



# Multivessel Disease:

# Should Invasive Physiology Change

## My strategy?

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# **Conflicts of Interest**

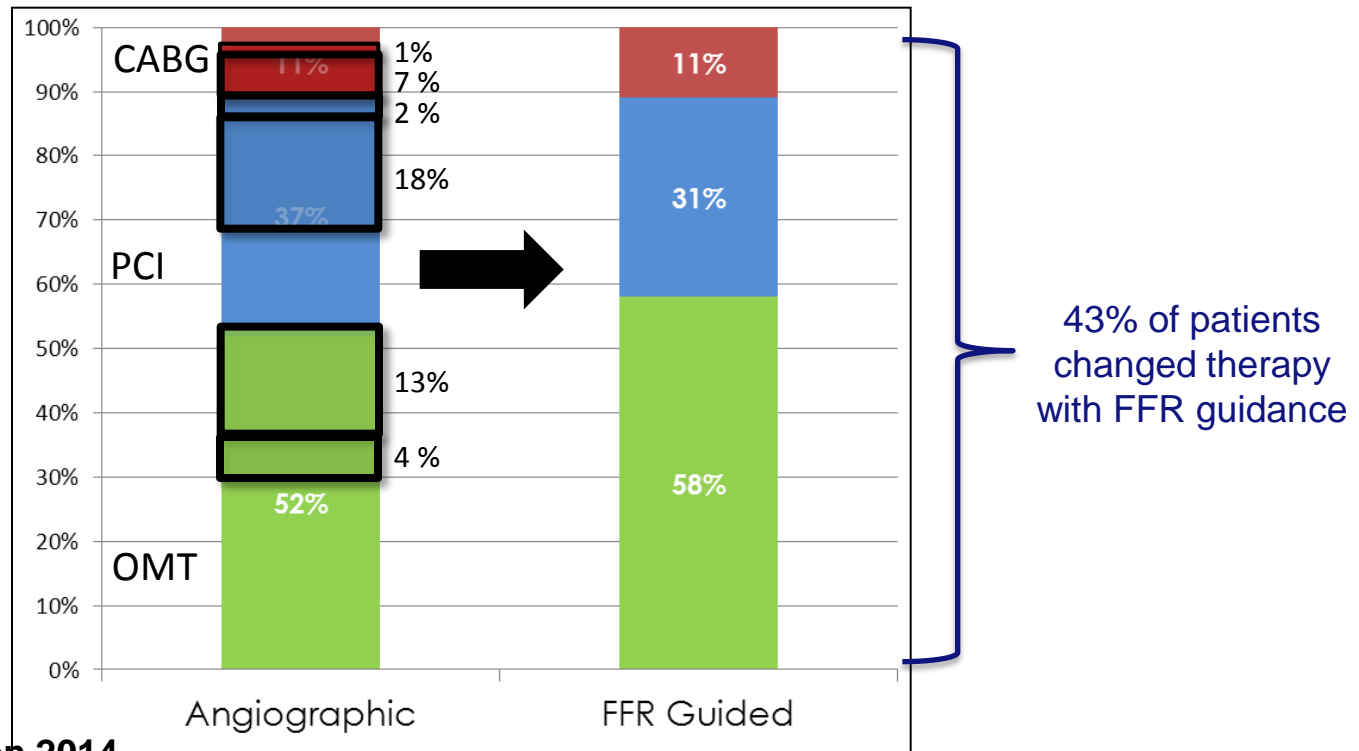
**Philips/Volcano,**

**Abbott/SJM**

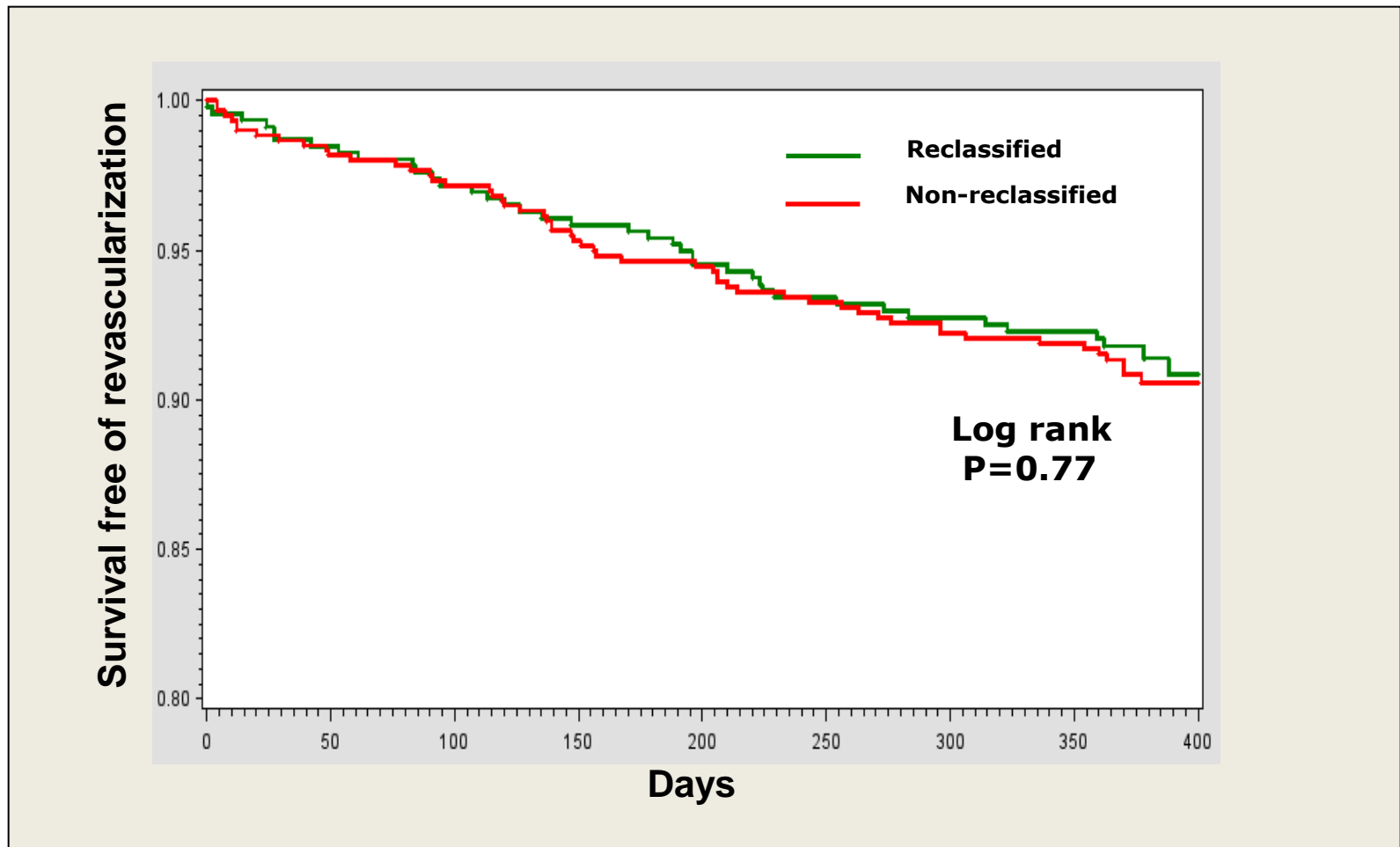
# Outcome Impact of Coronary Revascularization Strategy Reclassification With Fractional Flow Reserve at Time of Diagnostic Angiography

## Insights From a Large French Multicenter Fractional Flow Reserve Registry

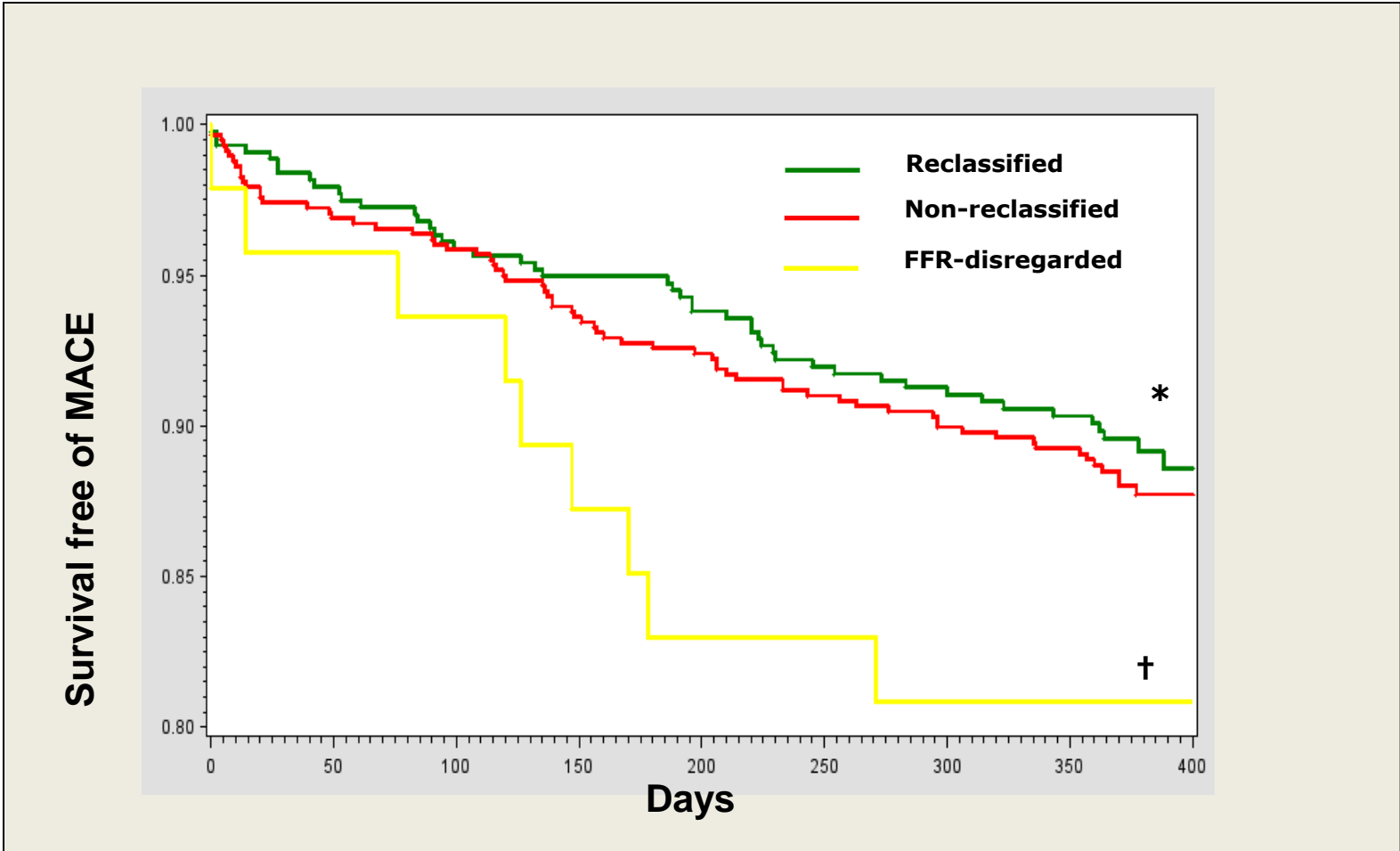
Eric Van Belle, MD, PhD; Gilles Rioufol, MD, PhD; Christophe Pouillot, MD;



# Survival free of unplanned revascularization according to Reclassification by FFR



# Survival free of MACE according to Reclassification by FFR (« per-use » analysis)



# Functional testing and intravascular imaging for lesion assessment

Recommendations	Class	Level
When evidence of ischaemia is not available, FFR or iwFR are recommended to assess the haemodynamic relevance of intermediate-grade stenosis.	I	A
FFR-guided PCI should be considered in patients with multivessel disease undergoing PCI.	IIa	B
IVUS should be considered to assess the severity of unprotected left main lesions.	IIa	B

**What about MVD patients?**



# JACC

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY



# Impact of Routine Invasive Physiology at Time of Angiography in Patients With Multivessel Coronary Artery Disease on Reclassification of Revascularization Strategy

## Results From the DEFINE REAL Study

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Marios Vlachojannis, MD,<sup>i</sup> Irene Lang, MD,<sup>j</sup> Philippe Commeau, MD,<sup>k</sup> Flavien Vincent, MD,<sup>a</sup> Luca Testa, MD, PhD,<sup>l</sup>  
Wojciech Wasek, MD, PhD,<sup>m</sup> Nicolas Debry, MD,<sup>a</sup> Stephan Kische, MD, PhD,<sup>n</sup> Gabriele Gabrielli, MD,<sup>o</sup>  
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# Objectives

As systematic FFR multi-vessel assessment is time consuming and therefore rarely performed in routine practice, the iFR<sup>®</sup> index may help to simplify the physiology assessment of MVD patient population.

The DEFINE REAL objectives are:

- To assess prospectively the impact of physiology on revascularization strategy of MVD patients compared to diagnostic angiogram only.
- To analyze how FFR and iFR<sup>®</sup> are used in routine practice during physiology evaluation of MVD patients.

Patient with MVD disease being investigated by angiogram



**Initial** Treatment Strategy based on diagnostic **Angiogram**:

CABG, PCI or OMT



**Final** treatment strategy based on **Physiology (FFR or iFR)**:

CABG, PCI or OMT



**Reclassification** based upon the difference between Initial and Final Treatment::

→ At **Vessel** level

→ At **Patient** Management level

→ At **Procedural** Management level (For those without patient management change)

→ At **overall** management (Patient + Procedural change)

ANGIOGRAPHY

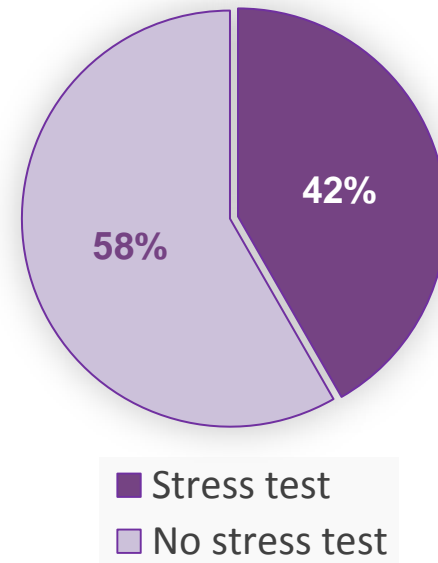
PHYSIOLOGY

RECLASSIFICATION

# Patient Demographics

Patient Demographics	n = 484
Gender (male)	80%
Age (mean)	66.7 yr
Previous MI	36%
ACS	17.8%
Diabetes	26.7%
Normal LVEF	62.8%

Non-invasive Test in Stable Patients



Tests: Stress ECG, Stress SPECT, Stress Echo, Stress MRI, CT-Scan

# Baseline Characteristics

Patients population **484**

- Patient with LM involved **9.1%**

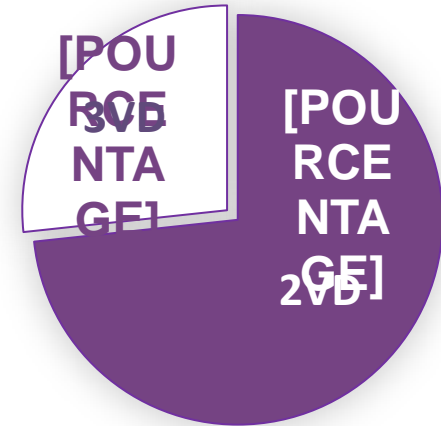
Vessels diseased **1107**

- Average per patient **2.29**

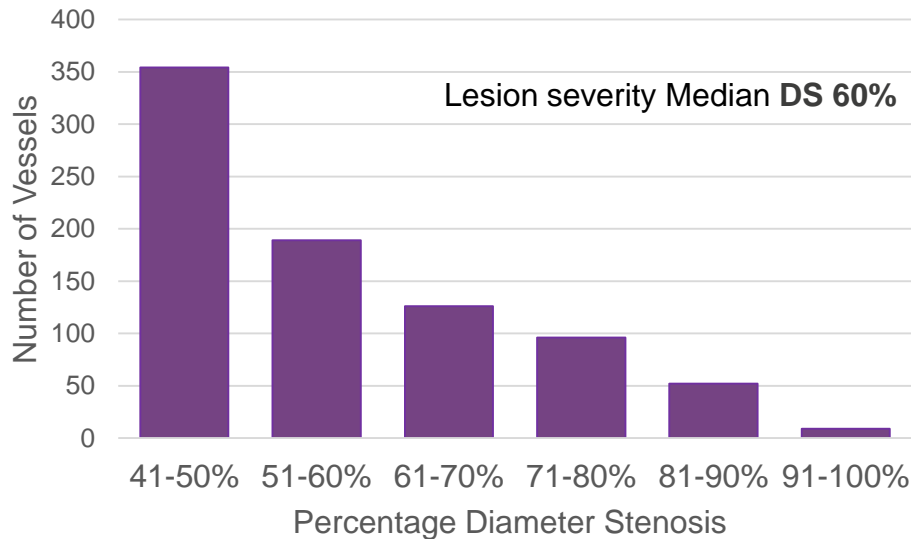
Vessels assessed by physiology **830 (75%)**

- Average per patient **1.71**

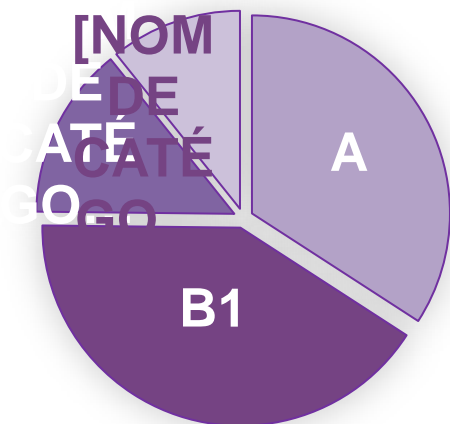
## Multi-Vessel Disease



% Diameter Stenosis Distribution



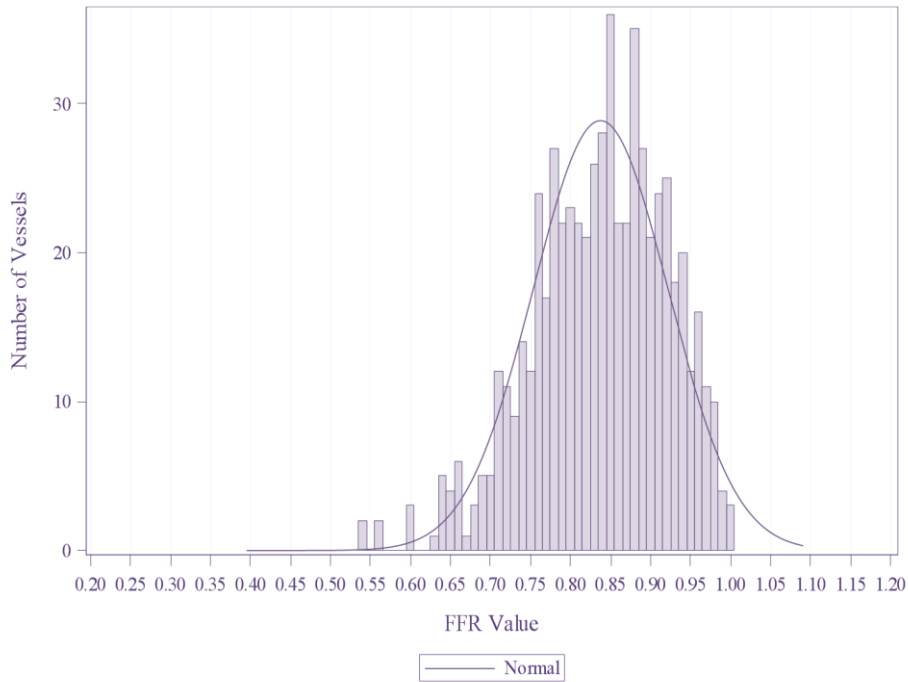
## Lesion type





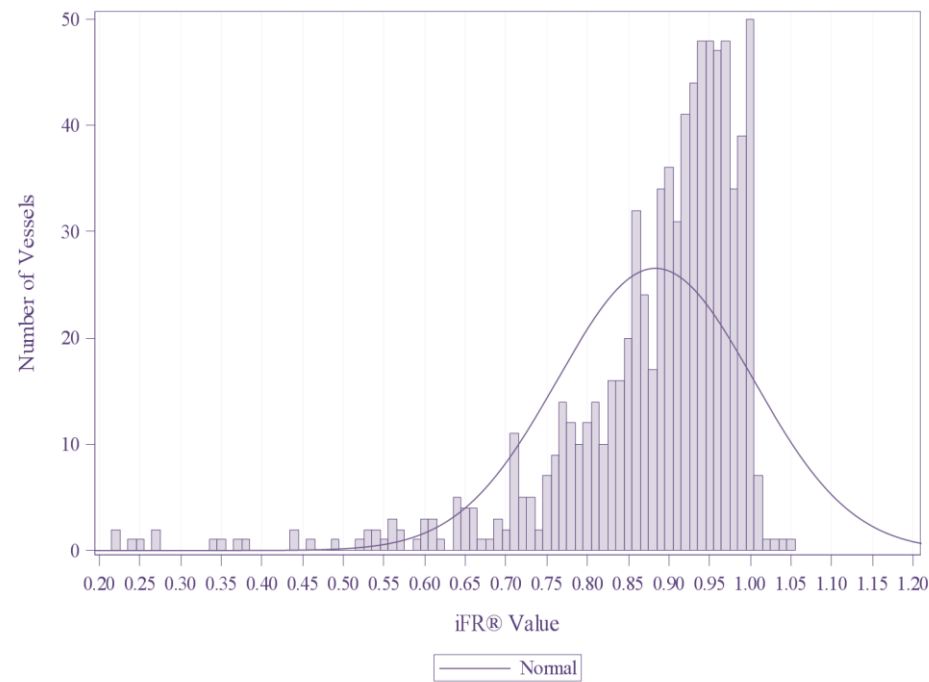
# Results of FFR/iFR<sup>®</sup>

Figure 4: FFR Value Distribution



Median FFR Value: **0.84**

Figure 3: iFR<sup>®</sup> Value Distribution



Median iFR<sup>®</sup> Value: **0.92**

Typical intermediate lesion population

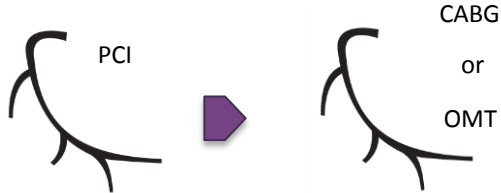
# ANGIOGRAPHY

# PHYSIOLOGY

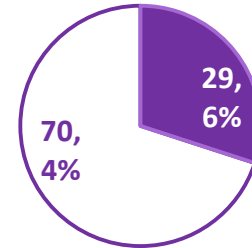
# RECLASSIFICATION OF TREATMENT ?

2A

VESSEL



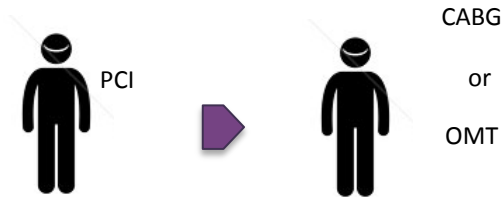
**Vessel Management**  
At Vessel Level  
(e.g PCI → CABG)



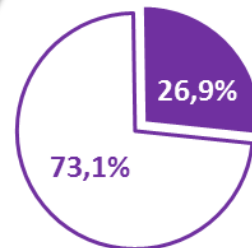
Vessel management change in 29,6% of vessels

2B

PATIENT



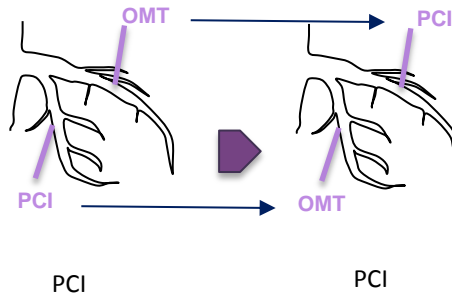
**Patient Management**  
“visible” change for the patient  
(e.g PCI → CABG)



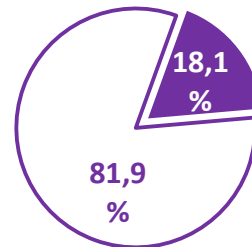
Patient management change in 26,9% of patients

2C

PROCEDURAL

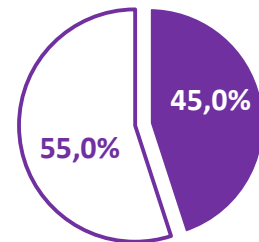


**Procedural Management**  
Procedural change  
No “visible” change for the patient



Procedural management change in 18,1% of patients

2D



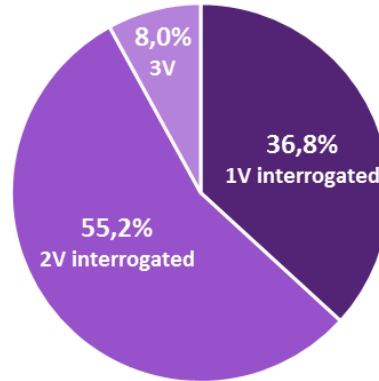
Total changes in 45% of patients

**Overall Management**

Patient + Procedural change

# Reclassification according to the number of vessels investigated

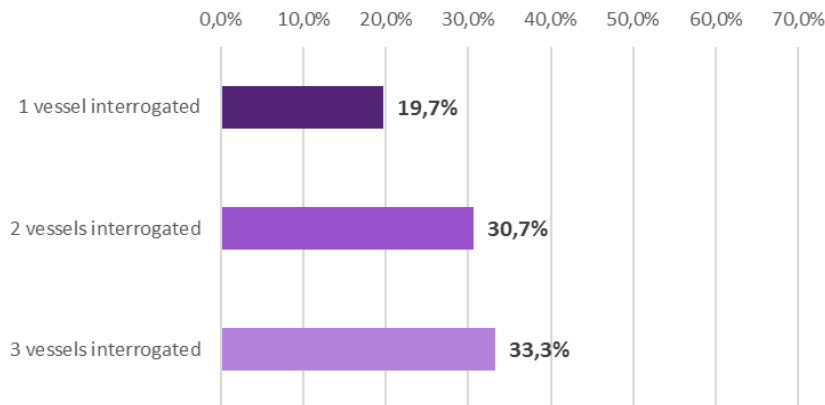
Vessels interrogated in MVD patients



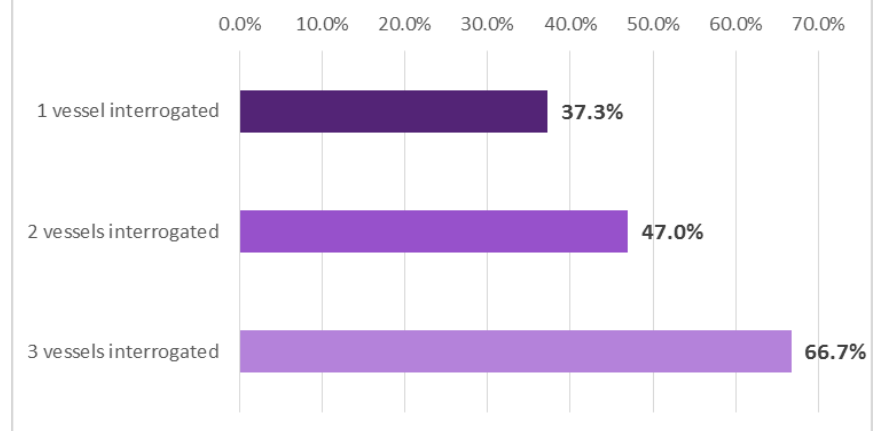
P=0.02

P=0.002

Patient management change by physiology



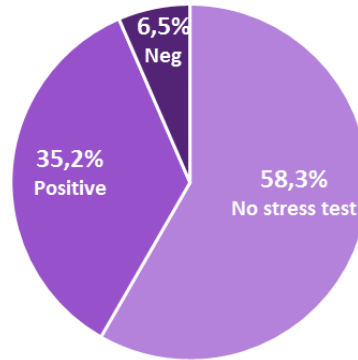
Procedural management change by physiology





# Reclassification according to the results of non-invasive tests

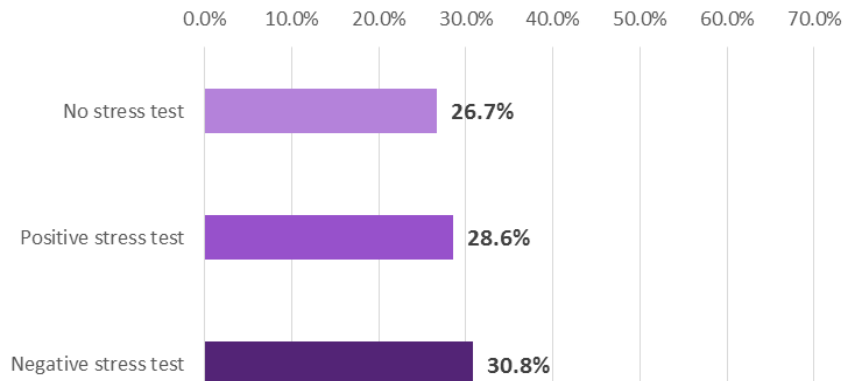
Stress test diagnosis in stable patients



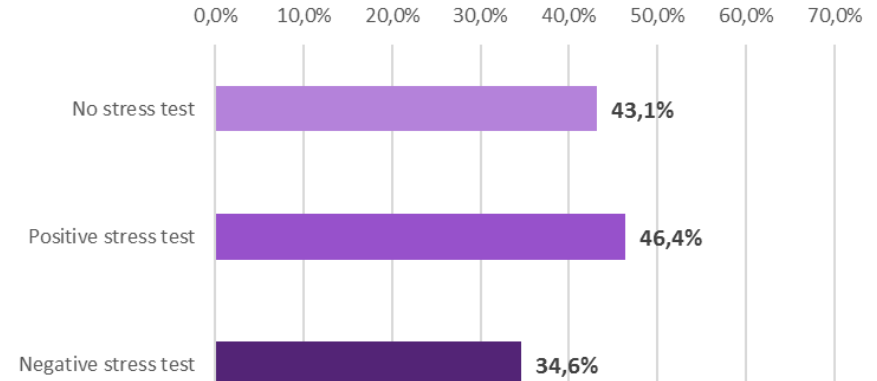
P=0.87

P=0.51

Patient management change by physiology

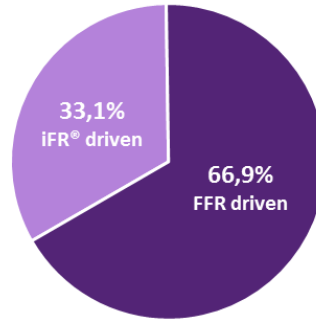


Procedural management change by physiology



# Reclassification according to the use of iFR/FFR

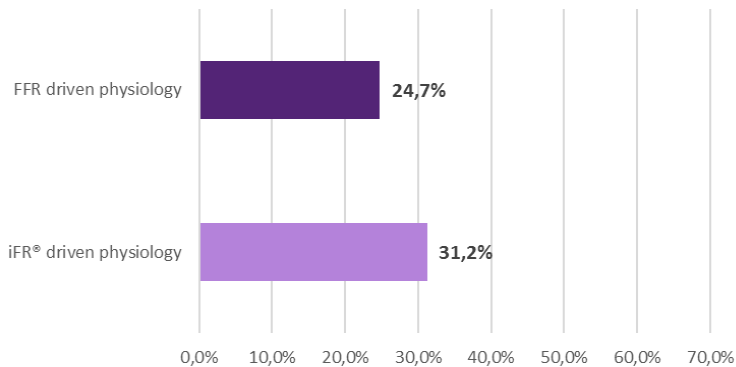
iFR<sup>®</sup> versus FFR driven physiology assesement in MVD patients



**iFR : 1.9 vessels**  
**FFR: 1.6 vessels**

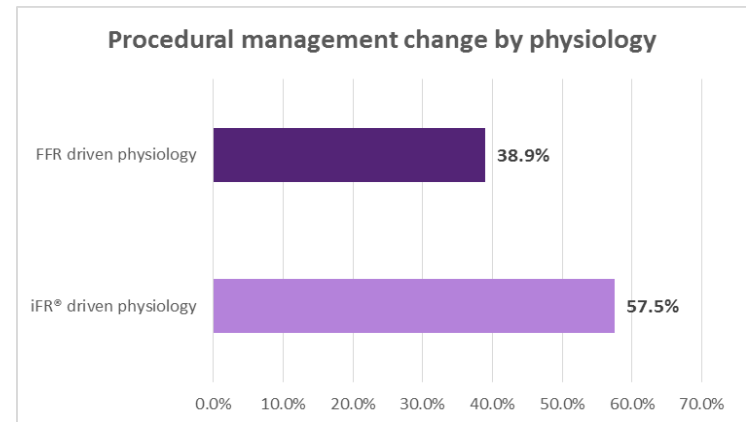
P=0.12

Patient management change by physiology



P=0.0001

Procedural management change by physiology





## Treatment Strategy Change After Routine Pressure Wire Assessment for Coronary Artery Disease

What You See Is “NOT” What You Get\*

Bon-Kwon Koo, MD, PhD

**TABLE 1** Summary of Previous Studies

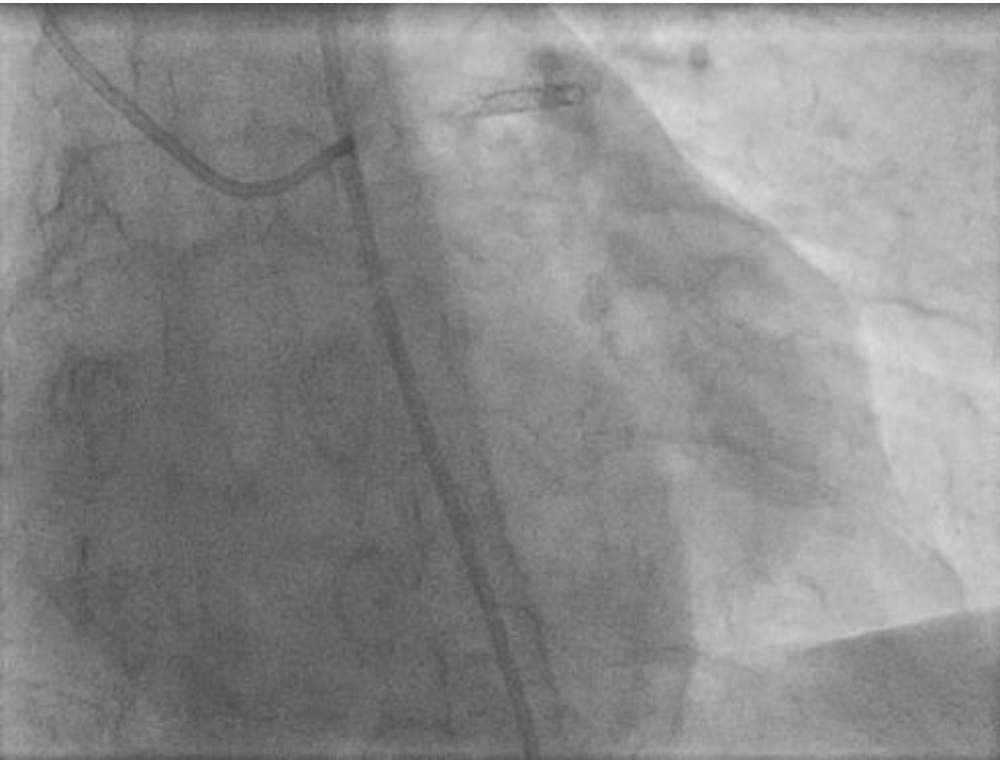
Trial (Year) (Ref. #)	Subjects	PW Assessment	Change in Management Strategy
DEFINE REAL (2018) (6)	Multivessel disease	FFR and/or iFR Intermediate lesions	26.9% (130 of 484 patients)
POST-IT (2016) (7)	FFR in $\geq 1$ vessel	FFR Operator's discretion	44.2% (406 of 918 patients)
FAMOUS-NSTEMI (2015) (8)	NSTEMI	FFR All lesions with $\geq 30\%$ stenosis	21.6% (38 of 176 patients)
R3F (2014) (9)	Ambiguous stenosis +	FFR Angiographically 35% to 65% stenosis	43.2% (464 of 1,075 patients)
RIPCARD (2014) (10)	Stable chest pain	FFR All coronary arteries $\geq 2.25$ mm	26.5% (53 of 200 patients)

FFR = fractional flow reserve; iFR = instantaneous wave free ratio; NSTEMI = non-ST-segment elevation myocardial infarction; PW = pressure wire.

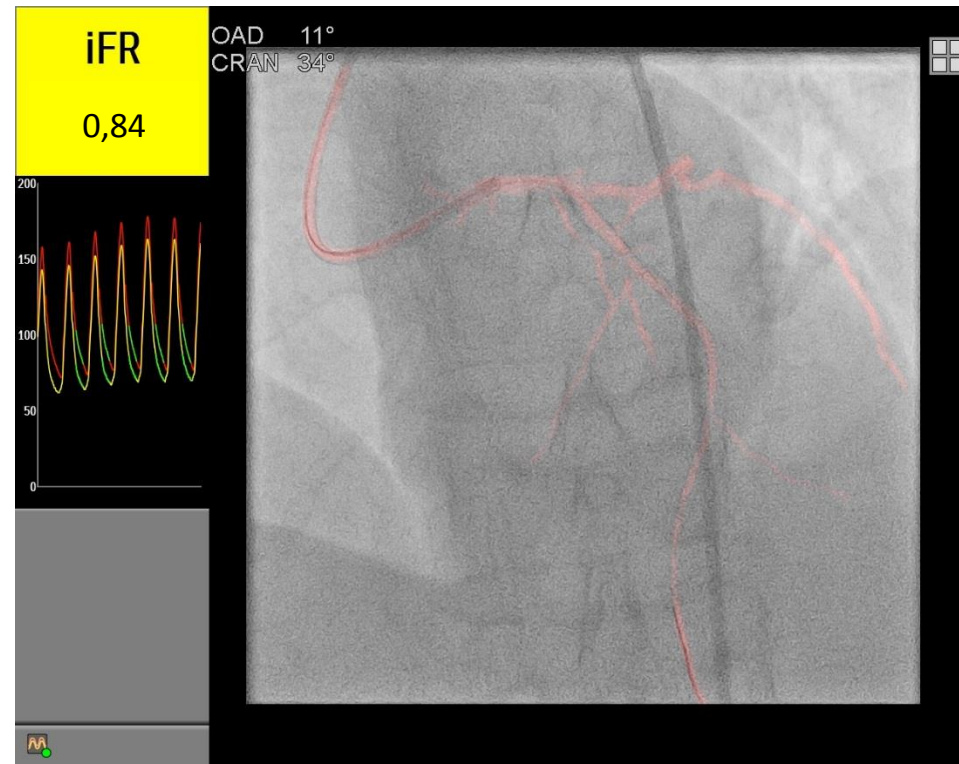
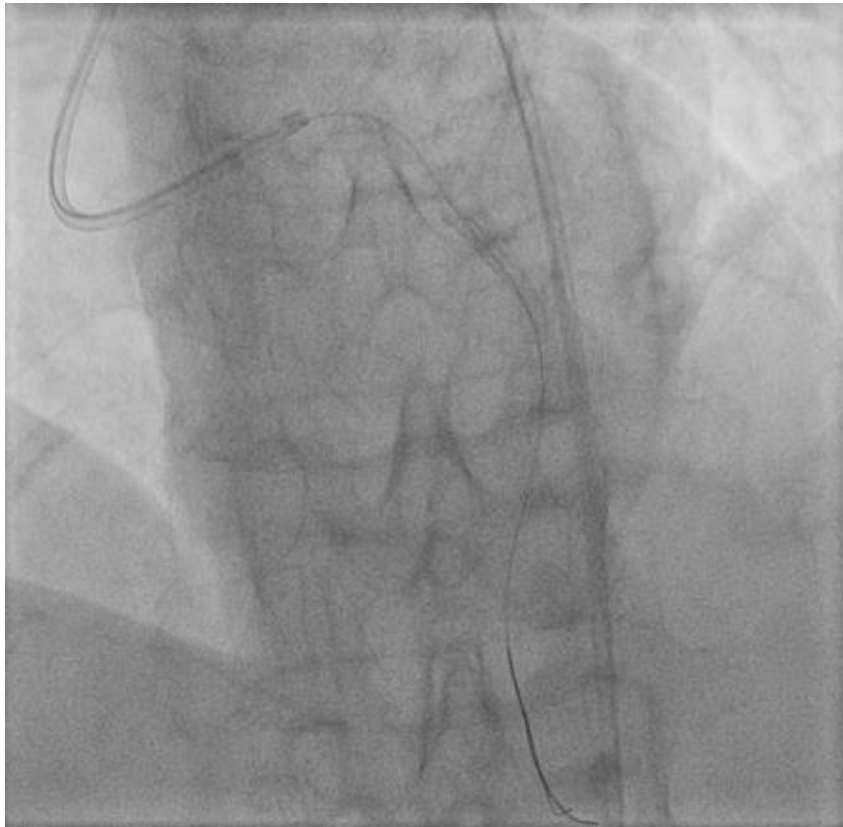
# Clinical Case

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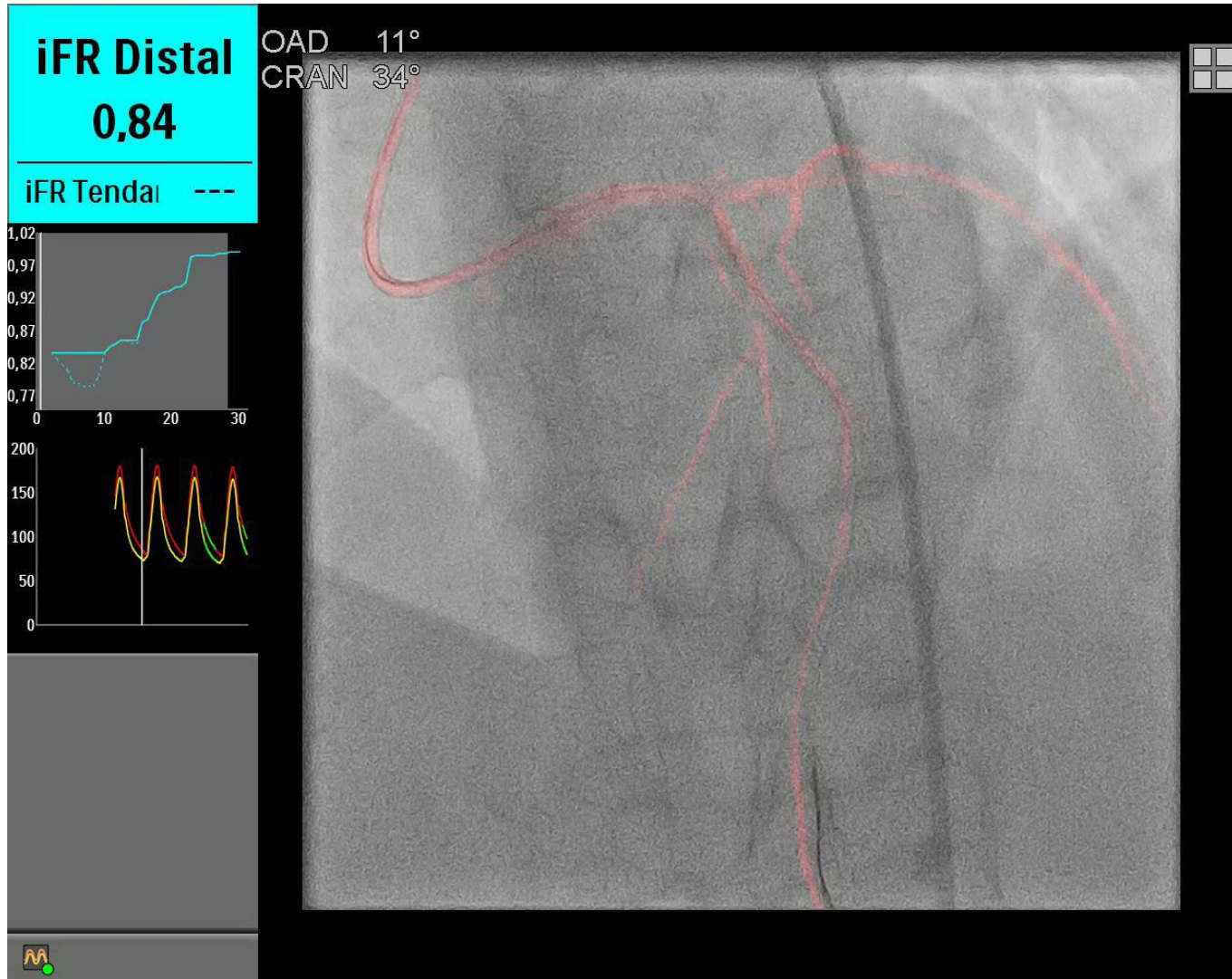
- Male 76 years.
- History of CAD and previous Stent LAD in 2011.
- Patient admitted for severe angina
- TTE : Preserved LEF
- Diagnostic angio : Stenosis of left distal LM
- Referred for PCI of of left main.



# iFR en distalité



# iFR Roadmap



# Conclusions

- ✓ Over the years invasive physiology (IP) has become the gold standard for the evaluation of epicardial vessel related ischemia.
- ✓ IP-guided PCI is associated with an improved clinical outcome (FAME and FAME 2)
- ✓ Routine use of IP in patients referred for diagnostic angiography is associated with change of the treatment decision (Reclassification) in **> 40%**
- ✓ Reclassification rates are **independent** of the pre-angiography performance of non-invasive testing and results.
- ✓ IP-based “reclassification” of the revascularization decision including FFR-deferral is safe



Thank you for your attention!



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