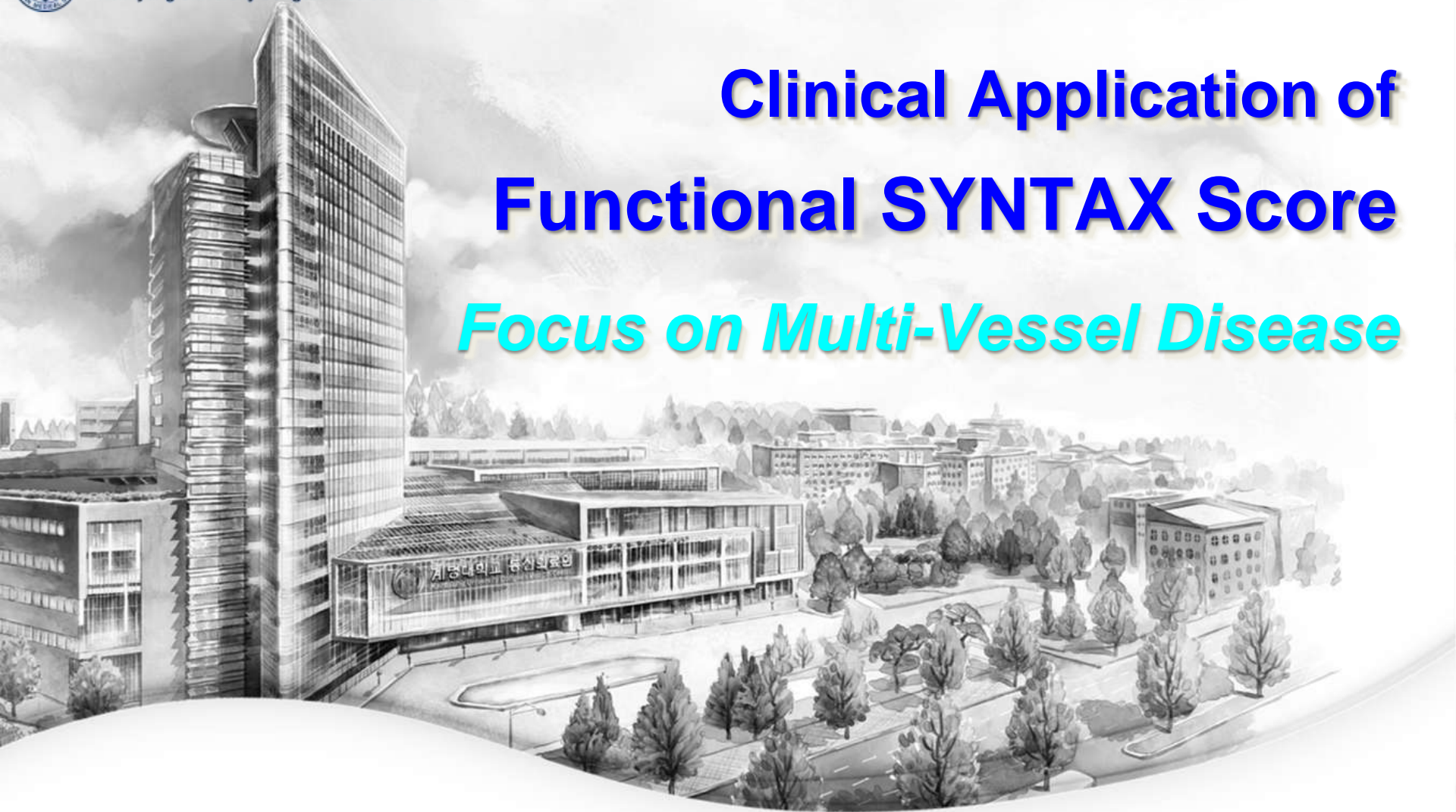




# Clinical Application of Functional SYNTAX Score

## *Focus on Multi-Vessel Disease*



**NAM, Chang-Wook, MD, PhD**

*Keimyung University Dongsan medical center, Daegu, Korea*

# CONTENTS

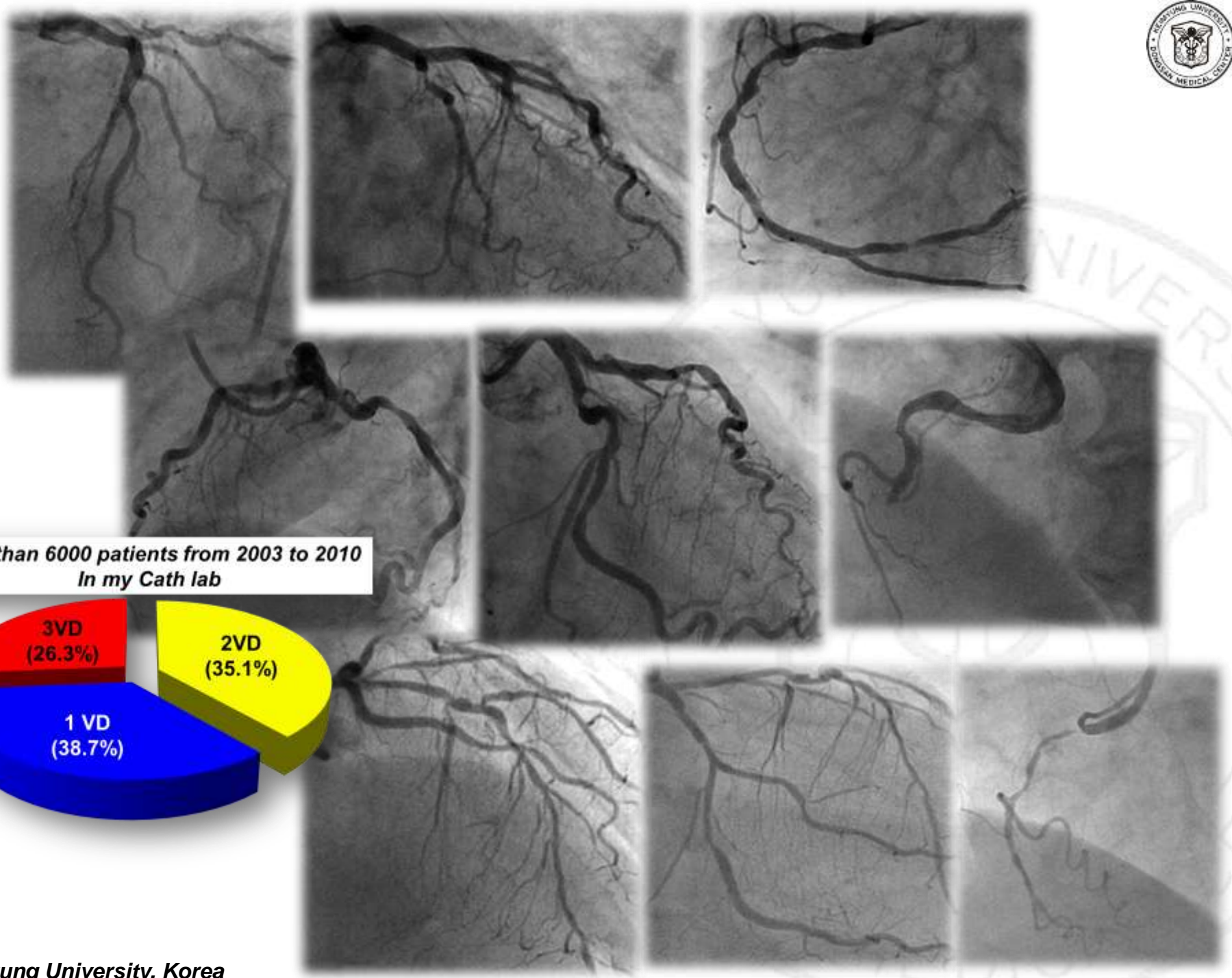
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- 1 Why multi-vessel disease?**
- 2 How to evaluate multi-vessel disease?**
- 3 How to treat multi-vessel disease?**

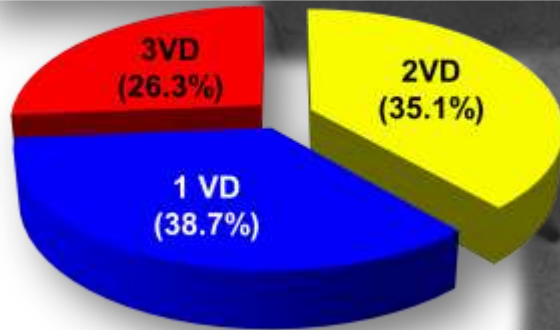


01

**Why multi-vessel disease?**



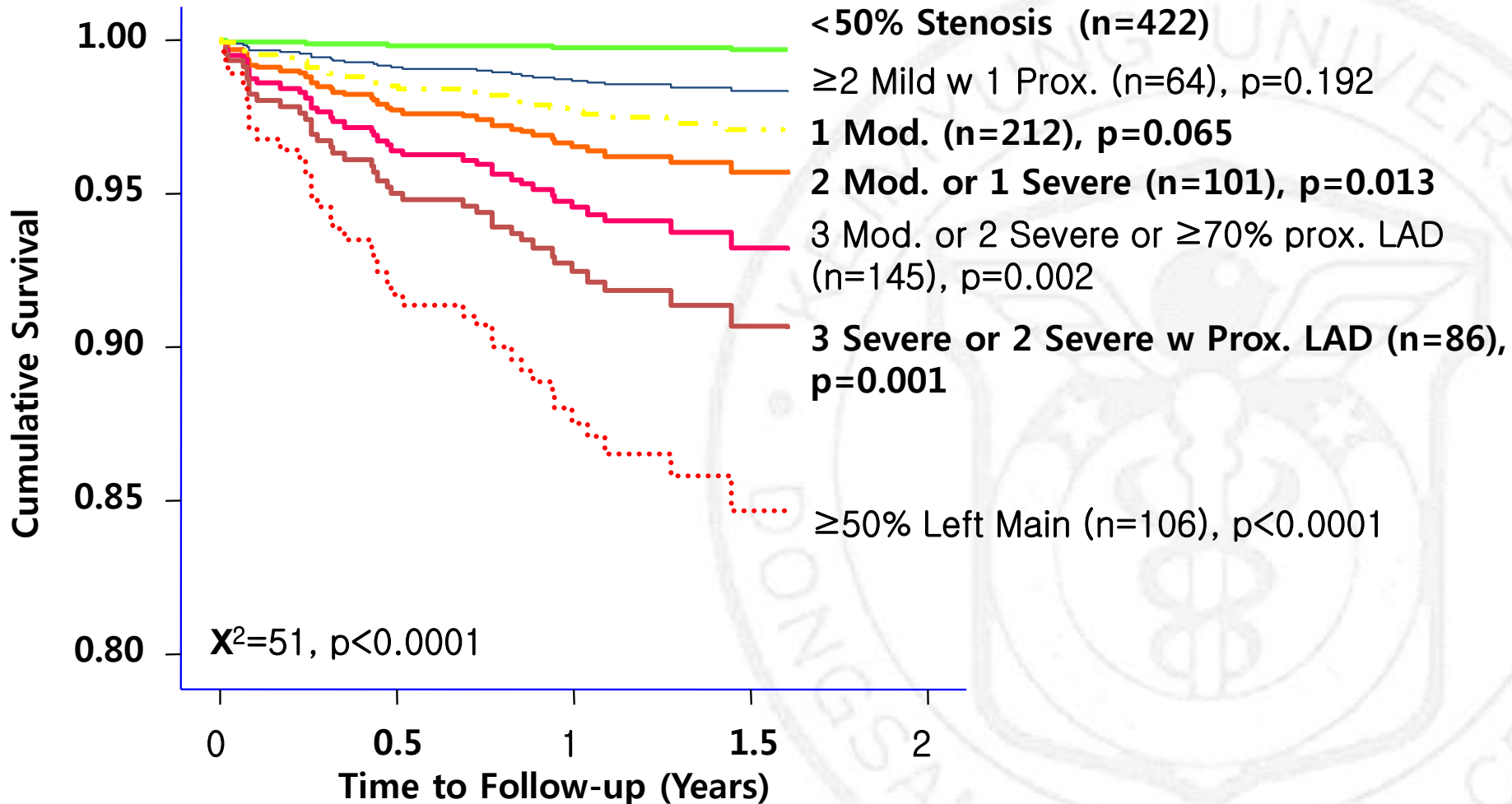
**More than 6000 patients from 2003 to 2010  
In my Cath lab**





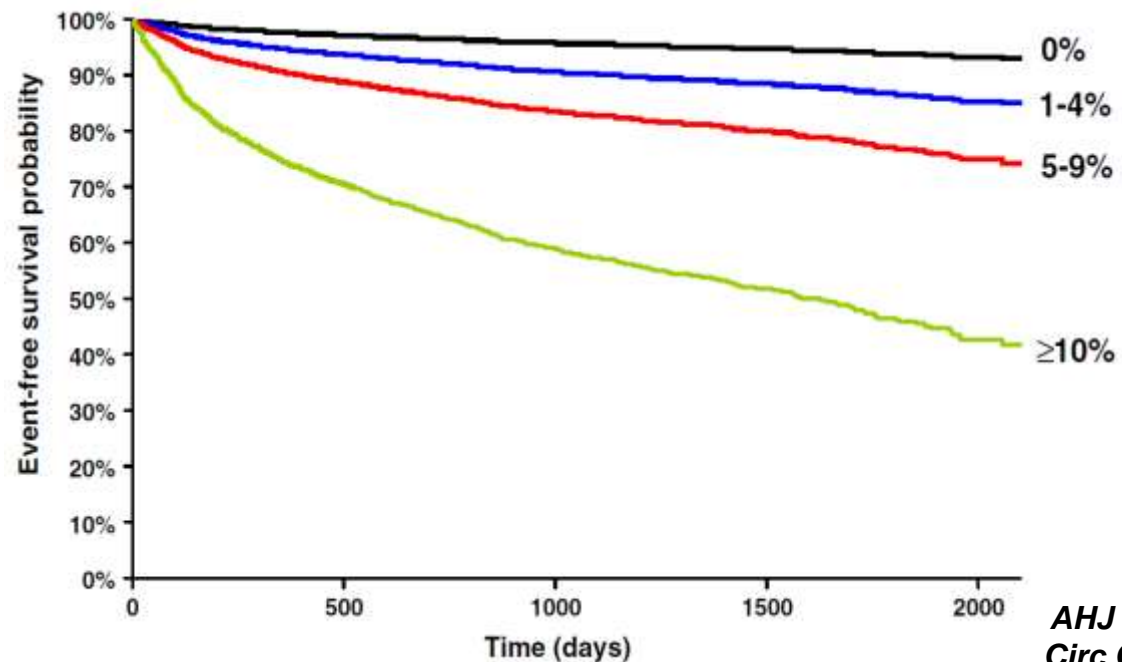
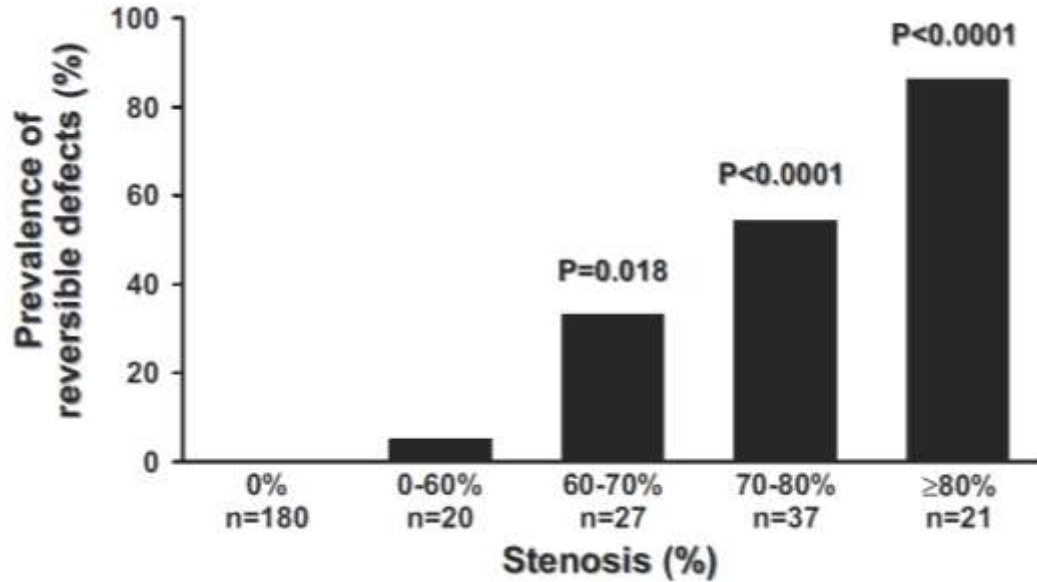
# Extent of CAD for prediction of risk of death

1,127 consecutive pts with CCTA for suspected or known CAD followed for 15 months.

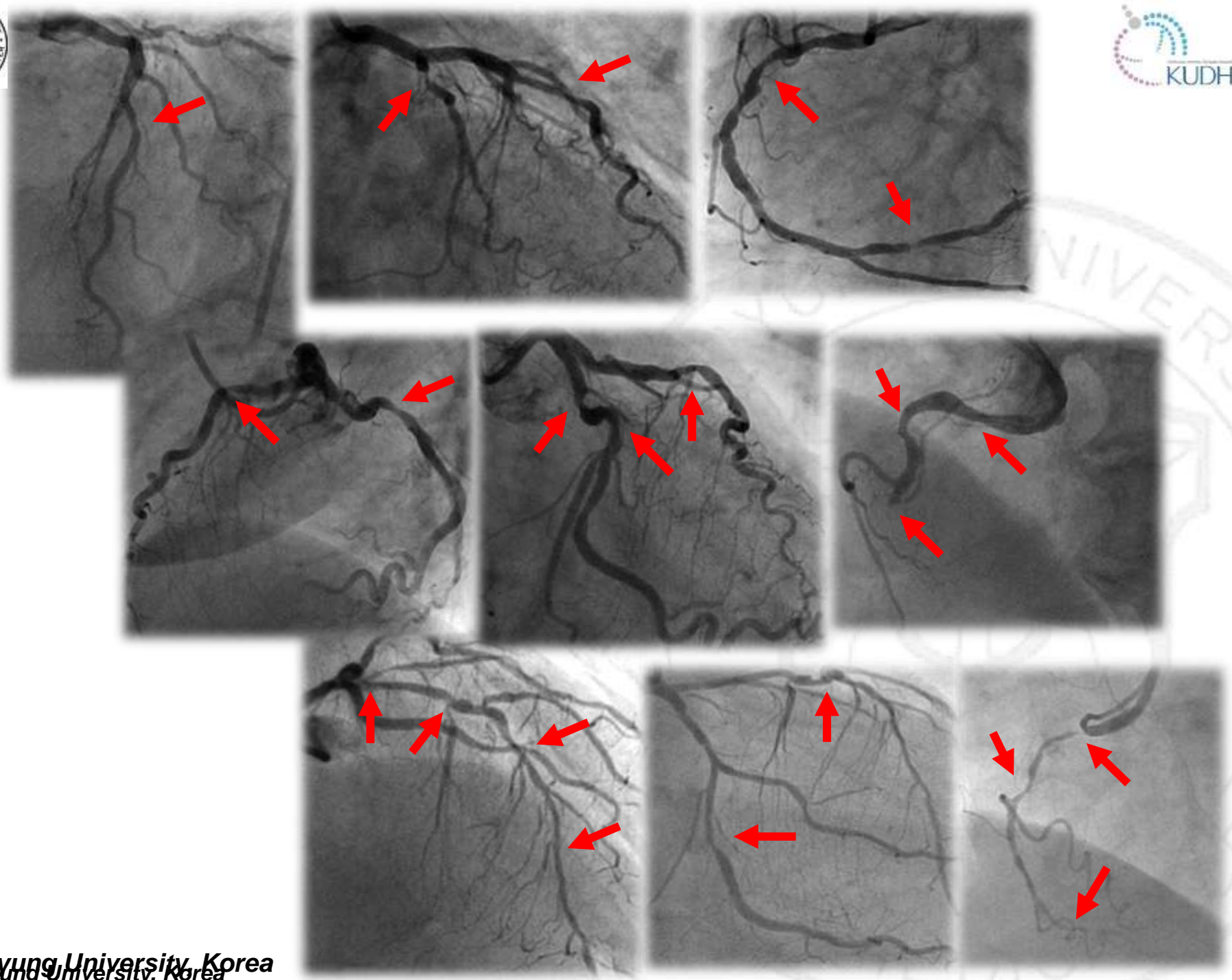


R-A p<0.0001 (adjusting for risk factors, chest pain, + dyspnea), Mild (30%–49%), Mod. (50%–69%), & Severe ( $\geq 70\%$ ).

# Outcome and LV ischemia



AHJ 2011;161:900  
Circ CI 2008;1:257

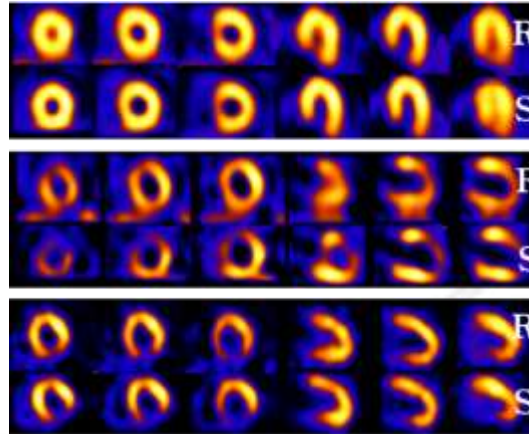




## 2 How to evaluate multi-vessel disease?

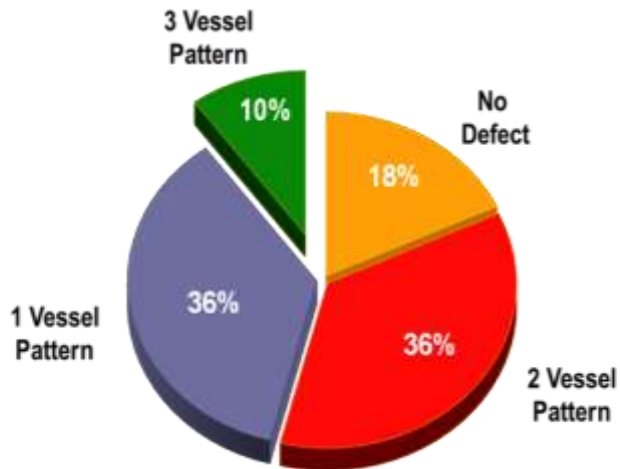


# Gated SPECT



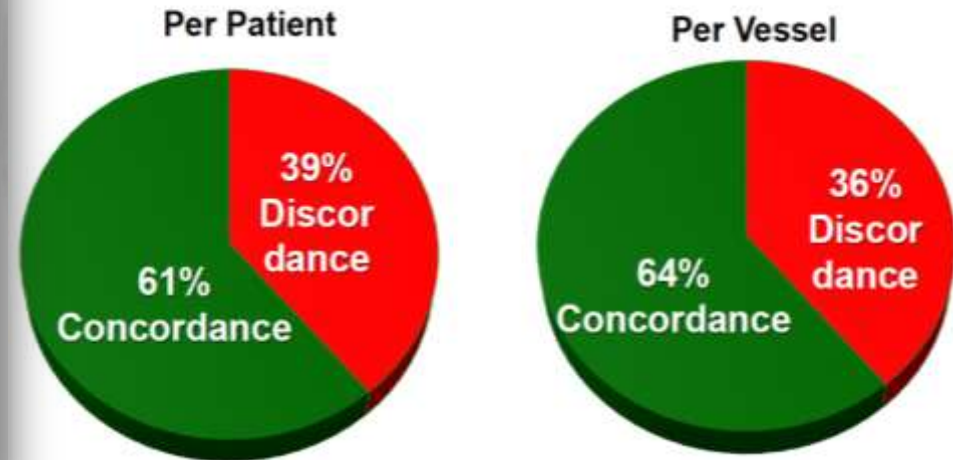
## Comparison of MIBI SPECT & CAG

143 patients with severe 3VD and Tc-SPECT



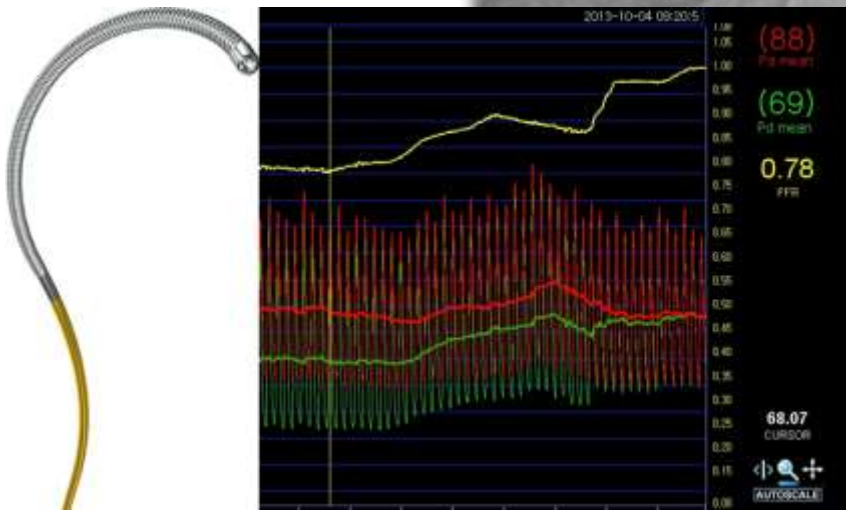
## Comparison of MIBI SPECT & FFR

Patients with MVD (n = 67), vascular territories (n = 201)



Adpated from Dr Koo & Dr De Bruyne  
Lima RS, et al JACC 2003  
N Melikian et al, JACC interv 2010

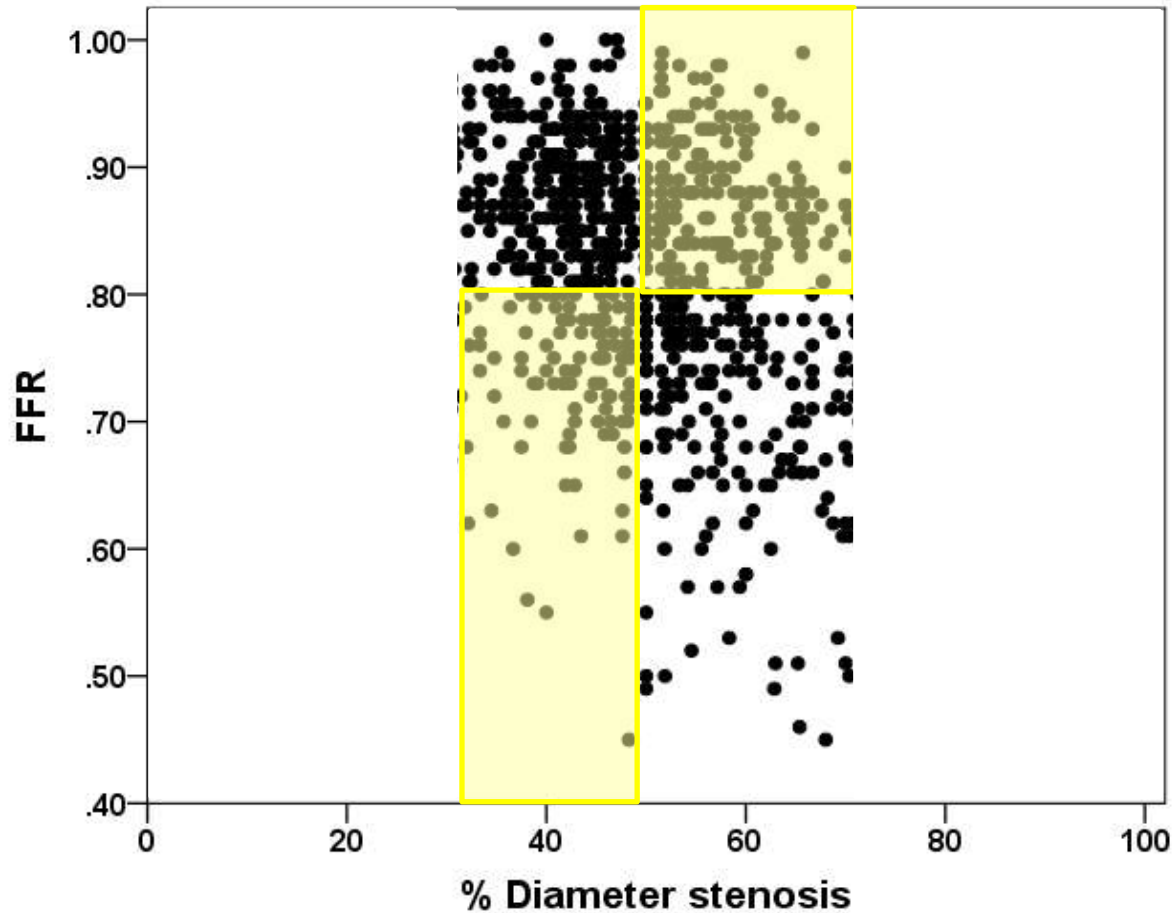
# What we need...



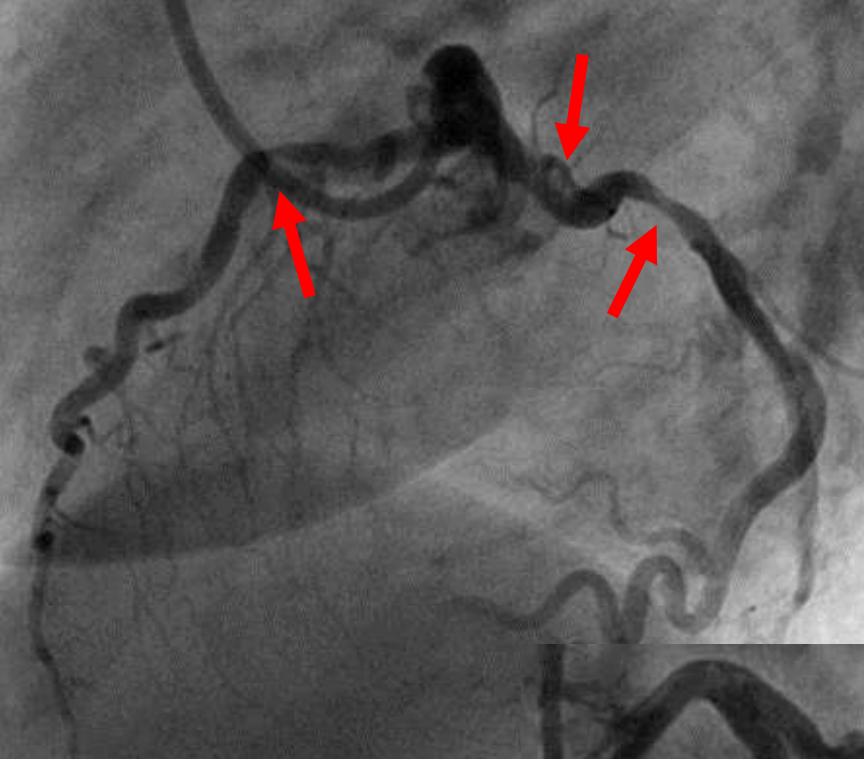
# Physiologic view in CAD

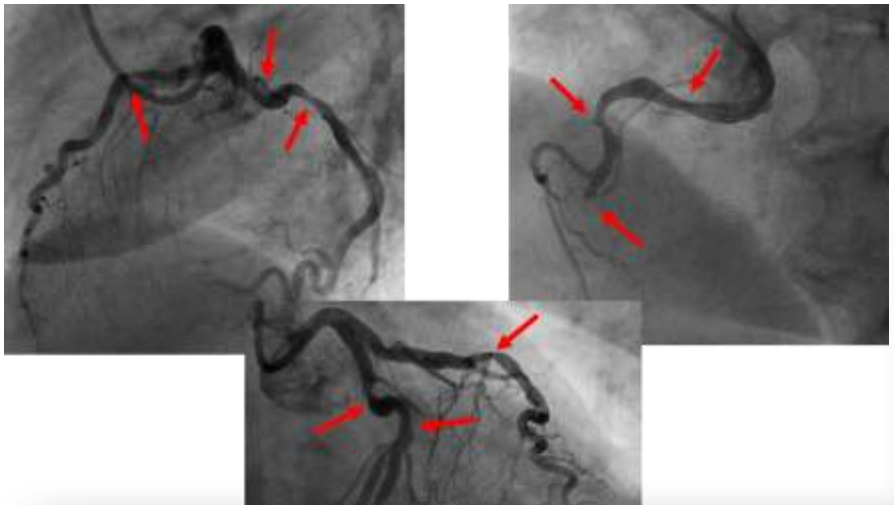


***~30% mismatch***



***Pressure wire should be ready in your cath lab!***





### Summary

**Lesion 1**  
 (segment 1): 1x2=  
 Severe Tortuosity  
 Sub total lesion 1

**Lesion 2**  
 segment number(s)

2  
2  
4

### Indications to perform CABG or PCI in stable CAD

Clinical conditions	Type of preferred revascularization <sup>a</sup>
Single-vessel disease, non-proximal LAD, with or without diabetes mellitus.	PCI
Multi-vessel disease with SYNTAX score <22 and high surgical risk (e.g. EuroSCORE >6).	PCI
Revascularization in patient with contra-indication to surgery (severely impaired lung function, prior mediastinal irradiation, prior CABG or non-coronary cardiac surgery, bilateral carotid artery stenoses).	PCI
Elderly patient (>80 years) and co-morbidities or frailty <sup>b</sup>	PCI
Left main disease with SYNTAX score ≥33.	CABG
Multi-vessel disease (with or without diabetes) with LAD involvement and SYNTAX score >22.	CABG
Recurrent in-stent re-stenosis after DES implantation in proximal-mid LAD.	CABG
Revascularization in patients with concomitant significant structural heart disease also requiring surgery.	CABG
Multi-vessel disease or left main disease with SYNTAX score <22 and low surgical risk (e.g. EuroSCORE <6)	CABG or PCI
Left main disease with SYNTAX score <33.	CABG or PCI
Impaired LV function.	CABG or PCI
Renal insufficiency or dialysis.	CABG or PCI

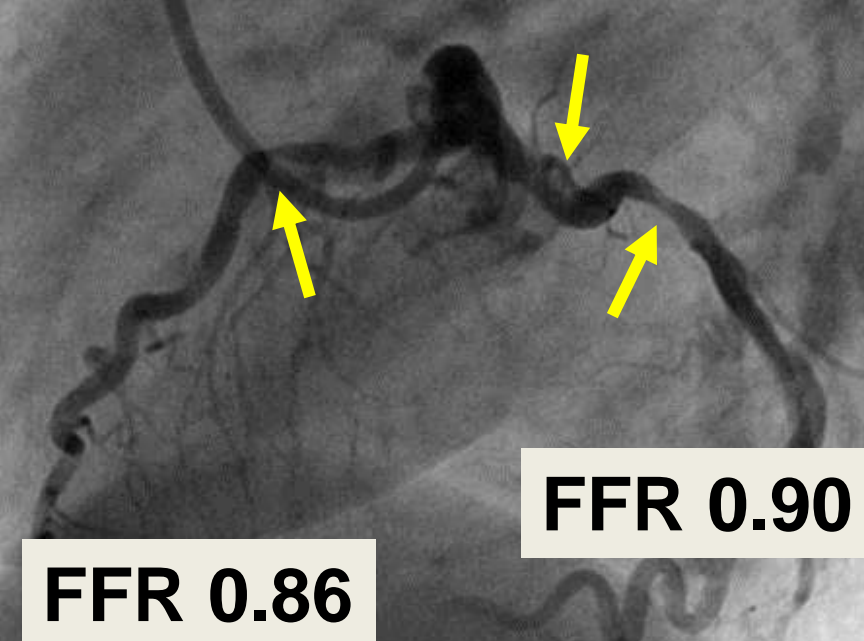
5  
1  
1  
2  
1  
2  
12

5  
2  
2  
9

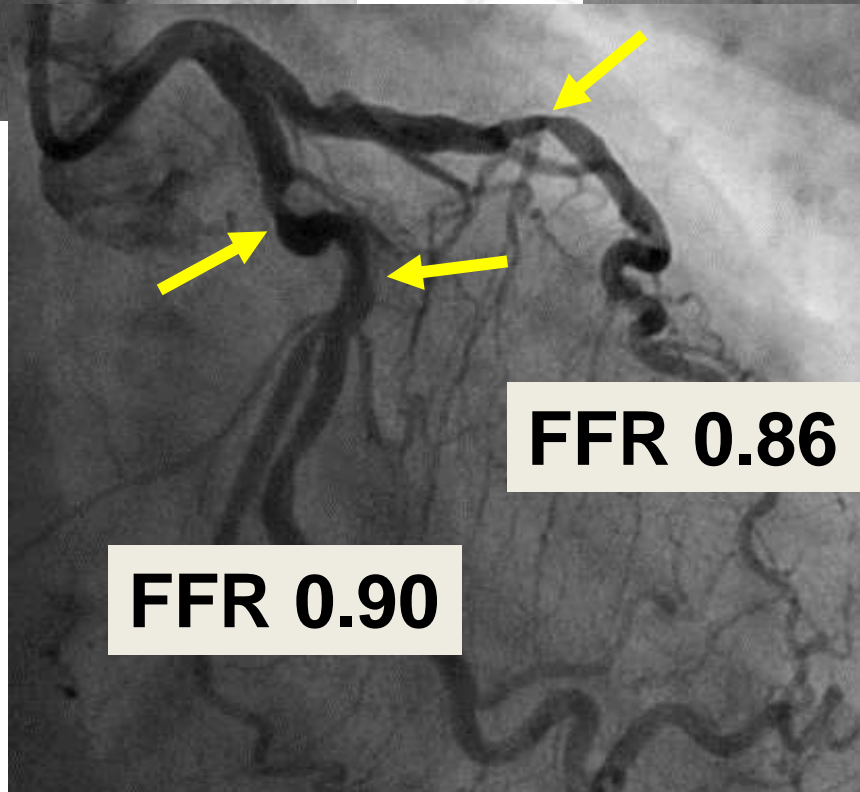
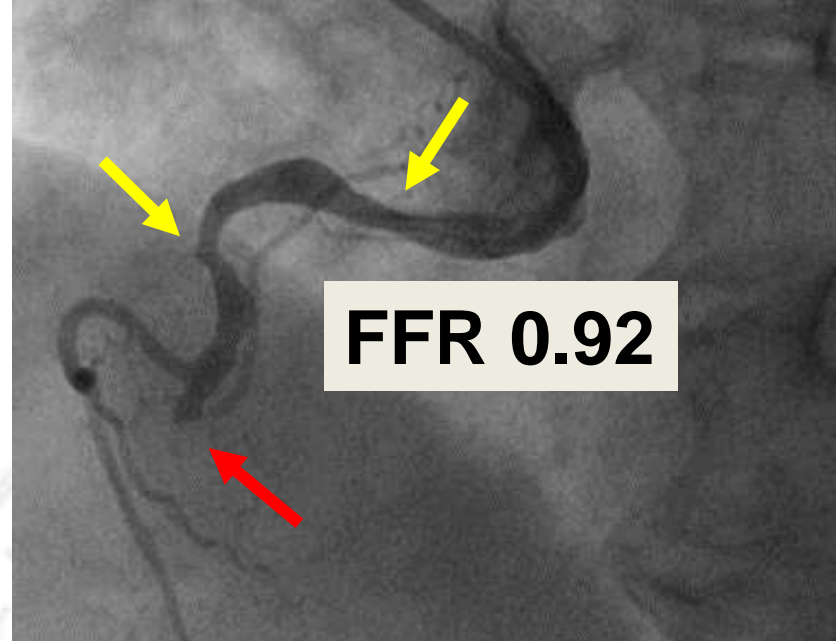
3  
3

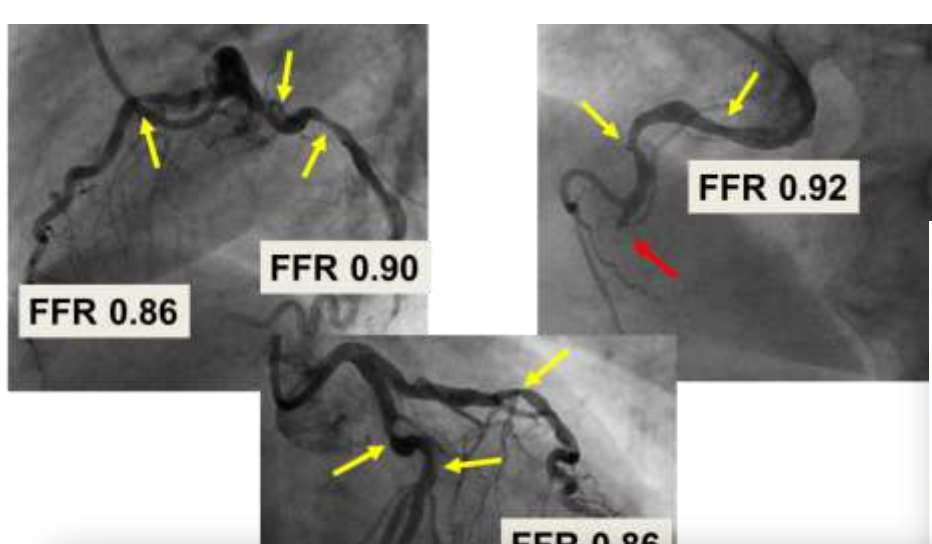
3  
2  
5

33



**FFR 0.90**





**Summary**

**Lesion 1**  
 (segment 1); 1x2=  
 Severe Tortuosity  
 Sub total lesion 1

**Lesion 2**  
 segment number(s)

2  
2  
4

**Indications to perform CABG or PCI in stable CAD**

Clinical conditions	Type of preferred revascularization <sup>a</sup>
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Multi-vessel disease or left main disease with SYNTAX score <22 and low surgical risk (e.g. EuroSCORE <6)	CABG or PCI
Left main disease with SYNTAX score <33.	CABG or PCI
Impaired LV function.	CABG or PCI
Renal insufficiency or dialysis.	CABG or PCI

5  
1  
1  
2  
1  
2  
12  
  
5  
2  
2  
9  
  
3  
3  
  
3  
2  
5  
  
33



# *Revisit FAME*



## *Functional SYNTAX Score for Risk Assessment in Multi-vessel Coronary Artery Disease*

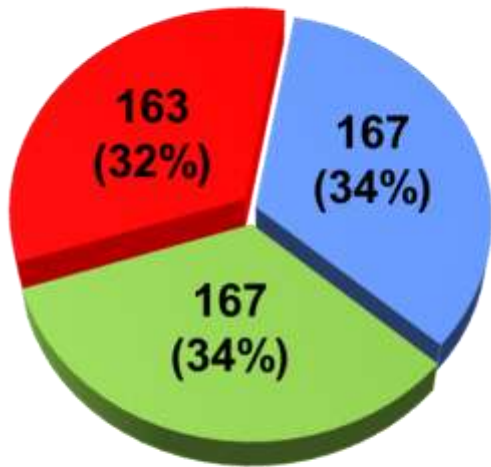
**FFR-guided “Functional SYNTAX score (FSS)”  
would predict clinical outcome better than the  
“classic SYNTAX score (SS)” in patients with  
multi-vessel coronary artery disease  
undergoing percutaneous coronary intervention**



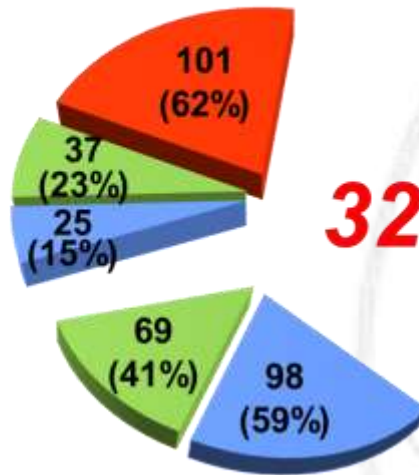
# Revisit FAME

## Functional SYNTAX score

SYNTAX score

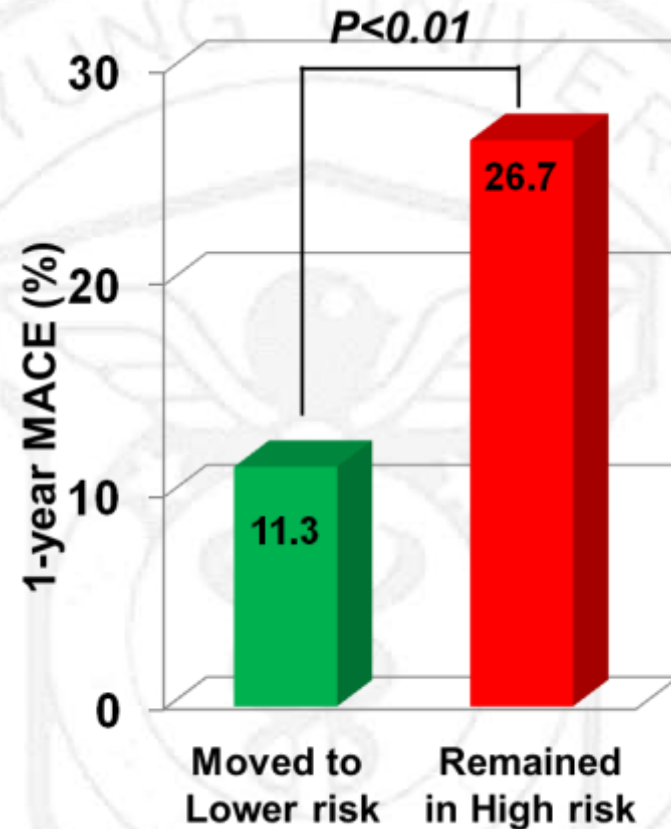


Functional SYNTAX score



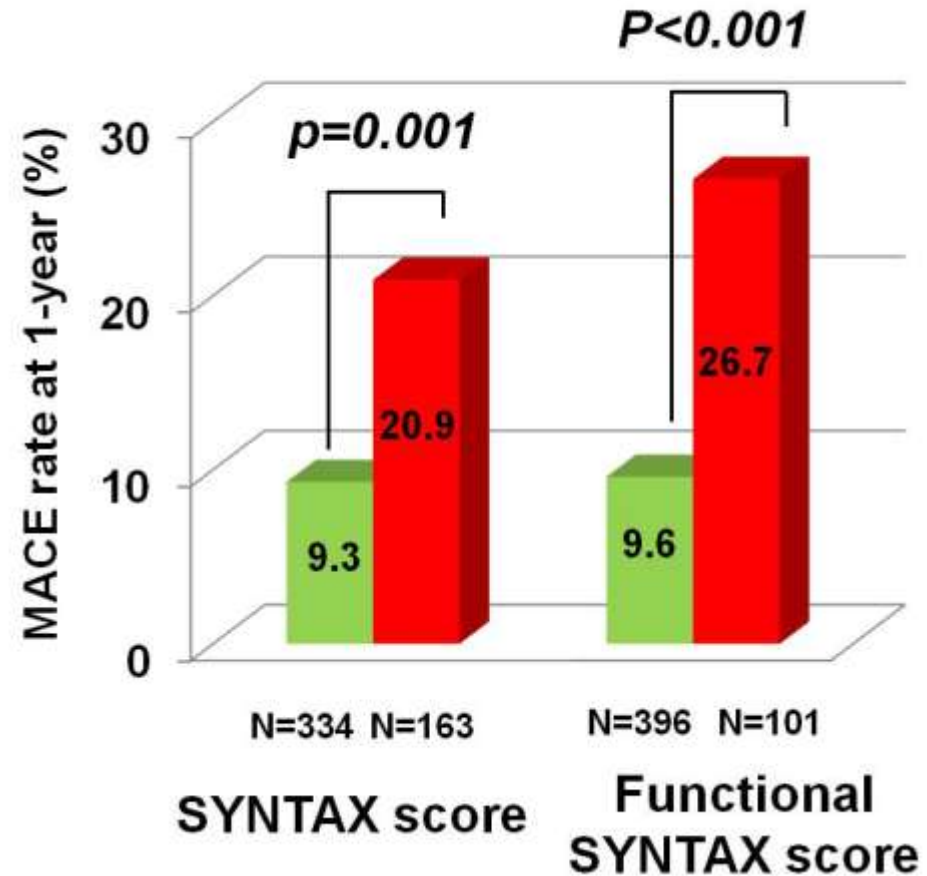
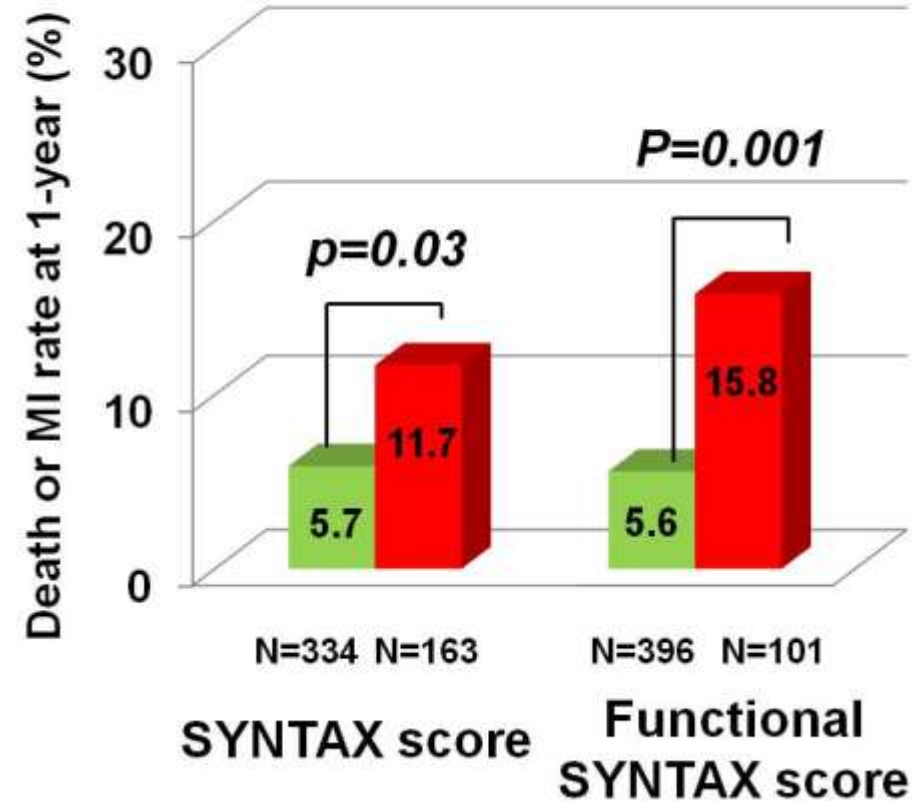
**32%** ↓

- Low SYNTAX score
- Medium SYNTAX score
- High SYNTAX score



# Comparison of Outcomes

■ Low or Medium risk  
■ High risk



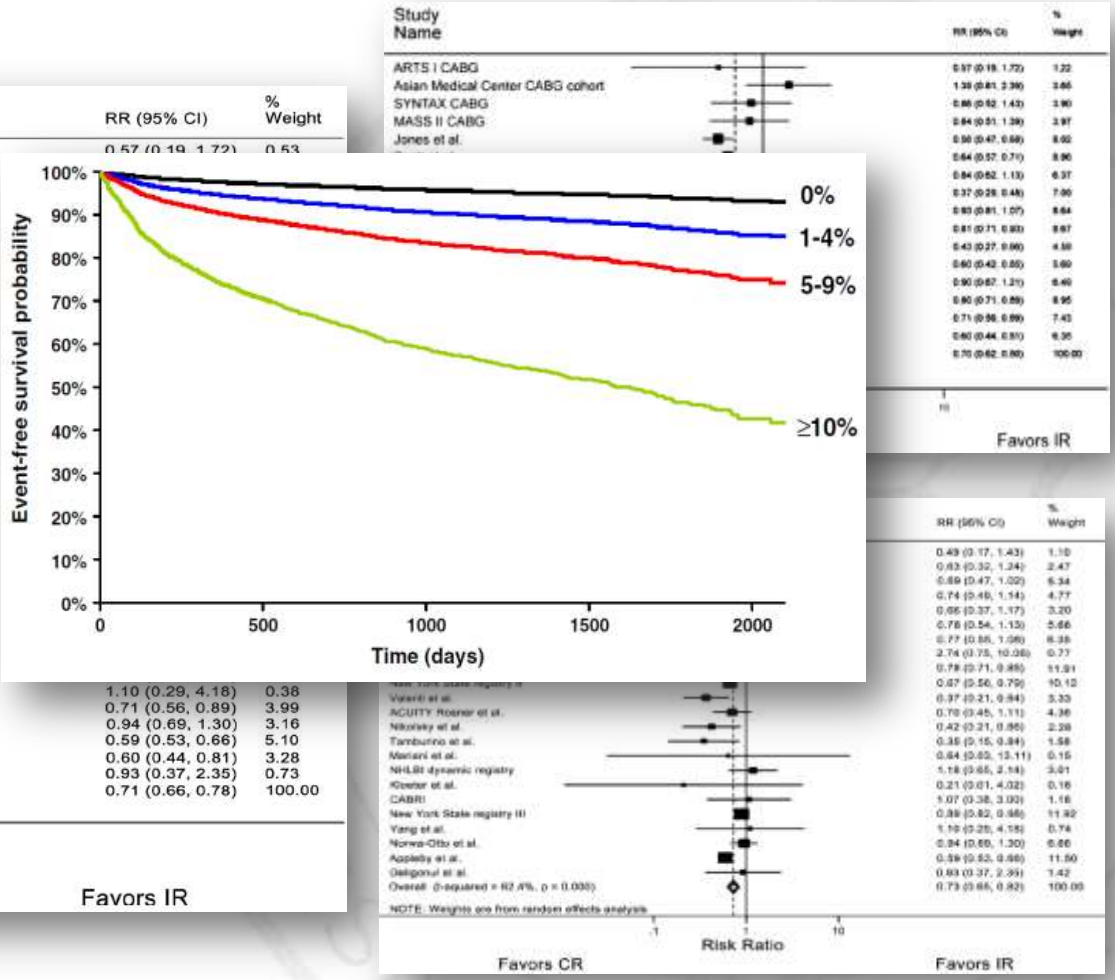
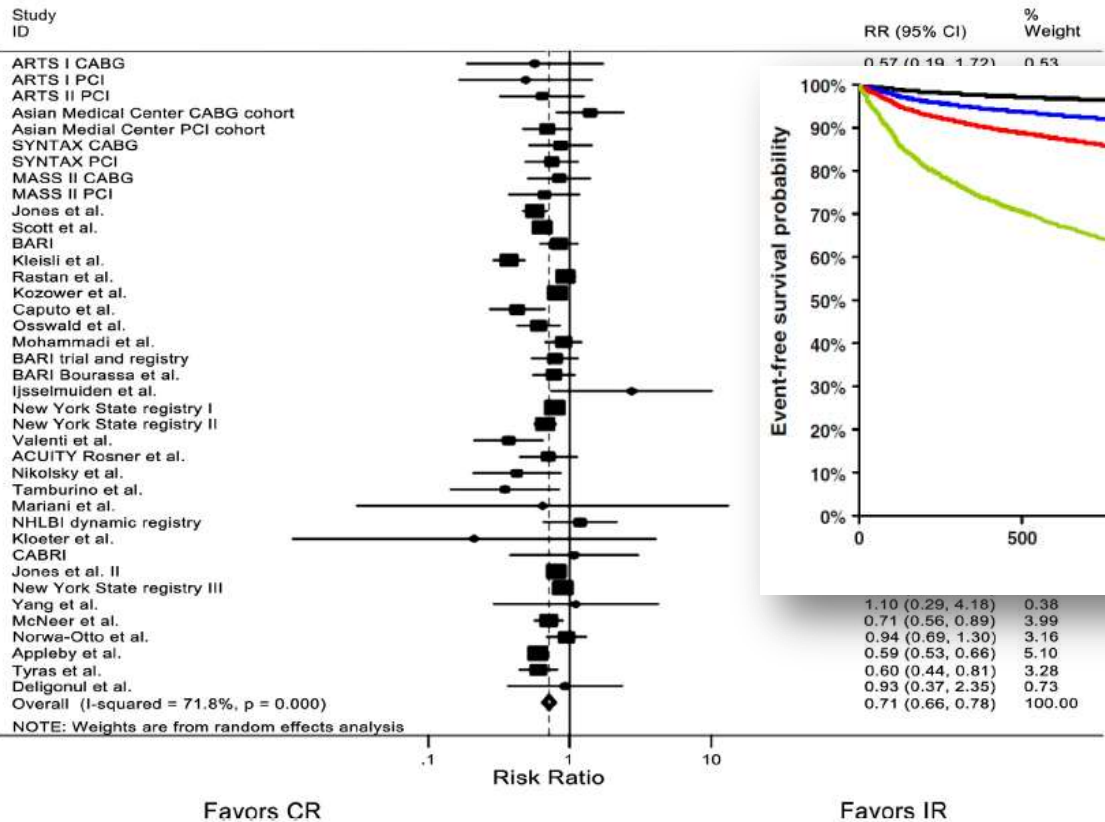


**3**

**How to treat multi-vessel disease?**

# Outcomes After Complete Versus Incomplete Revascularization of Patients With Multivessel Coronary Artery Disease

## A Meta-Analysis of 89,883 Patients Enrolled in Randomized Clinical Trials and Observational Studies



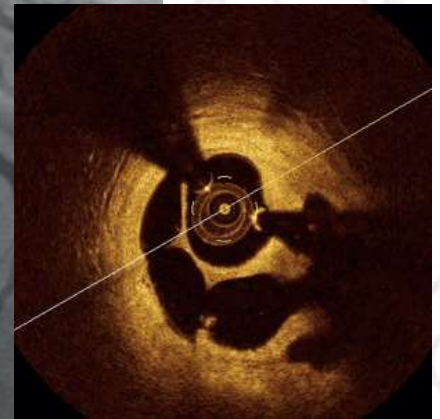
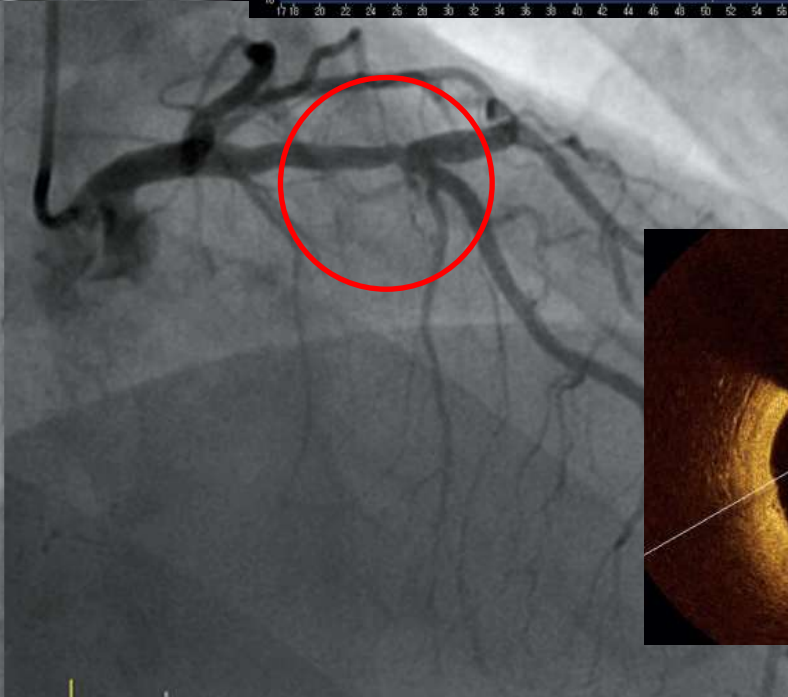
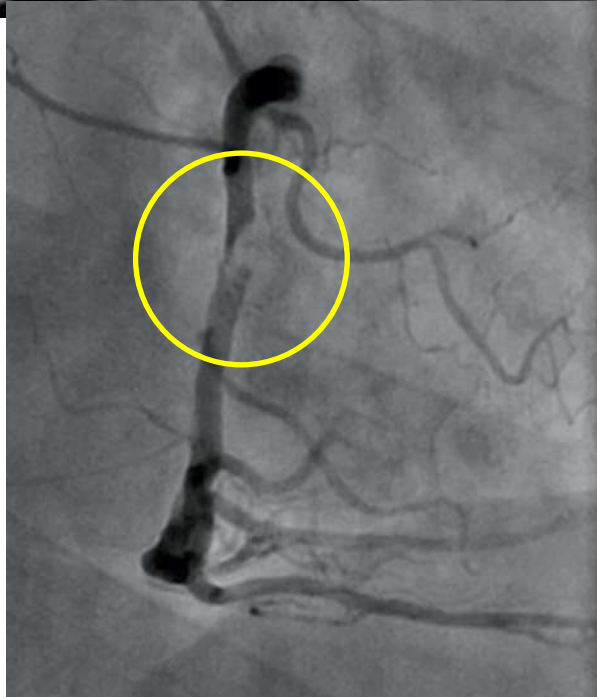


# HOW TO TREAT MVD ?

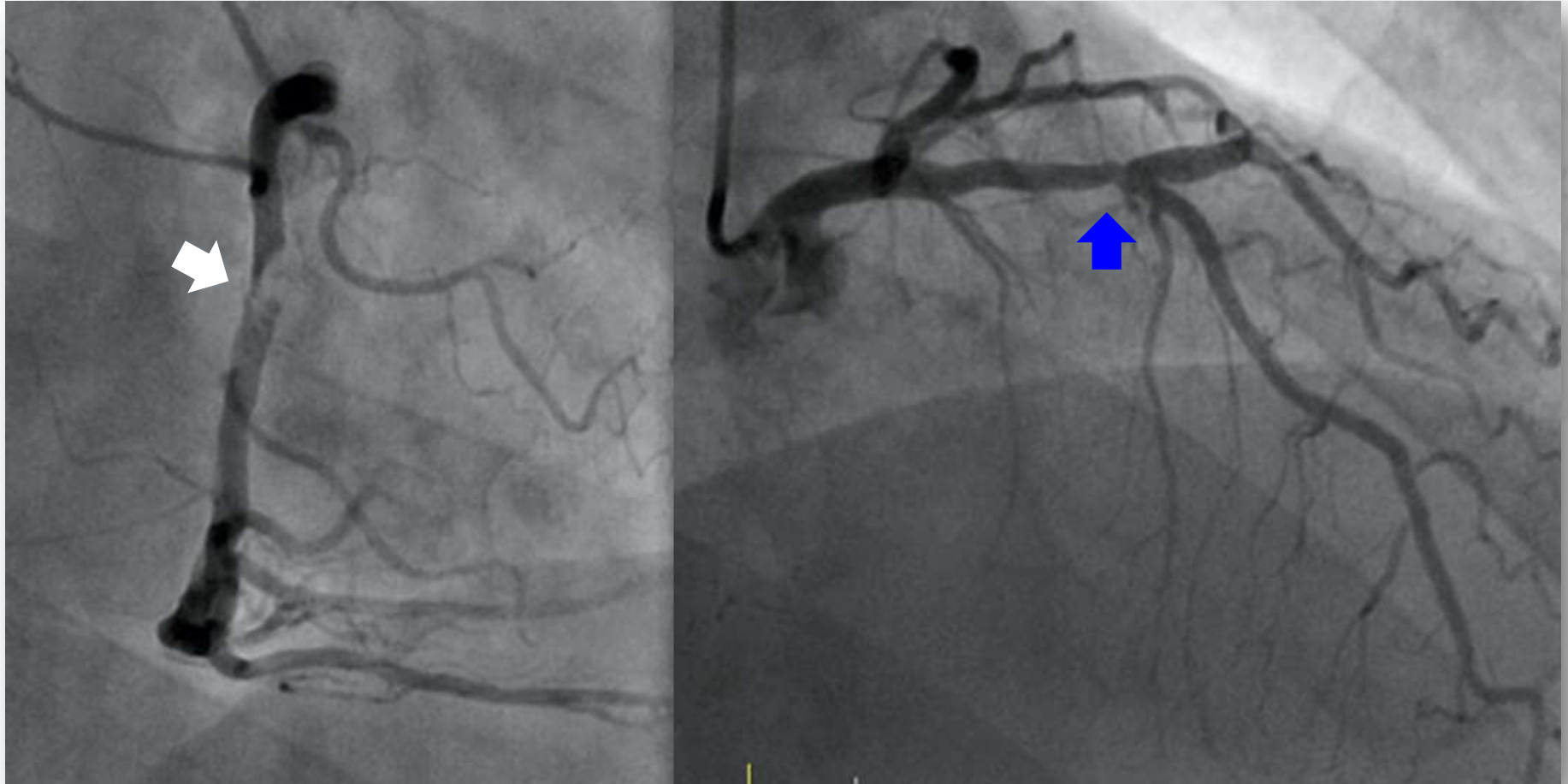
**Angiographic vs. In Functional  
Complete Revascularization**



# 48YO/♂ Angina, TMT(+/-)

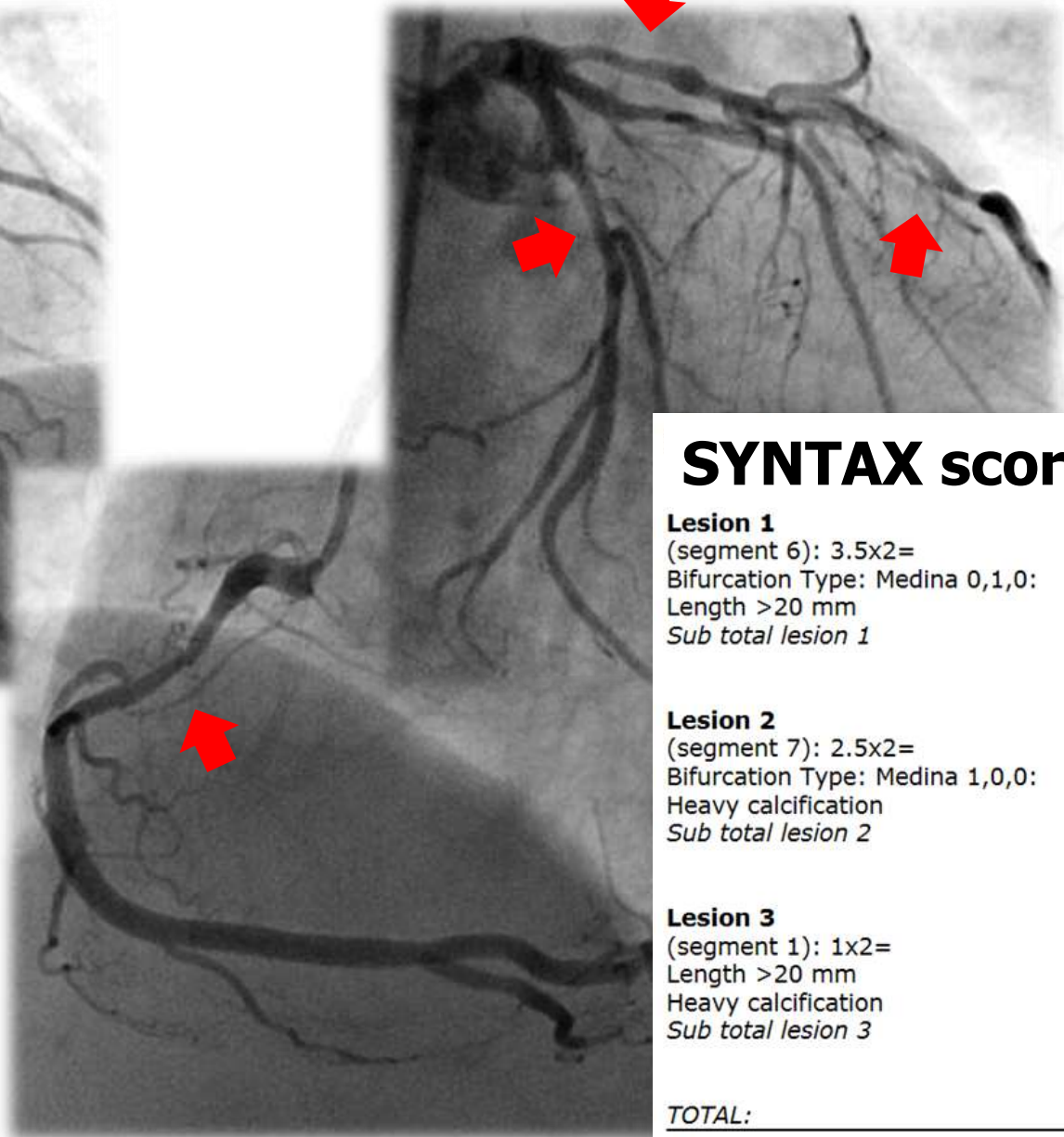
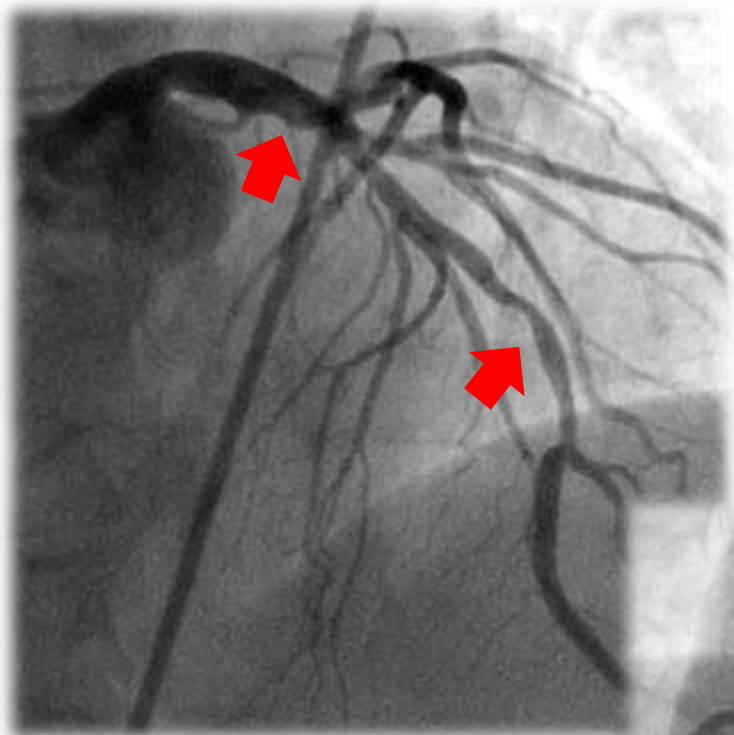


# Angiographic single vessel disease



# Functional multi-vessel disease

# 52YO/♂ Angina



## SYNTAX score

**Lesion 1**  
 (segment 6): 3.5x2= 7  
 Bifurcation Type: Medina 0,1,0: 1  
 Length >20 mm 1  
 Sub total lesion 1 9

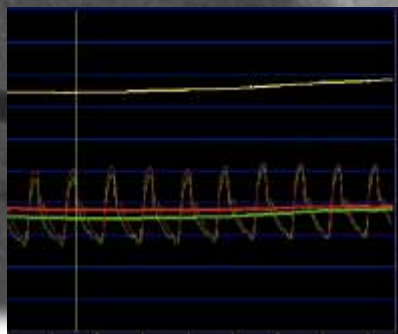
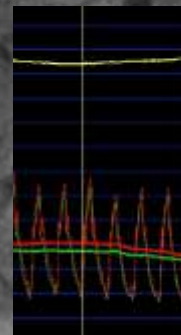
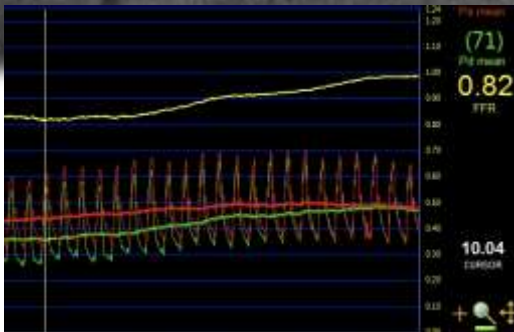
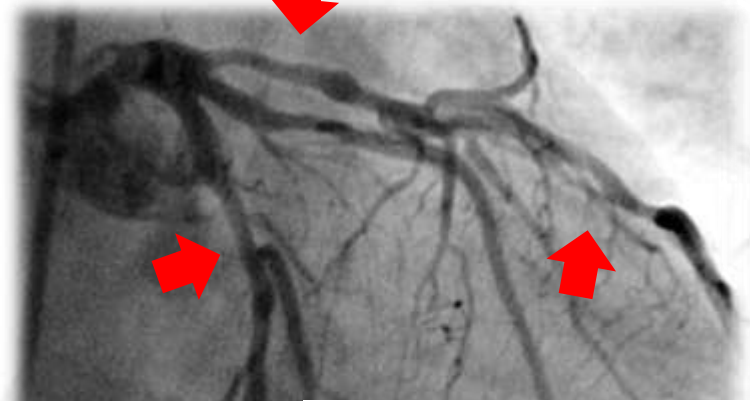
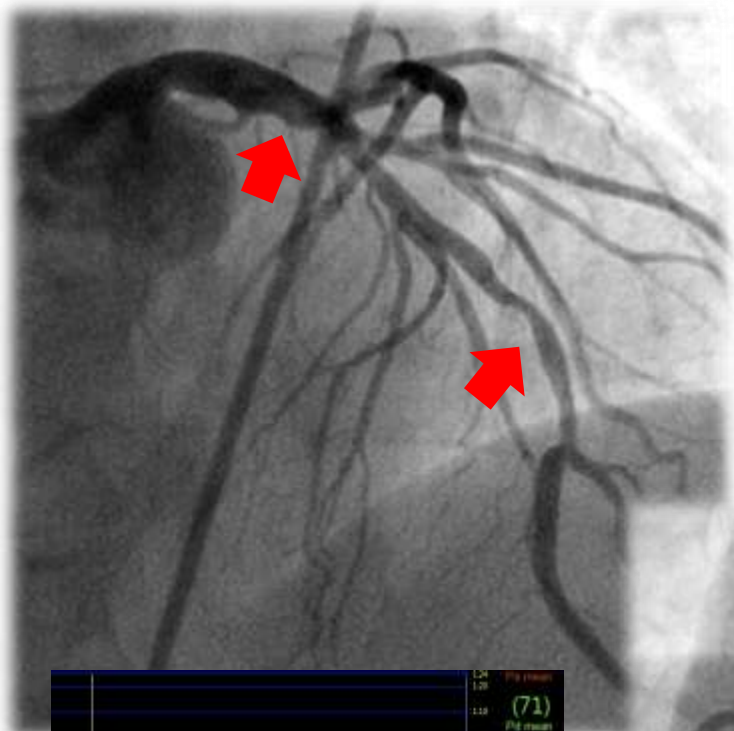
**Lesion 2**  
 (segment 7): 2.5x2= 5  
 Bifurcation Type: Medina 1,0,0: 1  
 Heavy calcification 2  
 Sub total lesion 2 8

**Lesion 3**  
 (segment 1): 1x2= 2  
 Length >20 mm 1  
 Heavy calcification 2  
 Sub total lesion 3 5

**TOTAL:** 29

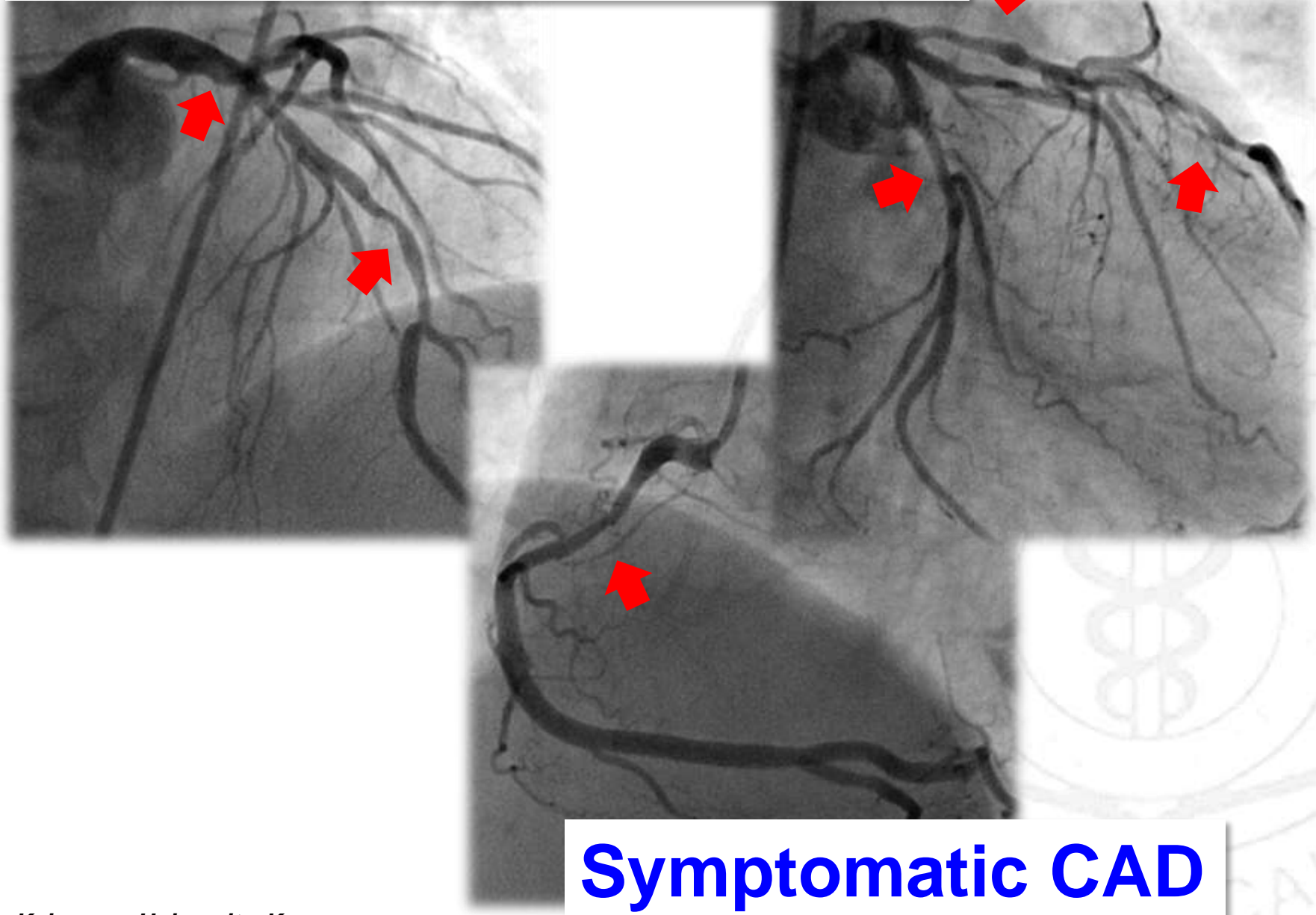


# Functional SYNTAX score



Functional SYNTAX score		0
<b>Lesion 1</b>		
(segment 6): $3.5 \times 2 =$		7
Bifurcation Type: Medina 0,1,0:		1
Length >20 mm		1
<i>Sub total lesion 1</i>		9
<b>Lesion 2</b>		
(segment 7): $2.5 \times 2 =$		5
Bifurcation Type: Medina 1,0,0:		1
Heavy calcification		2
<i>Sub total lesion 2</i>		8
<b>Lesion 3</b>		
(segment 1): $1 \times 2 =$		2
Length >20 mm		1
Heavy calcification		2
<i>Sub total lesion 3</i>		5
<b>TOTAL:</b>		<b>29</b>

# Angiographic 3 vessel disease



**Symptomatic CAD**



# ***Why do we apply Functional SYNTAX score in daily practice?***

---

**1** Why multi-vessel disease?

**Not rare multi-vessel disease**

**2** How to evaluate multi-vessel disease?

**Anatomic evaluation is not enough**

**3** How to treat multi-vessel disease?

**Functional complete revascularization**

# Functional complete revascularization in multi-vessel disease



- ❖ Angiographic multi-vessel coronary artery disease (MVD) is **not always functional MVD**. FFR can help to reveal the indicated lesion for revascularization.
- ❖ Therefore, the selection of target vessels, the method for revascularization, and the determination of prognosis in patients with **MVD can be guided by FFR** in daily practice.



# Clinical Application of Functional SYNTAX Score *Focus on Multi-Vessel Disease*



**Thank You for Your Attention**