

## MMD6500

### Évaluation cardiaque préopératoire

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Aucun conflit d'intérêt

## Objectifs

- Comprendre l'importance des complications cardiaque périopératoire en chirurgie non-cardiaque
- Connaître et rechercher les facteurs de risques prédictifs de complication cardiaque périopératoire
- Comprendre le fondement des recommandations relatives à l'évaluation cardiovasculaire périopératoire pour chirurgie non-cardiaque

## Pertinence

- Complication cardiaque majeure périopératoire
  - Population générale = 2%
  - Population à haut risque
    - Mortalité cardiovasculaire = 1,4%
    - Infarctus = 5,7%
    - AVC = 0,5%
    - Défaillance cardiaque = 2,8%

Age (years)	Number of procedures (in thousands)		% change
	1994/95	2004/05	
75 and over	3479	4317	+24.1

### Physiopathologie de l'infarctus périop

- Sténose coronarienne préexistante
- Exacerbation périopératoire
  - Instabilité hémodynamique
  - Anémie
  - Hypoxémie
  - Hypercoagulabilité
  - Rupture de plaque
- Équilibre entre livraison et consommation d'O<sub>2</sub>

### Physiopathologie de l'infarctus périop

Thygesen et al. JACC 2012

### Évaluation du risque

- Historique
  - Goldman et al. NEJM 1977
  - Detsky et al. J Gen Intern Med 1986
  - Lee et al. Circulation 1999

### Cardiac risk index

The New England Journal of Medicine

• Étude prospective 1001 pts

• 9 facteurs indépendants

**Table 3. Computation of the Cardiac Risk Index.**

Criteria*	MULTIVARIATE DISCRIMINANT-FUNCTION COEFFICIENT	"POINTS"
1 History:		
(a) Age > 70 yr	0.191	5
(b) MI in previous 6 mo	0.384	10
2 Physical examination:		
(a) S <sub>3</sub> gallop or JVD	0.451	11
(b) Impotent IVAS	0.119	3
3 Electrocardiogram:		
(a) Rhythm other than sinus or PAC's on last preoperative ECG	0.283	7
(b) > 5 PVC's/min documented at any time before operation	0.278	7
4 General status:		
PvO <sub>2</sub> < 50 or PvO <sub>2</sub> > 50 mm Hg, K < 3.0 or HCO <sub>3</sub> < 20 mEq/liter, BUN > 50 or Cr > 3.0 mg/dl, abnormal SGOT, signs of chronic liver disease or patient bed ridden from noncardiac causes	0.132	3
5 Operation:		
(a) Intracranial, intrathoracic or aortic operation	0.123	3
(b) Emergency operation	0.167	4
<b>Total possible</b>		<b>53 points</b>

**Table 4. Cardiac Risk Index.**

CLASS	POINT TOTAL	NO. OF ONLY MENOR COMPLICATIONS* (n = 943)	LIFE-THREATENING COMPLICATIONS* (n = 39)	CARDIAC DEATHS (n = 19)
I (N = 537)	0-5	532 (99%)	4 (0.7)	1 (0.2)
II (N = 316)	6-12	305 (95)	16 (5)	5 (2)
III (N = 130)	13-25	112 (86)	15 (11)	3 (2)
IV (N = 18)	≥ 26	4 (22)	4 (22)	10 (56)

### Revised CRI

*Derivation and Prospective Validation of a Simple Index for Prediction of Cardiac Risk of Major Noncardiac Surgery*  
 Thomas H. Lee, Edward B. Massaro, Carol M. Mangano, Eric J. Thomas, Carlo A. Franceschini, H. Frank Cook, David J. Asch, Stephen C. Cook, Jonathan A. Kohn, Peter A. K. Li, Ho-Lyun E. Loh, Alan P. Miller and Lee Goldman  
 Circulation. 2009;119:1045-1052  
 doi: 10.1161/CIRC.109.253124

- Cohorte 4315 patients
  - Cohorte de dérivation → validation
  - 1989-1994
  - 2 centres hospitaliers américains
  - Critères d'inclusion
    - Âge ≥ 50 ans
    - Chirurgie **élective** non-cardiaque
- Complications cardiaques majeures
  - Infarctus du myocarde
  - Œdème pulmonaire
  - FV ou arrêt cardiaque 1°
  - BAV complet

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 Thomas H. Lee, Edward B. Massaro, Carol M. Mangano, Eric J. Thomas, Carlo A. Franceschini, H. Frank Cook, David J. Asch, Stephen C. Cook, Jonathan A. Kohn, Peter A. K. Li, Ho-Lyun E. Loh, Alan P. Miller and Lee Goldman  
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**TABLE 4. Rates of Major Cardiac Complications and Multivariate ORs\* Among Patients With Individual Risk Factors in Derivation and Validation Sets**

	Derivation Set (n=2893)		Validation Set (n=1422)	
	Crude Data	Adjusted OR (95% CI)	Crude Data	Adjusted OR (95% CI)
1. High-risk type of surgery	27/894 (3%)	2.8 (1.6, 4.9)	16/490 (4%)	2.6 (1.3, 5.3)
2. Ischemic heart disease	34/951 (4%)	2.4 (1.3, 4.2)	26/478 (5%)	3.8 (1.7, 8.2)
3. History of congestive heart failure	23/434 (5%)	1.9 (1.1, 3.5)	19/255 (7%)	4.3 (2.1, 8.8)
4. History of cerebrovascular disease	17/291 (6%)	3.2 (1.8, 6.0)	10/140 (7%)	3.0 (1.3, 6.8)
5. Insulin therapy for diabetes	7/112 (6%)	3.0 (1.3, 7.1)	3/59 (5%)	1.0 (0.3, 3.8)
6. Preoperative serum creatinine >2.0 mg/dL	9/103 (9%)	3.0 (1.4, 6.8)	3/55 (5%)	0.9 (0.2, 3.3)

\*Based on logistic regression models including these 6 variables.

### Revised CRI

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 Thomas H. Lee, Edward B. Massaro, Carol M. Mangano, Eric J. Thomas, Carlo A. Franceschini, H. Frank Cook, David J. Asch, Stephen C. Cook, Jonathan A. Kohn, Peter A. K. Li, Ho-Lyun E. Loh, Alan P. Miller and Lee Goldman  
 Circulation. 2009;119:1045-1052  
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**TABLE 3. Major Cardiac Complication Rates and 95% CIs in Derivation and Validation Cohorts Stratified by Risk Classification System**

	Derivation Cohort (n=2893)		Validation Cohort (n=1422)	
	Events/Pop	Rate (95% CI)	Events/Pop	Rate (95% CI)
Original Cardiac Risk Index				
ROC area (SE)	0.606 (0.034)		0.701 (0.043)	
Modified Cardiac Risk Index				
ROC area (SE)	0.545 (0.022)		0.582 (0.034)	
ASA class				
ROC area (SE)	0.697 (0.031)		0.706 (0.036)	
Revised Cardiac Risk Index				
Class I	5/1071	0.5 (0.2, 1.1)	2/488	0.4 (0.05, 1.5)
Class II	14/1106	1.3 (0.7, 2.1)	5/567	0.9 (0.3, 2.1)
Class III	18/506	3.6 (2.1, 5.6)	17/258	6.6 (3.9, 10.3)
Class IV	19/210	9.1 (5.5, 13.8)	12/109	11.0 (5.8, 18.4)
ROC area (SE)	0.759 (0.032)*		0.806 (0.034)†	

### Revised CRI

- Risque cardiovasculaire selon type de chirurgie
- Chx AAA → pas de corrélation entre classe RCRI et risque cardiovasculaire

Procedure Type	Class 1 (%)	Class 2 (%)	Class 3 (%)	Class 4 (%)
AAA	7.5	11.5	13.5	14.5
Other vascular	1.5	2.5	3.5	4.5
Thoracic	1.5	2.5	3.5	4.5
Abdominal	1.5	2.5	3.5	4.5
Orthopedic	1.5	2.5	3.5	4.5
Other	1.5	2.5	3.5	4.5

## RCRI toujours à jour?

Can J Anesth / Can Anesth (2013) 60:855-863  
DOI: 10.1007/s12601-013-9988-3

REPORTS OF ORIGINAL INVESTIGATIONS

**The Revised Cardiac Risk Index in the new millennium: a single-centre prospective cohort re-evaluation of the original variables in 9,519 consecutive elective surgical patients**

Christopher Davis, BSc · Gordon Tait, PhD ·  
Jo Carroll, RN, BHA · Duminda N. Wijeyesundara, MD, PhD ·  
W. Scott Beattie, MD, PhD

**Table 4** Comparison of the original RCRI model with models generated using CAIS data: Individual risk stratification by point score and resultant model AUC

Model	Events/Total, by Model Score, n/n (%)				AUC (95% CI)
	0 Points	1 Point	2 Points	≥ 3 Points	
RCRI data 1999 <sup>13</sup>	7 / 1,559 (0.4)	19 / 1,673 (1.1)	35 / 764 (4.6)	31 / 319 (9.7)	0.78 (0.73 to 0.82)
CAIS data (Reconstructing RCRI)	25 / 5,276 (0.5)	81 / 3,145 (2.6)	65 / 897 (7.2)	29 / 201 (14.4)	0.79 (0.76 to 0.83)
4-Factor model* (CAIS data)	25 / 5,397 (0.5)	87 / 3,156 (2.8)	70 / 842 (8.3)	18 / 124 (14.5)	0.79 (0.76 to 0.82)
5-Factor model (Using eGFR < 30 mL·min <sup>-1</sup> ·1.73m <sup>2</sup> )**	21 / 4,446 (0.5)	78 / 2,693 (2.9)	56 / 753 (7.4)	23 / 135 (17.0)	0.79 (0.75 to 0.82)

\*Original RCRI predictors, including high-risk type of surgery, a history of ischemic heart disease, congestive heart failure, cerebrovascular disease, but removing "insulin therapy for diabetes" and "preoperative serum creatinine > 176.8 μmol·L<sup>-1</sup>".  
\*\*4-Factor model with the addition of glomerular filtration rate (GFR) < 30 mL·min<sup>-1</sup>. Not all patients had data necessary to calculate GFR (n = 8,027 used, total MCAS n = 178). RCRI = Revised Cardiac Risk Index; CAIS = Clinical Anesthesia Information System; AUC = area under the curve; CI = confidence interval; NRI = net reclassification index; eGFR = estimated glomerular filtration rate. The NRI tables are in the Appendix.

## Impact de la chirurgie

- Augmentation de catécholamines
  - Augmentation de FC
  - Augmentation de PA
  - Augmentation de sécrétion AG libres = augmentation MVO2
  
- Intérêt potentiel des b-bloquants!

## Mangano et al.

The New England Journal of Medicine  
December 8, 1996

EFFECT OF ATENOLOL ON MORBIDITY AND CARDIOVASCULAR MORTALITY AFTER NONCARDIAC SURGERY

David J. Mangano, PhD, MB, Kenneth L. Green, MD, Bruce W. Bevilacqua, PhD, MB, and the Study Group

- Population
  - Monocentrique (SF VA 1996)
  - RCT vs placebo
  - Double insu
  - Analyse per-protocole
  - **200 patients**
- Critères d'inclusion
  - Chirurgie non-cardiaque sous AG
  - MCAS ou à risque de MCAS

<p style="text-align: center;">MCAS</p> <ul style="list-style-type: none"> <li>• ATCD infarctus</li> <li>• Angine typique</li> <li>• Angine atypique avec EE positive</li> </ul>	<p style="text-align: center;">Risque de MCAS si ≥ 2 facteurs</p> <ul style="list-style-type: none"> <li>• Âge ≥ 65 ans</li> <li>• HTA</li> <li>• Tabagisme actif</li> <li>• DLP (CT ≥ 6,2 mmol/L)</li> <li>• DB</li> </ul>
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- Intervention
  - Rx préop poursuivi sauf...
    - β-bloquants cessés
  - Préop: atenolol ad 10 mg IV 30 min avant induction
  - Postop: atenolol ad 10 mg IV en postop immédiat
  - Postop jour 1 ad jour 7
    - Atenolol ad 10 mg IV q12h
    - Atenolol ad 100 mg PO q24h
  - Dose titrée selon FC et TA systolique

**Mangano et al.**

The New England Journal of Medicine

TABLE 1. CHARACTERISTICS OF THE PATIENTS, ACCORDING TO SURVIVAL GROUP\*

CHARACTERISTIC	Atenolol (N=100)	Placebo (N=101)	P Value
Definite coronary artery disease (%)	36	42	0.38
At risk for coronary artery disease (%)	63	59	0.38
History of cardiac disease (%)			
Cholesterol reduction	18	26	0.26
Coronary bypass surgery	11	17	0.31
Coronary revascularization	1	1	0.93

• Groupes non-balancés  
• Arrêt β-bloquants chez 8% (groupe placebo)

Preoperative medications (%)			
Antiarrhythmic agents	0	3	0.25
Beta-blockers	18	8	0.02
Calcium-channel blockers	22	34	0.11
Diuretics	28	17	0.04
Antihypertensive agents	30	19	0.05
Digoxin	6	10	0.44
Nitrates	8	13	0.36

• Intra-abdominale

	197-197	197-197	P Value
Duration of anesthesia and surgery (hr)	4.2 (3.7-4.6)	3.7 (3.4-4.0)	0.18
Type of surgery (%)			
Major vascular	38	43	0.64
Distal arterial	21	21	0.92
Orthopedic	12	15	0.57
Neurological	10	8	0.59
Other†	18	14	0.41

**Mangano et al.**

The New England Journal of Medicine

Résultats

• Mortalité à 2 ans

- Aténolol 10% vs placebo 21% (NNT = 10)
- ↓ 55 % mortalité globale (p = 0,019)
- ↓ 65% mortalité de cause cardiaque (p = 0,033)

• Composé (IM, AI, PAC, défaillance cardiaque)

- Aténolol 17% vs placebo 32%
- ↓ 48% événements cardiaques
- Effet maximal entre 6 et 8 mois postop
- IM périop = aucune différence

**Mangano et al.**

The New England Journal of Medicine

Résultats

• Sécurité : aténolol IV

- 10% variation HD significative (20%)
- Aucune instabilité HD nécessitant traitement
- Aténolol PO comparable au placebo

TABLE 2. PREDICTORS OF DEATH AMONG PATIENTS UNDERGOING NONCARDIAC SURGERY\*

PATIENT	HAZARD RATIO (95% CI)	P VALUE
Multifactorial models		
Diabetes mellitus	2.8 (1.4-6.2)	0.01
Atenolol	0.5 (0.2-1.1)	0.06

**DECREASE**

THE EFFECT OF BISOPROLOL ON PERIOPERATIVE MORTALITY AND MYOCARDIAL INFARCTION IN HIGH-RISK PATIENTS UNDERGOING VASCULAR SURGERY

POPULATION

- 112 patients
- 1996-1999
- Multicentrique (7 centres, 3 pays)
- Open-labeled, analyse à l'aveugle, cross-over permis
- Intent-to-treat

• Critères d'inclusion

- Chirurgie vasculaire (aorte abdominale, infrainguinale)
- Patient à (très) haut risque
  - Au moins 1 facteur de risque
  - Écho-dobutamine positive

• Critères d'exclusion

- ARC étendues (WMSI > 1,70 au repos)
- Asthme
- Suspicion MCAS tronc commun ou 3 vaisseaux
- Prise de β-bloquants

## DECREASE

THE EFFECT OF BISOPROLOL ON PERIOPERATIVE MORTALITY AND MYOCARDIAL INFARCTION IN HIGH-RISK PATIENTS UNDERGOING VASCULAR SURGERY

Don Poldermans, Ph.D., Eric Boersma, Ph.D., Jeroen J. Bax, Ph.D., Ian R. Thomson, Ph.D., Louis L.M. van de Ven, Ph.D., Jan D. Blankenbiller, Ph.D., Hubert F. Blank, M.D., Tchien Yu, Ph.D., Giuseppe Tronzo, M.D., Carlo Vigna, M.D., Jos R.T.C. Roland, Ph.D., and Heng van Uin, Ph.D., FOR THE DUTCH ECHOCARDIOGRAPHIC CARDIAC RISK EVALUATION APPLYING STRATIS ECHOCARDIOGRAPHY STUDY GROUP\* (N Engl J Med 1999;341:1789-94)

### Intervention

- Bisoprolol 5-10 mg PO die
  - Débuté ≥ 1 semaine préop
  - En moyenne 37 jours préop
  - Poursuivi ad 30 jours postop
  - NPO = métoprolol IV pour FC < 80 bpm
- Prise en charge anesthésique selon MD traitant
  - AG 60%
  - AG + épidurale 35%

## DECREASE

THE EFFECT OF BISOPROLOL ON PERIOPERATIVE MORTALITY AND MYOCARDIAL INFARCTION IN HIGH-RISK PATIENTS UNDERGOING VASCULAR SURGERY

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### Résultats

- Étude interrompue (112/266 patients)
- Mortalité cardiaque et infarctus non-fatal à 30 jours
  - Mortalité 3,4 vs 17% (p = 0,02)
  - Infarctus non-fatal 0 vs 17% (p < 0,001)
  - Combiné = RR 0,09 (0,02-0,37)

**NNT = 4!**

Days after Surgery	Standard care	Bisoprolol
0	63	66
7	38	65
14	37	62
21	37	62
28	35	62

## Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group\* Lancet 2008; 371: 1839-47

- Population
  - **8351 patients**
  - 2002-2007
  - Multicentrique
    - 23 pays
    - Canada = 42% du recrutement
  - RCT vs placebo
  - Double insu (oui mais...)
  - Analyse intent-to-treat

## POISE

Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial POISE Study Group\*   
 Lancet 2008; 371: 1839-47

- Critères d'inclusion
  - Chirurgie non-cardiaque (peu importe type d'anesthésie)
  - Âge > 45 ans
  - Hospitalisation prévue > 24 hrs

1 facteur de risque « élevé »

- MCAS
- MVAS
- AVC
- Hospitalisation pour défaillance cardiaque (< 3 ans)
- Chirurgie vasculaire majeure (excluant CEA)

OU

3 facteurs de risque « moyen »

- Chx intrathoracique ou intrapéritonéale
- Insuffisance cardiaque
- ICT
- DB
- Créatinine > 175 umol/L
- Âge > 70 ans
- Chirurgie urgente

**POISE** Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group<sup>a</sup> www.nmb.ox.ac.uk

- Critères d'exclusion
  - FC < 50 bpm
  - BAV 2<sup>e</sup> ou 3<sup>e</sup> degré
  - Asthme
  - Prise de β-bloquant
  - PAC depuis < 5 ans et asymptomatique
  - Chirurgie faible risque (jugement clinique)
  - Prise de verapamil
  - Déjà recruté dans POISE

**POISE** Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group<sup>a</sup> www.nmb.ox.ac.uk

- Intervention
  - Metoprolol LA 100 mg PO 2-4 hrs préop puis
  - Metoprolol LA 100 mg PO 0-6 hrs postop puis
  - Metoprolol LA 200 mg PO die x 30 jours
- Si NPO:
  - Metoprolol 15 mg IV q6h (infusion lente) ou
  - Metoprolol 5 mg IV q5min x 3 (infusion rapide)

**POISE** Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group<sup>a</sup> www.nmb.ox.ac.uk

- Résultats
  - Composé ↓ 1,1% (HR 0,84 (0,70-0,99) p = 0,04)
  - Infarctus ↓ 1,5% (HR 0,73 (0,60-0,89) p = 0,002)
  - Risque de revascularisation et FA ↓

Number at risk: Placebo 4277, Metoprolol 4274

Time (days): 3915, 3971, 3928, 3984, 3941, 3997, 3954, 4010

Composé: Mortalité CV, Infarctus non-fatal, ACR non-fatal

Infarctus

**POISE** Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group<sup>a</sup> www.nmb.ox.ac.uk

- Résultats
  - AVC ↑ 0,5% (HR 2,17 (1,26-3,74) p = 0,005)
  - Mortalité ↑ 0,8% (HR 1,33 (1,03-1,74), p = 0,03)
  - Risque de bradycardie et hypotension ↑

Number at risk: Placebo 4277, Metoprolol 4274

Time (days): 4105, 4098, 4091, 4084, 4077, 4070, 4063, 4056, 4049, 4042, 4035, 4028, 4021, 4014, 4007, 4000, 4019

AVC

Mortalité

## POISE

Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial

POISE Study Group<sup>1</sup> www.bmj.com/2013/01/08/307

- Pour 1000 patients prenant métoprolol LA en chirurgie non-cardiaque...

15 infarctus du myocarde	8 décès
3 revascularisation	5 AVC
7 FA de novo	53 hypotension
	42 bradycardie

## β-bloquants selon risque

ORIGINAL ARTICLE

### Perioperative Beta-Blocker Therapy and Mortality after Major Noncardiac Surgery

Peer K. Lindenauer, M.D., Theodore Paline, Ph.D., Kujun Wang, M.S., Dhruv K. Mamali, M.B., B.S., M.P.H., Benjamin Gutierrez, Ph.D., and Evan M. Benjamin, M.D.

*N Engl J Med* 2008;359:984-93

Cohorte rétrospective

- 663,000+ pts
- 122,000+ sous b-bloc
- Chx non-cardiaque
- > 18 ans

Figure 1. Adjusted Odds Ratio for In-Hospital Death Associated with Perioperative Beta-Blocker Therapy among Patients Undergoing Major Noncardiac Surgery, According to the RCRI Score and the Presence of Other Risk Factors in the Propensity-Matched Cohort and the Entire Study Cohort. Open boxes represent patient subgroups within the listed RCRI category.

## Principales études

Table 6. Summary of randomized controlled trials evaluating the effect of perioperative β-blockade on post-operative mortality and non-fatal MI

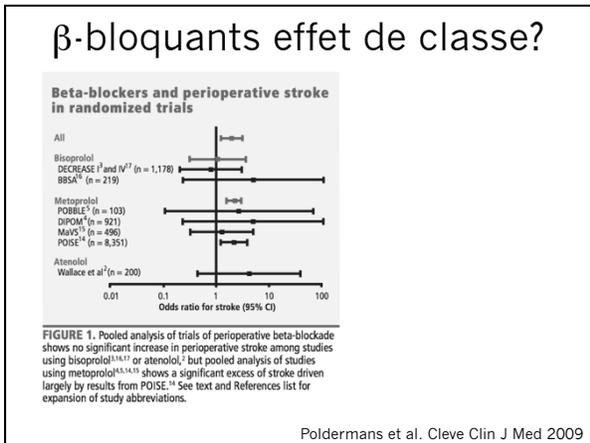
Study	n	Vascular surgery (%)	β-Blocker			Patient selection according to cardiac risk	30-day mortality (%)		30-day rate of non-fatal MI (%)	
			Type	Onset (before surgery)	Duration (days after surgery)		Dose (duration)	β-Blocker	Control	β-Blocker
Mangano et al. <sup>24</sup>	200	40	Atenolol	30 min	7	No	5/99 (5.1%)	12/101 (11.9%)	—	—
DECREASE <sup>25</sup>	112	100	Bisoprolol	7 days	30	Yes	2/59 (3.4%)	9/51 (17.6%)	0/59 (0)	9/51 (17.6%)
POBBLE <sup>26</sup>	103	100	Metoprolol tartrate	<24 h	7	No	3/53 (5.6%)	1/48 (2.1%)	3/53 (5.5%)	5/48 (10.4%)
MaVS <sup>27</sup>	496	100	Metoprolol succinate	2 h	5	No	0/246 (0)	4/252 (1.6%)	19/246 (7.7%)	21/252 (8.4%)
DPOM <sup>28</sup>	921	7	Metoprolol succinate	12 h	8	No	7/442 (1.6%)	7/269 (2.6%)	3/403 (0.8%)	4/403 (1.0%)
BBSA <sup>29</sup>	219	5	Bisoprolol	>3 h	10	Yes	1/110 (0.9%)	0/109 (0)	0/110 (0)	0/109 (0)
POISE <sup>30</sup>	8351	41	Metoprolol succinate	2–4 h	30	No	128/4174 (3.1%)	9/94177 (2.3%)	152/4174 (3.6%)	215/4177 (5.1%)

MI = 6 months.  
DSE = adjuvant stress echocardiography; IHD = ischemic heart disease; MI = myocardial infarction.

- POBBLE = b-bloc en chx vasculaire infrarénale
- MaVS = b-bloc en chx vasculaire majeure
- DPOM = b-bloc chez diabétiques + chx majeure
- BBSA = b-bloc en chx vasculaire sous rachi

## Principales études

Figure 2. Effect of β-blockers on 30-day rates of non-fatal MI and all-cause mortality as assessed from the seven randomized trials. Note: in the trial by Mangano et al., mortality was assessed at 6 months.



## Revascularisation préopératoire

The NEW ENGLAND  
JOURNAL of MEDICINE

ESTABLISHED IN 1812    DECEMBER 10, 2008    VOL 359, NO 25

**Coronary-Artery Revascularization before Elective Major Vascular Surgery**

Edward D. Michalis, M.D., Ph.D., Herbert B. Wood, M.D., Ph.D., Thomas J. Minnie, M.D., Steven Goldstein, M.D., William C. Koyanagi, M.D., Paul Libson, M.D., Gordon Rossouw, M.D., Steve Quinlan, M.D., Joseph Ryan, M.D., Bruce Wallace, M.D., Amanda Shum, M.D., Ph.D., George Jamnik, B.Sc., B.S.N., Lay Thompson, M.S., Nancy Ellis, M.S., Giovanni J. Reza, Ph.D., and William C. Kandarian, Ph.D.

**A Clinical Randomized Trial to Evaluate the Safety of a Noninvasive Approach in High-Risk Patients Undergoing Major Vascular Surgery**

The DECREASE-V Pilot Study

Das Palermans, MD,\* Olaf Schotten, MD,† Radwan Yakoubi, MD,‡ James J. Bee, MD,§ Jan R. Thomson, MD,§ Sante E. Hoeks, MSc,‡ Hans H. H. Frings, MD,§ Martin Dougladis, MD,§ Peter de Jaeger, MD,§ Alexander Maas, MD,§ Marc R. H. M. van Santbrink, MD,§ Mikko D. Kerne, MD,§ Eero Suominen, PhD,‡‡ for the DECREASE Study Group (J Am Coll Cardiol 2007;49:1763-9) Rotterdam and Leiden, the Netherlands, and Winnipeg, Canada

## CARP

- Population
  - 510 patients
  - 1997-2003
  - Multicentrique (18 VA)
  - RCT
- Critères d'inclusion
  - Chirurgie vasculaire prévue (AAA ou infrainguinale)
  - Coronarographie préop indiquée selon MD traitant
  - Sténose coronarienne > 70%, revascularisable
- Critères d'exclusion
  - Indication de chirurgie vasculaire urgente
  - Co-morbidité sévère
  - Revascularisation antérieure sans ischémie récurrente
  - TC > 50%, FeVG < 20%, sténose aortique sévère

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## CARP

- Intervention
  - Revascularisation ou non
  - PAC ou percutanée selon choix des investigateurs
- Revascularisation
  - PAC = chx vasculaire < 3 mois plus tard
  - PCI = chx vasculaire > 2 semaines post-procédure

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## CARP

The NEW ENGLAND JOURNAL of MEDICINE

Contemporary Artery Revascularization before Elective Major Vascular Surgery

Résultats

- Mortalité à long terme (2,7 ans)
  - Aucune différence (22 vs 23%)
- Autres points d'aboutissements
  - Mortalité à 30 jrs comparable (3,1 vs 3,4%)
  - FeVG comparable
- Conséquences de revascularisation préop
  - Délai ad chx vasculaire 54 vs 18 jrs (p < 0,001)
  - Tendance à meilleure survie si déficit étendu? (p = 0,09)

## DECREASE-V

A Clinical Randomized Trial to Evaluate the Safety of a Noninvasive Approach in High-Risk Patients Undergoing Major Vascular Surgery

The DECREASE-V Pilot Study

Population

- 101 patients
- 2000-2005
- Multicentrique

Critères d'inclusion

- Chirurgie vasculaire haut risque
- Présence de ≥ 3 facteurs de risque
- Ischémie étendue à l'écho-dobu ou scintigraphie

Intervention

- β-bloquant titré chez tous les patients
- Revascularisation (PAC ou PCI) vs tx médical

## DECREASE-V

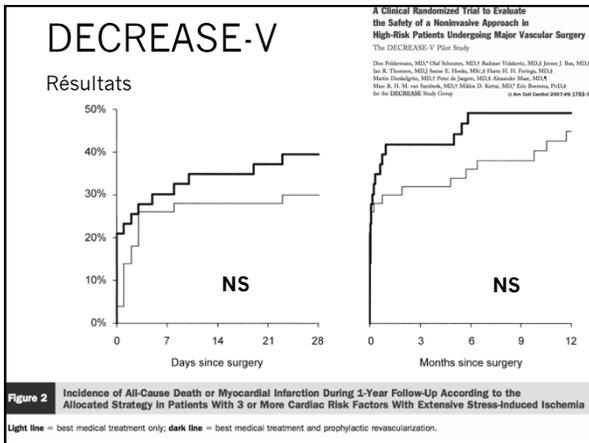
A Clinical Randomized Trial to Evaluate the Safety of a Noninvasive Approach in High-Risk Patients Undergoing Major Vascular Surgery

The DECREASE-V Pilot Study

Résultats

**Table 2 Patient Outcome**

	Revascularization n (%)	No Revascularization n (%)	HR (95% CI)	p Value
Number of patients	49	52		
Events before surgery				
All-cause mortality	2 (4.1)	0	—	0.23
Myocardial infarction	1 (2.1)	0	—	
Composite	3 (6.1)	0	—	0.11
Events up to 30 days after surgery				
All-cause mortality	11 (22.5)	6 (11.5)	2.2 (0.74-6.6)	0.14
Myocardial infarction	17 (34.7)	16 (30.8)	—	
Composite	21 (42.9)	17 (32.7)	1.4 (0.73-2.8)	0.30
Events up to 365 days after surgery				
All-cause mortality	13 (26.5)	12 (23.1)	1.3 (0.65-2.9)	0.68
Myocardial infarction	18 (36.7)	19 (36.5)	—	
Composite	24 (49.0)	23 (44.2)	1.2 (0.68-2.3)	0.48



# Recommendations

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DOI: 10.1016/j.jacc.2009.07.001

**PRACTICE GUIDELINES: FULL TEXT**

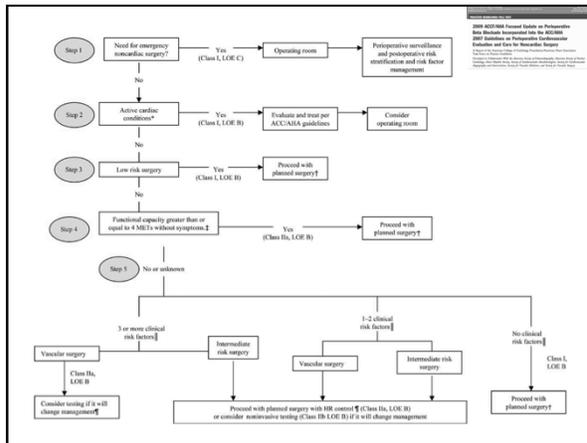
## 2009 ACCF/AHA Focused Update on Perioperative Beta Blockade Incorporated Into the ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines  
Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine, and Society for Vascular Surgery

European Heart Journal (2009) 30, 2769–2812  
doi:10.1093/eurheartj/ehp337

**Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery**

**The Task Force for Preoperative Cardiac Risk Assessment and Perioperative Cardiac Management in Non-cardiac Surgery of the European Society of Cardiology (ESC) and endorsed by the European Society of Anaesthesiology (ESA)**



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**Table 4. Cardiac Risk\* Stratification for Noncardiac Surgical Procedures**

Risk Stratification	Procedure Examples
Vascular (reported cardiac risk often more than 5%)	Aortic and other major vascular surgery Peripheral vascular surgery
Intermediate (reported cardiac risk generally 1% to 5%)	Intraabdominal and intrathoracic surgery Carotid endarterectomy Head and neck surgery Orthopedic surgery Prostate surgery
Low† (reported cardiac risk generally less than 1%)	Endoscopic procedures Superficial procedure Cataract surgery Breast surgery Ambulatory surgery

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**Table 3. Estimated Energy Requirements for Various Activities**

1 MET	Can you ... Take care of yourself? Eat, dress, or use the toilet? Walk indoors around the house? Walk a block or 2 on level ground at 2 to 3 mph (3.2 to 4.8 kph)? Do light work around the house like dusting or washing dishes?	4 METs	Can you ... Climb a flight of stairs or walk up a hill? Walk on level ground at 4 mph (6.4 kph)? Run a short distance? Do heavy work around the house like scrubbing floors or lifting or moving heavy furniture? Participate in moderate recreational activities like golf, bowling, dancing, doubles tennis, or throwing a baseball or football?
4 METs		Greater than 10 METs	Can you ... Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

**Table 2. Active Cardiac Conditions for Which the Patient Should Undergo Evaluation and Treatment Before Noncardiac Surgery (Class I, Level of Evidence: B)**

Condition	Examples
Unstable coronary syndromes	Unstable or severe angina* (CCS class III or IV) Recent MI†
Decompensated HF (NYHA functional class IV; worsening or new-onset HF)	
Significant arrhythmias	High-grade atrioventricular block Mobitz II atrioventricular block Third-degree atrioventricular heart block Symptomatic ventricular arrhythmias Supraventricular arrhythmias (including atrial fibrillation) with uncontrolled ventricular rate (HR greater than 100 bpm at rest) Symptomatic bradycardia Newly recognized ventricular tachycardia
Severe valvular disease	Severe aortic stenosis (mean pressure gradient greater than 40 mm Hg, aortic valve area less than 1.0 cm <sup>2</sup> , or symptomatic) Symptomatic mitral stenosis (progressive dyspnea on exertion, exertional presyncope, or HF)

\*According to Campeau (10). †May include "stable" angina in patients who are unusually sedentary. ‡The American College of Cardiology National Database Library defines recent MI as greater than 7 but less than or equal to 1 month (within 30 d).  
CCS indicates Canadian Cardiovascular Society; HF = heart failure; HR, heart rate; MI, myocardial infarction; and NYHA, New York Heart Association.

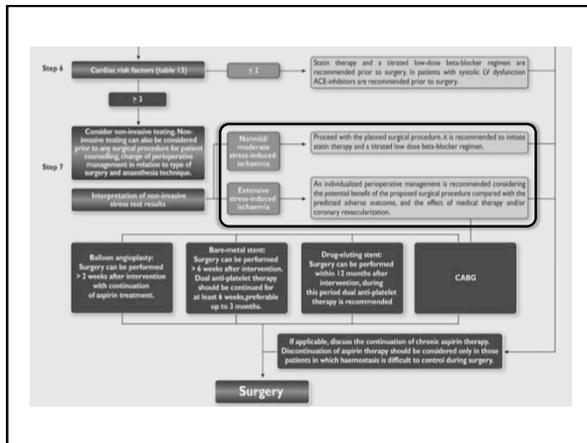
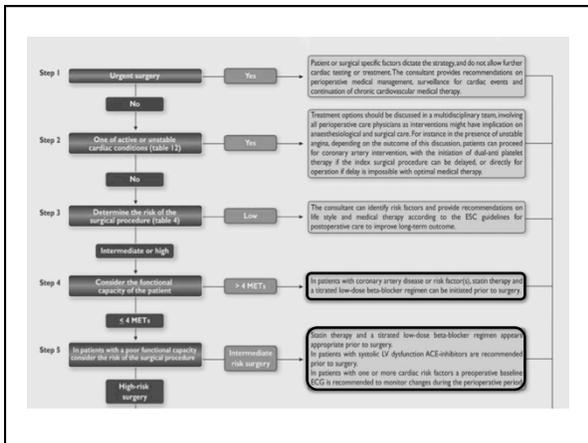
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**Table 4 Surgical risk<sup>a</sup> estimate (modified from Boersma et al.<sup>6</sup>)**

Low-risk <1%	Intermediate-risk 1-5%	High-risk >5%
<ul style="list-style-type: none"> <li>Breast</li> <li>Dental</li> <li>Endocrine</li> <li>Eye</li> <li>Gynaecology</li> <li>Reconstructive</li> <li>Orthopaedic—minor (knee surgery)</li> <li>Urologic—minor</li> </ul>	<ul style="list-style-type: none"> <li>Abdominal</li> <li>Carotid</li> <li>Peripheral arterial angioplasty</li> <li>Endovascular aneurysm repair</li> <li>Head and neck surgery</li> <li>Neurological/orthopaedic—major (hip and spine surgery)</li> <li>Pulmonary renal/liver transplant</li> <li>Urologic—major</li> </ul>	<ul style="list-style-type: none"> <li>Aortic and major vascular surgery</li> <li>Peripheral vascular surgery</li> </ul>

<sup>a</sup>Risk of MI and cardiac death within 30 days after surgery.

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## En conclusion

- Algorithmes ASA/ACC ou ESA utiles pour évaluation du risque
- Utilisation des  $\beta$ -bloquants demeure controversé...
- Quelques pistes de réflexion...
  - Titrer et adapter dose pour le patient
  - Effet différentiel selon l'agent utilisé?
  - Impact de polymorphisme génétique
- Revascularisation préopératoire demeure l'exception plutôt que la règle

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