

CARDIO
RUN
2023

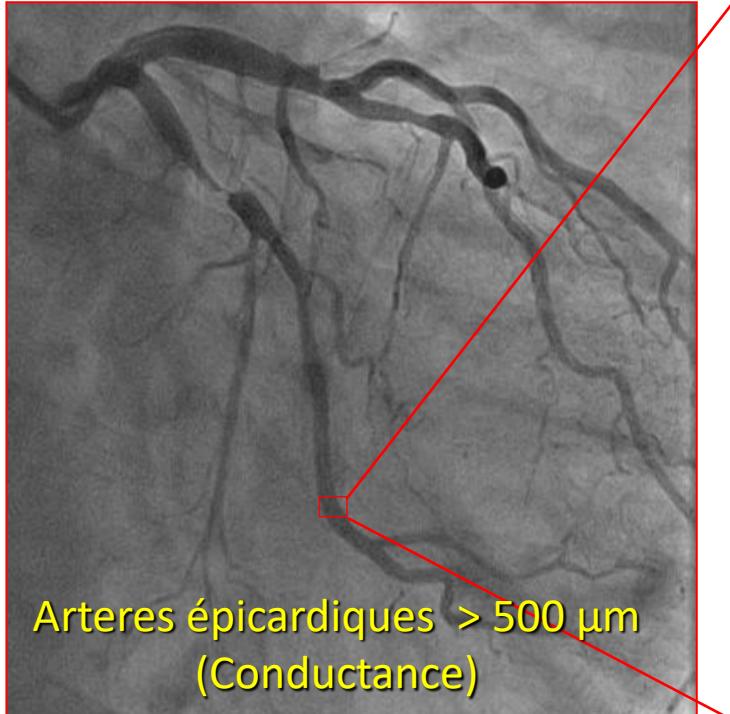
15^{ème} CONGRÈS
DE PATHOLOGIE
CARDIO-VASCULAIRE



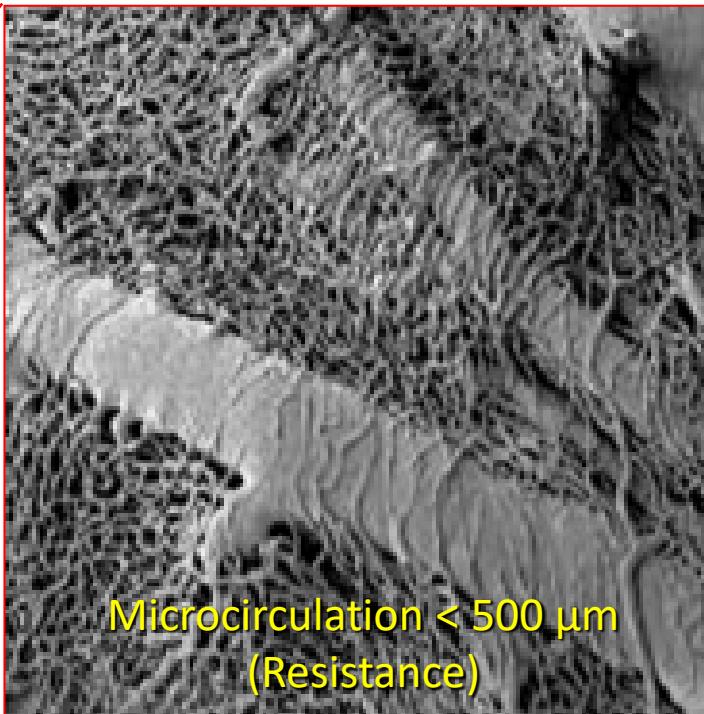
ANGOR MICRO-CIRCULATOIRE : diagnostic et prise en charge

Dr Léo CUENIN
Saint-Laurent-du-Var

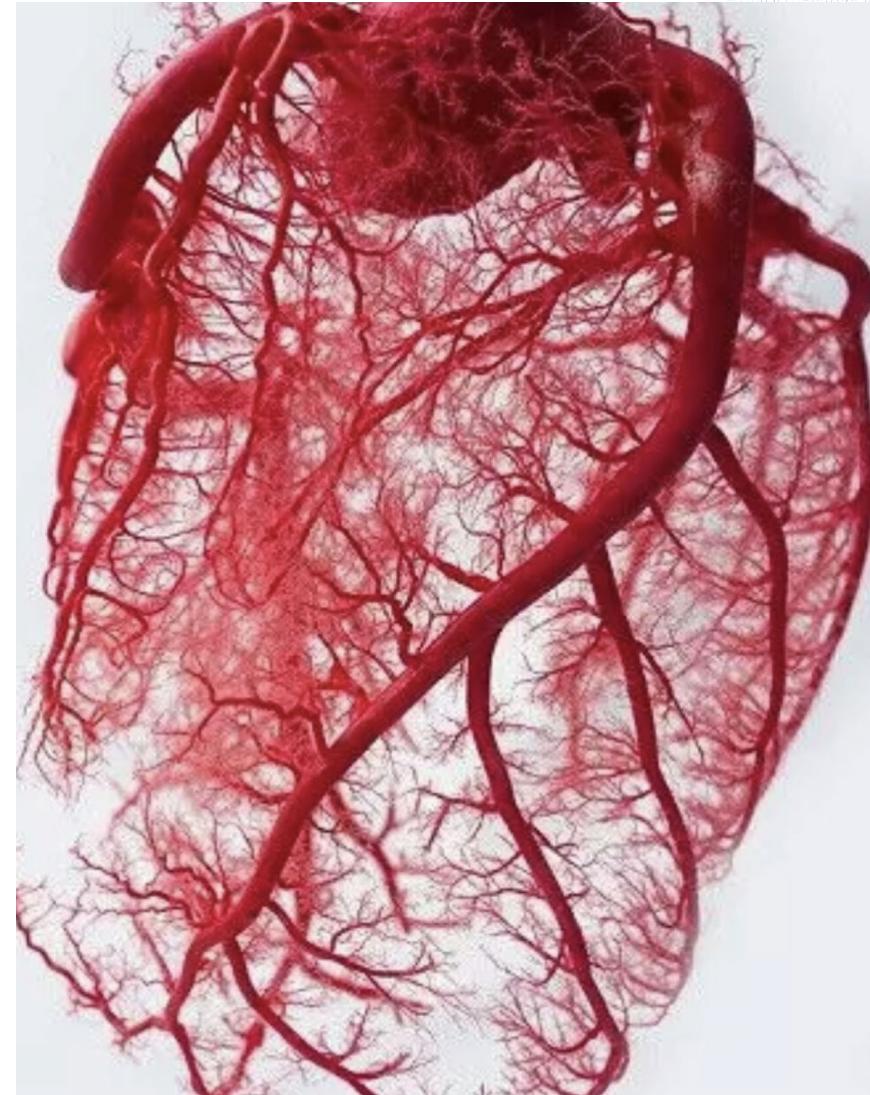
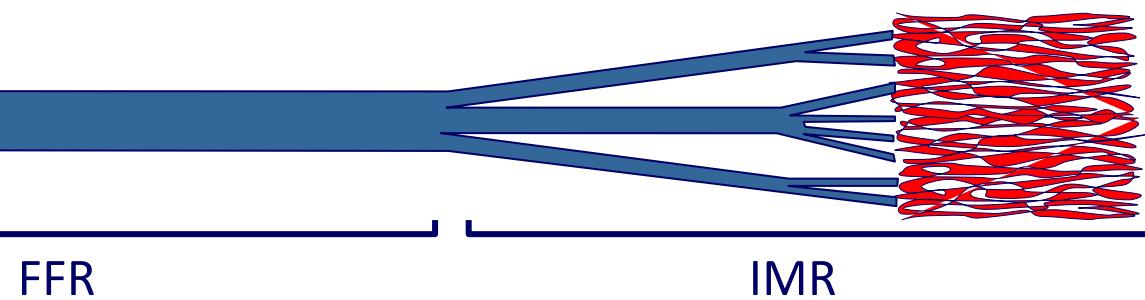
ARBRE CORONAIRES



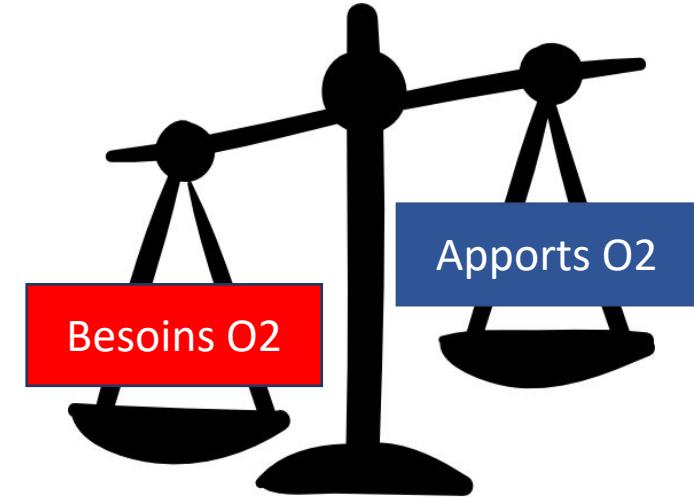
Arteres épicardiques > 500 µm
(Conductance)



Pries et al. 2015 [Eur Heart J 36\(45\): 3134-3146](#)



ISCHEMIE MYOCARDIQUE



Syndrome coronaire stable

Lésion coronaire obstructive

INOCA

Syndrome coronaire instable

Troponine +

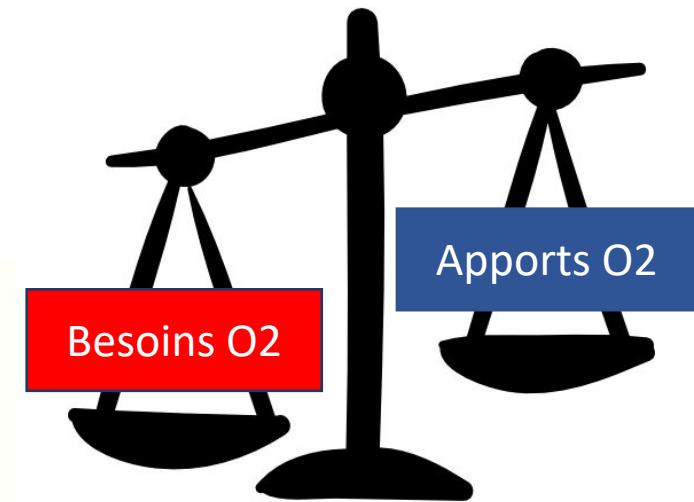
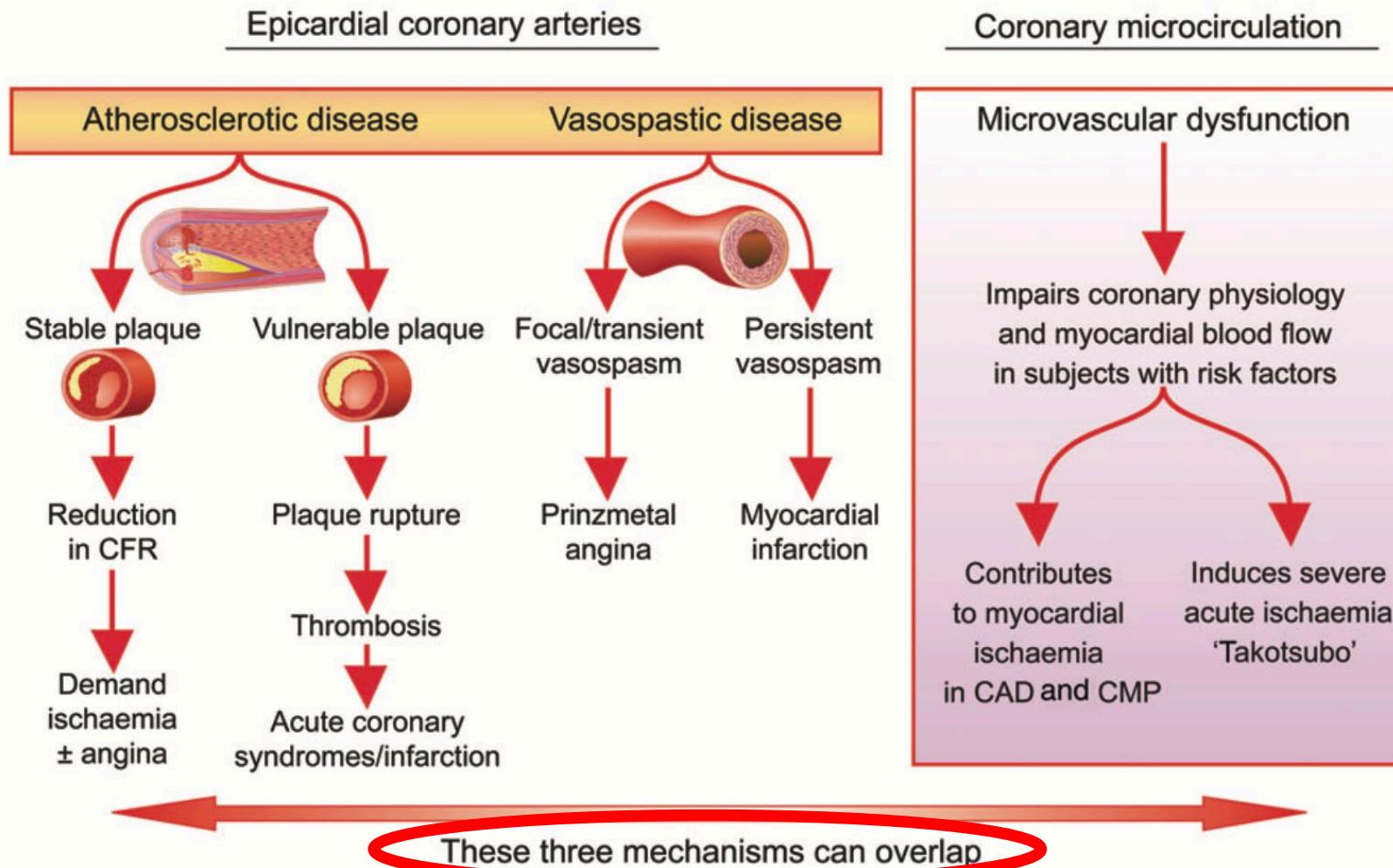
MINOCA

NSTEMI

STEMI

ISCHEMIE MYOCARDIQUE

Mechanisms of myocardial ischaemia



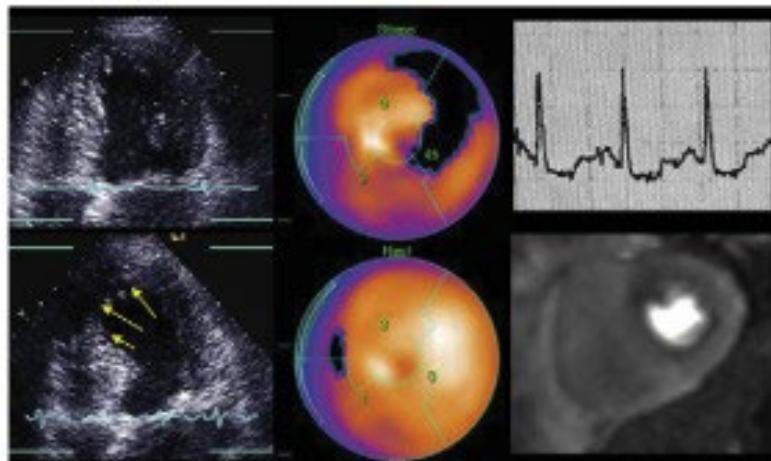
Crea et al. Eur Heart J 2014

EPIDEMIOLOGIE

1 patient(e) ischémique sur 6

CENTRAL ILLUSTRATION: INOCA in the ISCHEMIA Study

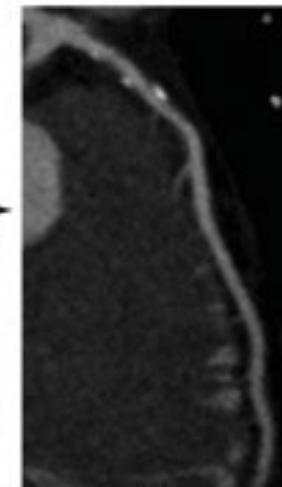
8,518 ISCHEMIA Enrolled Participants



Moderate or
severe ischemia
→
Core lab-verified

Exclusion of
prior PCI, CABG,
uninterpretable
CCTA or no CCTA

13% INOCA



Ischemia severity not
associated with extent of
nonobstructive CAD on CCTA

- INOCA associated with:
- Female sex
 - Younger age
 - Relatively less severe ischemia

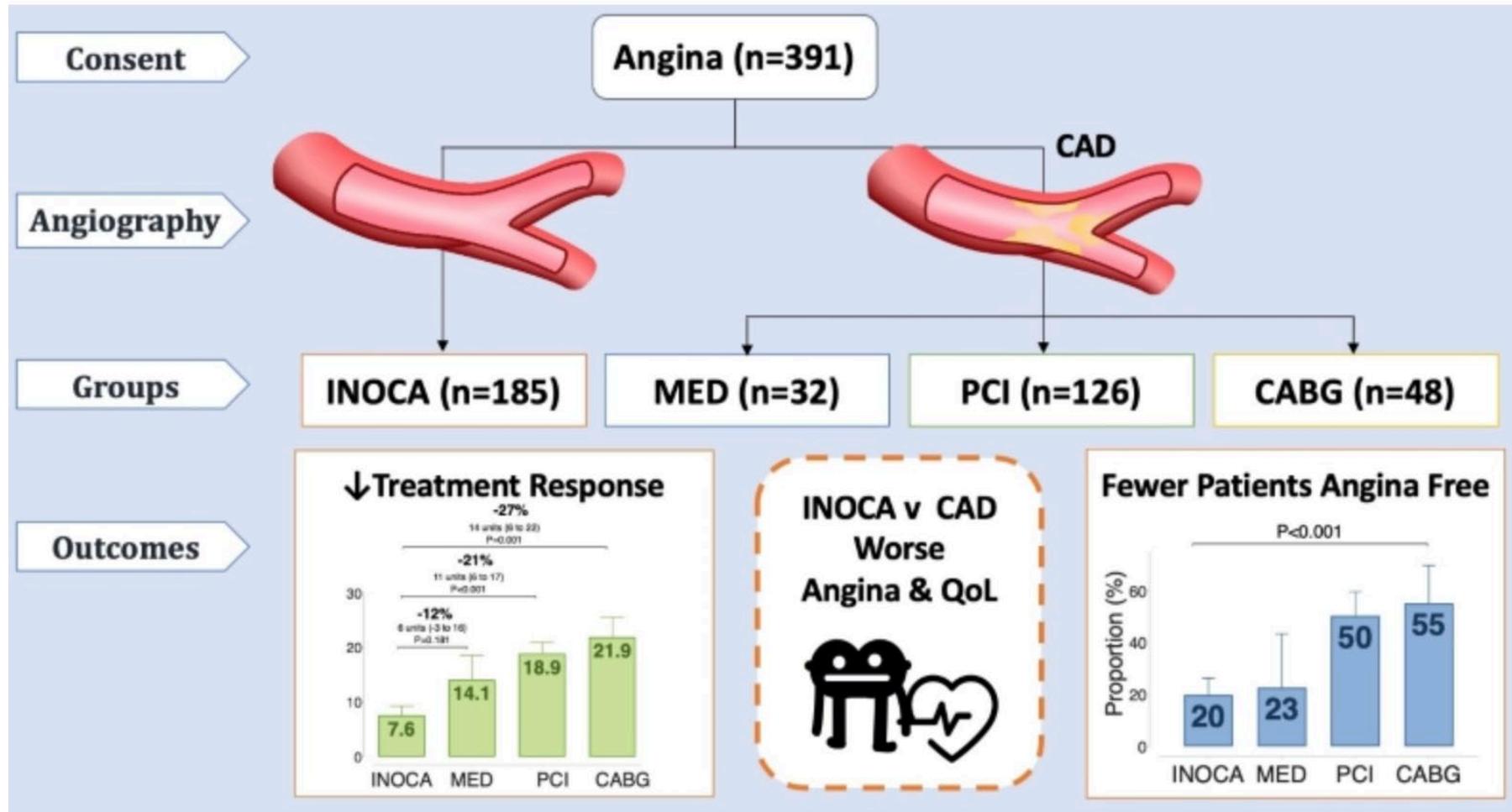


Women >4-fold odds of INOCA
vs men on multivariate analysis

Reynolds HR, et al. J Am Coll Cardiol Img. 2023;16(1):63-74.

EPIDEMIOLOGIE

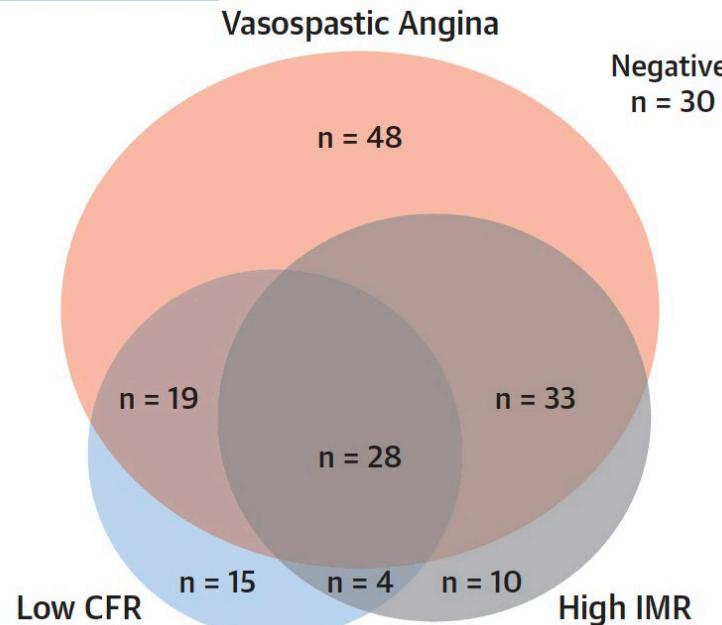
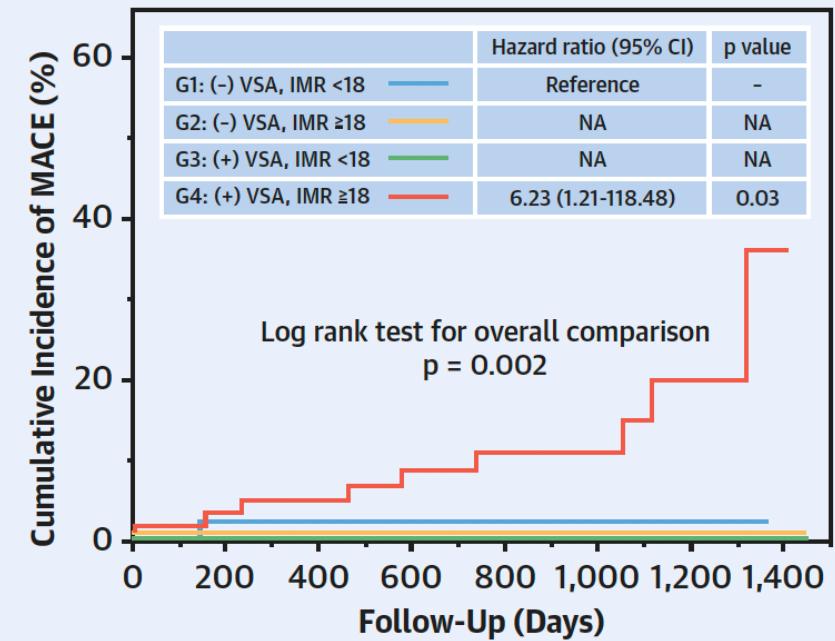
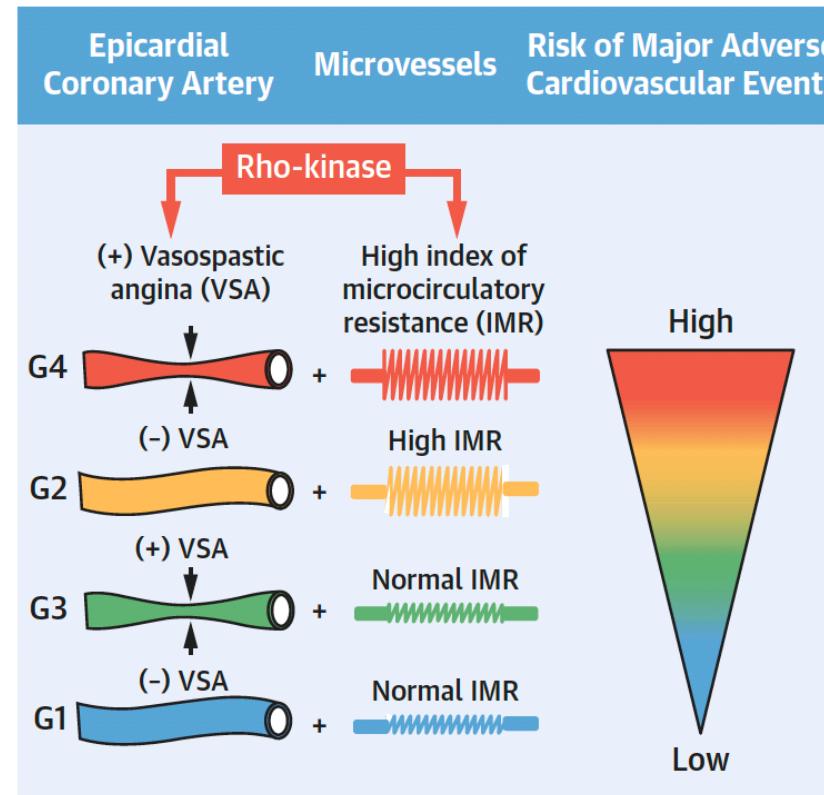
1 patient(e) angineux sur 2



PRONOSTIC

FIGURE 4 Coexistence of Coronary Functional Abnormalities

Overall n = 187

**CENTRAL ILLUSTRATION** Vasospastic Angina and High Index of Microcirculatory Resistance: Prognostic Impact of Coexistence

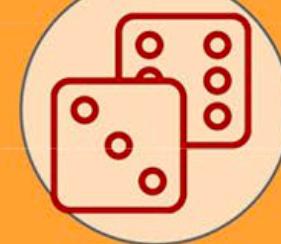
PRONOSTIC

**Randomized
151 Patients**



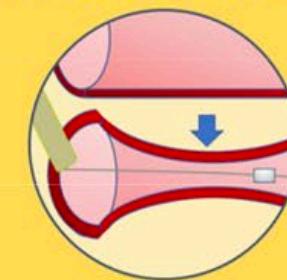
**Angina & No
Obstructive CAD**

Intervention
Invasive Coronary
Function Guided
Care (n=75)



Control
Angiography guided
Care (n=76)

Linked Diagnosis:
Microvascular angina
Vasospastic angina
Non-cardiac

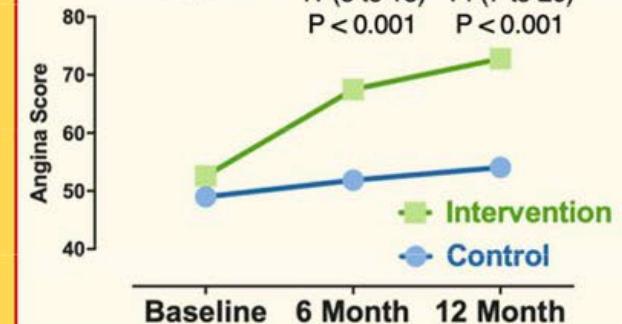


Therapy:
Stratify Antianginals
Non-pharmacological

Main Results:

Improved Angina: ↑22% ↑27%

11 (5 to 18) 14 (7 to 20)



Sustained Benefits:
**Improved Angina and
Quality of Life**

CAS CLINIQUE: Patient 47 ans

- HTA, dyslipidémie, tabac sevré
- **SCA ST- 2020 : 1 stent IVA moyenne → Thrombose de stent à 1 mois → stent FE 40% sur séquelle antérieure**
- ttt : ASPIRINE, ATORVASTATINE, COSIMPREL
- **Angor d'effort et de repos depuis 2 mois**



CORONAROGRAPHIE



CONSENSUS : DIAGNOSTIC

Ischaemia with non obstructive coronary arteries (INOCA)



Coronary Microvascular dysfunction (CMD)/Vasospastic angina (VSA)

Non-invasive evaluation

Step 1: Patient evaluation

Step 2: Non-invasive evaluation
Functional Imaging
± Coronary CT Angiography

Invasive evaluation

Step 1: Invasive Coronary angiography

Step 2: FCA guidewire and Adenosine test

Step 3: FCA Vasoreactivity (ACH test)

Epicardial
Vasospastic
Angina

Microvascular
Angina

Microvascular
And Epicardial
Vasospastic Angina

INOCA ENDOTYPES

Management of INOCA

1. Lifestyle factors

2. Risk factor management

3. Antianginal medications

CONSENSUS : EVALUATION NON INVASIVE

Ischaemia with non obstructive coronary arteries (INOCA)

Coronary Microvascular dysfunction (CMD)/Vasospastic angina (VSA)

Non-invasive evaluation

Step 1: Patient evaluation

Step 2: Non-invasive evaluation

Functional Imaging
± Coronary CT Angiography

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Epicardial
Vasospastic
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Microvascular
And Epicardial
Vasospastic Angina

INOCA ENDOTYPES

Management of INOCA

1. Lifestyle factors

2. Risk factor management

3. Antianginal medications

Step 1: Patient evaluation

Patient

GP

Cardiologist

Ischaemic symptoms



History taking including risk factors
Physical examination

Convincing ongoing history of cardiac ischaemia

ECG – non-diagnostic/normal

Cardiology referral

Step 2: Non-invasive evaluation

Preferentially considered if:

- High clinical likelihood
- Revascularisation likely
- Local expertise and availability
- Viability assessment also required

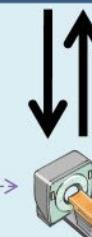


Functional imaging

- Exercise Tolerance Test
- Transthoracic Doppler Echocardiography
- Myocardial Contrast Echocardiography
- Myocardial Perfusion Imaging
- Positron Emission Tomography
- Cardiac Magnetic Resonance Imaging

Preferentially considered if:

- Low clinical likelihood
- Patient characteristics suggest high image quality
- Local expertise and availability
- Information on atherosclerosis desired
- No history of CAD



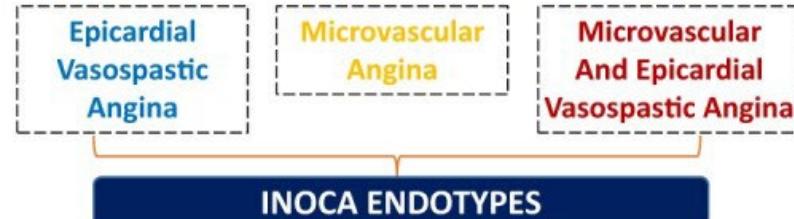
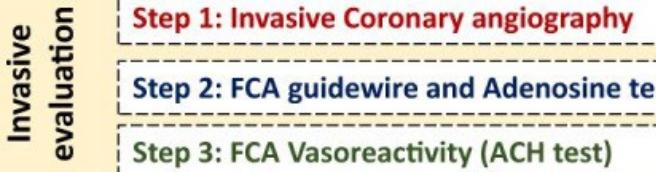
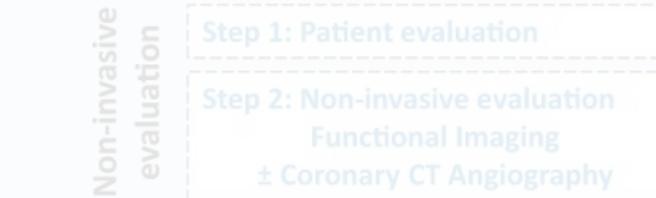
Denotes can be performed in any sequence based on local availability

± Coronary Computed Tomographic angiography

CONSENSUS : EVALUATION INVASIVE

Ischaemia with non obstructive coronary arteries (INOCA)

Coronary Microvascular dysfunction (CMD)/Vasospastic angina (VSA)

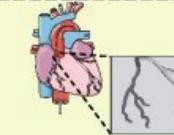


INOCA ENDOTYPES

Management of INOCA

1. Lifestyle factors
2. Risk factor management
3. Antianginal medications

Step 1: Coronary angiography & LVEDP



Step 2: Diagnostic guidewire and Adenosine test

FFR + CFR + IMR*

FFR > 0.8
CFR ≥ 2.0
IMR < 25

FFR > 0.8
CFR < 2.0
IMR ≥ 25

No Coronary Microvascular Dysfunction Present

Coronary Microvascular Dysfunction Present

Step 3: Vasoreactivity (Acetylcholine test)

1. No or <90% diameter reduction
2. No angina
3. No ischaemic ECG changes

1. ≥ 90% diameter reduction
2. + angina
3. + ischaemic ECG changes

1. No or <90% diameter reduction
2. No angina
3. No ischaemic ECG changes

1. No or < 90% or ≥ 90% diameter reduction
2. + angina
3. + ischaemic ECG changes

Non cardiac pain

Epicardial Vasospastic Angina

Microvascular Angina

Microvascular And Epicardial Vasospastic Angina

INOCA ENDOTYPES

RECHERCHE DE SPASME



AcetylCholine 100 µg IC



Isosorbide dinitrate 1mg IC

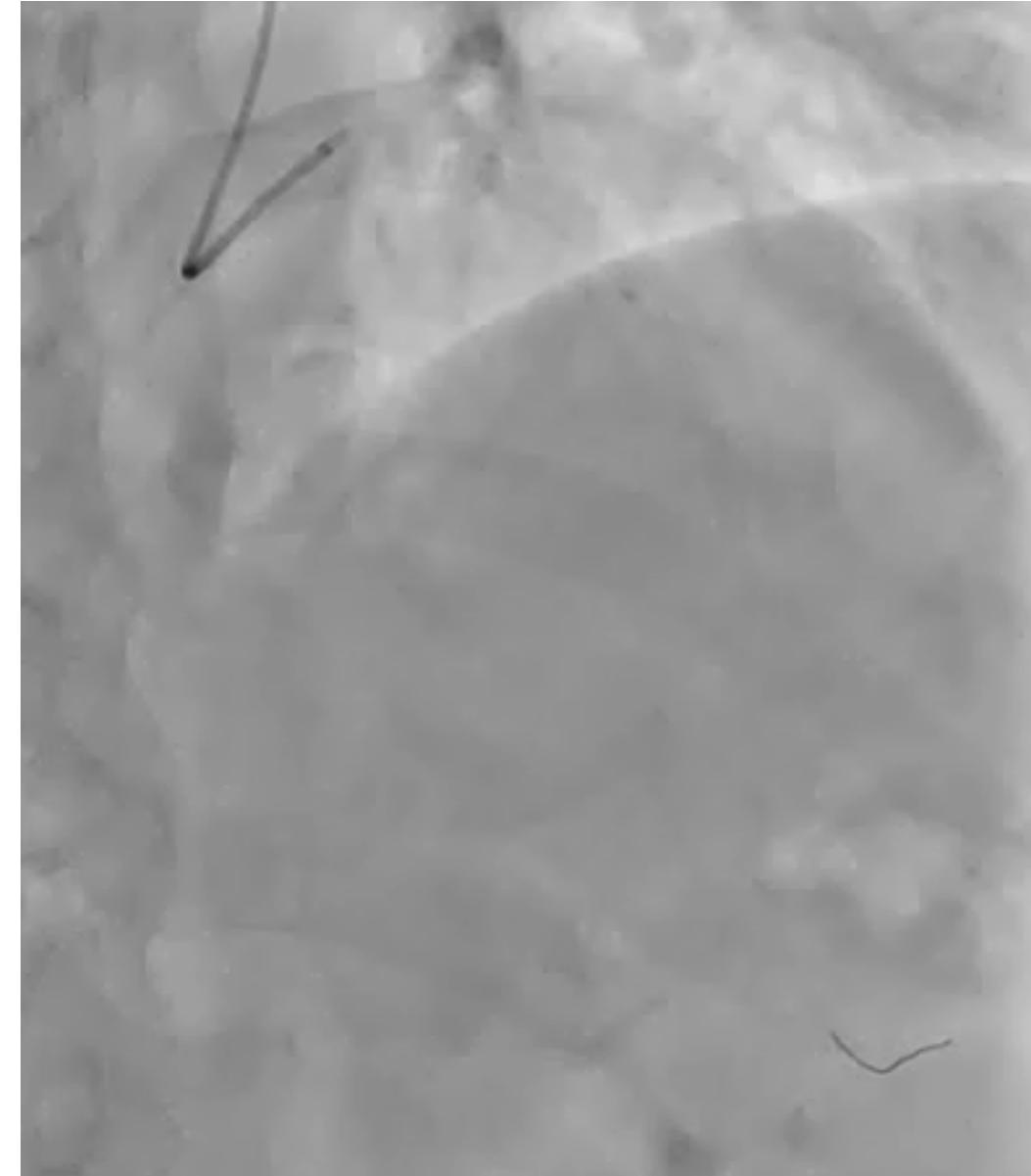
EVALUATION HEMODYNAMIQUE



Guide FFR IVA distale



ANGIOPLASTIE IVA

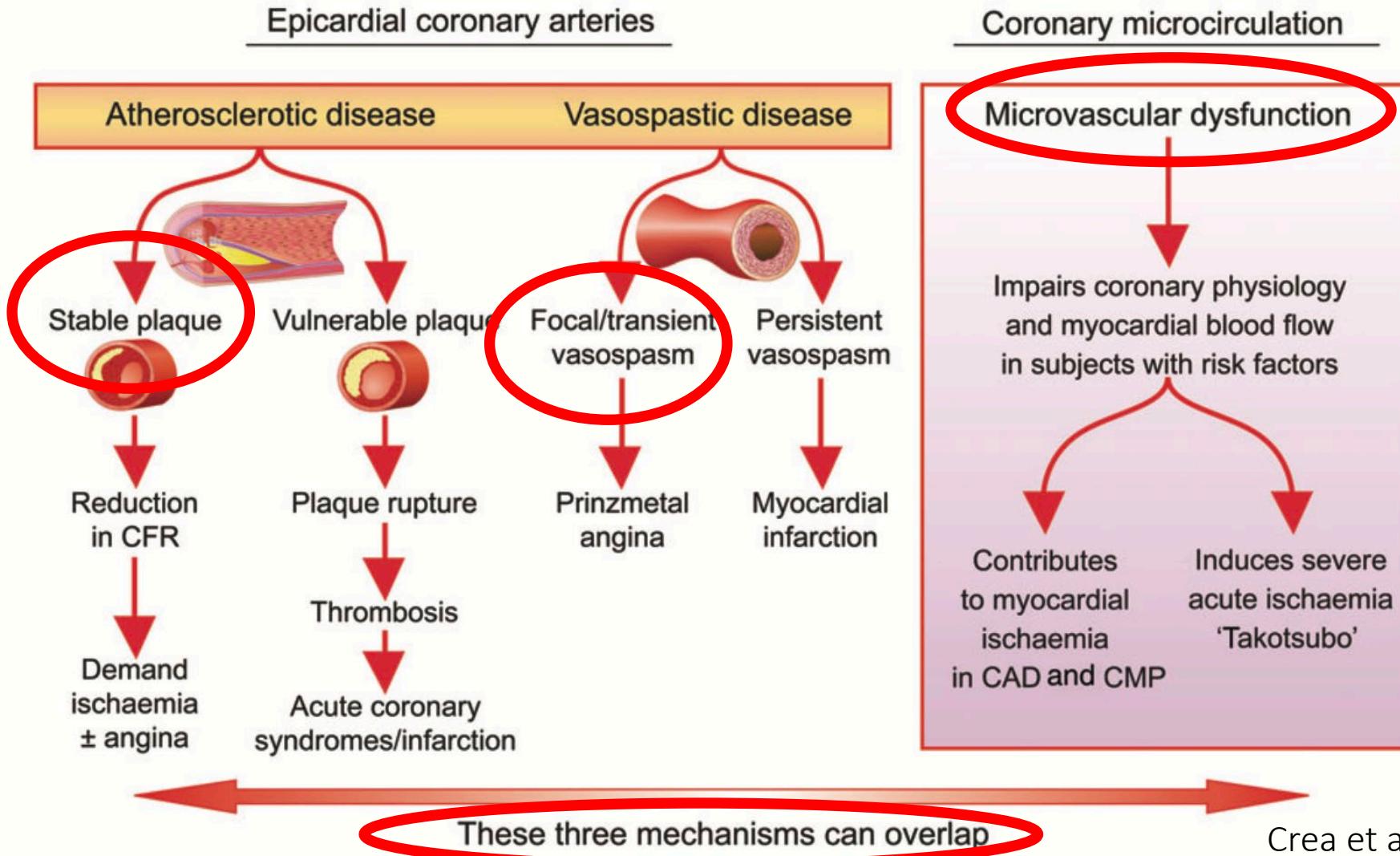


REEVALUATION DE LA MICROCIRCULATION



CONCLUSION CAS CLINIQUE

Mechanisms of myocardial ischaemia



Crea et al. Eur Heart J 2014

CONSENSUS : TRAITEMENT

Management of INOCA



Nutrition



Exercise



Weight management



Smoking cessation



Coping with stress



Hypertension



Dyslipidaemia



Diabetes mellitus

3. Antianginal medication



Microvascular angina



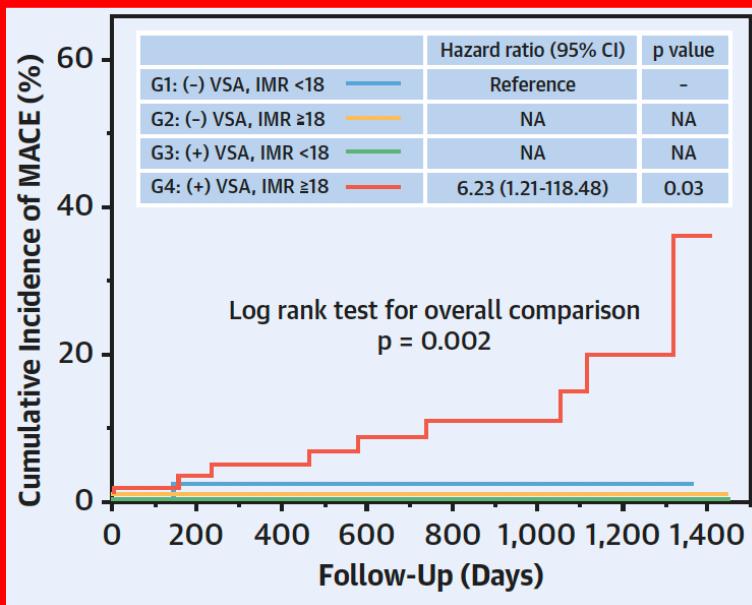
Vasospastic angina

Consider statins and ACEI/ARB

1. **Beta-blocker**
2. **Calcium channel blocker**
3. **Nicorandil**
4. **Ranolazine**
5. **Ivabradine**
6. **Trimetazidine**

1. **Calcium channel blocker**
2. **Long-acting nitrate**
3. **Nicorandil**

7. Place du sinus reducer ?



TAKE HOME MESSAGE / INOCA

Bon diagnostic

Bon
traitement

Meilleure
qualité de vie