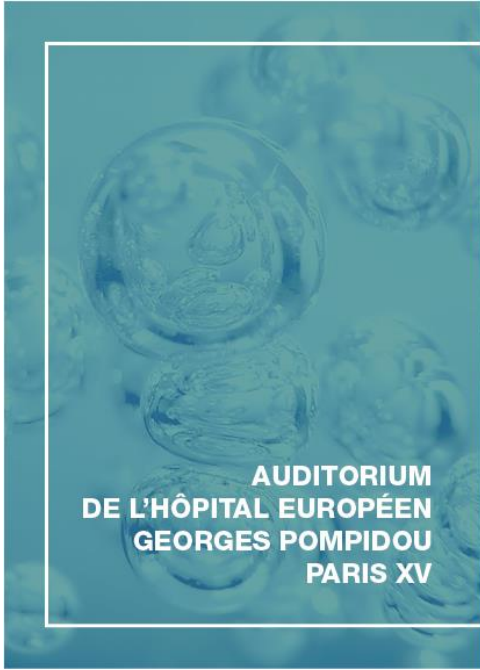
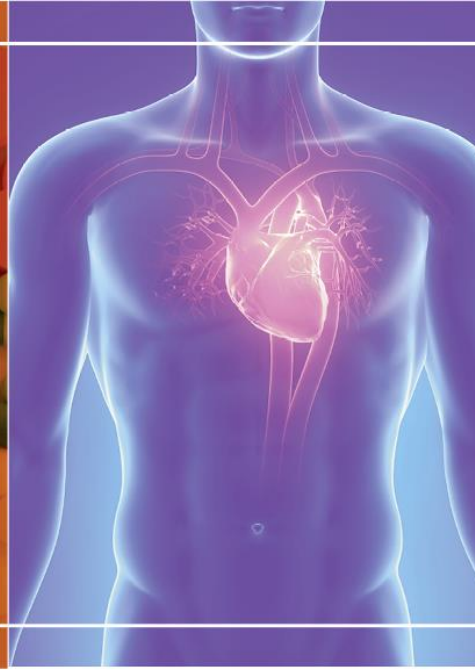




AUDITORIUM
DE L'HÔPITAL EUROPÉEN
GEORGES POMPIDOU
PARIS XV



MERCREDI
17 MAI
2017

LE PATIENT CORONARIEN EN CHIRURGIE NON CARDIAQUE

JOURNÉE MONOTHÉMATIQUE DE LA SFAR



Gestion des évènements post-opératoires avérés

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DÉCLARATION DE LIEN D'INTÉRÊT

Je déclare avoir les liens d'intérêt suivants :

Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board
Université Lyon 1 Hospices civils de Lyon	Astra Zeneca	None	Roche Diag Novartis	None	Fresenius Roche Diag Astra Zeneca Novartis

POMI et MINS des entités distinctes

POMI

Post-operative myocardial infarction

- postoperative troponin elevation – rise/fall
- clinical symptoms and signs of ischemia
- no evidence of a non-ischaemic aetiology

MINS

Myocardial injury after non-cardiac surgery

- postoperative troponin elevation
- no clinical symptoms and signs of ischemia

TYPE 1

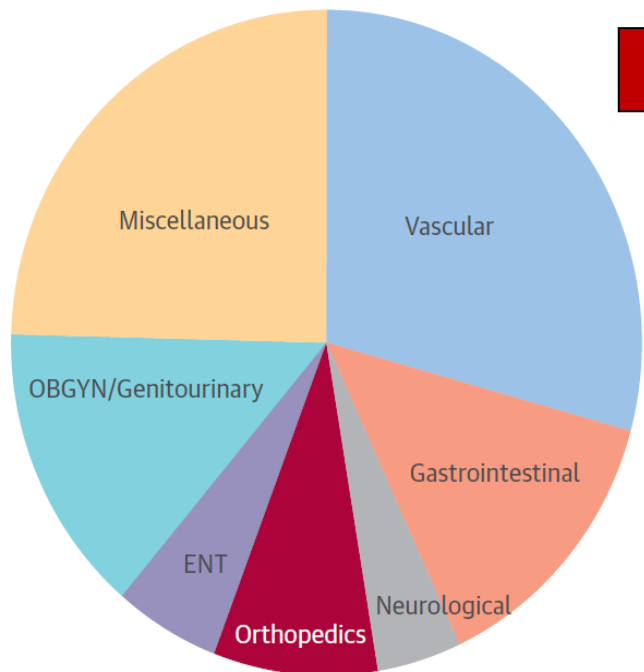
TYPE 2

Multifactorial
MYOCARDIAL
INJURY

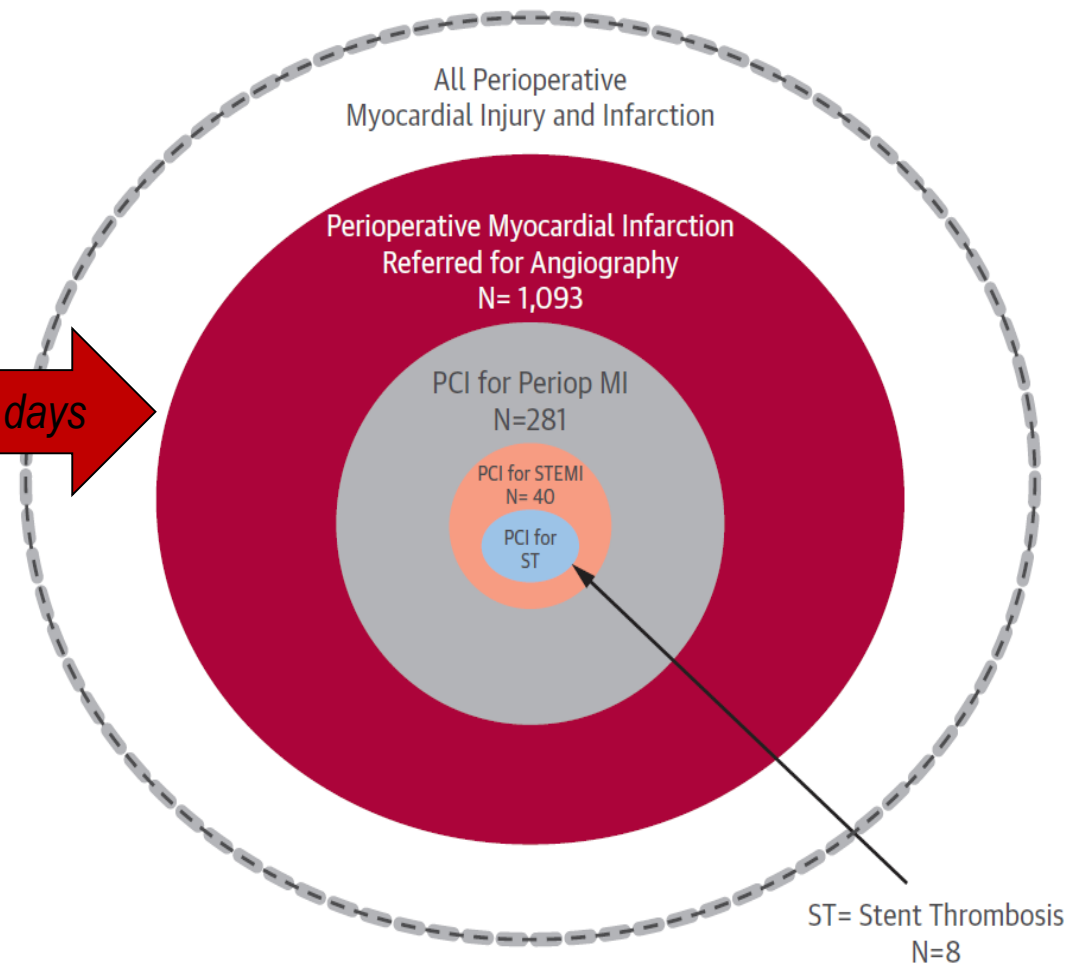
Preoperative
CHRONIC Tn
elevation

Coronary angiography and Percutaneous Intervention for Myocardial Infarction After Noncardiac Surgery

26000 patients
2003 through 2012
TnT



<7 days



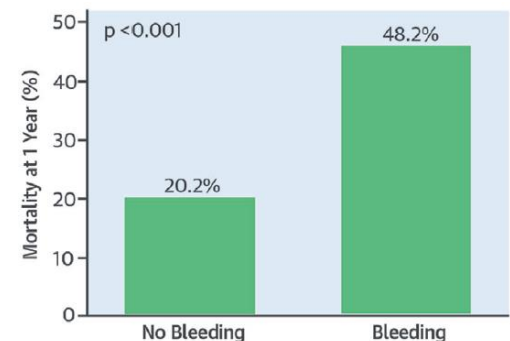
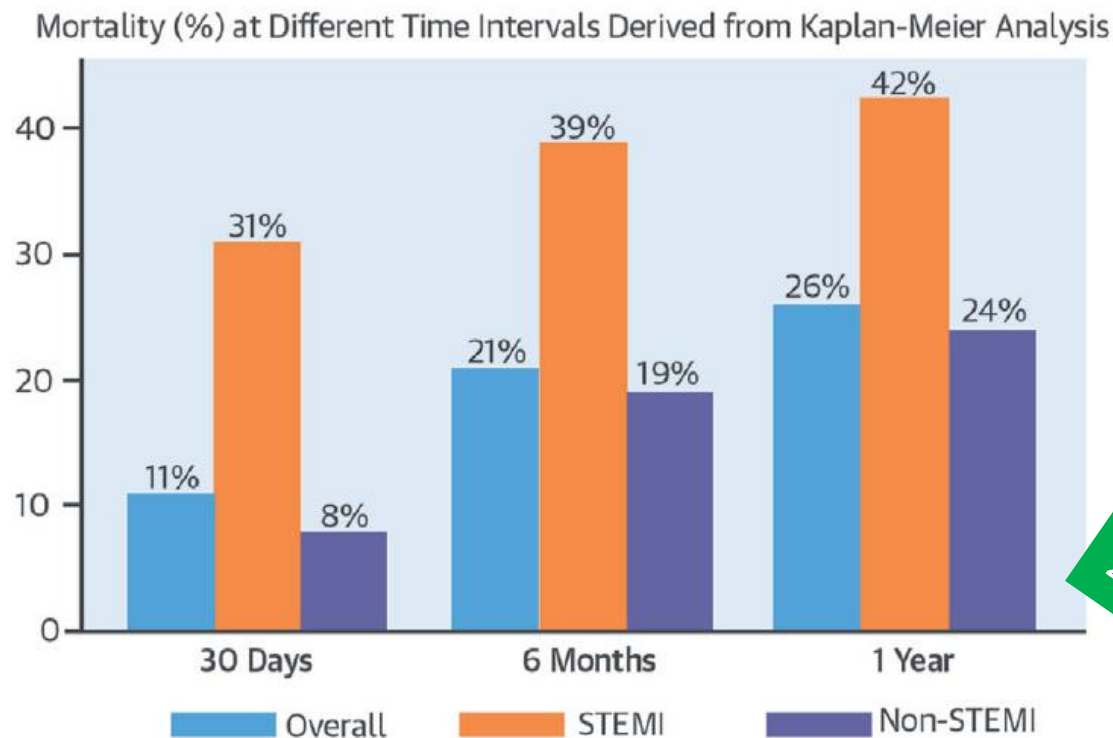
Myocardial Infarction and Coronary Angiography After Noncardiac Surgery

Disposition After Angiography	N (% of total)*
Percutaneous intervention	281 (25.7%)
→ Non-flow-limiting stenosis	589 (53.9%)
Well-collateralized vessels	29 (2.7%)
Referred for coronary artery bypass grafting	73 (6.7%)
Intervention delayed in light of frailty	63 (5.7%)
Patent grafts	49 (4.5%)
Lesions were not amenable to revascularization, or the family refused	9 (3.2%)
Total	1,093 (100%)

POMI and Percutaneous Intervention

	All Patients (N = 281)	STEMI (n = 40)	NSTEMI (n = 241)	p Value
Plain old balloon angioplasty	49 (17.4)	10 (25.0)	39 (16.2)	0.17
→ Any stent used	219 (77.9)	28 (68.2)	191 (79.2)	0.19
Bare-metal stent	145 (51.7)	22 (55.0)	123 (51.0)	0.64
Drug-eluting stent	77 (27.4)	6 (15.0)	71 (29.4)	0.06
Intra-procedural medications				
→ Glycoprotein IIb/IIIa inhibitors	76 (27.0)	18 (45)	58 (24.1)	0.006
→ Bivalirudin	157 (55.9)	26 (65)	131 (54.3)	0.73
→ Heparin	124 (44.1)	14 (35)	110 (45.6)	0.73
Procedural success	258 (91.8)	34 (85)	224 (93.3)	0.08

Percutaneous Intervention for Myocardial Infarction After Noncardiac Surgery



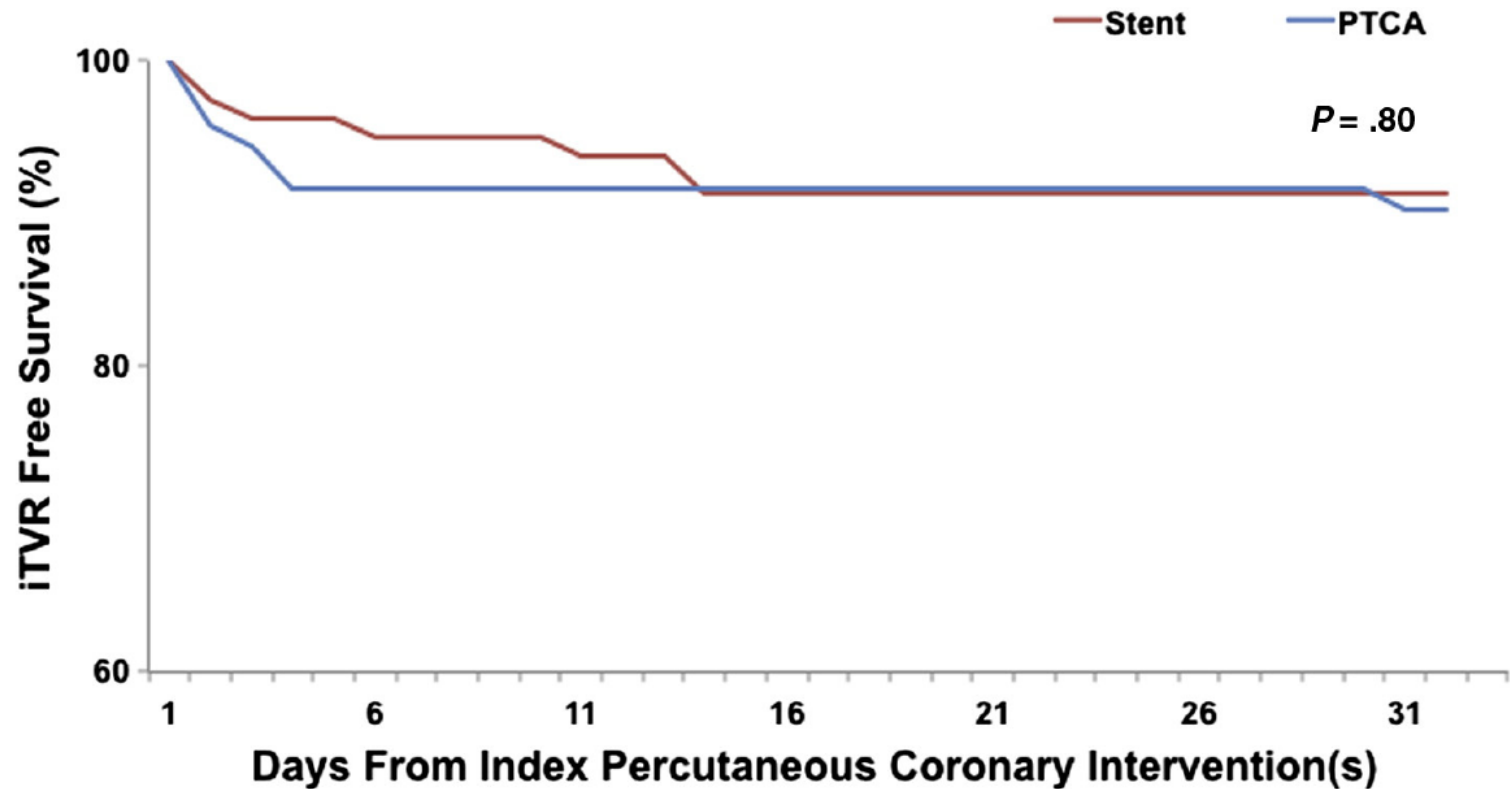
Après une chirurgie, qui « doit » bénéficier d'une **coronarographie urgente** ?

Surement les STEMI - Sus-décalages du segment ST ou infarctus postérieur

Probablement certains non STEMI à très haut risque

- Douleur thoracique ischémique persistante + ECG compatible
- Troubles du rythme ventriculaires
- Insuffisance cardiaque avec FE altérée → état de choc cardiogénique

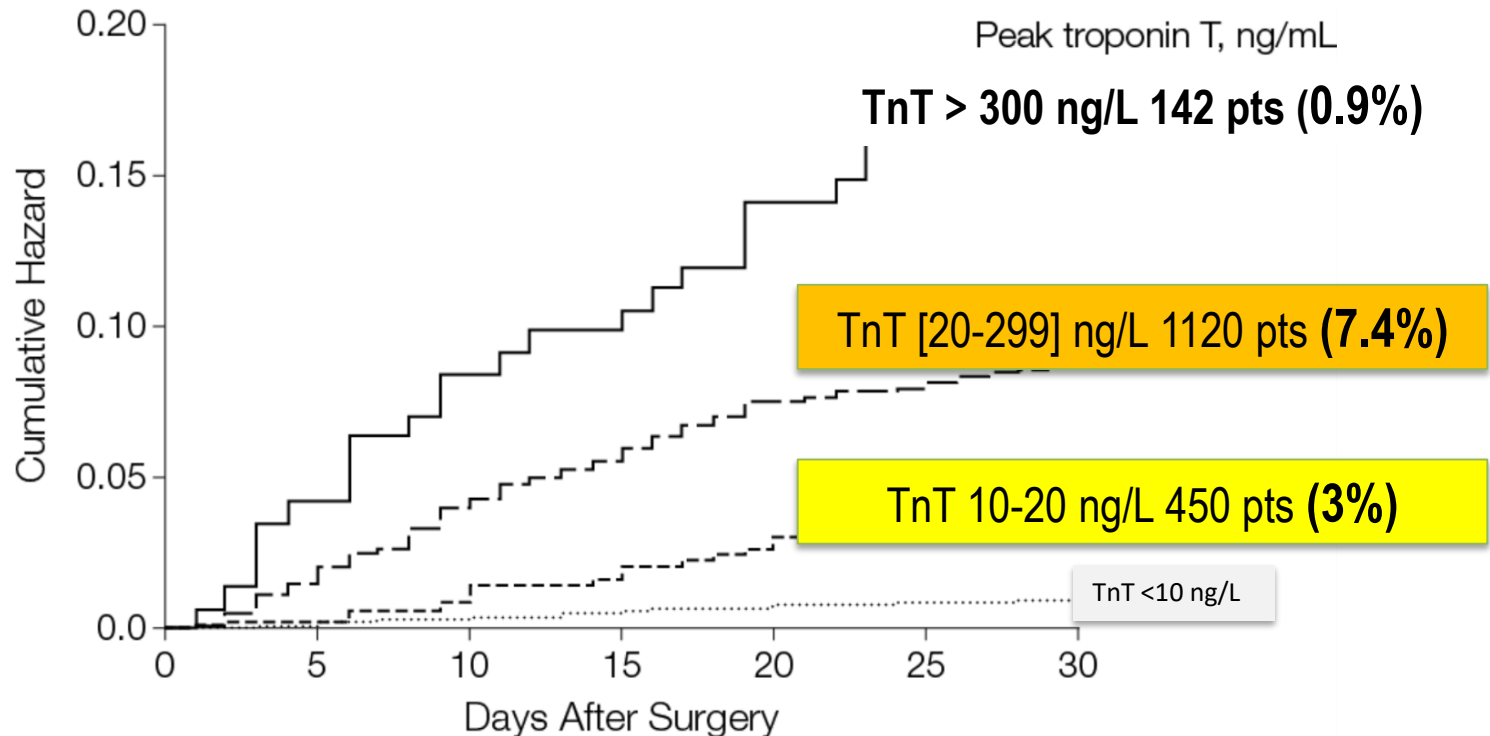
One-month events among patients with balloon angioplasty versus stent



Secondary prevention after an NSTEMI **without PCI**

It is recommended	level
→ Aspirin	I A
→ High-intensity statin as early as possible and target LDL-C <70 mg/dL	I A
→ ACE inhibitors if LVEF $\leq$ 40% or heart failure, hypertension or diabetes	I A
→ Beta-blocker if LVEF $\leq$ 40%	I A
→ Eplerenone if LVEF $\leq$ 35% and heart failure or diabetes	I A

Association Between Postoperative Troponin Levels and 30-Day Mortality Among Patients Undergoing Noncardiac Surgery



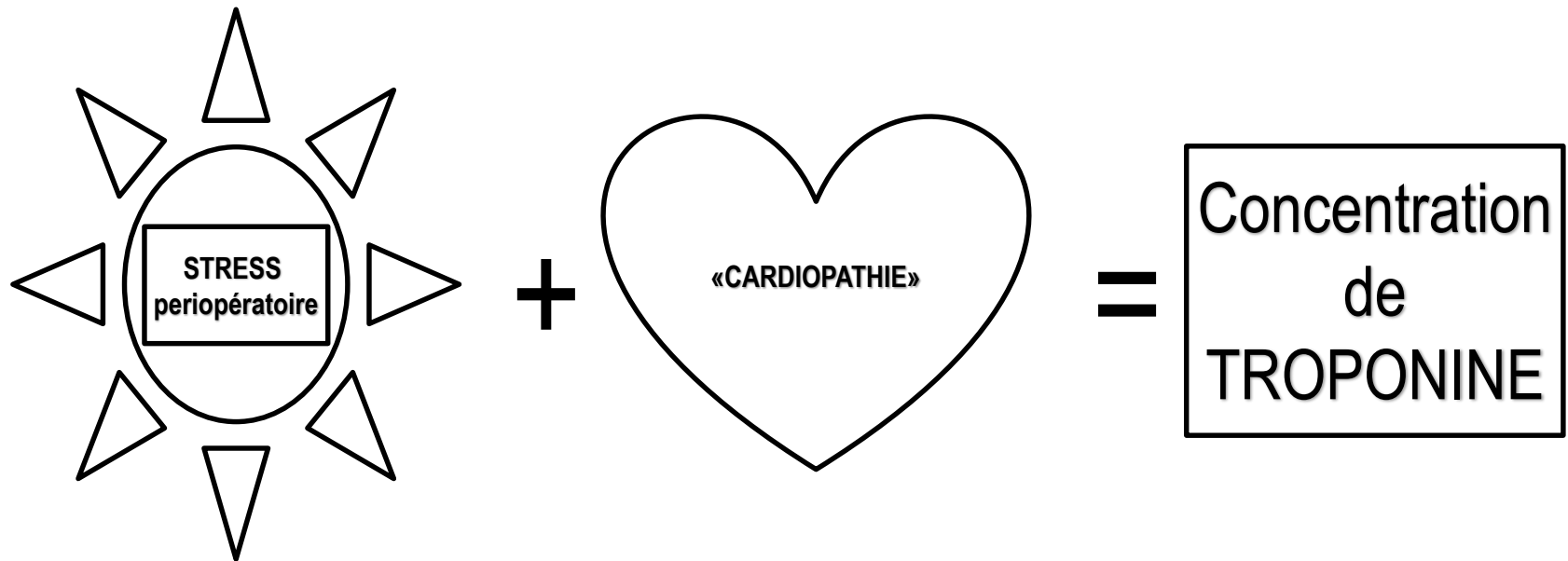
LONG TERME, au delà de la mortalité

- nonfatal cardiac arrest
- heart failure
- coronary revascularization
- recurrent nonfatal acute coronary syndrome

Devereaux Ann Intern Med. 2011
Botto Anesthesiology. 2014
Devereaux JAMA. 2012

Type 2 et/ou NIMS

Equation à deux inconnues



Infarctus de type 2 et NIMS

Les facteurs périopératoires de stress cardiaque

Reduced O₂ supply

- **Anemia**
Hgb <5,5 mmol/l for men, and <5 mmol/l for women
- **Respiratory failure**
PaO₂ <8 kPa
- **Shock**
Systolic BP <90 mmHg and organ dysfunction
- **Brady-arrhythmias**
Demanding medical supportive treatment or cardiac pacing.

Increased O₂ demand

- **Ventricular tachy-arrhythmia**
Ventricular tachy- arrhythmia for > 20 min
- **Supraventricular tachycardia**
Supraventricular tachycardia > 150 b/min for > 20 min
- **Hypertensive pulmonary oedema**
Systolic BP >160 mmHg and signs of pulmonary oedema
- **Hypertension with LVH**
Verified by imaging or ECG.

Prospective Study at Odense University Hospital

Prise en charge périopératoire d'une FA

- . Volémie
- . K > 4 mmol/l
- . MgSO4
- . Inotropes
- . Saignement
- . Ischémie
- . Arrêt BB

- . EP
- . PNO
- . Péricarde
- . Sepsis

Tolérance ?

- Instabilité HD
- OAP
- Angor réfractaire

CEE en urgence
150 J -200 J
sous sédation, électrodes
antéro-postérieure

HD stable : contrôle de fréquence
Objectif FC < 110/min

Symptomatique

FEVG inconnue /altérée
1. BB : Esmolol IV
2. Amiodarone IV
3. Digoxine

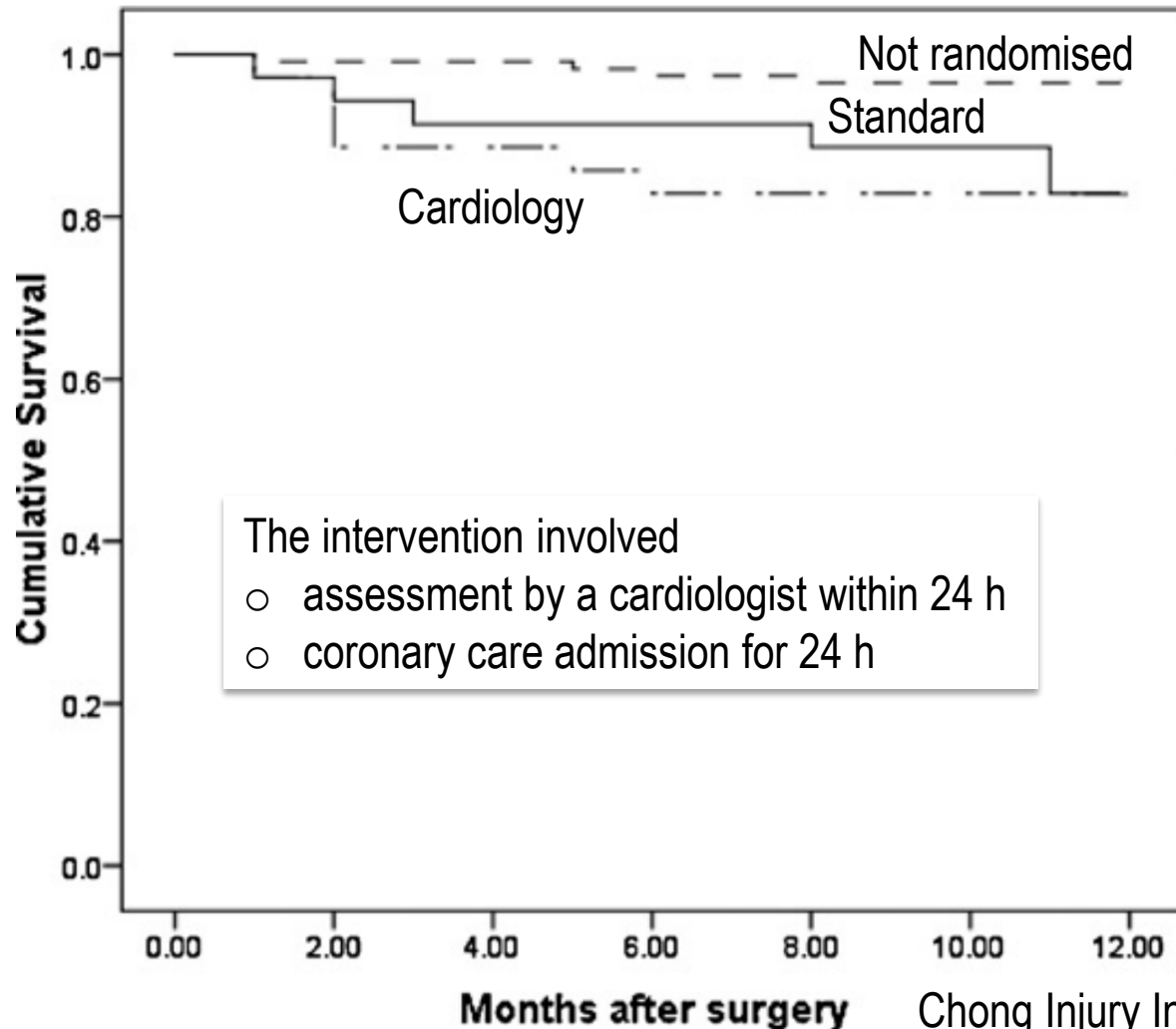
1. BB: Atenolol IV
2. Ica: Diltiazem Iv

Peu ou pas de
symptôme, FEVG
conservée / pas d'IC

1. BB : Bisoprolol PO
2. Amiodarone PO

1. BB: Atenolol PO
2. Diltiazem PO

Does cardiologist intervention improve mortality for post-operative troponin elevations after emergency orthopedic–geriatric surgery?



Cardiologist Interventions in Patients with Postoperative Myocardial Injury

- 3224 patients >60 years old undergoing major noncardiac surgery
- Postoperative myocardial injury in 715 patients (22%)
- A cardiac consultation in 290 patients (41%) and then
 - 62%: nothing
 - 36% new medication or a dose increase
 - 50% β -blockers
 - 20% ACE inhibitors, diuretics, and calcium channel blockers
 - 32% aspirin
 - 25% heparin (low molecular weight)
 - 27% statins
 - 13% red blood cell transfusion was advised by the cardiologist
 - 15% coronary angiography

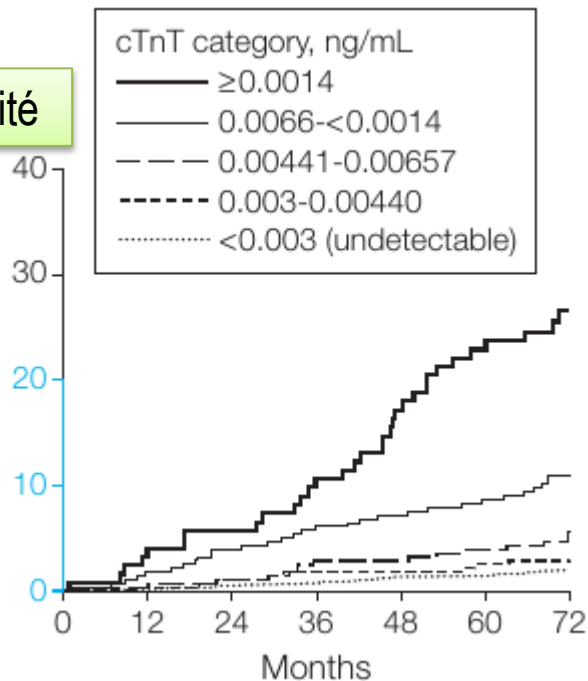
Preoperative Predictors of Myocardial Injury after Noncardiac Surgery

Une Population particulière

Analyses Based on 13,948 Patients	Model Derivation	
	Adjusted HR (95% CI)	P Value
Age ≥75 yr old	1.73 (1.48–2.03)	<0.001
Females	0.72 (0.64–0.81)	<0.001
Current atrial fibrillation	1.47 (1.20–1.81)	<0.001
History of		
Diabetes	1.34 (1.18–1.53)	<0.001
Hypertension	1.32 (1.14–1.52)	<0.001
Congestive heart failure	1.37 (1.14–1.65)	<0.001
Coronary artery disease	1.27 (1.09–1.47)	0.002
High-risk coronary artery disease	1.63 (1.21–2.19)	0.001
Peripheral vascular disease	1.92 (1.60–2.29)	<0.001
Stroke	1.36 (1.13–1.64)	0.001
Preoperative eGFR, ml/min/1.73 m ²		
<30	7.85 (6.66–9.25)	<0.001
30–44	2.39 (1.98–2.89)	<0.001
45–59	1.69 (1.41–2.01)	<0.001
>60	1.00	—
Low-risk surgery	0.72 (0.51–0.99)	0.049
Urgent/emergent surgery	1.83 (1.59–2.11)	<0.001

Independent Preoperative Predictors of Elevated troponin in the General Population

Mortalité



DALLAS heart study
3546 personnes de 30 à 65 ans
Bilan de santé systématique dont IRM

Caractéristiques associées à des concentrations élevées de troponine

Age

Homme

HTA

Diabète

Hcholestérolémie

Insuffisance rénale

Score calcique >100

HVG

2016 European Guidelines on cardiovascular disease prevention in clinical practice

VERY HIGH RISK

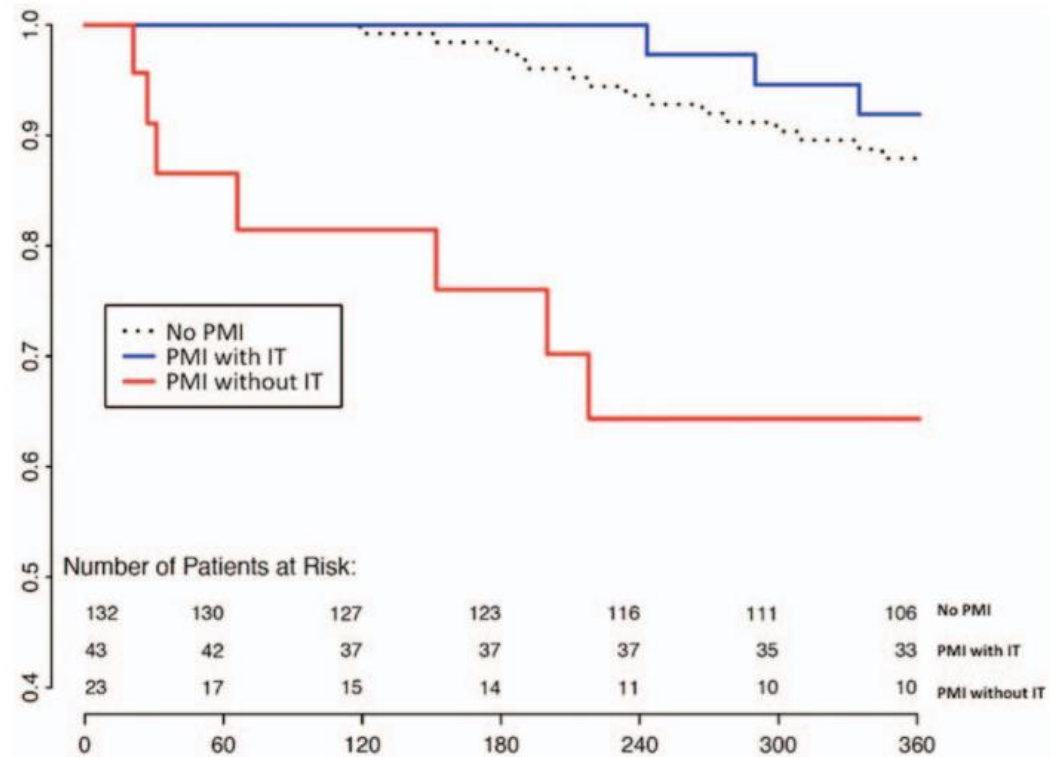
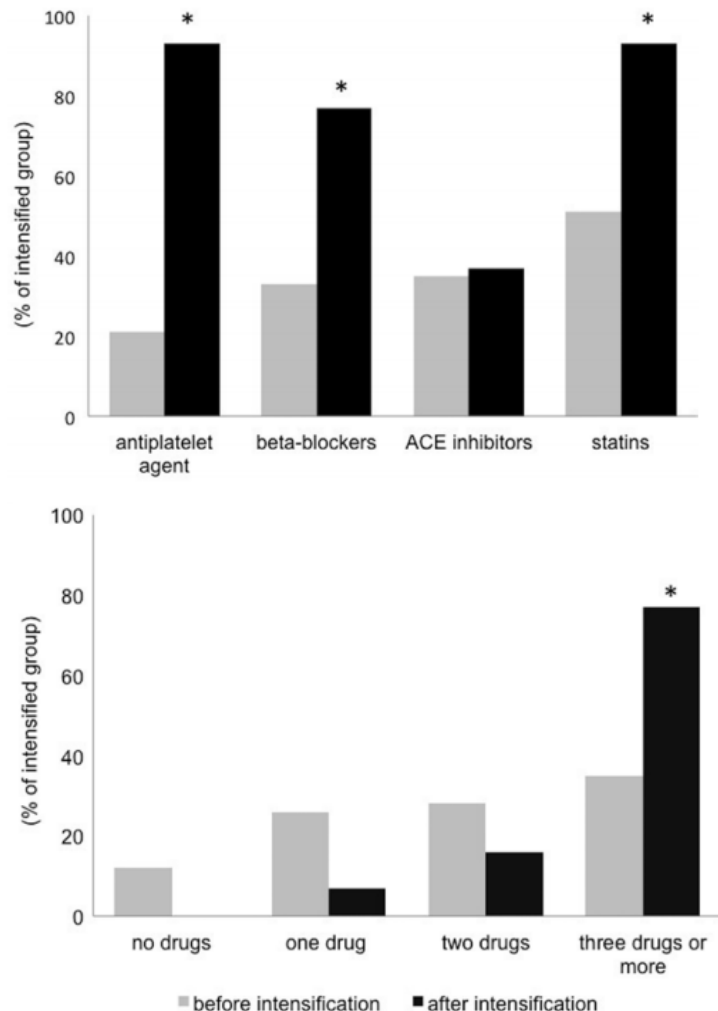
- AMI, ACS
- coronary **revascularization** and other arterial revascularization procedures
- **stroke** and TIA
- aortic aneurysm
- **peripheral arterial disease**
- plaque on coronary angiography or carotid ultrasound
- **DM** with proteinuria or a major risk factor such as smoking or marked hypercholesterolaemia or marked hypertension.
- severe **CKD** (GFR <30 mL/min/1.73 m²)

HIGH RISK

- Markedly elevated single risk factors
 - smoking
 - marked hypercholesterolaemia
 - marked hypertension
- DM
- Moderate CKD (GFR 30–59 mL/min/1.73 m²)

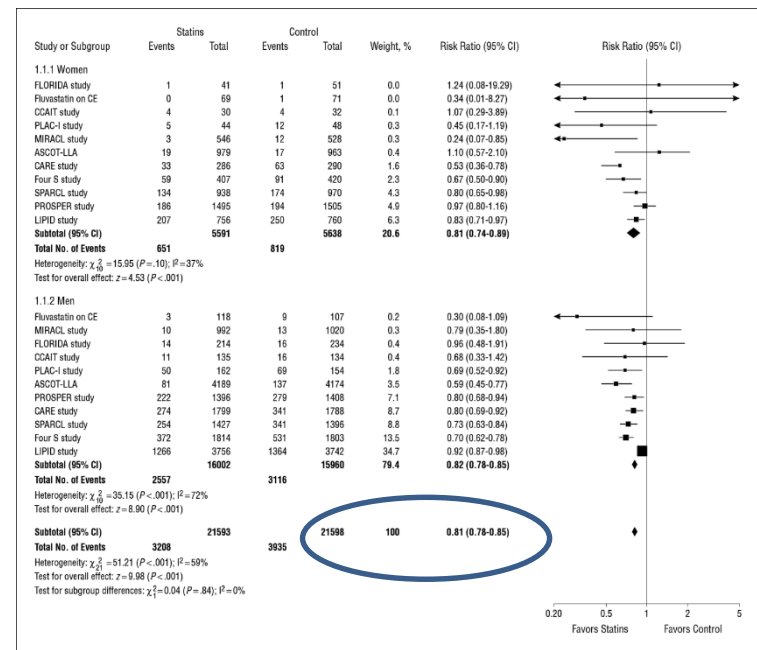
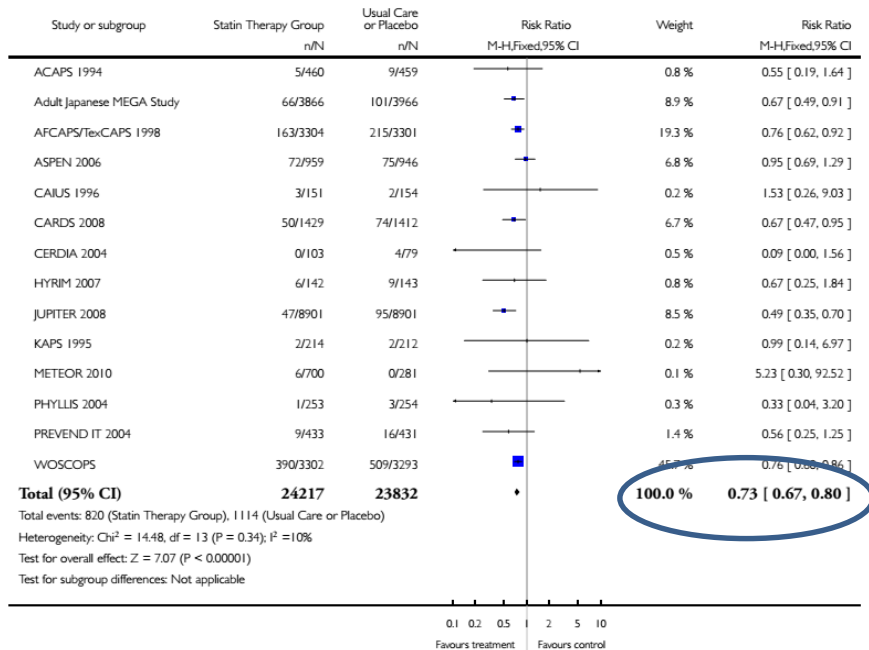
Very high-risk	Subjects with any of the following: • Documented CVD, clinical or unequivocal on imaging. Documented clinical CVD includes previous AMI/ACS, coronary revascularization and other arterial revascularization procedures, stroke and TIA, aortic aneurysm and PAD. • Unequivocally documented CVD on imaging includes significant plaque on coronary angiography or carotid ultrasound. It does NOT include some increase in continuous imaging parameters such as intima-media thickness of the carotid artery. • DM with target organ damage such as proteinuria or with a major risk factor such as smoking or marked hypercholesterolaemia or marked hypertension. • Severe CKD (GFR <30 mL/min/1.73 m²). • A calculated SCORE ≥10%.
High-risk	Subjects with: • Markedly elevated single risk factors, in particular cholesterol >8 mmol/L (>310 mg/dL) (e.g. in familial hypercholesterolaemia) or BP ≥180/110 mmHg. • Most other people with DM (with the exception of young people with type 1 DM and without major risk factors that may be at low or moderate risk). • Moderate CKD (GFR 30–59 mL/min/1.73 m²). • A calculated SCORE ≥5% and <10%.
Moderate-risk	SCORE is ≥1% and <5% at 10 years. Many middle-aged subjects belong to this category.
Low-risk	SCORE <1%.

The Long-Term Impact of **Early Cardiovascular Therapy Intensification** for Postoperative Troponin Elevation After Major Vascular Surgery



Optimiser tout le traitement de sortie

Prévention primaire ou secondaire



REDUCTION DE 25% des événements cardiovasculaires

The pharmaco-economics of routine postoperative troponin surveillance

	Troponin surveillance	No troponin surveillance
Direct and indirect costs of troponin surveillance and therapy (A)		
Cost of troponin surveillance for 3 days	732	0
Cost of statin and aspirin therapy for 30 days	13.21	0
Drug dispensing fee	2.9	0
Costs of perioperative cardiovascular complications (B)		
Cost of fatal myocardial infarction	581.15	660.32
Cost of non-fatal myocardial infarction without complications	1 988.76	2 336.84
Total cost per patient (C = A + B)	3 318.02 (C1)	2 997.16 (C2)
Total incremental cost for surveillance and therapy (D = C1 - C2)	320.86	
Absolute risk reduction	0.99	
NNT to prevent 1 event	101	
Total incremental cost (E = D × NNT)	32 409.80	
Cost-effectiveness in SA patients (F = E - R49 134) ^[11]	-16 724.20	
SA = South African; NNT = number-needed-to-treat; RRR = relative risk reduction. *Scenario based on a 25% RRR in vascular mortality only and non-fatal myocardial infarction only.		

CONCLUSIONS

- **Filière «coro-angioplastie»**
→ pour les patients à risque vital immédiat, à activer largement - prudence pour les autres situations
- **Filière postopératoire cardiologique**
pour les MINS / type 2 car puissant marqueur de risque
 - Prévention → Statine – BB - Aspirine
 - Réévaluer la cardiopathie
- **Il faut des guidelines multi-disciplinaires sur la gestion des MINS**