Hôpitaux de Toulouse

RESTORE
a geroscience and rejuvenation research center

Nouveautés dans la prise en charge de l'insuffisance cardiaque chronique

RENCONTRE D'ANESTHESIE SANOFI

Dr LABASTE François

CHU Toulouse

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25 juin 2022

Conflits d'intérêts
Labaste François

Honoraires reçus en tant que consultant ou conférencier

SANOFI

VIFOR PHARMA

Edwards

Sanofi ne recommande en aucun cas l'usage des produits en dehors de leurs indications approuvées.
Merci de consulter le résumé des caractéristiques du(es) produit(s) avant de le(s) prescrire.
Les informations ci-après sont fournies pour un usage médical et scientifique uniquement,
et sont destinées exclusivement aux participants de cette manifestation scientifique.

Nouveautés en insuffisance cardiaque
Quelles implications pour le MAR?

Quels nouveaux médicaments ?
Comment adapter en périopératoire ?

Comment optimiser les patients?

Introduction
IC en chirurgie non-cardiaque

- **IC = Pathologie fréquente**

- **Incidence :**
  - 2,3 % population globale
  - **10% chez les plus de 70ans**

- Près de **70 000 morts** par an en France

  → **25 à 50%** des patients sont décédés à 5ans après le diagnostic

- **Incidence en augmentation** :
  - Amélioration du pronostic
  - Vieillissement de la population

Devenir dépendant :
- Age
- Comorbidité
- Projet : Greffe – Assistance cardiaque chronique

Introduction
IC en chirurgie non-cardiaque

Incidence de l'IC en péri-opératoire :

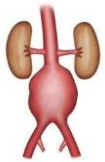
2,5 à 10% des patients

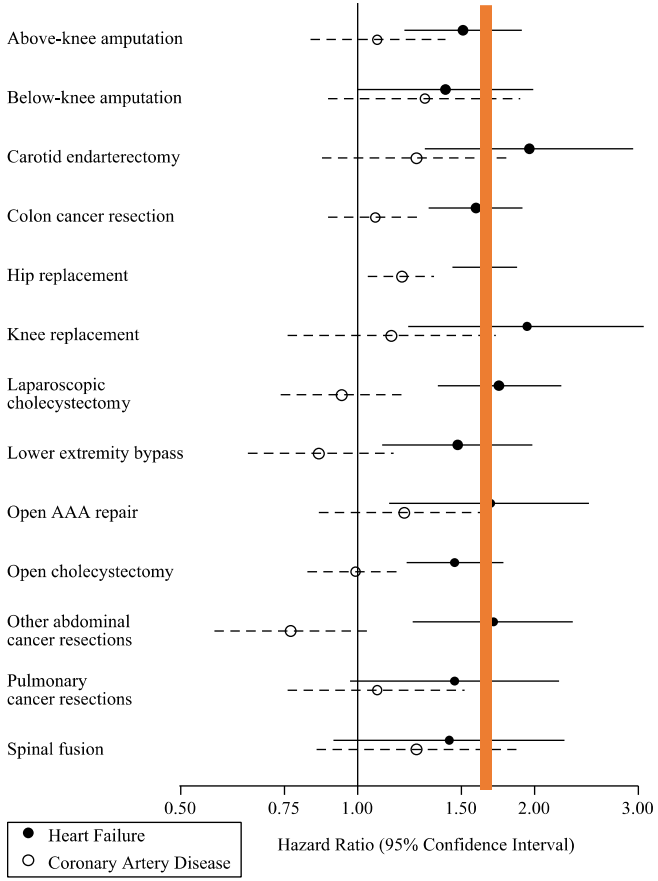
Augmentation mortalité et morbidité

ANESTHESIOLOGY
Trusted Evidence: Discovery to Practice

N = 159 327





Eur J Anaesthesiol 2014; 31:517–573

Anesthesiology, V 108, No 4, Apr 2008

Introduction
IC = des insuffisances

2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

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

IC = syndrome

- **Définition classique :**
  - Symptômes cliniques : asthénie - dyspnée
  - Signes cliniques : TJ – RHJ – Crépitants..
- **Anomalie** structurelle ou fonctionnelle cardiaque
- Répercussion sur le Débit Cardiaque

Table 3 Definition of heart failure with reduced ejection fraction, mildly reduced ejection fraction and preserved ejection fraction

Type of HF		HFrEF	HFmrEF	HFpEF
CRITERIA	1	Symptoms ± Signs[a]	Symptoms ± Signs[a]	Symptoms ± Signs[a]
	2	LVEF ≤40%	LVEF 41–49%[b]	LVEF ≥50%
	3	–	–	Objective evidence of cardiac structural and/or functional abnormalities consistent with the presence of LV diastolic dysfunction/raised LV filling pressures, including raised natriuretic peptides[c]

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IC systolique
= FEVG altérée

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= FEVG altérée

IC diastolique
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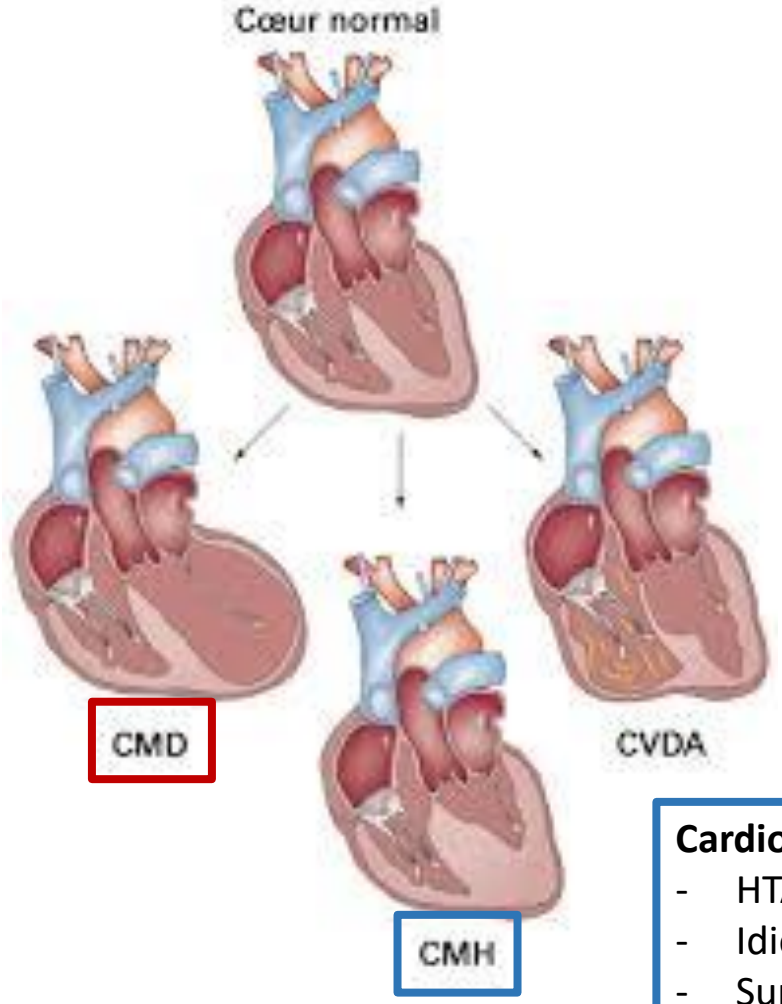
Diagnostic sous-estimé

Introduction
IC = des insuffisances

Cardiopathie dilatée :
- MonoVG – BiV
- Ischémique
- Idiopathiques
- Valvulaires

IC systolique
= FEVG altérée

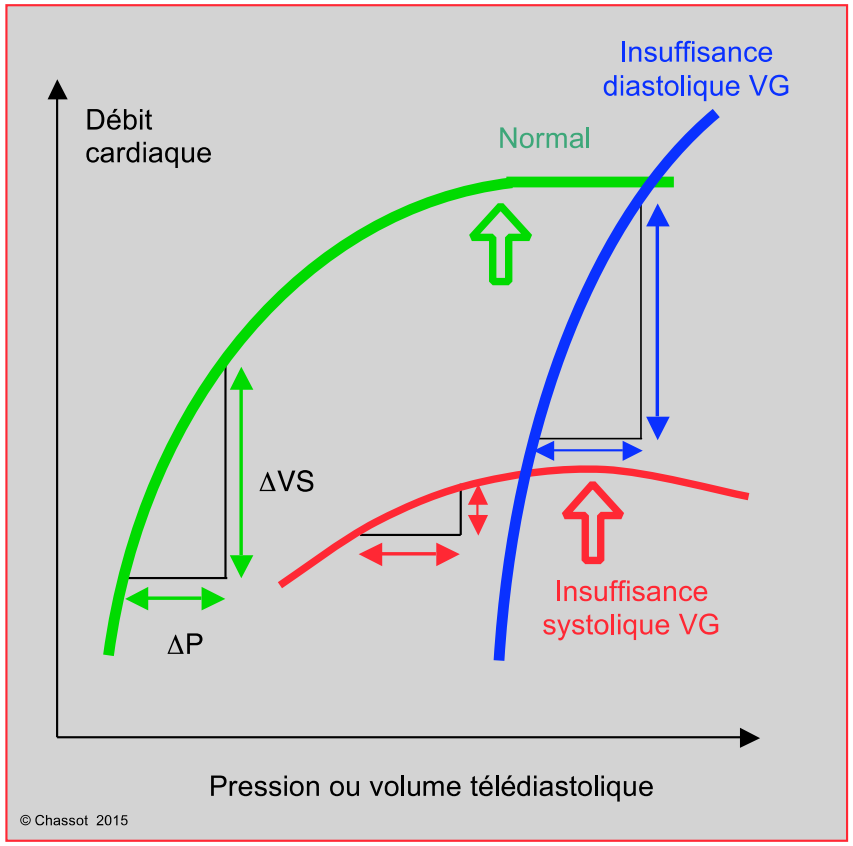


Cardiopathies hypertrophiques :
- HTA – RAo
- Idiopahtiques (familiales)
- Surcharges

IC diastolique
= FEVG préservée

Introduction
IC = des insuffisances

Conséquences hémodynamiques



DC = VES x FC

Précharge

Inotrop

Postcharge

IC systolique
= moindre précharge dépendance

IC diastolique
= dépendance à la précharge

Nouveautés en insuffisance cardiaque
Quelles implications pour le MAR

Quels nouveaux médicaments ?
Comment adapter en périopératoire ?

Comment optimiser les patients?

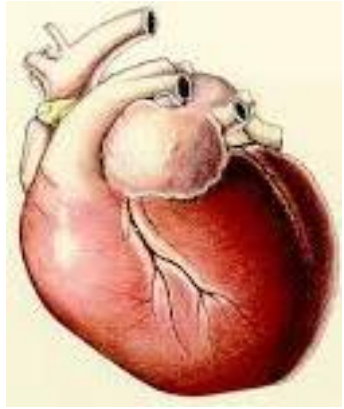
Evaluation préopératoire
IC et physiopathologie

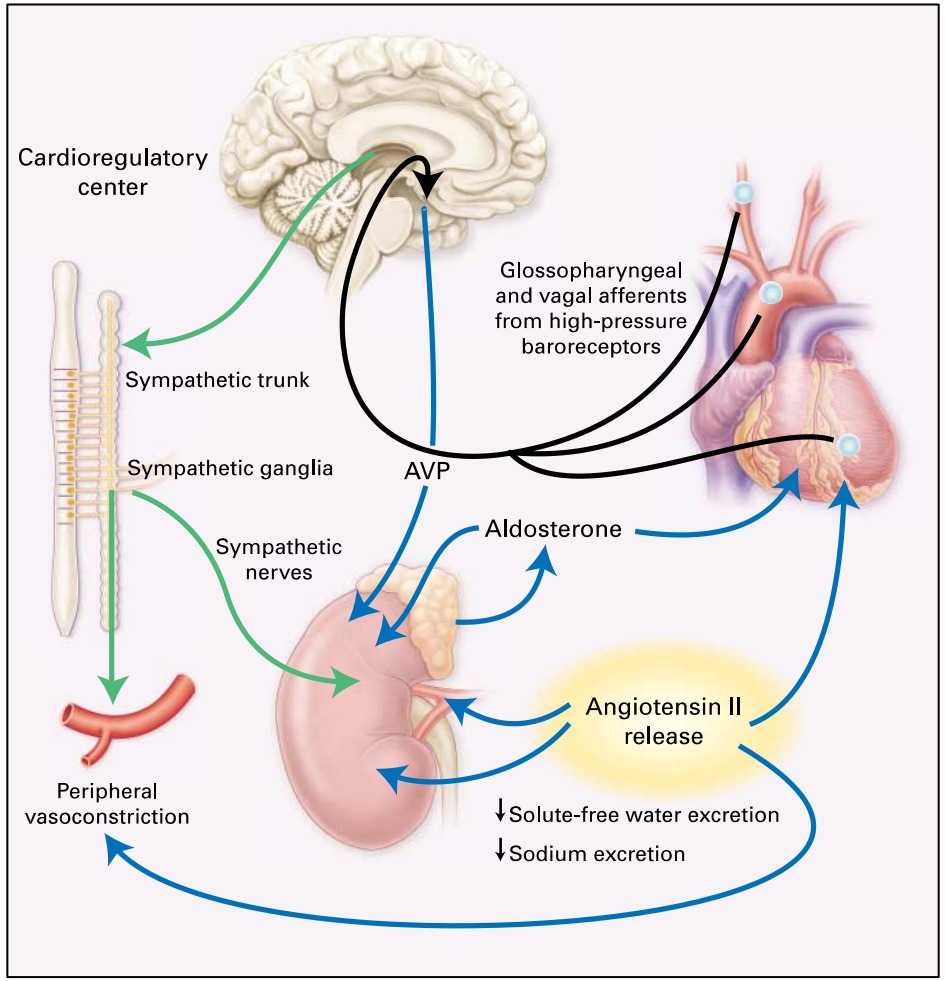
Augmentation de la pression pariétale
Remodelage cardiaque

IC systolique
= FEVG altérée

↓

Baisse de la PA





Activation du système sympathique

Activation du SRAA

Activation du système arginine vasopressine

Schrier, Abraham. N Engl J Med 1999;341:577–85

Evaluation préopératoire
IC : l'ordonnance type

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Béta-bloquant

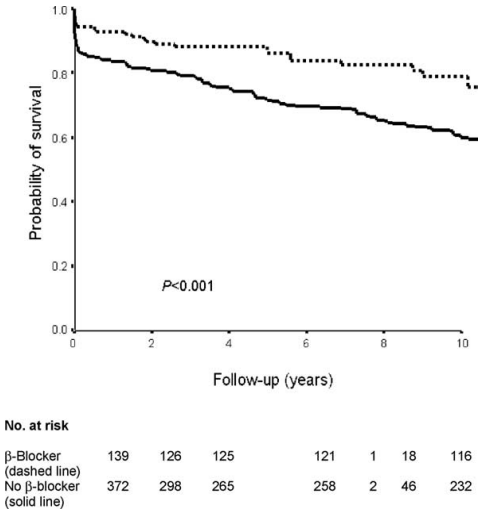
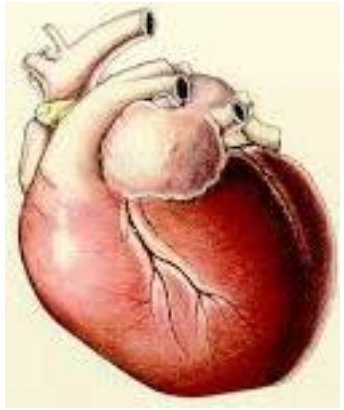


Fig. 1. Kaplan–Meier estimates of all-cause mortality, stratified according to the use of β-blockers. Dashed line denotes β-blocker use; solid line denotes no β-blocker use.

Eur J Vasc Endovasc Surg 31, 351–358 (2006)

Médicaments classiques



Evaluation préopératoire
IC : l'ordonnance type

Stimulation adrénergique réflexe

↓

Down régulation des récepteurs $\beta 1$

	Cœur sain	Cœur pathologique
$\beta 1$	80 %	40 %
$\beta 2$	10 %	40 %
α	10 %	20 %

Implications :

- Intérêt des β-Bloquants
- Réduction de l'impact de la down régulation
- Risque d'effet rebond

EJA

Eur J Anaesthesiol 2014; **31**:517–573

GUIDELINES

2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management

The Joint Task Force on non-cardiac surgery: cardiovascular assessment and management of the European Society of Cardiology (ESC) and the European Society of Anaesthesiology (ESA)

→ **Pas d'arrêt**

Evaluation préopératoire
IC : l'ordonnance type

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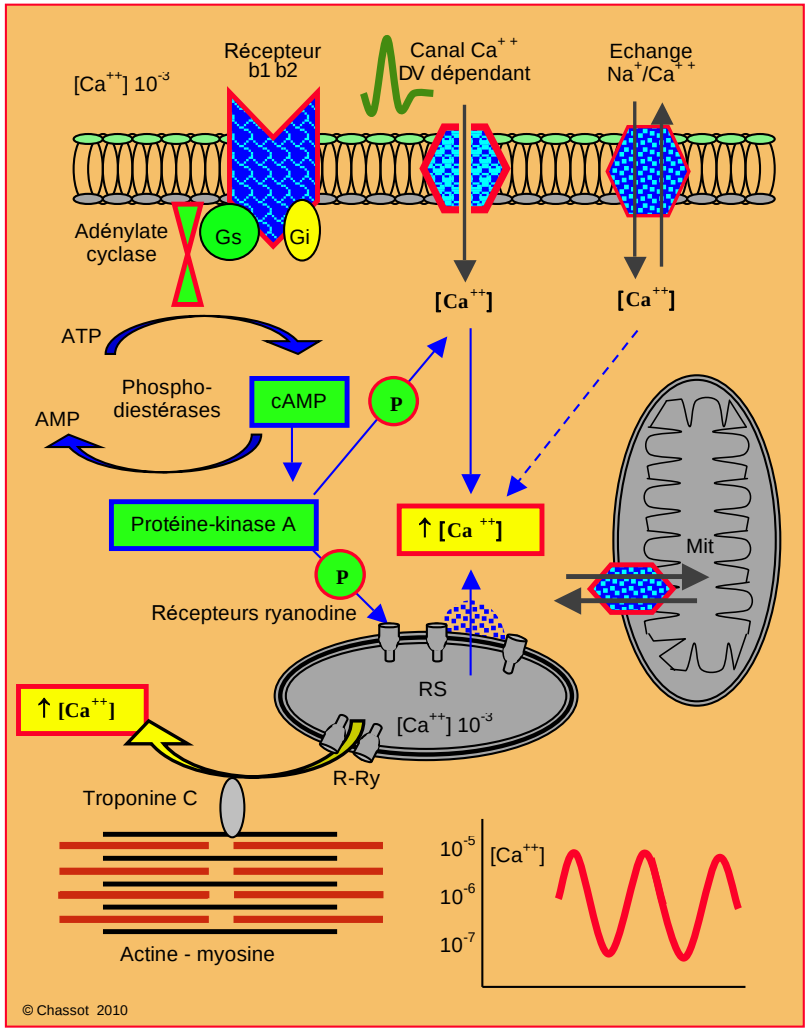
DOBU parfois non suffisante



Décompensation

Evaluation préopératoire
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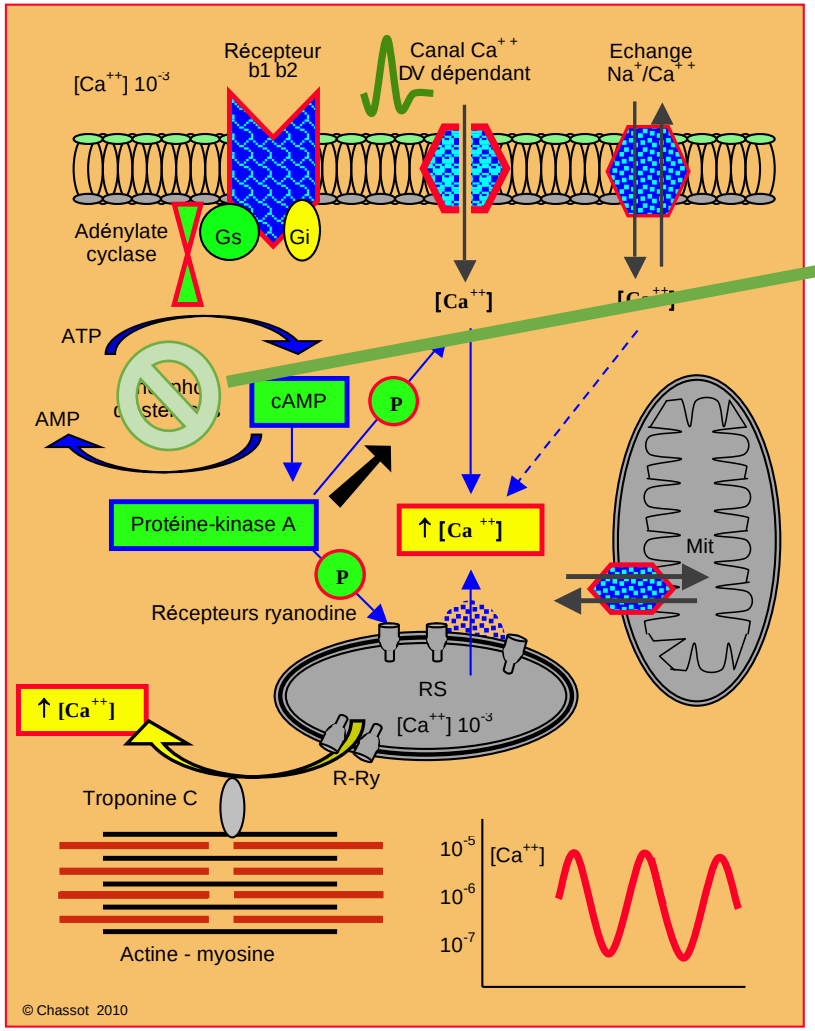

Décompensation

Milrinone

Evaluation préopératoire
IC : l'ordonnance type

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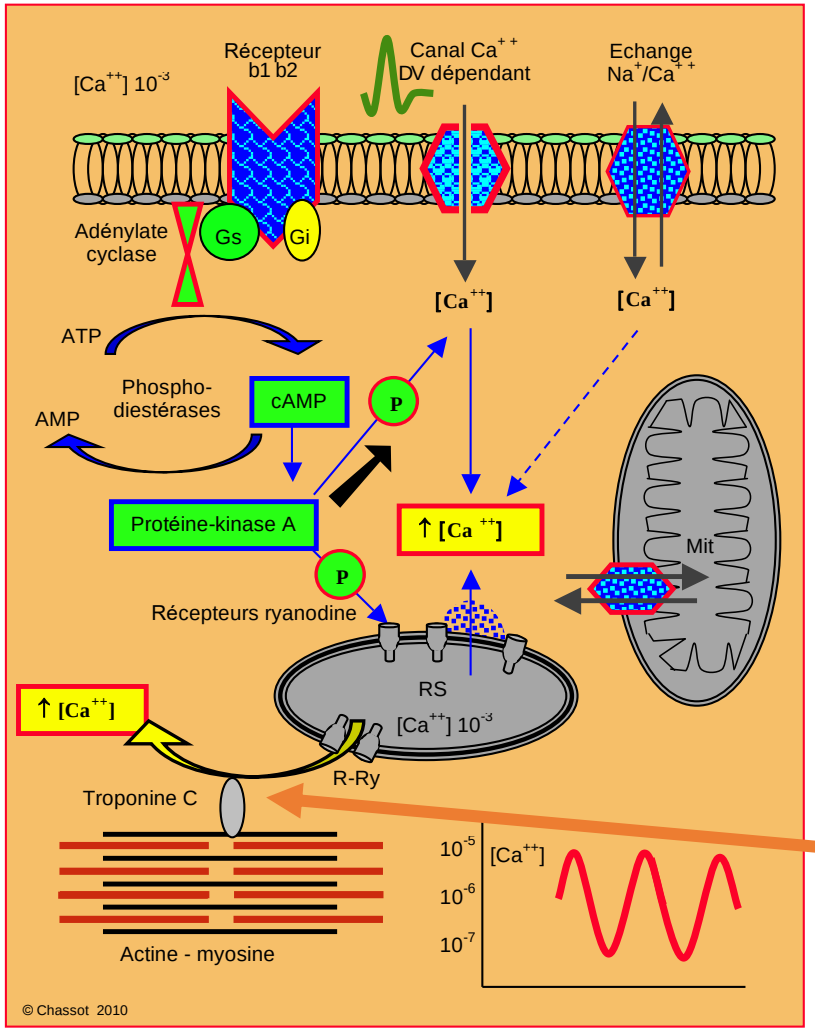

Décompensation

Milrinone

Levosimendan

Evaluation préopératoire
IC : l'ordonnance type

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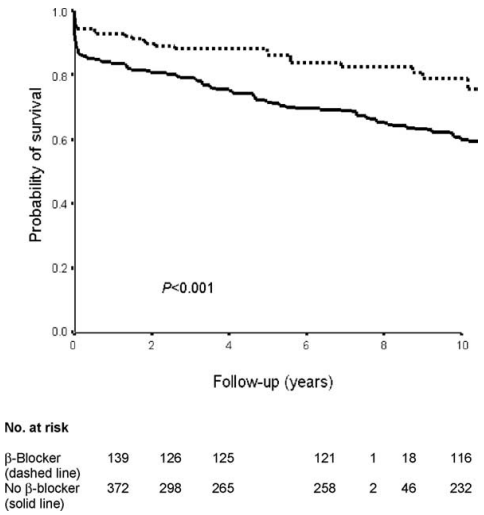
Béta-bloquant



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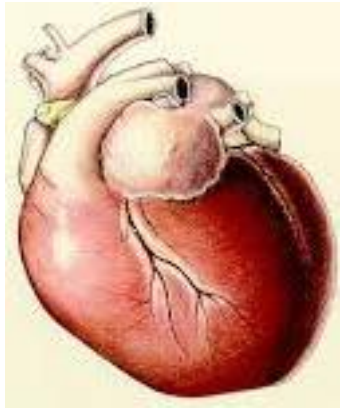

Diurétiques de l'anse

IEC – ARA2

Blocage du SRAA
Réduction de la stimulation sympathique
Diminution pré et post-charge
Action remodelage

Anti-aldostérone

Diurétiques épargneurs de K+
Freinent la fibrose myocardique
Diminuent du taux de NAD circulante
Augmentation du $NO^{\bullet}$

Evaluation préopératoire
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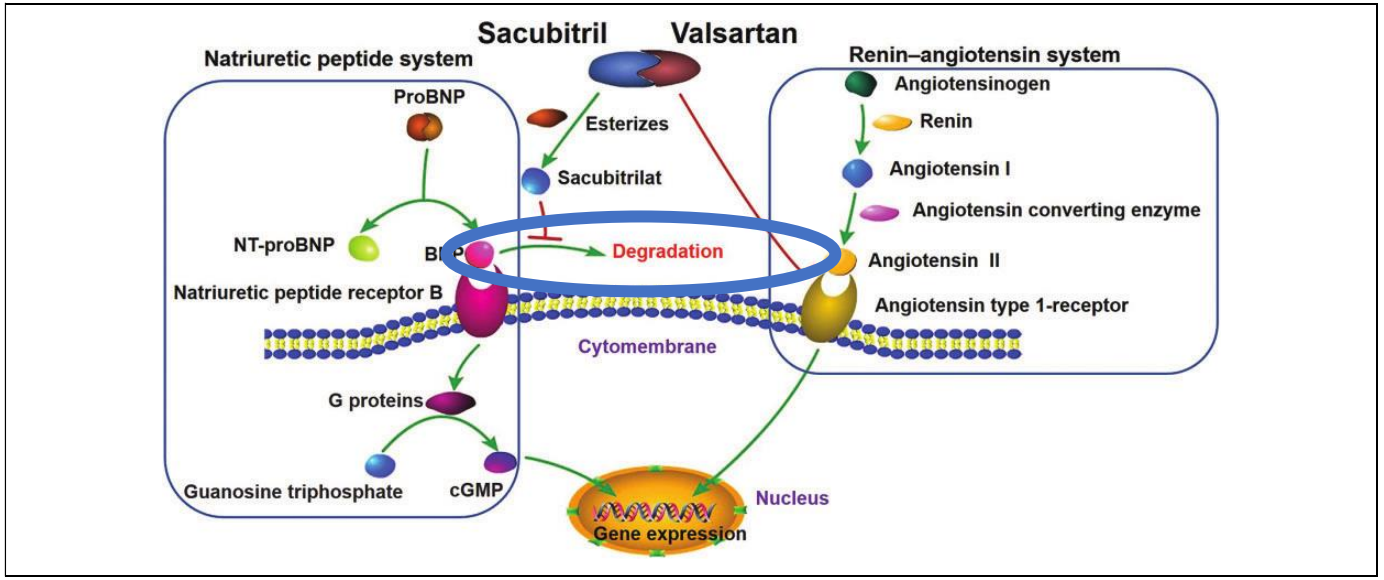
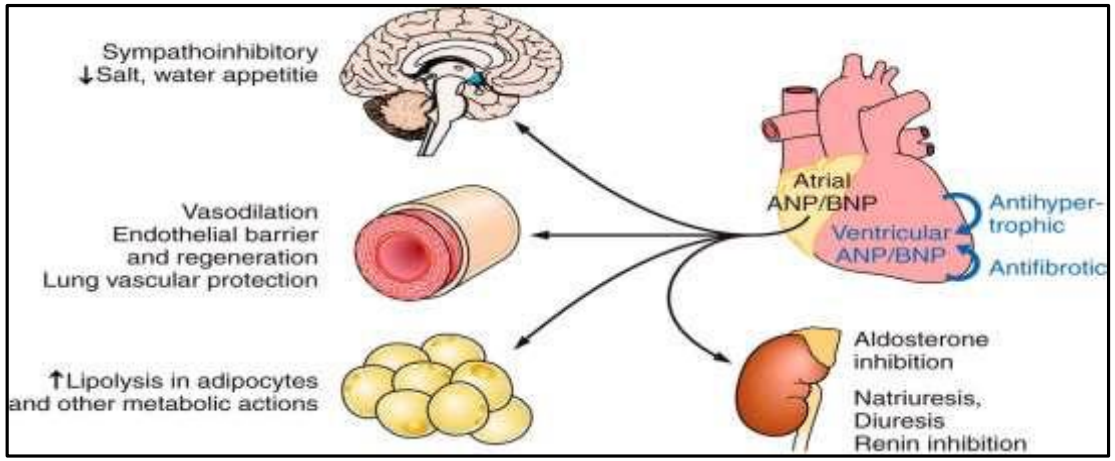
Sacubutril – Valsartan

Plusieurs dosages
Max dose tolérée

Inhibiteur des Neprilysines → **Augmentation des BNP / ANP**





Journal of Cardiovascular Pharmacology and Therapeutics 2022, Vol. 27: 1-12

Evaluation préopératoire
IC : l'ordonnance type

The NEW ENGLAND JOURNAL of MEDICINE

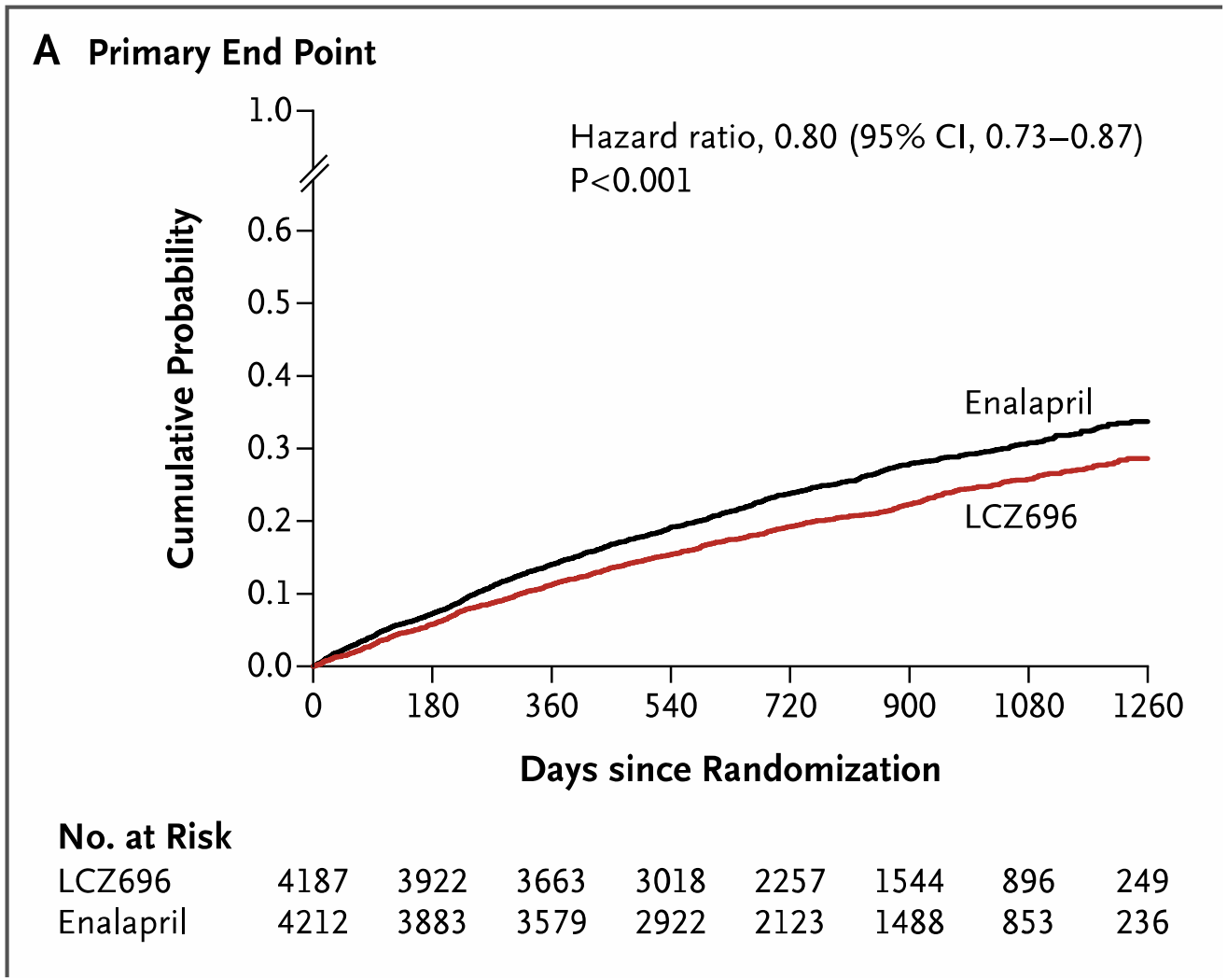
ESTABLISHED IN 1812 SEPTEMBER 11, 2014 VOL. 371 NO. 11

Angiotensin–Neprilysin Inhibition versus Enalapril in Heart Failure

John J.V. McMurray, M.D., Milton Packer, M.D., Akshay S. Desai, M.D., M.P.H., Jianjian Gong, Ph.D., Martin P. Lefkowitz, M.D., Adel R. Rizkala, Pharm.D., Jean L. Rouleau, M.D., Victor C. Shi, M.D., Scott D. Solomon, M.D., Karl Swedberg, M.D., Ph.D., and Michael R. Zile, M.D., for the PARADIGM-HF Investigators and Committees*

Réduction significative mortalité et hospitalisations

IC systolique
= FEVG altérée



Evaluation préopératoire
IC : l'ordonnance type

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 24, 2019 VOL. 381 NO. 17

Angiotensin–Neprilysin Inhibition in Heart Failure with Preserved Ejection Fraction

S.D. Solomon, J.J.V. McMurray, I.S. Anand, J. Ge, C.S.P. Lam, A.P. Maggioni, F. Martinez, M. Packer, M.A. Pfeffer, B. Pieske, M.M. Redfield, J.L. Rouleau, D.J. van Veldhuisen, F. Zannad, M.R. Zile, A.S. Desai, B. Claggett, P.S. Jhund, S.A. Boytsov, J. Comin-Colet, J. Cleland, H.-D. Düngen, E. Goncalvesova, T. Katova, J.F. Kerr Saraiva, M. Lelonek, B. Merkely, M. Senni, S.J. Shah, J. Zhou, A.R. Rizkala, J. Gong, V.C. Shi, and M.P. Lefkowitz, for the PARAGON-HF Investigators and Committees*

IC diastolique
= FEVG préservée

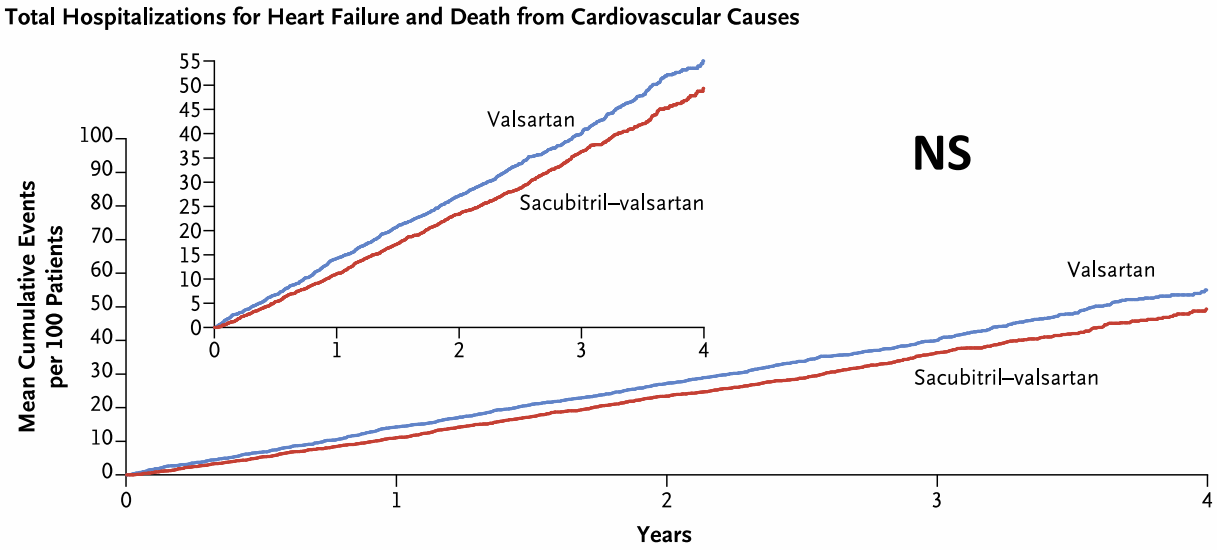


Table 2. Primary and Secondary Outcomes.*

Outcome	Sacubitril–Valsartan (N=2407)	Valsartan (N=2389)	Ratio or Difference (95% CI)
Primary composite outcome and components			
Total hospitalizations for heart failure and death from cardiovascular causes†			RR, 0.87 (0.75–1.01)

Evaluation préopératoire
IC : l'ordonnance type

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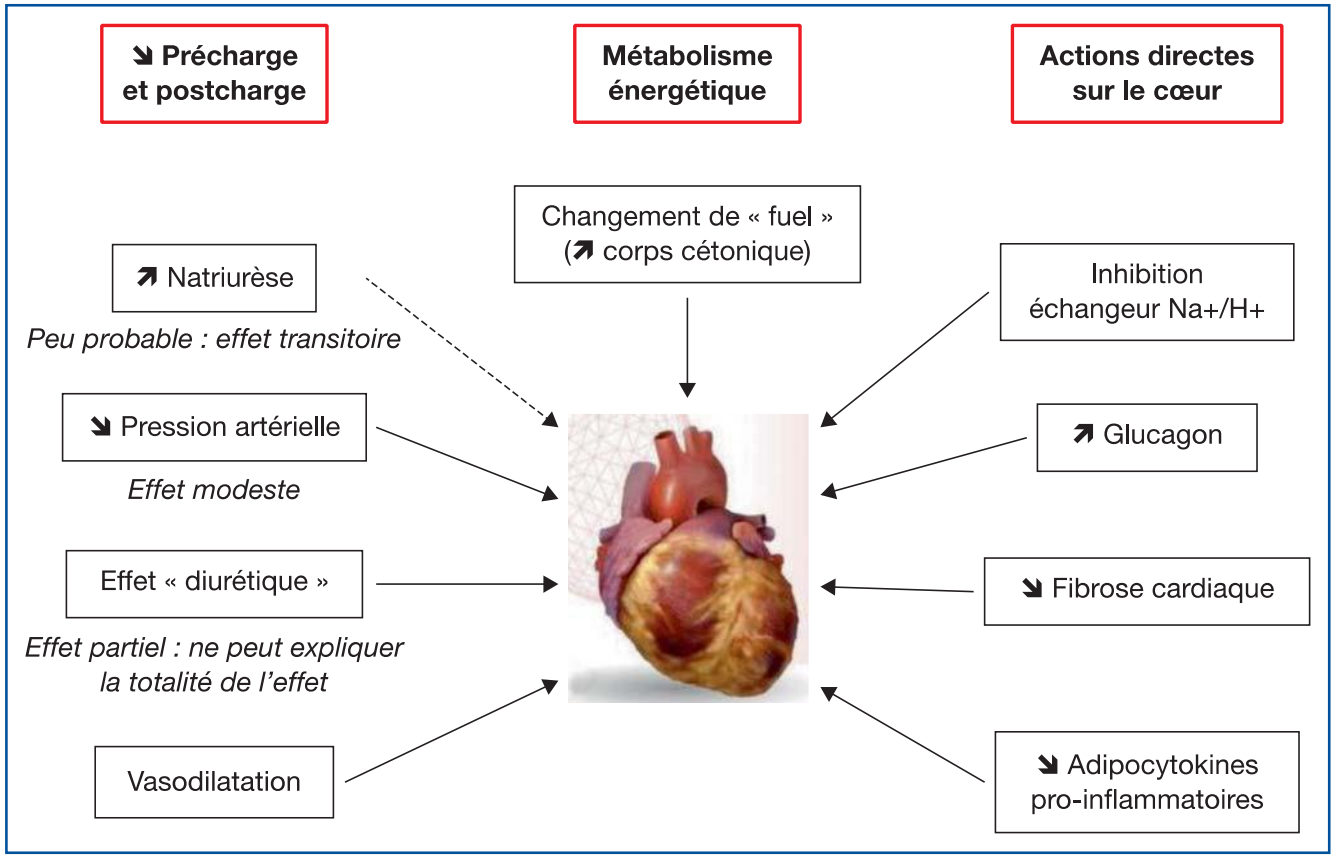
ADO
Inhibiteur des SGLT2
Co transport Na+ - Glusose

Mécanismes multiples probables

Dapaglifozine - Empagliflozine **Un dosage : 10 mg/j**



Archives of Cardiovascular Diseases Supplements (2019) **11,** S18-S22

Evaluation préopératoire
IC : l'ordonnance type

The NEW ENGLAND JOURNAL of MEDICINE

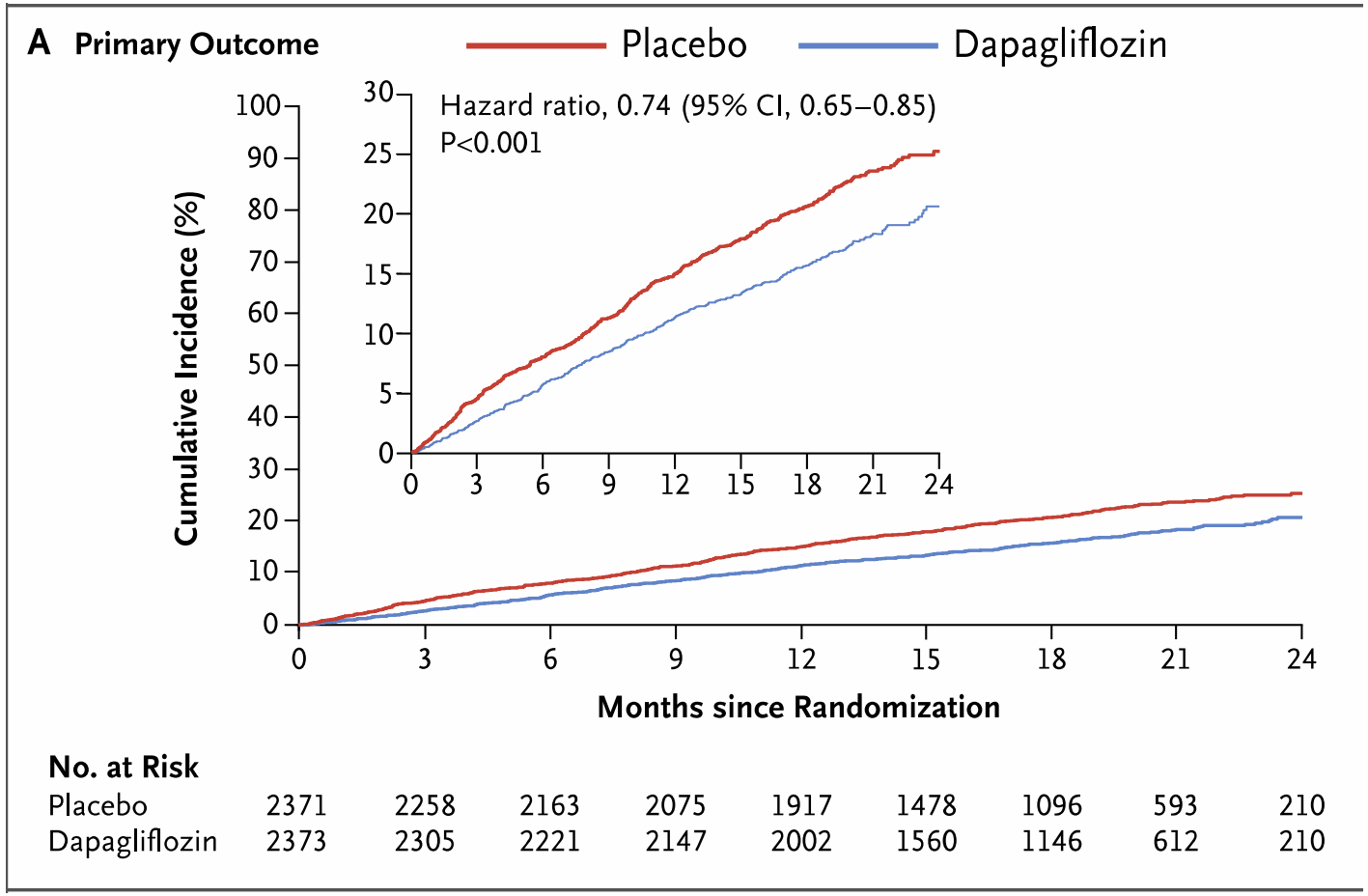
ESTABLISHED IN 1812 NOVEMBER 21, 2019 VOL. 381 NO. 21

Dapagliflozin in Patients with Heart Failure and Reduced Ejection Fraction

J.J.V. McMurray, S.D. Solomon, S.E. Inzucchi, L. Køber, M.N. Kosiborod, F.A. Martinez, P. Ponikowski, M.S. Sabatine, I.S. Anand, J. Bělohlávek, M. Böhm, C.-E. Chiang, V.K. Chopra, R.A. de Boer, A.S. Desai, M. Diez, J. Drozdz, A. Dukát, J. Ge, J.G. Howlett, T. Katova, M. Kitakaze, C.E.A. Ljungman, B. Merkely, J.C. Nicolau, E. O'Meara, M.C. Petrie, P.N. Vinh, M. Schou, S. Tereshchenko, S. Verma, C. Held, D.L. DeMets, K.F. Docherty, P.S. Jhund, O. Bengtsson, M. Sjöstrand, and A.-M. Langkilde, for the DAPA-HF Trial Committees and Investigators*

Réduction de 25 %

IC systolique
= FEVG altérée



Evaluation préopératoire
IC : l'ordonnance type

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 OCTOBER 14, 2021 VOL. 385 NO. 16

Empagliflozin in Heart Failure with a Preserved Ejection Fraction

S.D. Anker, J. Butler, G. Filippatos, J.P. Ferreira, E. Bocchi, M. Böhm, H.-P. Brunner–La Rocca, D.-J. Choi, V. Chopra, E. Chuquiure-Valenzuela, N. Giannetti, J.E. Gomez-Mesa, S. Janssens, J.L. Januzzi, J.R. Gonzalez-Juanatey, B. Merkely, S.J. Nicholls, S.V. Perrone, I.L. Piña, P. Ponikowski, M. Senni, D. Sim, J. Spinar, I. Squire, S. Taddei, H. Tsutsui, S. Verma, D. Vinereanu, J. Zhang, P. Carson, C.S.P. Lam, N. Marx, C. Zeller, N. Sattar, W. Jamal, S. Schnaidt, J.M. Schnee, M. Brueckmann, S.J. Pocock, F. Zannad, and M. Packer, for the EMPEROR-Preserved Trial Investigators*

Réduction de 20 %

IC diastolique
= FEVG préservée

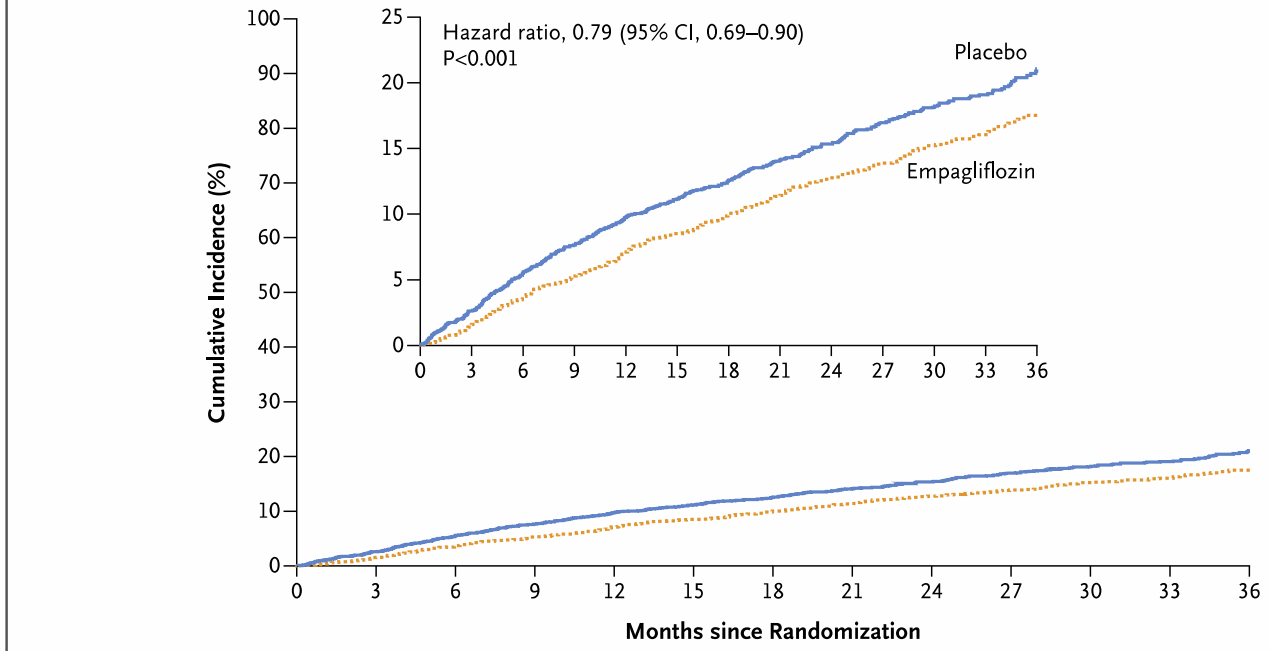


Figure 1. Primary Outcome, a Composite of Cardiovascular Death or Hospitalization for Heart Failure.
The estimated cumulative incidence of the primary outcome in the two groups is shown. The inset shows the same data on an expanded y axis.

Evaluation préopératoire
IC : l'ordonnance type

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IC systolique
= FEVG altérée

Recommendations	Class[a]	Level[b]
An ACE-I is recommended for patients with HFrEF to reduce the risk of HF hospitalization and death.[110–113]	I	A
A beta-blocker is recommended for patients with stable HFrEF to reduce the risk of HF hospitalization and death.[114–120]	I	A
An MRA is recommended for patients with HFrEF to reduce the risk of HF hospitalization and death.[121,122]	I	A
Dapagliflozin or empagliflozin are recommended for patients with HFrEF to reduce the risk of HF hospitalization and death.[108,109]	I	A
Sacubitril/valsartan is recommended as a replacement for an ACE-I in patients with HFrEF to reduce the risk of HF hospitalization and death.[105]	I	B

IC diastolique
= FEVG préservée

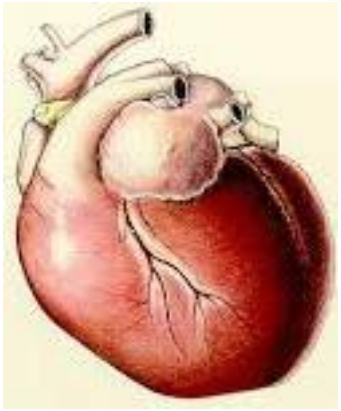
SGLT2 inhibitors (canagliflozin, dapagliflozin, empagliflozin, ertugliflozin, sotagliflozin) are recommended in patients with diabetes at high risk of CV disease or with CV disease in order to prevent HF hospitalizations.[293–297]	I	A

Evaluation préopératoire
La nouvelle ordonnance

Béta-bloquant

Anti-aldostérone

Sacubutril – Valsartan



Diurétiques de l'anse

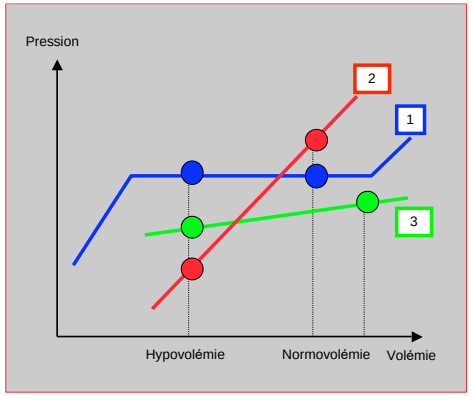
Dapaglifozine

Evaluation préopératoire
Comment j'adapte le traitement chronique ?

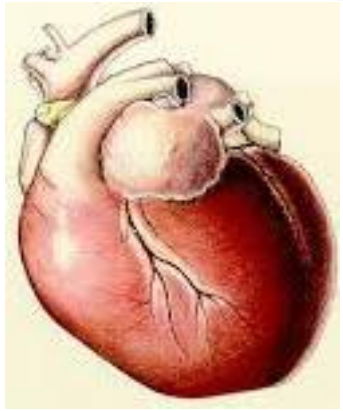
Ne pas stopper

Béta-bloquant

IEC – ARA2



http://www.pac4.ch/Chapitre12/Images/Figure%2012-13A.pdf



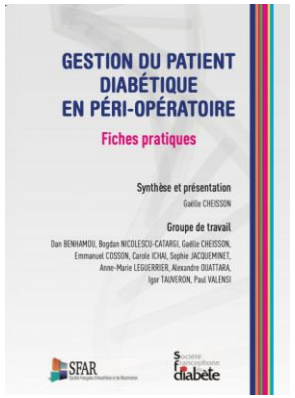
Stopper

Anti-aldostérone

Diurétiques de l'anse

Evaluation préopératoire
Comment j'adapte le traitement chronique ?

Dapaglifozine
Empagliflozine



Type de traitement	Chirurgie majeure ou mineure
Metformine	Pas de prise la veille au soir et le matin
Sulfamides	Pas de prise le matin
Glinides	Pas de prise le matin
Inhibiteurs α-glucosidases	Pas de prise le matin
Inhibiteurs DDP-4	Pas de prise le matin
Inhibiteurs des SGLT2	Pas de prise le matin
Analogues GLP-1	Pas d'injection le matin
Insulines SC	Pas d'injection le matin

Sacubutril – Valsartan

Recommendations	Class[a]	Level[b]	Ref[c]
Preoperative period			
It is recommended to discontinue ACEIs and ARBs preoperatively in patients undergoing cardiac surgery[d].	I	C	

2017 EACTS Guidelines on perioperative medication in adult cardiac surgery

Authors/Task Force Members: Miguel Sousa-Uva* (Chairperson) (Portugal), Stuart J. Head (Netherlands), Milan Milojevic (Netherlands), Jean-Philippe Collet (France), Giovanni Landoni (Italy), Manuel Castella (Spain), Joel Dunning (UK), Tómas Gudbjartsson (Iceland), Nick J. Linker (UK), Elena Sandoval (Spain), Matthias Thielmann (Germany), Anders Jeppsson (Sweden) and Ulf Landmesser* (Chairperson) (Germany)

Stop IEC et ARA 2

Evaluation préopératoire
Comment j'adapte le traitement chronique ?

Article

ARNI Pre-Operative Use and Vasoplegic Syndrome in Patients Undergoing Heart Transplantation or Left Ventricular Assist Device Surgery

Lamis Haider [1,*], Elisabeth Hugon-Vallet [1], Jean Philippe Constantin [1], Zakaria Riad [2], Laurent Sebbag [1,3] and Nathan Mewton [1,3,*]

Pas de risque de choc vasoplégique postopératoire

	No Vasoactive Treatment (n = 8)	ACEI/ARBs (n = 31)	ARNI (n = 22)	Norepinephrine (n = 12)	F-Test
Norepinephrine duration, days	3.9 ± 2.3	4.7 ± 4.7	7.1 ± 6.8	10.3 ± 9.3	0.045
Norepinephrine, maximal dose mcg/kg/min	1.5 ± 1.4	1.0 ± 0.9	1.0 ± 0.6	1.1 ± 0.9	0.65

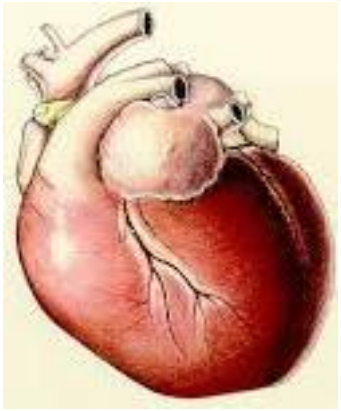
RASi: renin-angiotensin system inhibitors, ACEI: Angiotensin-converting enzyme inhibitors, ARBs: Angiotensin II receptor blockers, ARNI: angiotensin receptor and neprilysin inhibitors. All comparisons between groups are performed with an ANOVA, and the corresponding F-test result is presented.

Evaluation préopératoire
La nouvelle ordonnance

Béta-bloquant

Anti-aldostérone

Sacubutril – Valsartan



Diurétiques de l'anse

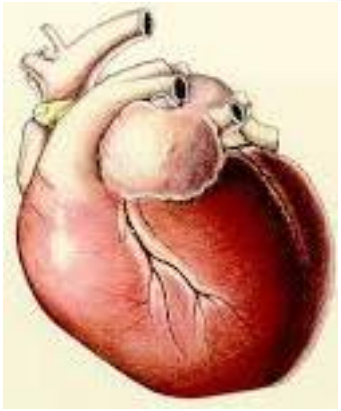
Dapaglifozine

Insuffisant cardiaque
Comment j'adapte le traitement chronique ?

Béta-bloquant

Anti-aldostérone

Sacubutril – Valsartan



Diurétiques de l'anse

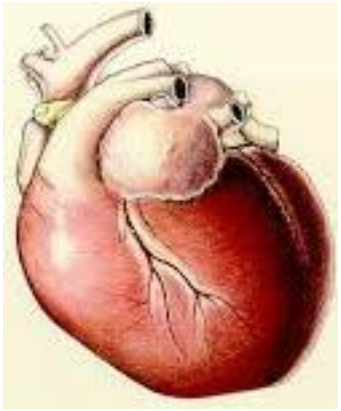
Dapaglifozine

Insuffisant cardiaque
Comment j'adapte le traitement chronique ?

Béta-[illegible]uant

[illegible]
Valsarta[illegible]acubitril

IEC[illegible]RA2



Diurétiques

ATTENTION : Si plus de traitement tolérable = IC avancé

Nouveautés en insuffisance cardiaque
Quelles implications pour le MAR

Quels nouveaux médicaments ?
Comment adapter en périopératoire ?

Comment optimiser les patients?

Optimisation préopératoire
Bilan préopératoire

Objectif : dépistage d'une carence martiale

Bilan simple

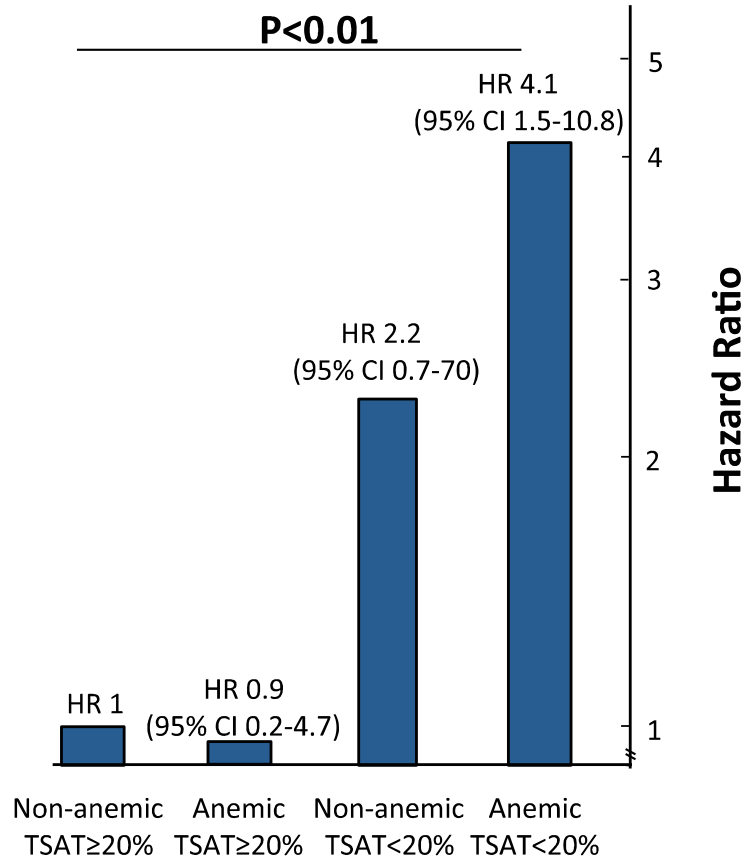
Hémoglobine
Bilan martial : Ferritinémie – Taux de saturation de la transferrine
Bilan inflammatoire : CRP
Bilan rénal : clairance de la créatinémie

Carence martial + IC = Fréquente de 55% à 80% des patients

Etiologie multiple : dénutrition – inflammation – défaut d'absorption

IC systolique
= FEVG altérée

IC diastolique
= FEVG préservée



JACC Vol. 58, No. 12, 2011
September 13, 2011:1241–51

Optimisation préopératoire
Bilan préopératoire

Beneficial effects of long-term intravenous iron therapy with ferric carboxymaltose in patients with symptomatic heart failure and iron deficiency†

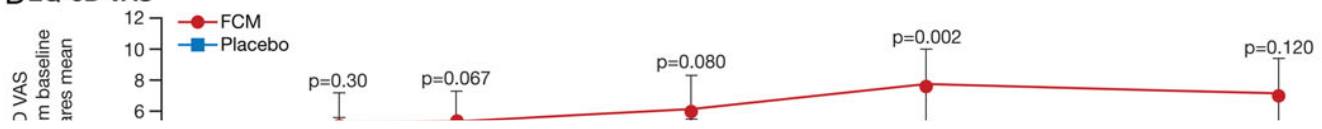
Piotr Ponikowski[1,2]*, Dirk J van Veldhuisen[3], Josep Comin-Colet[4], Georg Ertl[5,6], Michel Komajda[7], Viacheslav Mareev[8], Theresa McDonagh[9], Alexander Parkhomenko[10], Luigi Tavazzi[11], Victoria Levesque[12], Claudio Mori[12], Bernard Roubert[12], Gerasimos Filippatos[13], Frank Ruschitzka[14], and Stefan D. Anker[15], for the CONFIRM-HF Investigators

European Heart Journal (2015) 36, 657–668
doi:10.1093/eurheartj/ehu385

IC systolique
= FEVG altérée

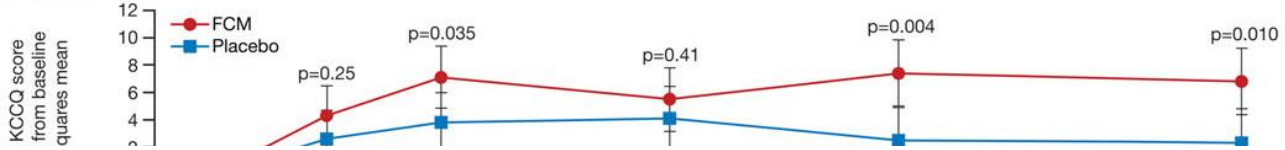
Placebo					
No of patients	146	143	124	113	106
LS mean (95% CI)	2.6 (0.4, 4.7)	3.8 (1.6, 6.0)	4.1 (1.8, 6.4)	2.5 (-0.2, 4.8)	2.3 (-0.2, 4.8)
FCM vs Placebo	1.8 (-1.2, 4.8)	3.3 (0.2, 6.4)	1.3 (-1.9, 4.6)	5.0 (1.6, 8.3)	4.5 (1.1, 7.9)

D EQ-5D VAS

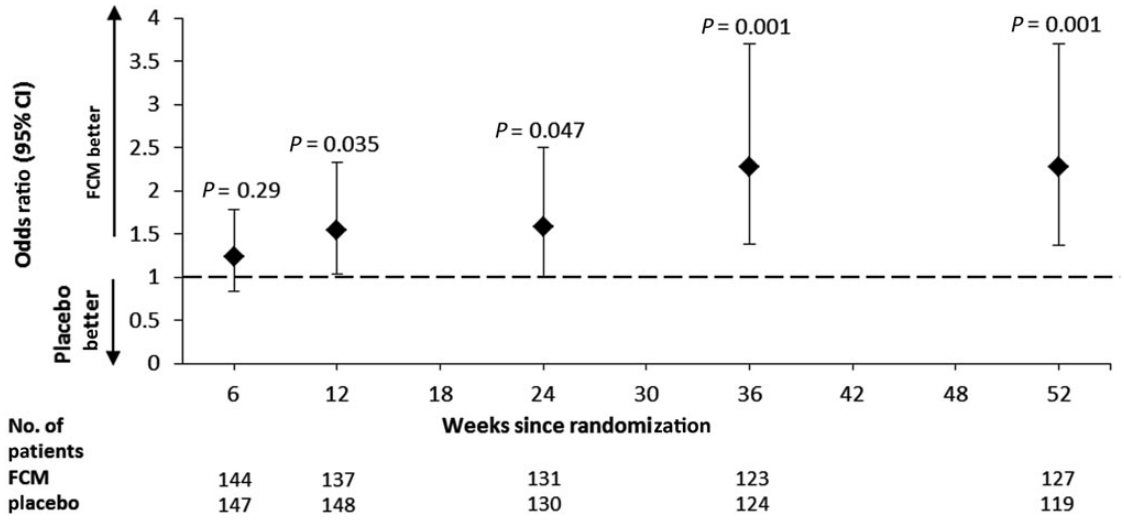


Placebo					
No of patients	141	138	120	111	103
LS mean (95% CI)	-0.2 (-0.4, 0.1)	-0.3 (-0.6, -0.1)	-0.2 (-0.5, 0.1)	-0.2 (-0.5, 0.1)	-0.1 (-0.4, 0.2)
FCM vs Placebo	-0.2 (-0.5, 0.2)	-0.5 (-0.9, -0.1)	-0.6 (-1.0, -0.2)	-0.8 (-1.2, -0.4)	-0.7 (-1.1, -0.2

C KCCQ



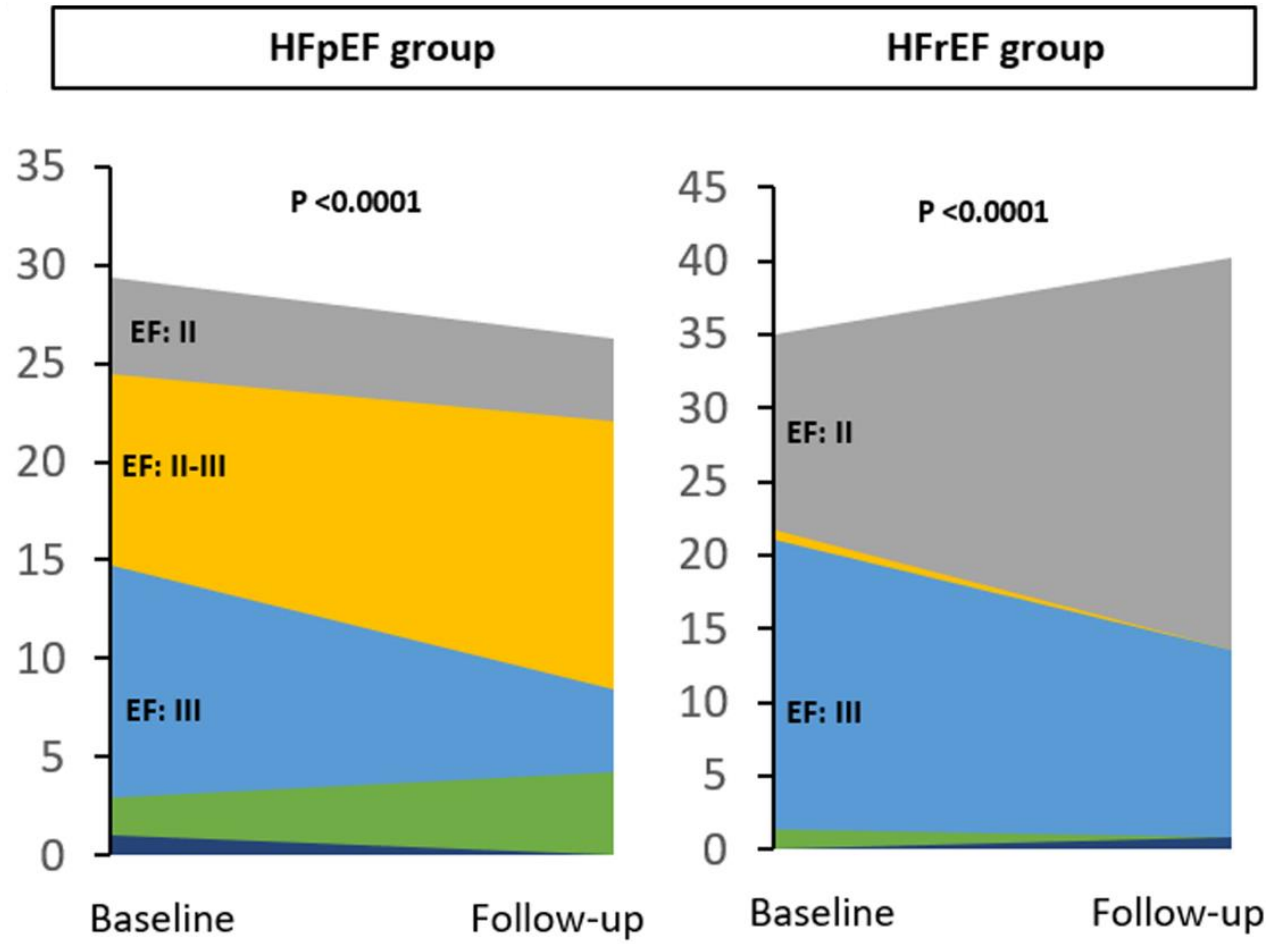
A



No. of patients									
FCM	144	137		131		123			127
placebo	147	148		130		124			119

Optimisation préopératoire
Bilan préopératoire

IC systolique
= FEVG altérée



IC diastolique
= FEVG préservée

Amélioration de la FEVG

ESC HEART FAILURE
ESC Heart Failure 2022; **9**: 133–145

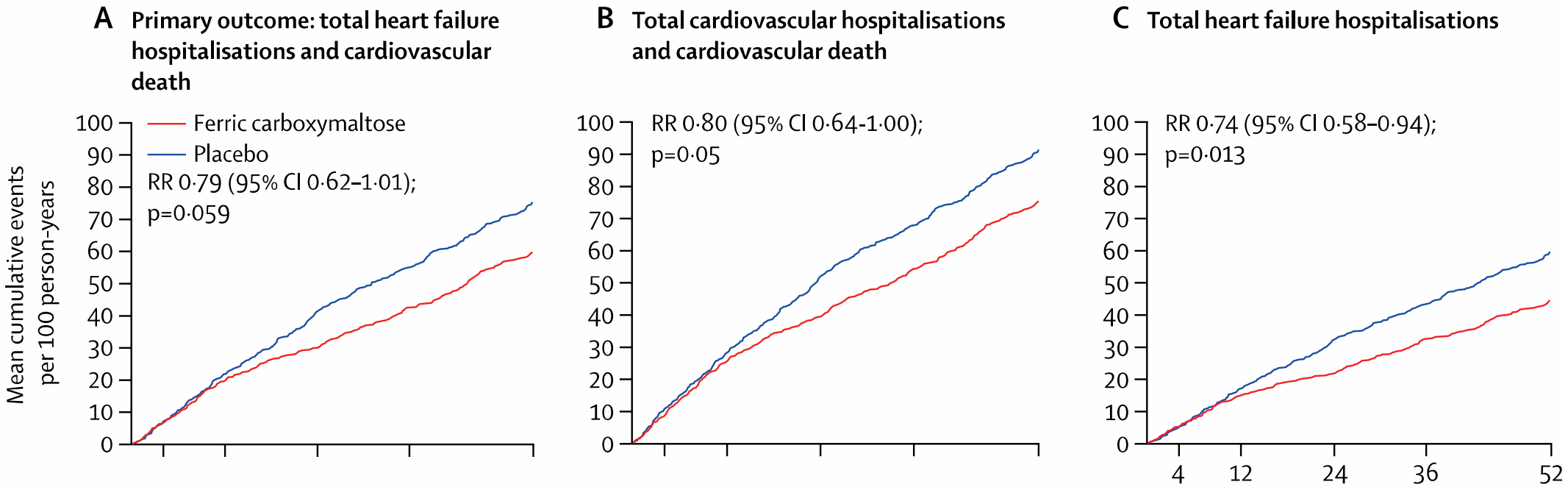
Optimisation préopératoire
Bilan préopératoire

Ferric carboxymaltose for iron deficiency at discharge after acute heart failure: a multicentre, double-blind, randomised, controlled trial

Piotr Ponikowski, Bridget-Anne Kirwan, Stefan D Anker, Theresa McDonagh, Maria Dorobantu, Jarosław Drozdz, Vincent Fabien,

N = 1108

Insuffisance cardiaque aigue



November 13, 2020 https://doi.org/10.1016/S0140-6736(20)32339-4

Optimisation préopératoire
Bilan préopératoire

2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

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

Fer IV pour IC systolique symptomatique

Fer IV si hospitalisation pour décompensation

Recommendations	Class[a]	Level[b]
It is recommended that all patients with HF be periodically screened for anaemia and iron deficiency with a full blood count, serum ferritin concentration, and TSAT.	I	C
Intravenous iron supplementation with ferric carboxymaltose should be considered in symptomatic patients with LVEF <45% and iron deficiency, defined as serum ferritin <100 ng/mL or serum ferritin 100–299 ng/mL with TSAT <20%, to alleviate HF symptoms, improve exercise capacity and QOL.[720,722,724]	IIa	A
Intravenous iron supplementation with ferric carboxymaltose should be considered in symptomatic HF patients recently hospitalized for HF and with LVEF <50% and iron deficiency, defined as serum ferritin <100 ng/mL or serum ferritin 100–299 ng/mL with TSAT <20%, to reduce the risk of HF hospitalization.[512]	IIa	B

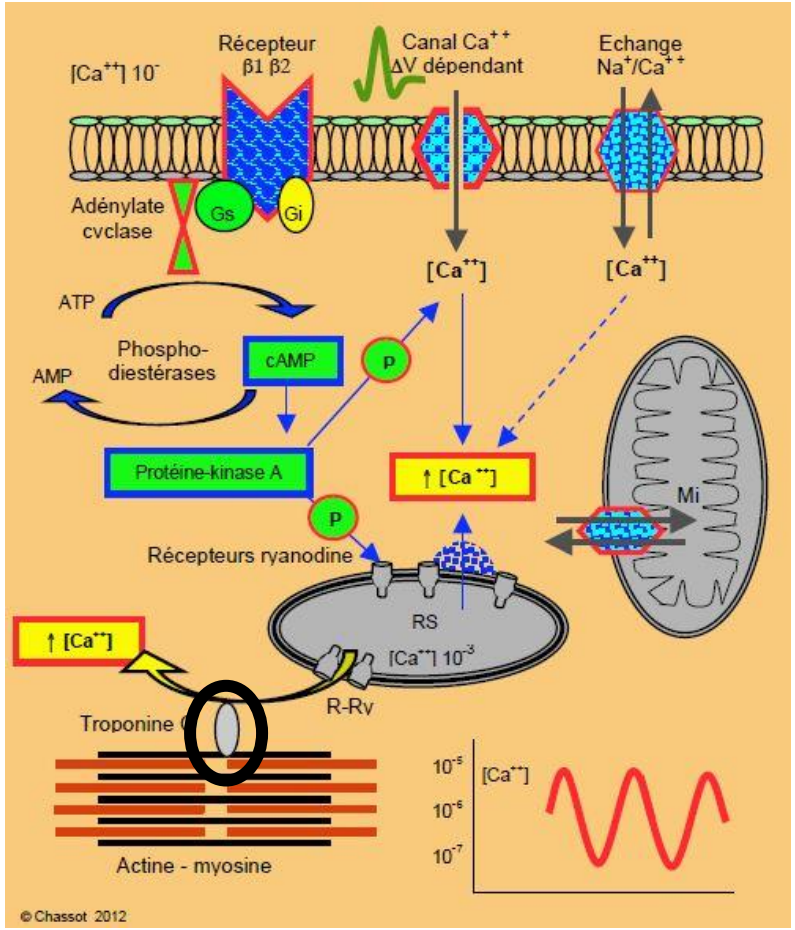
Optimisation préopératoire
Lévosimendan

Multiples effets cardio-vasculaires

Sensibilisateur Ca++

Administration en cure
0,1 à 0,2 µg/kg/min
24 heures

Métabolite actif
Efficacité 7 – 10 jours



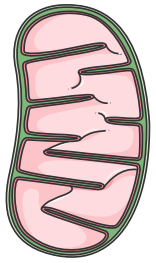
Canaux KATP cellules musculaires lisses artériolaires

↓

Vasodilatateurs

↓

Diminution Précharge et Postcharge



Canaux KATP Mitochondriaux

↓

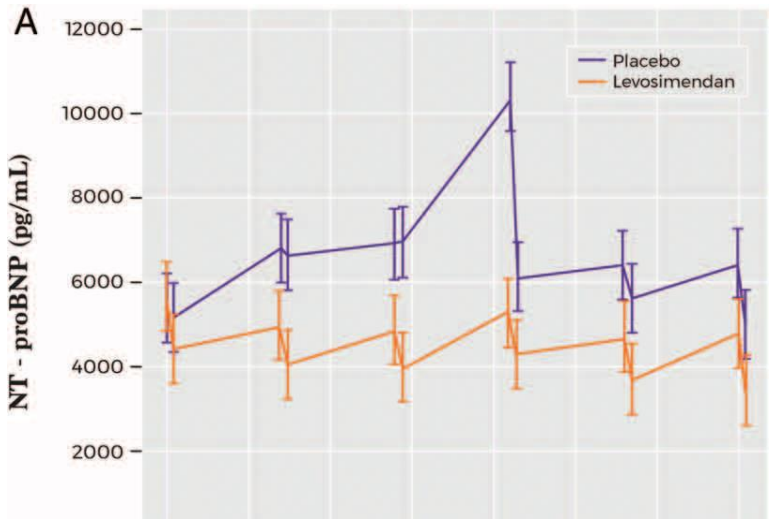
Pré-conditionnement à l'ischémie

Optimisation préopératoire
Lévosimendan

Eff cacy and safety of intermittent intravenous outpatient administration of levosimendan in patients with advanced heart failure: the LION-HEART multicentre randomised trial

Josep Comín-Colet[1,2]*, Nicolás Manito[2], Javier Segovia-Cubero[3], Juan Delgado[4],

Cures de Lévosimendan itératives



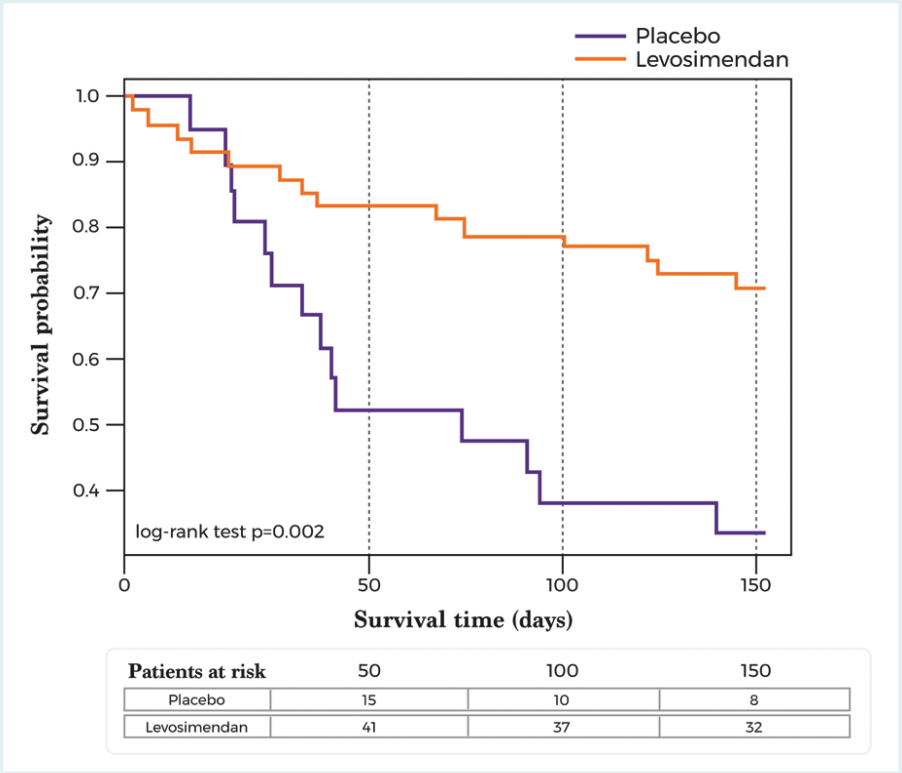
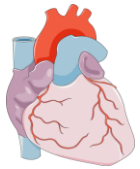


Figure 3 Kaplan–Meier survival curves (time to the first event) for the composite event of all-cause death or heart failure hospitalisation. *P*-value according to log-rank test.

European Journal of Heart Failure (2018) **20**, 1128–113

Optimisation préopératoire
Lévosimendan



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Levosimendan in Patients with Left Ventricular Dysfunction Undergoing Cardiac Surgery

R.H. Mehta, J.D. Leimberger, S. van Diepen, J. Meza, A. Wang, R. Jankowich, R.W. Harrison, D. Hay, S. Fremes, A. Duncan, E.G. Soltesz, J. Luber, S. Park, M. Argenziano, E. Murphy, R. Marcel, D. Kalavrouziotis, D. Nagpal, J. Bozinovski, W. Toller, M. Heringlake, S.G. Goodman, J.H. Levy, R.A. Harrington, K.J. Anstrom, and J.H. Alexander, for the LEVO-CTS Investigators*

LEVO-CTS

N = 882

Chirurgie cardiaque

FEVG < 35% dans les 60 derniers jours

Dose : 0,2µg/kg/min pendant 1h puis 0,1µg/kg/min 23h

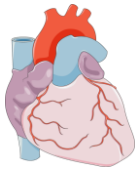
Table 4. End Points.*

End Point	Levosimendan (N=428)	Placebo (N=421)	Odds Ratio (95% CI)†	P Value
Primary end points — no. (%)				
Four-component end point‡	105 (24.5)	103 (24.5)	1.00 (0.66–1.54)	0.98
Two-component end point§	56 (13.1)	48 (11.4)	1.18 (0.76–1.82)	0.45
Secondary end points¶				
Duration of stay in ICU — days‖				
Median	2.8	2.9	—	0.25
Interquartile range	1.6–4.8	1.8–4.9		
Low cardiac output syndrome — no. (%)‖	78 (18.2)	108 (25.7)	0.62 (0.44–0.88)	0.007
Use of inotrope at or beyond 24 hr after infusion initiation — no. (%)‖	235 (54.9)	264 (62.7)	0.71 (0.53–0.94)	0.02

NS

Critère de jugement :
- DC à J30
- EER à J30
- IDM à J5
- Assistance à J5

Optimisation préopératoire
Lévosimendan



JAMA | Original Investigation

Effect of Levosimendan on Low Cardiac Output Syndrome in Patients With Low Ejection Fraction Undergoing Coronary Artery Bypass Grafting With Cardiopulmonary Bypass
The LICORN Randomized Clinical Trial

Bernard Cholley, MD, PhD; Thibaut Caruba, PharmD, PhD; Sandrine Grosjean, MD; Julien Amour, MD, PhD; Alexandre Ouattara, MD, PhD;

N = 336

Pontages sous CEC
+/- autre geste (26%)

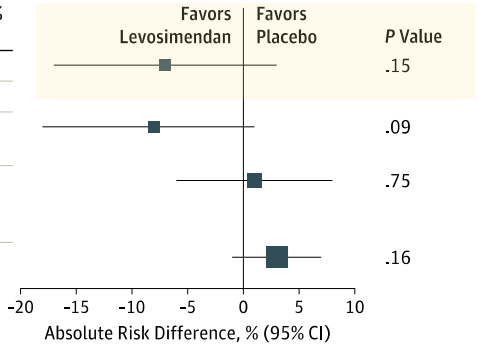
FEVG < 40 %

Table 1. Baseline Patient Characteristics

	No. (%)	
	Levosimendan (n = 167)	Placebo (n = 168)
Age, mean (SD), y	69 (10)	67 (10)
Male sex	139 (83)	143 (85)
BMI, mean (SD)	27 (5)	27 (5)
ASA class[a]		
1-2	7 (4)	4 (2)
3	126 (75)	120 (71)
4	34 (20)	44 (26)
Euroscore II,[b] median (IQR) [range], %	3.1 (2-5.9) [0.7-31.1]	3.4 (2-6.4) [0.9-29.5]
LVEF		
30%-40%	134 (80)	129 (77)
<30%	33 (20)	39 (23)

Figure 2. Forest Plot of the Absolute Risk Difference in the Primary End Point and Its Individual Components

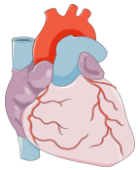
	No. of Events (%)		Absolute Risk Difference, % (95% CI)	P Value
	Levosimendan (n = 167)	Placebo[a] (n = 168)		
Primary end point	87 (52)	101 (61)	-7 (-17 to 3)	.15
Individual component of the primary end point				
Catecholamine infusion beyond 48 hours of study drug initiation	82 (49)	98 (59)	-8 (-18 to 1)	.09
Need for any mechanical assist device any time after CPB or failure to wean from device before 96 hours of study drug initiation if inserted prior CPB	27 (16)	25 (15)	1 (-6 to 8)	.75
Need for renal replacement therapy during ICU stay	15 (9)	10 (6)	3 (-1 to 7)	.16



NS

Limites :
- FEVG relativement haute
- Posologie : 0,1µg/kg/min

Optimisation préopératoire
Lévosimendan



The efficacy and safety of prophylactic use of levosimendan on patients undergoing coronary artery bypass graft: a systematic review and meta-analysis

Wanyu Wang[1] · Xiaoshuang Zhou[1] · Xinyang Liao[2] · Bin Liu[1] · Hai Yu[1]

Méta-analyse

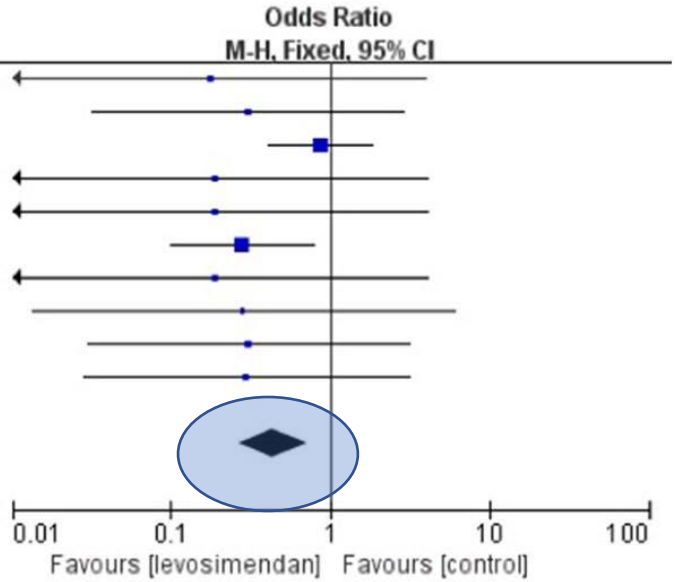
Pontages avec ou sans CEC

Administration préop : entre 0,03 et 2,4 µg/kg/min

Study or Subgroup	Levosimendan Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI
Anastasiadis, K. 2016	0	16	2	16	4.8%	0.18 [0.01, 3.97]
Atalay, H.2016	1	25	4	33	6.5%	0.30 [0.03, 2.89]
Cholley, B.2017	14	167	16	168	28.7%	0.87 [0.41, 1.84]
Desai, P. M.2018	0	30	2	30	4.8%	0.19 [0.01, 4.06]
Eriksson, Hi2009	0	30	2	30	4.8%	0.19 [0.01, 4.06]
Levin, R.2012	5	127	16	125	30.4%	0.28 [0.10, 0.79]
Ristikankare, A.2012	0	30	2	30	4.8%	0.19 [0.01, 4.06]
Sahin, V2014	0	47	2	68	4.0%	0.28 [0.01, 5.97]
Shah, B. 2014	1	25	3	25	5.6%	0.31 [0.03, 3.16]
Sharma, P.2014	1	20	3	20	5.6%	0.30 [0.03, 3.15]
Total (95% CI)		**517**		**545**	**100.0%**	**0.43 [0.26, 0.71]**
Total events	22		52			

Heterogeneity: Chi² = 5.52, df = 9 (P = 0.79); I² = 0%

Test for overall effect: Z = 3.30 (P = 0.0010)



Mortalité

Optimisation préopératoire
Lévosimendan

L'administration prophylactique de levosimendan est-il bénéfique chez des patients IC avant une chirurgie?

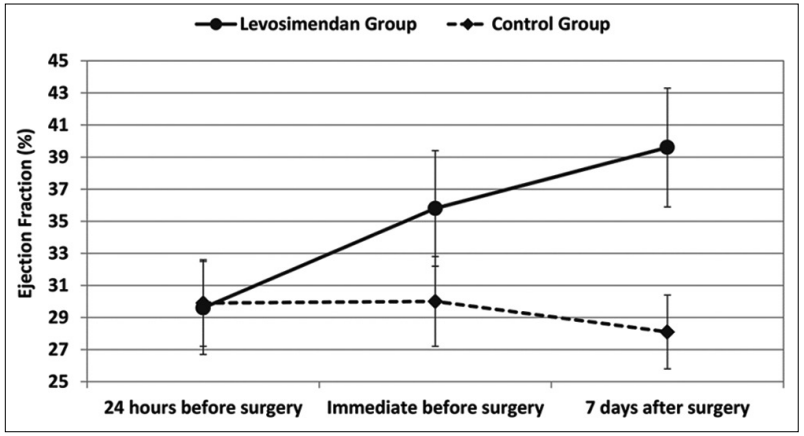
Levosimendan for patients with heart failure undergoing major oncological surgery: A randomised blinded pilot study

N = 60

Ehab H Shaker, Khaled Hussein[1], Ehab M Reyad[2]

Department of Anaesthesia and Pain Management, National Cancer Institute, Cairo University, [1]Department of Critical Care Medicine, Faculty of Medicine, Cairo University, [2]Department of Clinical Pathology, National Hepatology and Tropical Medicine Research Institute, Cairo, Egypt

Chirurgie oncologie digestive



FEVG

Table 2: Postoperative complications and adverse outcomes in the two studied groups

Adverse outcome	Levosimendan (*n*=30)	Control (*n*=30)	*P*	RR	95% CI
Hypotension	6 (20%)	17 (57%)	0.003	0.40	0.19 to 0.83
Hypotension requiring vasopressor	6 (20%)	14 (47%)	0.028	0.50	0.24 to 1.02
Decompensated heart failure	4 (13%)	16 (53%)	0.001	0.31	0.12 to 0.76
Dysrhythmia	2 (7%)	6 (20%)	0.129	0.46	0.14 to 1.58
Deterioration of renal function	2 (7%)	5 (17%)	0.424	0.54	0.16 to 1.79
Sepsis	6 (20%)	8 (27%)	0.542	0.82	0.42 to 1.60
Difficult weaning from MV	4 (13%)	10 (33%)	0.067	0.51	1.03 to 2.62

Data are presented as number (percentage). MV – Mechanical ventilation; RR – Relative risk; CI – Confidence interval

Table 3: Perioperative changes in the ejection fraction, cardiac index and stroke volume index in the two studied groups

	Levosimendan (*n*=30)	Control (*n*=30)	*P*
EF (%)			
24 h before surgery	29.6 (2.9)	29.9 (2.7)	0.680
Immediately before surgery	35.8 (3.6)	30.0 (2.8)	<0.001
7 days after surgery	39.6 (3.7)	28.1 (2.3)	<0.001
CI (l/min/m^2)			
Immediately after induction	3.1 (0.3)	3.1 (0.3)	0.604
Immediately after surgery	3.2 (0.3)	2.9 (0.3)	<0.001
24 h after surgery	3.3 (0.3)	2.9 (0.2)	<0.001
SVI (ml/m^2)			
Immediately after induction	40.8 (4.1)	39.4 (2.5)	0.110
Immediately after surgery	44.1 (4.0)	34.1 (2.1)	<0.001
24 h after surgery	46.3 (4.4)	35.2 (2.3)	<0.001

Data are presented as mean (standard deviation). EF – Ejection fraction; CI – Cardiac index; SVI – Stroke volume index

Optimisation préopératoire
Lévosimendan

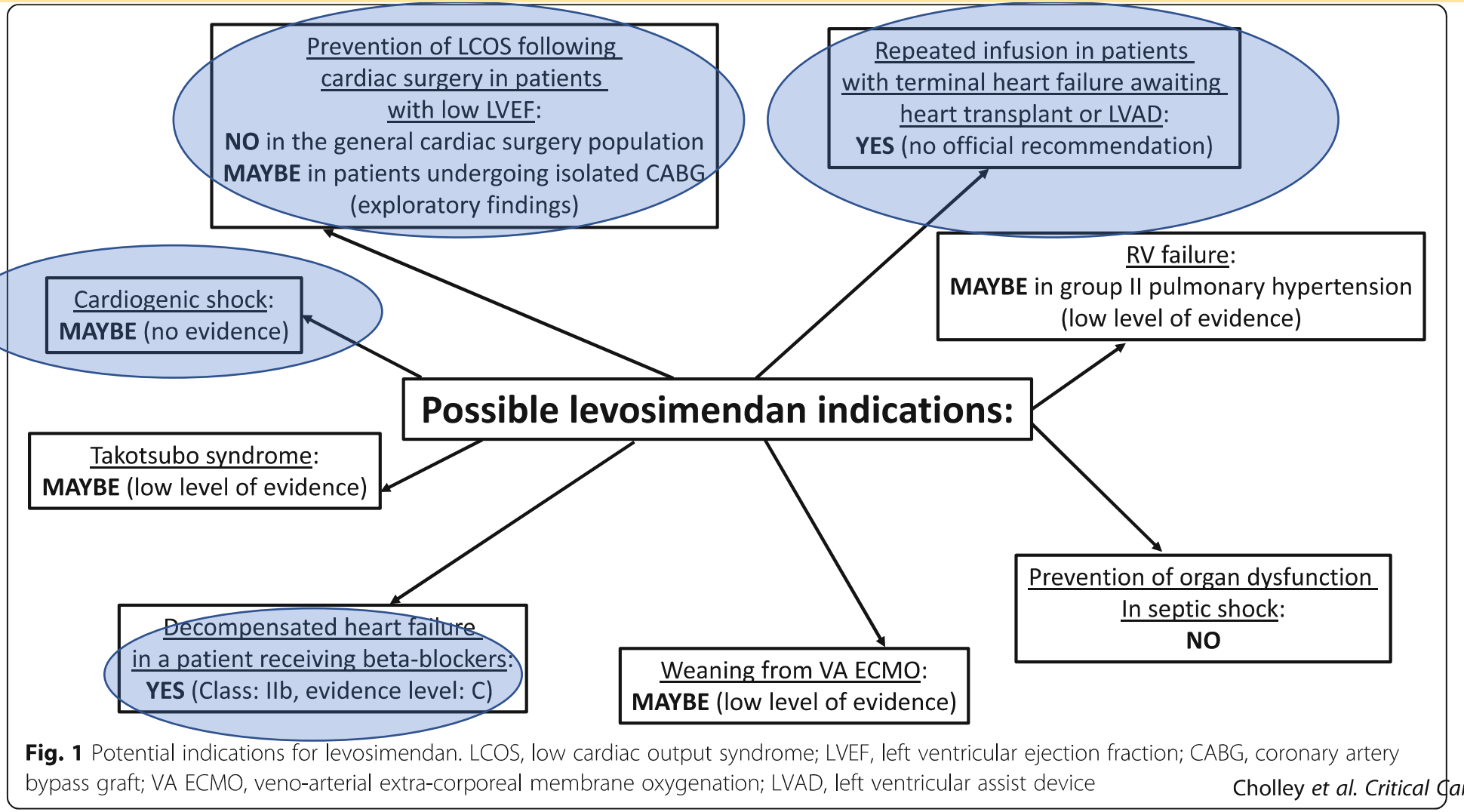
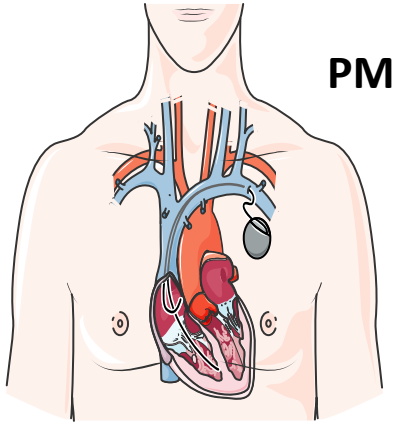
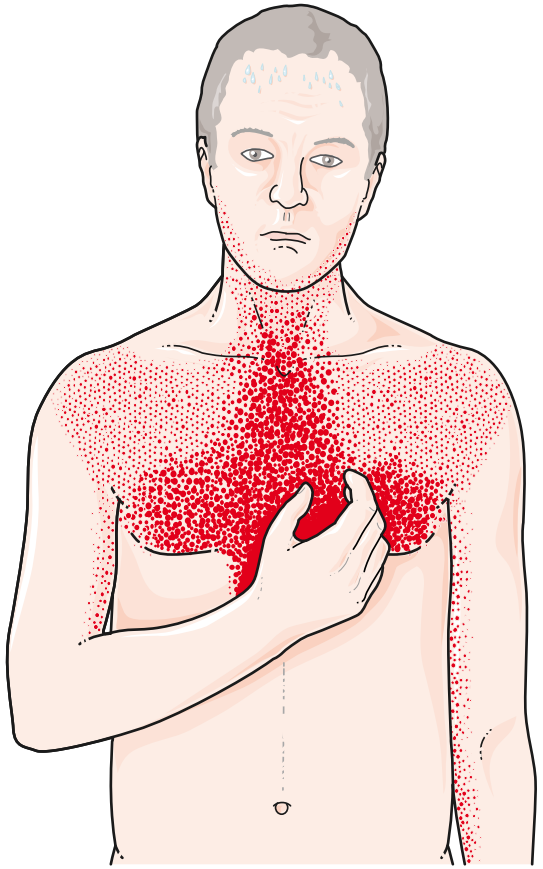


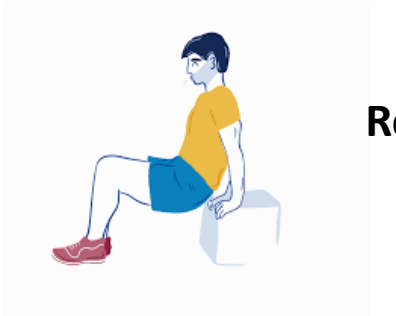
Fig. 1 Potential indications for levosimendan. LCOS, low cardiac output syndrome; LVEF, left ventricular ejection fraction; CABG, coronary artery bypass graft; VA ECMO, veno-arterial extra-corporeal membrane oxygenation; LVAD, left ventricular assist device

Optimisation préopératoire
Parcours de soin



PM / DAI





Réadaptation cardiaque

Prise en charge multi-disciplinaire
Heart Team

Hôpitaux de Toulouse

Greffe?
Assistance?

Télésurveillance

Conclusion
Take home message

IC = fréquente

Nouveaux médicaments : Sacubitril – Dapaglifozine

Dépistage et prise en charge **d'une carence martiale** (avec ou sans anémie)

Lévosimendan : une place encore à définir

Parcours de soin de l'IC