

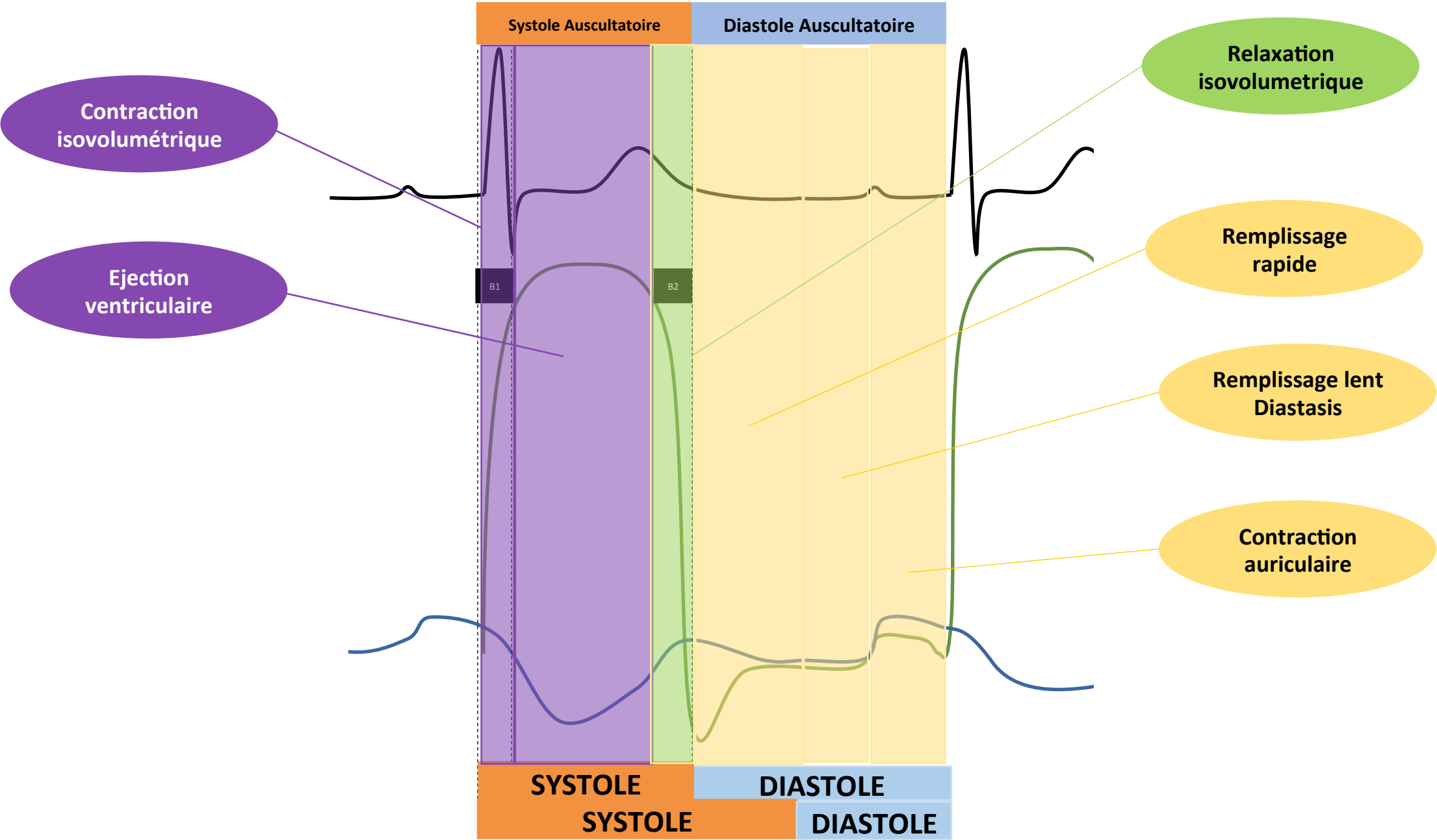
La fonction diastolique

Cours DESC – Réanimation Médicale – Décembre 2018

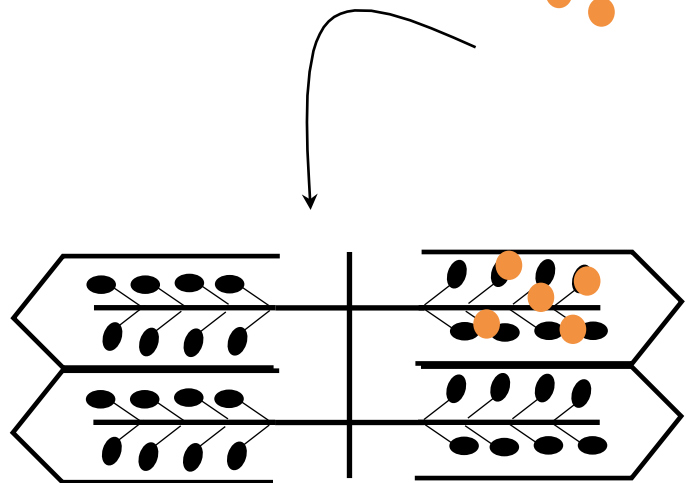
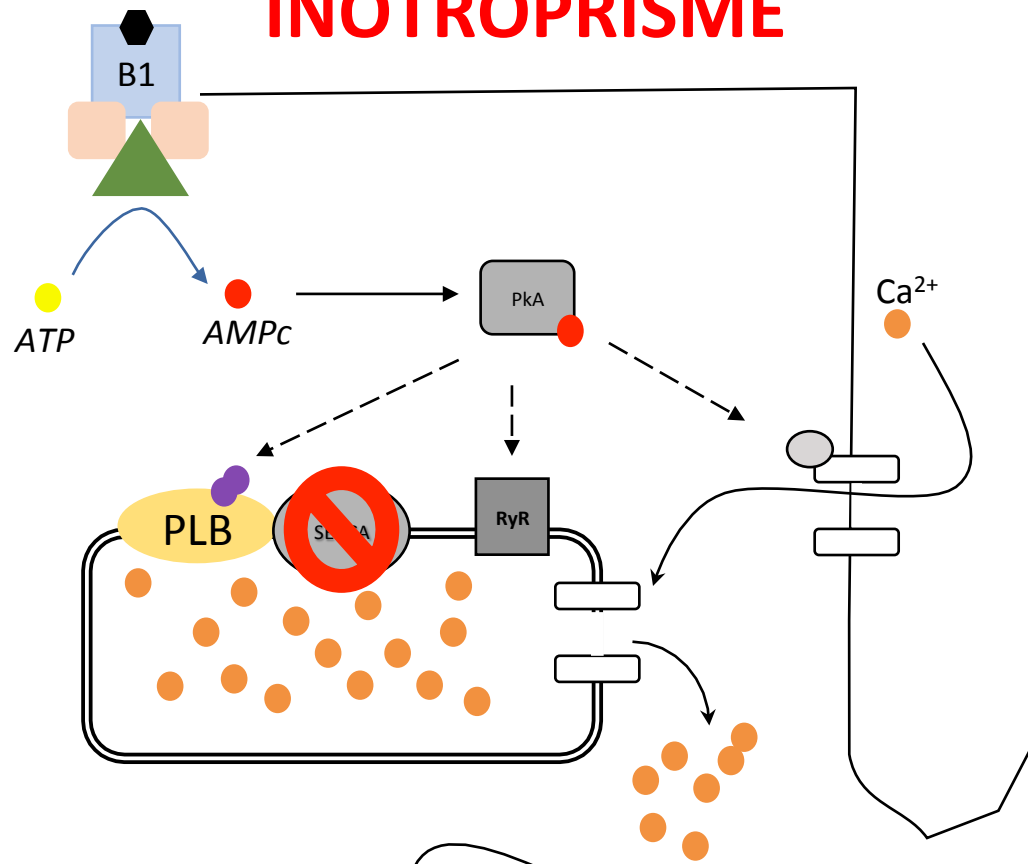
Dr BEYLS Christophe

CCA - Service Réanimation CTVR – CHU Amiens

beyls.christophe59@gmail.com

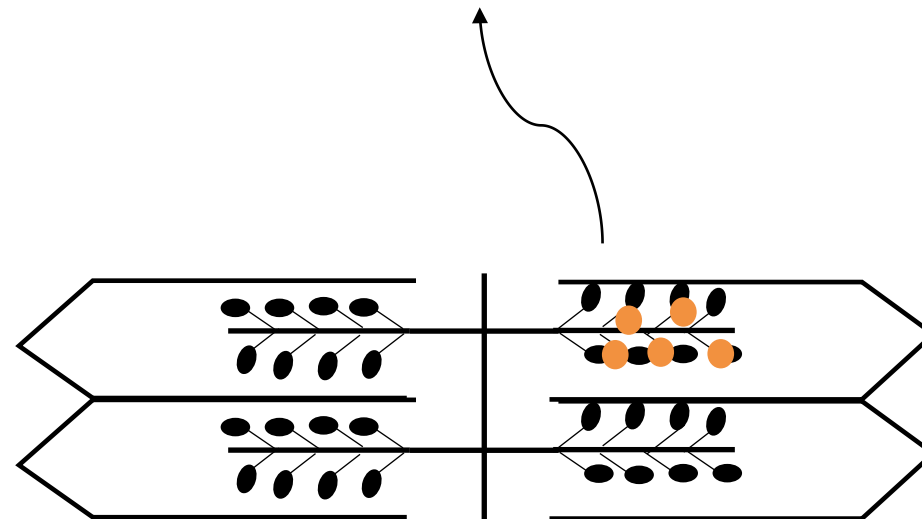
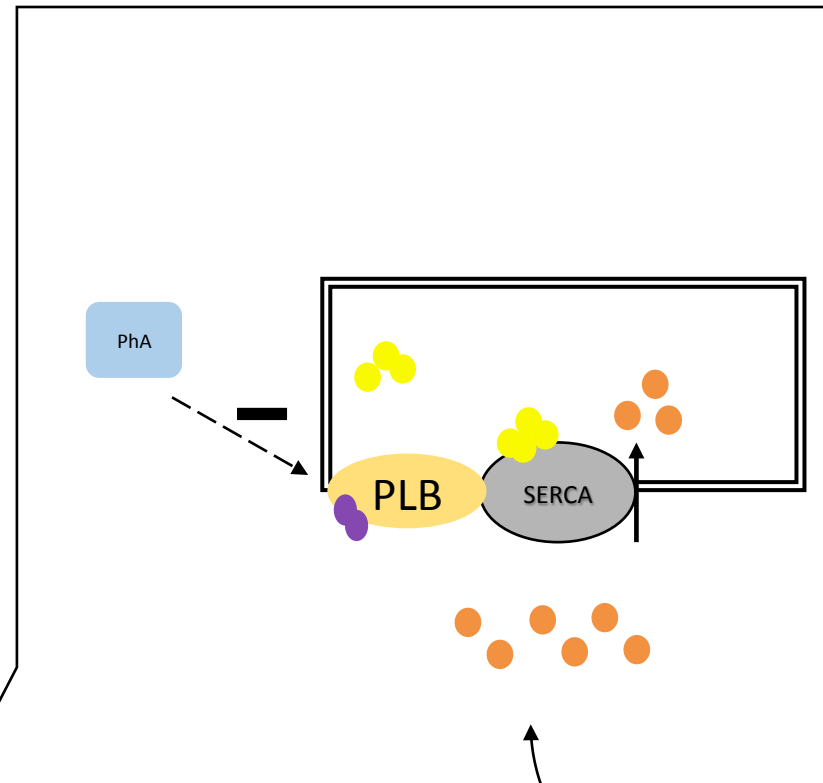


INOTROPISME



Contraction

LUSITROPISME



Relaxation

Temps physiologique **ACTIF**



Consommation **d'énergie – ATP +**

Fonction diastolique **NORMALE**

Capacité du ventricule **à accepter un volume de remplissage, dans les limites physiologiques, **sans augmentation de pression****

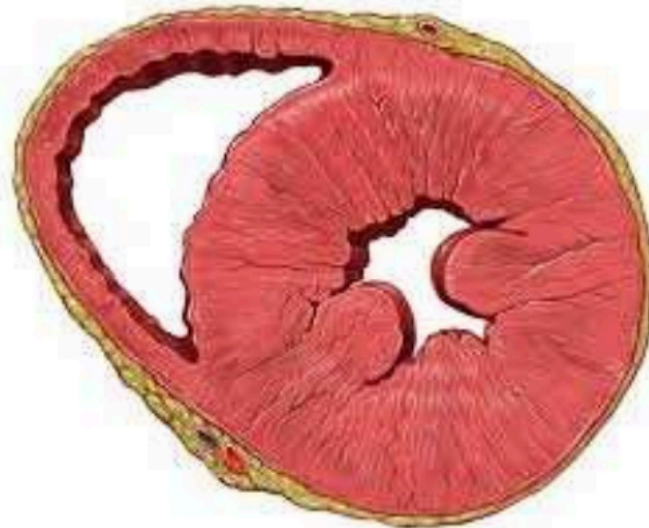
La dysfonction **DIASTOLIQUE**

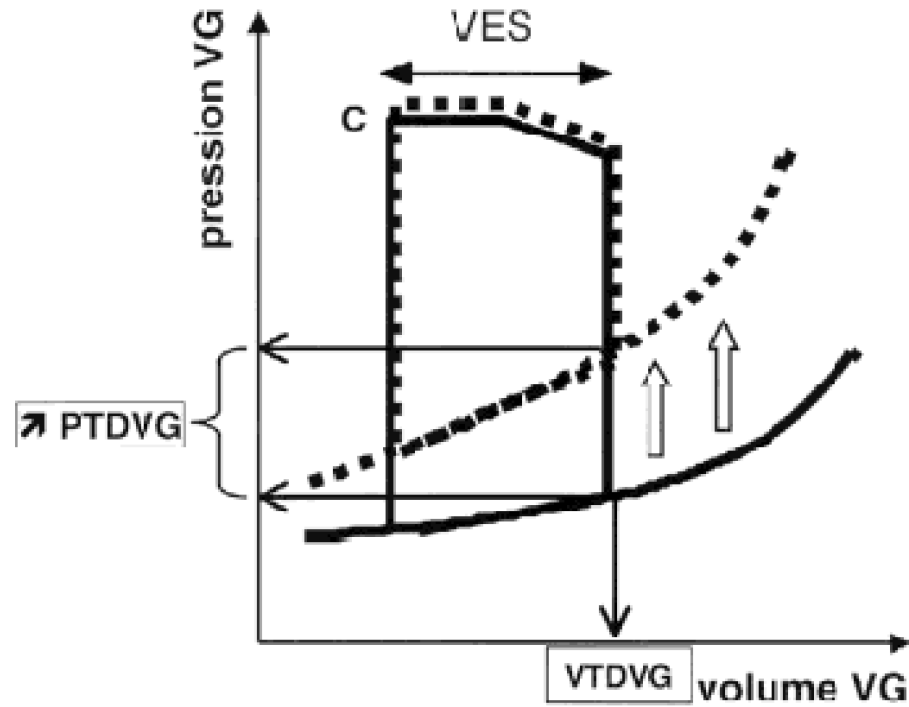


Anomalie de la **RELAXATION** des fibres
myocardiques
(ischémie, âge...)



Anomalie de la **COMPLIANCE** et donc de
la **DISTENSION** des fibres myocardiques
(fibrose, HVG...)





Anomalies lors de la **phase du remplissage du VG**



Augmentation de la PTDVG



IC 'diastolique' symptomatique **congestive**

Ne pas **CONFONDRE** **dysfonction diastolique** et **PTDVG/PAPO**



On peut avoir un trouble de la relaxation **ET** une PTDVG basse

Ne pas **CONFONDRE** **dysfonction diastolique** et **IC à FE préservée**

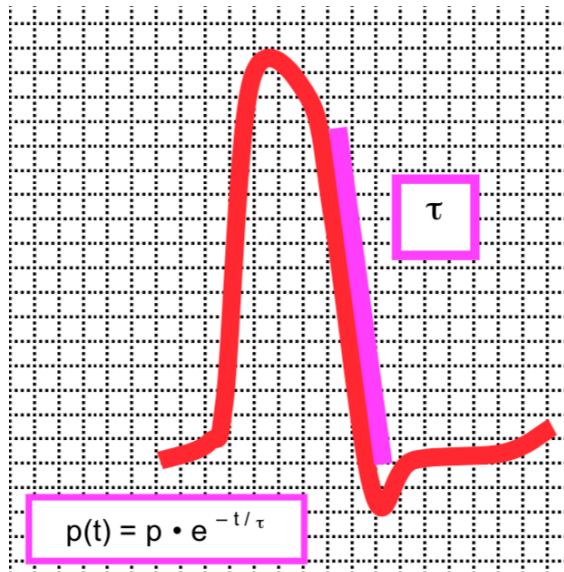
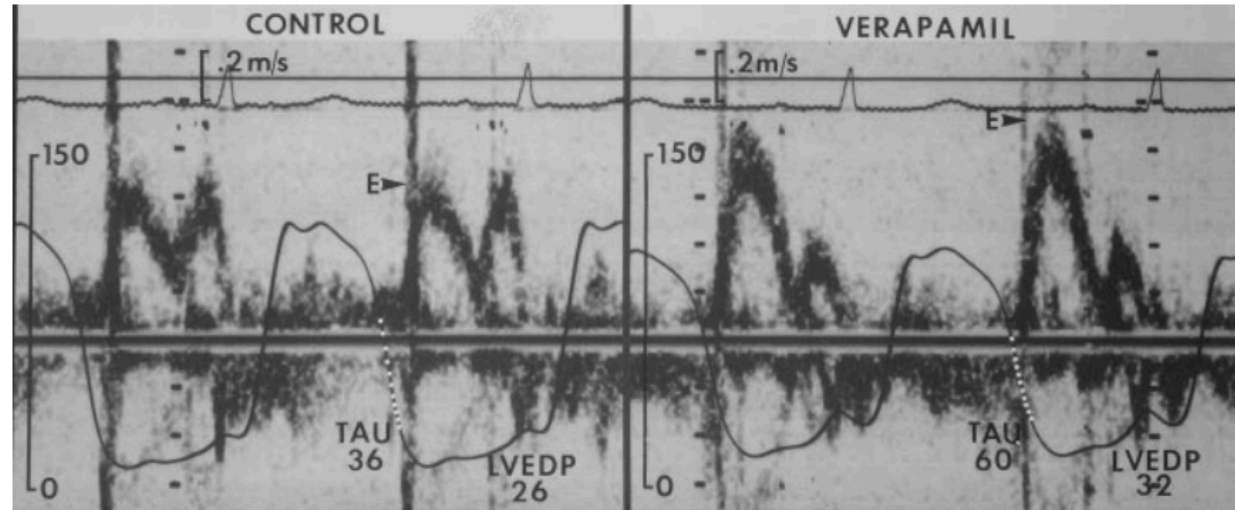
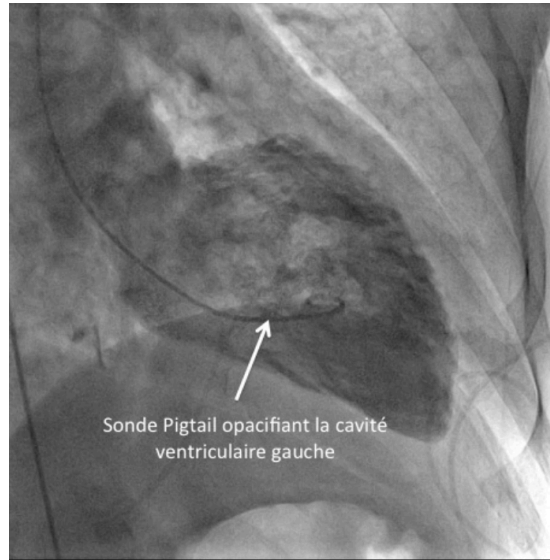


Type of HF		HFrEF	HFmrEF	HFpEF
CRITERIA	1	Symptoms ± Signs ^a	Symptoms ± Signs ^a	Symptoms ± Signs ^a
	2	LVEF <40%	LVEF 40–49%	LVEF ≥50%
	3	–	1. Elevated levels of natriuretic peptides ^b ; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).	1. Elevated levels of natriuretic peptides ^b ; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).

Comment **EVALUER** la fonction diastolique ?

Pas de GLOD STANDARD !!

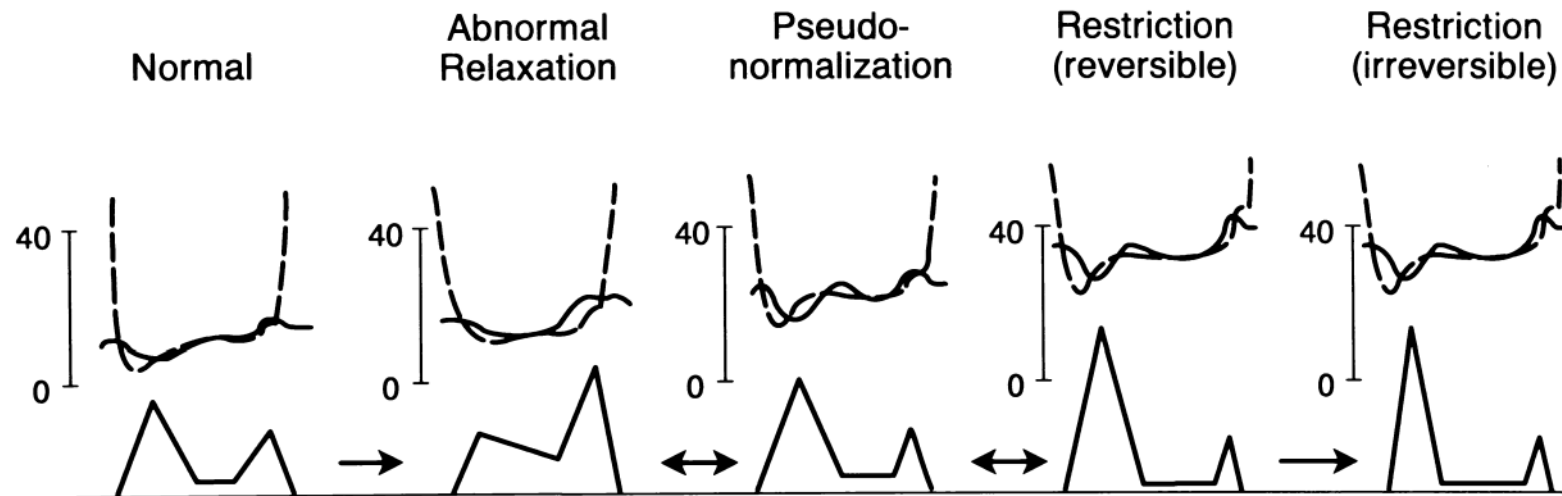
La méthode invasive d'exploration



Allongement de Tau si atteinte de la relaxation

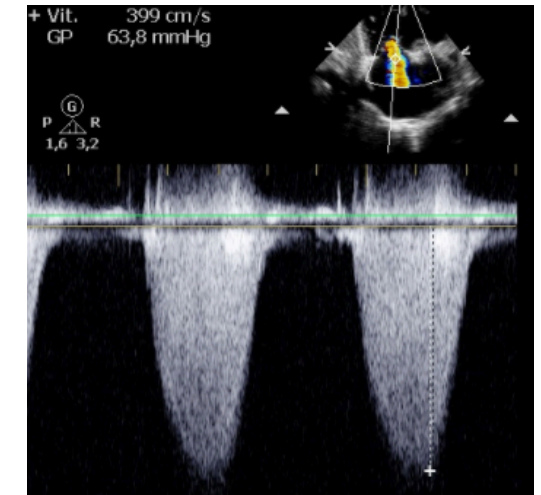
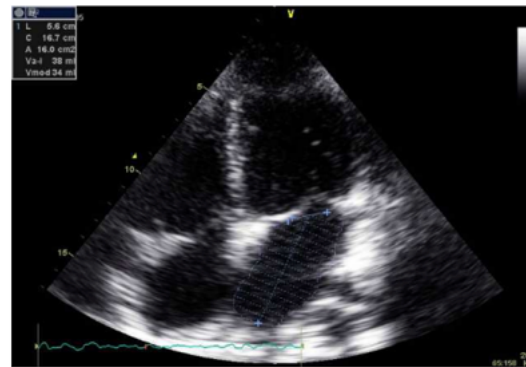
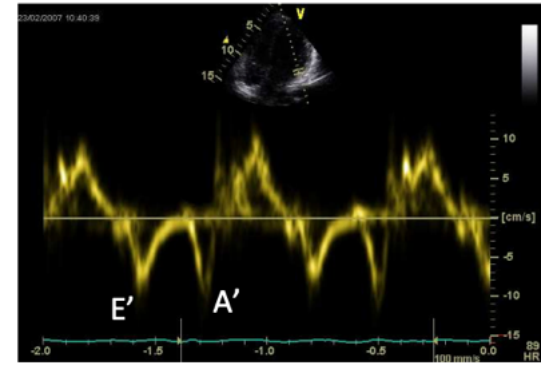
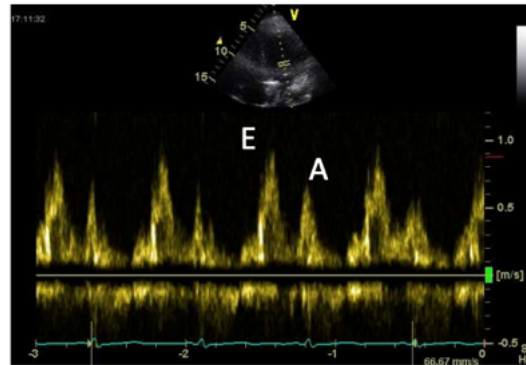
Reflet du **LUSITROPISME**

La méthode non invasive d'exploration : ETT

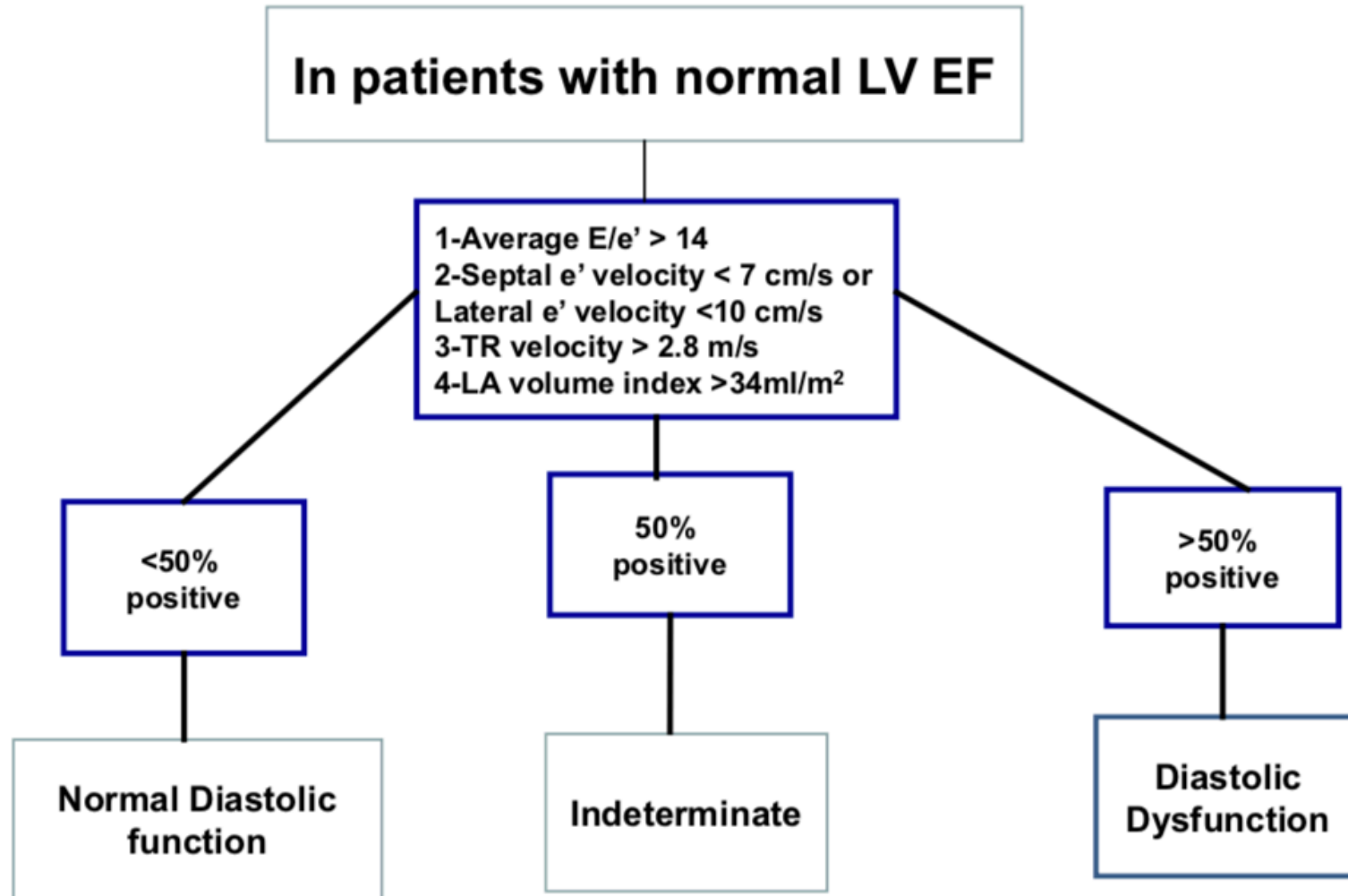


Mean LAP	=	= ↑	↑↑	↑↑↑	↑↑↑
TAU	=	↑	↑	↑↑	↑↑
NYHA		I-II	II-III	III-IV	IV
Grade diastolic dysfunction		I	II	III	IV

La méthode non invasive d'exploration : ETT



Approche **MULTIPARAMETRIQUE ++**

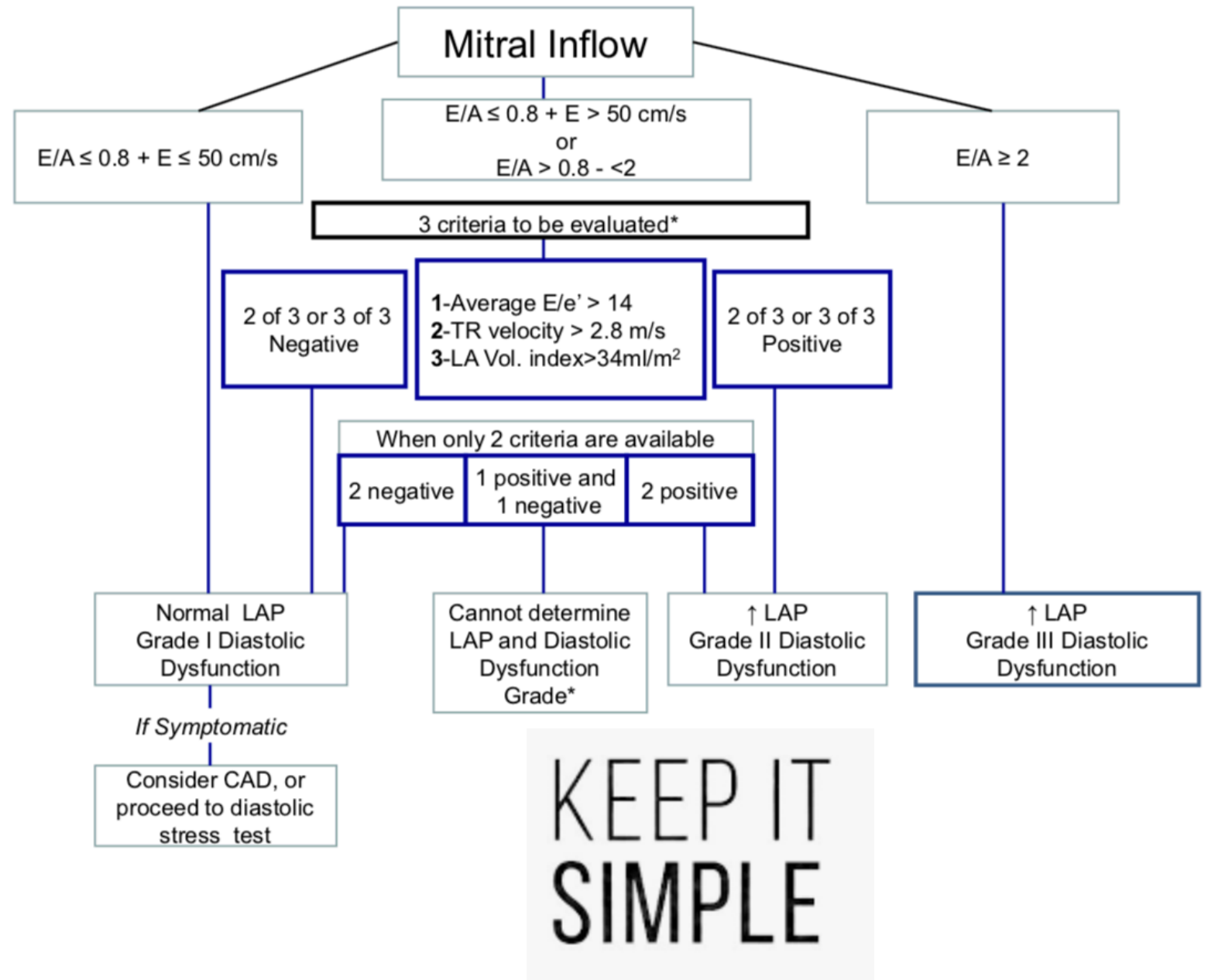


TECHNIQUE ECHOGRAPHIQUE

- Echogénéicité
- Qualité des coupes (80% ETT)
- Expérience ++

PARAMETRES et TERRAIN

- Exclusion des patients en FA
- Tachycardie ++
- Pathologie mitrale évoluée
- Dilatation OG non pathologique
- Âge ++



Echo-Doppler estimation of left ventricular filling pressure: results of the multicentre EACVI Euro-Filling study

Patrizio Lancellotti^{1,2*}, Maurizio Galderisi³, Thor Edvardsen⁴, Erwan Donal⁵,

Table 5 Echo estimates of LVFP and LVEDP according to 2009 ASE/EACVI recommendations

Parameters	Echo normal LV filling pressure N = 103	Echo elevated LV filling pressure N = 56
LVEDP < 15 mmHg	70 (68%)	25 (45%)
LVEF ≥ 50%	59 (57%)	20 (36%)
LVEF < 50%	11 (11%)	5 (9%)
LVEDP ≥ 15 mmHg	33 (32%)	31 (55%)
LVEF ≥ 50%	24 (23%)	17 (30%)
LVEF < 50%	9 (9%)	14 (25%)

ACE, angiotensin converting enzyme; EF, ejection fraction; EDP, end-diastolic pressure; LAV, left atrial volume; LV, left ventricle; TR, tricuspid regurgitation.

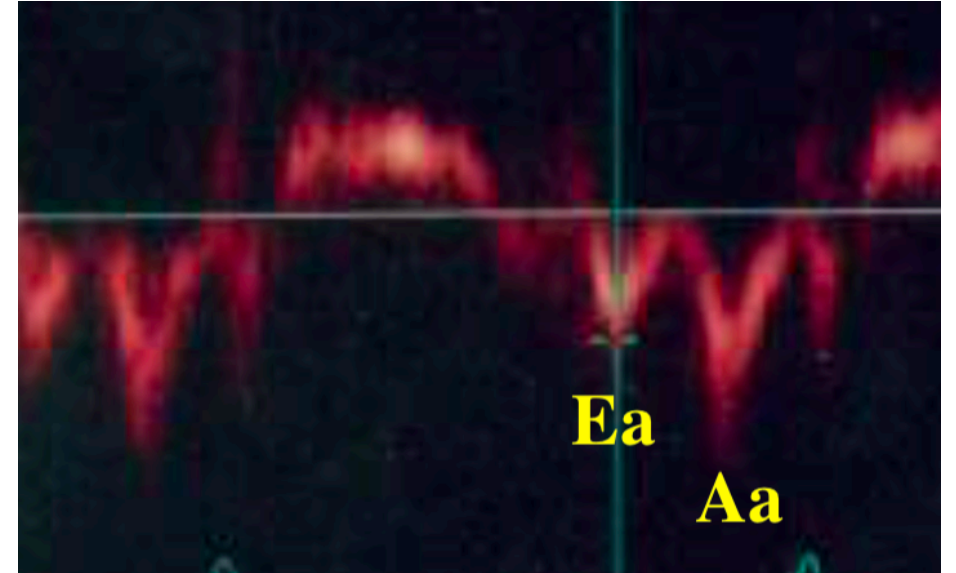
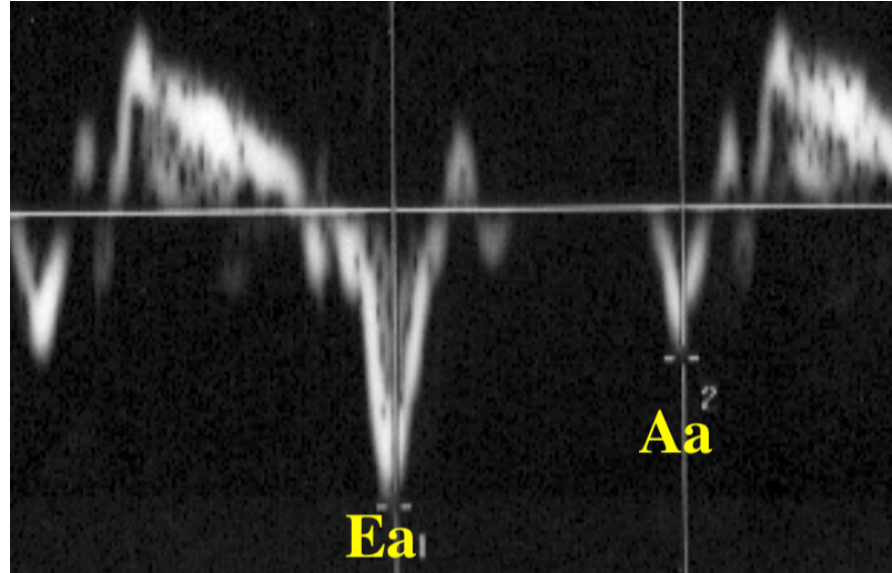
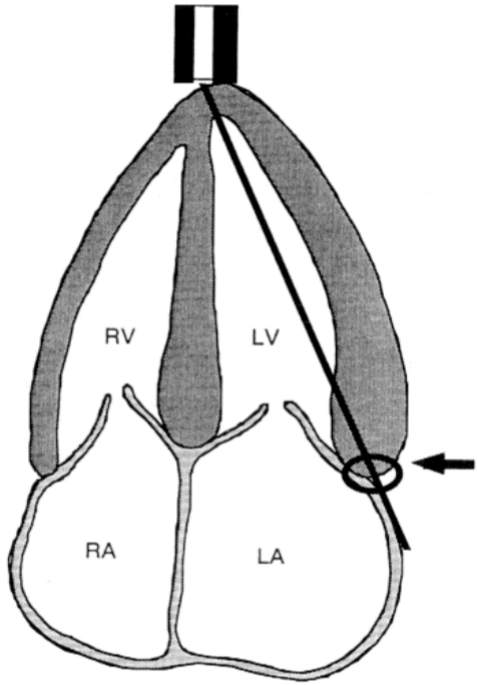
Tables 4 Echo estimates of LVFP and LVEDP according to 2016 ASE/EACVI recommendations

Parameters	Echo Normal LV filling pressure N = 108	Echo Elevated LV filling pressure N = 24	Echo Indeterminate or Cannot determine N = 27
LVEDP < 15 mmHg	70 (65%)	5 (21%)	20 (74%)
LVEF ≥ 50%	62 (57%)	1 (4.2%)	16 (59%)
LVEF < 50%	8 (8%)	4 (16.8%)	4 (15%)
LVEDP ≥ 15 mmHg	38 (35%)	19 (79%)	7 (26%)
LVEF ≥ 50%	32 (30%)	4 (17%)	5 (19%)
LVEF < 50%	6 (5%)	19 (62%)	2 (7%)

ACE, angiotensin converting enzyme; EF, ejection fraction; EDP, end-diastolic pressure; LAV, left atrial volume; LV, left ventricle; TR, tricuspid regurgitation.

Evaluation **DIFFICILE ++** même si augmentation du diagnostic sur la **PTDVG** et non pas la **dysfonction diastolique seule**

Vitesse de déplacement de l'anneau mitral en protodiastole en DTI (Ea)



Valeurs normales avec **Ea > 8 cm/s – 15 +/- 4cm/s**

Attention si zone ischémie - Alignement

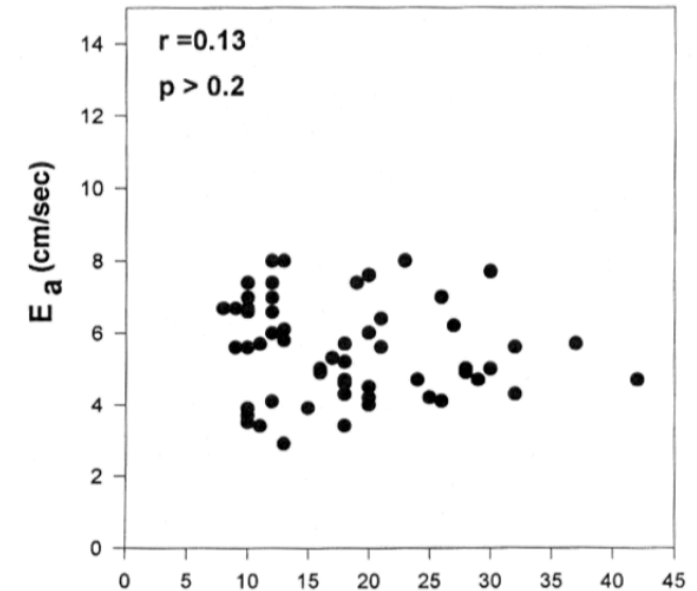
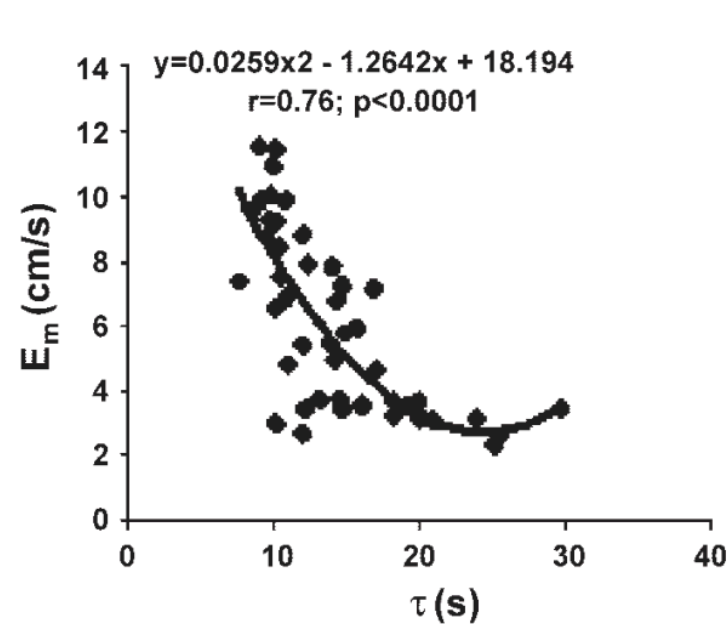
Intérêts ++ avec **anomalie de la relaxation si Ea < 8 cm/s**

Validation of echocardiographic and Doppler indexes of left ventricular relaxation in adult hypertensive and normotensive rats

Michel Slama,¹ Jwari Ahn,² Marcel Peltier,¹ Julien Maizel,¹ Denis Chemla,³ Jasmina Varagic,²
Dinko Susic,² Christophe Tribouilloy,¹ and Edward D. Frohlich²

¹ERI 12, UPRES 3906, INSERM Faculté de Médecine, Université Jules Verne, Amiens, France; ²Research Division, Ochsner Clinic Foundation, New Orleans, Louisiana; and ³UPRES 2705-APHP, Université Paris, Paris, France

Submitted 13 April 2004; accepted in final form 16 April 2005

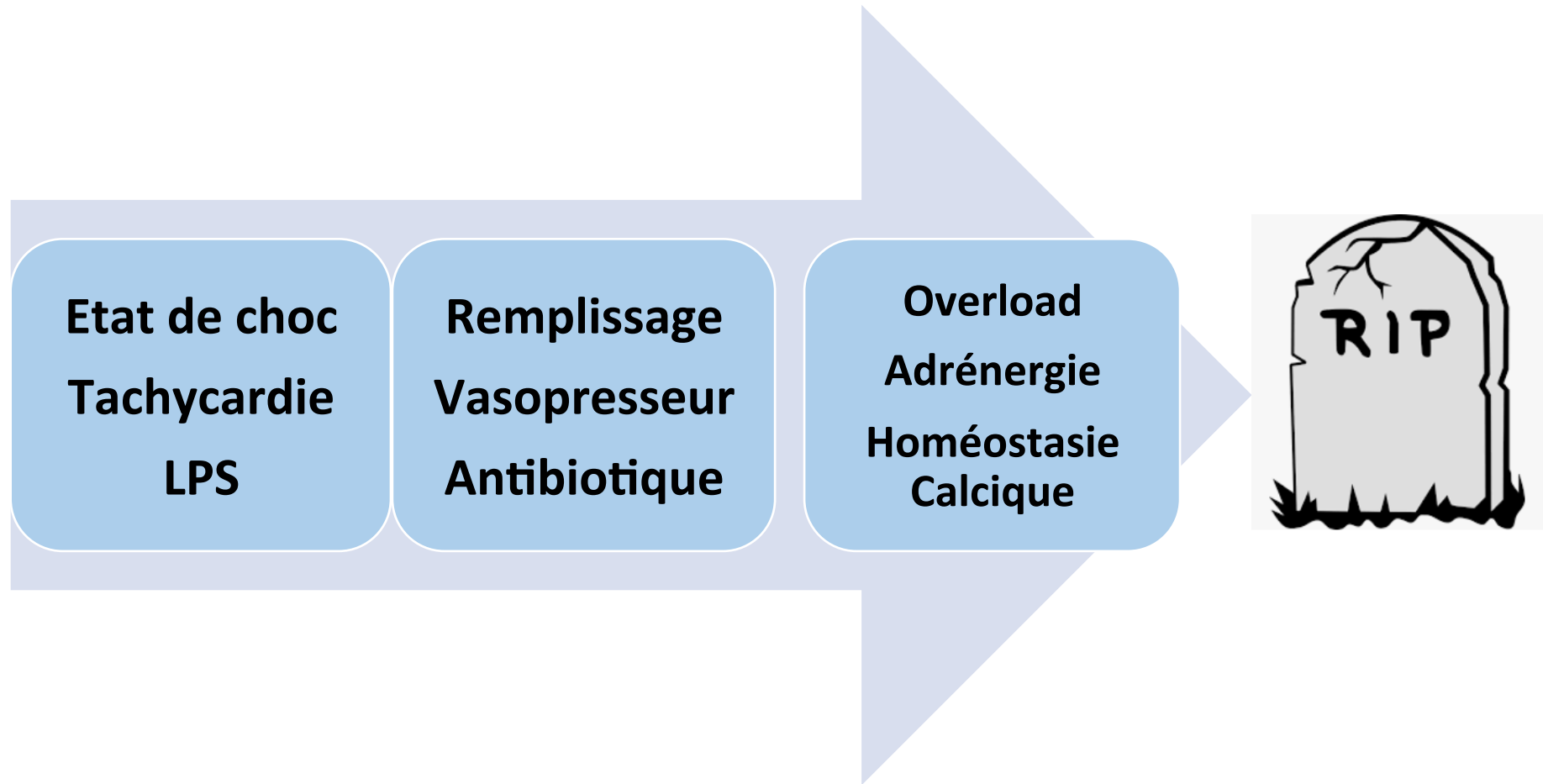
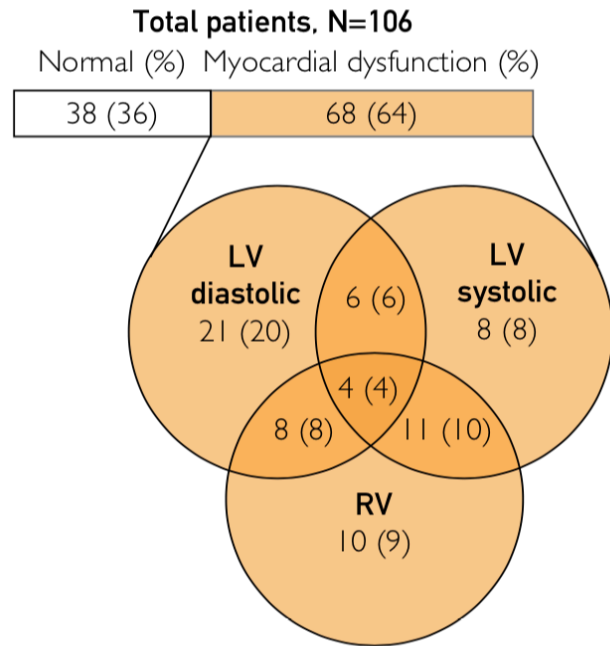


Nagueh – 1997

Indice de **RELAXATION** qui à une corrélation inverse avec Tau

Indice **PEU DEPENDANT** de la précharge ou de la PTDVG

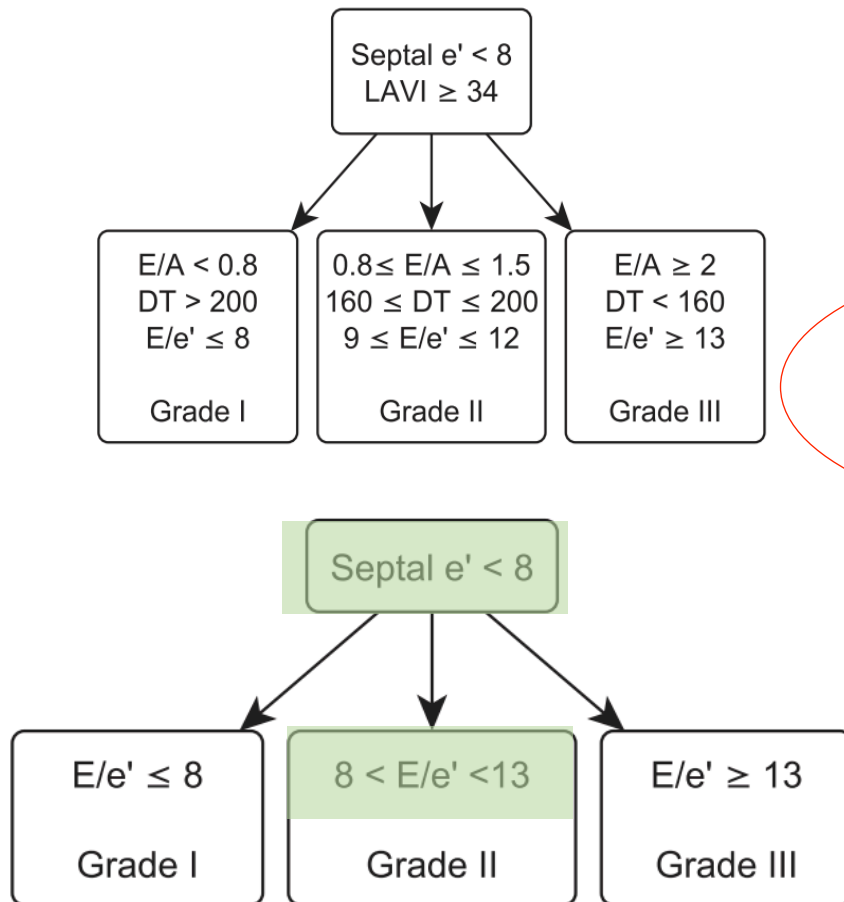
La dysfonction diastolique en réanimation – **Le choc septique**



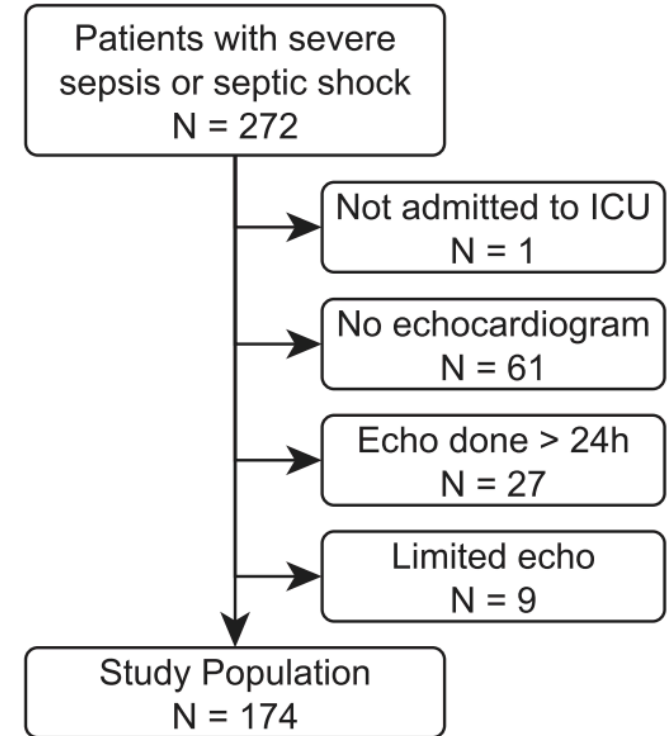
Application of a simplified definition of diastolic function in severe sepsis and septic shock

Michael J. Lanspa^{1,2*}, Andrea R. Gutschel³, Emily L. Wilson¹, Troy D. Olsen¹, Eliotte I. Hirshberg^{1,2,4}, Daniel B. Knox^{2,5}, Samuel M. Brown^{1,2} and Colin K. Grissom^{1,2}

Critical Care 2016



**60 %
INCLASSABLE !**



ASE definition	Modified definition
51 Normal	50 Normal
7 Grade I	3 Grade I
1 Grade II	37 Grade II
11 Grade III	56 Grade III
104 Uncategorizable	35 Uncategorizable

Algorithme SIMPLE – Applicable en réanimation

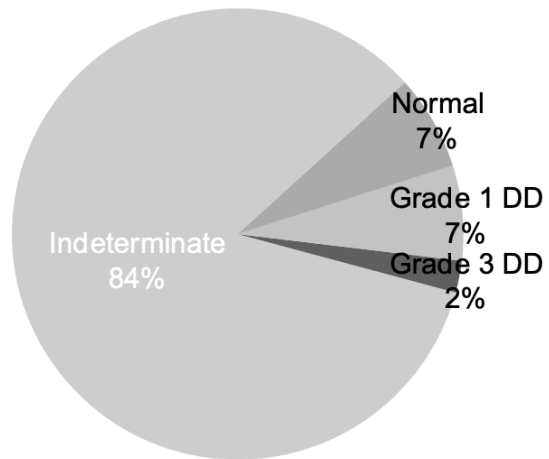
RESEARCH

Open Access

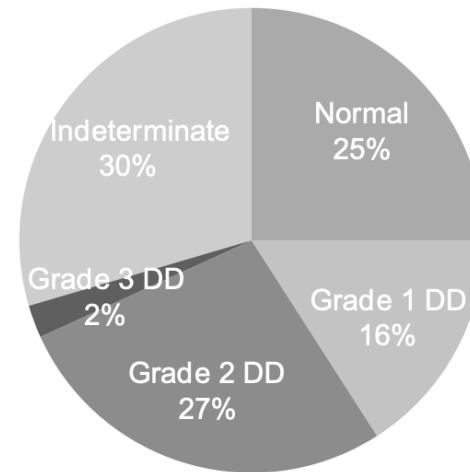


Application of updated guidelines on diastolic dysfunction in patients with severe sepsis and septic shock

David J. Clancy¹, Timothy Scully¹, Michel Slama², Stephen Huang¹, Anthony S. McLean¹ and Sam R. Orde^{1*}

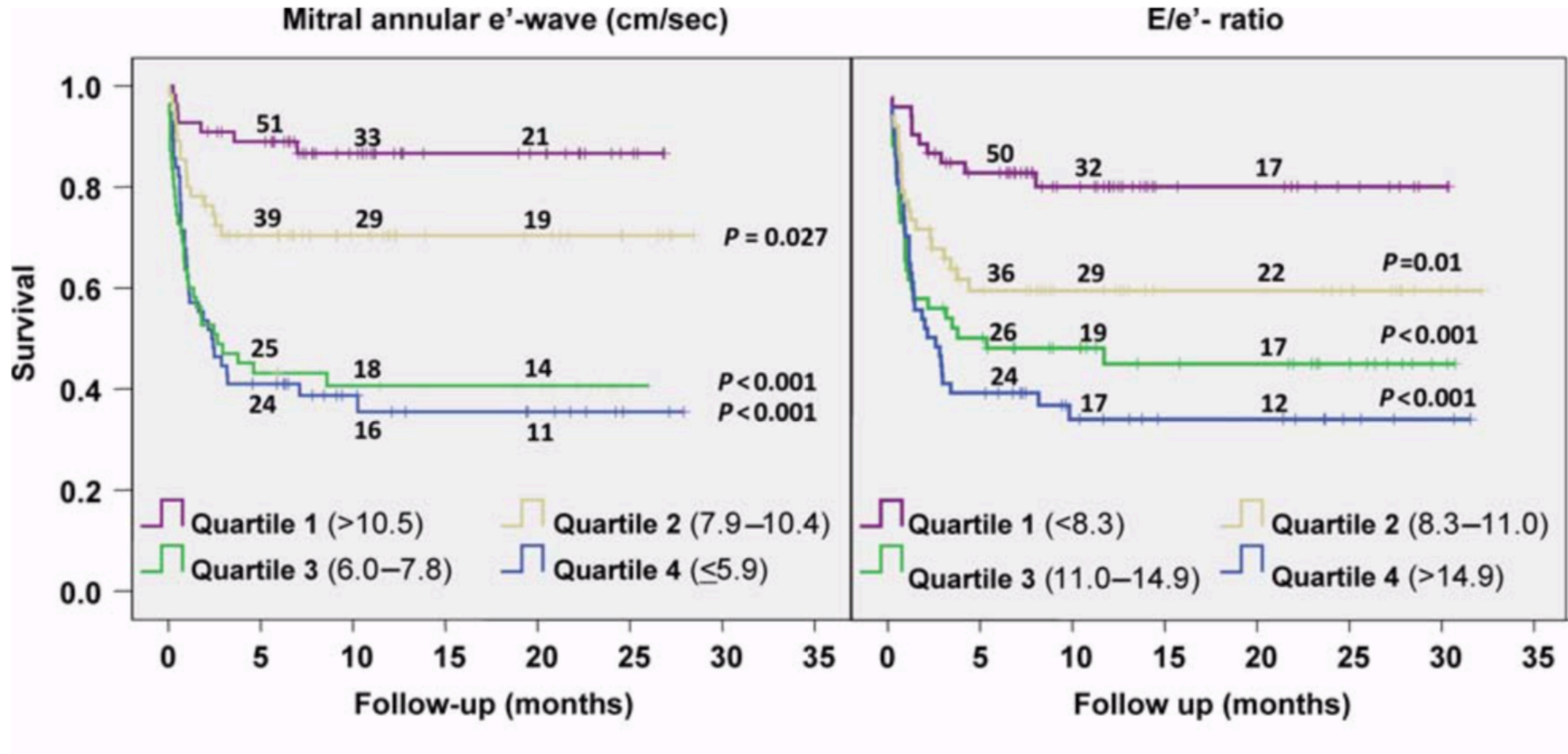


2009 ASE Diastolic dysfunction guidelines

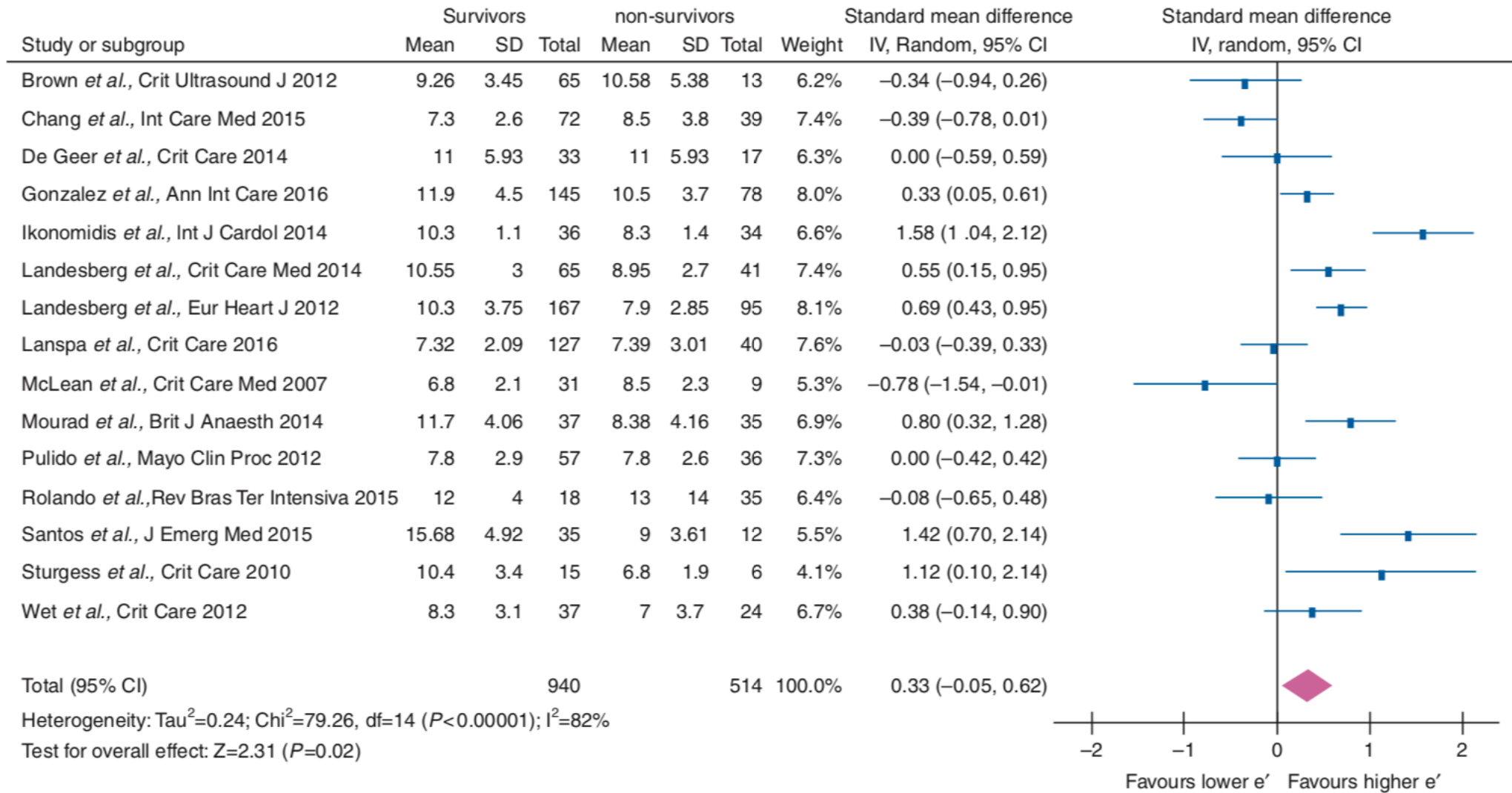


2016 ASE/EACVI Diastolic dysfunction guidelines

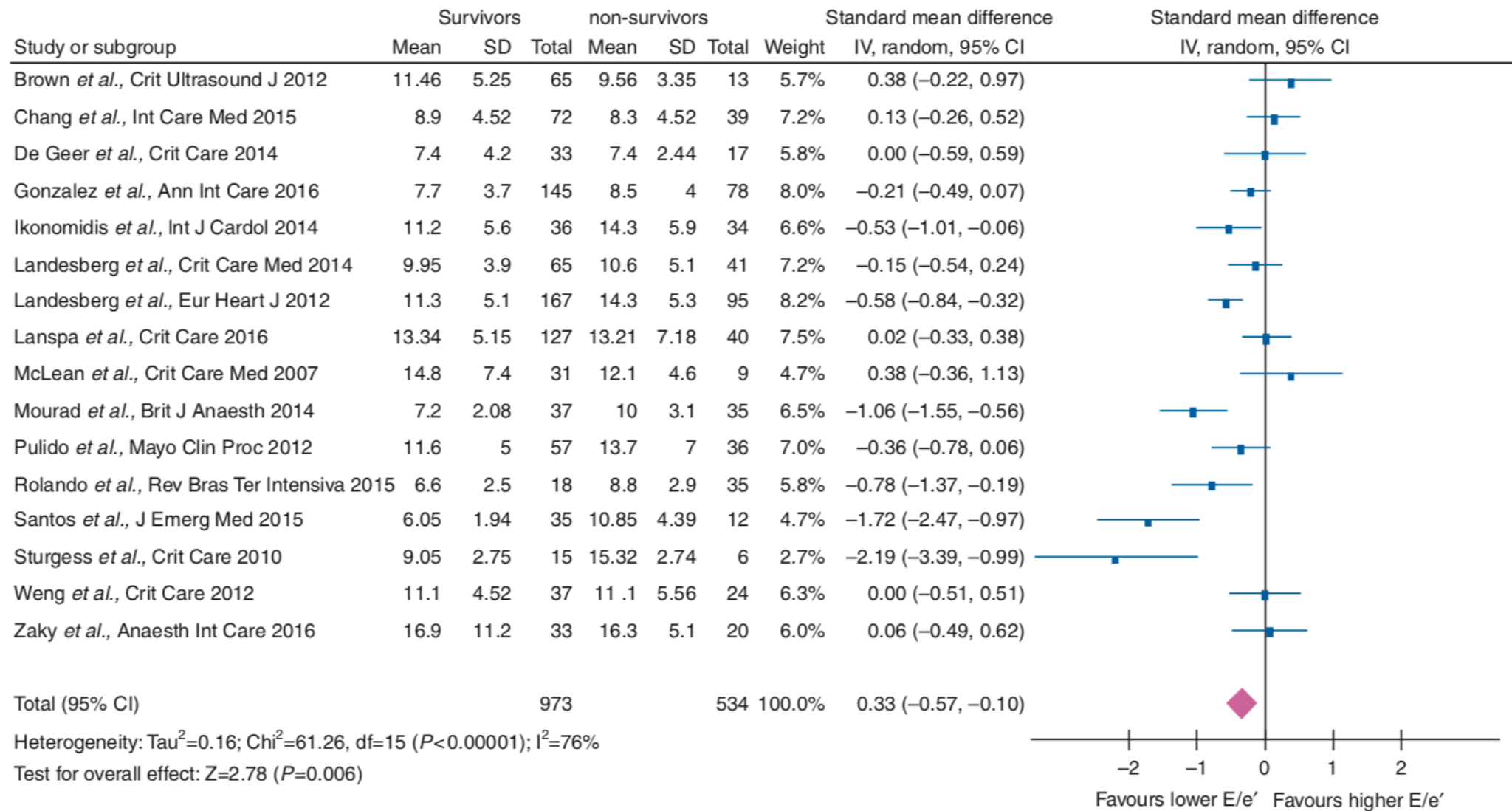
Augmentation du diagnostic de la dysfonction diastolique



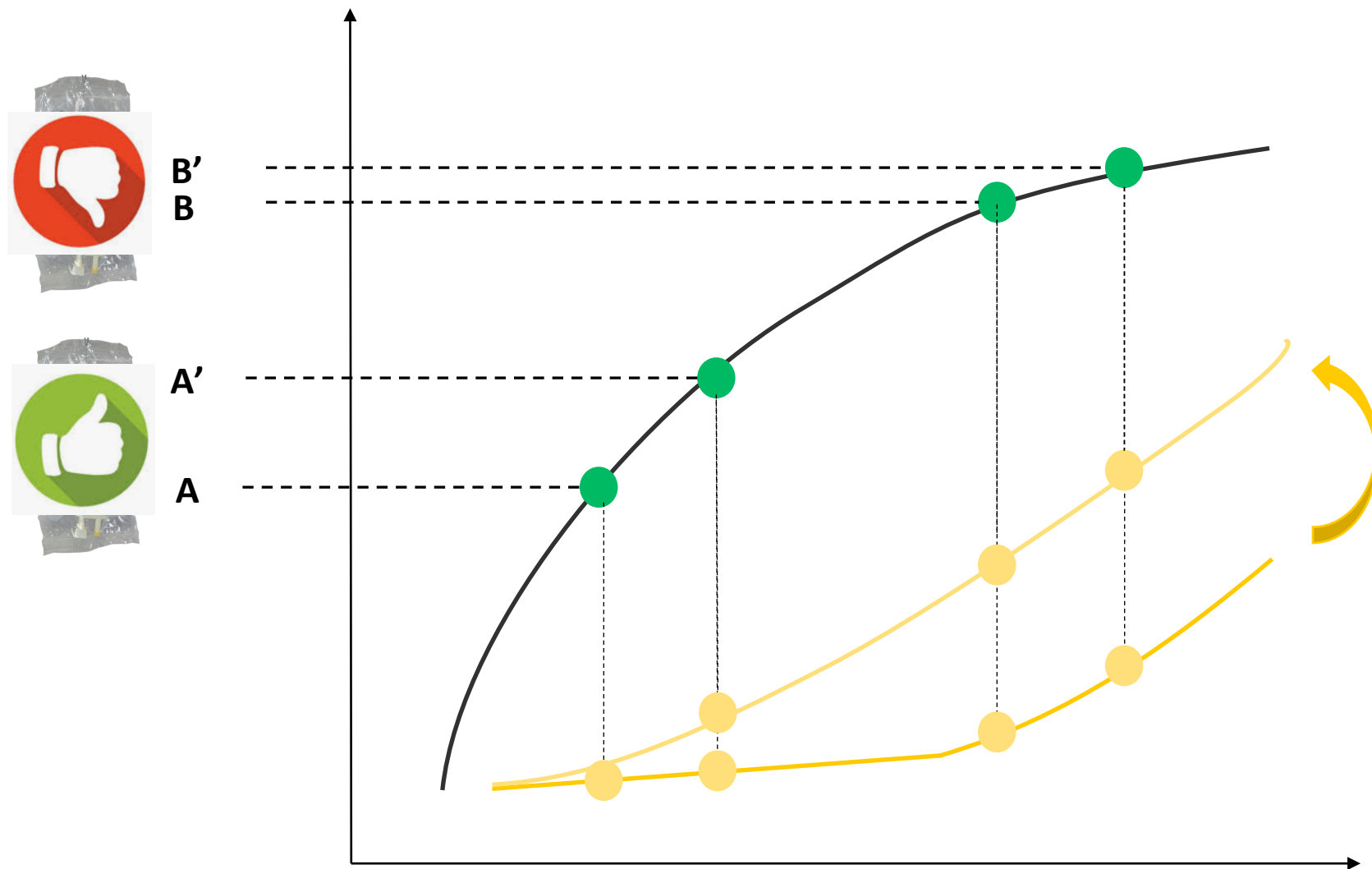
Impact **pronostic important**



Impact pronostic important d'une atteinte de la relaxation



Impact pronostic important d'une élévation de la POG



Dysfonction diastolique = **MONITORAGE REMPLISSAGE**

**Improvement of left ventricular relaxation
as assessed by tissue Doppler imaging
in fluid-responsive critically ill septic patients**

	VE-induced variation in haemodynamic parameters	Responders	Non-responders	<i>p</i>
	$\Delta E'$ wave % (m/s)	22 ± 4 (0.020 ± 0.010)	5 ± 6 (0.007 ± 0.007)	0.02
	$\Delta A'$ wave % (m/s)	27 ± 11 (0.03 ± 0.02)	56 ± 18 (0.07 ± 0.03)	0.17
	$\Delta E/E'$ %	8 ± 5 (0.2 ± 0.3)	28 ± 8 (1.4 ± 0.4)	0.02
NDD	$\Delta E'$ wave % (m/s)	13 ± 6 (0.02 ± 0.01)	6 ± 10 (0.01 ± 0.02)	0.48
	$\Delta A'$ wave % (m/s)	26 ± 12 (0.03 ± 0.02)	23 ± 20 (0.04 ± 0.03)	0.90
	$\Delta E/E'$ %	14 ± 8 (0.3 ± 0.3)	19 ± 12 (0.9 ± 0.5)	0.73
DD	$\Delta E'$ wave % (m/s)	29 ± 5 (0.022 ± 0.004)	5 ± 8 (0.005 ± 0.006)	0.01
	$\Delta A'$ wave % (m/s)	27 ± 17 (0.02 ± 0.02)	83 ± 28 (0.10 ± 0.04)	0.10
	$\Delta E/E'$ %	2 ± 6 (0.03 ± 0.39)	35 ± 9 (1.75 ± 0.61)	0.02

Augmentation de la POG si NR – Notamment si dysfonction diastolique

Amélioration de la relaxation

WHY ?

Cardiac force-frequency relationship and frequency-dependent acceleration of relaxation are impaired in LPS-treated rats

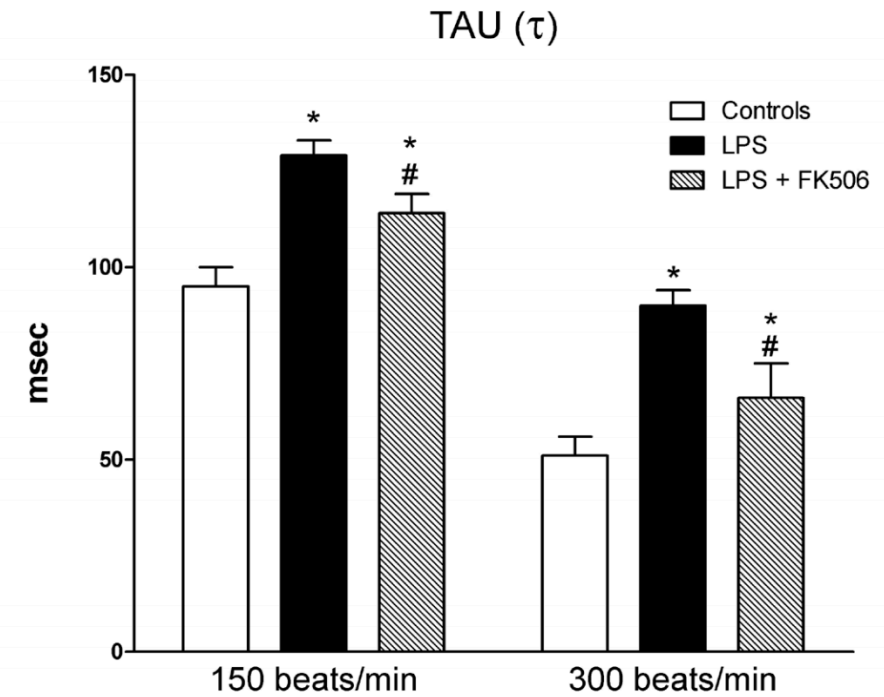
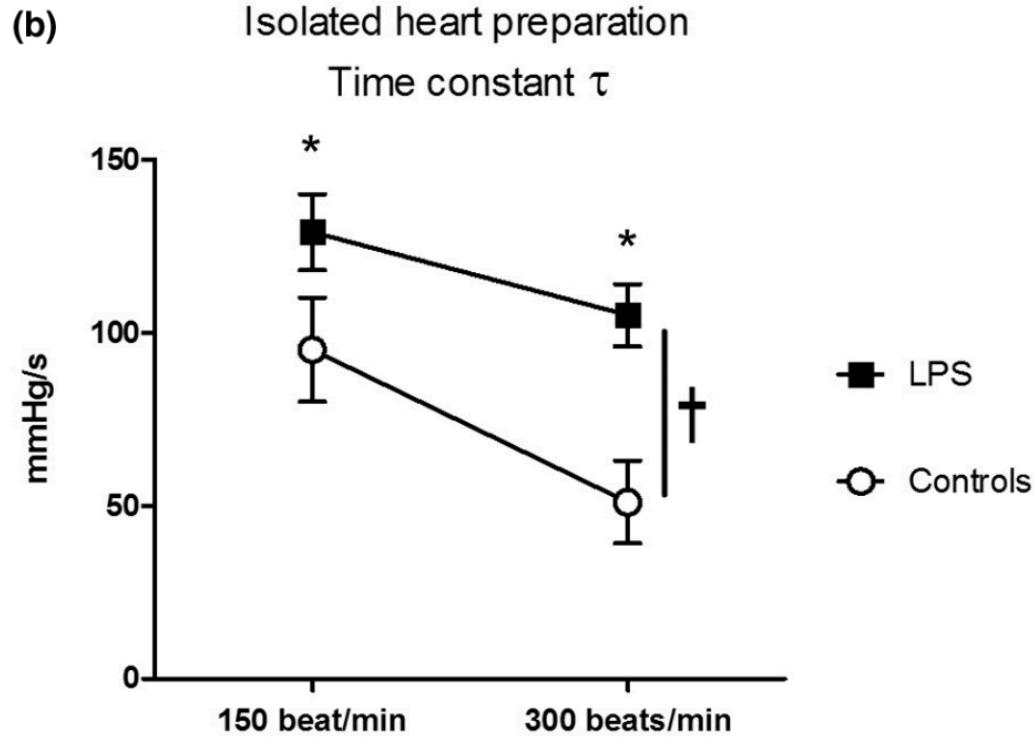
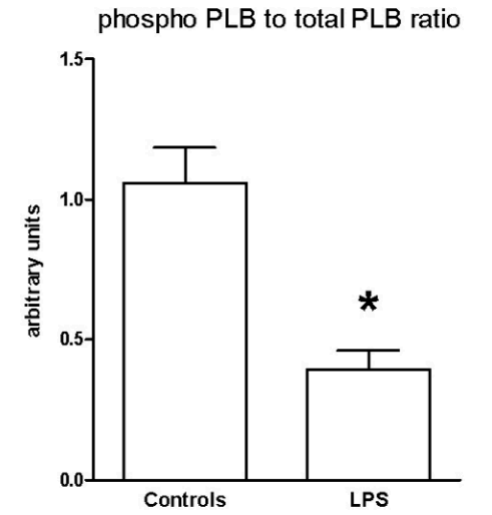
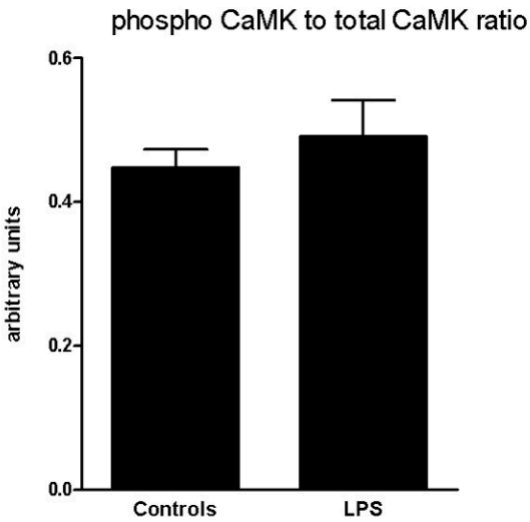
Olivier Joulin¹, Sylvestre Marechaux^{2,3}, Sidi Hassoun^{1,3}, David Montaigne^{1,3}, Steve Lancel³ and Remi Neviere^{1,3}

¹EA 2689, IMPRT-IFR114, Université de Lille 2, 1 place de Verdun 59000 Lille, France
²Service Explorations Fonctionnelles Cardiovasculaires, CHRU Lille, Bd Pr. Leclercq 59000 Lille, France
³Département de Physiologie, Faculté de Médecine, 1 place de Verdun 59000 Lille, France

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Received: 8 Oct 2008 Revisions requested: 13 Jan 2008 Revisions received: 17 Dec 2008 Accepted: 6 Feb 2009 Published: 6 Feb 2009

Critical Care 2009, 13:R14 (doi:10.1186/cc7712)



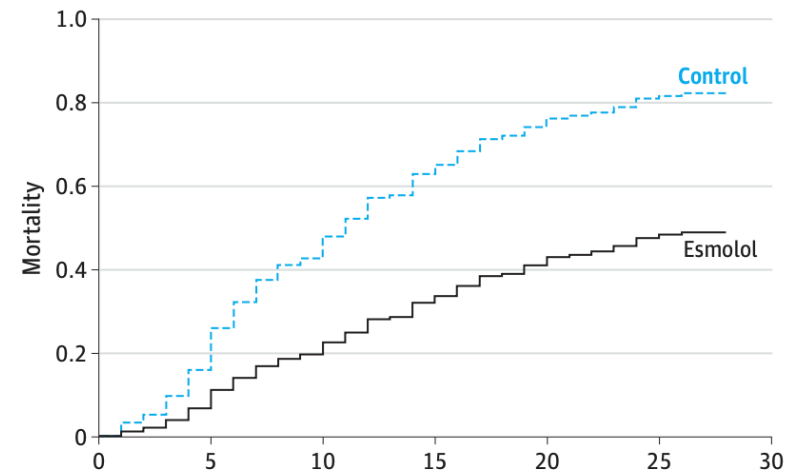
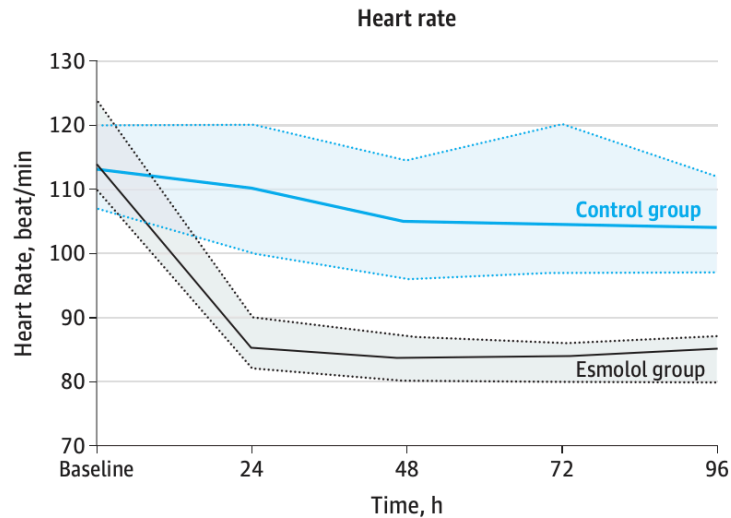
Homéostasie calcique ++

Agir sur la tachycardie

Preliminary Communication | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Heart Rate Control With Esmolol on Hemodynamic and Clinical Outcomes in Patients With Septic Shock A Randomized Clinical Trial

Andrea Morelli, MD; Christian Ertmer, MD; Martin Westphal, MD; Sebastian Rehberg, MD; Tim Kampmeier, MD; Sandra Ligges, PhD; Alessandra Orecchioni, MD; Annalia D'Egidio, MD; Fiorella D'Ippoliti, MD; Cristina Raffone, MD; Mario Venditti, MD; Fabio Guarracino, MD; Massimo Girardis, MD; Luigi Tritapepe, MD; Paolo Pietropaoli, MD; Alexander Mebazaa, MD; Mervyn Singer, MD, FRCP



[Trials](#). 2018 Nov 19;19(1):637. doi: 10.1186/s13063-018-3024-6.

Landiolol in patients with septic shock resident in an intensive care unit (LANDI-SEP): study protocol for a randomized controlled trial.

[Unger M](#)¹, [Morelli A](#)², [Singer M](#)³, [Radermacher P](#)⁴, [Rehberg S](#)⁵, [Trimmel H](#)⁶, [Joannidis M](#)⁷, [Heinz G](#)⁸, [Cerny V](#)⁹, [Dostál P](#)¹⁰, [Siebers C](#)¹¹, [Guarracino F](#)¹², [Pratesi F](#)¹³, [Biancofiore G](#)¹⁴, [Girardis M](#)¹⁵, [Kadlecova P](#)¹⁶, [Bouvet O](#)¹⁷, [Zörer M](#)¹⁸, [Grohmann-Izay B](#)¹⁸, [Krejcy K](#)¹⁸, [Klade C](#)¹⁸, [Krumpl G](#)¹⁸.

Avenir prometteur ?

TAKE HOME MESSAGE

Consommation **d'énergie – ATP +**

Ne pas **CONFONDRE** **dysfonction diastolique** et **PTDVG/PAPO**

Evaluation difficile – Algorithme simple – **Ea ++**

Evaluation importante dans le choc septique

Optimisation de la prise en charge