



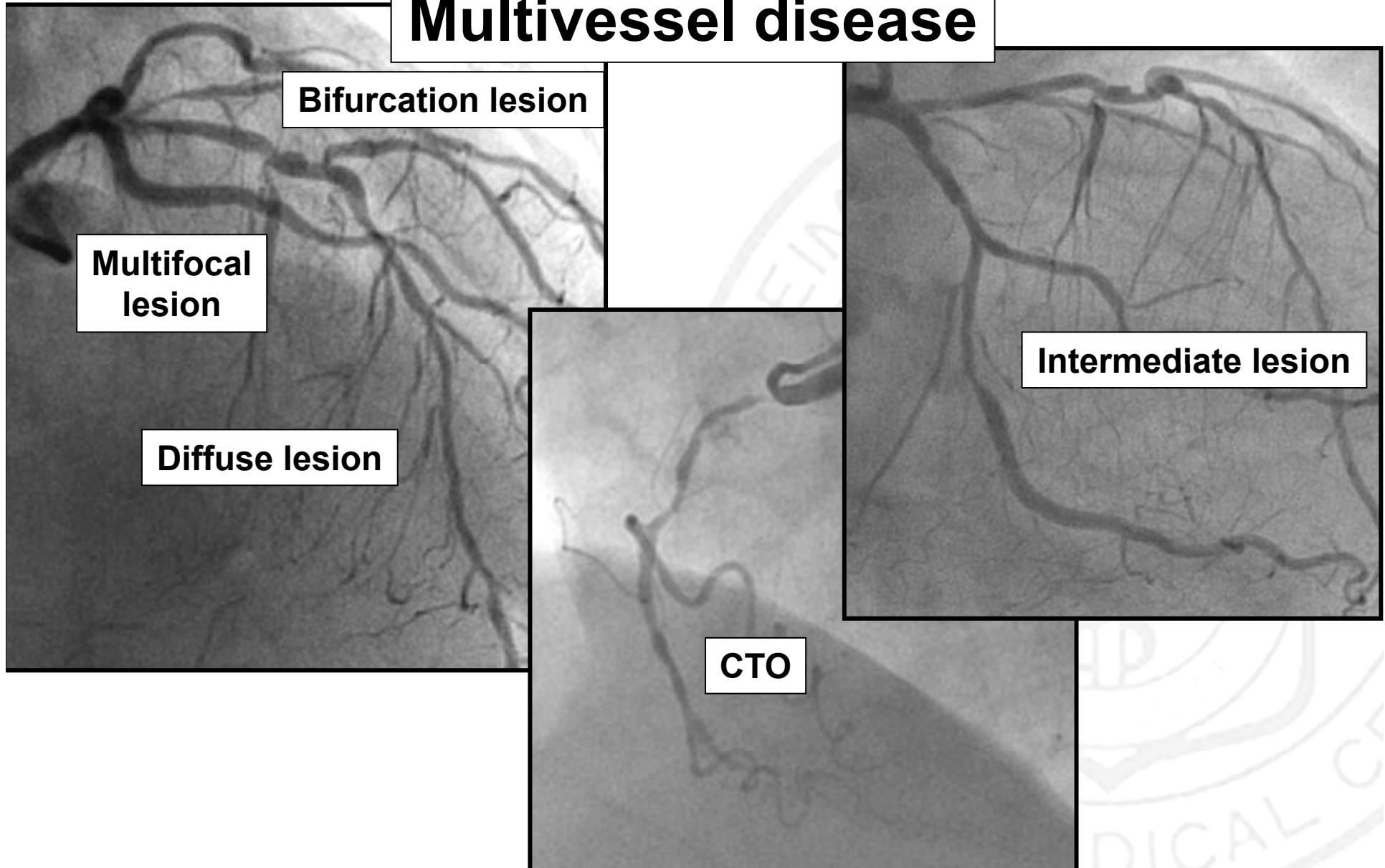
ANGIOPLASTY SUMMIT
TCTAP 2012

It's the FFR!:
**Functional Syntax Score
vs. Syntax Score**

Keimyung University Dongsan medical center, Daegu, Korea

Chang-Wook Nam MD, PhD

Multivessel disease



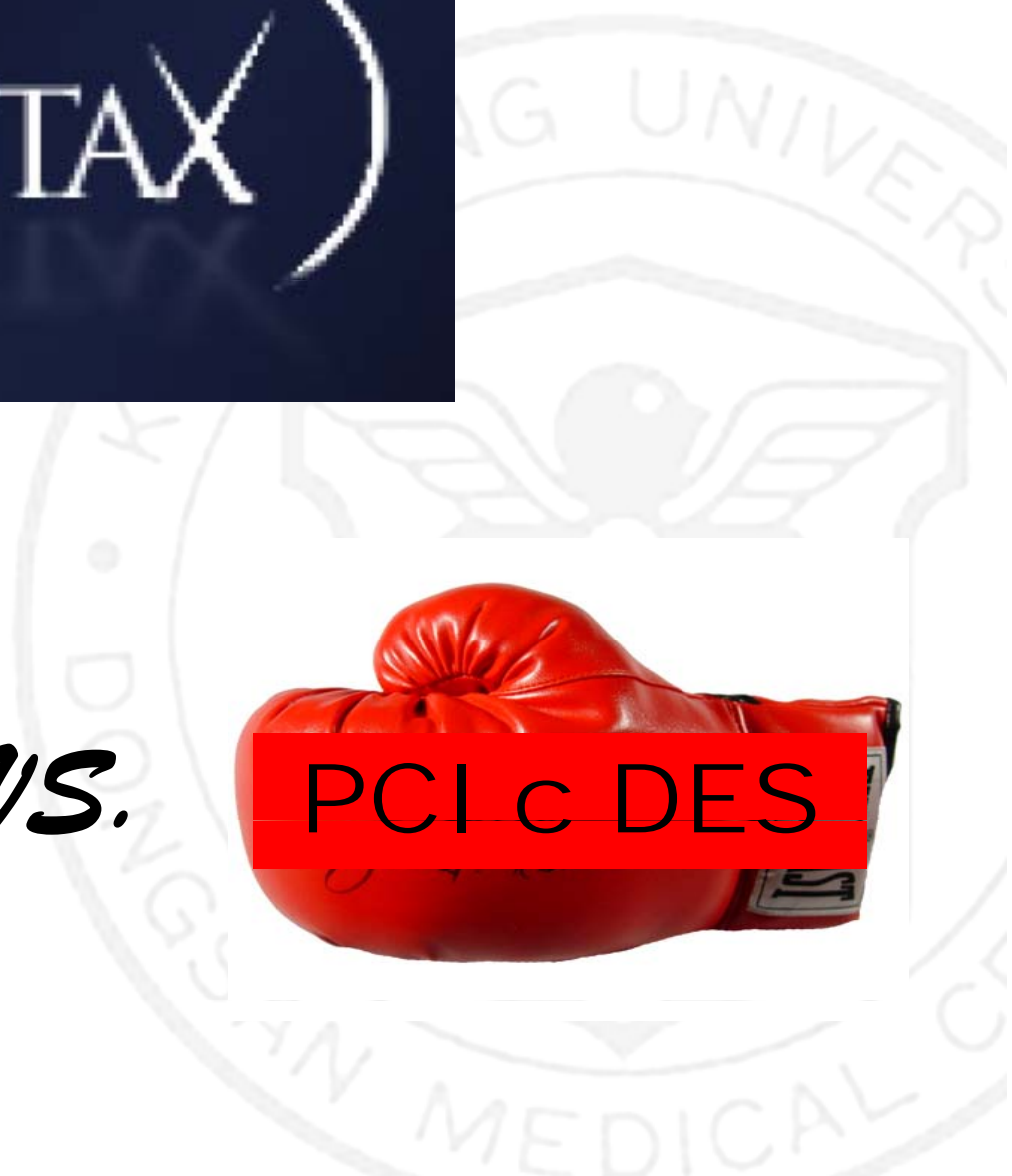


CABG

VS.



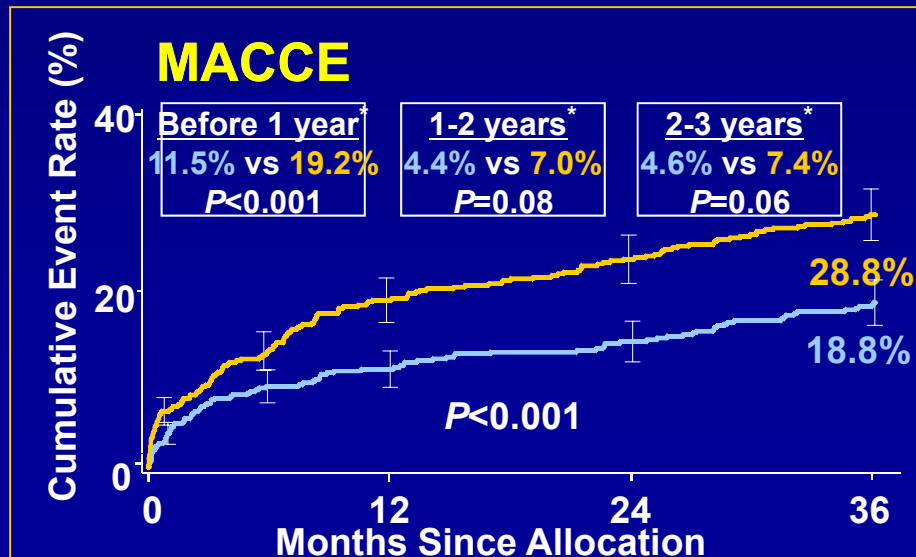
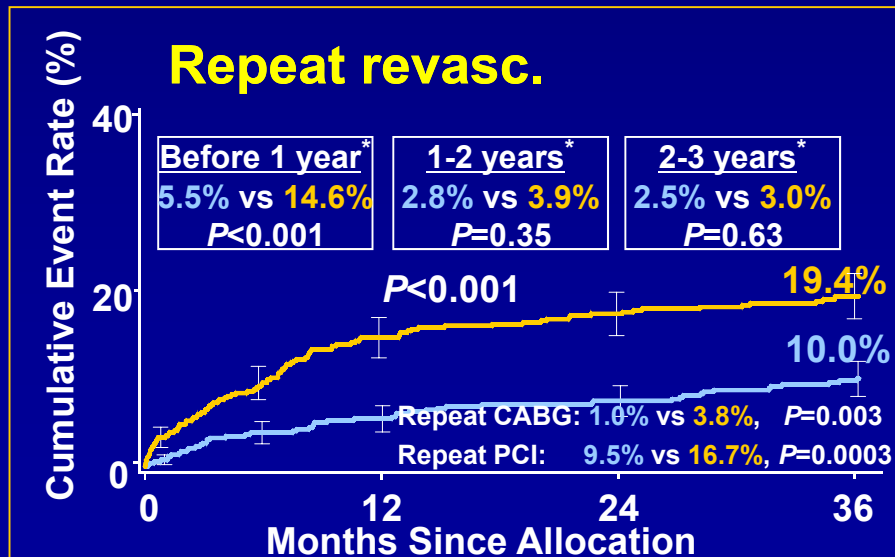
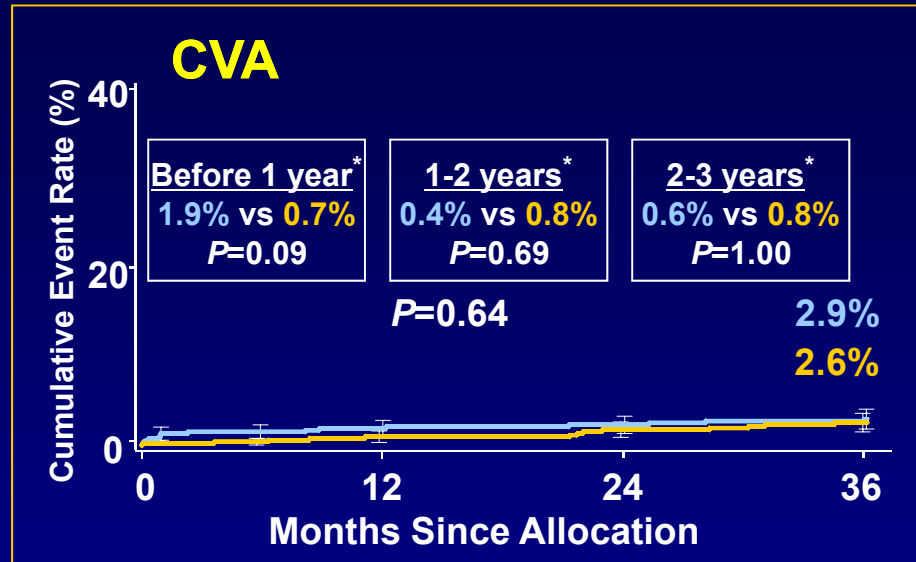
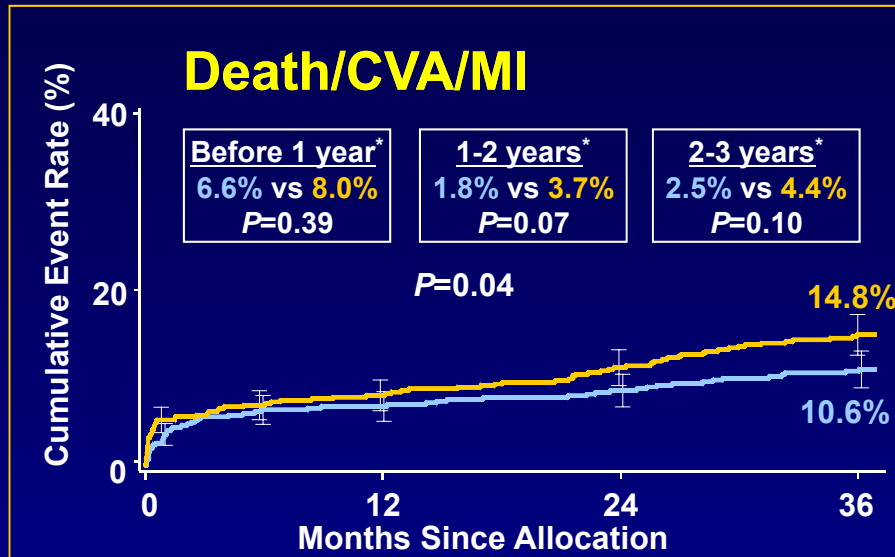
PCI c DES



Outcome

3-Year Results in 3 VD subset

■ CABG (N=549)
■ TAXUS (N=546)



Cumulative KM Event Rate ± 1.5 SE; log-rank P value; *Binary rates

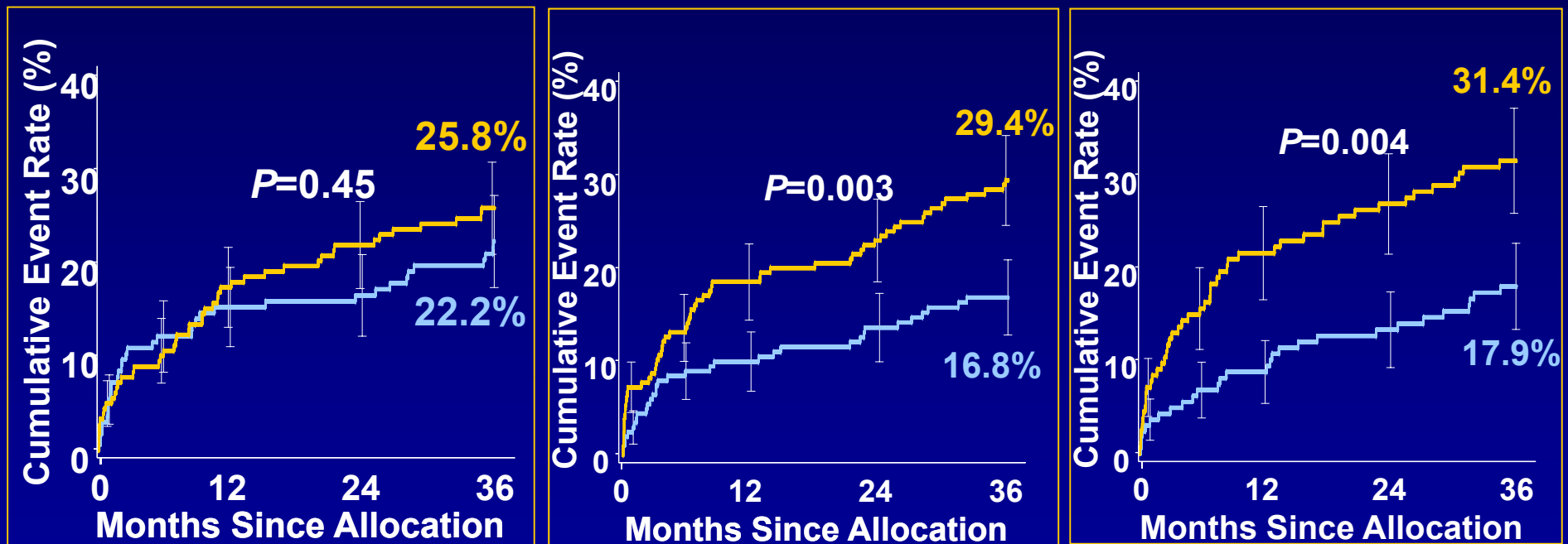
ITT population

2010 TCT

The Selection of Patients with Multi-vessel CAD can Improve Outcomes

MACCE to 3 Years by SYNTAX Score Tertile

CABG PCI



Low Scores
(0-22)

Intermediate Scores
(22-33)

High Scores
(33≤)



Multivessel disease

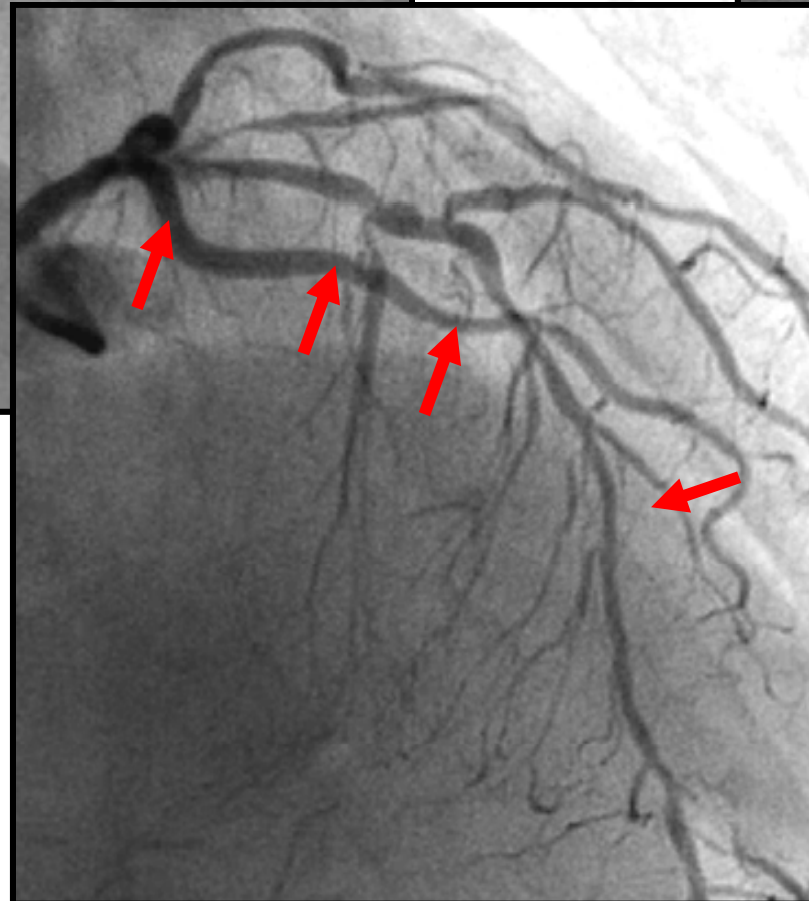
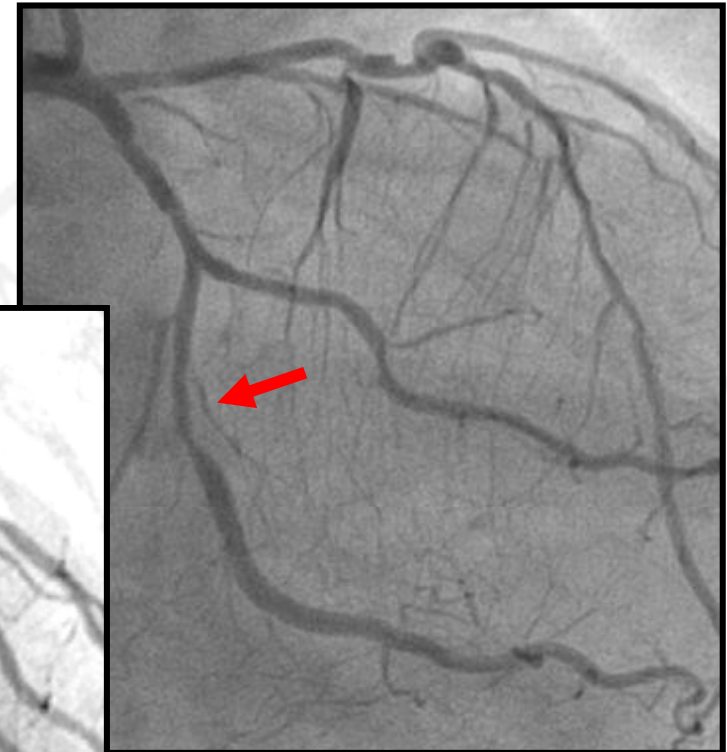
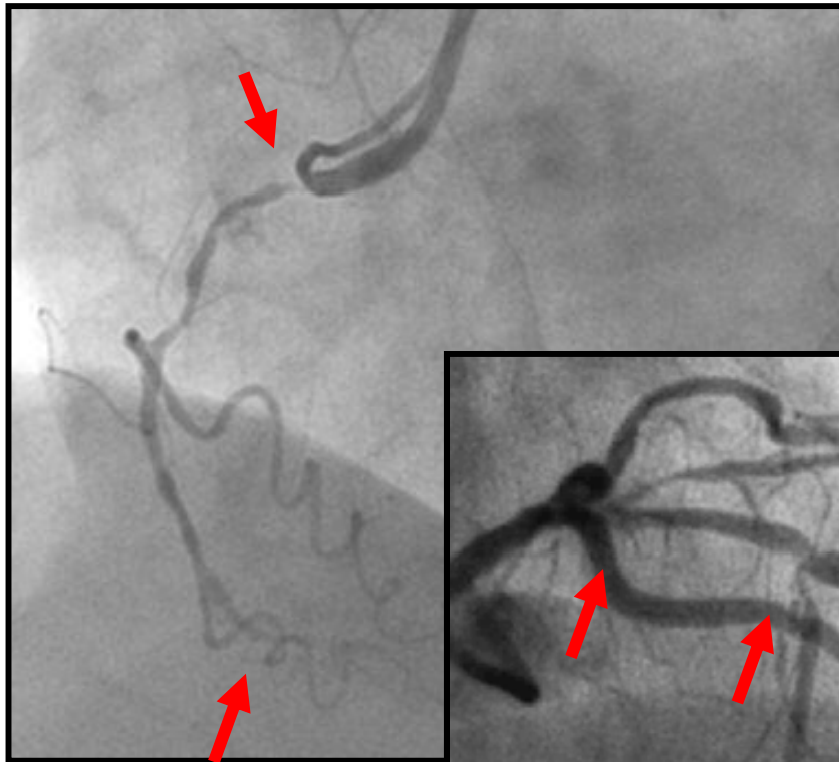


Current Guidelines for MVD

Subset of CAD by anatomy	Favours CABG	Favours PCI	Ref.
IVD or 2VD - non-proximal LAD	IIb C	I C	—
IVD or 2VD - proximal LAD	IA	IIa B	30, 31, 50, 51
3VD simple lesions, full functional revascularization achievable with PCI, SYNTAX score ≤ 22	IA	IIa B	4, 30–37, 53
3VD complex lesions, incomplete revascularization achievable with PCI, SYNTAX score > 22	IA	III A	4, 30–37, 53
Left main (isolated or IVD, ostium/shaft)	IA	IIa B	4, 54
Left main (isolated or IVD, distal bifurcation)	IA	IIb B	4, 54
Left main + 2VD or 3VD, SYNTAX score ≤ 32	IA	IIb B	4, 54
Left main + 2VD or 3VD, SYNTAX score ≥ 33	IA	III B	4, 54

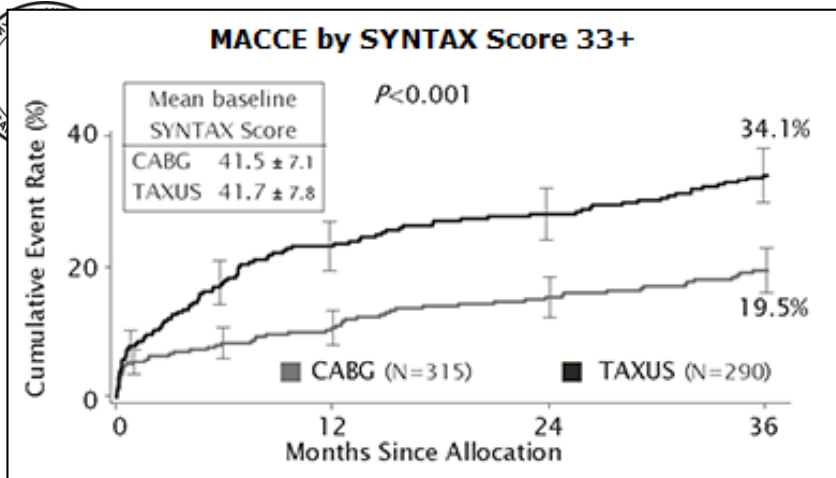
Wijns W, *EHJ* 2010;31:2501–2555.

Multivessel disease



**SYNTAX
score**

SYNTAX score



Subset of CAD by anatomy	Favours CABG	Favours PCI	Ref.
IVD or 2VD - non-proximal LAD	IIb C	I C	—
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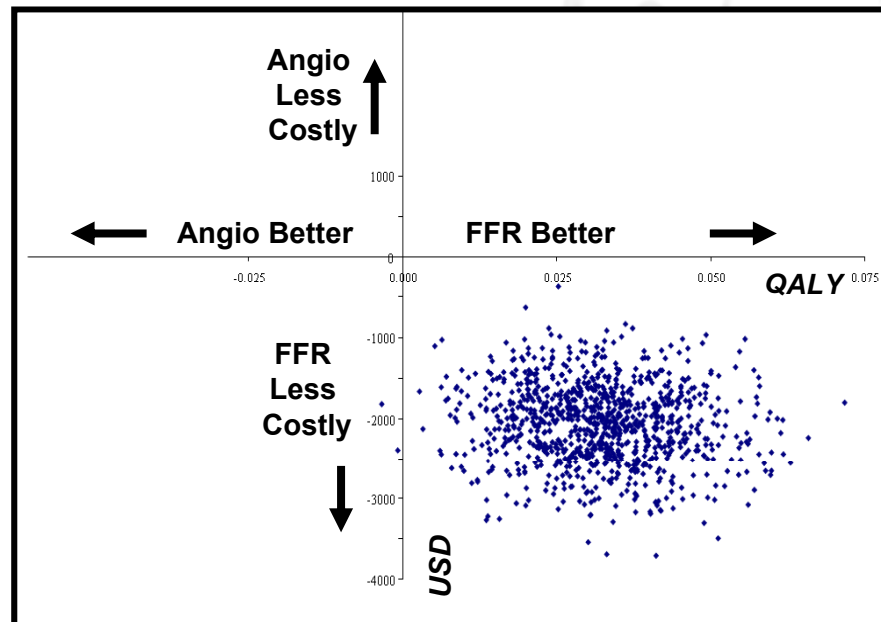
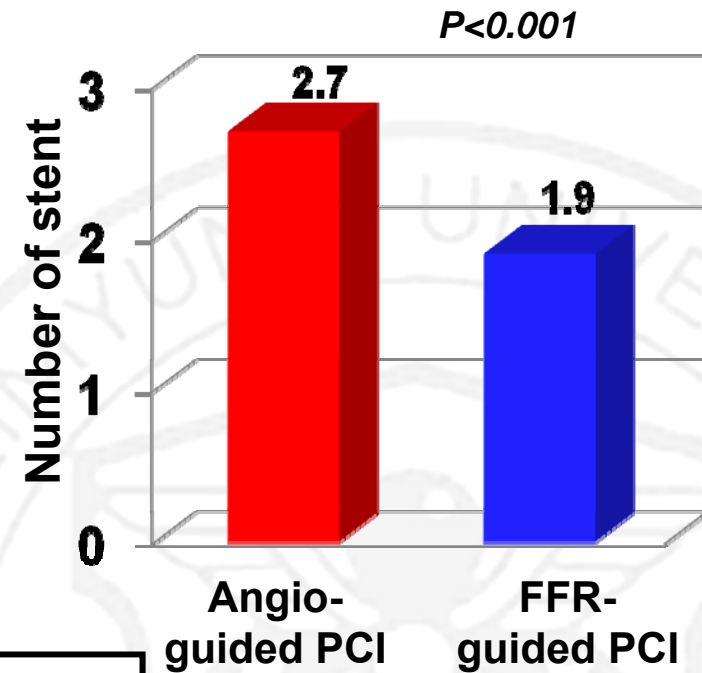
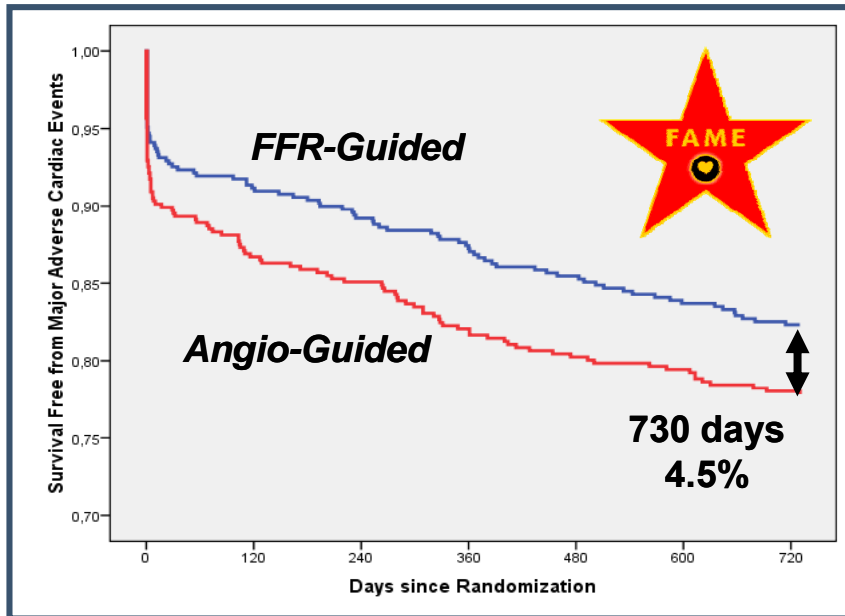
Summary

Lesion 1 (segment 1): 1x2= Length >20 mm Sub total lesion 1	2 1 3
Lesion 2 segment number(s) (segment 3): 1x5= Age T.O. is unknown the first segment beyond the T.O. visualized by contrast: 16 + sidebranch: Yes, both sidebranches <1.5mm and ≥1.5mm are involved Sub total lesion 2	5 1 1 1 8
Lesion 3 (segment 6): 3.5x2= Sub total lesion 3	7 7
Lesion 4 (segment 7): 2.5x2= Bifurcation Type: Medina 1,0,1: Sub total lesion 4	5 2 7
Lesion 5 (segment 7): 2.5x2= Length >20 mm Sub total lesion 5	5 1 6
Lesion 6 (segment 8): 1x2= Length >20 mm Sub total lesion 6	2 1 3
Lesion 7 (segment 13): 0.5x2= Bifurcation Type: Medina 1,1,0: Sub total lesion 7	1 1 2
Diffuse disease/Small vessels Segment 7 Segment 8 Sub total diffuse disease/small vessels	1 1 2
TOTAL:	38

38

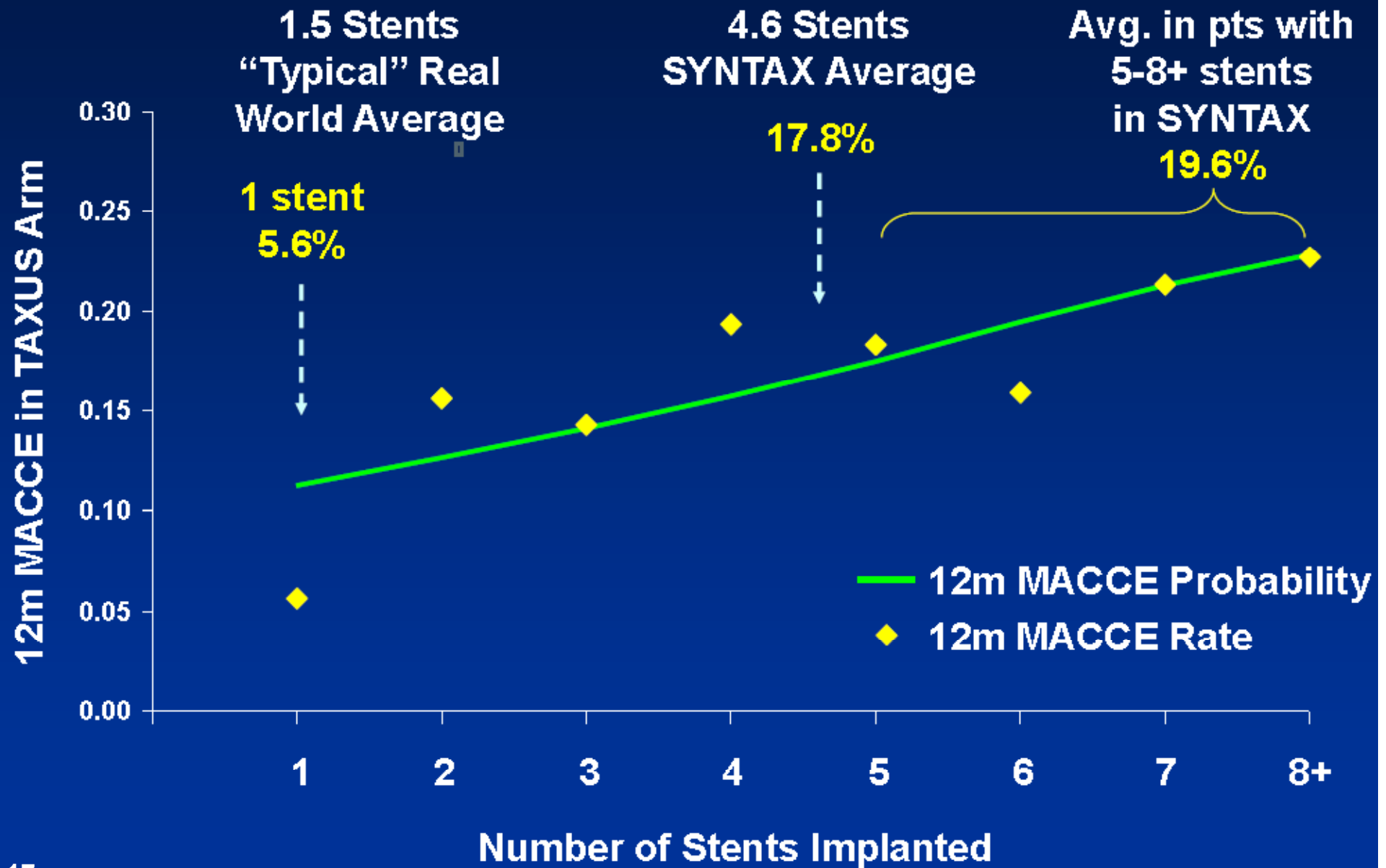


MVD in FAME



Tonino PA, NEJM 2009;360:213-24
Pijl NH, JACC 2010;56:177-84
Fearon WF, Circ 2010;29

Linear Increase in MACCE by Number of Stents in the SYNTAX Trial





The Selection of Patients with Multi-vessel CAD can Improve Outcomes



Current Guidelines for MVD

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Left main + 2VD or 3VD, SYNTAX score ≥ 33	I A	III B	4, 54

If we can add functional information for decision making...

Revisit FAME



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

FFR-guided “Functional SYNTAX score (FSS)” would predict 1-year clinical outcome better than the “classic SYNTAX score (SS)” in patients with multi-vessel coronary artery disease undergoing percutaneous coronary intervention

FLOW CHART



**Patient with stenoses $\geq 50\%$
in at least 2 of the 3 major
epicardial vessels**

**Indicate all stenoses $\geq 50\%$
considered for stenting**

Randomization

Angiography-guided PCI

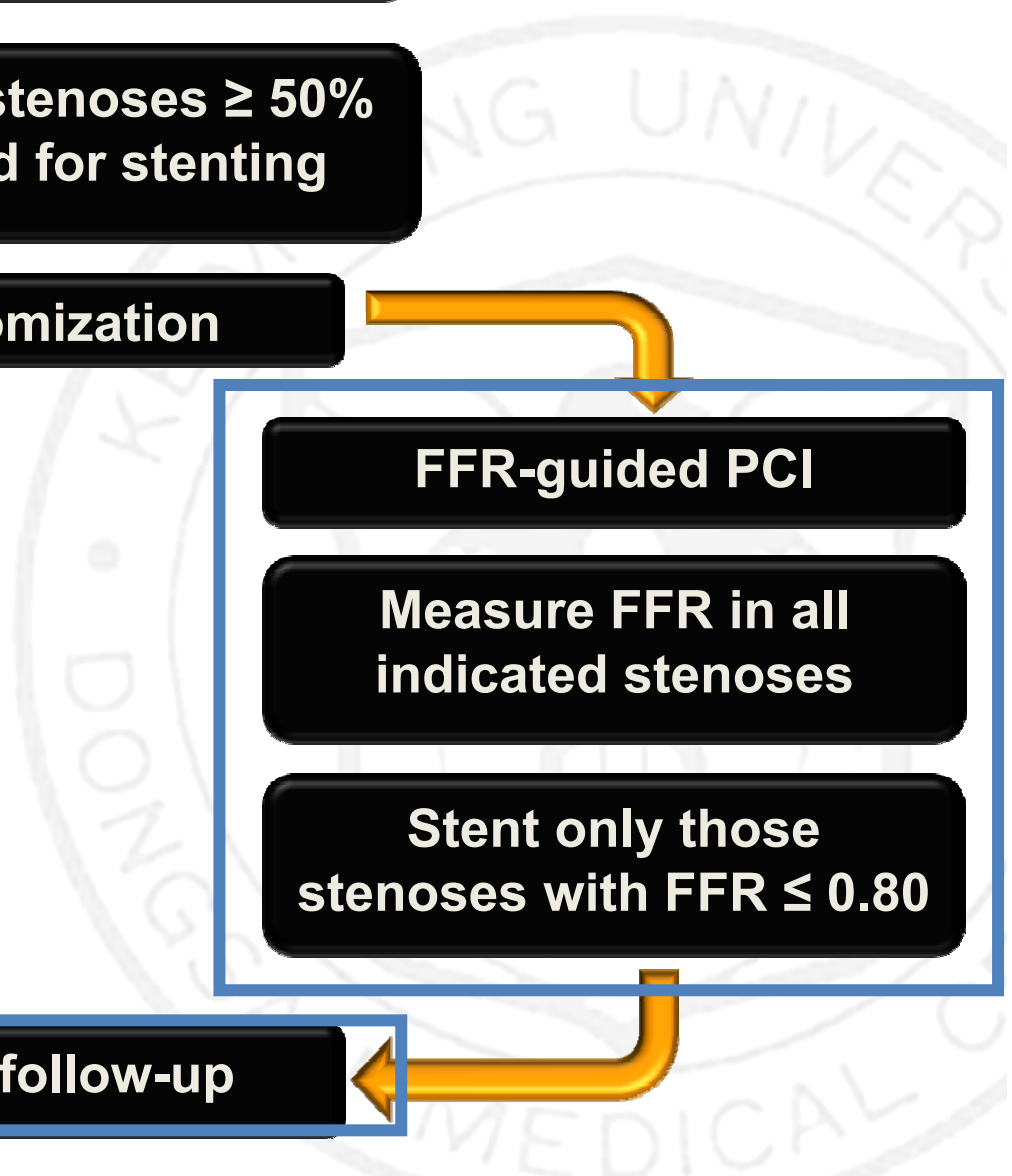
**Stent all indicated
stenoses**

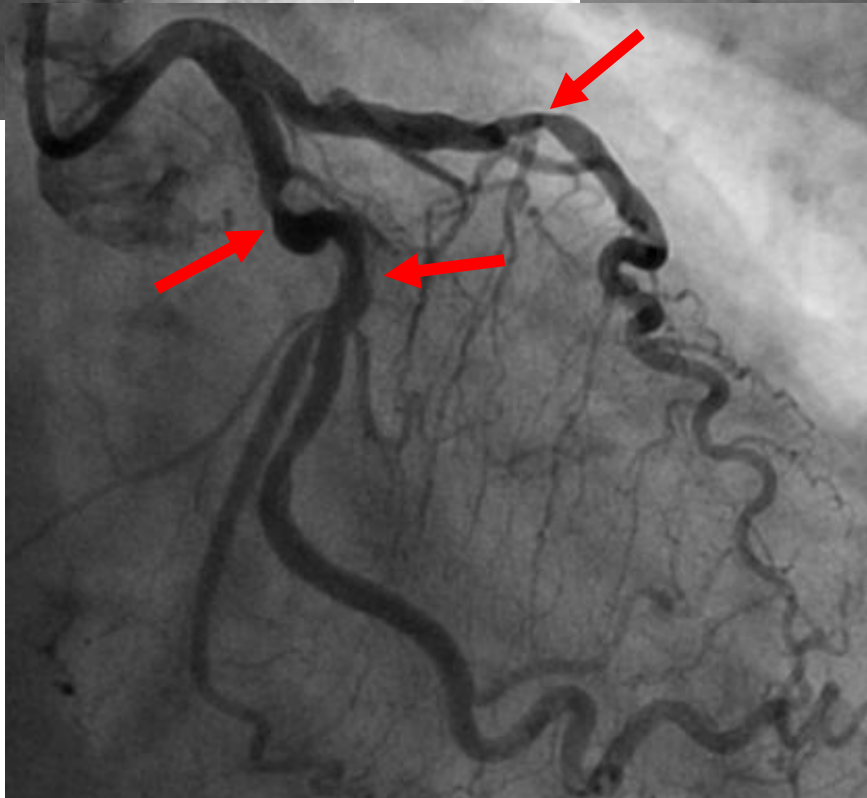
FFR-guided PCI

**Measure FFR in all
indicated stenoses**

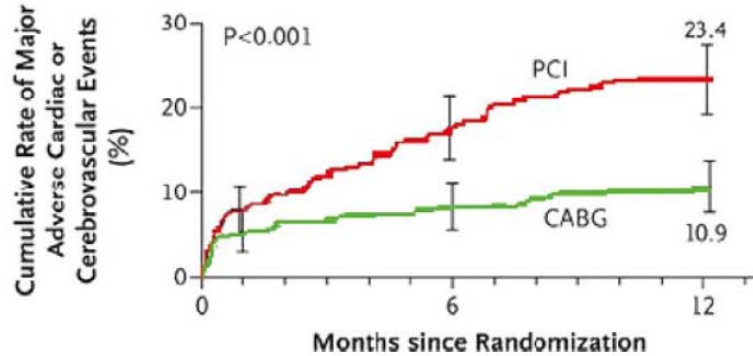
**Stent only those
stenoses with $FFR \leq 0.80$**

1-year follow-up





High SYNTAX Score



Subset of CAD by anatomy	Favours CABG	Favours PCI	Ref.
IVD or 2VD - non-proximal LAD	IIb C	I C	—
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Left main + 2VD or 3VD, SYNTAX score ≤ 32	IA	IIb B	4, 54
Left main + 2VD or 3VD, SYNTAX score ≥ 33	IA	III B	4, 54

SYNTAX score

Summary

Lesion 1

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

2
2
4

Lesion 2

segment number(s)
(segment 2): 1x5=
Age T.O. is unknown
+ Blunt stump
the first segment beyond the T.O. visualized by contrast: 16
+ sidebranch: Yes, all sidebranches $< 1.5\text{mm}$
Severe Tortuosity
Sub total lesion 2

5
1
1
2
1
2
12

Lesion 3

(segment 7): 2.5x2=
Severe Tortuosity
Heavy calcification
Sub total lesion 3

5
2
2
9

Lesion 4

(segment 11): 1.5x2=
Sub total lesion 4

3
3

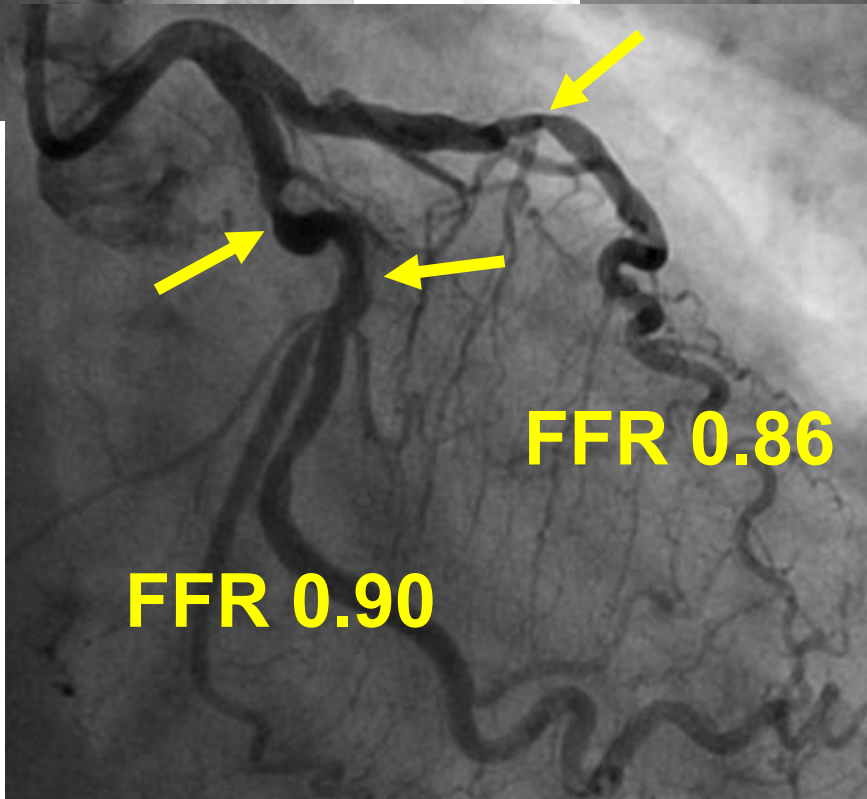
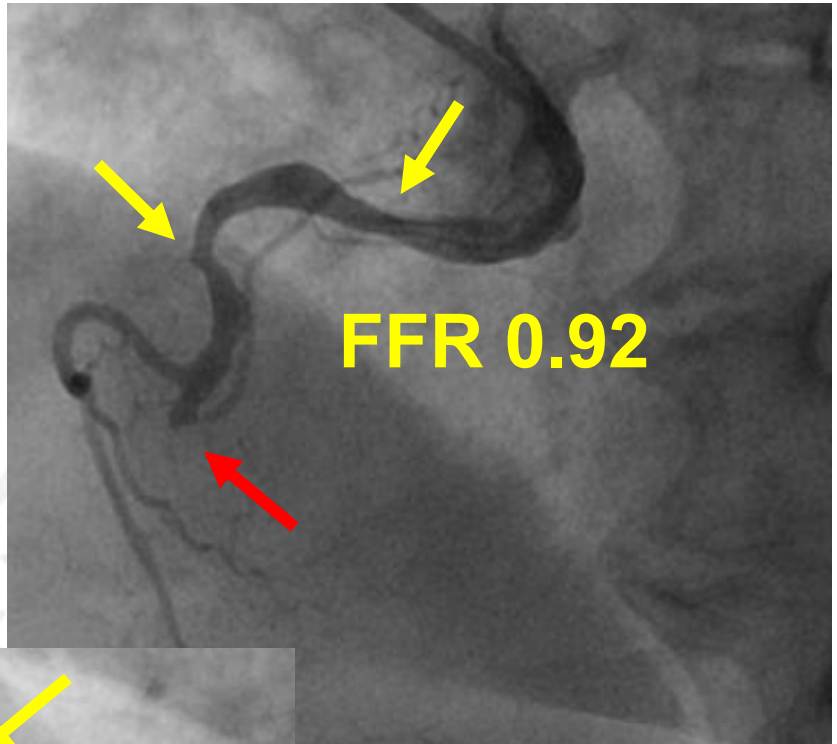
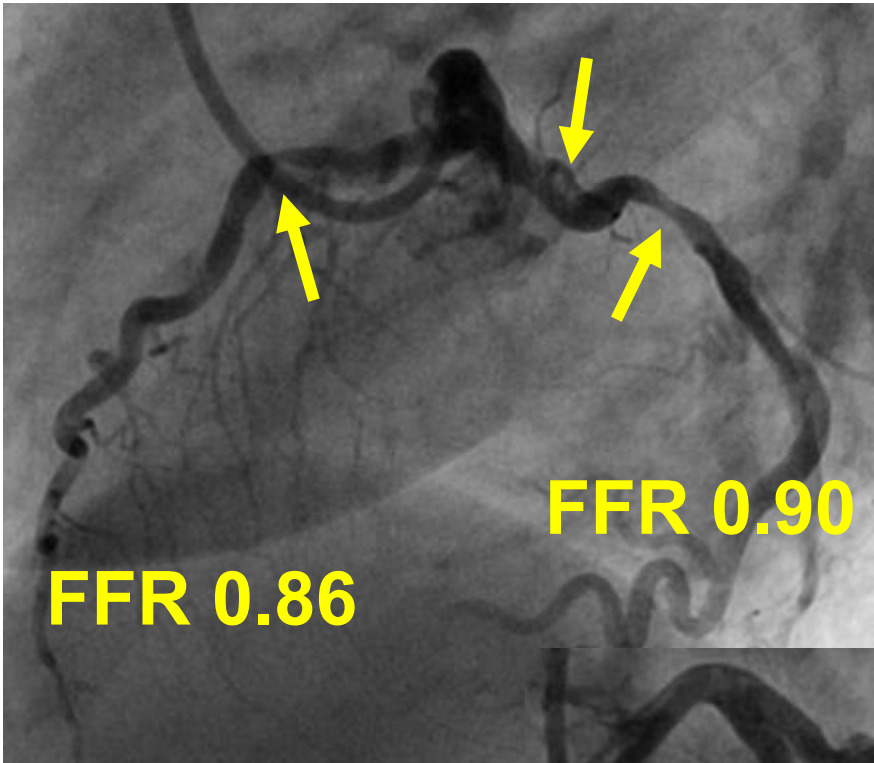
Lesion 5

(segment 11): 1.5x2=
Severe Tortuosity
Sub total lesion 5

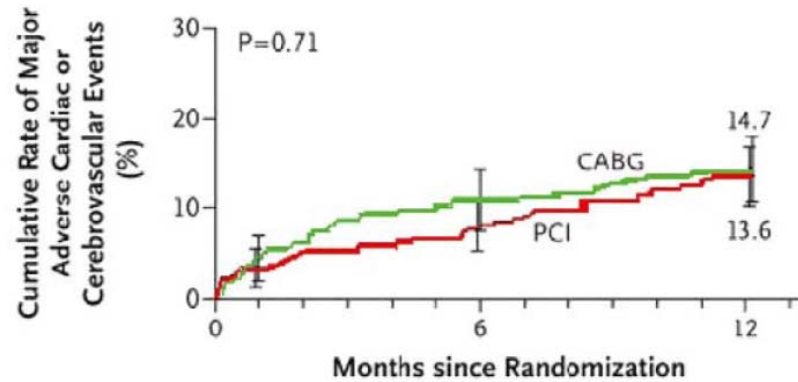
3
2
5

TOTAL:

33



Low SYNTAX Score



Subset of CAD by anatomy	Favours CABG	Favours PCI	Ref.
IVD or 2VD - non-proximal LAD	IIb C	I C	—
IVD or 2VD - proximal LAD	IA	IIa B	30, 31, 50, 51
3VD simple lesions, full functional revascularization achievable with PCI, SYNTAX score ≤22	IA	IIa B	4, 30–37, 53
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Left main + 2VD or 3VD, SYNTAX score ≤32	IA	IIb B	4, 54
Left main + 2VD or 3VD, SYNTAX score ≥33	IA	III B	4, 54

Functional SYNTAX score

Summary

Lesion 1

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

2
2
4

Lesion 2

segment number(s)
(segment 2): 1x5=
Age T.O. is unknown
+ Blunt stump
the first segment beyond the T.O. visualized by contrast: 16
+ sidebranch: Yes, all sidebranches <1.5mm
Severe Tortuosity
Sub total lesion 2

5
1
1
2
1
2
12

Lesion 3

(segment 7): 2.5x2=
Severe Tortuosity
Heavy calcification
Sub total lesion 3

5
2
2
9

Lesion 4

(segment 11): 1.5x2=
Sub total lesion 4

3
3

Lesion 5

(segment 11): 1.5x2=
Severe Tortuosity
Sub total lesion 5

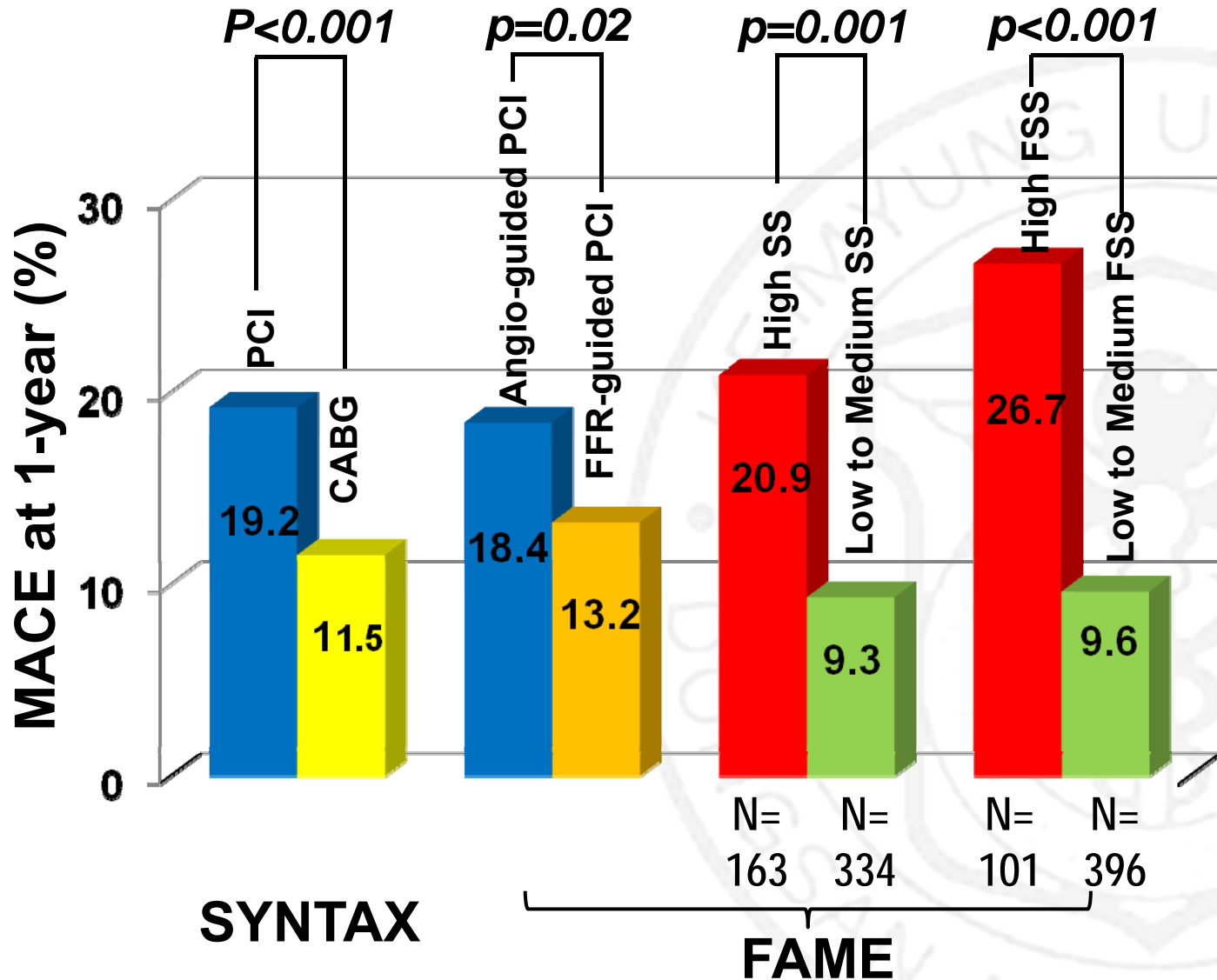
3
2
5

TOTAL:

33

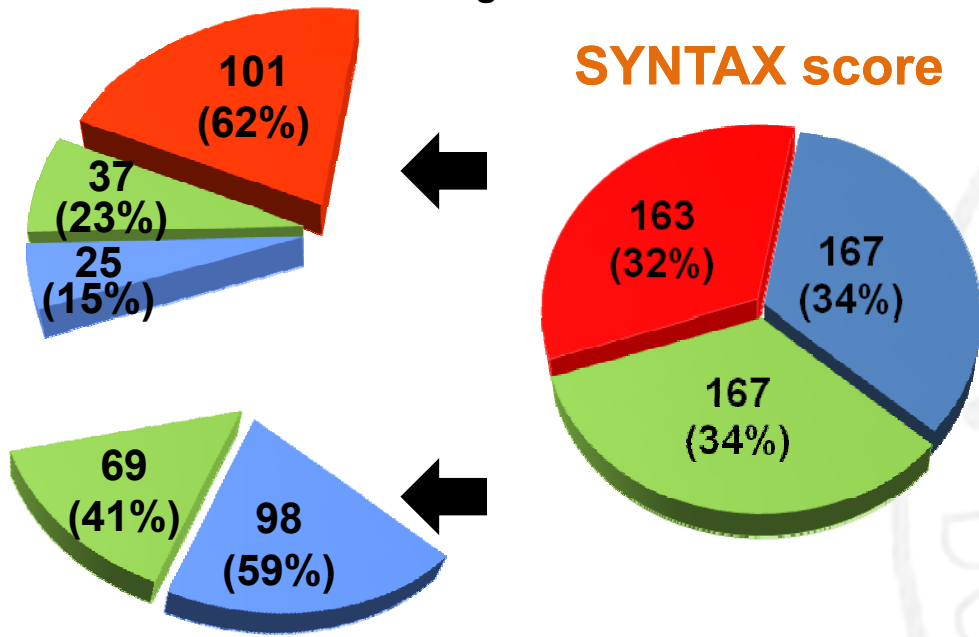


Comparison of Outcomes

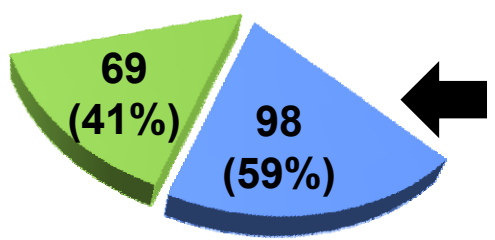


Different Fate of Risk Group

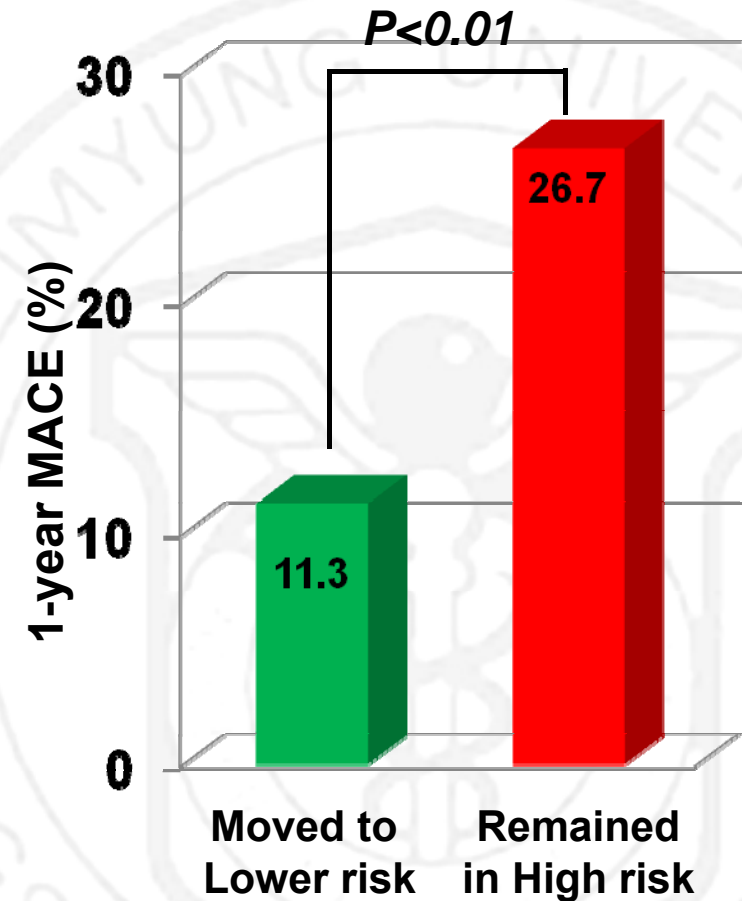
- Low risk
- Medium risk
- High risk



Functional SYNTAX score

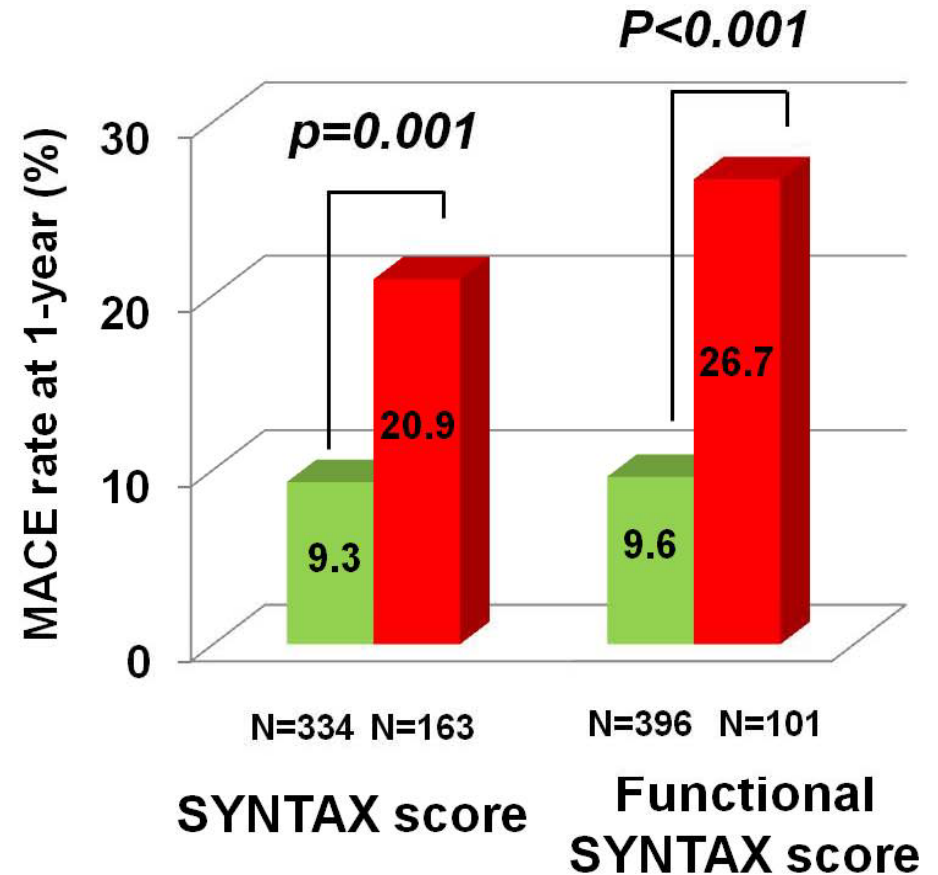
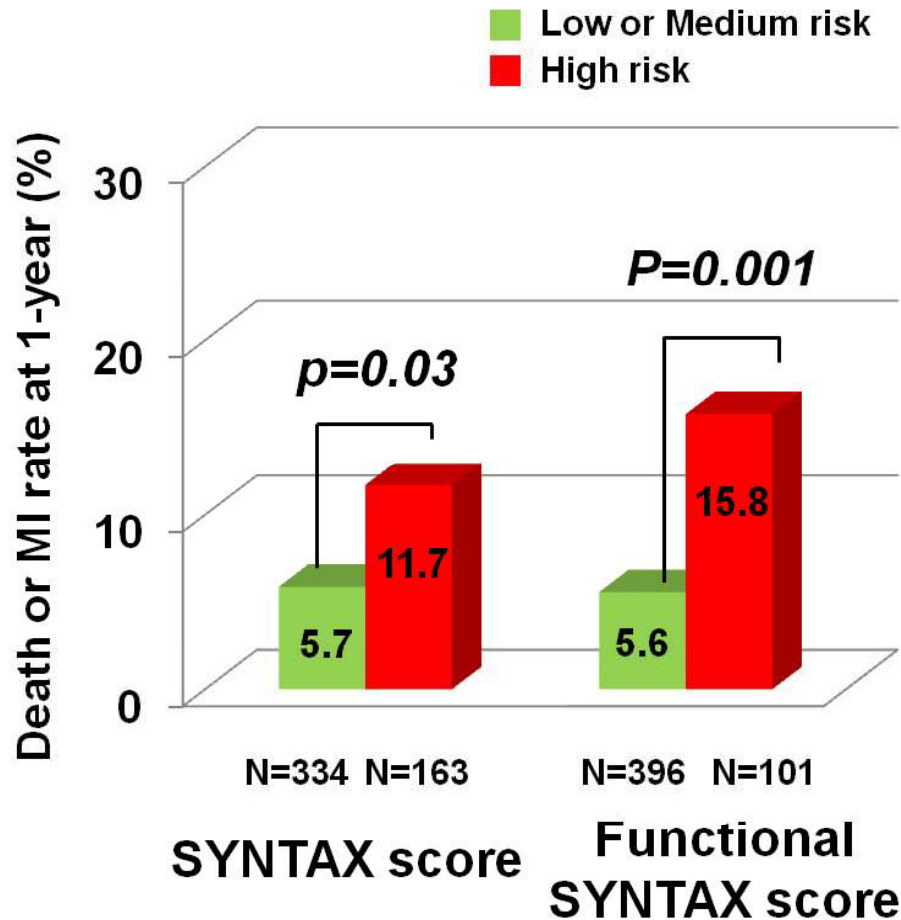


32% ↓



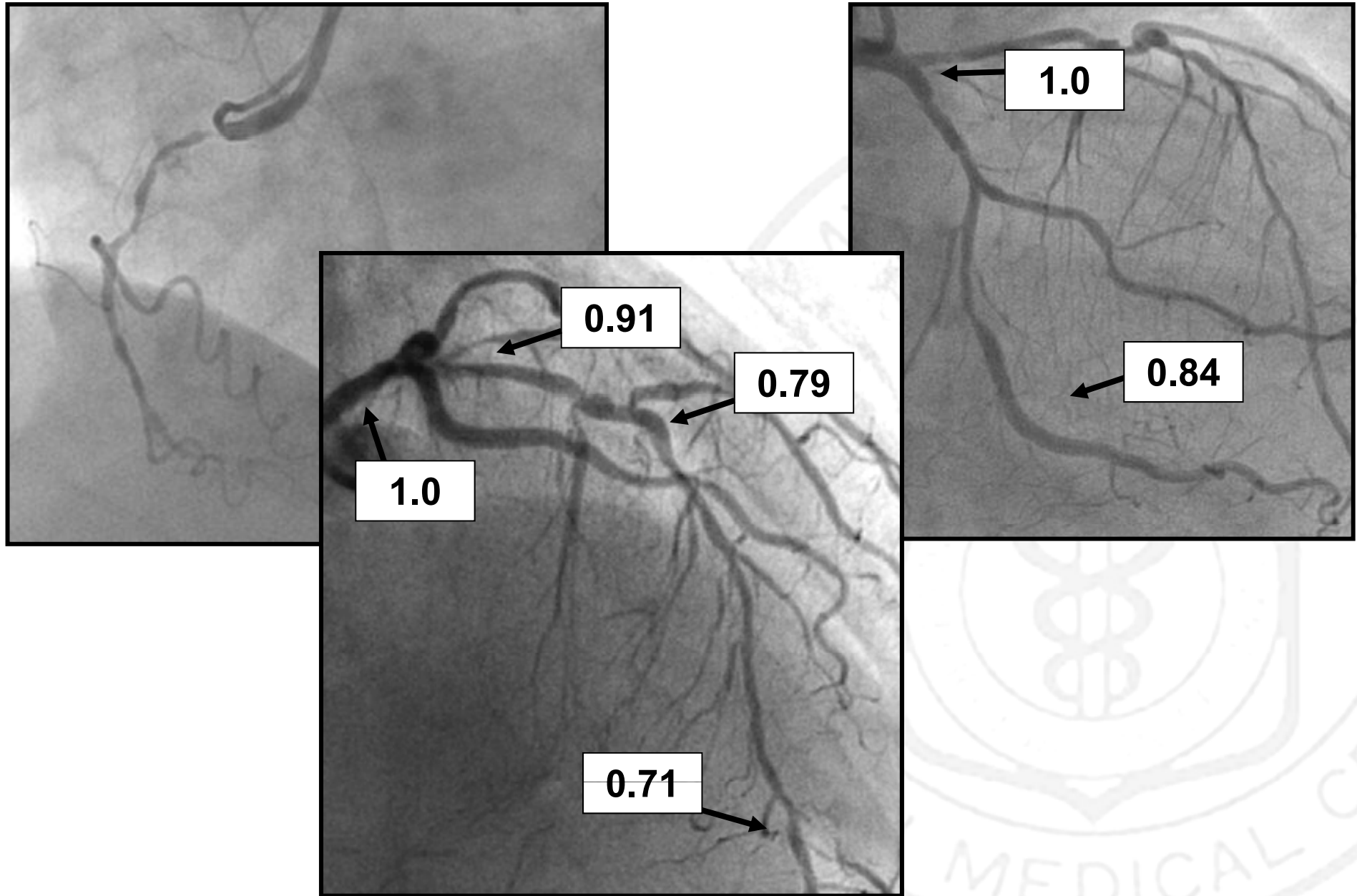


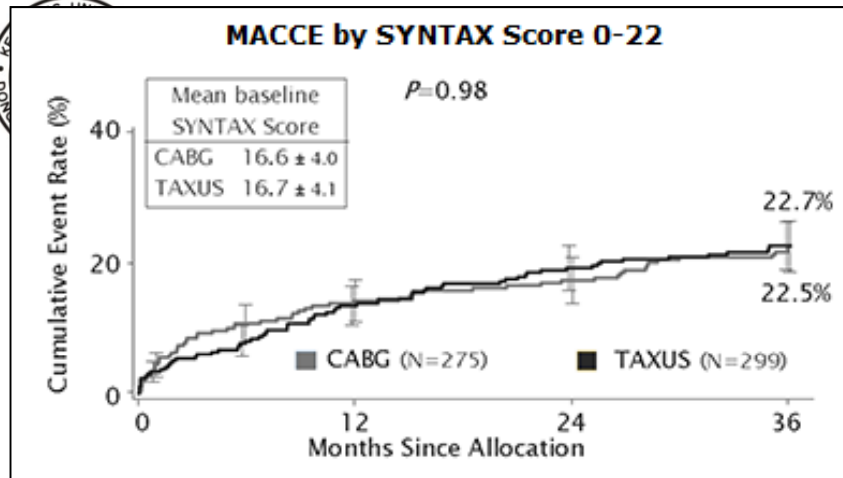
Comparison of Outcomes





Functional SYNTAX score





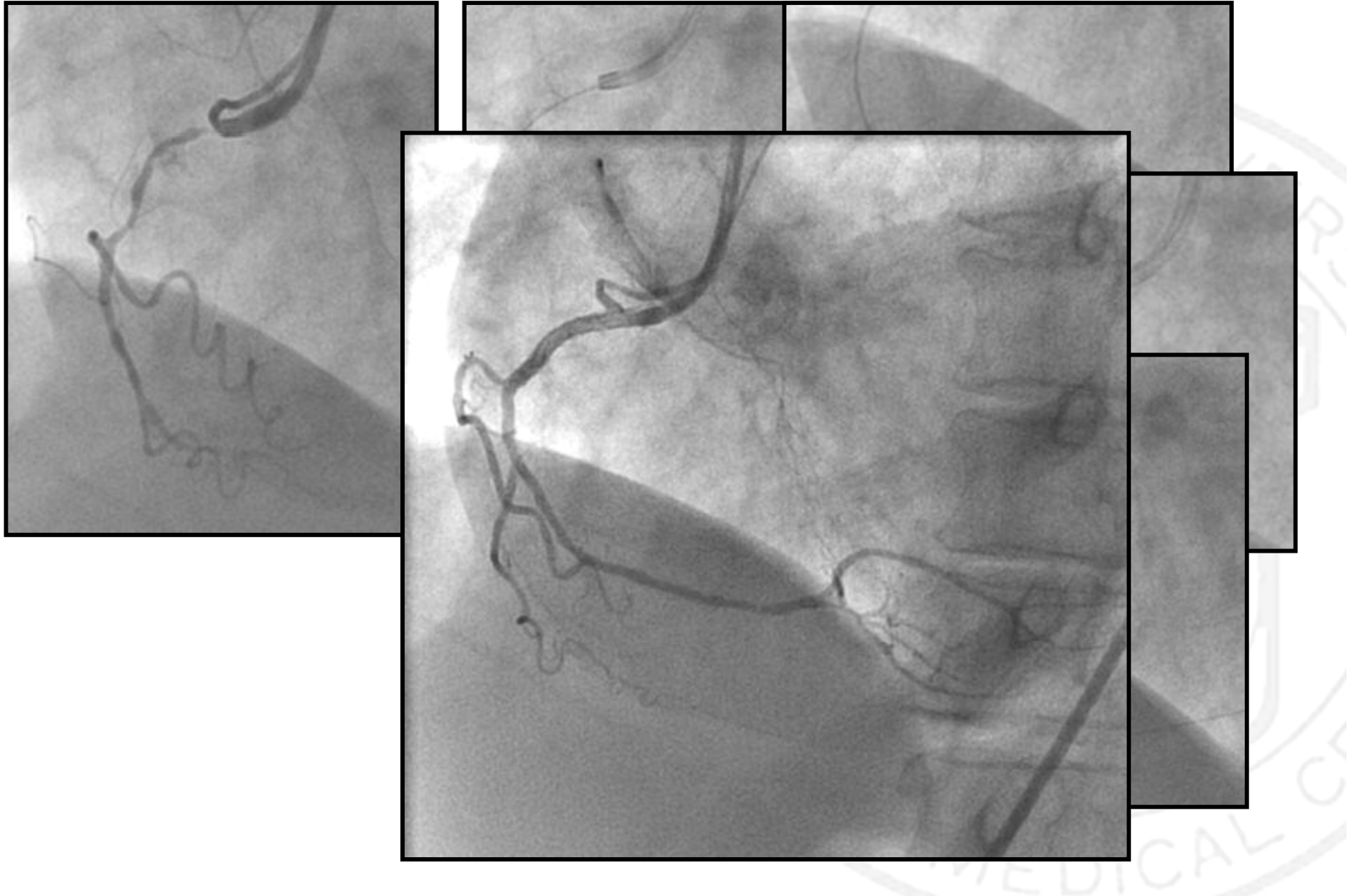
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Lesion 3 (segment 7): 2.5x2= Sub total lesion 3		5 5
Lesion 4 (segment 8): 1x2= Length >20 mm Sub total lesion 4		2 1 3
Lesion 5 (segment 13): 0.5x2= Sub total lesion 5		1 1
TOTAL:		18



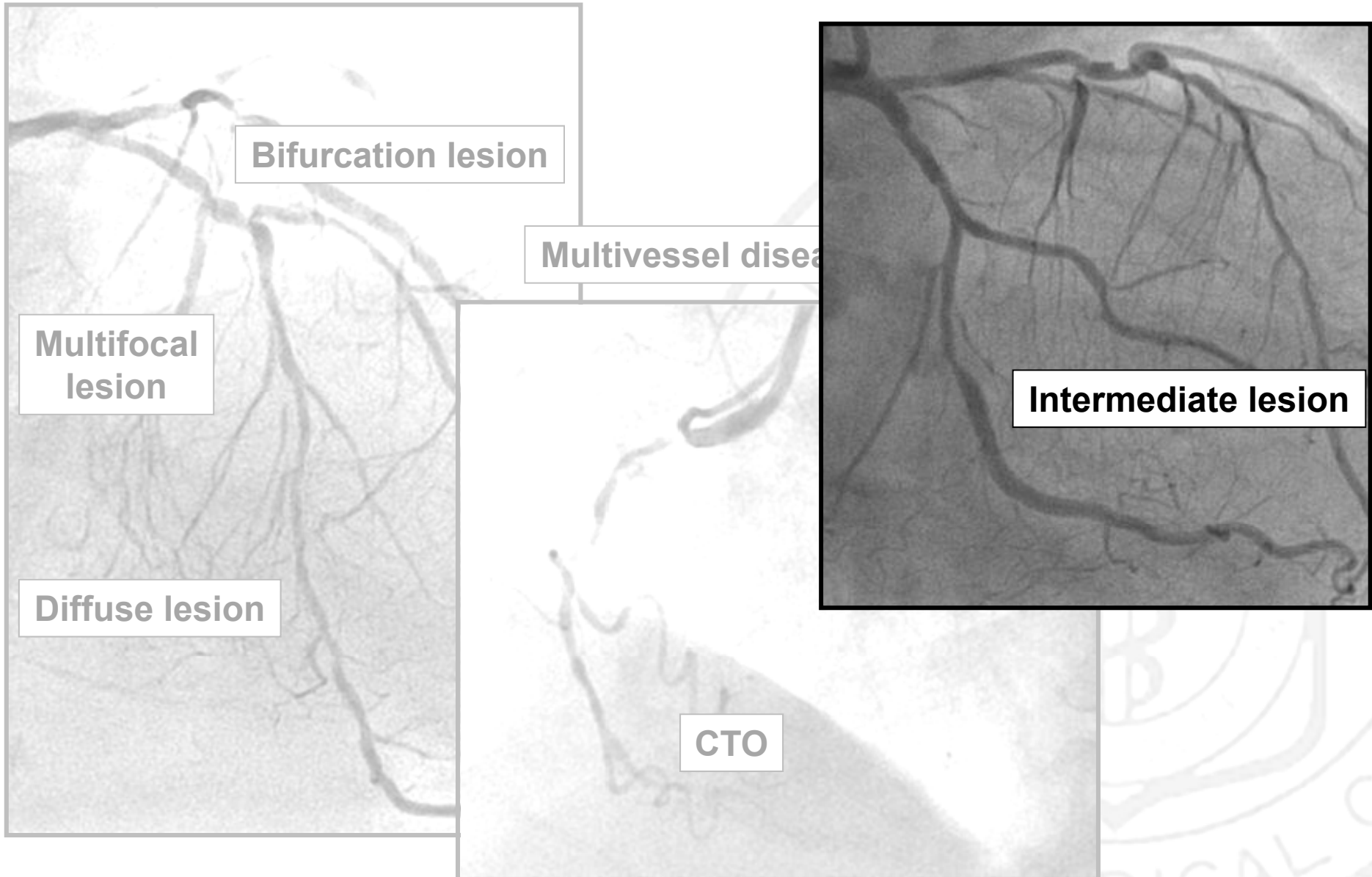


RCA CTO intervention



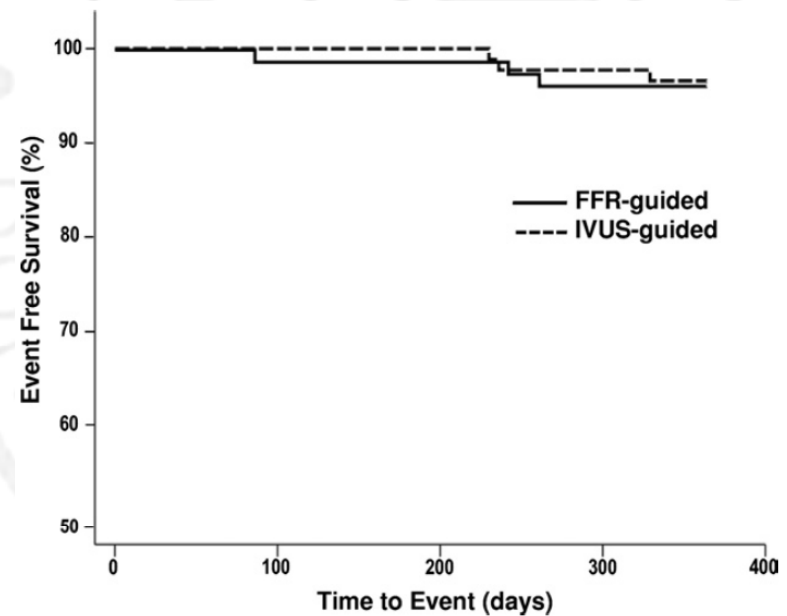
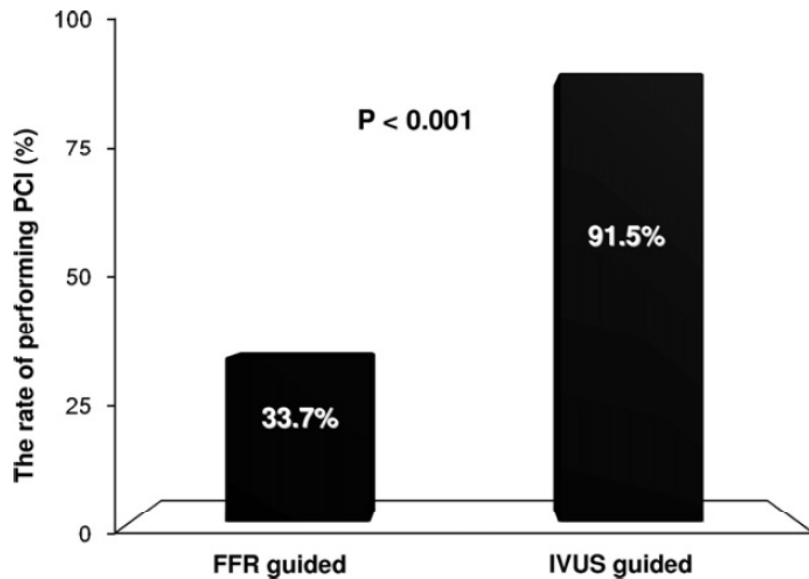
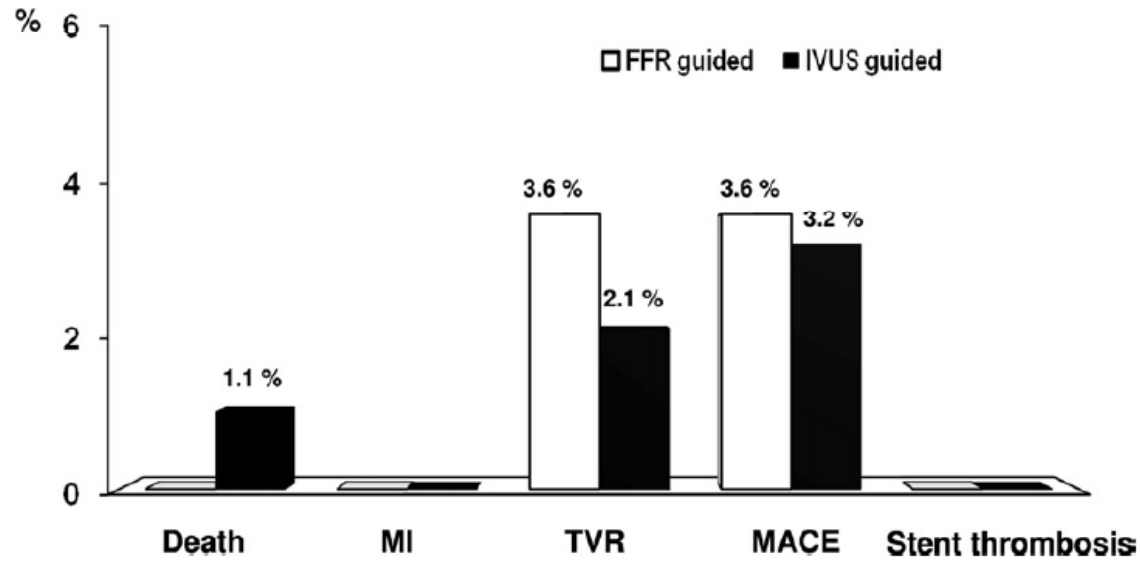


LCX Evaluation and Treatment

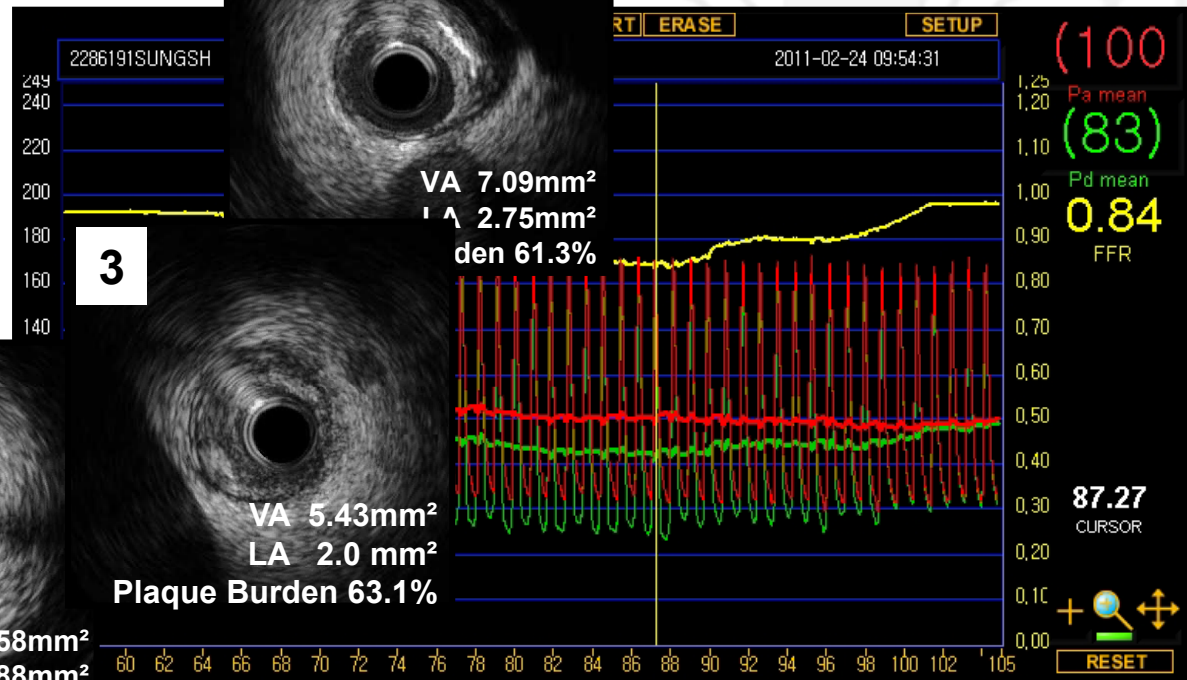
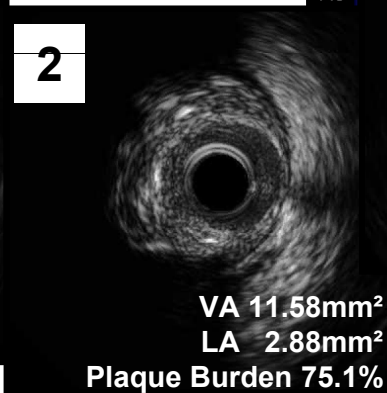
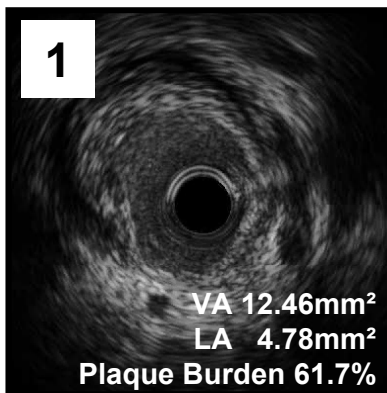
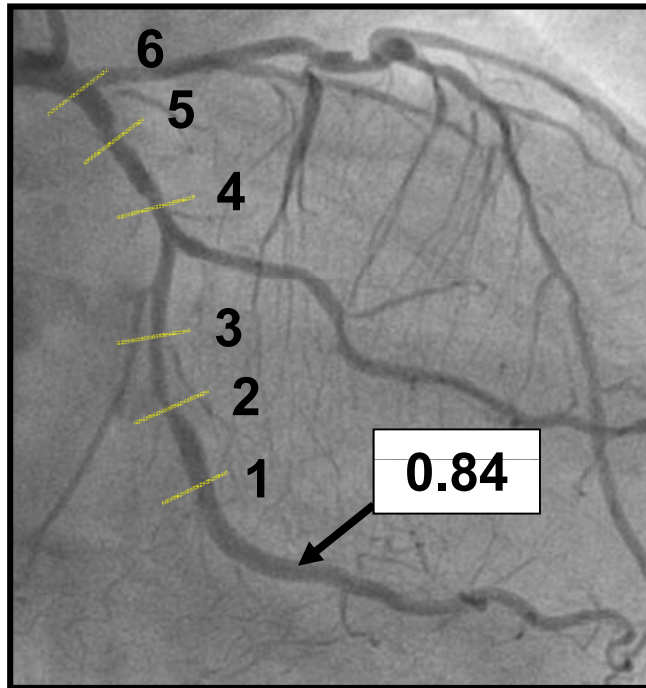




PCI in intermediate lesion: FFR vs IVUS

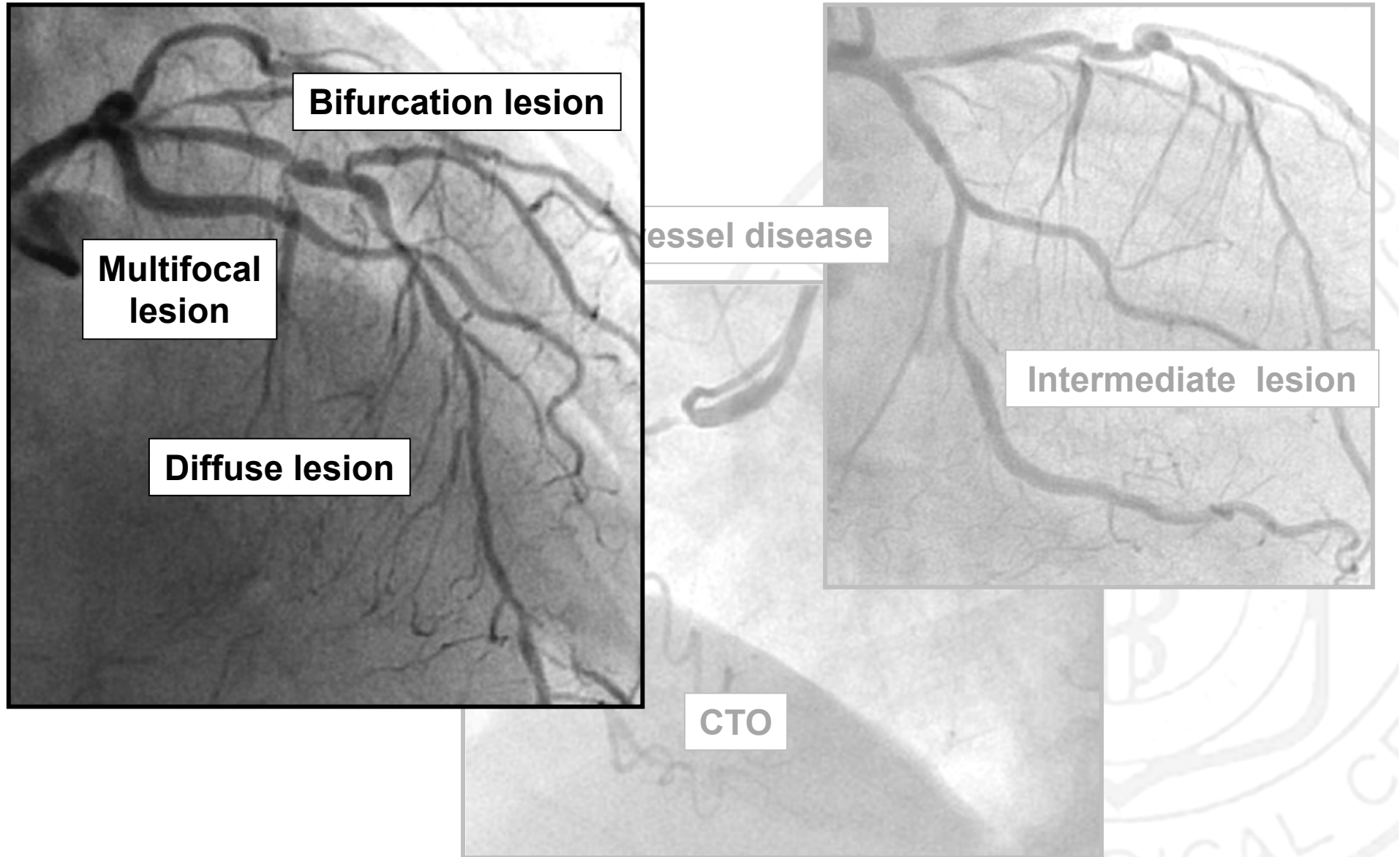


Intermediate lesion



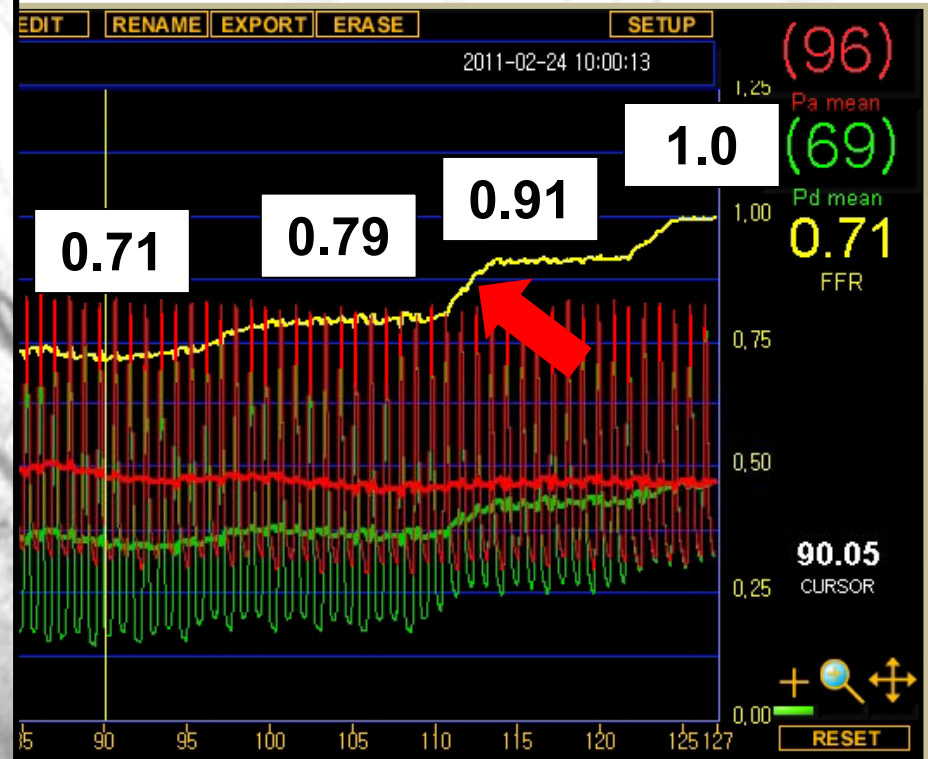
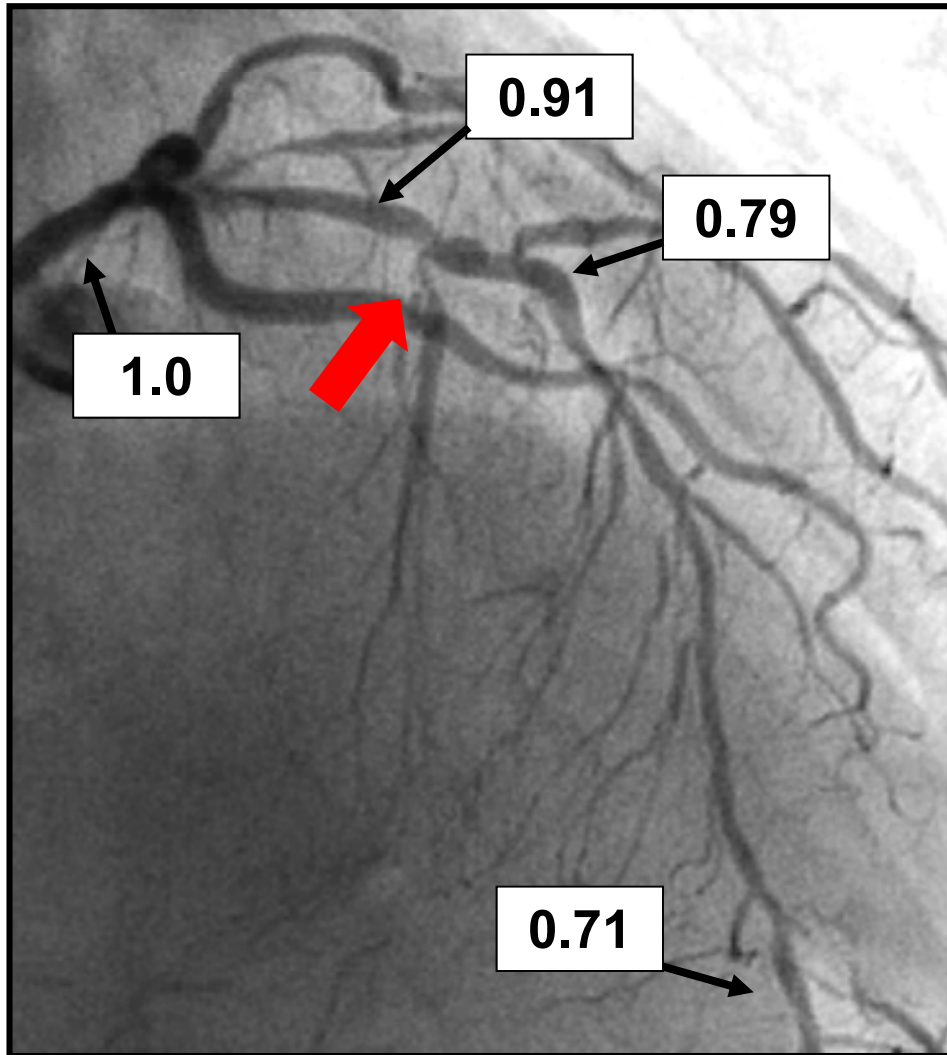


LAD Evaluation and Treatment



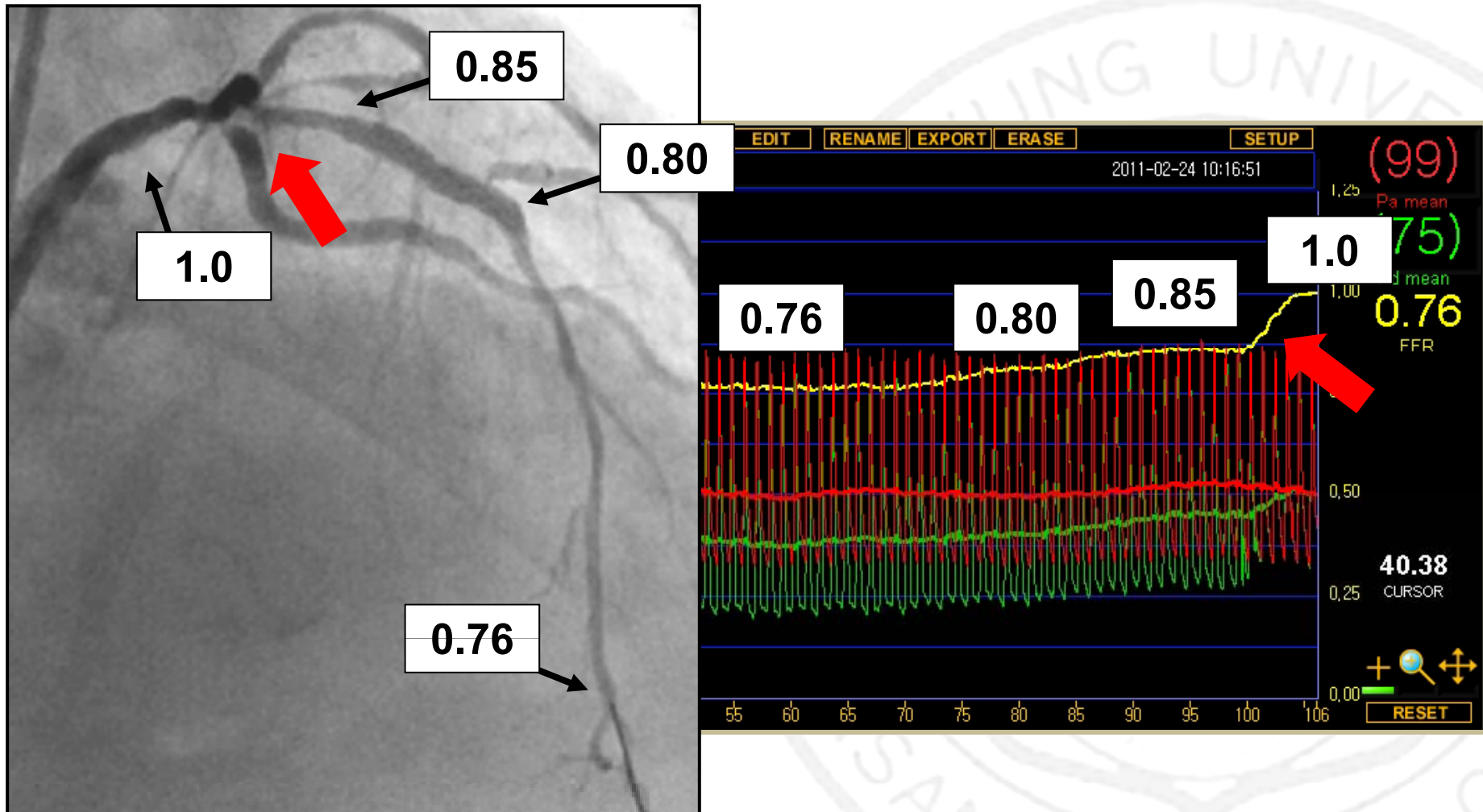


Multifocal & Diffuse long lesion



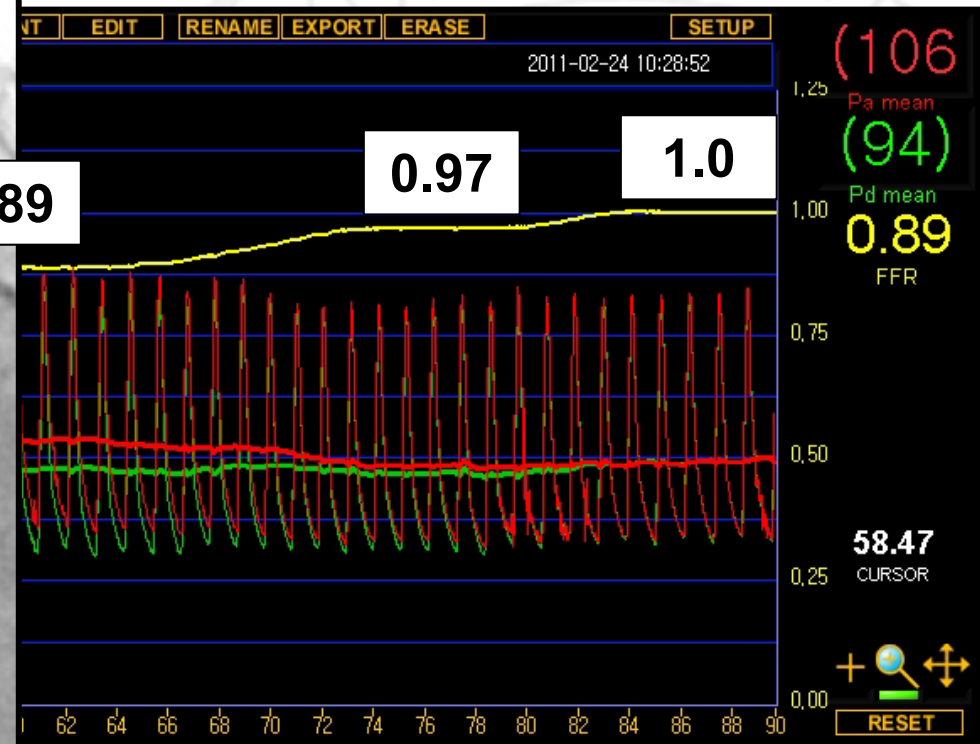
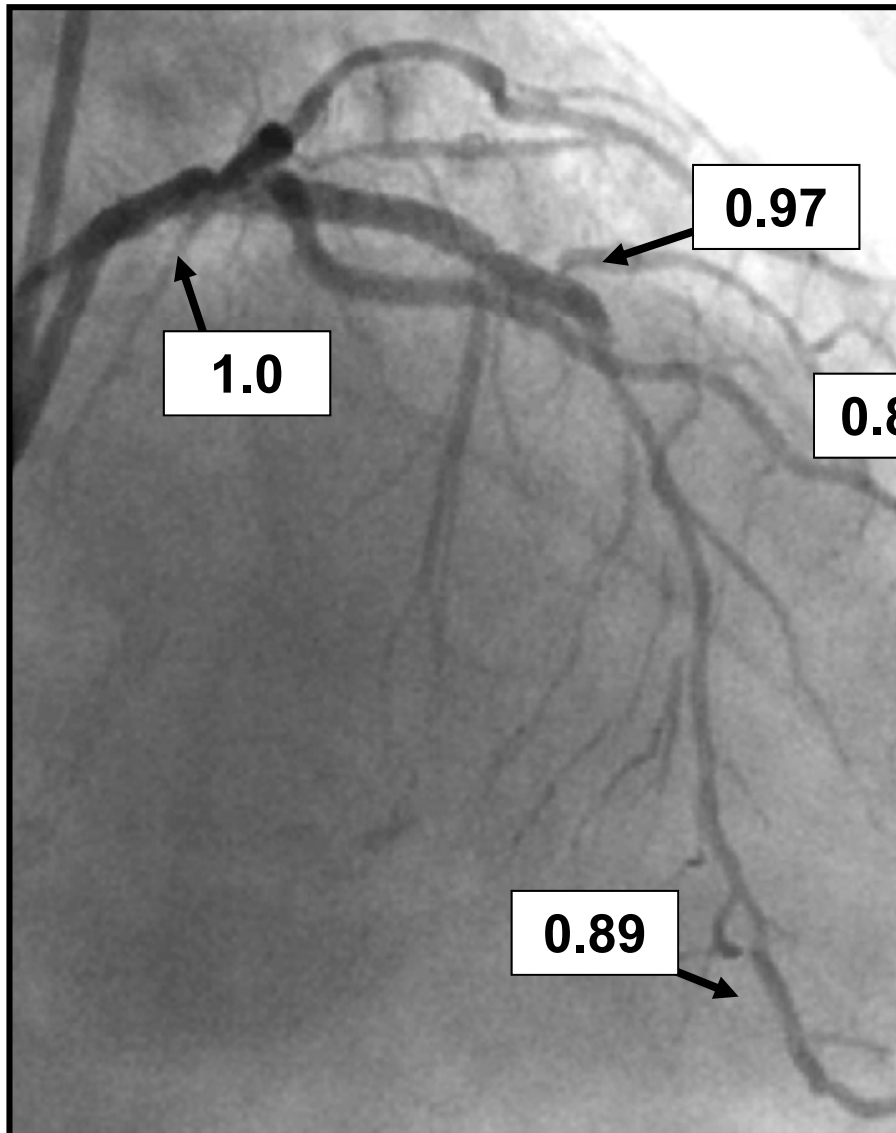


Post interventional evaluation



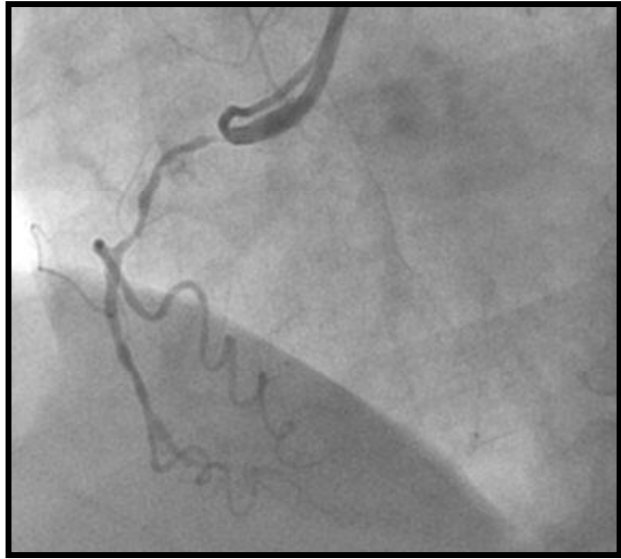


Post interventional evaluation





FFR-guided 3VD PCI





Conclusion



- ❖ **If FSS is applicable in the patients with multi-vessel CAD, the number of low- and medium-risk patients who usually are recommended PCI can be dramatically increased.**
- ❖ **CABG could be highly recommendable in the high-risk patients with multi-vessel CAD classified by FSS to hopefully improve outcomes.**
- ❖ **Therefore, the selection of target vessels, the method for revascularization, and the determination of prognosis in patients with multi-vessel CAD are improved by FFR-guided risk in daily practice.**