## Diastolic Guidelines - Are they helpful?

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## Why do we assess diastolic function?

- We want to diagnose HFpEF.
  - For a patient with HF symptoms with normal EF, we suspect a possibility of diastolic dysfunction.
- We want to know patient's prognosis.
  - We know diastolic dysfunction and high filling pressure worsen the patient's prognosis.

## **Definition of heart failure**

	HFrEF	HFmrEF	HFpEF
1	Symptoms $\pm$ signs	Symptoms $\pm$ signs	Symptoms $\pm$ signs
2	LVEF <40%	LVEF 40 – 49%	LVEF ≥50%
3	-	<ol> <li>Elevated levels of natriuretic peptides (BNP&gt;35 pg/mL and/or NT-proBNP&gt;125 pg/mL)</li> <li>At least one additional criterion:         <ol> <li>Relevant structural heart disease (LVH and/or LAE)</li> <li>Diastolic dysfunction</li> </ol> </li> </ol>	<ol> <li>Elevated levels of natriuretic peptides (BNP&gt;35 pg/mL and/or NT-proBNP&gt;125 pg/mL)</li> <li>At least one additional criterion:         <ol> <li>Relevant structural heart disease (LVH and/or LAE)</li> <li>Diastolic dysfunction</li> </ol> </li> </ol>
Sign	s of diastolic dysfunction	on	

(2016 ESC GL, EHJ 2016;37:2129)

- Structural alterations: LAVI>34 mL/m<sup>2</sup> or LVMI $\ge$ 115 g/m<sup>2</sup> (male)  $\ge$ 95 g/m<sup>2</sup> (female).
- Functional alterations :  $E/e' \ge 13$  and average e'<9 cm/s.
- Other : TR velocity

GUIDELINES AND STANDARDS ASE/EACVI GUIDELINES AND STANDARDS 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 Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography HF F. Sagnah, MD, Chan, <sup>2</sup> Christopher P. Applerin, MDA<sup>1</sup> Thiory C. Gildeen, MDA<sup>2</sup> Paulo N. Marino, MDA<sup>2</sup> Jer K. On, MD, Chan A. Smorth, MD, PhDA<sup>2</sup> Thior and Control MDA Transmission and Control PhDA<sup>2</sup> and A. Bellah, MD, Manamur, Old, NHD \* 476, Trans. Manuscripter, Artimeter, Janu, Neuran, Judy Kashner, Minsonic Ode, Neuropy, S. Leuis, Minneri, Pelagan, Gri Barcican, Spain. Chair, MD, FASF,<sup>1</sup> Orm A. Smitch, Go Chair, MD, FHD,<sup>2</sup> Orknopher J-Toyd, III, MD, FASF,<sup>1</sup> Hoham Dokamin, MD, FASE,<sup>2</sup> Ther Edwardsen, npf, MD, PAD, FESC,<sup>1</sup> Thinry: C. Gilekter, MD, PHD, FESC,<sup>2</sup> Alan L, K in Learedoni, MD, PHJ, FESC,<sup>1</sup> Factor, And Chair, MD, FESC,<sup>2</sup> Lin, L A, in Learedoni, MD, PHJ, FESC,<sup>1</sup> And Alan D. Waggnore, MHS, RPCS mits, Artison, YANGWI, Tensure, Reading, Granter, Canada F. Juni-L, MG, Artison, YANGWI, Tensure, Tensalisa, Character, Canada F. Juni-L, MC, MC, MD, Chair, Tensaria, Charalana, Character, Canada F. Juni-L, Stephen, MD, Character, Character, Canada F. Juni-L, Character, Chara graphy. Doppler, Heart falure TABLE OF CONTENTS Preface 108 2009 1 d Feasibility 111 111 111 2016 orderable A one of LV Hing ce and Acquisition 1 plication 113 i 113 nous How 113 card Franklity 113 Clinical App ion of UV Riling Presume in a 258 and 1 insert, ages Soler and 303 AN HRUEF 10 nants 114 115 Annular Early and I and Feasibility 115 L Arquinson 115 B Measurmenn 115 C Hensdynamic Determinants D Normal Values 116 E Christi Application 116 F Limitations 117 Measurements 1 VII. Des IX. Let Vi A. Cr arements 118 relating 118 acreatized, MD, IHO, Thomas anciented, MD, PHO, Paolo Ma The following authors report fermilie: Jan K. Oh, MD, has













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Web Table 4.3	Normal and abnormal values of echocardiographic indices of diastolic function of left ventricle at rest
according to age	categories, differentiated for gender. Values are presented as means ( $\pm$ standard deviations) (the
cut-offs of these	parameters have been derived from the following references). <sup>65,70,72,80-86</sup>

Parameter	Normal dias	tolic function					Diastolic dysfunction		
	20-40 years 40-60 years			≥60 years		Impaired	Pseudo-normal	Restrictive	
	Male Female		Male Female		Male Female		relaxation	filling	filling
MV-inflow									
MV-E (m/s)	0.79 ± 0.14	0.84 ± 0.17	0.72 ± 0.16	0.77 ± 0.17	0.67 ± 0.15	0.72 ± 0.17			
MV-A (m/s)	0.50 ± 0.13	0.51 ± 0.12	0.61 ± 0.15	0.63 ± 0.14	0.73 ± 0.16	0.76 ± 0.16			
DecT (m/s)	179.8 ± 46.4	176.7 ± 40.1	186.6 ± 52.8	188.2 ± 39.8	217.5 ± 69.7	201.5 ± 55.7	>220	140-220	<140
E/A ratio (m/s)	1.69 ± 0.52	1.72 ± 0.52	1.22 ± 0.31	1.26 ± 0.43	0.96 ± 0.27	0.99 ± 0.31	<1.0	1.0-2.0	>2.0
lvrt (m/s)							>110	60-100	<60
Tissue Doppler									
e' septal (cm/s)	11.9 ± 2.7	12.3 ± 2.3	9.8 ± 2.6	9.7 ± 2.5	7.3 ± 2.2	7.9 ± 2.3	<8	<8	<8
e' lateral (cm/s)	16.2 ± 3.6	16.6 ± 3.2	12.6 ± 3.0	12.4 ± 3.0	9.5 ± 2.1	9.7 ± 3.2	<10	<10	<10
e' mean sept-lat (cm/s)	14.0 ± 2.9	14.5 ± 2.4	11.2 ± 2.4	11.1 ± 2.5	8.5 ± 1.9	8.8 ± 2.6			
E/e' septal	6.9 ± 1.7	6.9 ± 1.6	7.8 ± 2.4	8.2 ± 2.2	9.8 ± 3.0	9.7 ± 2.6			
E/e' lateral	5.0 ± 1.3	5.2 ± 1.3	6.1 ± 2.2	6.5 ± 2.3	7.6 ± 2.1	7.9 ± 2.2			
E/e' mean sep-lat	5.8 ± 1.4	5.9 ± 1.3	6.7 ± 2.1	7.2 ± 2.0	8.4 ± 2.2	8.6 ± 2.2		≥13	≥13

(2016 ESC GL, EHJ 2016;37:2129)



ESC European Society of Cardiology European Journal of Heart Failure (2018) 20, 1303–1311 doi:10.1002/ejhf.1220

Correlation with invasive left ventricular filling pressures and prognostic relevance of the echocardiographic diastolic parameters used in the 2016 ESC heart failure guidelines and in the 2016 ASE/EACVI recommendations: a systematic review in patients with heart failure with preserved ejection fraction

**RESEARCH ARTICLE** 

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Study	Total	Correlation		CORV	/eight
Hummel 2017	98			0.24	16.3%
Matsushita 2015	16		-	- 0.56	9.6%
Kasner 2015	23		-	+ 0.84	11.5%
Bhella 2011	11	22	100	- 0.64	7.4%
Kasner 2010	21		1	0.57	11.0%
Weeks 2008	14			0.19	6.8%
Kasper 2007	43			- 0.71	14.1%
Random effects model		-0.5 0	0.5	0.56 1	00.0%
Study		Hazard Ratio	HR	95%-CI	Weight
Mascherbauer 2017			1.04	[0.99; 1.09]	5.9%
Kimura 2016			▶ 1.07	[0.99; 1.15]	3.0%
Burke 2014			1.03	[1.02; 1.05]	18.9%
Shah 2015			1.05	[1.02; 1.00]	14.5%
Donal 2015			1.06	[1.03; 1.09]	13.1%
Shah 2014			1.07	[1.05; 1.09]	16.6%
Zile 2011			1.01	[0.99; 1.04]	13.9%
Random effects model			1.05	[1.03; 1.06]	100.0%
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## *Limitations of E/e' to assess filling pressures*

- Healthy subjects
  Bhella PS et al. Circ CV Img 2011, Jacques DC et.al. Chest 2004
- HCM
  - Geske JB et al. Circulation 2007
- MR, MS
  - Diwan A et al. Circulation 2005
- Mitral annular calcification – Soeki T et al. Eur J Echocardiogr 2002, Abudiab MM et al. JACC CV Img 2017
- Advanced systolic heart failure
  - Mullens W et al. Circulation 2009, Kimura K et al. Echocardiogr 2012
- LBBB, PM rhythm, MI, severe PH ..... – Oh JK, et al. JACC CV Img 2020























- Yes, they are helpful.
- But they are not perfect.
  - Age and gender are not considered.
  - E/e' is not very much accurate to predict high filling pressure.
  - Not all Grade 1 patients have low filling pressure.
- Guidelines will progress. Let's wait for the "New" guidelines.

