PRÉVENTION DE LA MORT SUBITE DANS L'INSUFFISANCE CARDIAQUE

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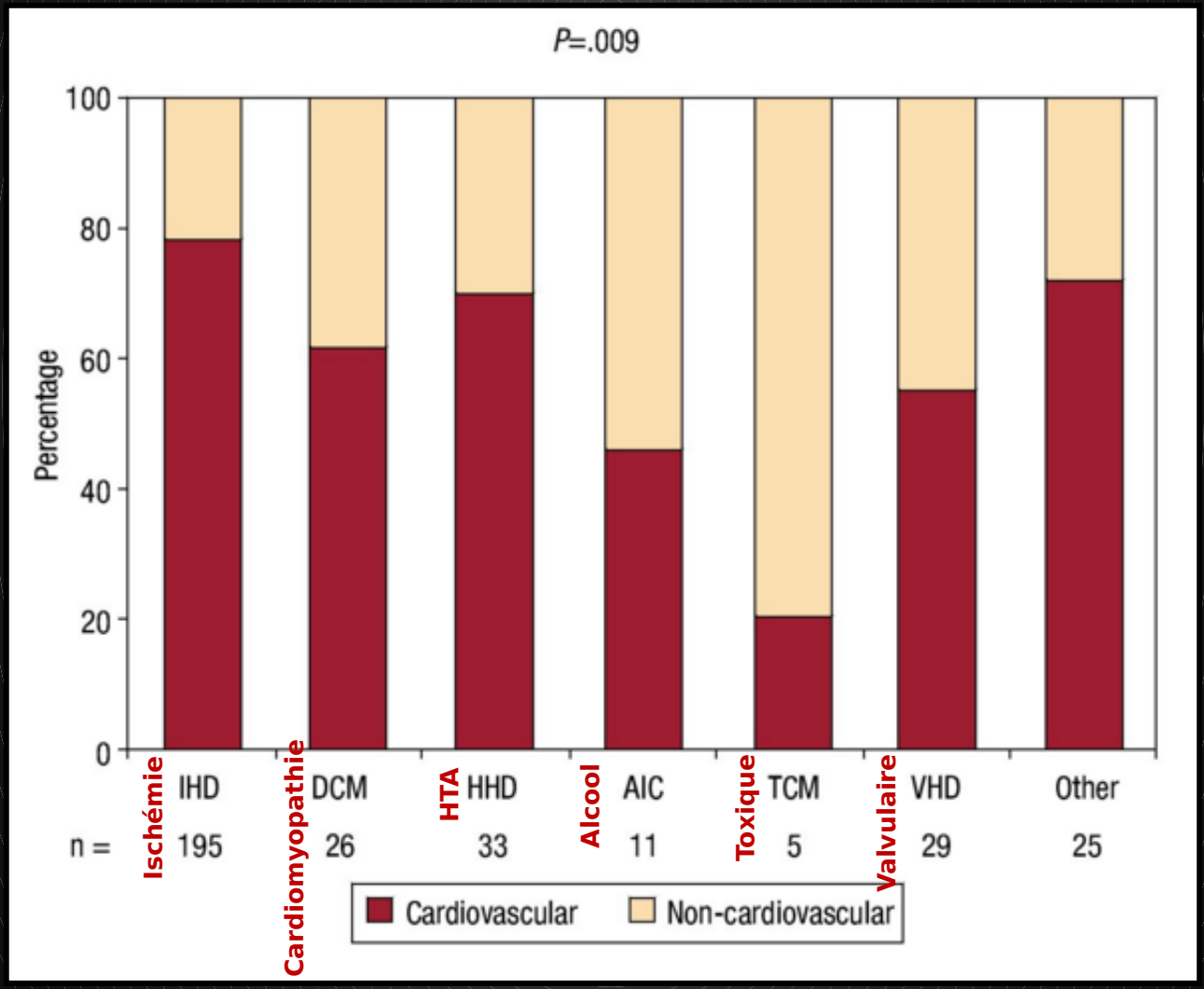
Tunis – Tunisie

Épidémiologie IC

Fréquente + Grave

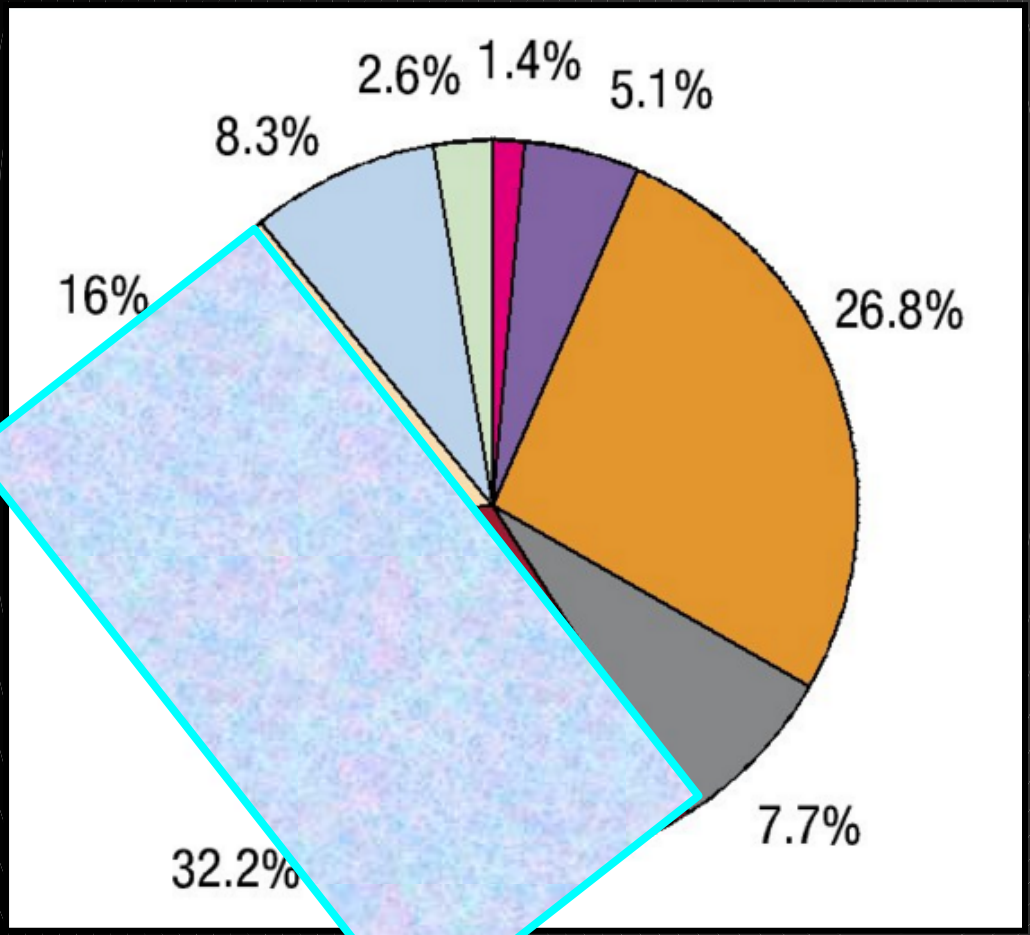
- Prévalence : 1% - 2% population adulte
  ≧ 10% patients > 70 ans ***(ESC - HF pilote study)***
- Mortalité annuelle : 7% - 17% ***(ESC - HF pilote study)***

Causes de décès



Rev Esp Cardiol. 2010;63:303-14 - Vol. 63 Num 03

Causes de décès



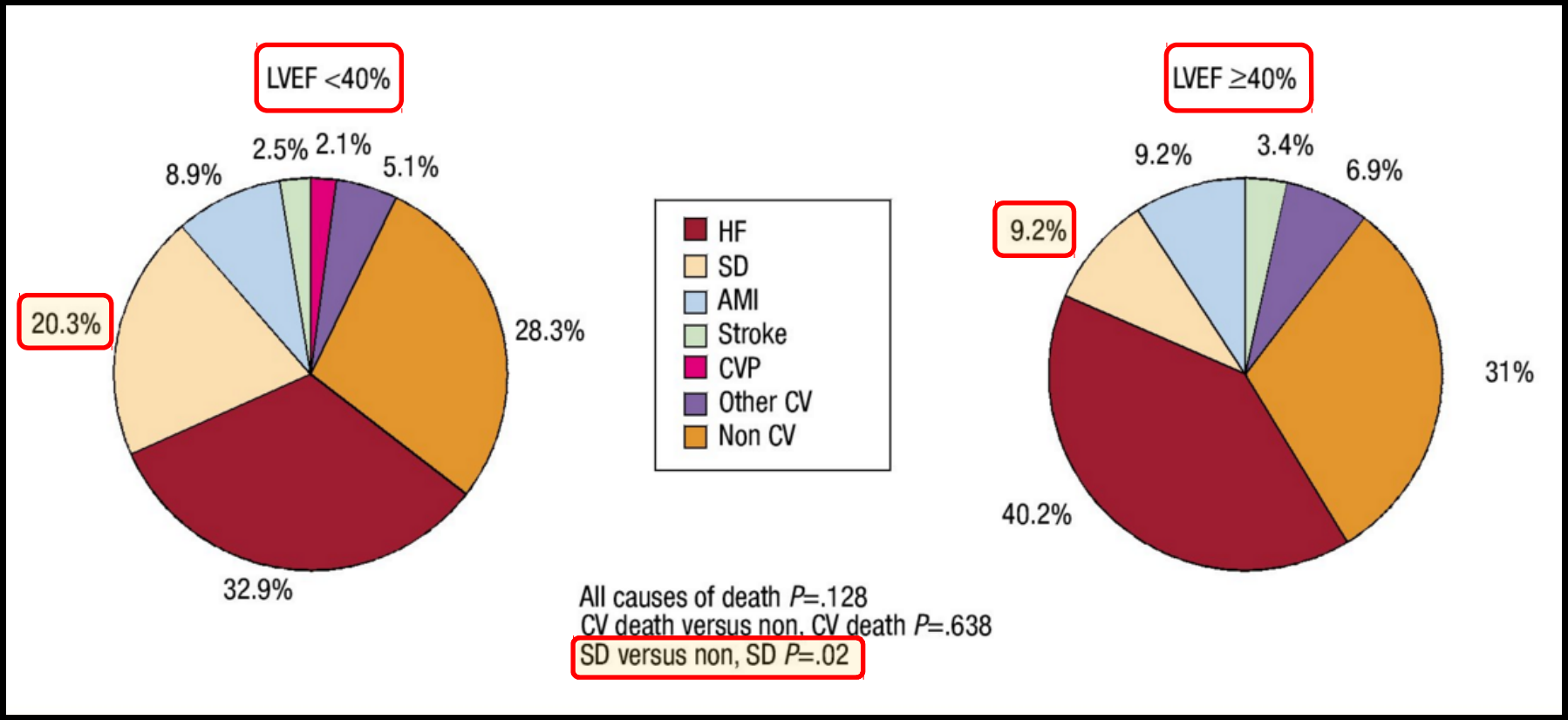
- Heart failure
- Sudden death
- Acute myocardial infarction
- Stroke
- Cardiovascular procedures
- Other cardiovascular causes
- Non-cardiovascular
- Unknown

Mortalité cardio-Vx : 65.5%

IC : 32.2% - MS: 16%

... Cardiol. 2010;63:303-14 - Vol. 63 Num.03

Causes de décès en fonction de FE



Rev Esp Cardiol. 2010;63:303-14 - Vol. 63 Num.03

↑ Automaticité - A déclenchées - Réentrées

Anomalies structurelles hémodynamiques

HVG ☾ Stretch + ↑ P rempl ☾ ischémie sous endo

Fibrose ☾ anisotropie + ralentissement ☾ réentrée

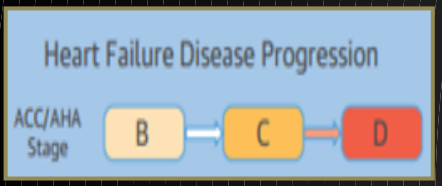
Anomalies électro φ

An courants k+, Na+, Ca++ intra Ç ☾ ↑ PA et Rep + post dép précoces et tardives

Anomalies neuro-hormonales

Débordement sympathique, ↓ T vagal

Système rénine angiotensine aldostéro



Remodelage myocardique (-) Décompensation hémodynamique

désynchronisation contractions V Adaptation myocardique métabolique

Prévention de la mort subite

- Correction anomalies électrolytiques (hypo k+ - Mg++), ischémie **IIa (C)**
- Optimisation TTT insuffisance cardiaque: β-, MRA, sacubitril/valsartan (LCZ) **I (A)**
- Anti-arythmiques non indiquées si asymptomatique (aggravation IC, effet pro-arythmogène) **III (A)**

- Prévention I_{aire} et II_{aire} mort subite ☾ ICD **I (A)**

Chez patients: ICD + chocs récurrents / non candidats ICD

- Amiodarone
- Ablation par cathéter
- CRT (FE, ECG)

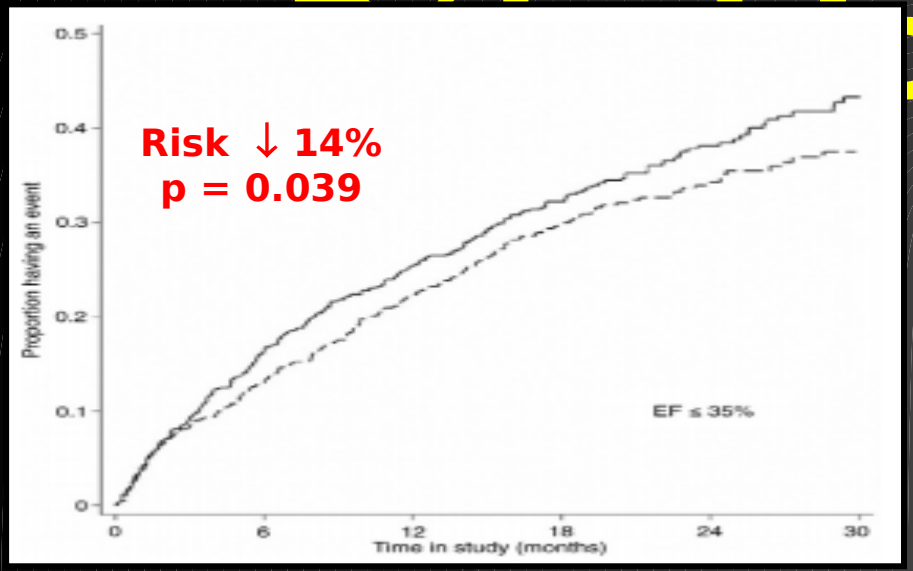
} **IIa (C)**

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure
European Heart Journal: May 20, 2016

Prévention de la mort subite
TRAITEMENT MÉDICAL

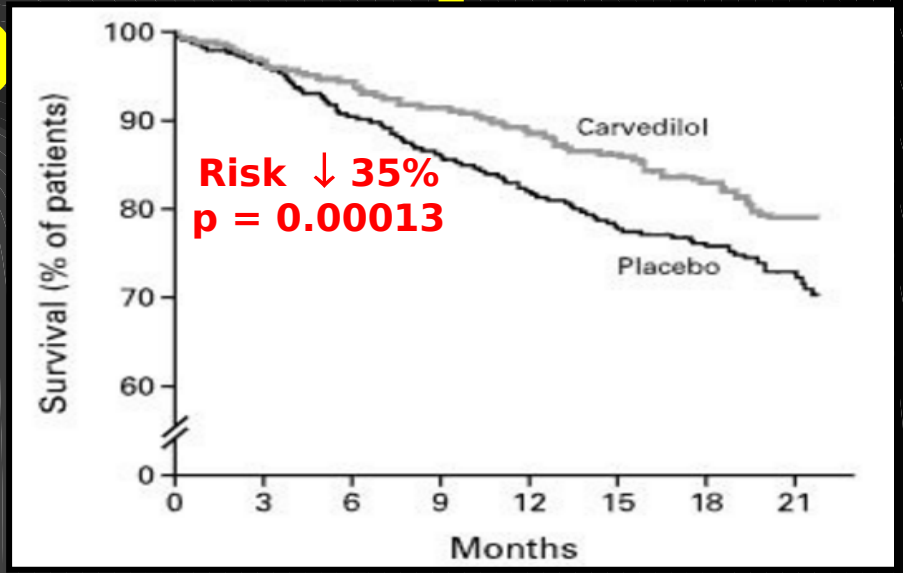
SENIORS (>70ans)

Eur Heart J 2005; 26 (3):203-6



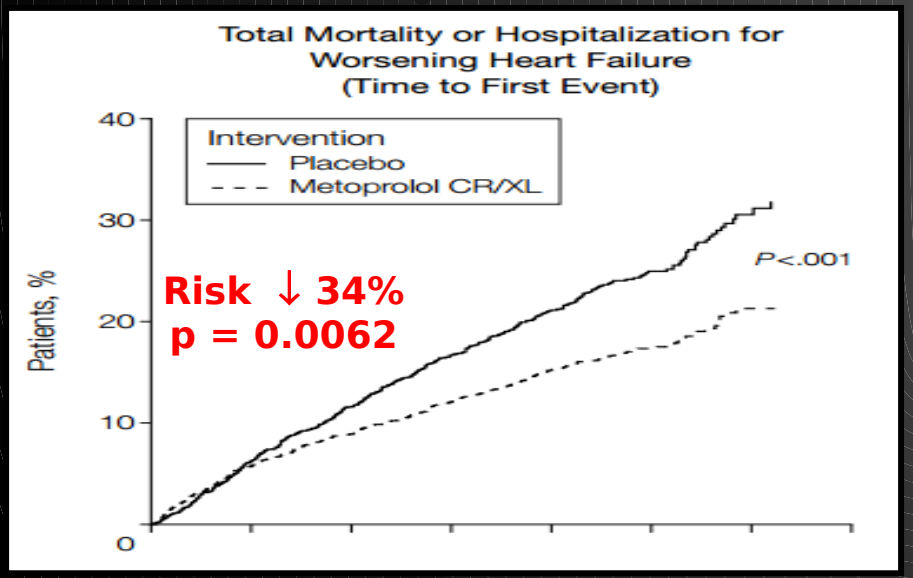
COPERNICUS (IC sévère)

N Engl J Med 2001; 344:1651-1658



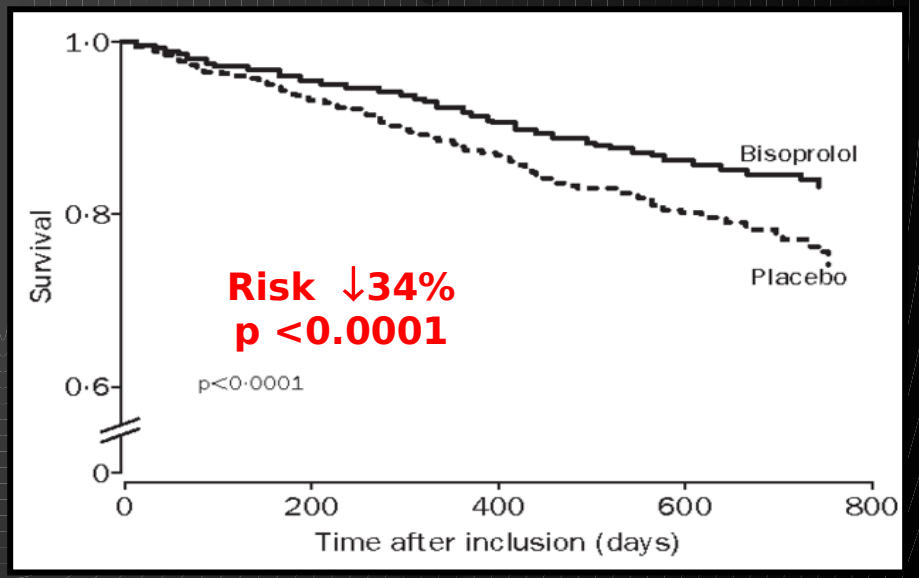
MERIT-HF

JAMA. 2000;283:1295-1302



CIBIS-II

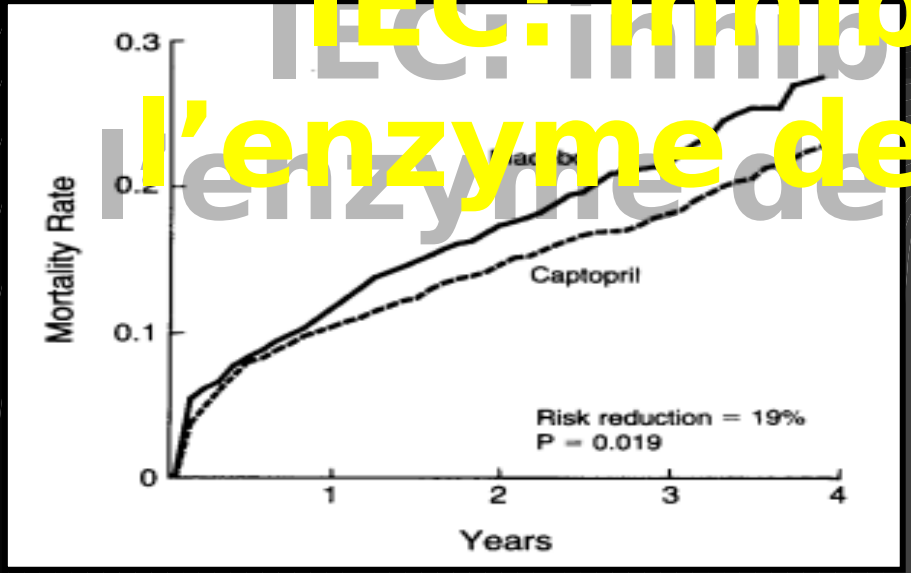
Lancet 1999;353:9-13.



IEC: inhibiteurs de l'enzyme de conversion

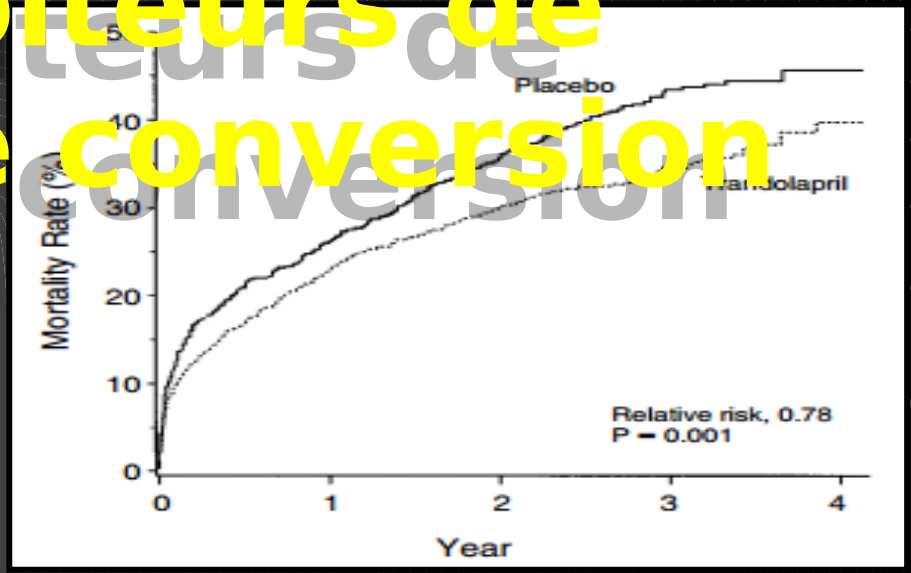
SAVE

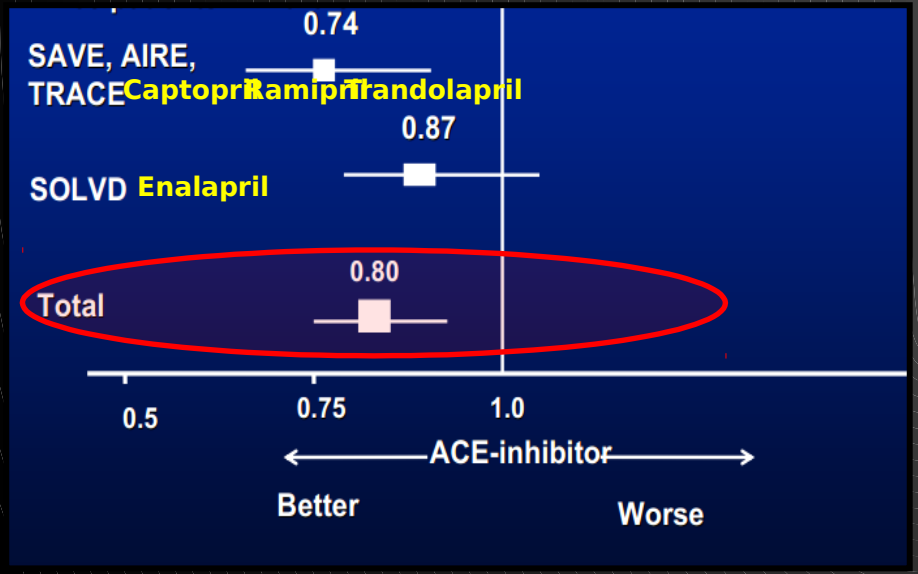
N Engl J Med 1992; 327:669-677



TRACE

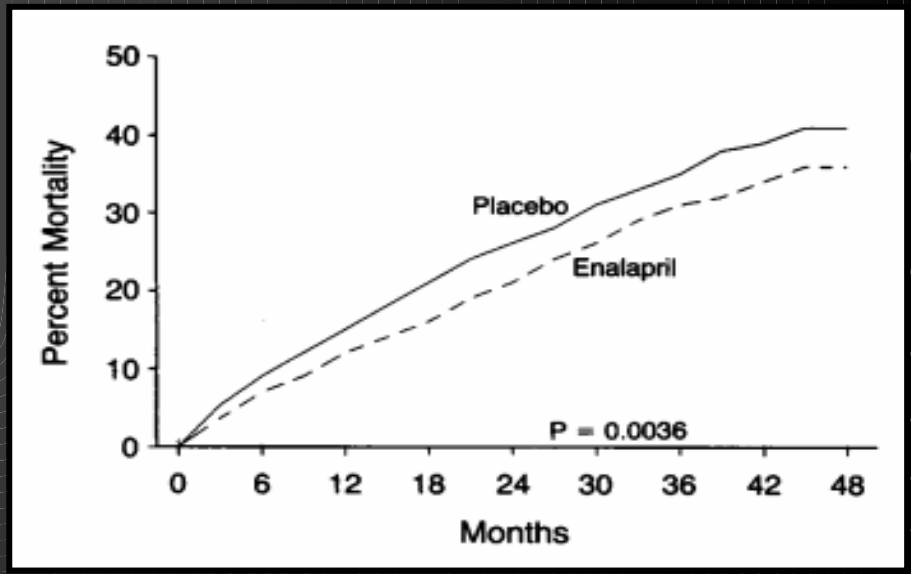
N Engl J Med 1995; 333:1670-1676





Méta analyse

Lancet. 2000 Jul 22;356(9226):338



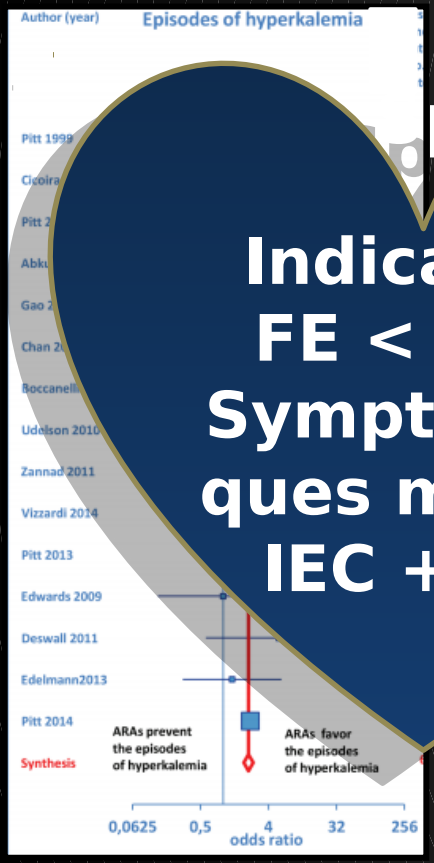
SOLVD

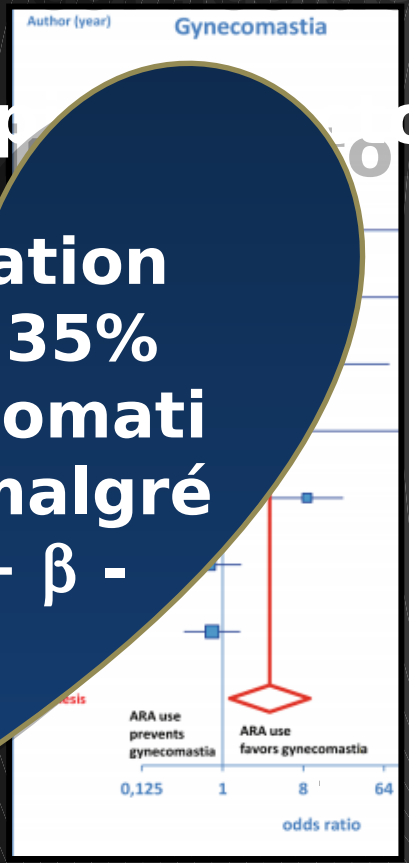
N Engl J Med 1991; 325:293-302

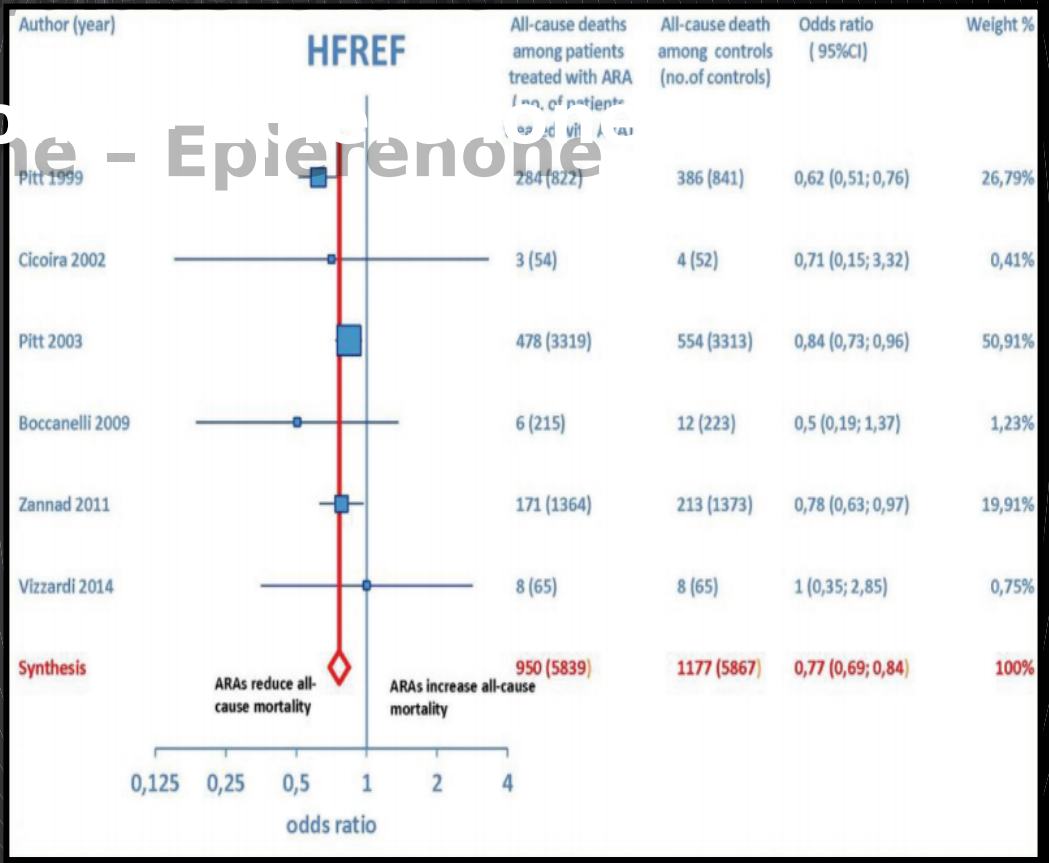
Antagonistes récepteurs minéralo-corticoïde/aldostérone

Antagonistes récepteurs minéralo-corticoïde/aldostérone

Indication
FE < 35%
Symptomatiques malgré IEC + β -



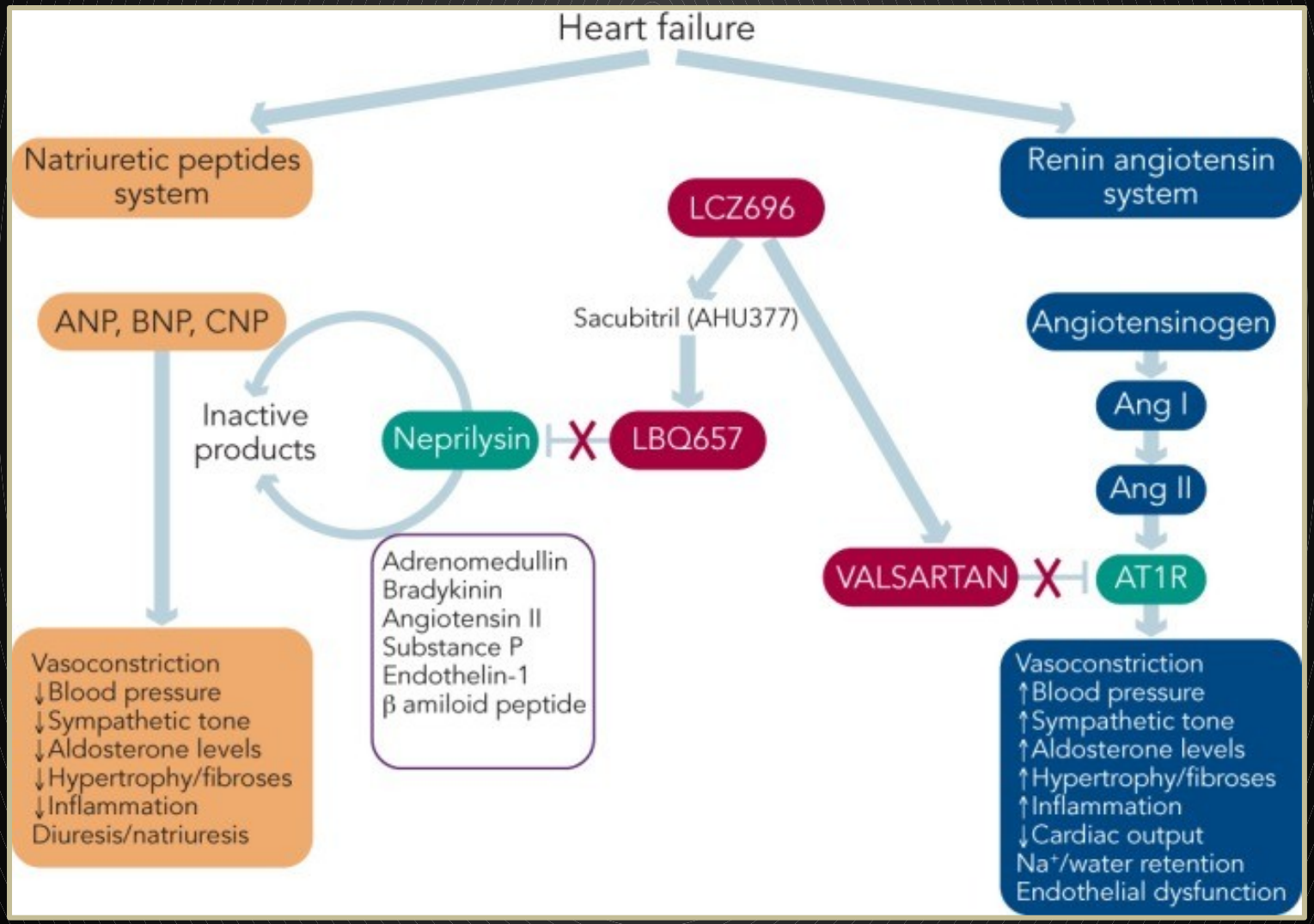




The Impact Exerted on Clinical Outcomes of Patients With Chronic Heart Failure by Aldosterone Receptor Antagonists:
A Meta-Analysis of Randomized Controlled Trials
J Clin Med Res. 2017;9(2):130-142

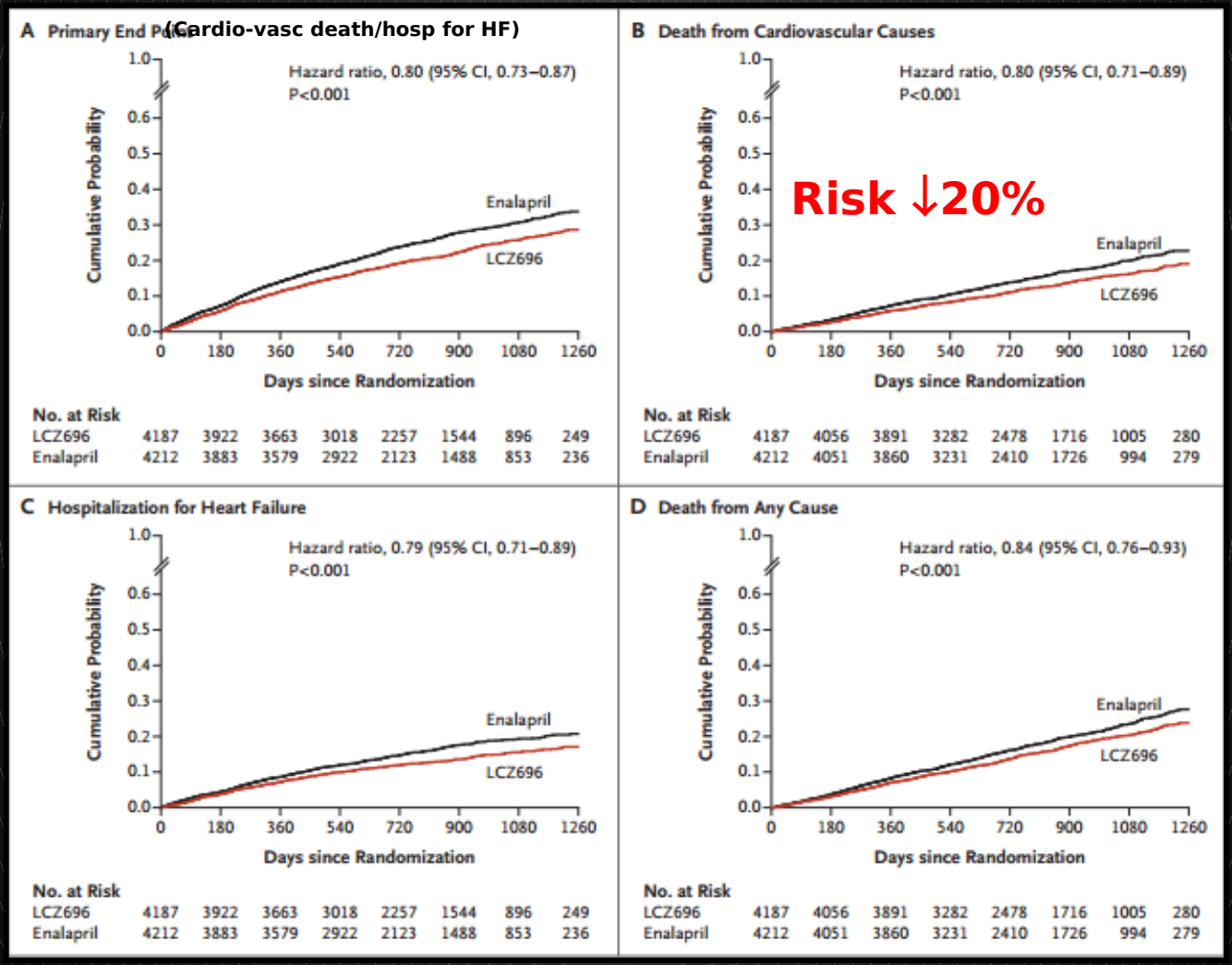
Inhibiteur Angiotensine - Neprilysine

LCZ696: Sacubitril/Valsartan



- Angioedème, dégradation en peptides β amyloïdes cérébrals
- Indiquée patients symptomatiques sous IEC

PARADIGM-HF



Angiotensin–Neprilysin Inhibition versus Enalapril in Heart Failure
N Engl J Med. 2014;371:993–1004.

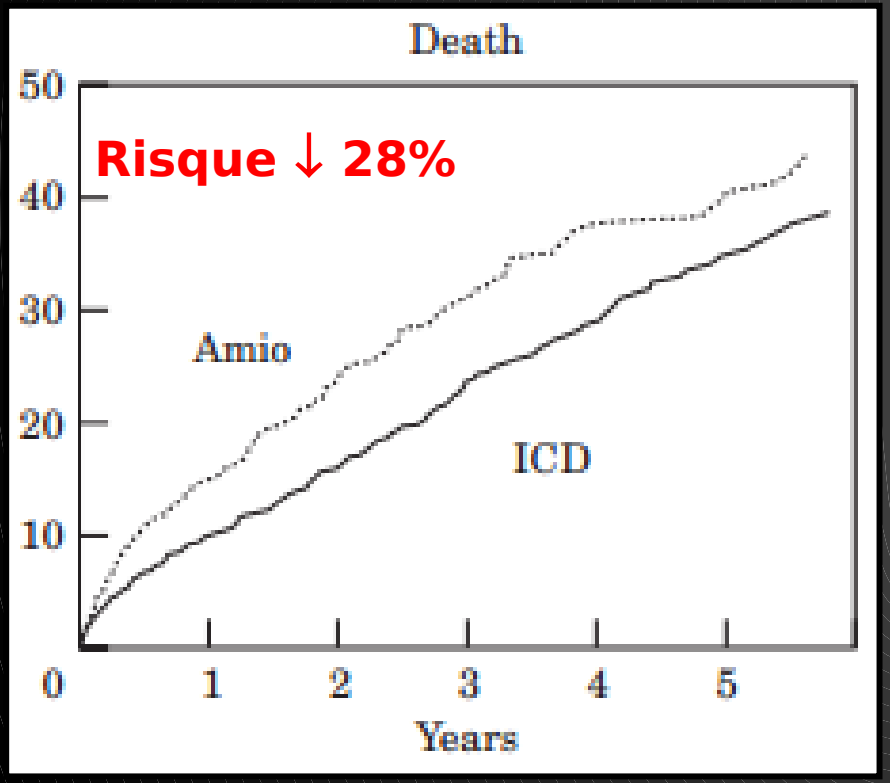
Défibrillateur automatique implantable

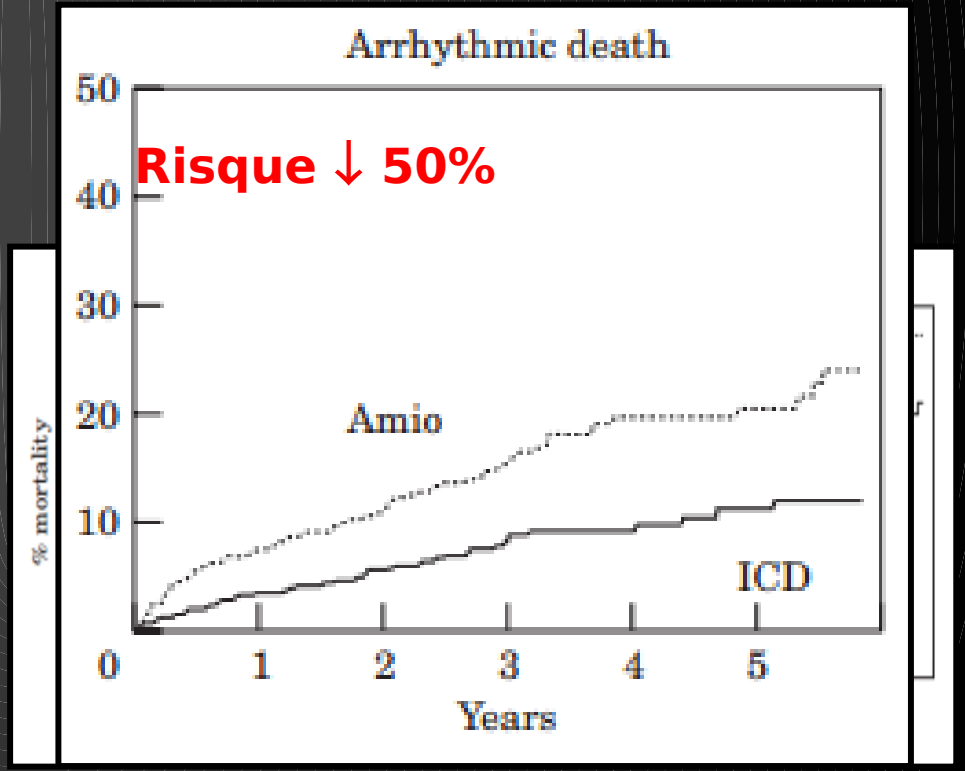
PRÉVENTION SECONDAIRE

ICD : Prévention secondaire

Secondary prevention An ICD is recommended to reduce the risk of sudden death and all-cause mortality in patients who have recovered from a ventricular arrhythmia causing haemodynamic instability, and who are expected to survive for >1 year with good functional status.	I	A

Circulation 1985;71:873-880





Meta-analysis of the implantable cardioverter defibrillator secondary prevention trials
European Heart Journal (2000) 21, 2071–2078

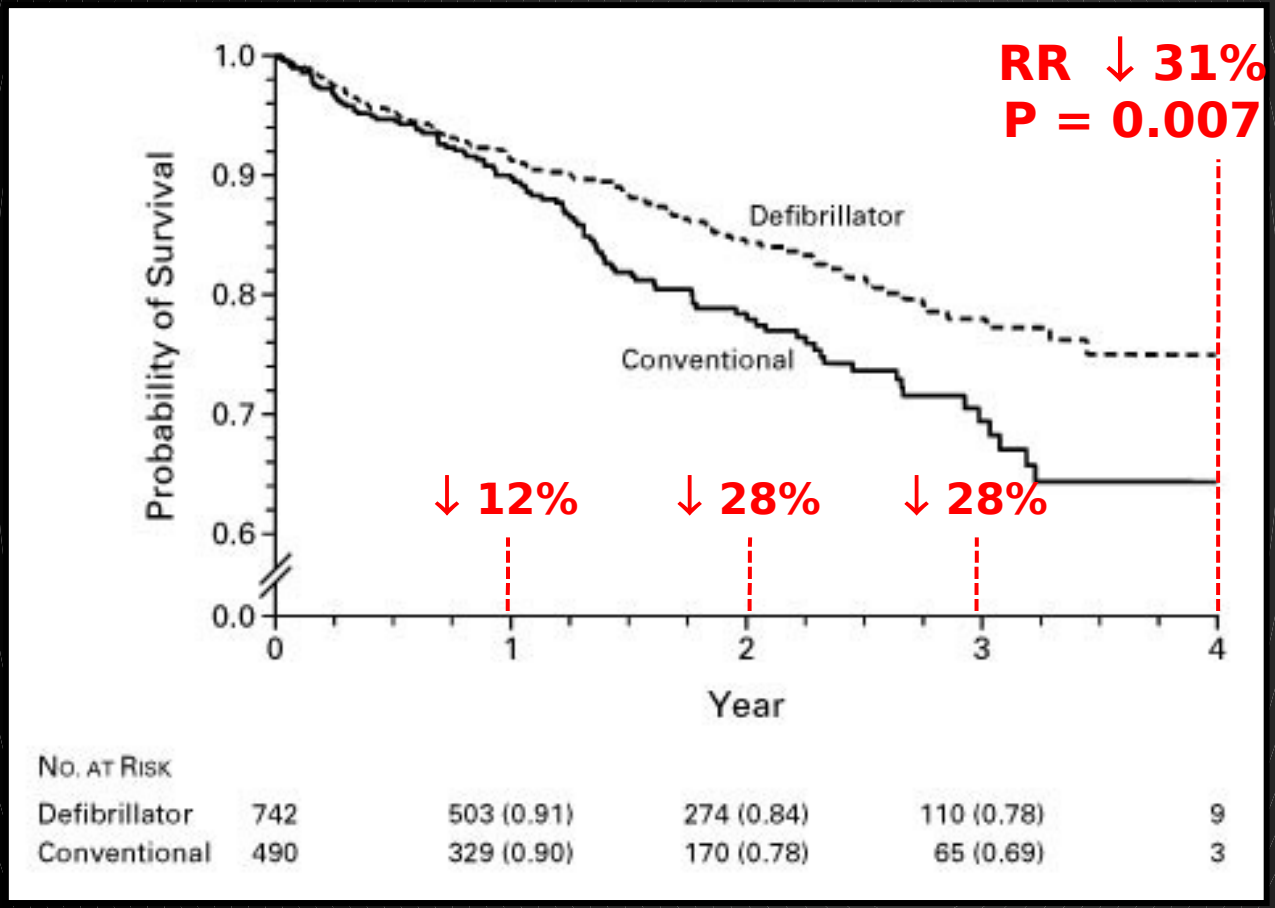
Défibrillateur automatique implantable

PRÉVENTION PRIMAIRE

CMD ischémique ≠ **CMD non ischémique**

Stratification Risque rythmique

Cardiopathie ischémique MADIT II



- N = 1232
- IDM + FE< 30%
- DAI = 742
- TT conv = 490
- Durée = 4

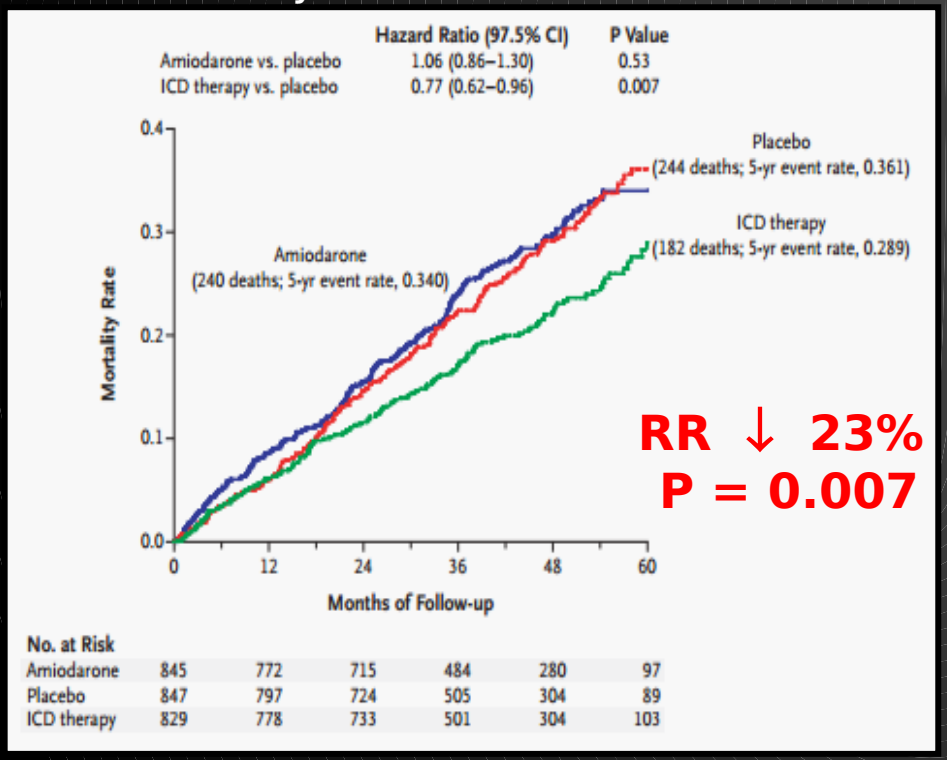
Prophylactic Implantation of a Defibrillator in Patients with Myocardial Infarction and Reduced Ejection Fraction

for the Multicenter Automatic Defibrillator Implantation Trial II Investigators*

N Engl J Med 2002; 346:877-883

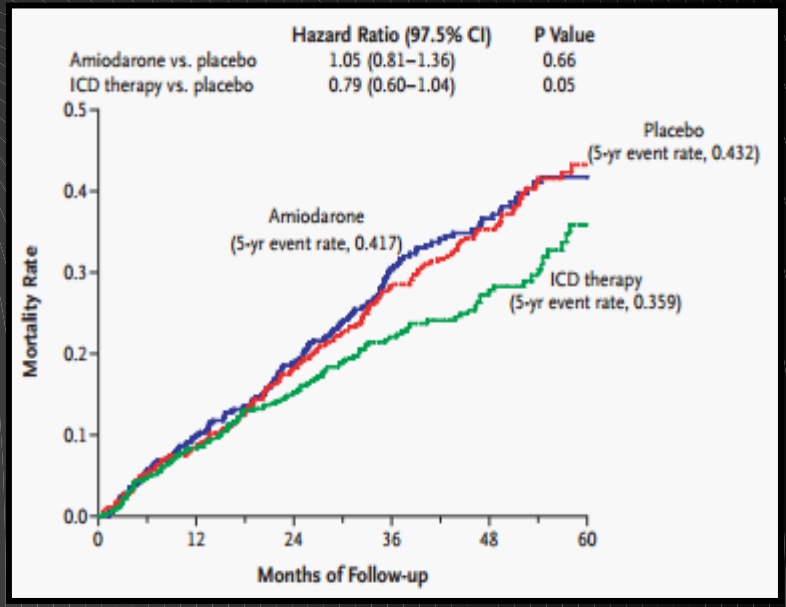
Cardiopathie ischémique SCD-HeFT

2521 patients, CMDI 52%, CMDNI 48%, FE < 35%
P = 847 - amiodarone = 845 - DAI = 829
Durée moyenne 45.5mois, mortalité

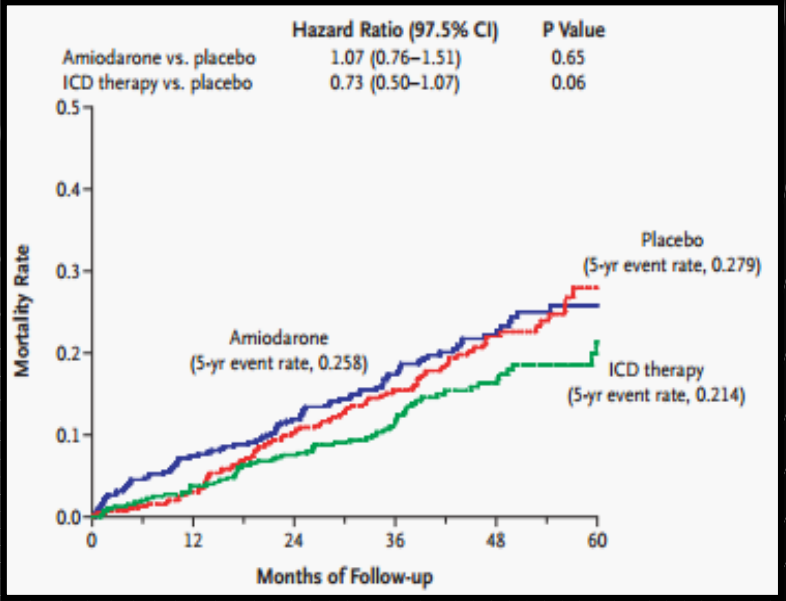


RR ↓ 23%
P = 0.007

Ischémique

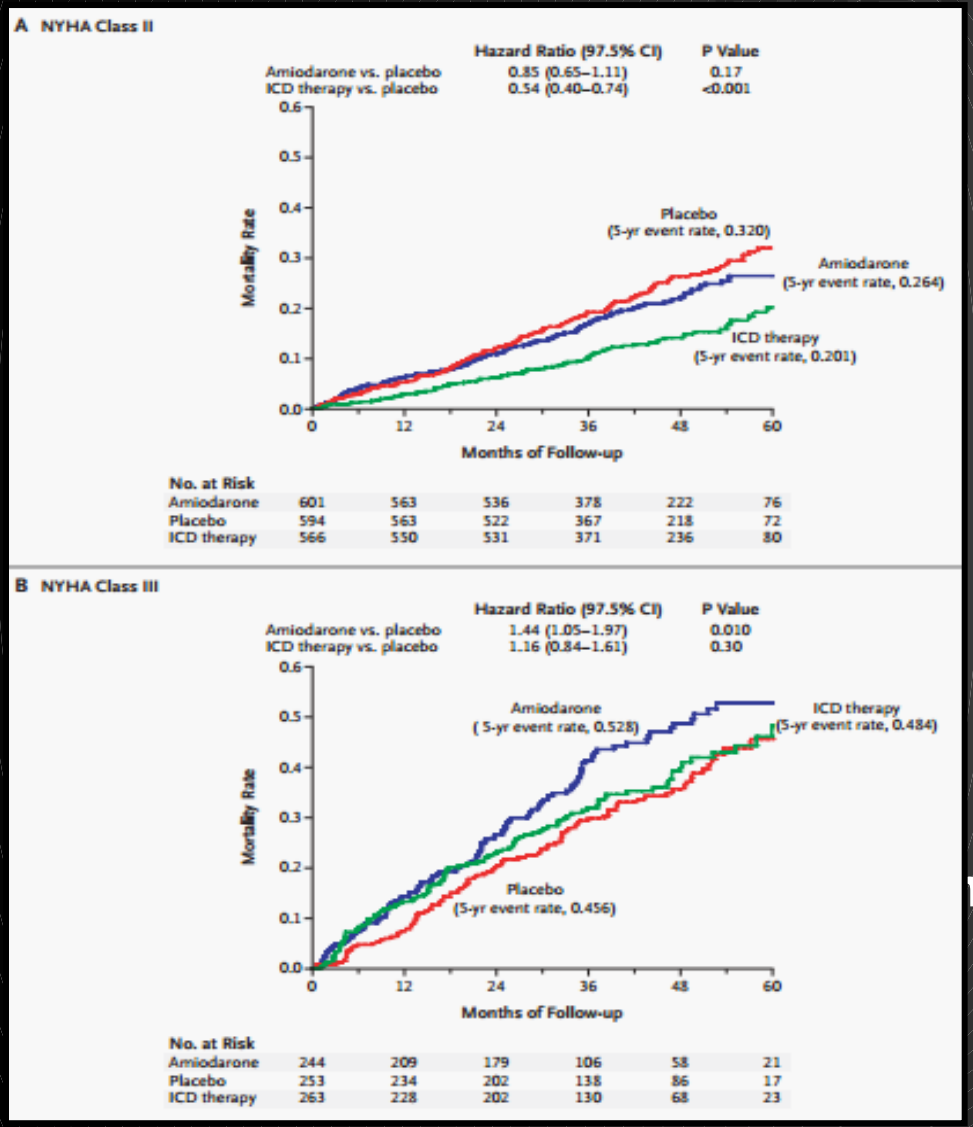


Non ischémique



N Engl J Med 2005; 352:225-237

Cardiopathie ischémique: SCD-HeFT



Classe II NYHA

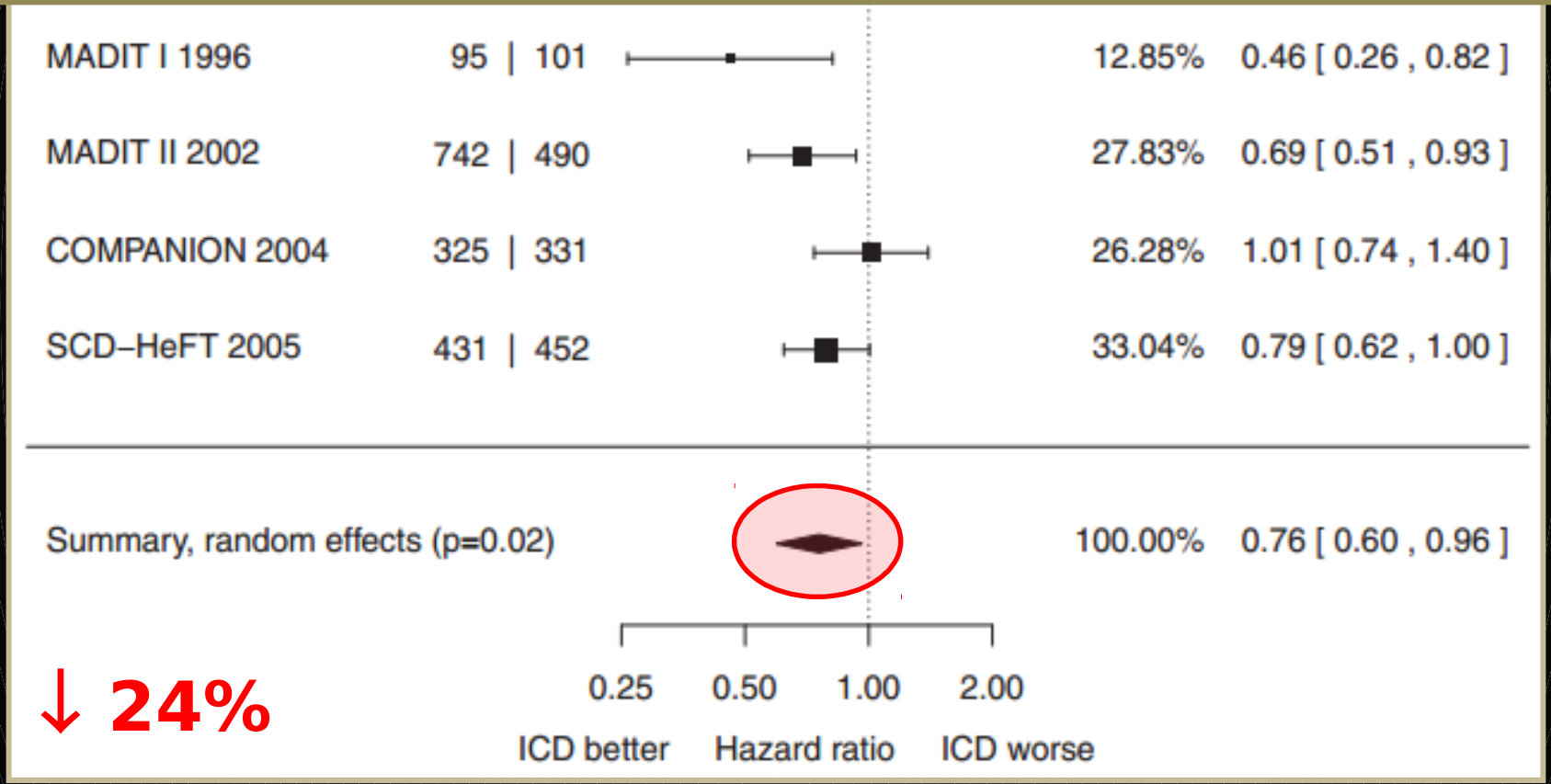
Amiodarone = placebo

Classe III NYHA

niodarone ↑ RR Mortalité 44%

N Engl J Med 2005; 352:225-237

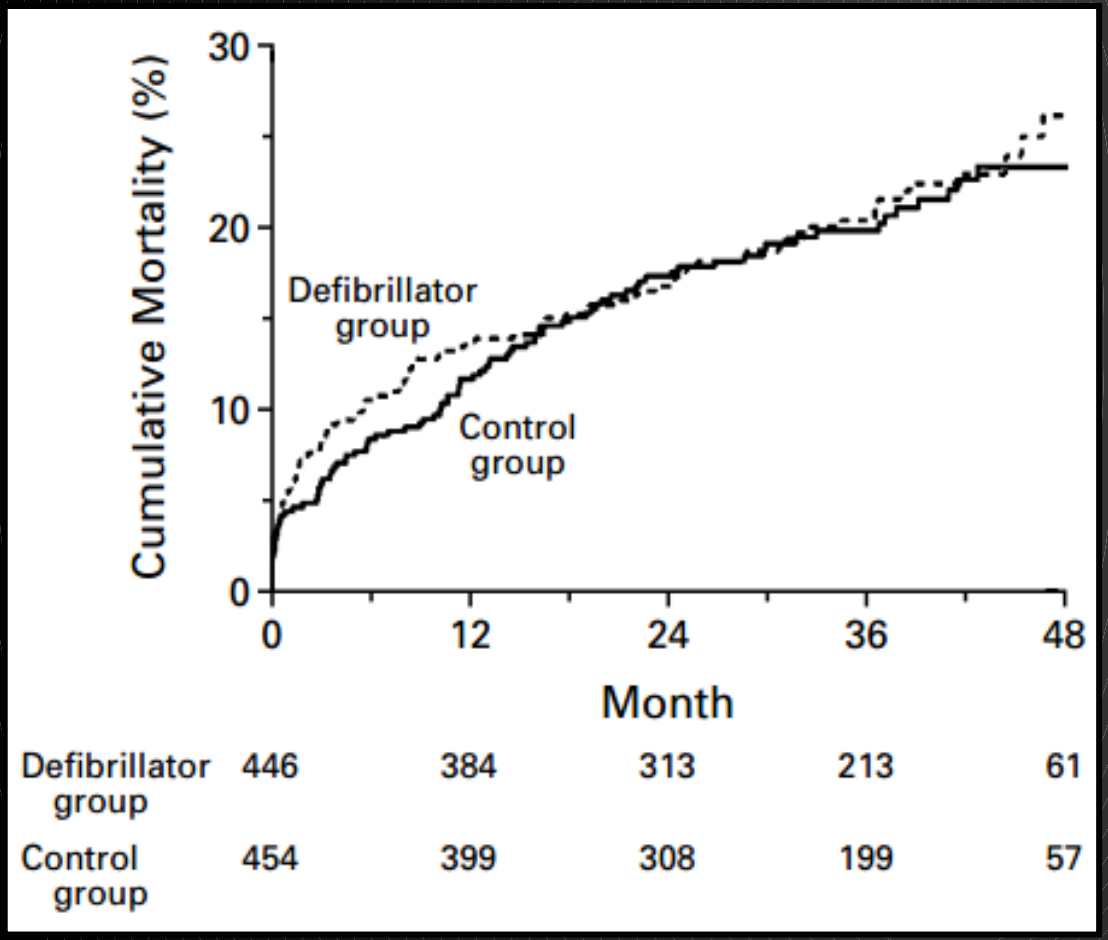
Primary prevention An ICD is recommended to reduce the risk of sudden death and all-cause mortality in patients with symptomatic HF (NYHA Class II–III), and an LVEF ≤35% despite ≥3 months of OMT, provided they are expected to survive substantially longer than one year with good functional status, and they have:		
• IHD (unless they have had an MI in the prior 40 days – see below).	I	A
• DCM	I	B



Implantable cardioverter defibrillators for primary prevention of death in left ventricular dysfunction with and without ischaemic heart disease: a meta-analysis of 8567 patients in the 11 trials
European Heart Journal (2017)38, 1738–1746

Cardiopathie ischémique
1/ Post chirurgie revascularisation

CABG - PATCH



Prophylactic use of implanted cardiac defibrillators in patients at high risk for ventricular arrhythmias after coronary-artery bypass graft surgery
N Engl J Med 1997;337:1569-75

900 CMDI + FE < 35%

Post chirurgie de revasc
ICD: 446 – Contrôle: 454
Suivi moyen: 32 ± 16 mois

Résultat : négatif

- Plus de complications

DAI

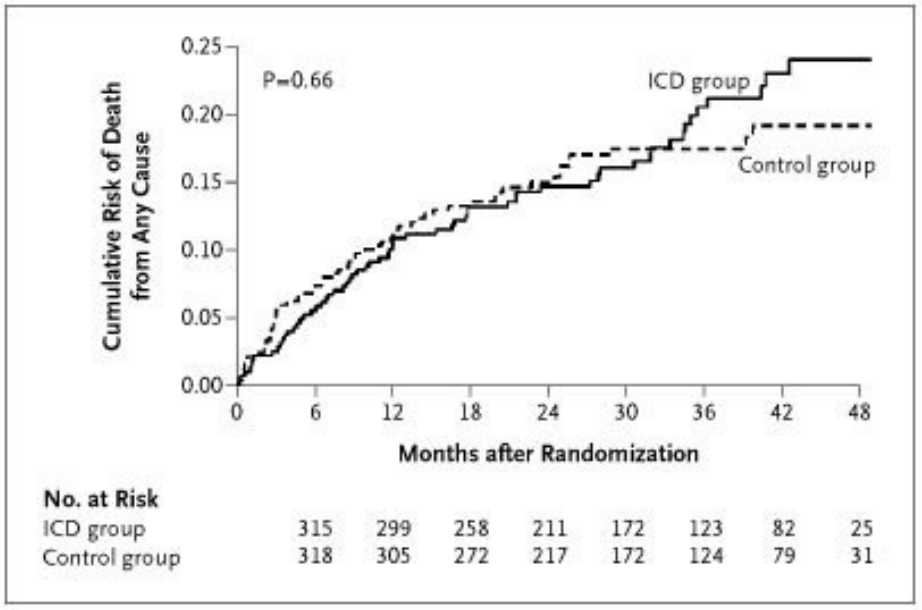
Deep sternal-wound infection	2.7	0.4†
Infection at wound or catheter site	12.3	5.9†
Pneumonia	8.5	4.0†

- Altération attaches SNA au niveau du cœur
- Remodelage positif

Cardiopathie ischémique
2/ Post IDM

DINAMIT

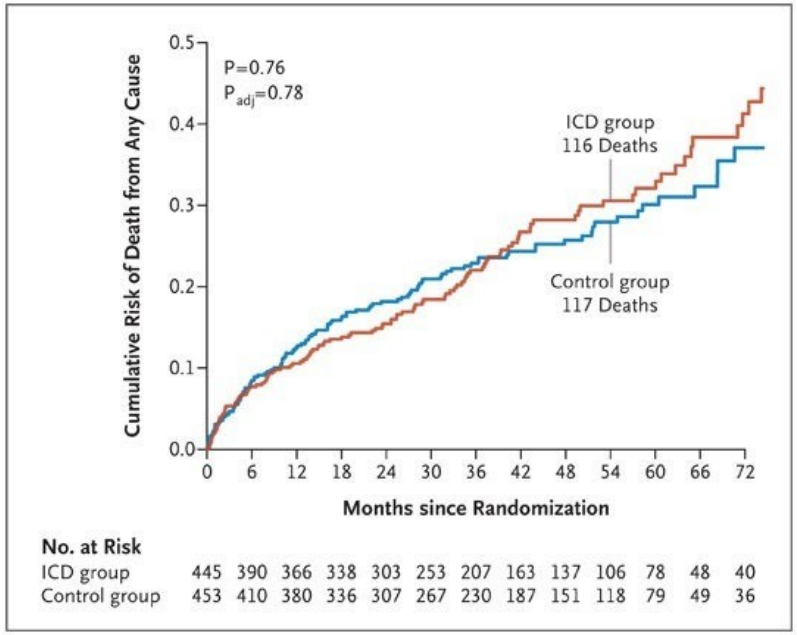
N: 674
ICD: 332 – contrôle:342
FE< 35% + ↓ variabilité sinusale



N Engl J Med 2004; 351:2481-2488

IRIS

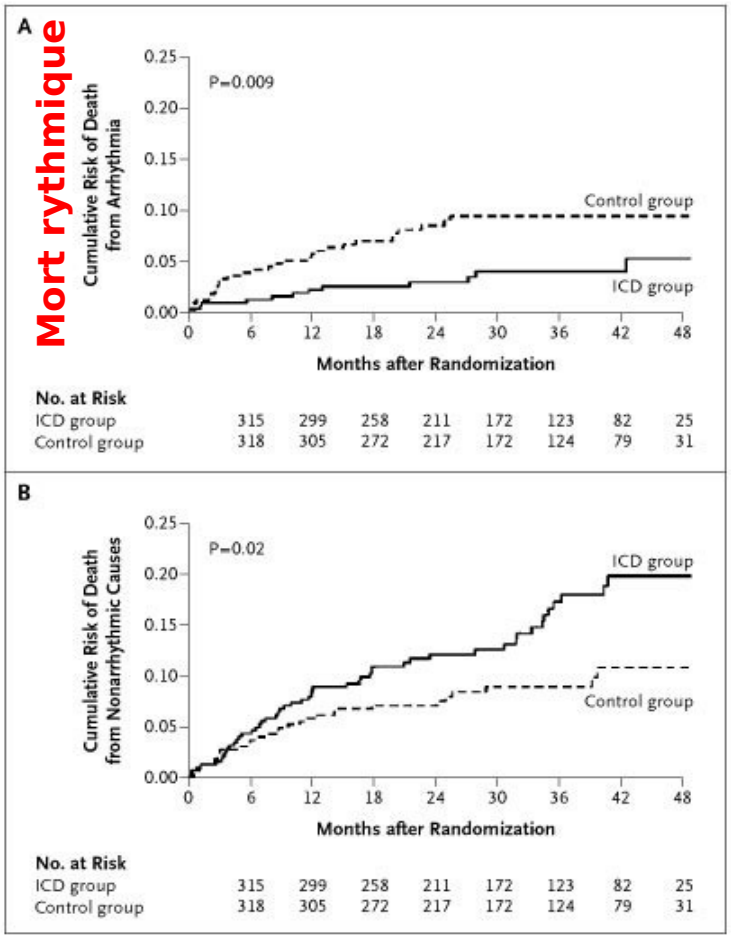
N: 898
ICD: 445 – contrôle 453
FE< 40% + ↓ variabilité sinusale et/ou TV NS



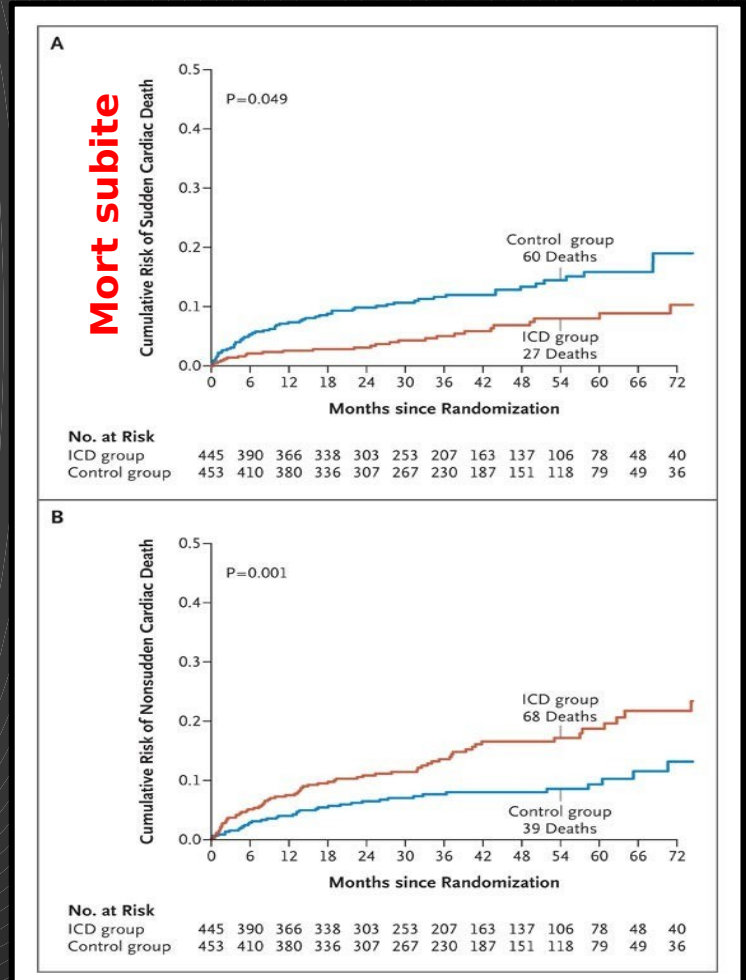
N Engl J Med 2009; 361:1427-1436

Cardiopathie ischémique : post IDM

DINAMIT



IRIS



WCD: Life Vest

IIb	B-NR	2. In patients at an increased risk of SCD but who are not ineligible for an ICD, such as awaiting cardiac transplant, having an LVEF of 35% or less and are within 40 days from an MI, or have newly diagnosed NICM, revascularization within the past 90 days, myocarditis or secondary cardiomyopathy or a systemic infection, wearable cardioverter-defibrillator may be reasonable (1-5).

1. **Dans les 40 J post IDM + FE < 35% sans revascularisation**

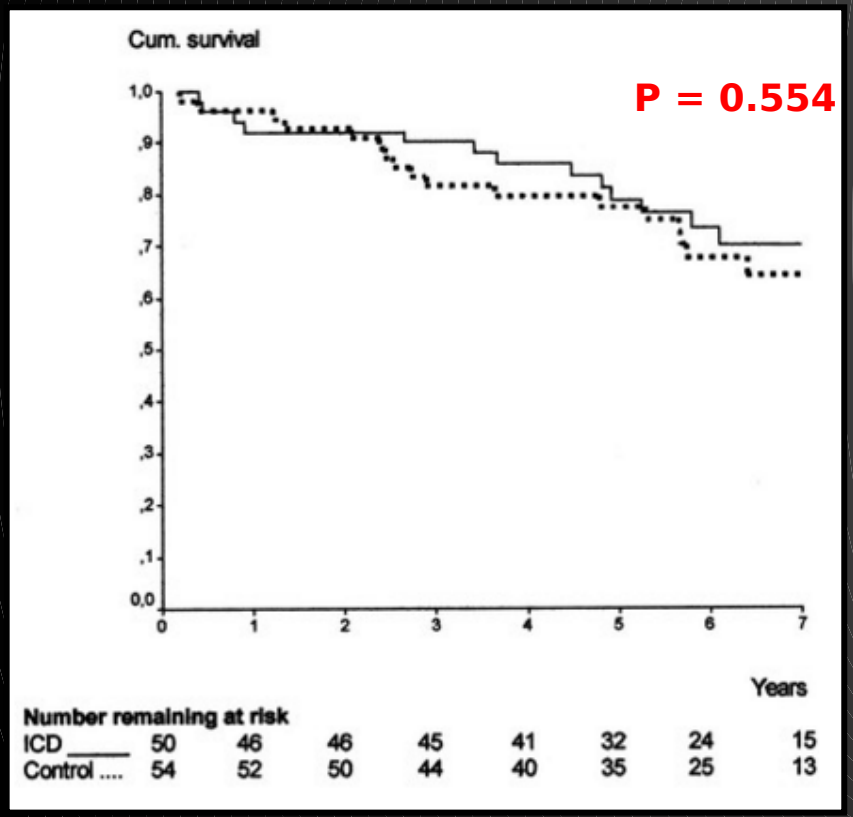
2. **Dans les 3 mois post revascularisation CMDI + EF < 35%**

2017 AHA/ACC/HRS Guideline for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death Circulation. 2017

CMD non ischémique

CAT

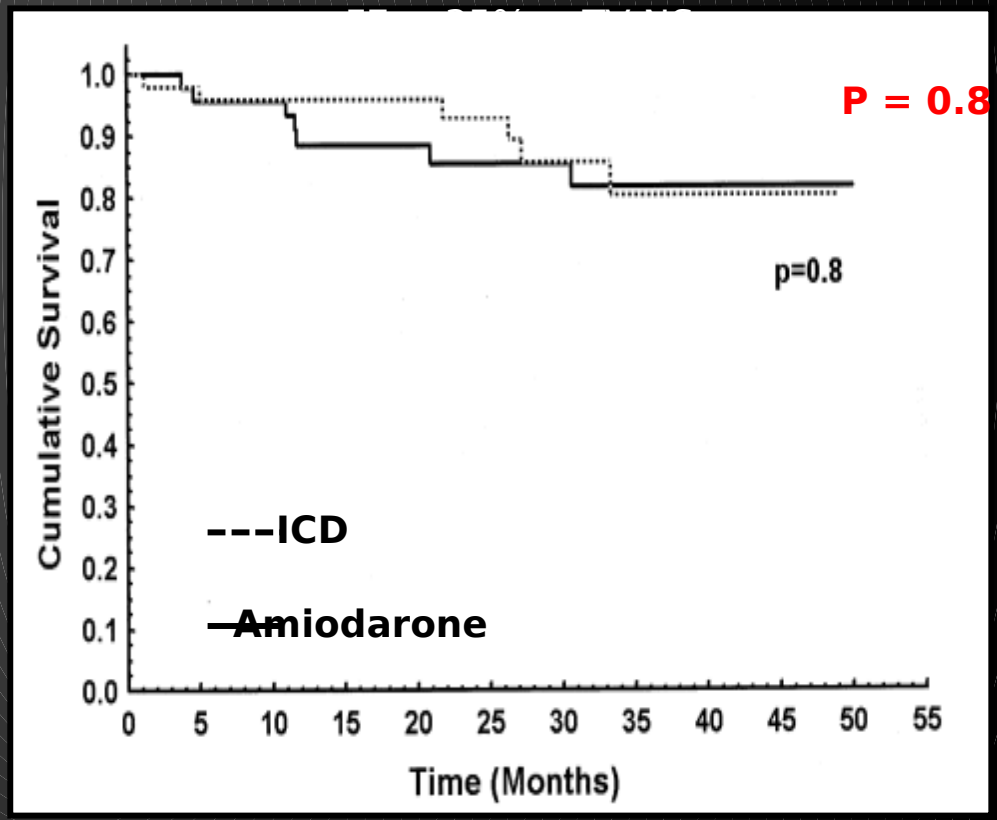
N: 104 . ICD: 50 – Contrôle: 54
FE < 30%



Primary Prevention of Sudden Cardiac Death in Idiopathic Dilated Cardiomyopathy The Cardiomyopathy Trial (CAT)
Circulation. 2002;105:1453-1458

AMIOVIRT

N: 103 . ICD: 52 – Amiodarone: 51

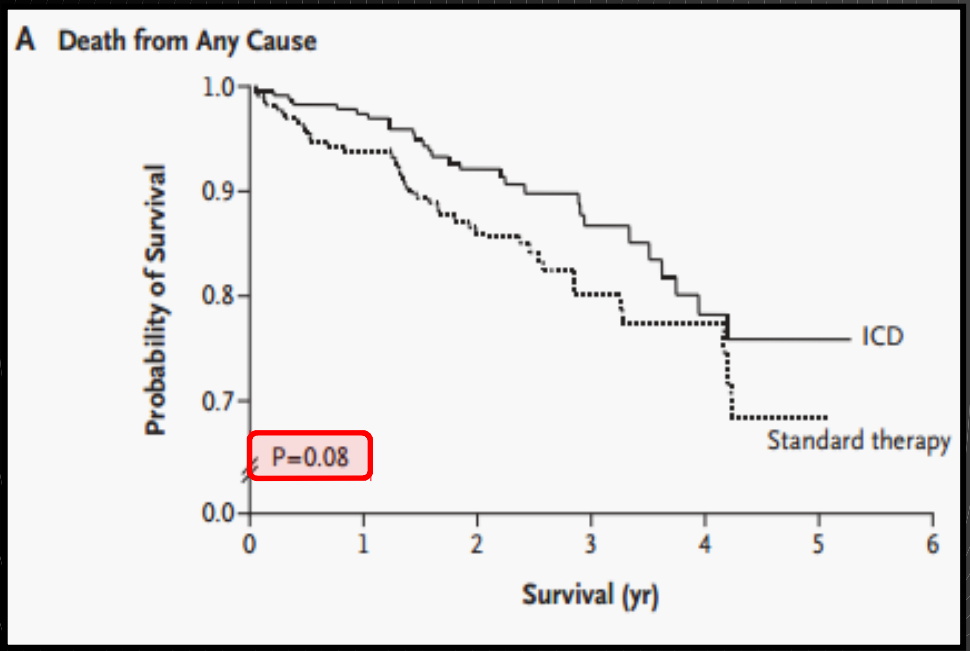


Amiodarone Versus I: Randomized Trial in Patients With Nonischemic DC and Asymptomatic Nonsustained Ventricular Tachycardia
J Am Coll Cardiol 2003; 41:1707–12

CMD non ischémique

DEFINITE

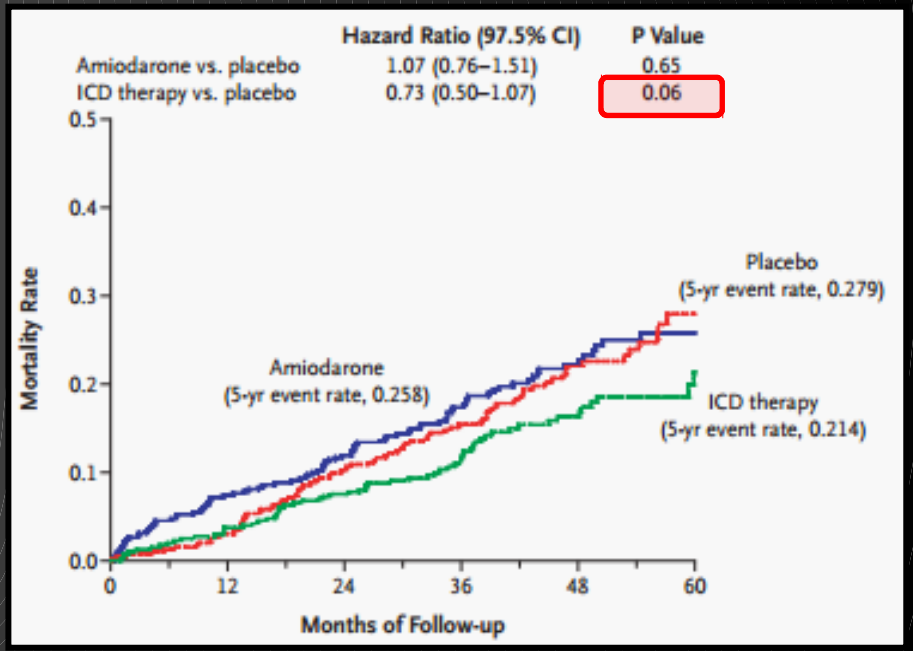
N: 458, 229 contrôle – 229 ICD
FE< 36% + ESV/ TVNS



Prophylactic Defibrillator Implantation in Patients with Nonischemic Dilated Cardiomyopathy
N Engl J Med 2004; 350:2151-8

SCD-HEFT

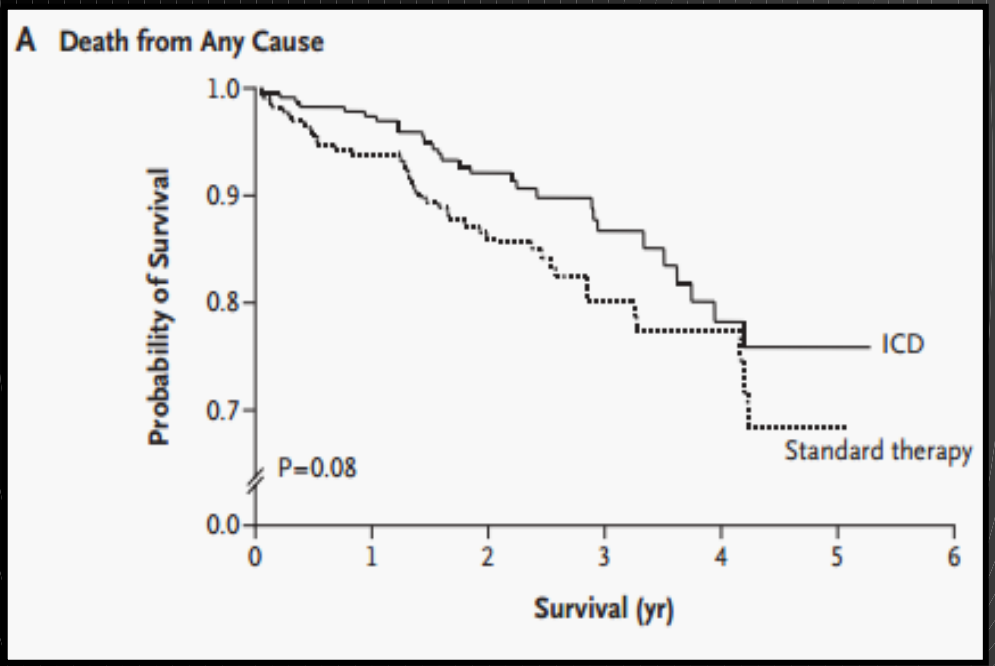
P: 394 – Amiodarone: 419 – ICD:398
FE < 35%



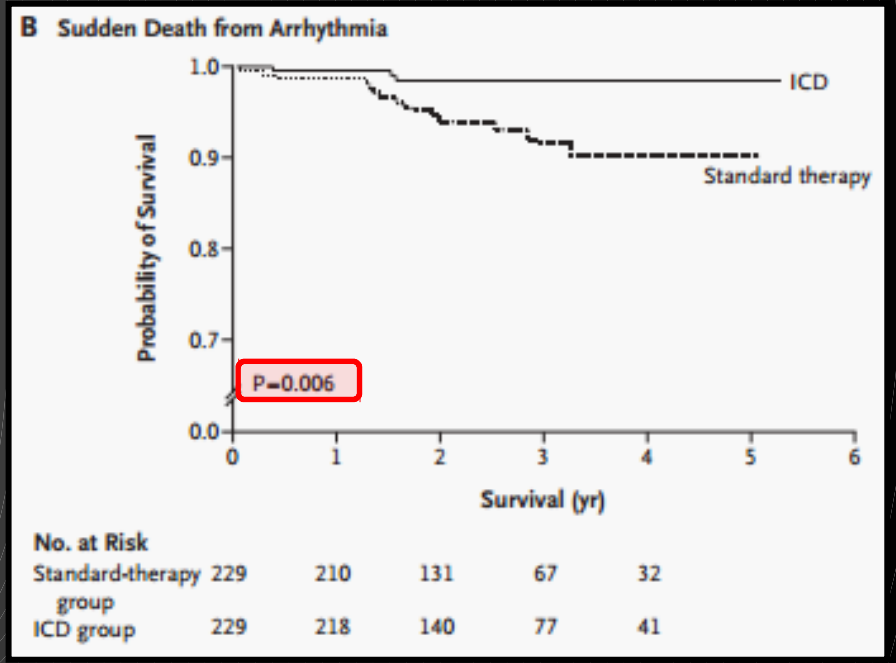
Amiodarone or an Implantable Cardioverter–Defibrillator for Congestive Heart Failure
N Engl J Med 2005; 352:225-237

CMD non ischémique
DEFINITE

Mortalité

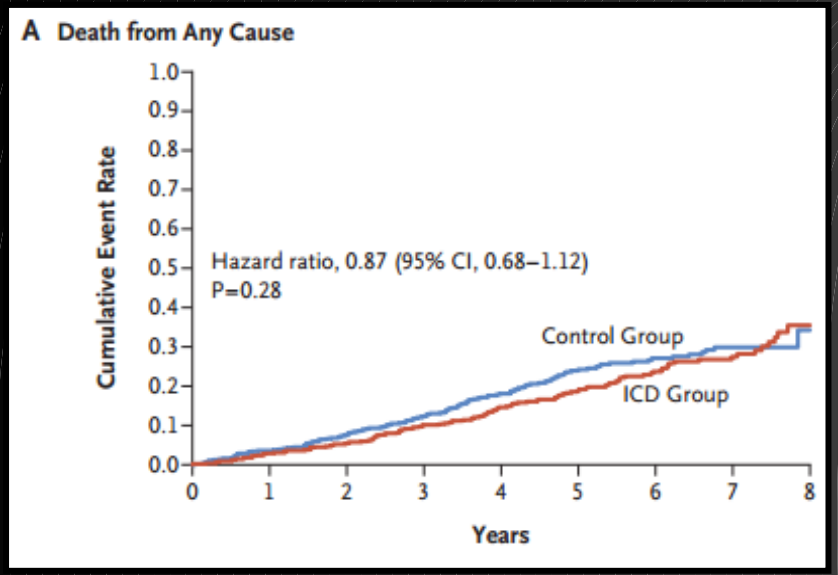


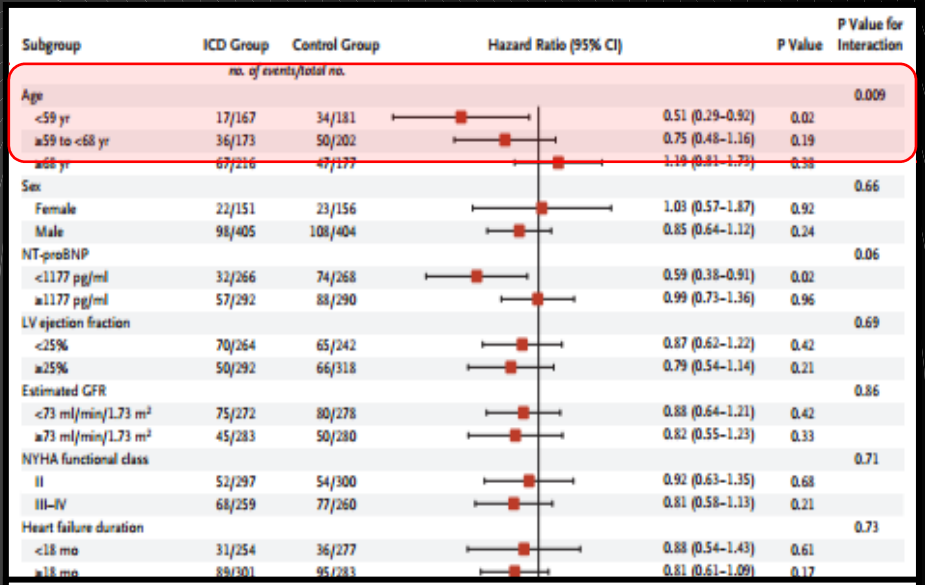
Mort subite

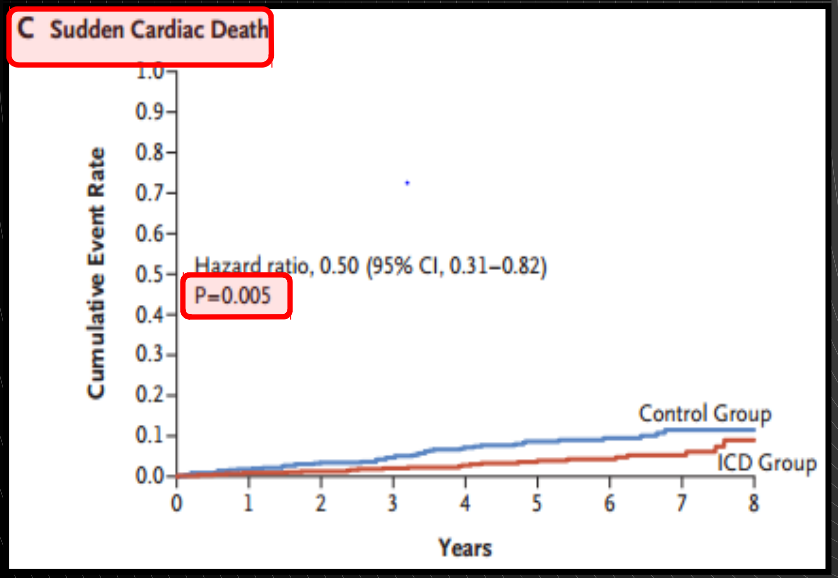


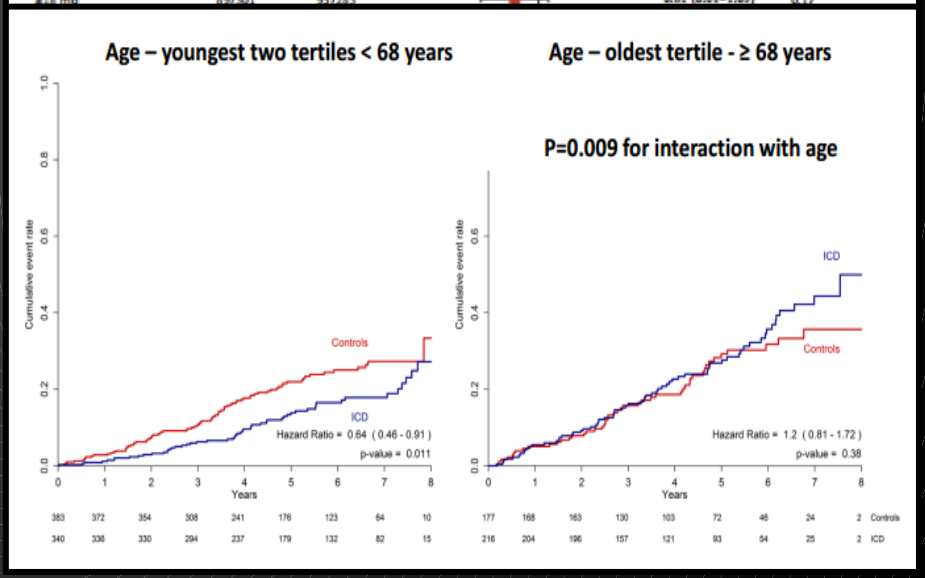
Prophylactic Defibrillator Implantation in Patients with Nonischemic Dilated Cardiomyopathy
N Engl J Med 2004; 350:2151-8

CMD non ischémique: DANISH









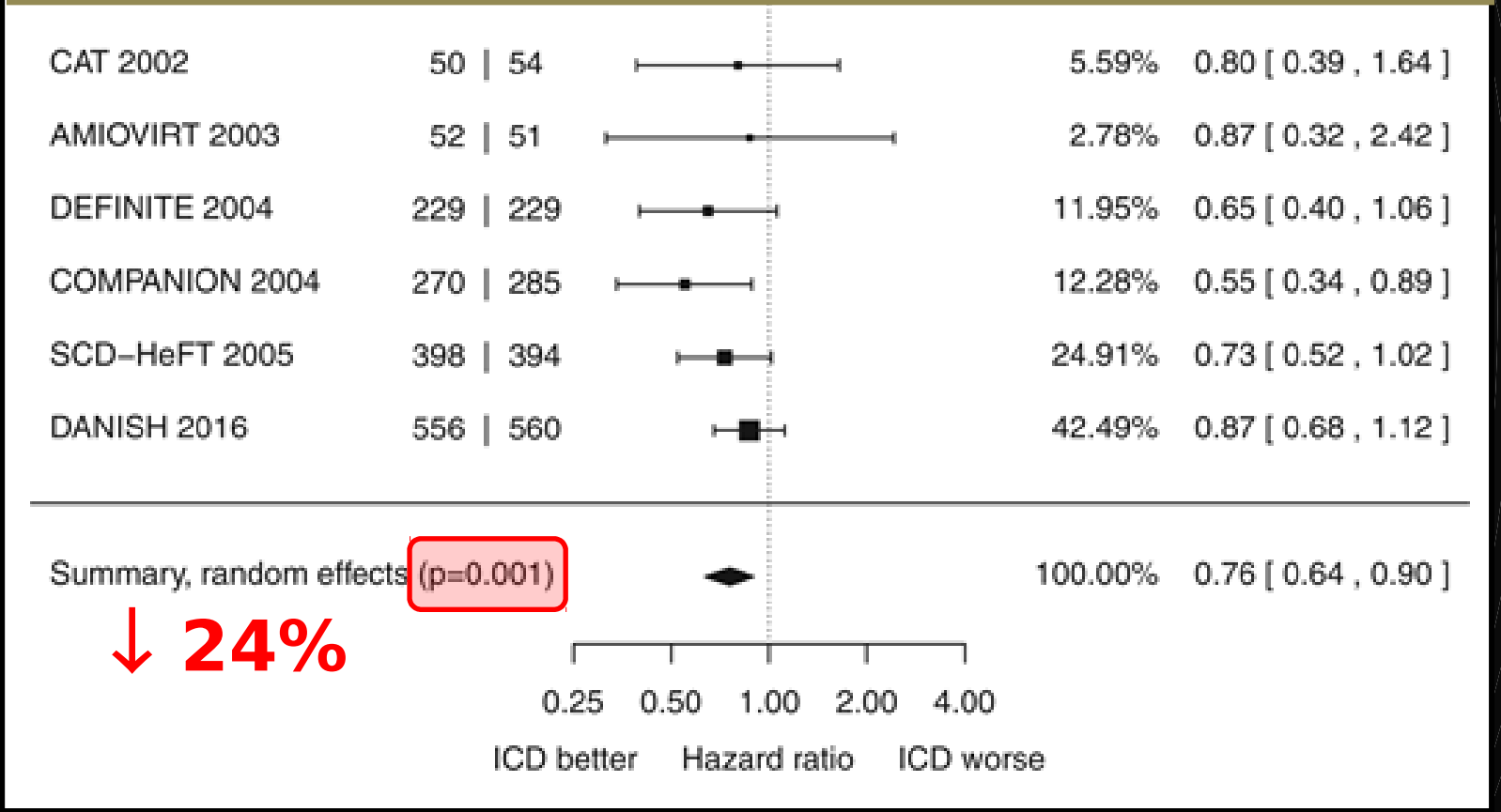
Defibrillator Implantation in Patients with Nonischemic Systolic Heart Failure : DANISH
N Engl J Med 2016; 375:1221-1230

Ir é

Primary prevention

An ICD is recommended to reduce the risk of sudden death and all-cause mortality in patients with symptomatic HF (NYHA Class II–III), and an LVEF ≤35% despite ≥3 months of OMT, provided they are expected to survive substantially longer than one year with good functional status, and they have:

• IHD (unless they have had an MI in the prior 40 days – see below).	I	A
• DCM.	I	B



Implantable cardioverter defibrillators for primary prevention of death in left ventricular dysfunction with and without ischaemic heart disease: a meta-analysis of 8567 patients in the 11 trials
European Heart Journal (2017)38, 1738–1746

Stratification du risque rythmique

Noninvasive Arrhythmia Risk Stratification in Idiopathic Dilated Cardiomyopathy

Results of the Marburg Cardiomyopathy Study

Wolfram Grimm, MD; Michael Christ, MD; Jennifer Bach, MD;
Hans-Helge Müller, PhD; Bernhard Maisch, MD

Background—Arrhythmia risk stratification with regard to prophylactic implantable cardioverter-defibrillator therapy is a completely unsolved issue in idiopathic dilated cardiomyopathy (IDC).

Methods and Results—Arrhythmia risk stratification was performed prospectively in 343 patients with IDC, including analysis of left ventricular (LV) ejection fraction and size by echocardiography, signal-averaged ECG, arrhythmias on Holter ECG, QTc dispersion, heart rate variability, baroreflex sensitivity, and microvolt T-wave alternans. During 52±21 months of follow-up, major arrhythmic events, defined as sustained ventricular tachycardia, ventricular fibrillation, or sudden death, occurred in 46 patients (13%). On multivariate analysis, LV ejection fraction was the only significant arrhythmia risk predictor in patients with sinus rhythm, with a relative risk of 2.3 per 10% decrease of ejection fraction (95% CI, 1.5 to 3.3; $P=0.0001$). Nonsustained ventricular tachycardia on Holter was associated with a trend toward higher arrhythmia risk (RR, 1.7; 95% CI, 0.9 to 3.3; $P=0.11$), whereas β-blocker therapy was associated with a trend toward lower arrhythmia risk (RR, 0.6; 95% CI, 0.3 to 1.2; $P=0.13$). In patients with atrial fibrillation, multivariate Cox analysis also identified LV ejection fraction and absence of β-blocker therapy as the only significant arrhythmia risk predictors.

Conclusions—Reduced LV ejection fraction and lack of β-blocker use are important arrhythmia risk predictors in IDC, whereas signal-averaged ECG, baroreflex sensitivity, heart rate variability, and T-wave alternans do not seem to be helpful for arrhythmia risk stratification. These findings have important implications for the design of future studies evaluating prophylactic implantable cardioverter-defibrillator therapy in IDC. (***Circulation***. 2003;108:2883-2891.)

- **FE VG**
- **Taille VG**
- **Potentiels tardifs à l'ECG haute amp**
- **Dispersion de QTc**
- **Arythmie au holter**
- **Variabilité sinusale**
- **Baroreflex sensitivity**

Impact chocs ICD dans l'insuffisance cardiaque

A

ICD + Arythmie mal contrôlées

- **Optimisation programmation DAI (zone ↑, ATP)**
- **Amiodarone IIa (C)**
- **Ablation TV alternative acceptée et validée IIa (C)**

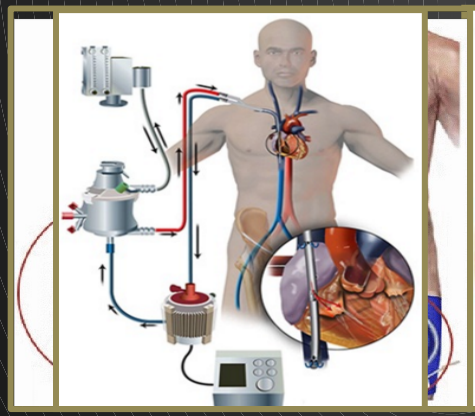
Poole JE et al. Prognostic importance of defibrillator shocks in patients with heart failure. N Engl J Med. 2008 Sep 4;359(10):1009–17.

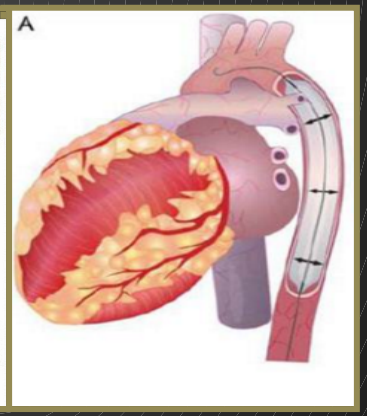
Ablation de TV dans l'insuffisance cardiaque

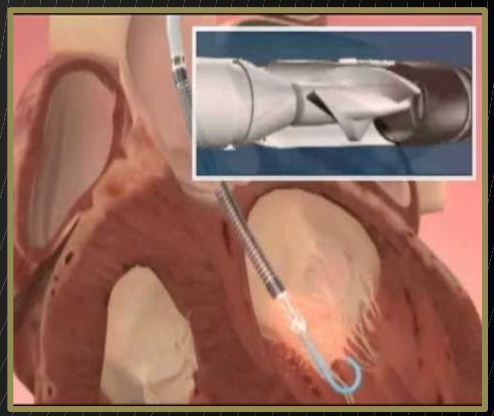
Au début réservée TV lentes bien tolérées

- Cartographie 3D de substrat en RS – IRM
- Assistance hémodynamique percutanée

TandemHeart **ECMO** **Conter pulsion intra AO** **Impella**

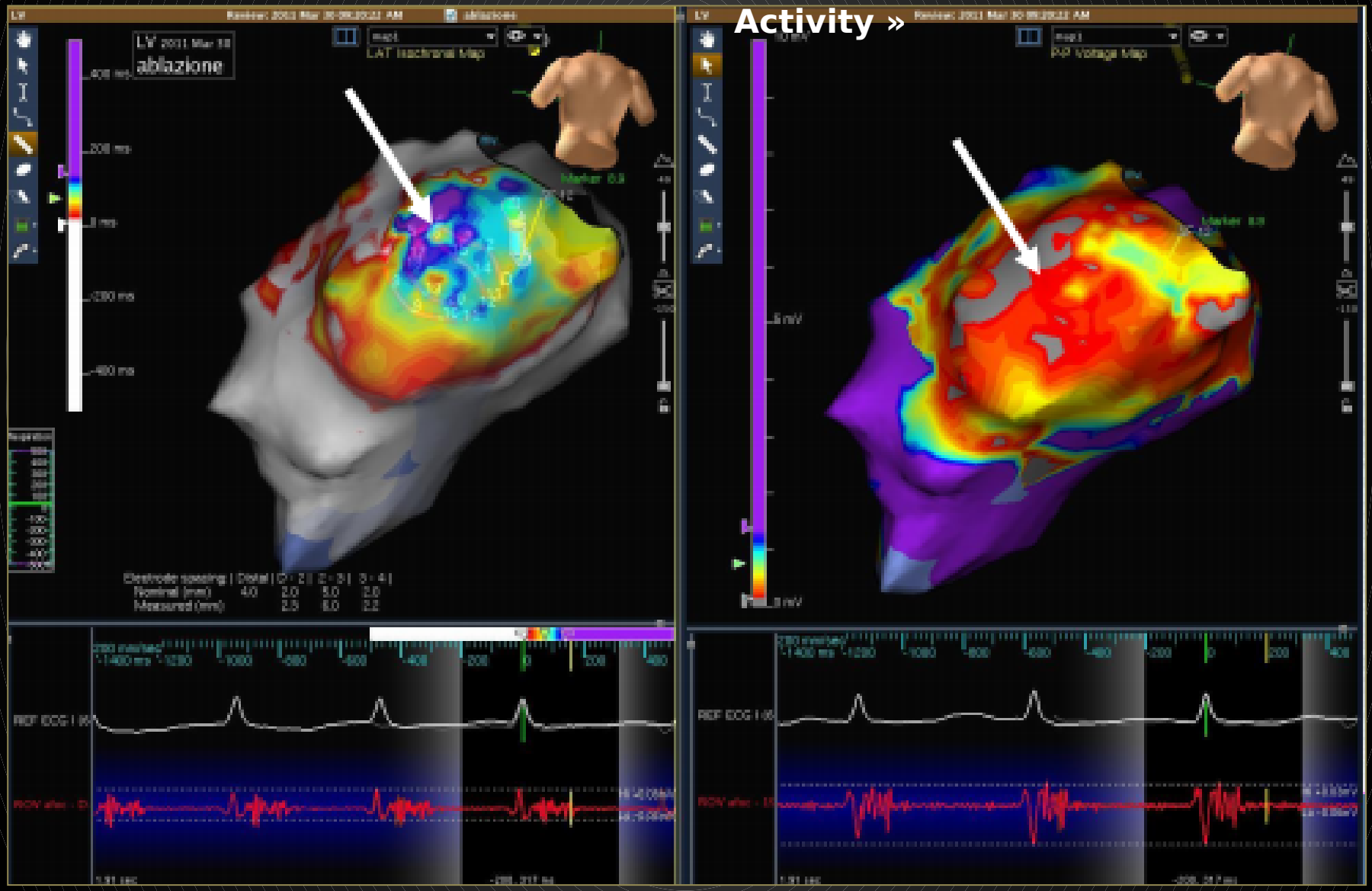






Carte de voltage en RS - L AVA zone cicatricielle

« Local Abnormal Ventricular Activity »



Résultats de l'ablation des TV dans l'IC
Succès – complications

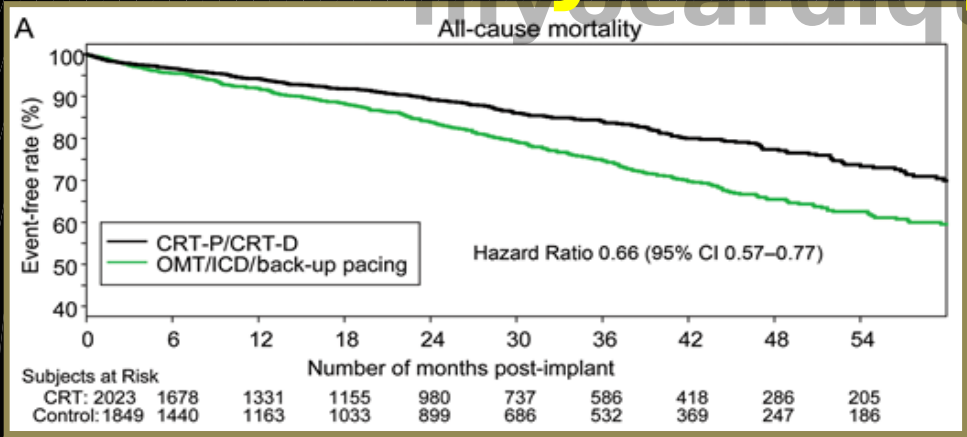
	NYHA II – III N = 1254	NYHA IV N = 111
Non inductible ou TV non clinique	1028 (82%)	88 (79%)
Complications	82 (7%)	11 (10%)

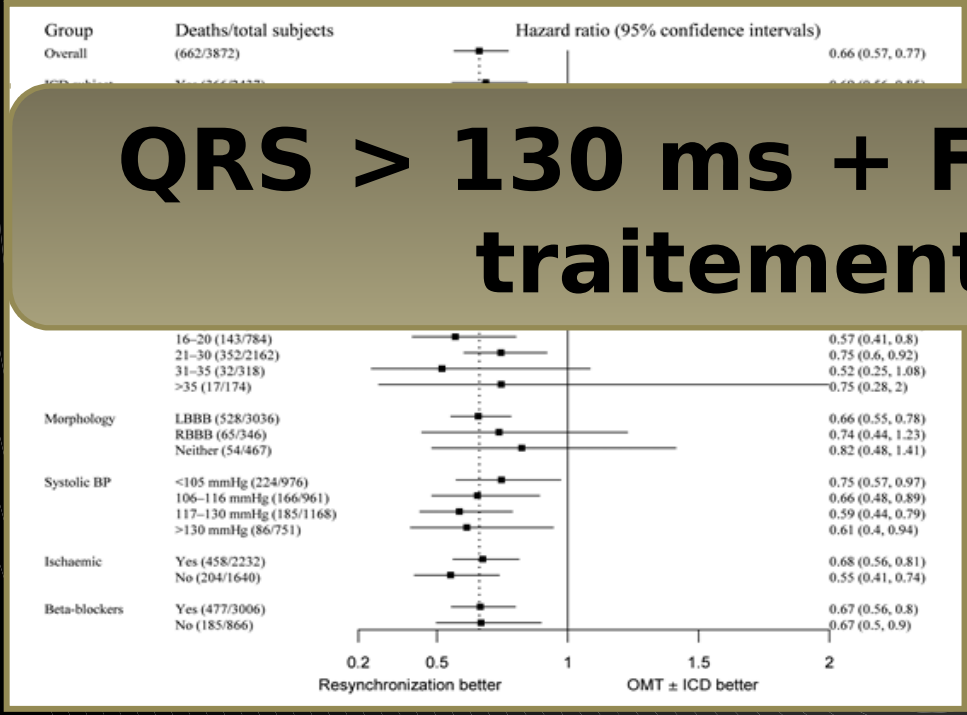
CMD non ischémique : (NYH II – III vs IV)

Non inductibilité fin de procédure : **55% vs 42%**

Ventricular Tachycardia Ablation in Severe Heart Failure : An international Ventricular Tachycardia Center Collabotation Analysis
Circ Arrhythm Electrophysiol. 2017

Resynchronisation myocardique: CRT





Study	Patients	Randomization
MIRACLE	NYHA III–IV, QRS ≥ 130 ms, EF ≤ 35%	1:1 (CRT-P vs. VDI-30)
MIRACLE ICD	NYHA II–IV, QRS ≥ 130 ms, EF ≤ 35%, ICD indication	1:1 (CRT-D vs. DDI-35)
REVERSE	NYHA I–II, QRS ≥ 120 ms, EF ≤ 40%	2:1 (CRT ± D vs. VVI-35)
RAFT	NYHA II–III, QRS ≥ 120 ms (pQRS ≥ 200 ms), EF ≤ 30%	1:1 (CRT-D vs. ICD)

QRS > 130 ms + FE < 35% malgré traitement optimal

Eur Heart J2013;34:3547 –

CONCLUSION

European Heart Journal (2016)37, 2129–2200

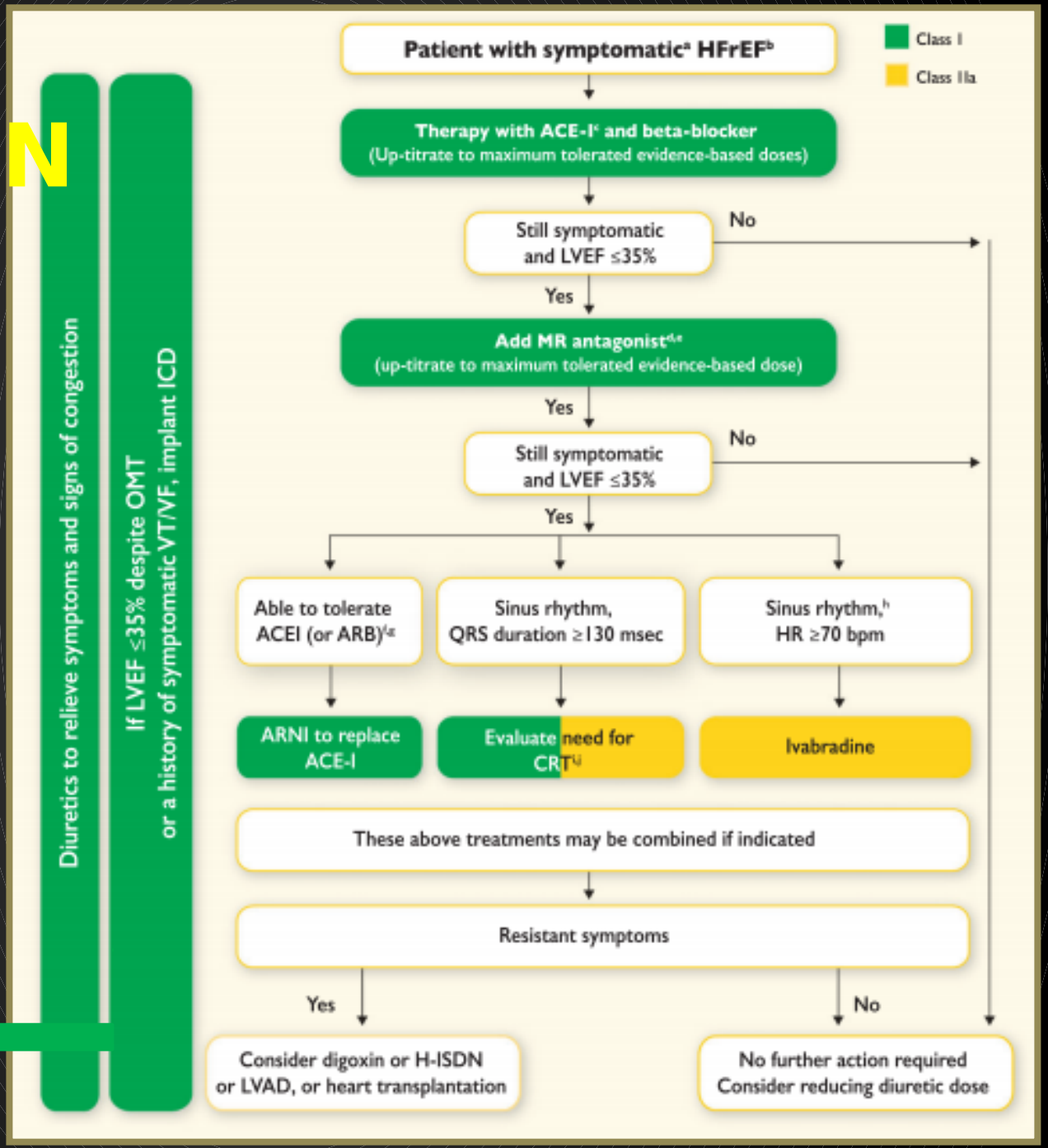
Life Vest — IIb (B)

1. Post IDM (40j)
2. Post revasc (3 mois)

ICD
Arythmie mal contrôlée

1. Amiodarone
2. Ablation

— IIa (C)

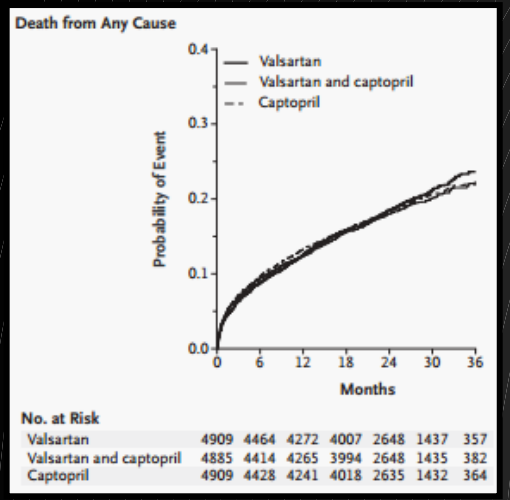


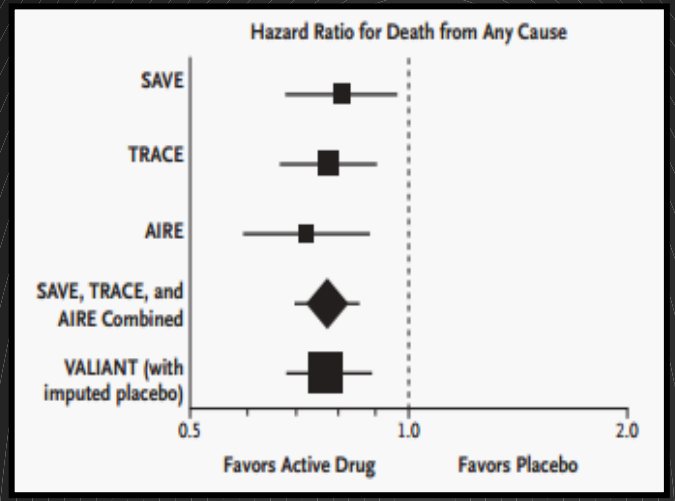
Merci

« Quand il fut dans sa chambre…. Le sang qui sortoit par sa bouche en abondance l'étouffa. »
La vie de Mr de Molière, Jean-Léonor Le Gallois, Sieur de Grimarest (1659-1713).

VALIAN

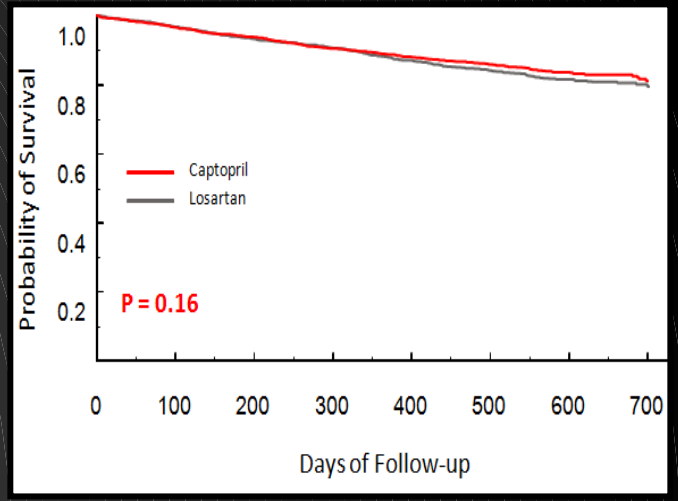
N Engl J Med 2003; 349:1893-1906





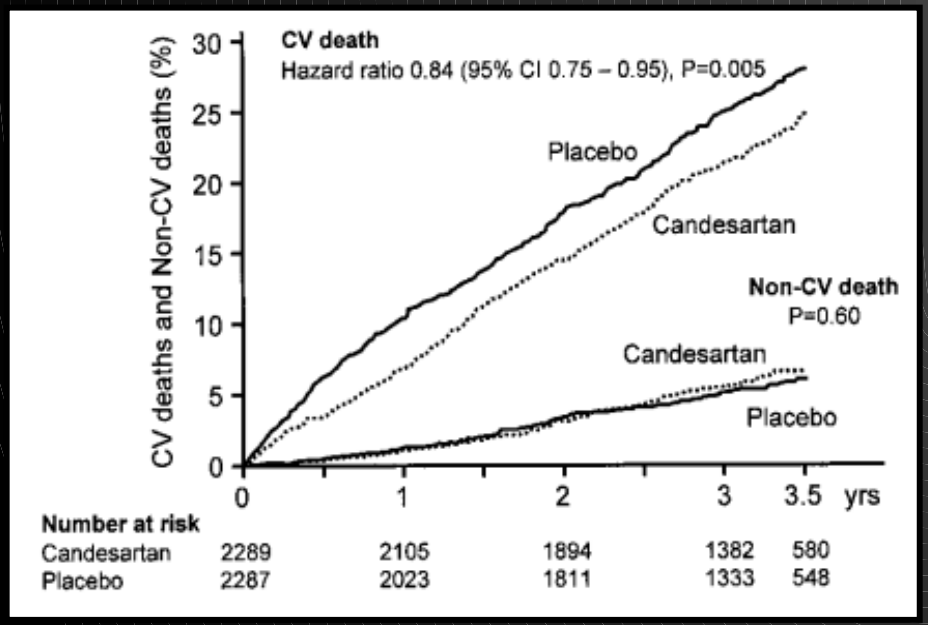
ELITE II

Lancet 2000;355:1582-87



CHARM

Circulation. 2004;110:2618-2626



Antagonistes des récepteurs de l'angiotensine II

ARAII