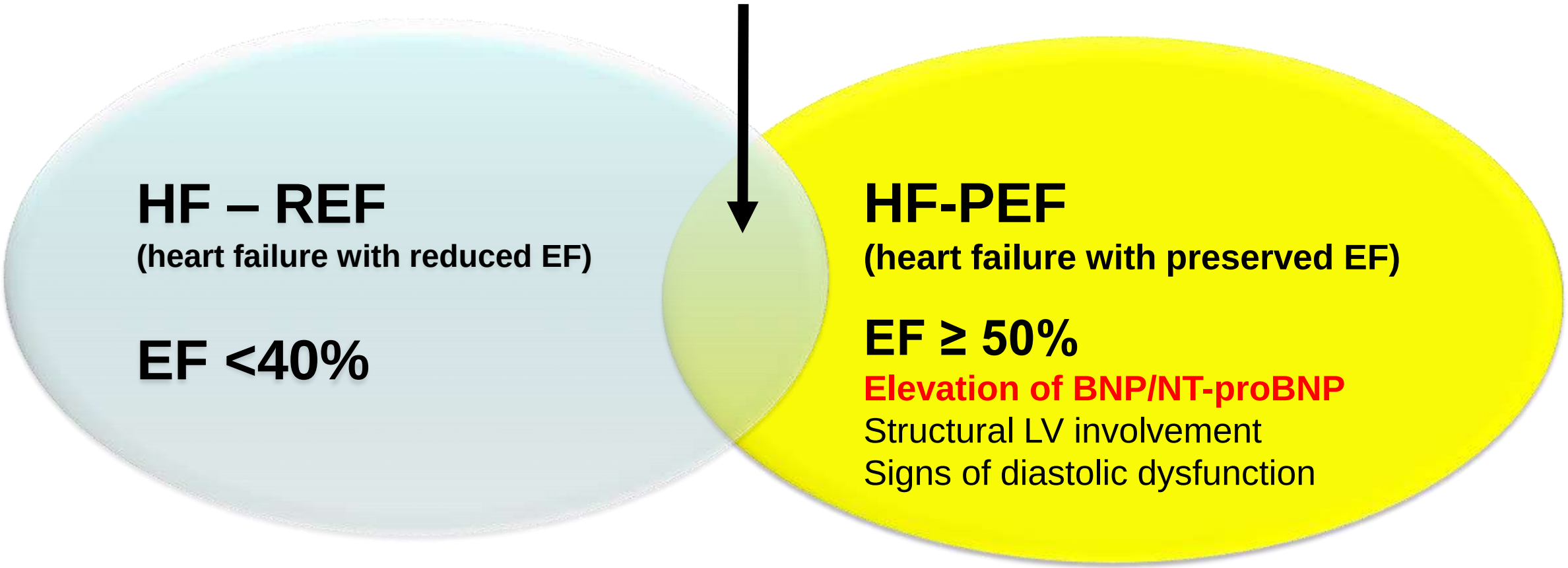
European Journal of Heart Failure (2016) doi:10.1002/ejhf.592

Left heart failure

All types = symptoms ± clinical signs of heart failure

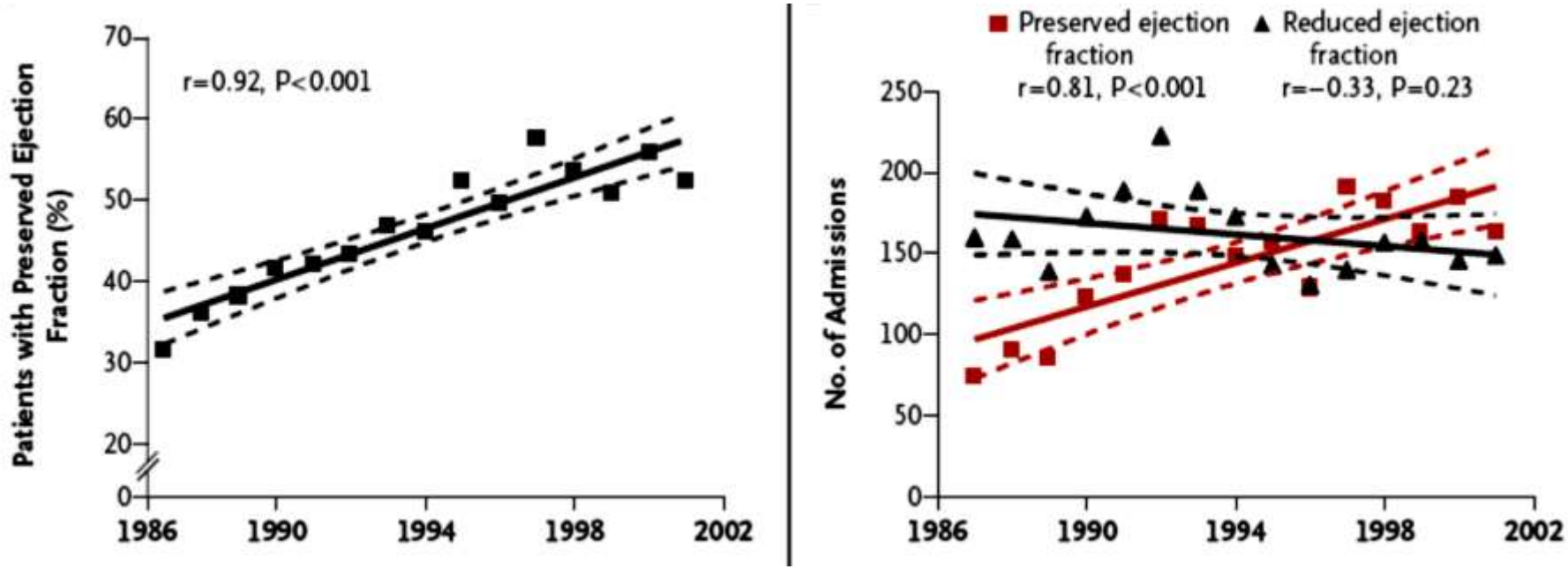
HFmrEF

(heart failure with mid-range EF)



European Journal of Heart Failure (2016) doi:10.1002/ejhf.592

Zvyšující se incidence srdečního selhání se zachovalou EF (diastolického)



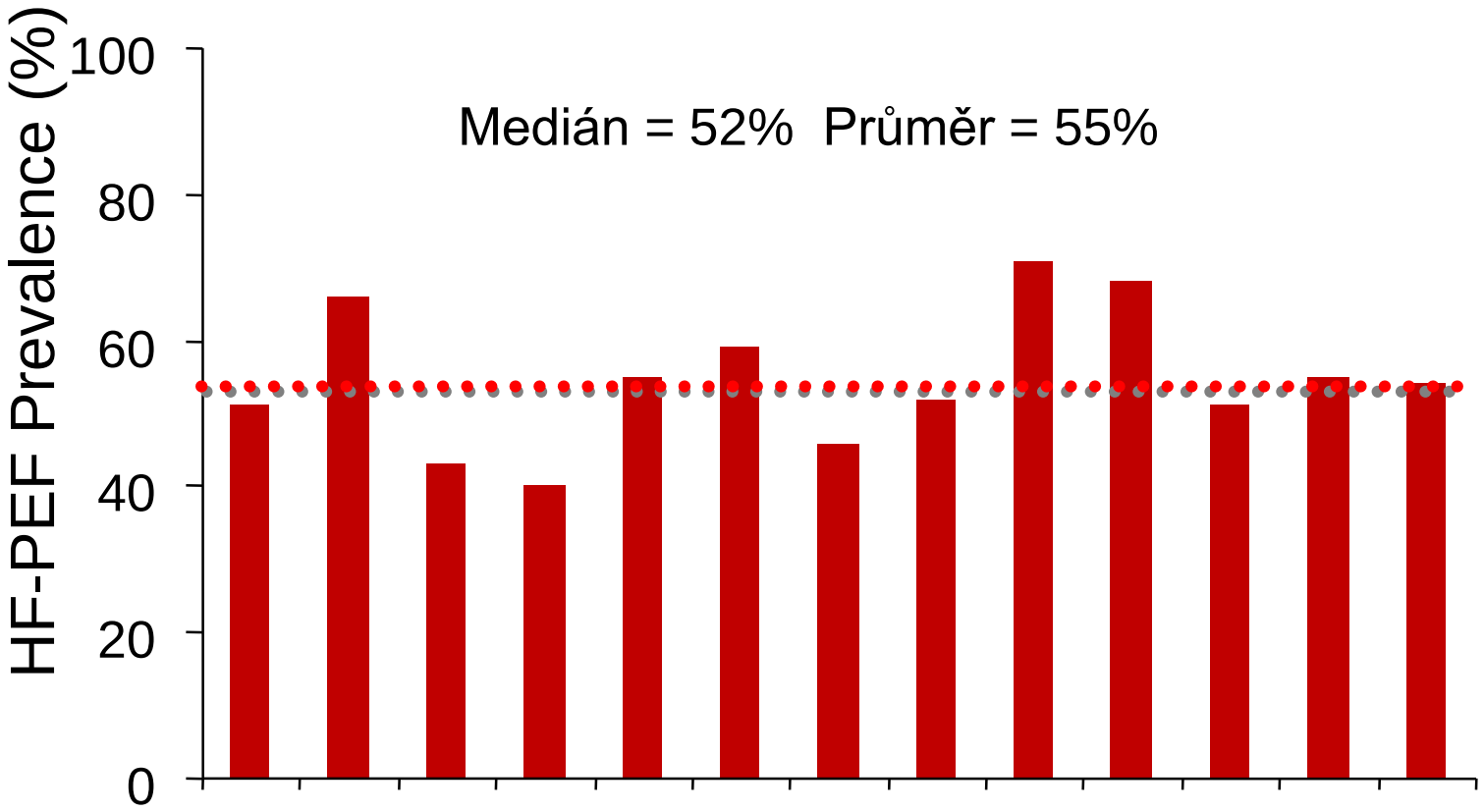
- n=4596 hospitalizovaní pro srdeční selhání v jediné nemocnici v průběhu 15 let → zvyšující se proporce nemocných se selháním a normální EF

N Engl J Med 2006; 355; 251

Prevalence HF-PEF

13 komunitních studií

1997- 2006



Hogg K et al, 2004 and Owan T et al, 2005, Owan T, NEJM, 2006; Bursi F, JAMA, 2006

European Journal of Heart Failure (2016)
doi:10.1002/ejhf.592

ESC GUIDELINES

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

Developed with the special contribution of the Heart Failure Association (HFA) of the ESC

Authors/Task Force Members: Piotr Ponikowski* (Chairperson) (Poland), Adriaan A. Voors* (Co-Chairperson) (The Netherlands), Stefan D. Anker (Germany), Héctor Bueno (Spain), John G. F. Cleland (UK), Andrew J. S. Coats (UK), Volkmar Falk (Germany), José Ramón González-Juanatey (Spain), Veli-Pekka Harjola (Finland), Ewa A. Jankowska (Poland), Mariell Jessup (USA), Cecilia Linde (Sweden), Petros Nihoyannopoulos (UK), John T. Parissis (Greece), Burkert Pieske (Germany), Jillian P. Riley (UK), Giuseppe M. C. Rosano (UK/Italy), Luis M. Ruilope (Spain), Frank Ruschitzka (Switzerland), Frans H. Rutten (The Netherlands), Peter van der Meer (The Netherlands)

Threshold levels of BNP and NTproBNP

Valid for HF-rEF and HF-pEF

New-onset acute HF

NT-proBNP < 300 pg/ml

BNP < 100 pg/ml

Probability

< 2%

New-onset non-acute

NT-proBNP < 125 pg/ml

BNP < 35 pg/ml

Probability

<10%

Thresholds are set at their best negative predictive values

But used as a positive diagnostic criterion

ESC guidelines 2012 European Heart Journal (2012) 33, 1787–1847

Predictive values of NT-pro BNP at specific cut-offs (Extract from NACB guidelines)

Cut-off hodnota pro akutní SS

Cut-off, pg/mL	300	450	600	900	1000
Positive predictive value	62 %	68 %	73 %	86 %	78 %
Negative predictive value	99 %	99 %	97 %	94 %	91 %

Januzzi JL, Richards AM, eds. An International Consensus Statement Regarding Amino Terminal Pro-B-Type Natriuretic Peptide Testing: The International NT-proBNP Consensus Panel. Am J Cardiol. 2008; 101(3A).

Age dependence pf NT-pro BNP in acute heart failure

Age	Cut-off	Sensitivity, %
< 50 years	< 450 pg/mL	97
50-75 years	< 900 pg/mL	90
> 75 years	< 1800 pg/mL	85

Januzzi JL, Richards AM, eds. An International Consensus Statement Regarding Amino Terminal Pro-B-Type Natriuretic Peptide Testing: The International NT-proBNP Consensus Panel. Am J Cardiol. 2008; 101(3A).

HF-pEF + HF-mrEF Guidelines 2016

BNP >35 pg/mL and/orNT-proBNP >125 pg/mL

- **Structural abnormalities**
  - Left atrial volume index (LAVi) >34 mL/m^2
  - LV mass index (LVMi)
    - ≥115 g/m^2 in men
    - ≥95 g/m^2 in women

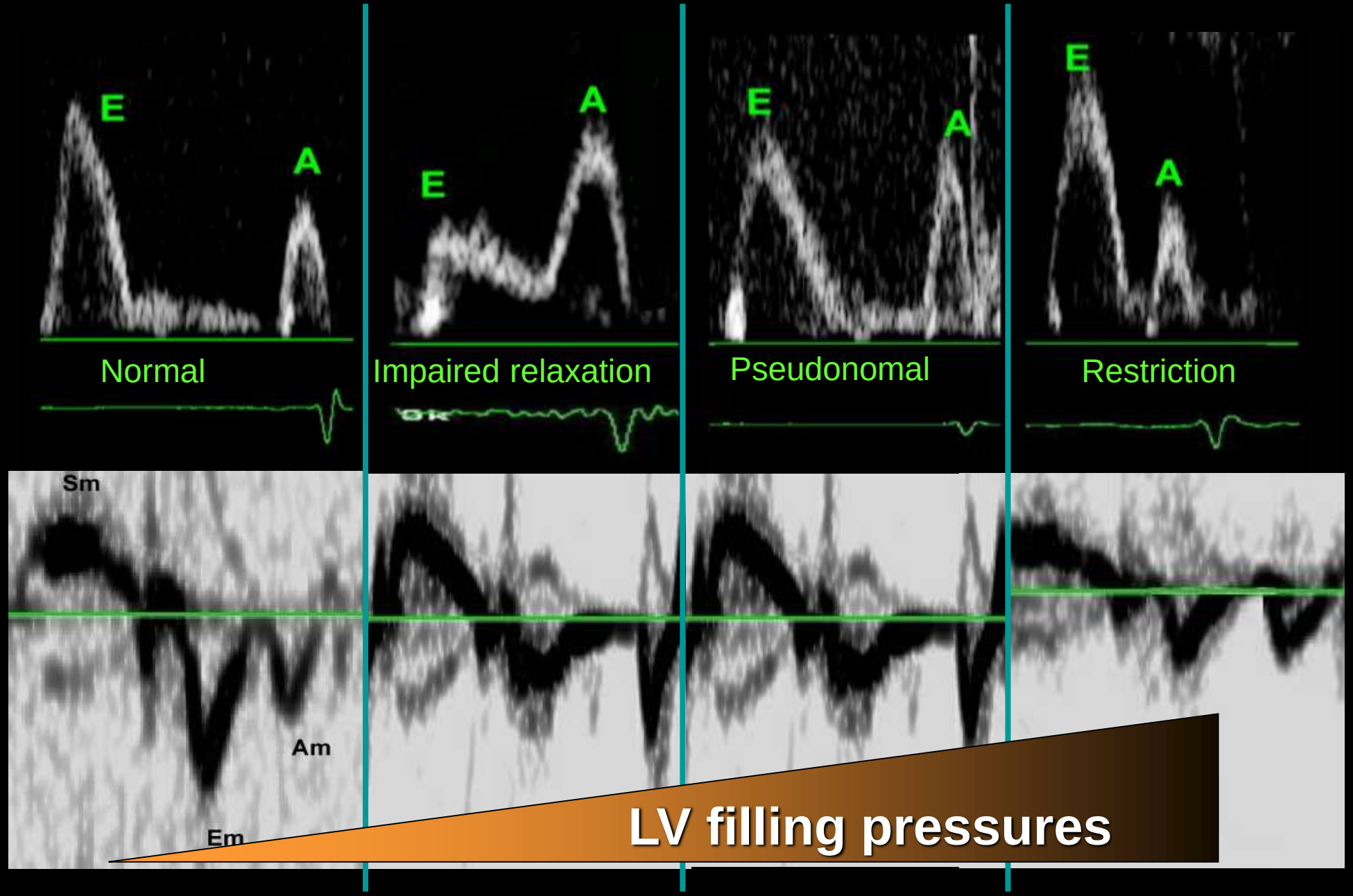
- **Functional abnormalities**
  - E/e′ ≥13
  - Septal and lateral e´<9 cm/s

European Journal of Heart Failure (2016) doi:10.1002/ejhf.592

Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging

Sherif F. Nagueh, Chair, MD, FASE,[1] Otto A. Smiseth, Co-Chair, MD, PhD,[2] Christopher P. Appleton, MD,[1] Benjamin F. Byrd, III, MD, FASE,[1] Hisham Dokainish, MD, FASE,[1] Thor Edvardsen, MD, PhD,[2] Frank A. Flachskampf, MD, PhD, FESC,[2] Thierry C. Gillebert, MD, PhD, FESC,[2] Allan L. Klein, MD, FASE,[1] Patrizio Lancellotti, MD, PhD, FESC,[2] Paolo Marino, MD, FESC,[2] Jae K. Oh, MD,[1] Bogdan Alexandru Popescu, MD, PhD, FESC, FASE,[2] and Alan D. Waggoner, MHS, RDCS[1], *Houston, Texas; Oslo, Norway; Phoenix, Arizona; Nashville, Tennessee; Hamilton, Ontario, Canada; Uppsala, Sweden; Ghent and Liège, Belgium; Cleveland, Ohio; Novara, Italy; Rochester, Minnesota; Bucharest, Romania; and St. Louis, Missouri*

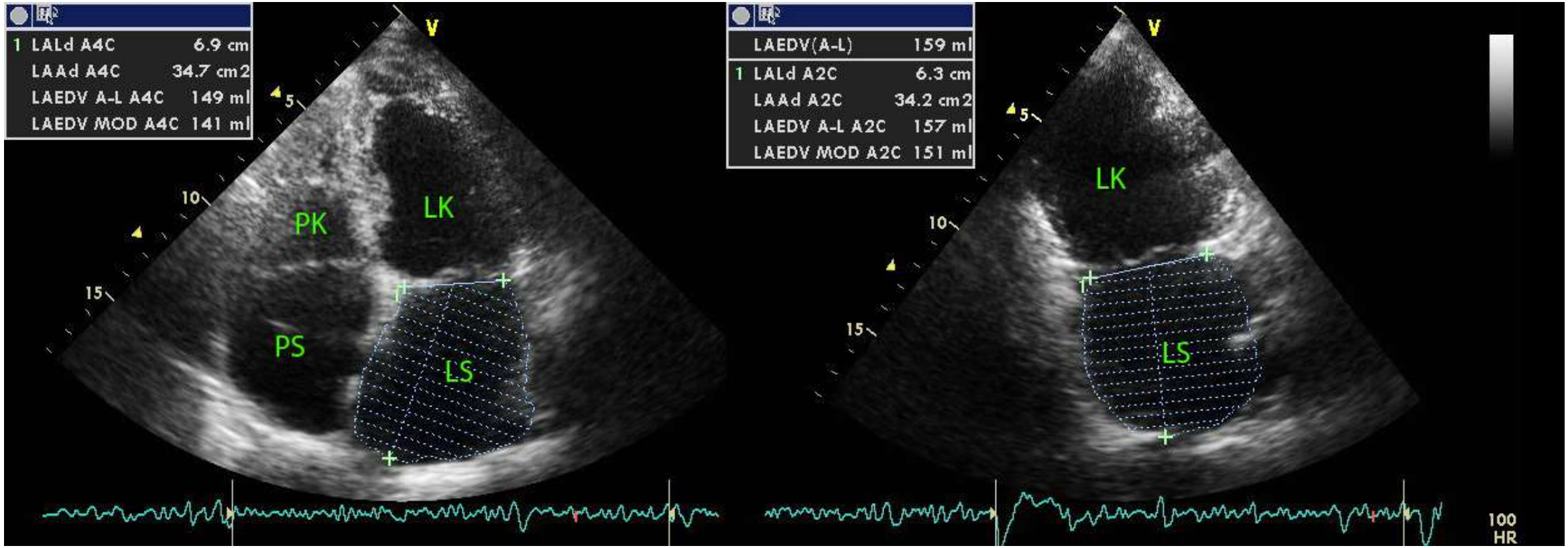
(J Am Soc Echocardiogr 2016;29:277-314.)



Paleček and Linhart Cor Vasa 2009; 51(11–12):789–804.

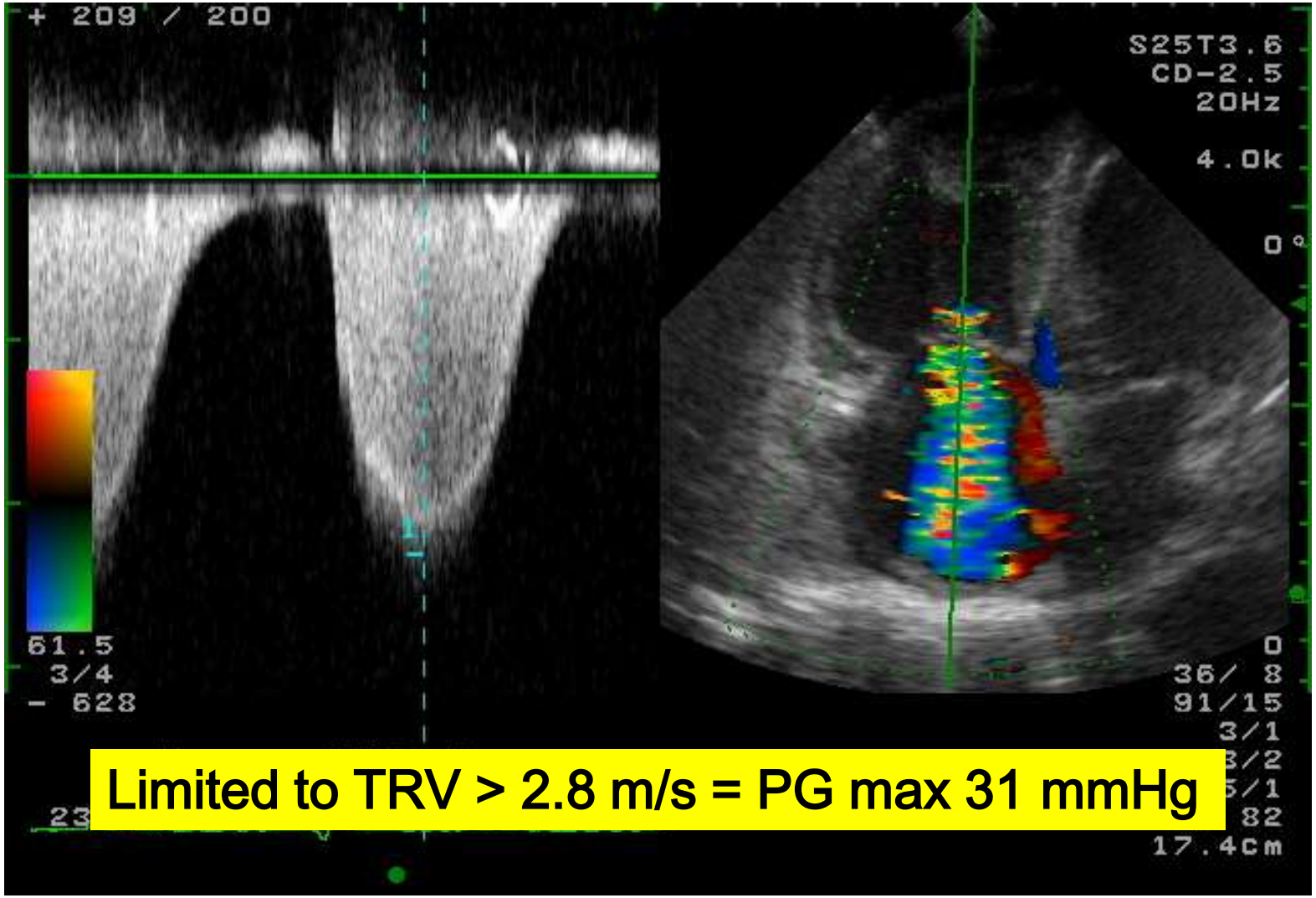
Left atrial volume index (LAVi)

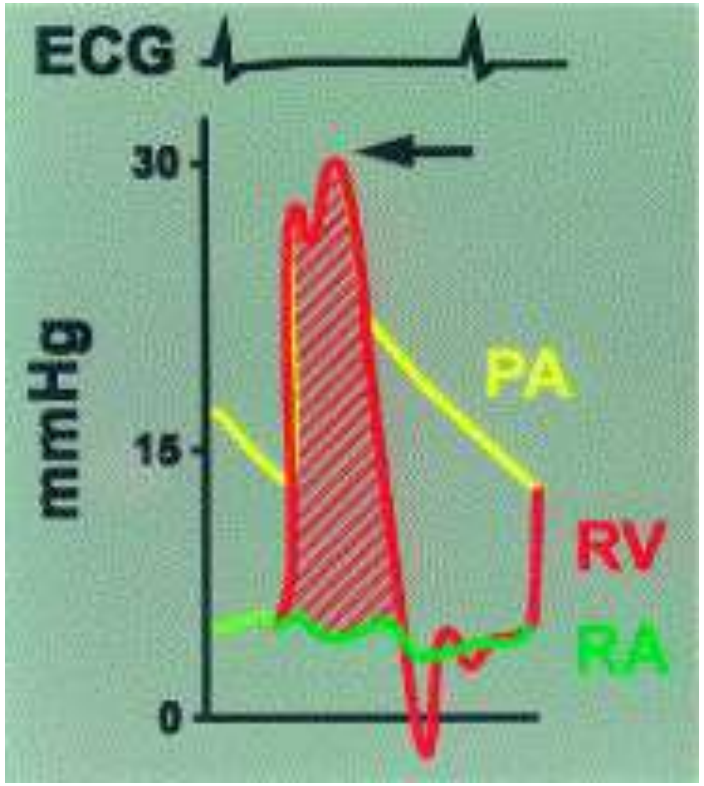
- 2 perpendicular planes
- Area length metoda



Source
General University Hospital
Prague, CZ

Pulmonary pressure estimates



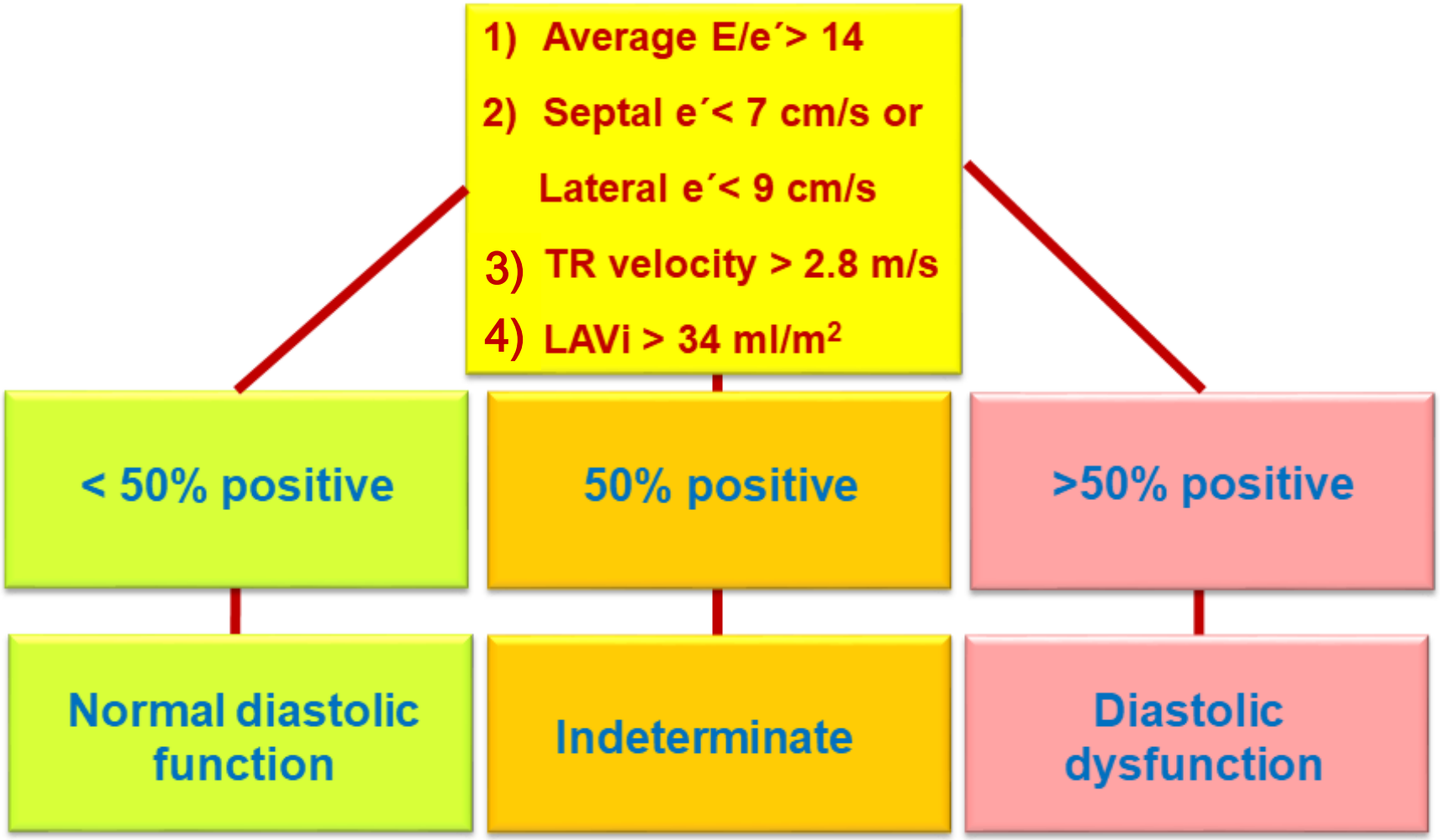


PASP

peak TR gradient + RAP

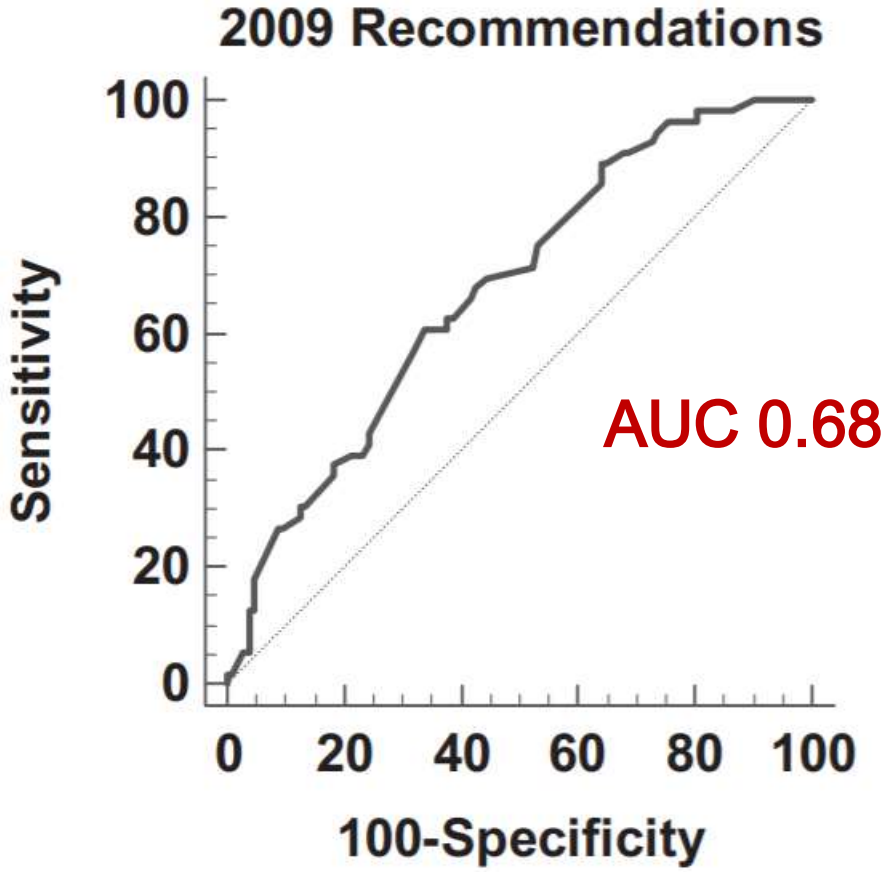
Nagueh et al. J Am Soc Echocardiogr 2016;29:277-314
Lancellotti et al. European Heart Journal - Cardiovascular Imaging 2017;18:961–968

How to make a diagnosis of HF-pEF /HF-mrEF

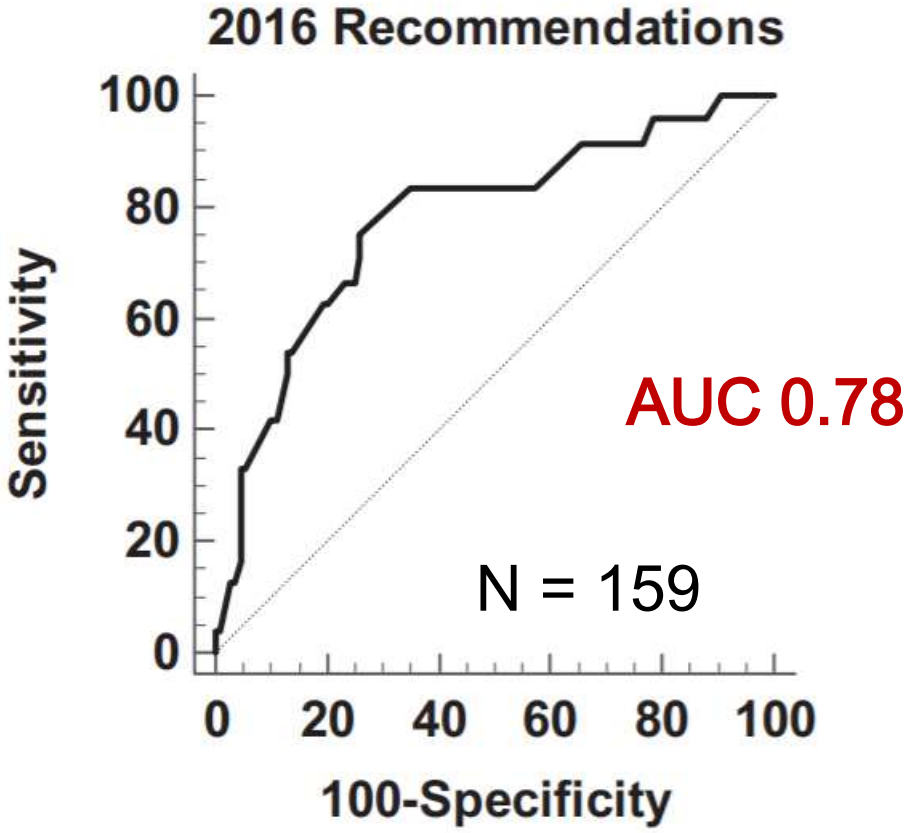


Nagueh et al. J Am Soc Echocardiogr 2016;29:277-314
Lancellotti et al. European Heart Journal - Cardiovascular Imaging 2017;18:961–968
Linhart A and Cecchi F. Int J Cardiol. 2018;257:344-350.

Current algorithms have a substantially better yet not optimal performance
Euro-filling study



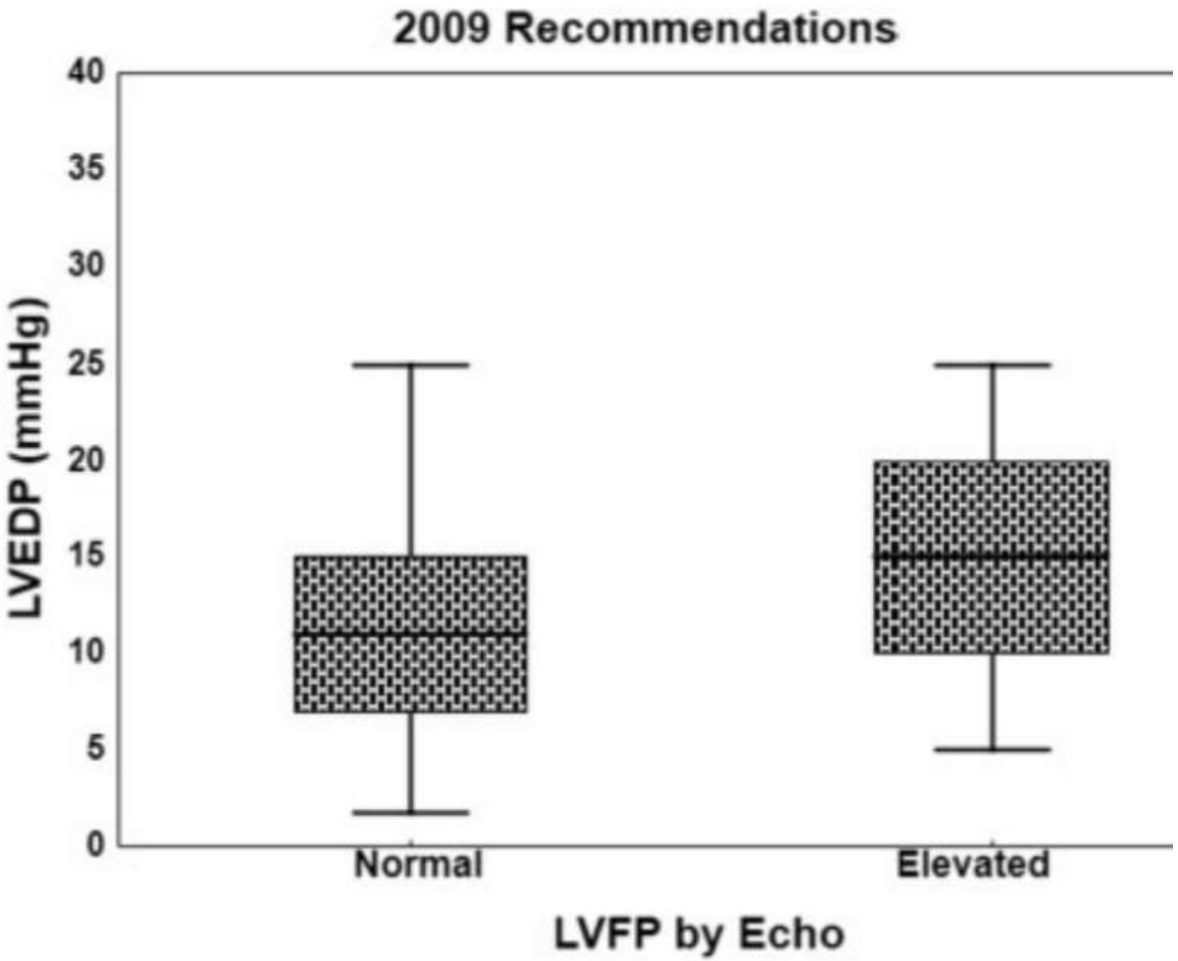
sensitivity 43%, specificity 75%

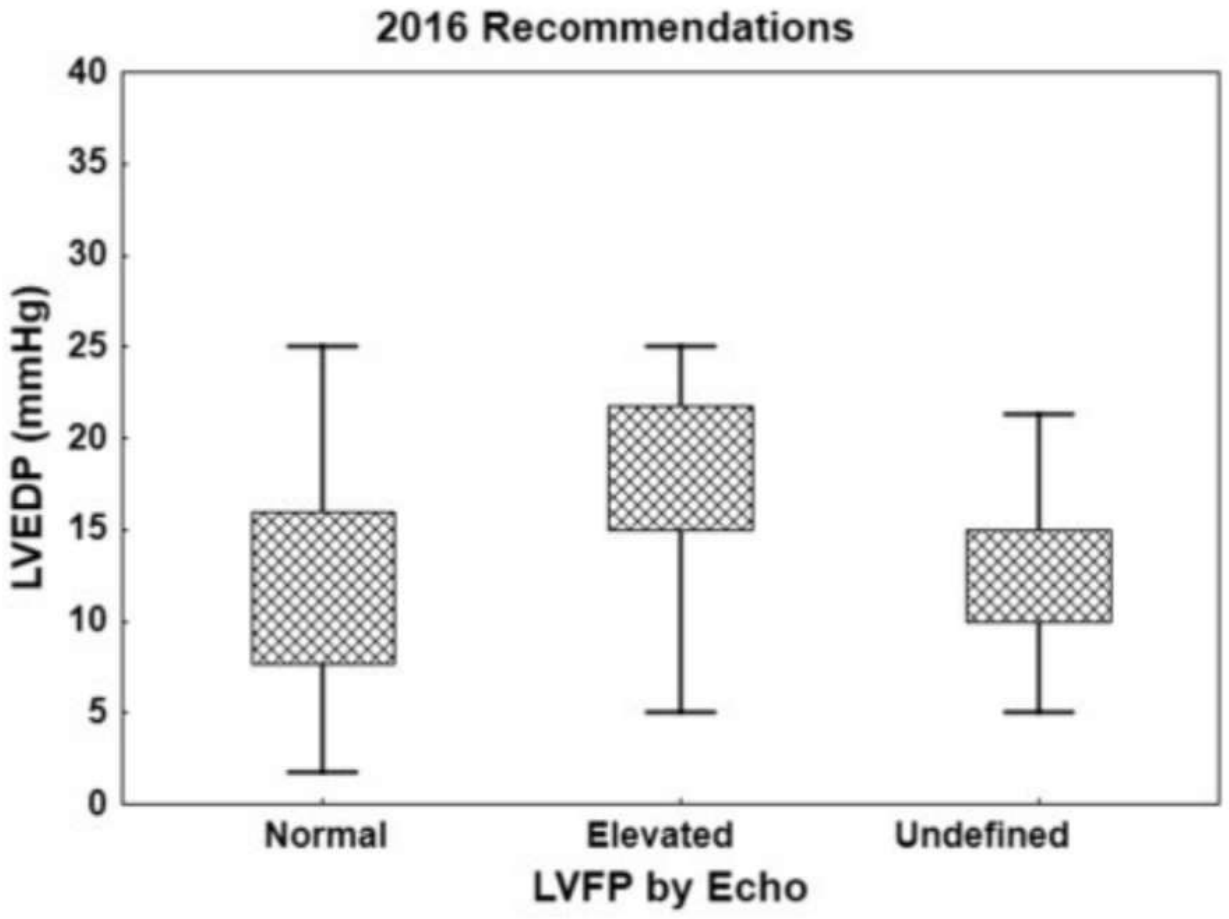


sensitivity 75%, specificity 74%

Lancellotti et al. European Heart Journal - Cardiovascular Imaging (2017) 18, 961–968

Undetermined are really „undetermined“





Lancellotti et al. European Heart Journal - Cardiovascular Imaging (2017) 18, 961–968

ESC European Society of Cardiology

European Heart Journal (2019) **40**, 3297–3317
doi:10.1093/eurheartj/ehz641

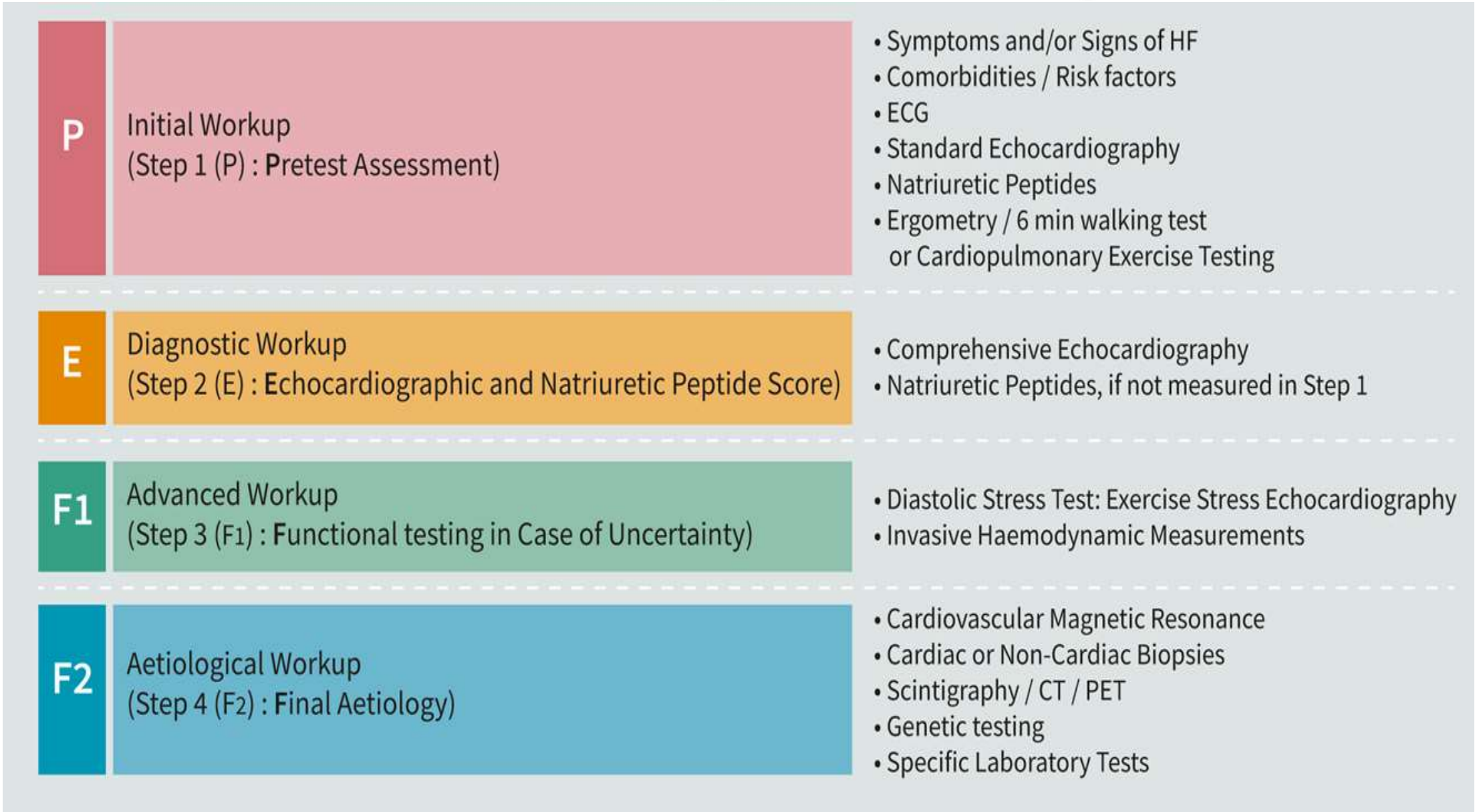
FASTTRACK CLINICAL RESEARCH
Heart failure/cardiomyopathy

How to diagnose heart failure with preserved ejection fraction: the HFA–PEFF diagnostic algorithm: a consensus recommendation from the Heart Failure Association (HFA) of the European Society of Cardiology (ESC)

Burkert Pieske[1,2,3,4]*, Carsten Tschöpe[1,2,5], Rudolf A. de Boer [6], Alan G. Fraser[7], Stefan D. Anker[1,2,5,8], Erwan Donal[9], Frank Edelmann[1,2], Michael Fu[10], Marco Guazzi[11,12], Carolyn S.P. Lam[13,14], Patrizio Lancellotti[15], Vojtech Melenovsky[16], Daniel A. Morris[1], Eike Nagel [17,18], Elisabeth Pieske-Kraigher[1], Piotr Ponikowski[19], Scott D. Solomon[20], Ramachandran S. Vasan[21], Frans H. Rutten [22], Adriaan A. Voors[6], Frank Ruschitzka[23], Walter J. Paulus[24], Petar Seferovic[25], and Gerasimos Filippatos[26,27]

HFA-PEFF diagnostic algorithm

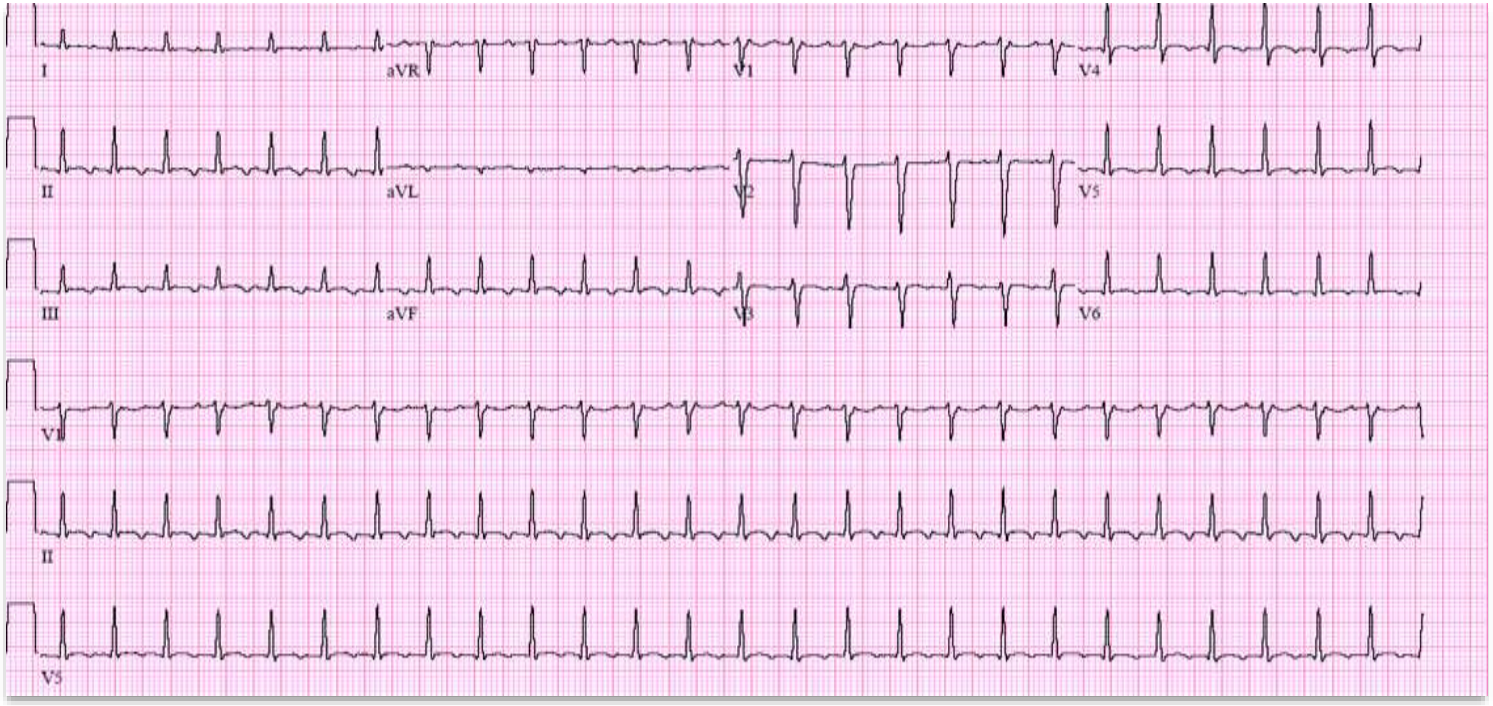
ESC European Society of Cardiology



European Heart Journal, Volume 40, Issue 40, 21 October 2019, Pages 3297–3317, https://doi.org/10.1093/eurheartj/ehz641

Why ECG ?

- **Probability of HF in presence of normal ECG[1]**
  - **New acute < 2%**
  - **New non-acute <10-14%**



The most important indication is to detect atrial fibrillation (AF), which is highly predictive of underlying HFpEF[2]

1. Eur J Heart Fail. 2016 Aug;18(8):891-975.
2. European Heart Journal (2019) 40, 3297–3317

Major and minor criteria for NPs according to HFA-PEFF scoring system

	SINUS RHYTHM		ATRIAL FIBRILLATION	
	NT-proBNP (pg/mL)	BNP (pg/mL)	NT-proBNP (pg/mL)	BNP (pg/mL)
MAJOR	> **220**	> **80**	> 660	> 240
MINOR	**125** - 220	**35** - 80	375 - 660	105 - 240

Pieske et al. European Heart Journal (2019) 40, 3297–3317

Marek *et al. Cardiovascular Ultrasound* (2019) 17:22
https://doi.org/10.1186/s12947-019-0172-0

Cardiovascular Ultrasound

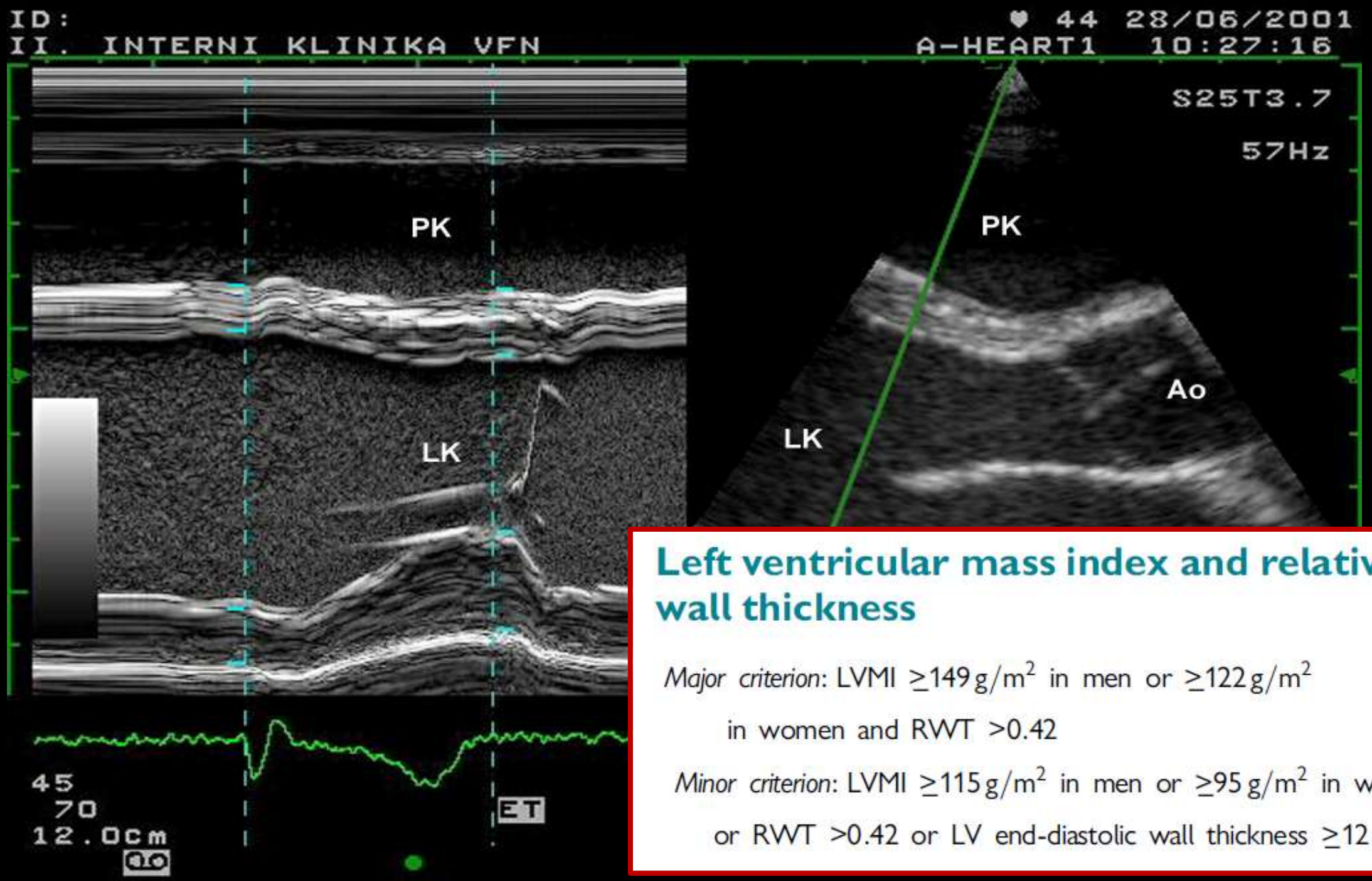
RESEARCH Open Access

Normative reference ranges for echocardiographic chamber dimensions in a healthy Central European population: results from the Czech post-MONICA survey

Josef Marek[1], Jean-Claude Lubanda[1], Renata Cifkova[1,2], Petr Kuchynka[1], Lubor Golan[1], Eduard Nemcek[1] and Ales Linhart[1*]

n = 575, median age 42 years [IQR 34–52], 57% females

HYPERTROFIE LEVÉ KOMORY?



Left ventricular mass index and relative wall thickness

Major criterion: LVMI $\geq 149\,g/m^2$ in men or $\geq 122\,g/m^2$ in women and RWT >0.42

Minor criterion: LVMI $\geq 115\,g/m^2$ in men or $\geq 95\,g/m^2$ in women or RWT >0.42 or LV end-diastolic wall thickness ≥ 12 mm

Suggested abnormality limits – Czech Population POSTMONICA

Variable	Males			Females		
	Abnormal			Abnormal		
M-mode method						
Interventricular septum (mm)	> 12.7					
Posterior wall (mm)	> 11.0	> 13.3	> 14.0	> 9.7	> 11.5	> 12.3
LV mass, BSA (g/m^2)	> 122	> 147	> 167	> 104	> 129	> 141
LV mass, height$^{2.7}$ (g/m)	> 53	> 68	> 76	> 47	> 69	> 76

Left ventricular mass index and relative wall thickness

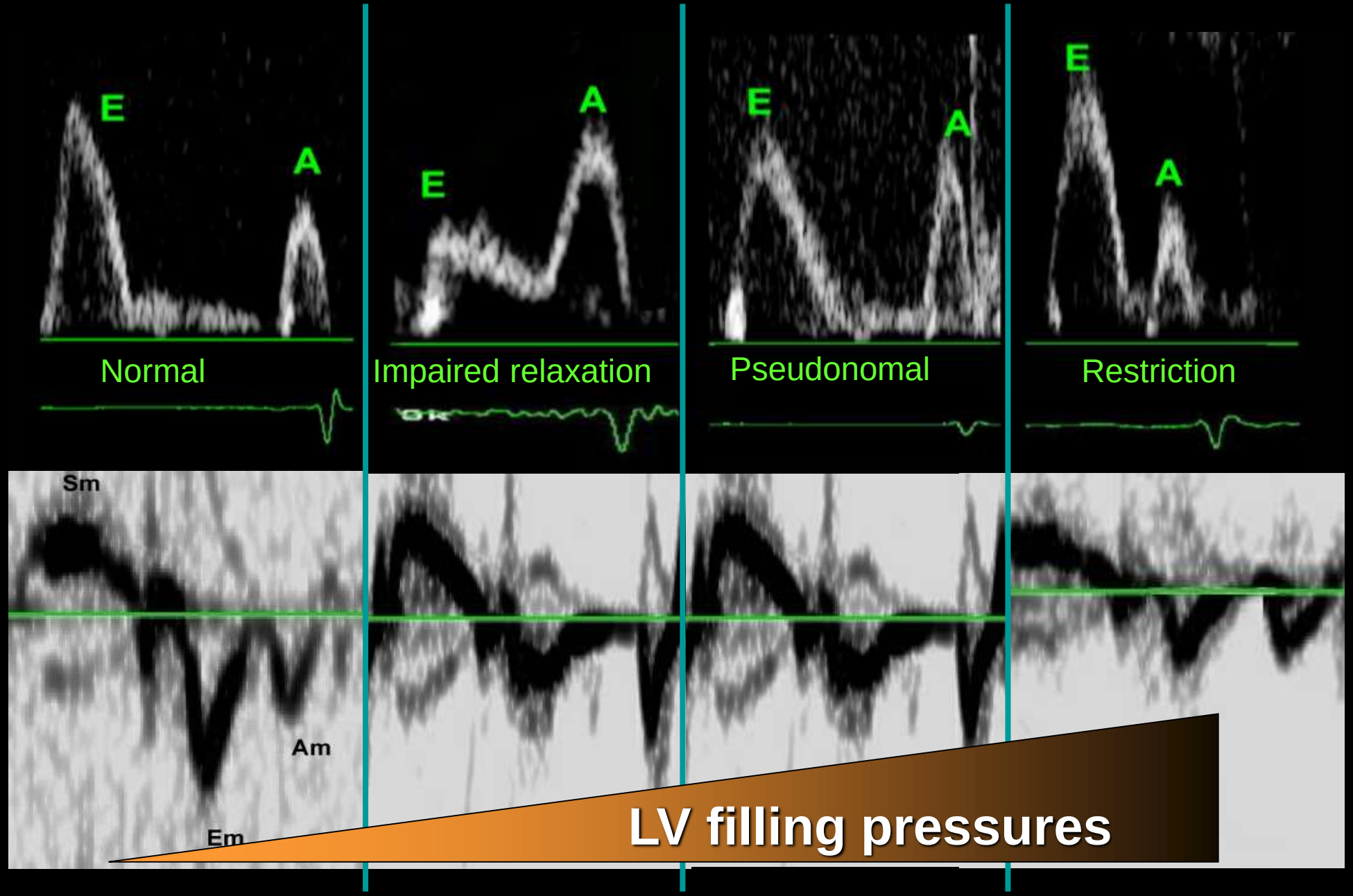
Major criterion: LVMI ≥149 g/m^2 in men or ≥122 g/m^2 in women and RWT >0.42

Minor criterion: LVMI ≥115 g/m^2 in men or ≥95 g/m^2 in women or RWT >0.42 or LV end-diastolic wall thickness ≥12 mm

115 g/m^2 149 g/m^2 95 g/m^2 122 g/m^2

Marek J et al. Cardiovasc Ultrasound 2019
European Journal of Heart Failure (2016) doi:10.1002/ejhf.592

E/E´?



Paleček and Linhart Cor Vasa 2009; 51(11–12):789–804.

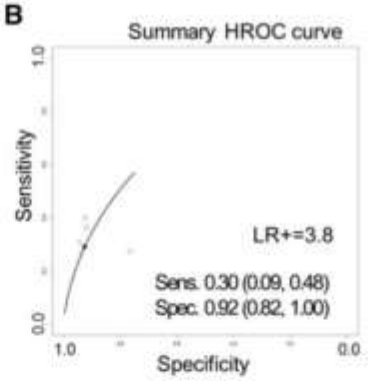
Dg. Senzitivita a specificita E/e´ k dg. zvýšených plnících tlaků

A

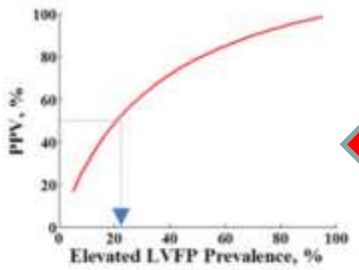
E/è Lateral >12

Study	LVFP	N	Prev. (%)	TP	FP	FN	TN	Sens. (95% CI)	Spec. (95% CI)
Kidawa, 2005* (24)	LVEDP	45/50	42	6	1	13	25	0.32 [0.15, 0.55]	0.96 [0.77, 1.00]
Ozer, 2011 (43)	LVEDP	45	51	6	1	17	21	0.26 [0.12, 0.47]	0.96 [0.74, 0.99]
Previtali, 2012* (46)	LVEDP	62/57	61	10	8	28	16	0.26 [0.15, 0.42]	0.67 [0.46, 0.82]
Rivas-Gotz, 2003* (18)	PCWP	51/55	67	15	1	20	15	0.43 [0.28, 0.59]	0.94 [0.66, 0.99]
Hadano, 2005* (23)	PCWP	63/65	19	5	4	7	47	0.42 [0.18, 0.69]	0.92 [0.81, 0.97]
Mansencal, 2004* (20)	Pre-A	20/20	25	0	0	5	15	0.08 [0.00, 0.62]	0.97 [0.65, 1.00]
Heterogeneity								I^2=0, P=0.48	I^2=63, P=0.02

B



C



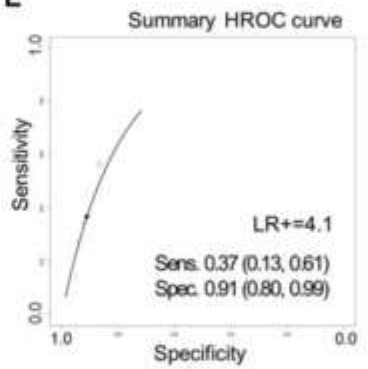
Sens. 0,30
Spec. 0,92

D

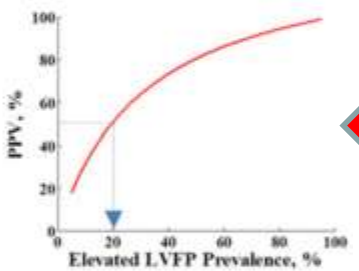
E/è Mean >13

Study	LVFP	N	Prev. (%)	TP	FP	FN	TN	Sens. (95% CI)	Spec. (95% CI)
Dokainish, 2010* (35)	LVEDP	122/122	81	57	3	42	20	0.58 [0.48, 0.67]	0.87 [0.66, 0.96]
Ozer, 2011 (43)	LVEDP	45	51	6	1	17	21	0.26 [0.12, 0.47]	0.96 [0.74, 0.99]
Dokainish, 2004* (19)	PCWP	19/19	58	6	2	5	6	0.54 [0.27, 0.80]	0.75 [0.38, 0.94]
Bhella, 2011* (39)	PCWP	10/10	50	3	0	2	5	0.58 [0.22, 0.88]	0.92 [0.39, 1.00]
Dini, 2010 (33)	Pre-A	55	47	9	2	17	27	0.35 [0.19, 0.54]	0.93 [0.76, 0.98]
Manouras, 2013* (48)	Pre-A	35/38	69	2	1	22	10	0.08 [0.02 ,0.28]	0.91 [0.56, 0.99]
Heterogeneity								I^2=75, P=0.001	I^2=0, P=0.70

E



F



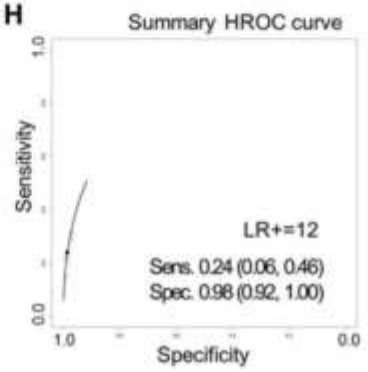
Sens. 0,37
Spec. 0,91

G

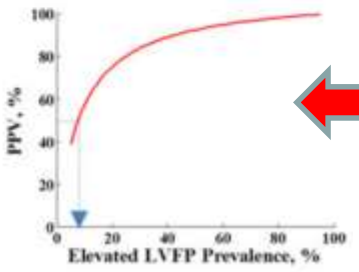
E/è Septal >15

Study	LVFP	N	Prev. (%)	TP	FP	FN	TN	Sens. (95% CI)	Spec. (95% CI)
Ozer, 2011 (43)	LVEDP	45	51	7	1	16	21	0.30 [0.15, 0.52]	0.96 [0.74, 0.99]
Rivas-Gotz, 2003* (18)	PCWP	52/55	69	12	1	24	15	0.33 [0.20, 0.50]	0.94 [0.66, 0.99]
Ommen, 2000* (15)	LVMDP	61/64	30	4	0	14	43	0.24 [0.10, 0.48]	0.99 [0.84, 1.00]
Rudko, 2008* (32)	LVMDP	43/39	42	2	0	16	25	0.13 [0.04, 0.36]	0.98 [0.76, 1.00]
Heterogeneity								I^2=0, P=0.45	I^2=0, P=0.74

H



I



Sens. 0,24
Spec. 0,98

Sharifov et al. J Am Heart Assoc. 2016;5:e002530 doi: 10.1161/JAHA.115.002530

E/e´

Average septal-lateral *E/e′* ratio[1]

Major criterion: average septal–lateral E/e' ratio ≥ 15

Minor criterion: average septal–lateral E/e' ratio 9-14

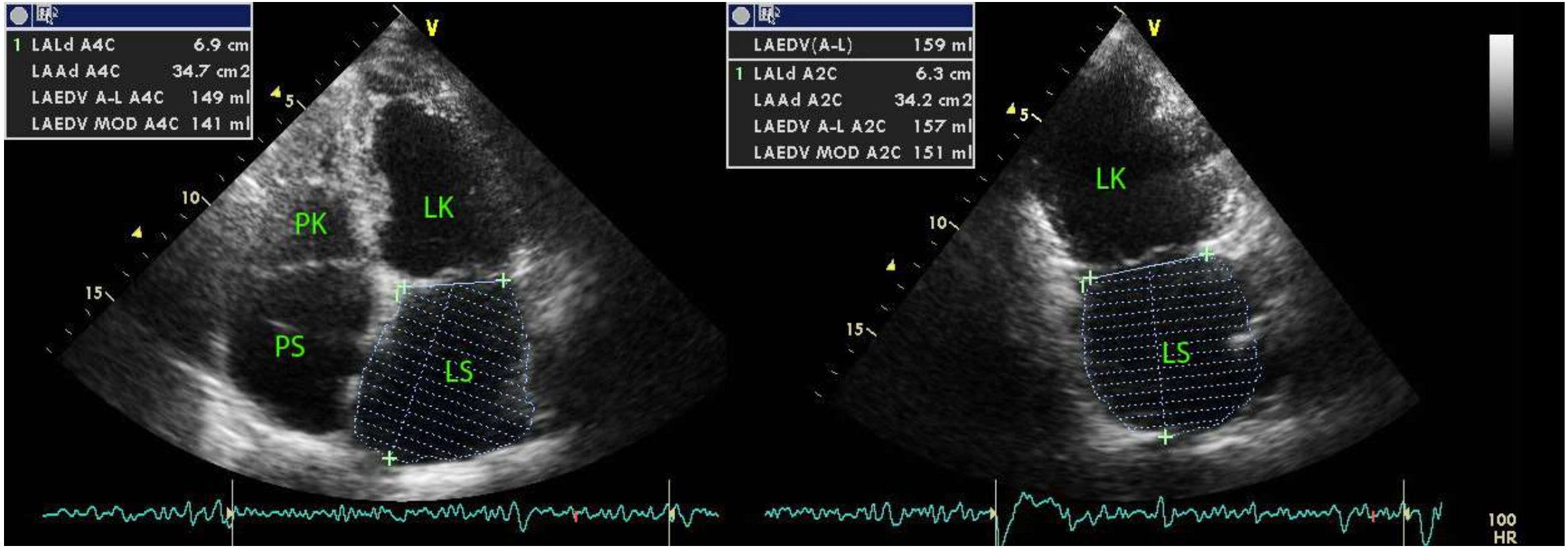
There is insufficient evidence to support that E/e can reliably estimate LVFP in preserved EF. The diagnostic accuracy of E/e to identify/exclude elevated LVFP and DD/HF-pEF is limited and requires further validation in a well-designed prospective clinical trial.[2]

1. Peiske et al. European Journal of Heart Failure (2016) doi:10.1002/ejhf.592
2. Sharifov et al. J Am Heart Assoc. 2016;5:e002530 doi: 10.1161/JAHA.115.002530

DILATACE LEVÉ SÍNĚ?

Left atrial volume index (LAVi)

- 2 perpendicular planes
- Area length metoda



Source
General University Hospital
Prague, CZ

LAVI – Czech Population - POSTMONICA

Left atrial volume index

Major criterion: >34 mL/m^2 [in sinus rhythm]

Major criterion: >40 mL/m^2 [in atrial fibrillation]

Minor criterion: 29-34 mL/m^2 [in sinus rhythm]

Minor criterion: 34–40 mL/m^2 [in atrial fibrillation]

Variable	Males			Females		
	Abnormal				ely	Severely
					al	abnormal
Left atrium						
LA diameter M-mode (mm)	> 46	> 53	> 56	> 41	> 48	> 51
LA diameter M-mode, BSA (mm/m^2)	> 23	> 25	> 27	> 24	> 26	> 27
LA vertical diameter (mm)	> 61	> 67	> 71	> 56	> 61	> 63
LA horizontal diameter (mm)	> 48	> 52	> 54	> 46	> 50	> 54
LA volume (ml)	> 86	> 108	> 123	> 70	> 90	> 105
LA volume, BSA (ml/m^2)	> 42	> 52	> 59	> 40	> 48	> 53

Marek J…. Linhart A, Cerdiovasc Ultrasound 2019, in press

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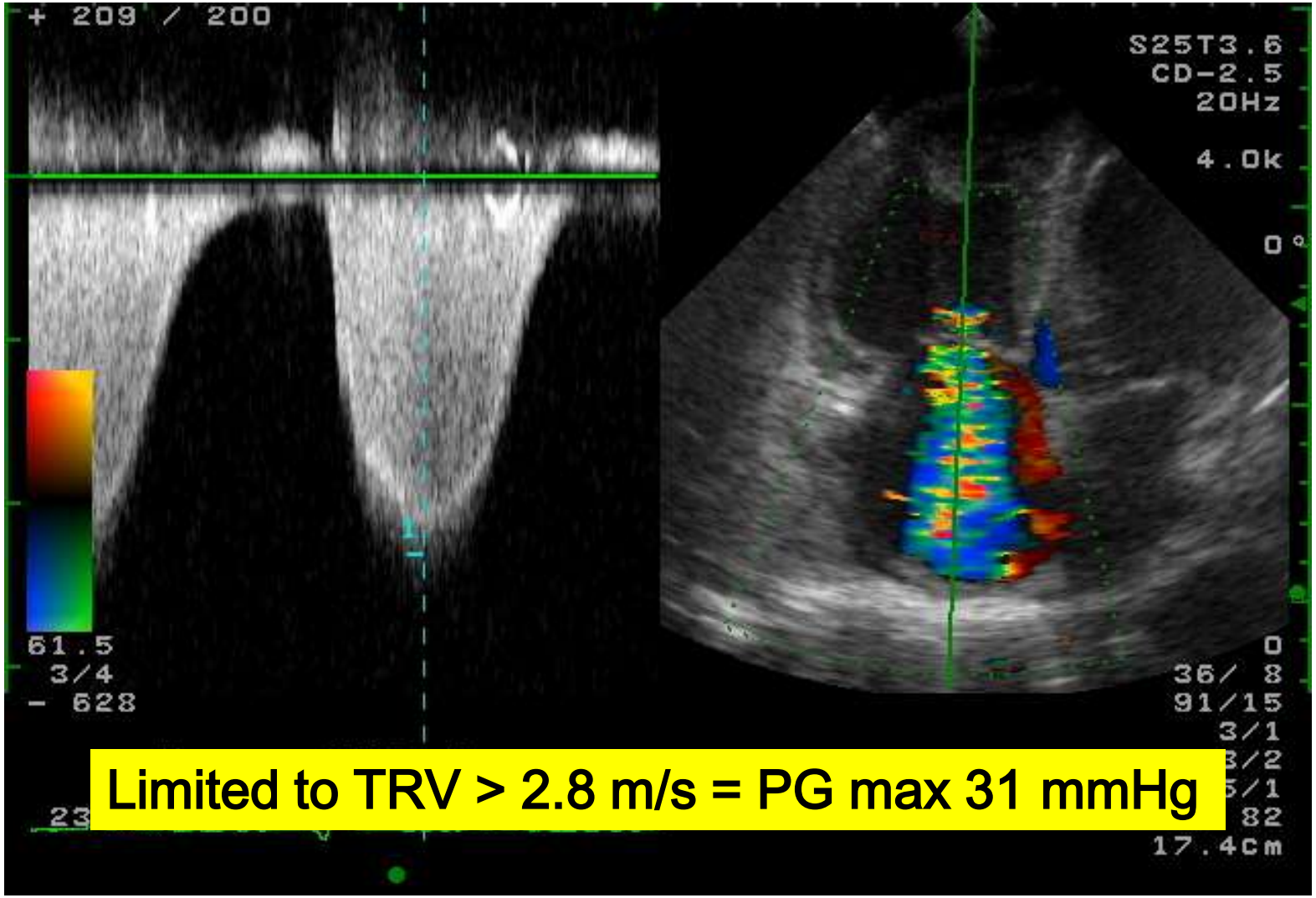
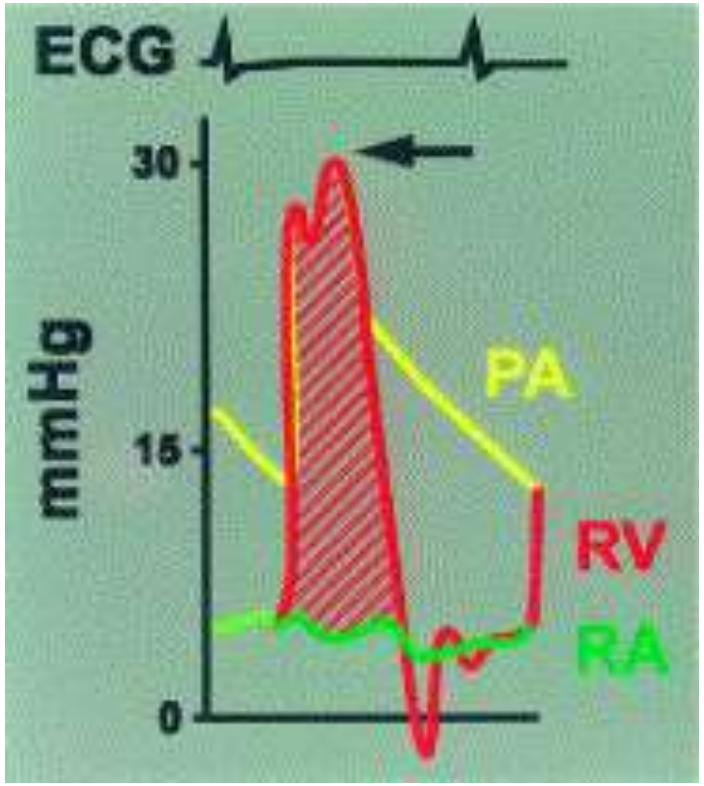
Pulmonary pressure estimates



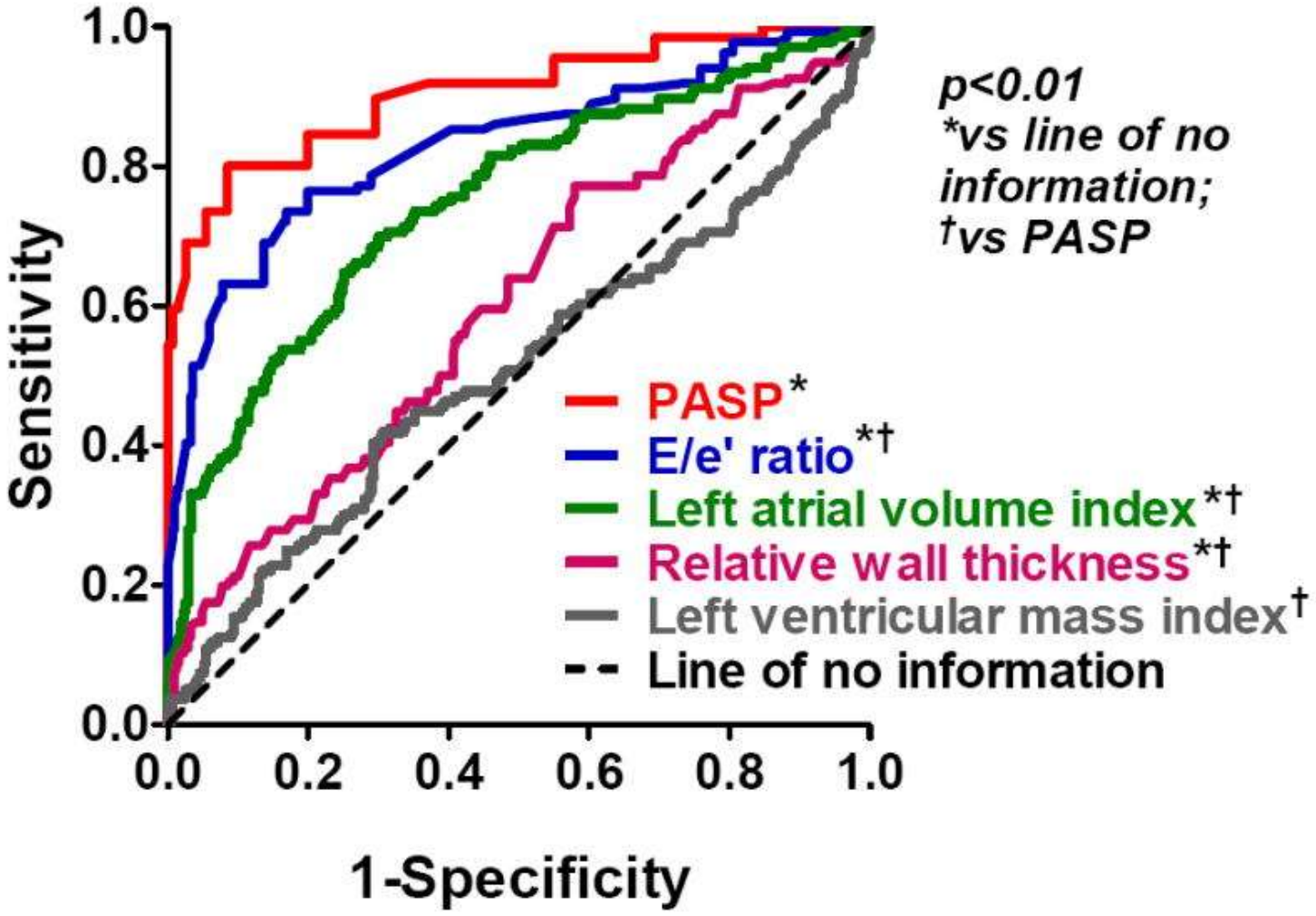


PASP

peak TR gradient + RAP

Nagueh et al. J Am Soc Echocardiogr 2016;29:277-314
Lancellotti et al. European Heart Journal - Cardiovascular Imaging 2017;18:961–968

PASP > 35 mmHg discriminates HF-pEF from HTN?



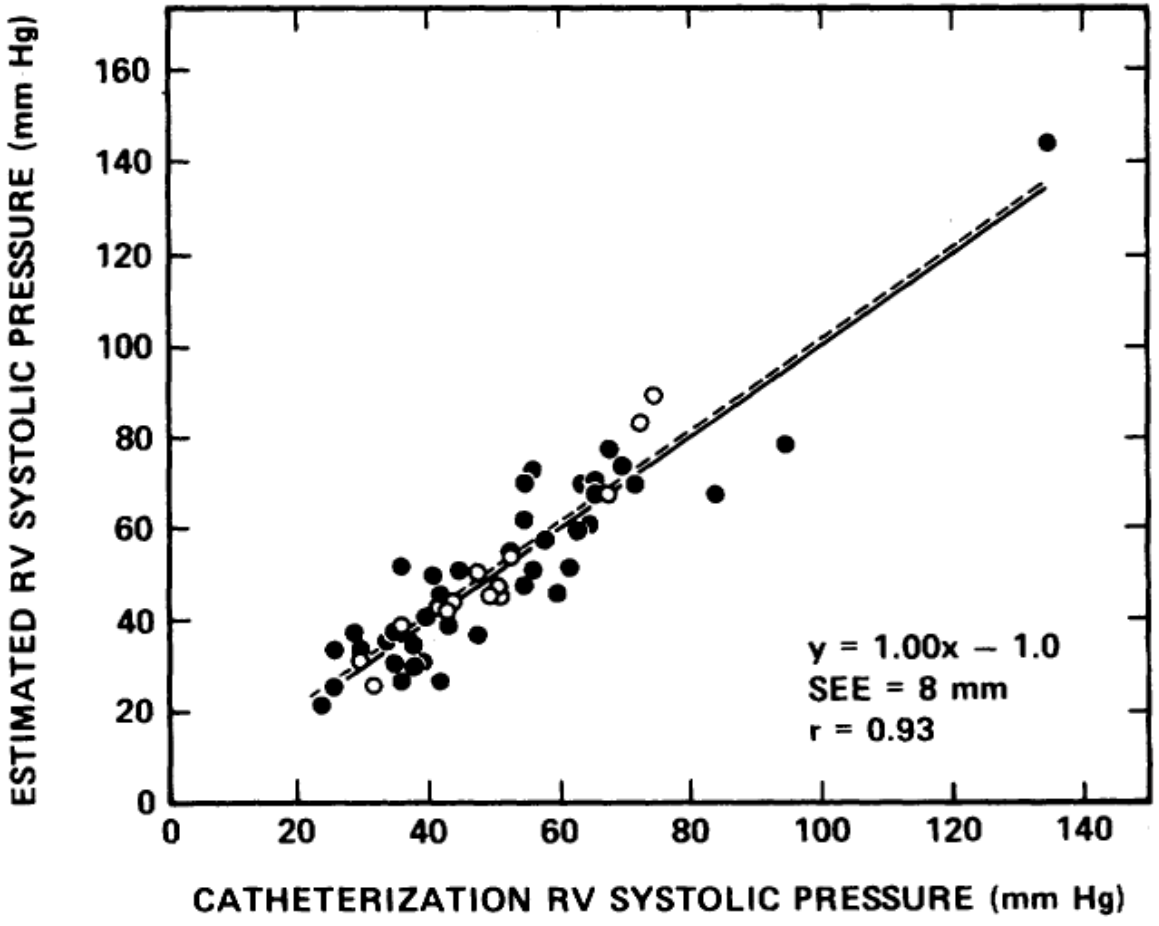
Right atrial pressure, estimated based on echocardiographic characteristics of the inferior vena cava and assigned a standardized value, was then added to the calculated gradient to give PASP.

sensitivity of 83% and a specificity of 92%.

Lam C et al. JACC Vol. 53, No. 13, 2009

Noninvasive estimation of right ventricular systolic pressure by Doppler ultrasound in patients with tricuspid regurgitation

62 pts explored by RHC, echo and RHC within 24 hours



RAP ~ (JVP + 5cm)/1.3 (mmHg)

Yock P., et al, Circulation 1984,70: 657

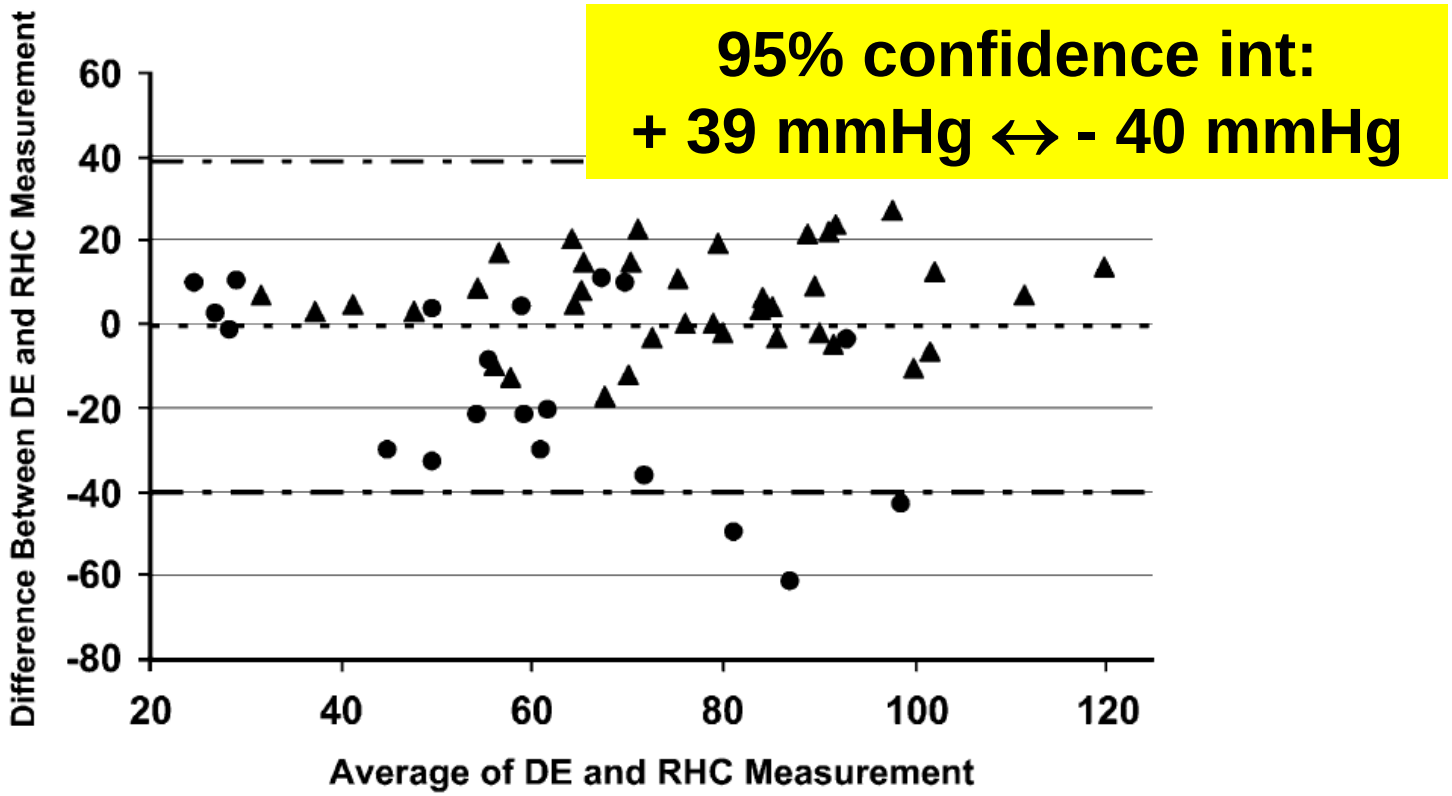
Accuracy of Doppler Echo in the Hemodynamic Assessment of PH

65 pts with different PAH types, PAMP 41 ± 15 mmHg,

Echo and Cath within 1 hour

(Johns Hopkins University, Baltimore, Maryland)

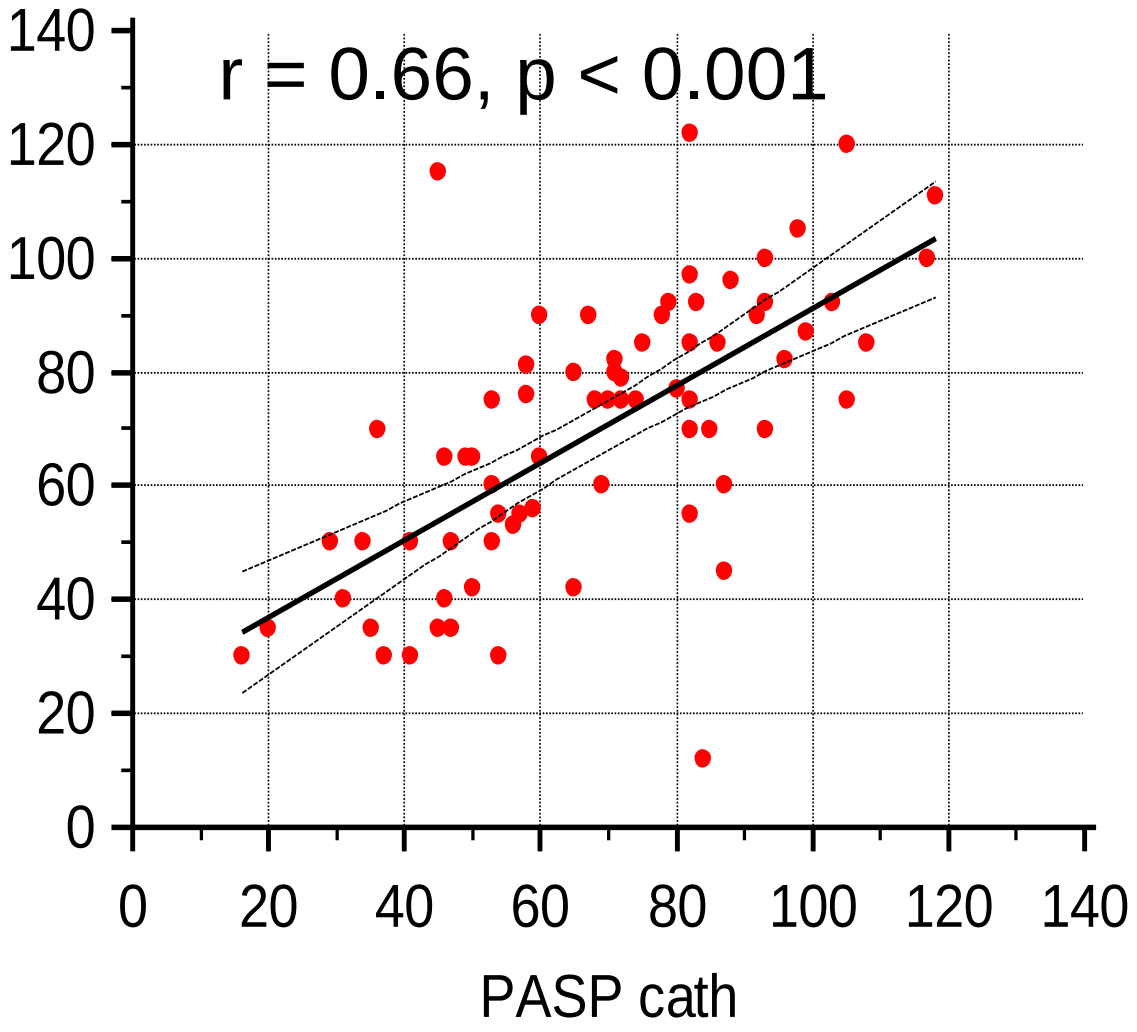
r = 0.66



Fisher MC., et al, Am J Resp Crit Care Med 2009,179: 615

Cath vs Echo data

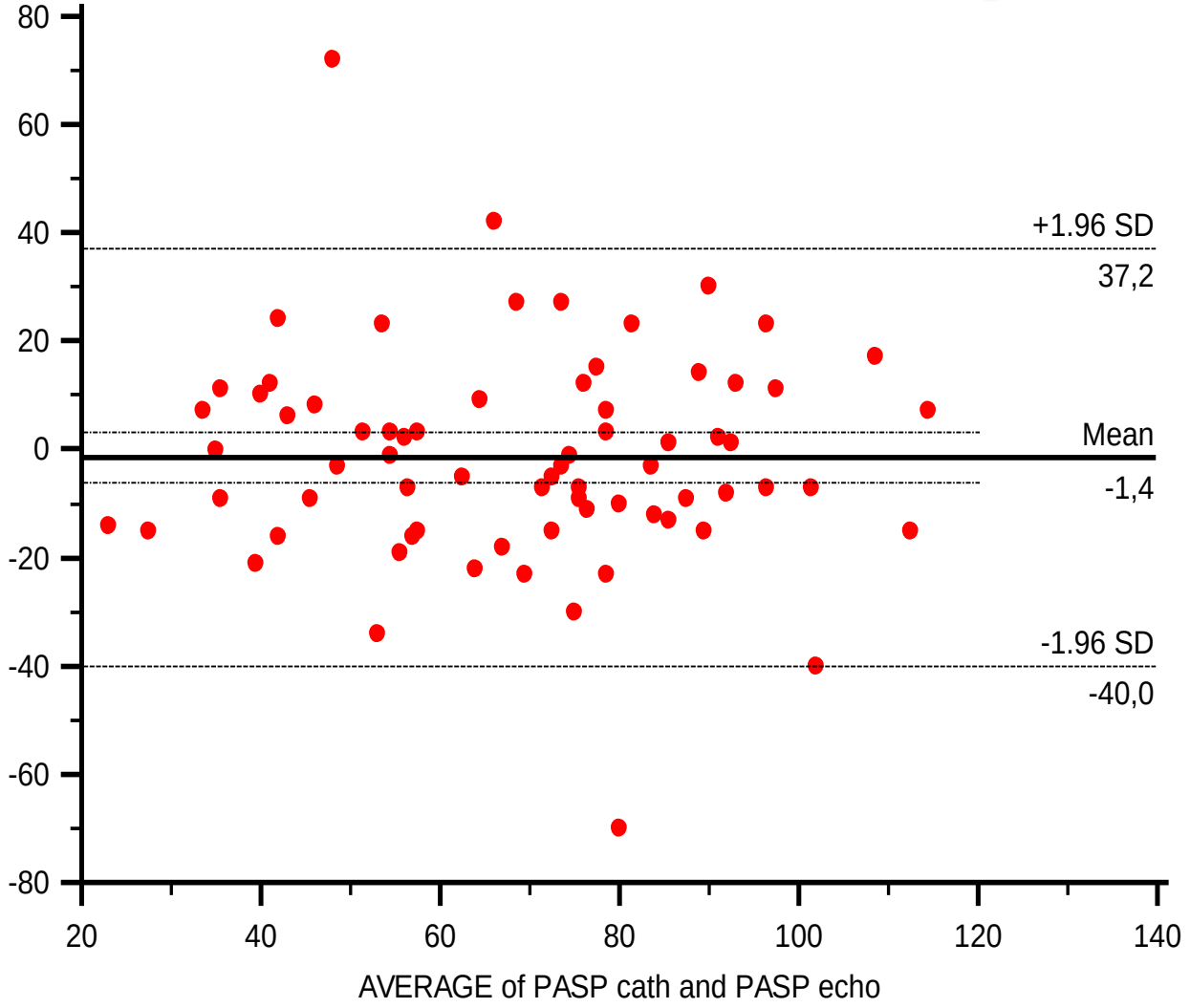
n= 72, RHC – ECHO < 7 days



(P. Poláček, P. Jansa – data on file)

Cath vs Echo data

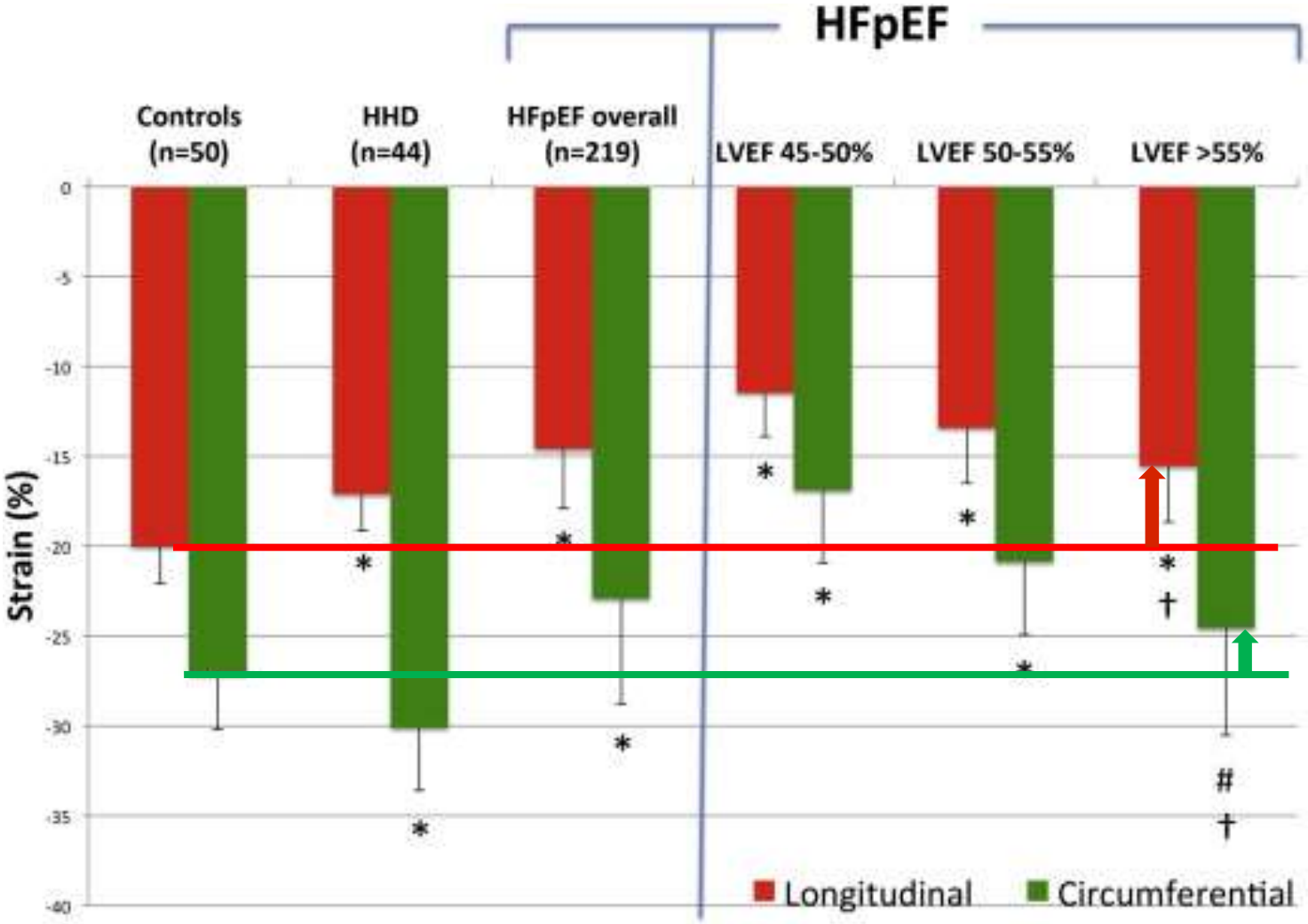
n= 72, RHC – ECHO < 7 days

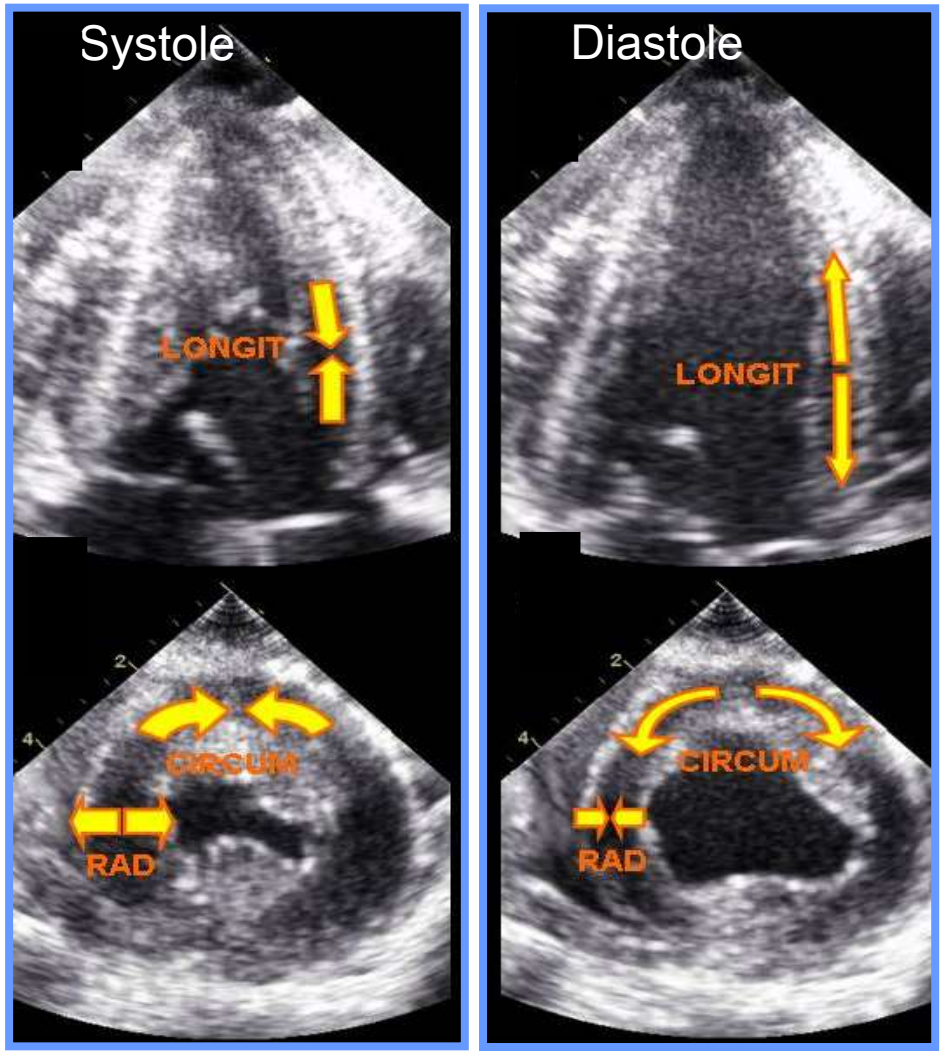


(P. Poláček, P. Jansa – data on

GLOBÁLNÍ LONGITUDINÁLNÍ STRAIN?

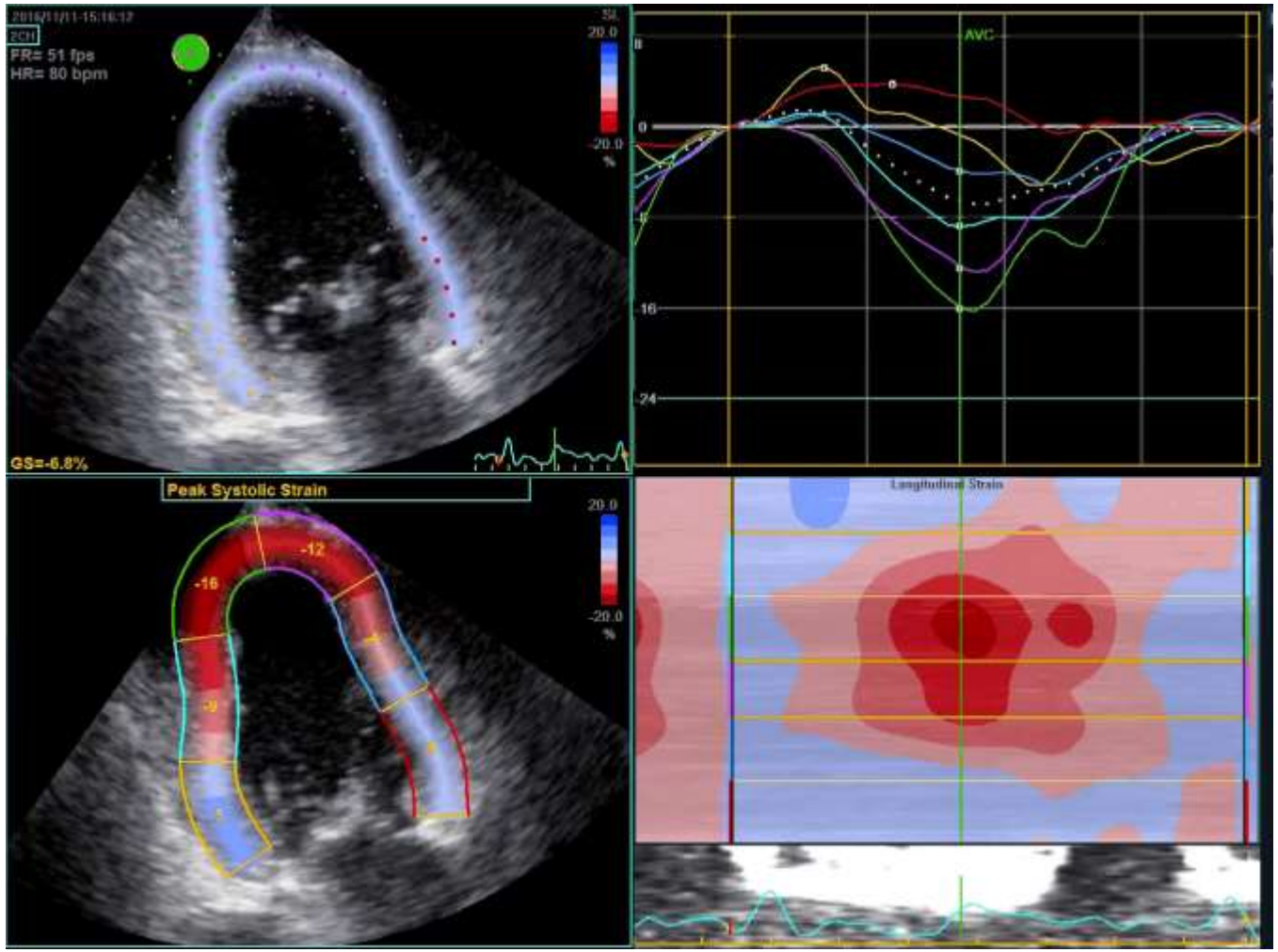
Je přítomna systolická dysfunkce u HFpEF?

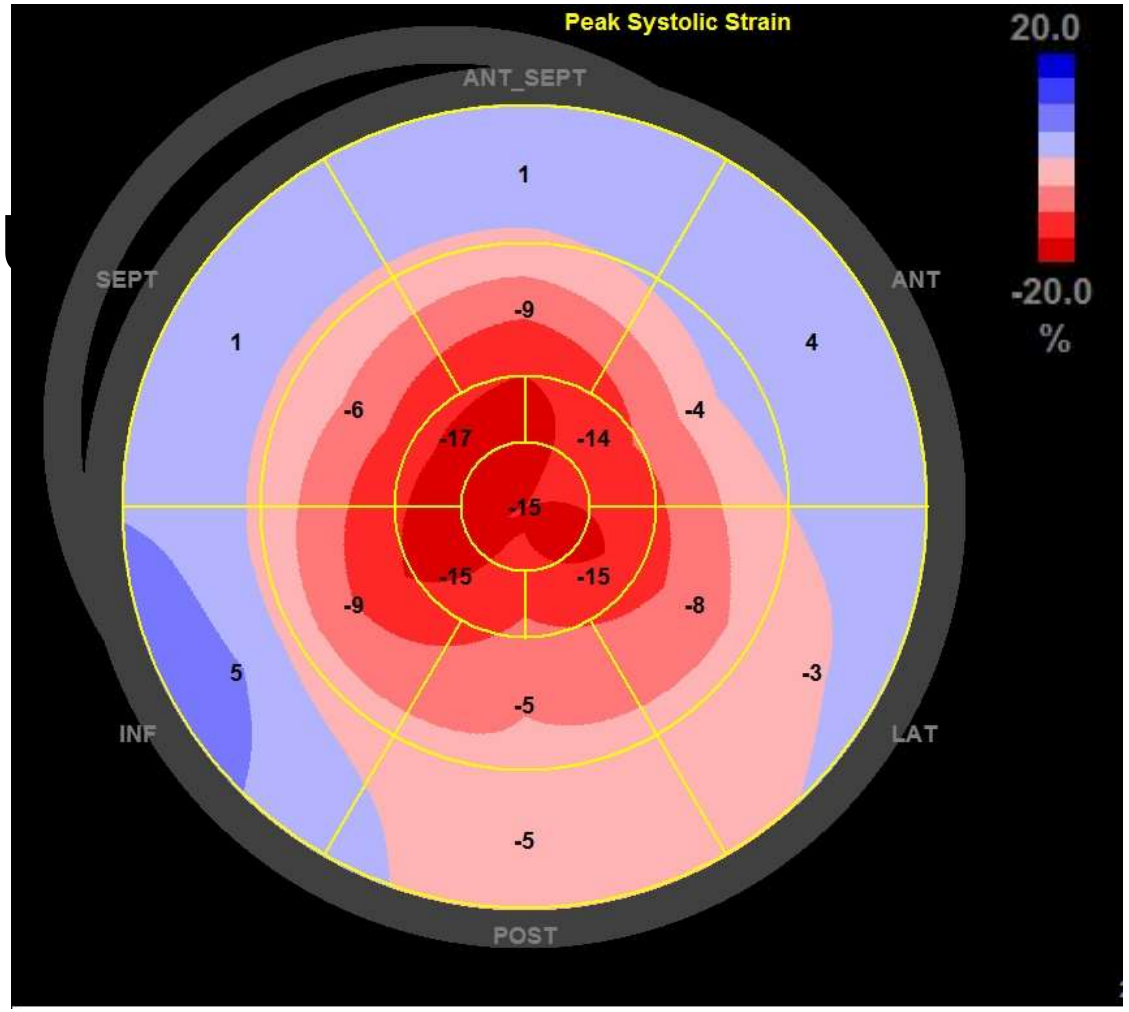




Kraigher-Krainer E et al. Impaired systolic function by strain imaging in heart failure with preserved ejection fraction
J Am Coll Cardiol. 2014 Feb 11;63(5):447-56 - studie PARAMOUNT (LCZ 696 vs. valsartan)

GLS in amyloid Apical sparing phenomenon



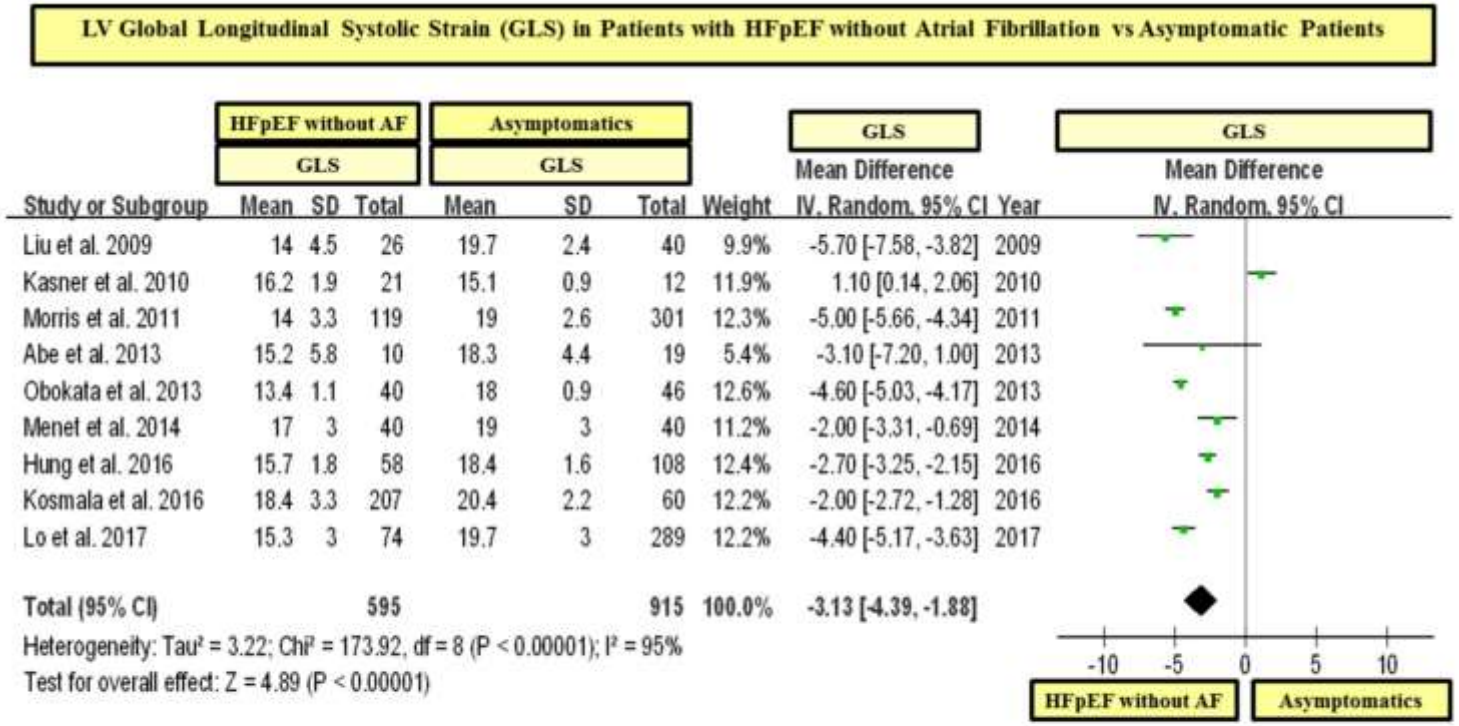


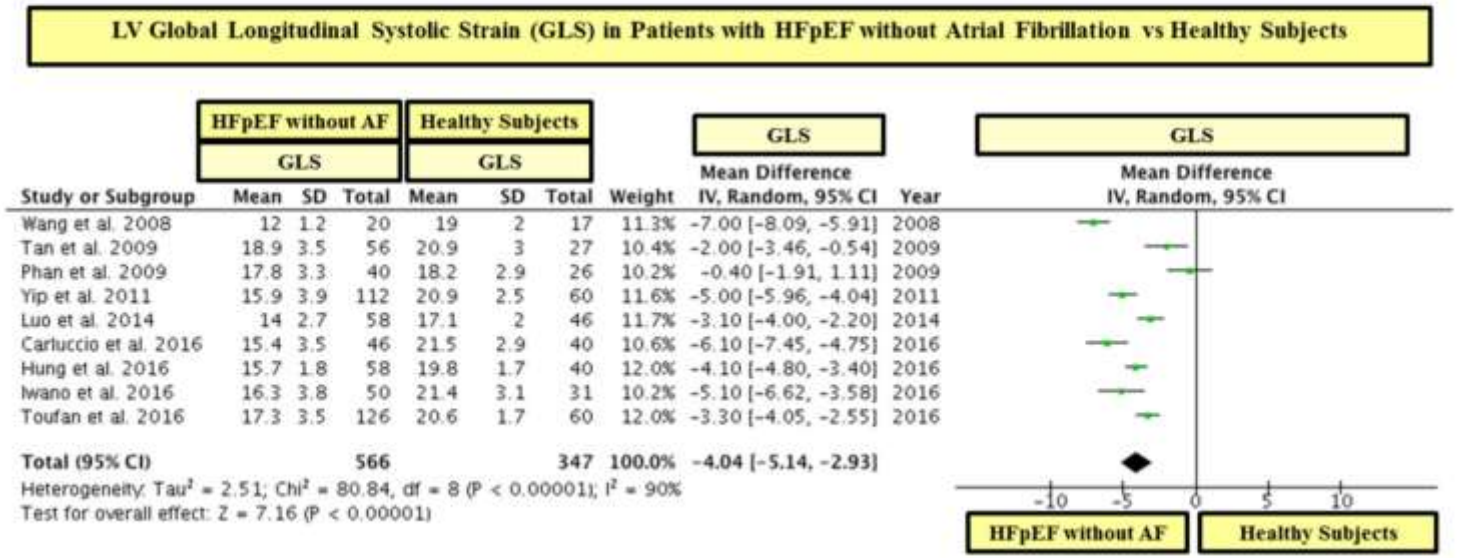
Cases and images: General University Hospital Prague, CZ

GLS < 16 = 1 point

Pieske et al. European Heart Journal (2019) 40, 3297–3317

GLS in HF-pEF





Morris DA, et al. Open Heart 2017;4:e000630. doi:10.1136/openhrt-2017-000630

VÝPOČET HFA-PEFF SKORE?

Calculation of HFA-PEFF score

	Functional	Morphological	Biomarker (SR)	Biomarker (AF)
Major	septal e' < 7 cm/s or lateral e' < 10 cm/s or Average E/e' ≥ 15 or TR velocity > 2.8 m/s (PASP > 35 mmHg)	LAVI > 34 ml/m² or LVMI ≥ 149/122 g/m² (m/w) and RWT > 0,42 #	NT-proBNP > 220 pg/ml or BNP > 80 pg/ml	NT-proBNP > 660 pg/ml or BNP > 240 pg/ml
Minor	Average E/e' 9 -14 or GLS < 16 %	LAVI 29-34 ml/m² or LVMI > 115/95 g/m² (m/w) or RWT > 0,42 or LV wall thickness ≥ 12 mm	NT-proBNP 125-220 pg/ml or BNP 35-80 pg/ml	NT-proBNP 365-660 pg/ml or BNP 105-240 pg/ml

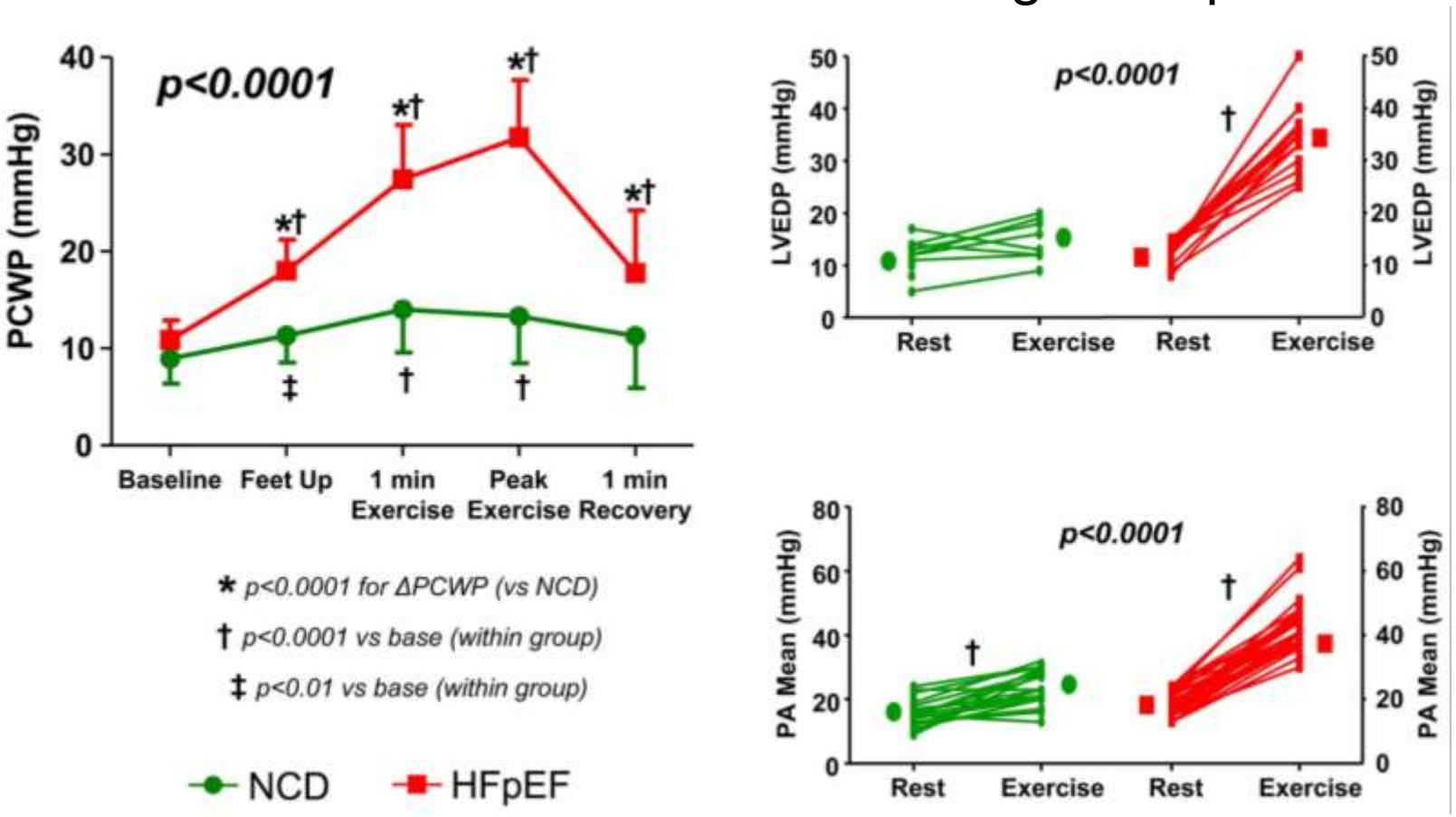
Major Criteria: 2 points	≥ 5 points: HFpEF
Minor Criteria: 1 point	2-4 points: Diastolic Stress Test or Invasive Haemodynamic Measurements

Pieske et al. European Heart Journal (2019) 40, 3297–3317

ROZHODNUTÍ PŘINÁŠÍ PSK?

Exercise induced LVEDP increase for unmasking HF-pEF

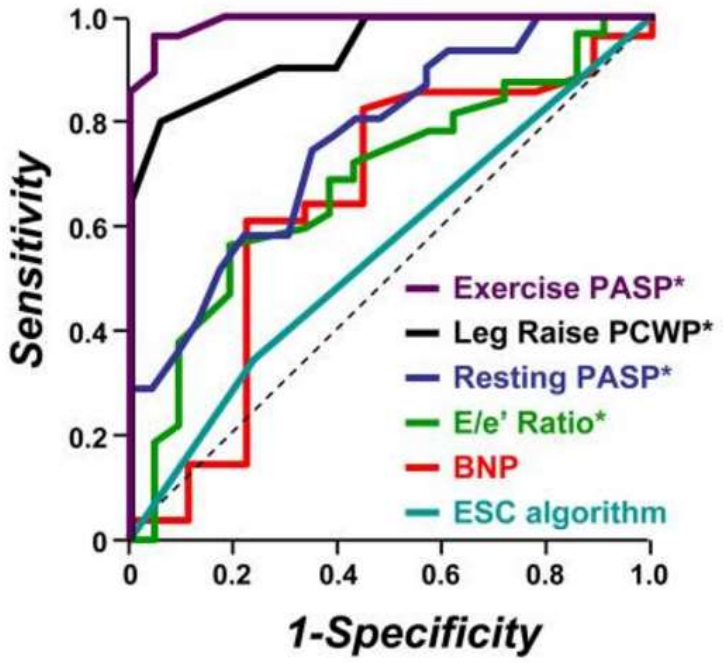
55 subjects with exercise-induced dyspnea,
PAPM < 25 mmHg and PAWP < 15 mmHg at rest
Exercise rise in PAWP > 25 mmHg = HF-pEF



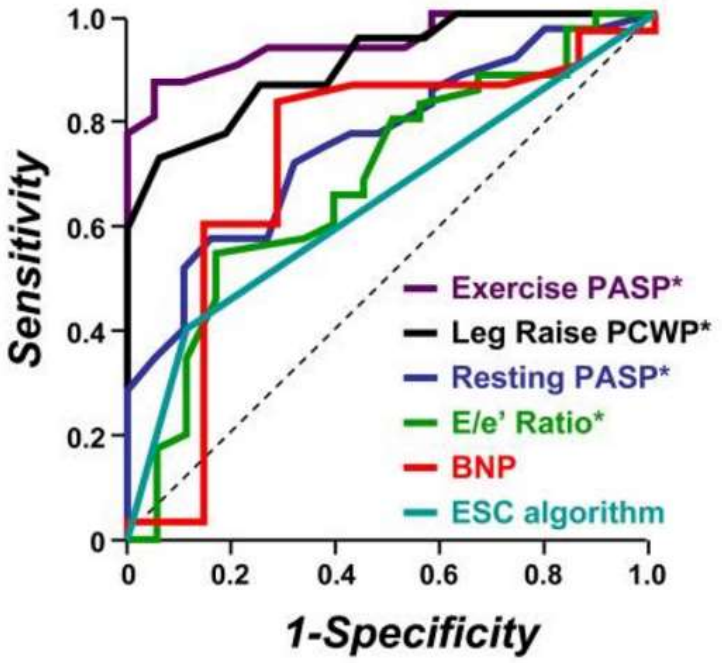
Borlaug BA et al. Circulation: Heart Failure. 2010;3:588-595

Exercise induced LVEDP increase for unmasking HF-pEF

Exercise PAWP > 25 mmHg



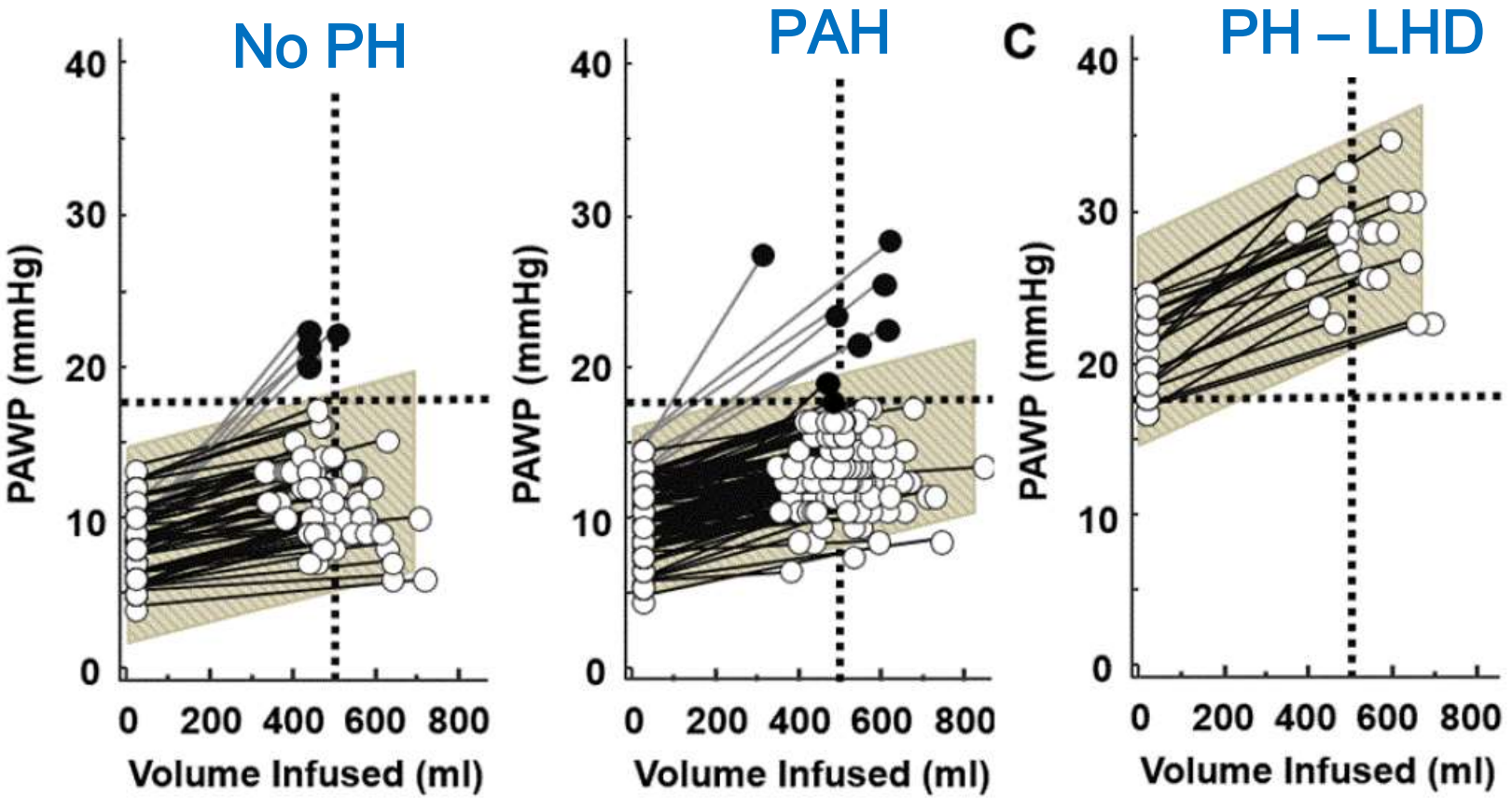
Exercise PAWP > 15 mmHg



Borlaug BA et al. Circulation: Heart Failure. 2010;3:588-595

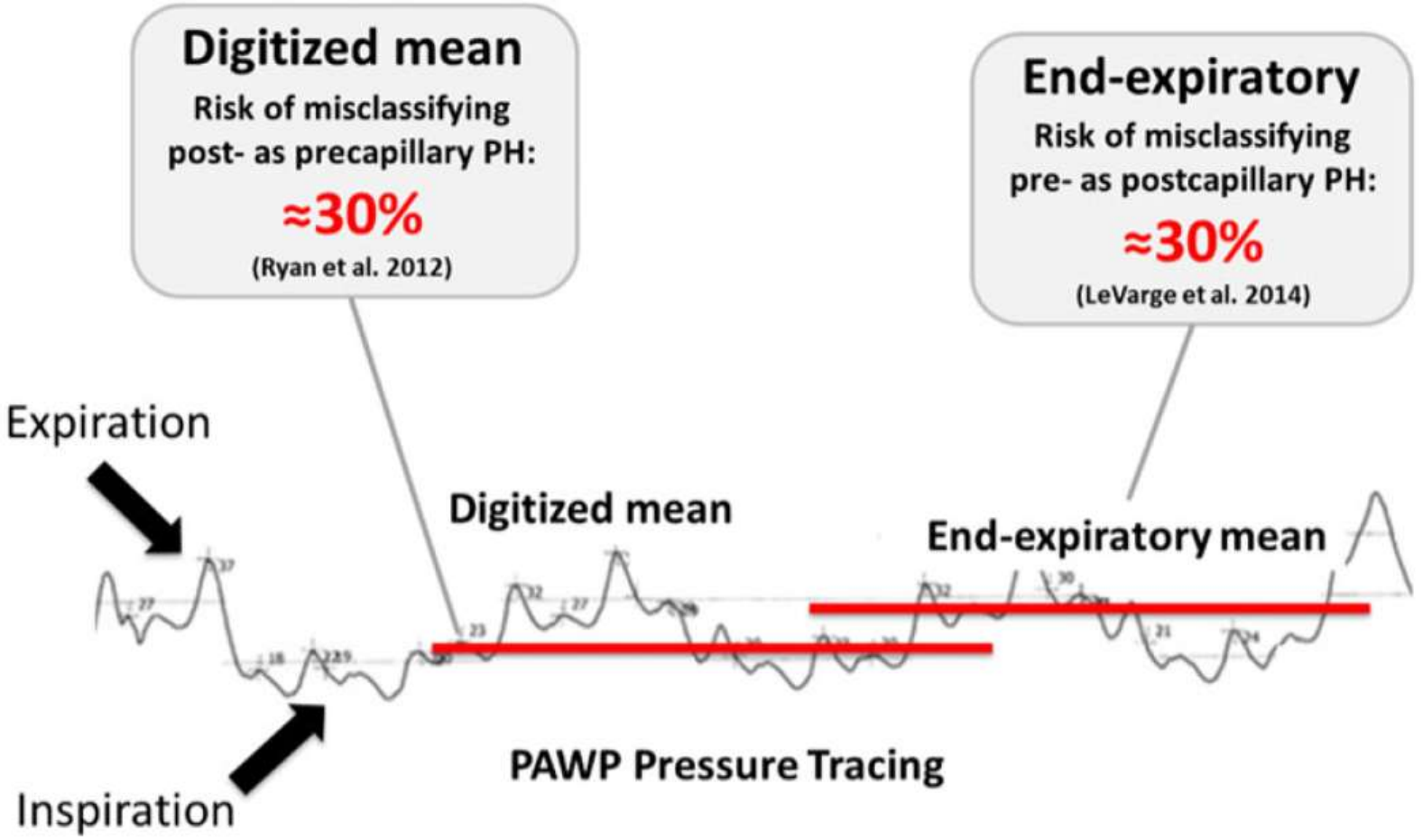
Re-classification of PH after fluid challenge?

- 7 ml/kg/10 min infusion
- cut-off PCWP 18 mmHg

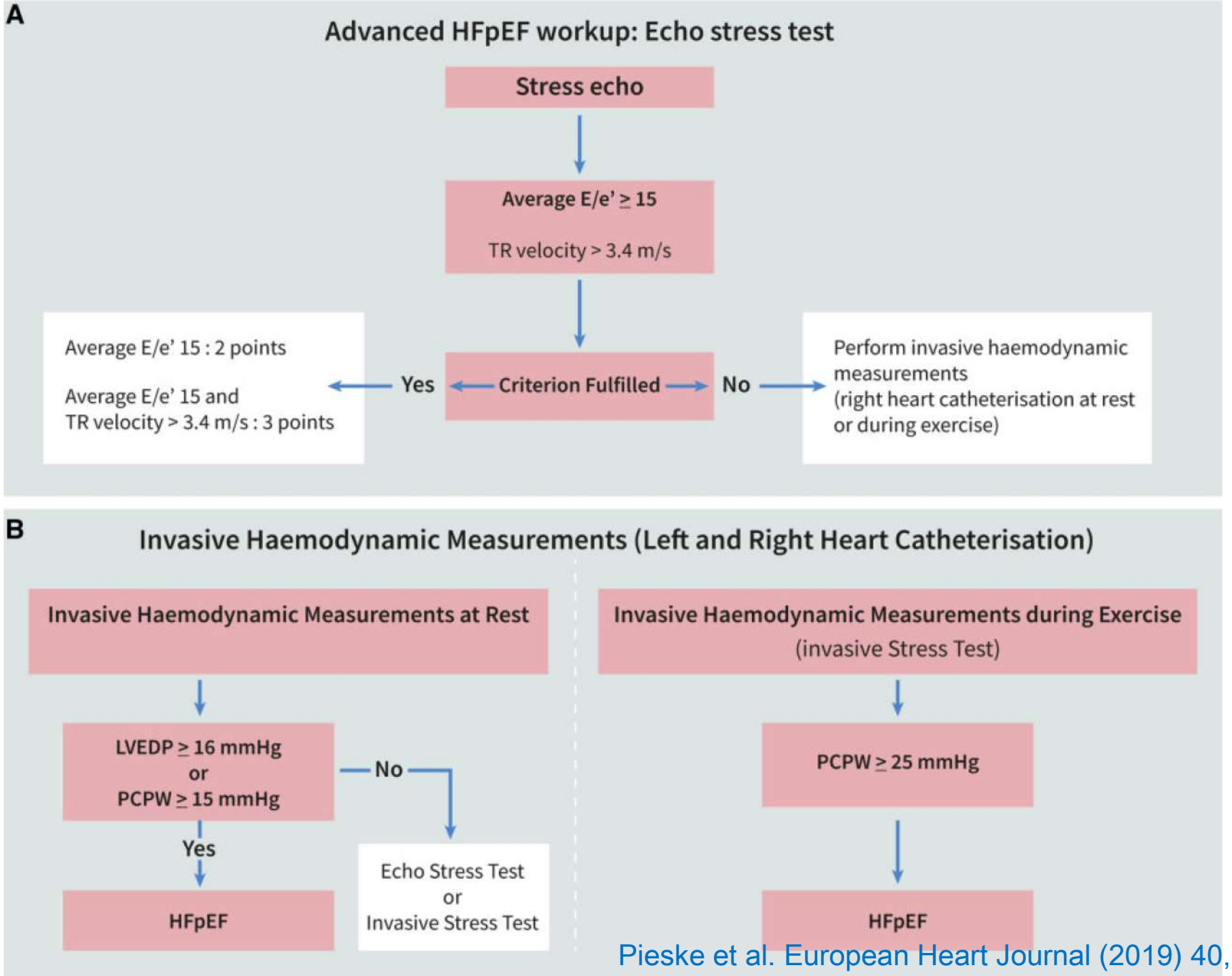


D´Alto Chest. 2017 Jan;151(1):119-126.

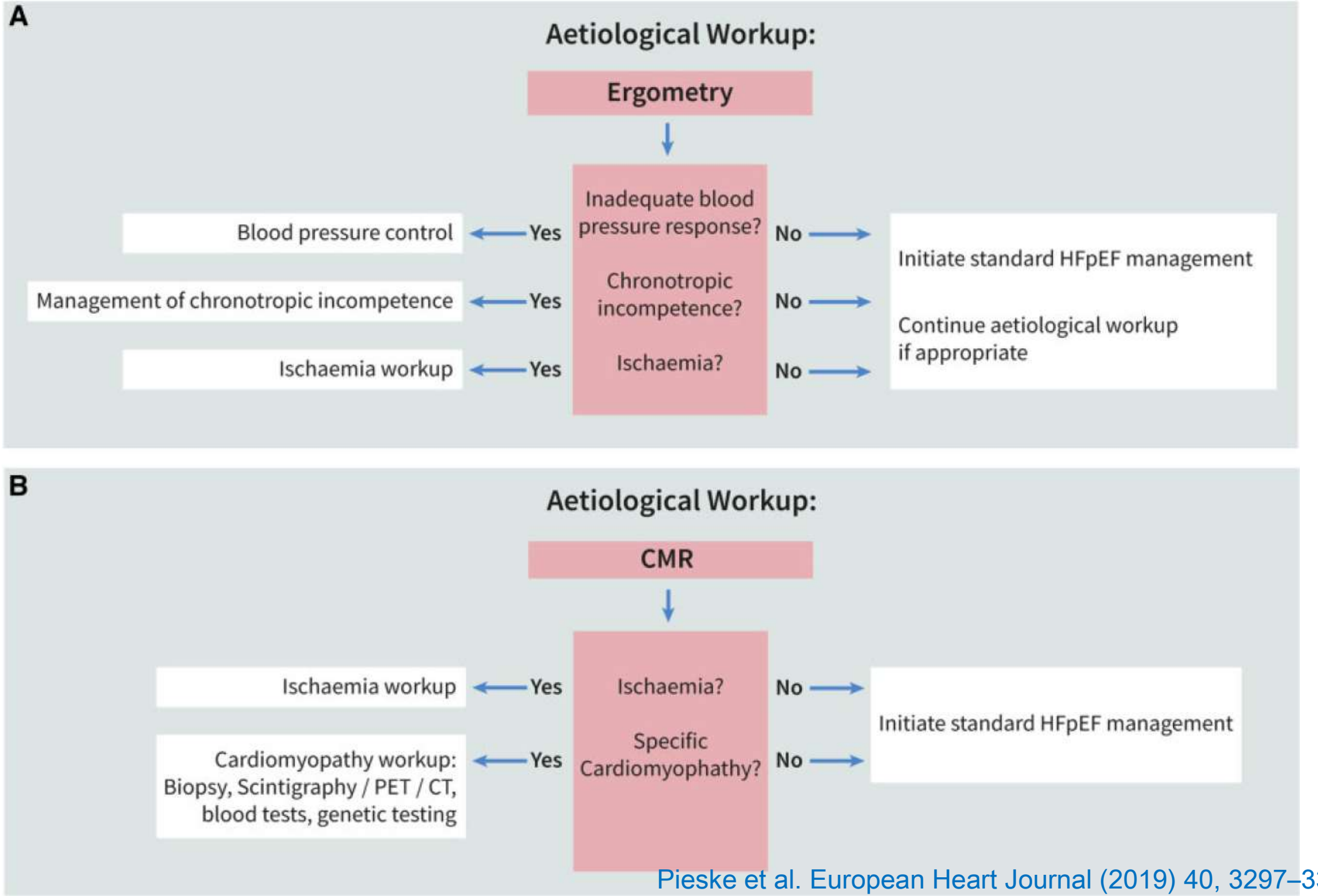
PAWP measurement method matters



Rosenkrantz et al. European Heart Journal (2016) 37, 942–954



Pieske et al. European Heart Journal (2019) 40, 3297–3317



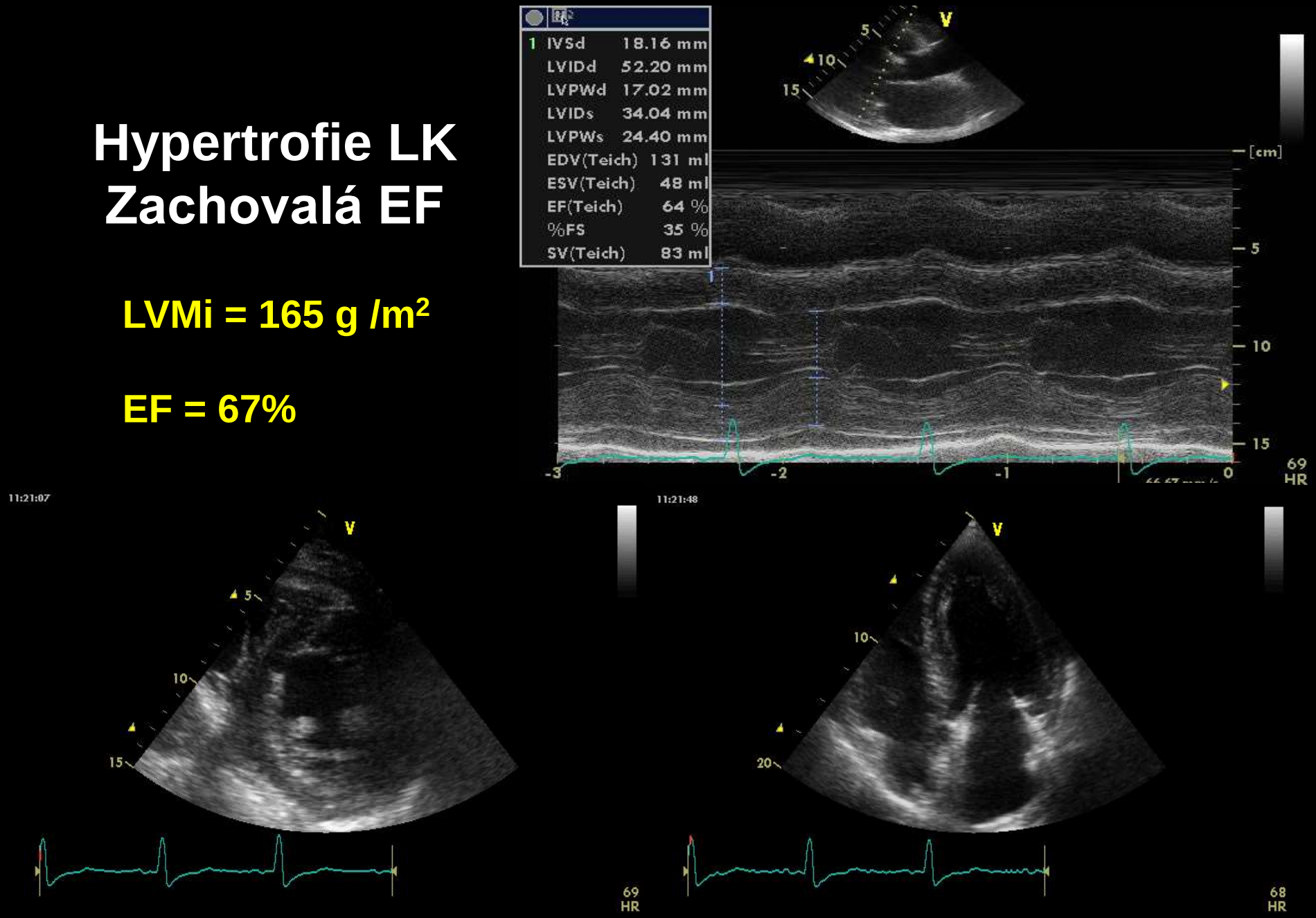
Pieske et al. European Heart Journal (2019) 40, 3297–3317

JAK MŮŽE NEMOCNÝ S HF-PEF VYPADAT?

Hypertrofie LK
Zachovalá EF

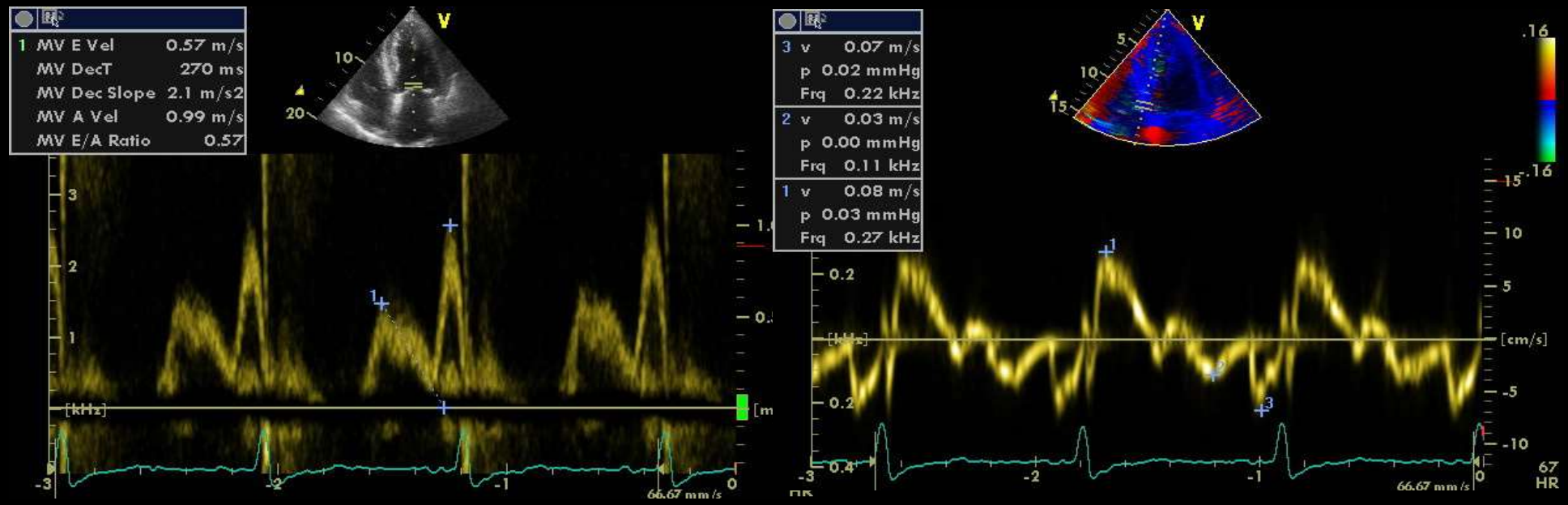
LVMi = 165 g /m²

EF = 67%



Zdrojová data: VFN Praha

Porucha plnění levé komory



E = 0,57

E´= 0,03

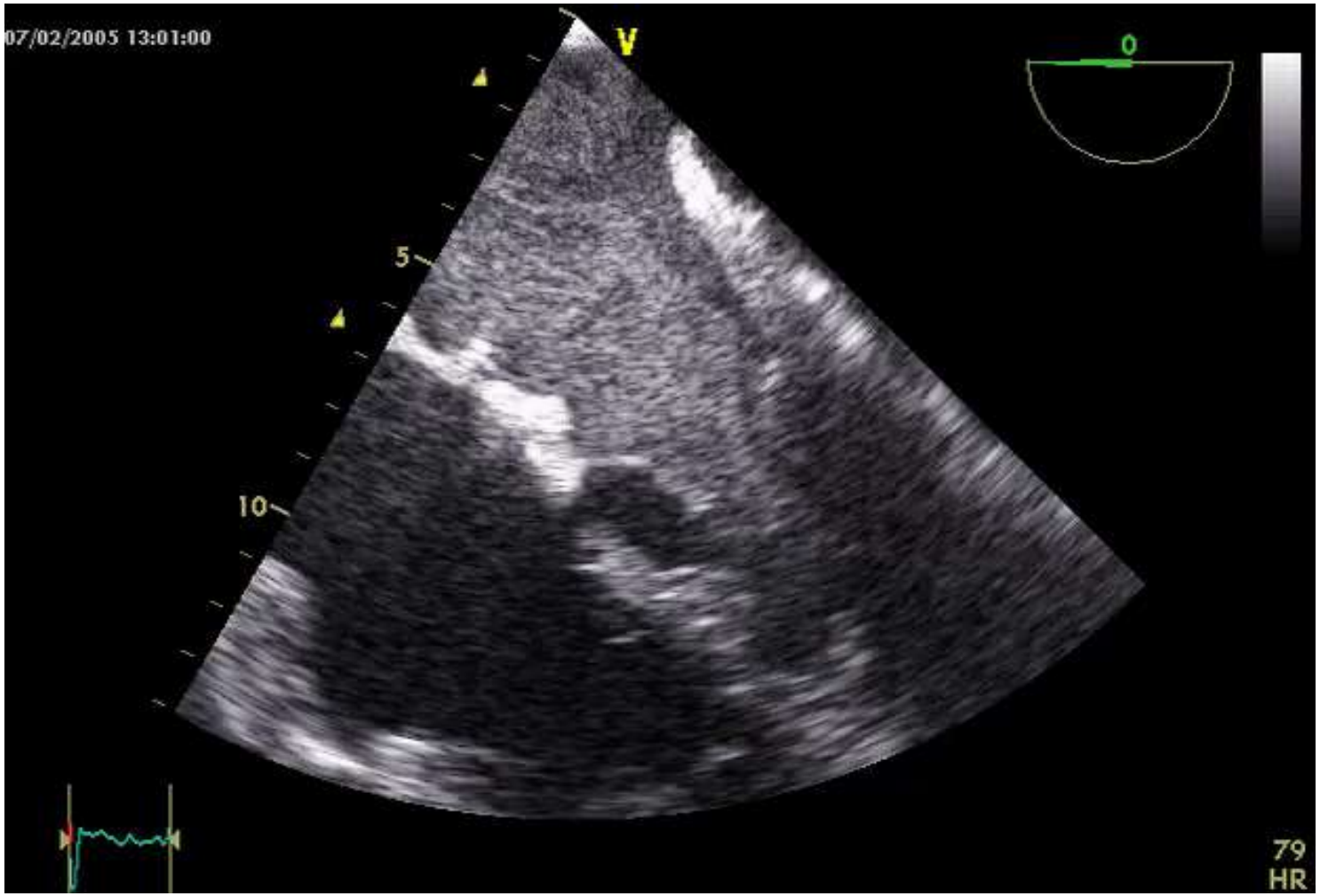
E/E´= 19

EDP=11.96 + 0.596 · E/E´ = 23 mmHg

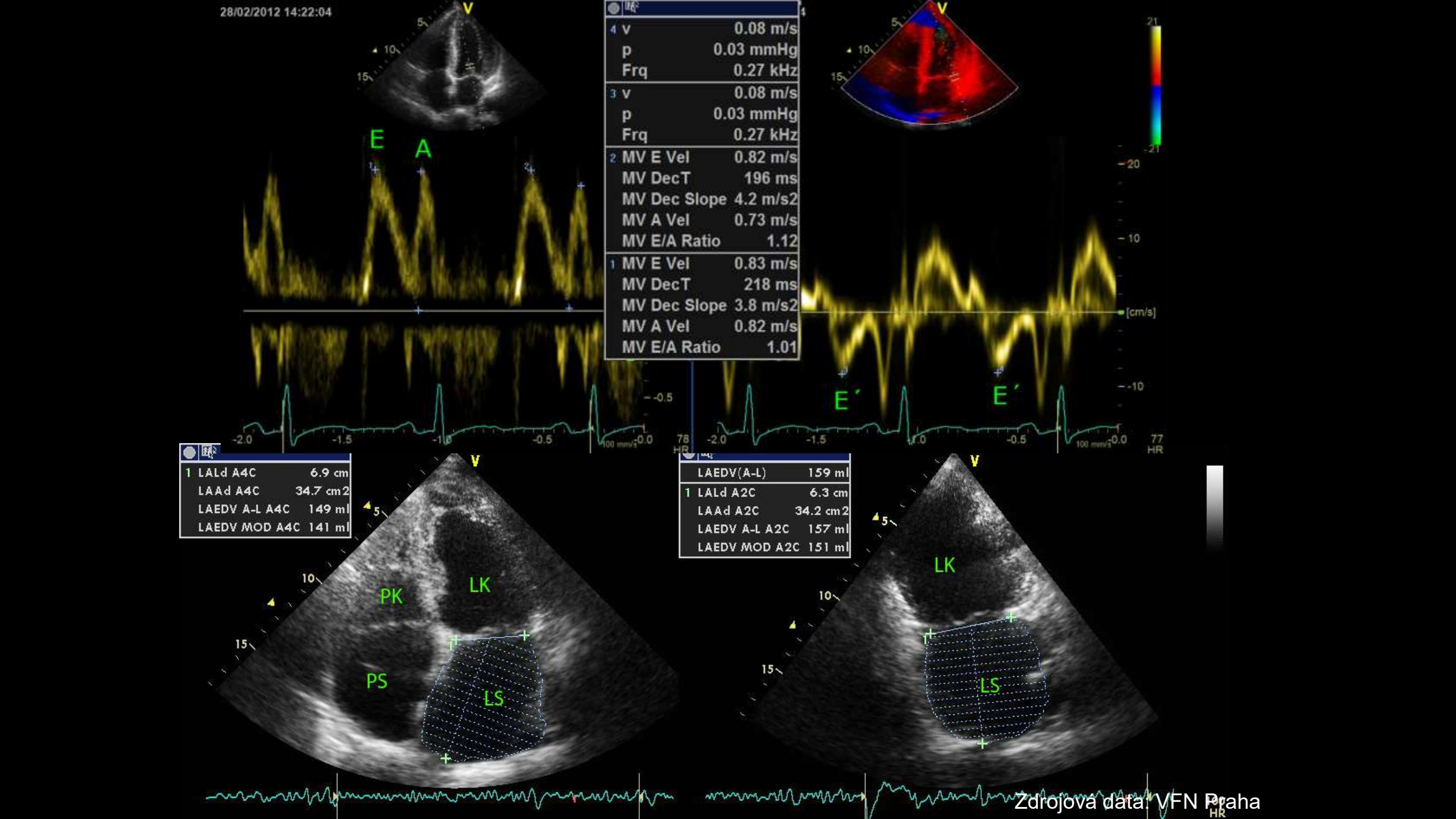
$\tau_{TDI} = (14.7 - 100.E´)/0.15 = 78$ ms

Zdrojová data: VFN Praha

Restriktivní idiopatická kardiomyopatie

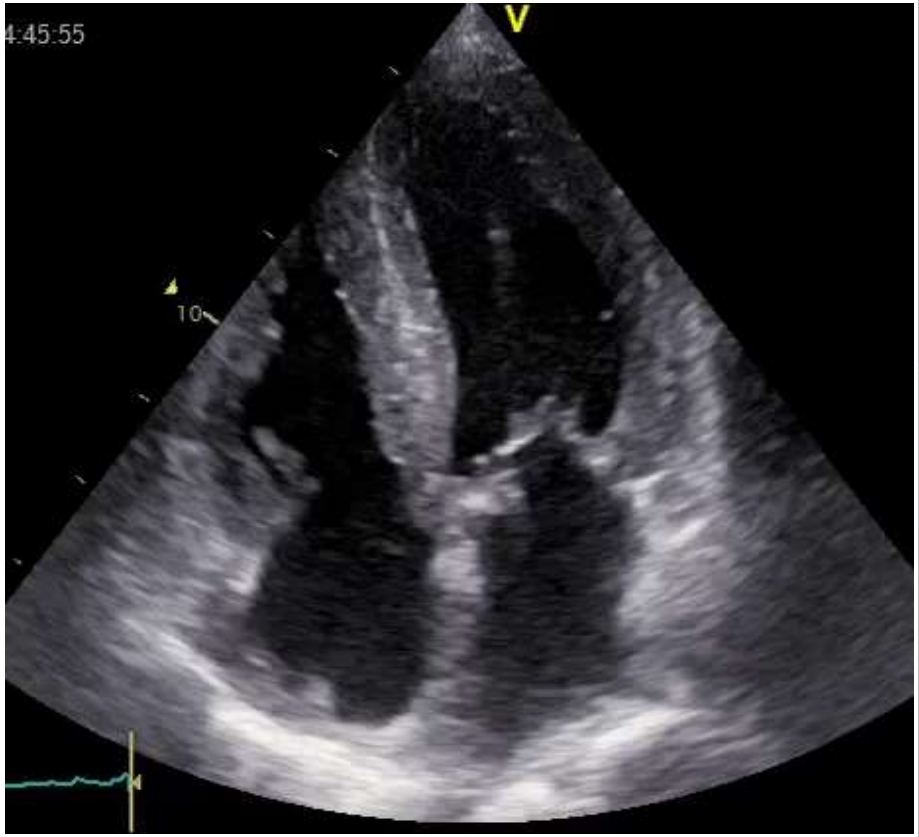


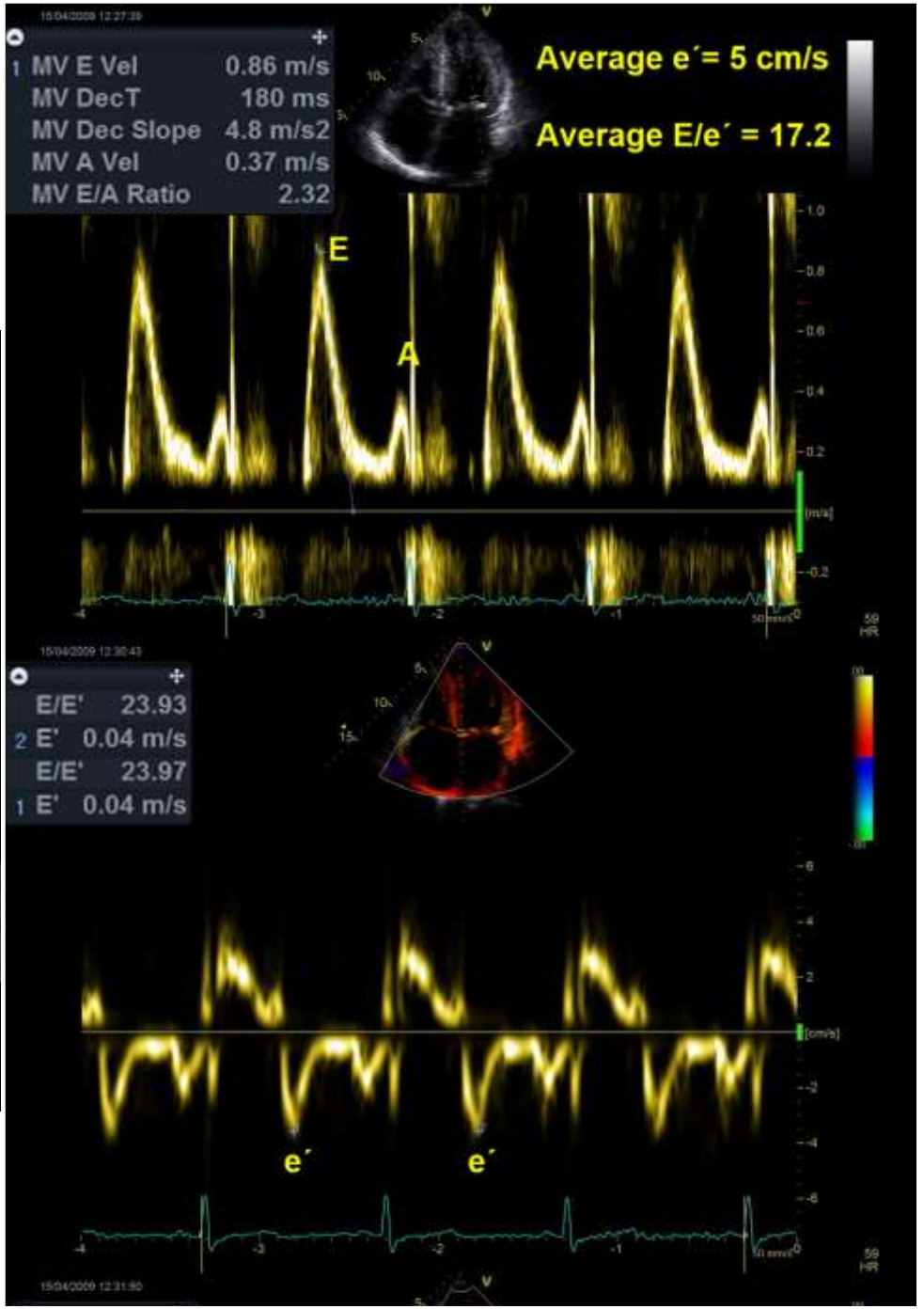
Cases and images: General University Hospital Prague, CZ



Zdrojová data: VFN Praha

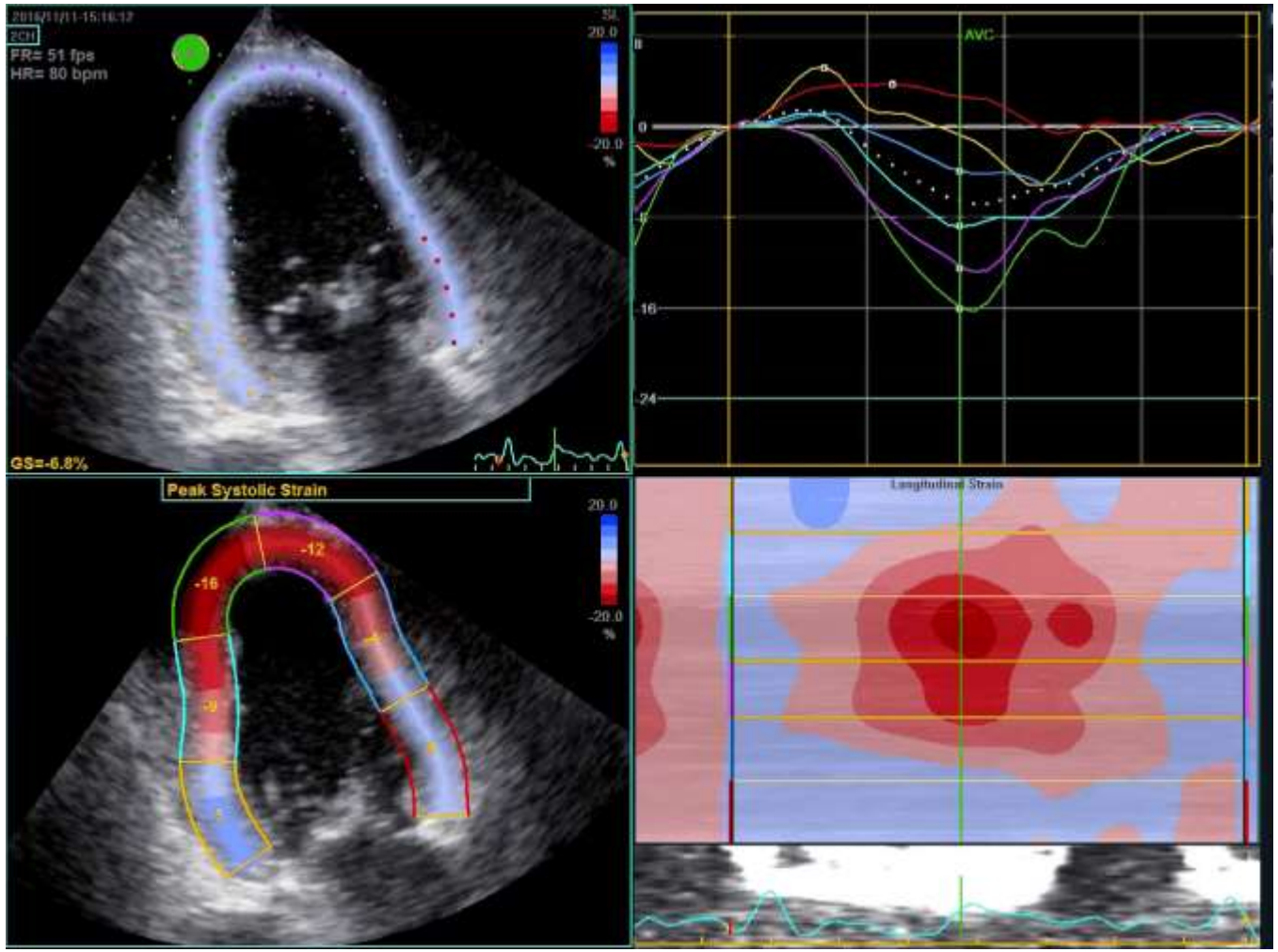
Restrictive cardiomyopathy

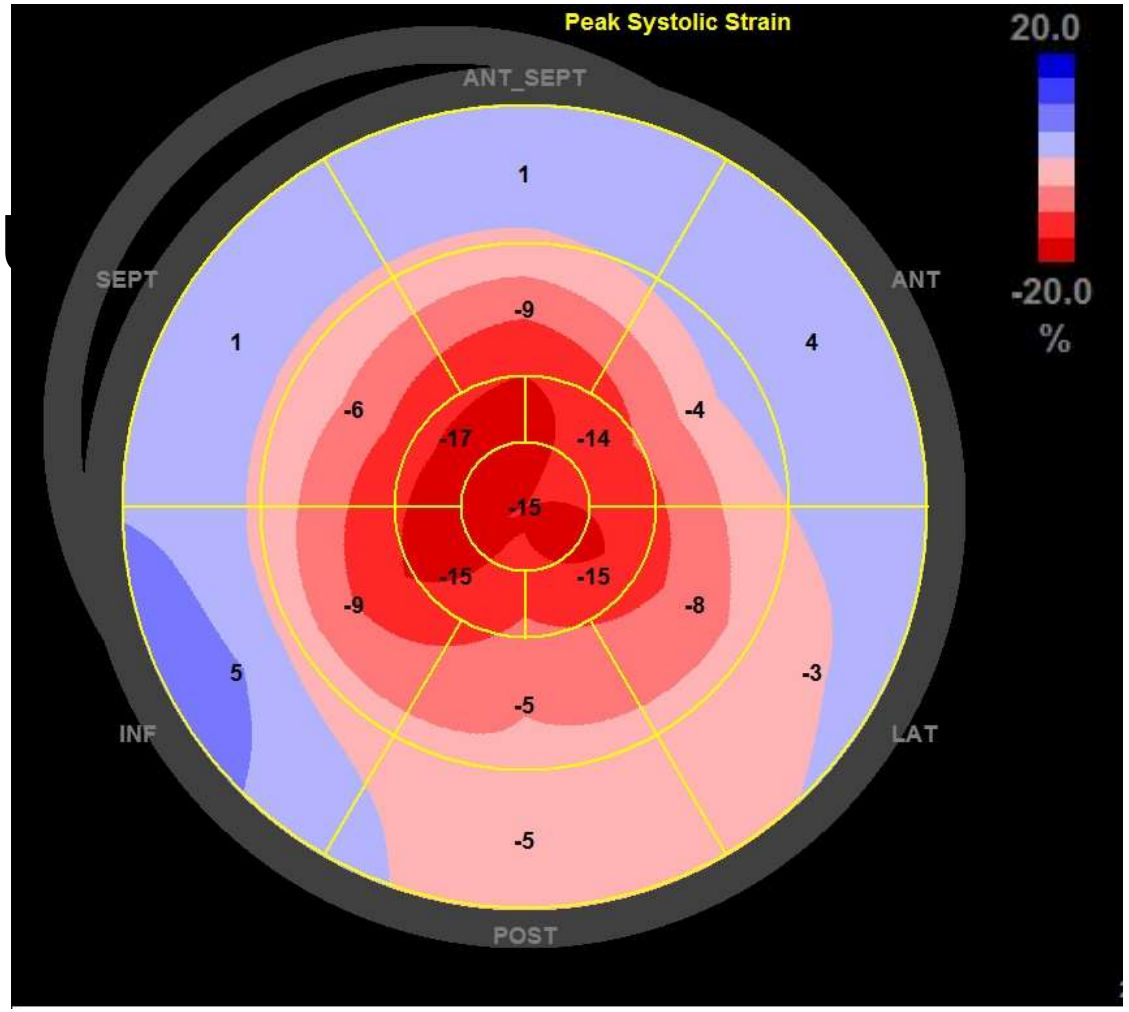




Imaging: General University Hospital, Prague, CZ

Apical sparing phenomenon



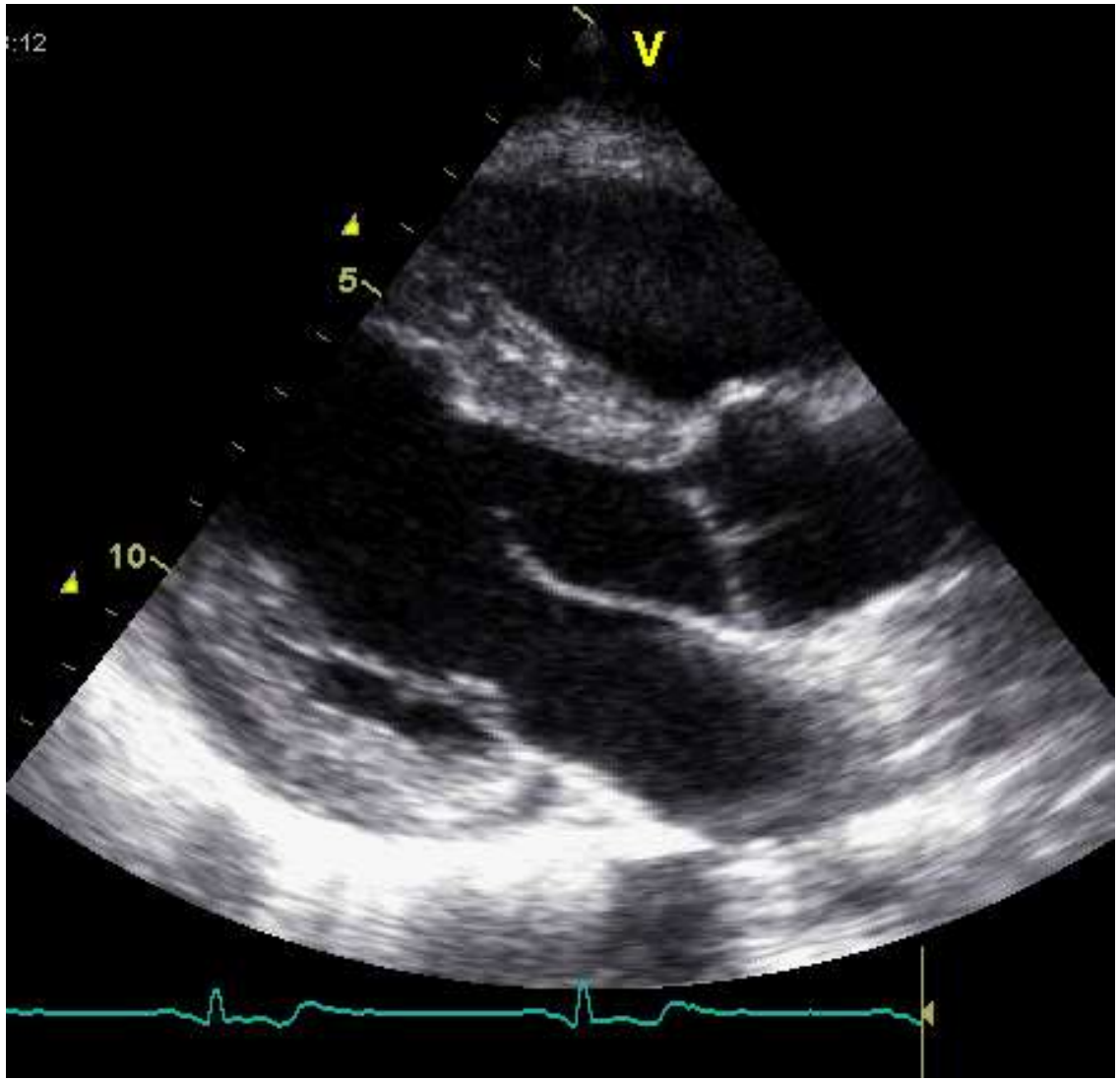


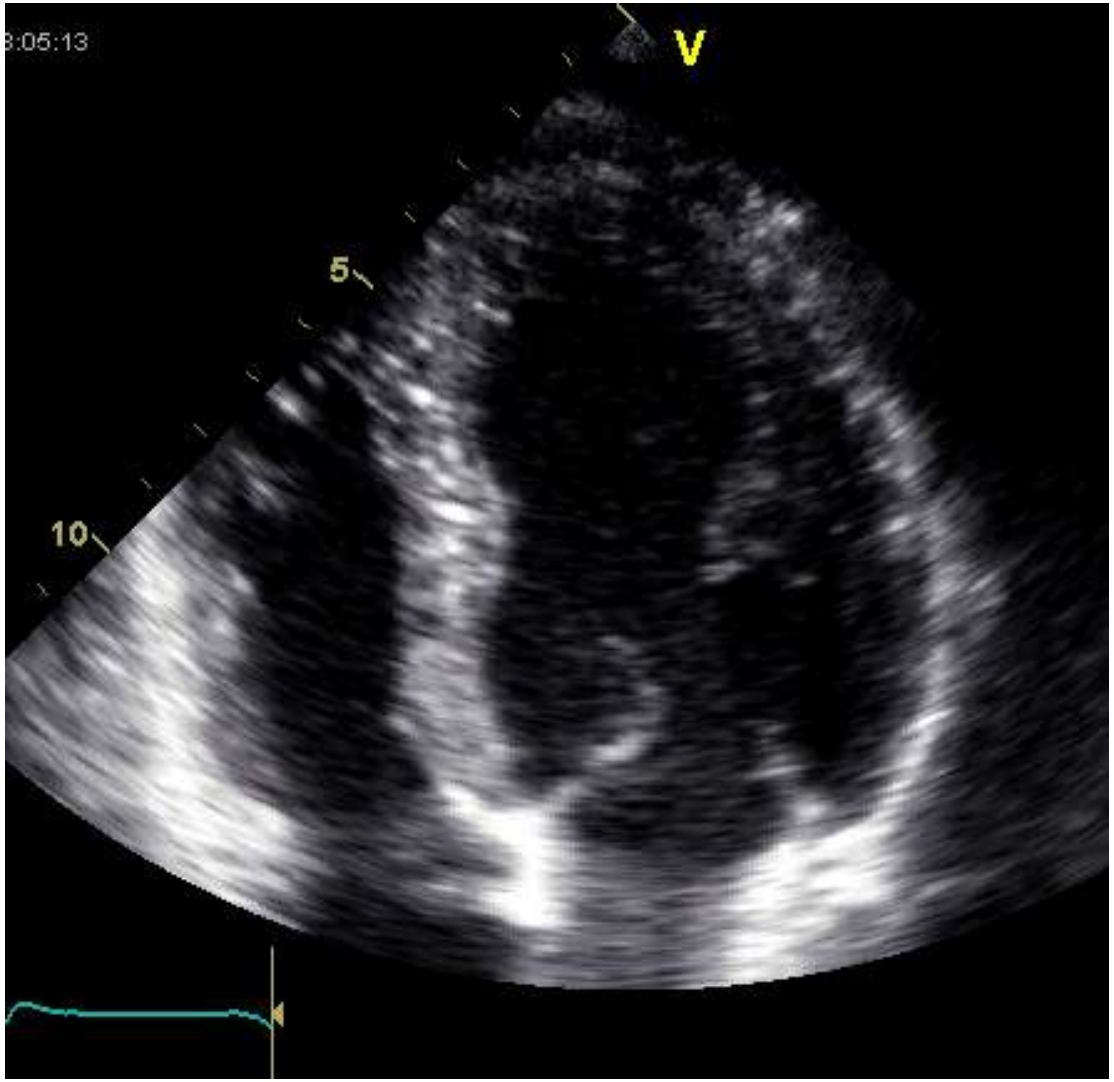
Cases and images: General University Hospital Prague, CZ

GLS < 16 = 1 point

Pieske et al. European Heart Journal (2019) 40, 3297–3317

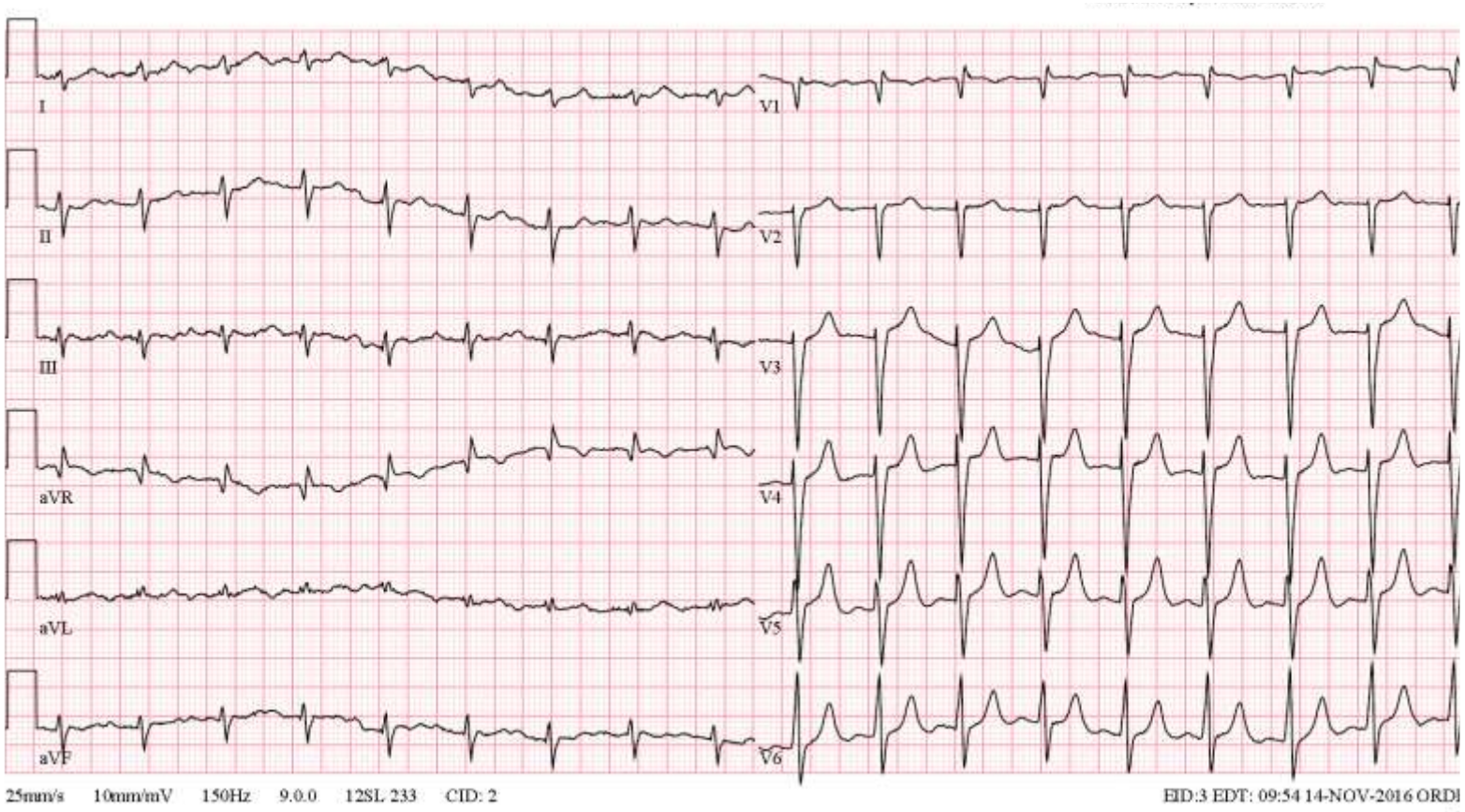
Diffuse LVH

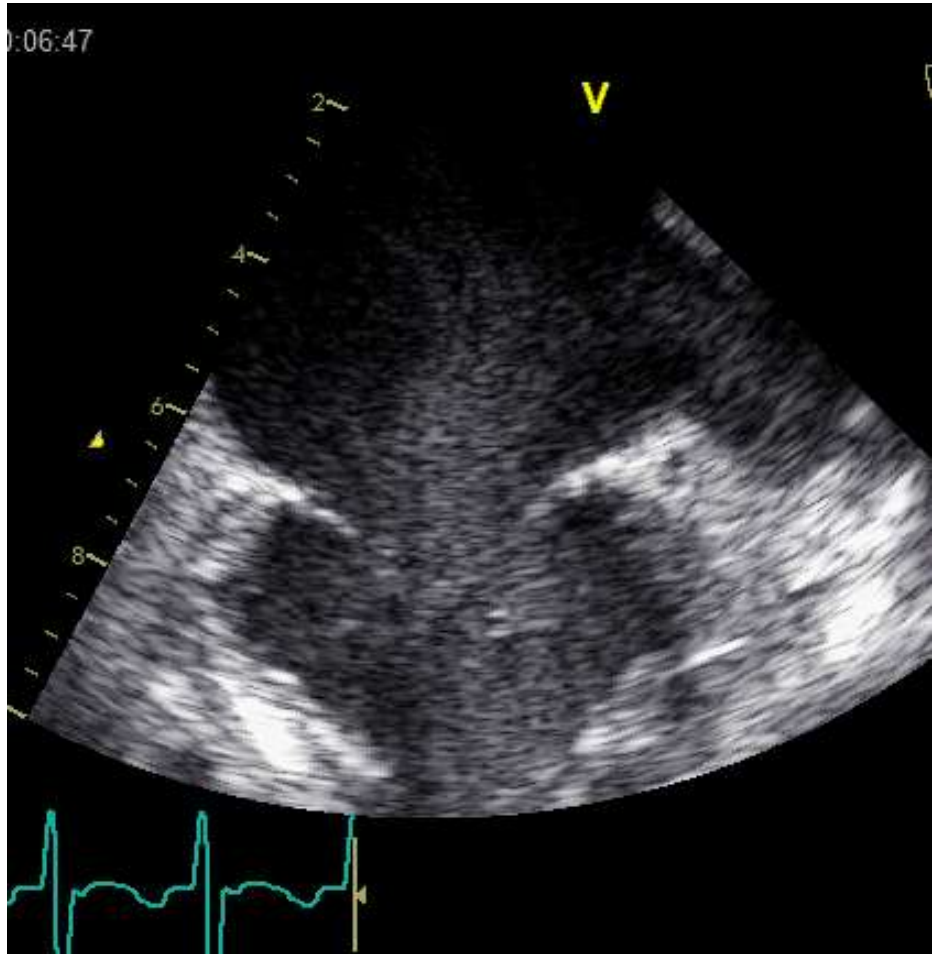




Cases and imaging source: General University Hospital, Prague, CZ

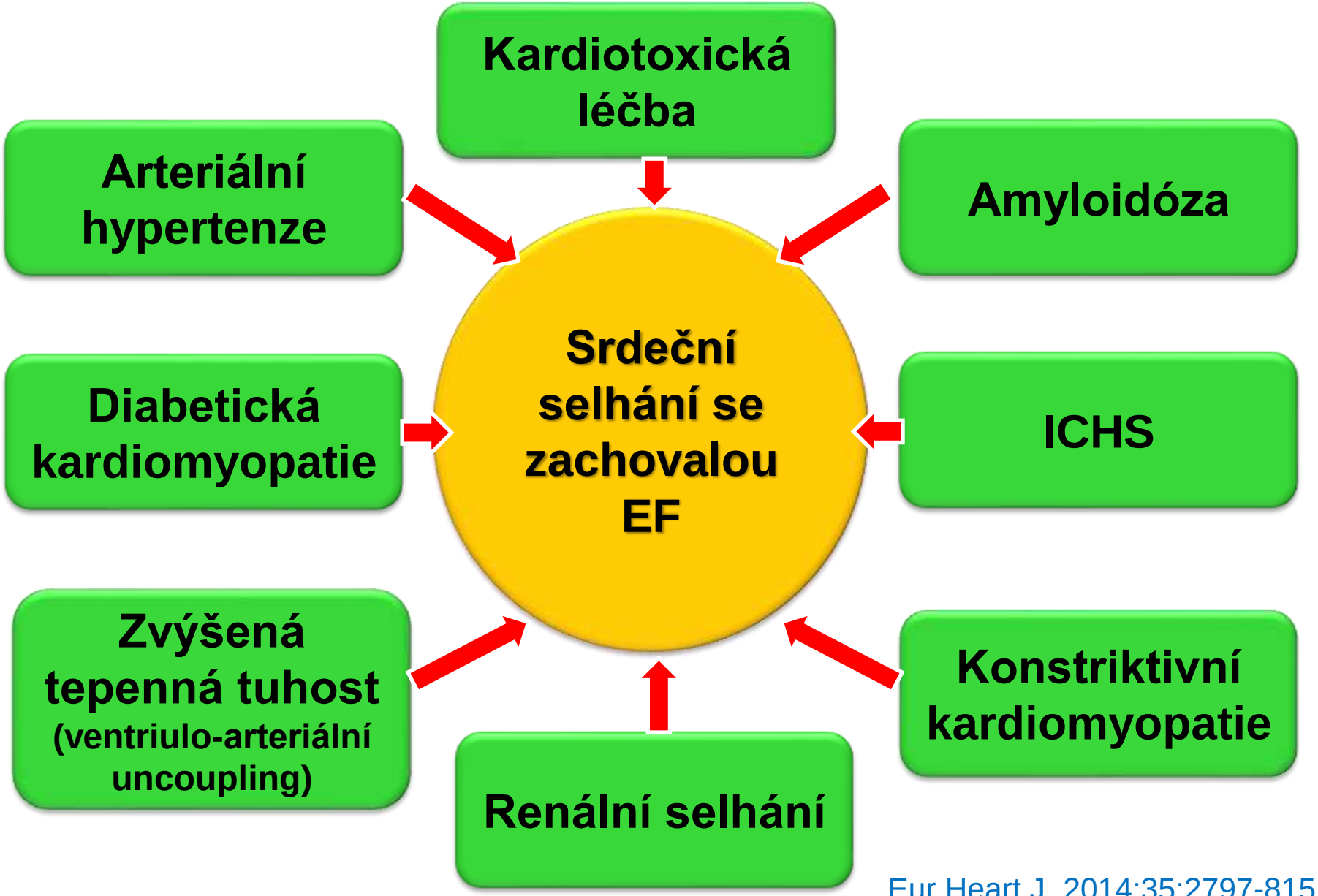
Fibrilace síní a HF-pEF





Cases and images: General University Hospital Prague, CZ

HF-pEF – heterogenní syndrom



Eur Heart J. 2014;35:2797-815.

Rozdíly v příčinách úmrtí u nemocných s HF-PEF a HF-REF[2]

Příčiny úmrtí	I-Preserve*[1]	HF-REF
Náhlá srdeční smrt	26	28
Srdeční selhání	**14**	**45**
IM	5	6
CMP	9	5
Nekardiovaskulární	**30**	**15**

*I-preserve = 4128 nemocných s EF > 45%, NYHA II-IV

1) Massie et al. N Engl J Med. 2008:359:2456-67

Závěr

- Nemocní s HF-pEF nepochybně existují
- U řady nemocných je ale dg. pochybná
- Kritéria navržená HFA zahrnují i normální nálezy jako známky HF-pEF
- Echo a BNP kritéria umožnila zařazení nemocných bez srdečního selhání do řady studií
- Nemocní s HF-pEF mají řadu specifických dg. (amyloidóza)
- Četné komorbidity činí léčbu nemocných problematickou