Function-guided Approach

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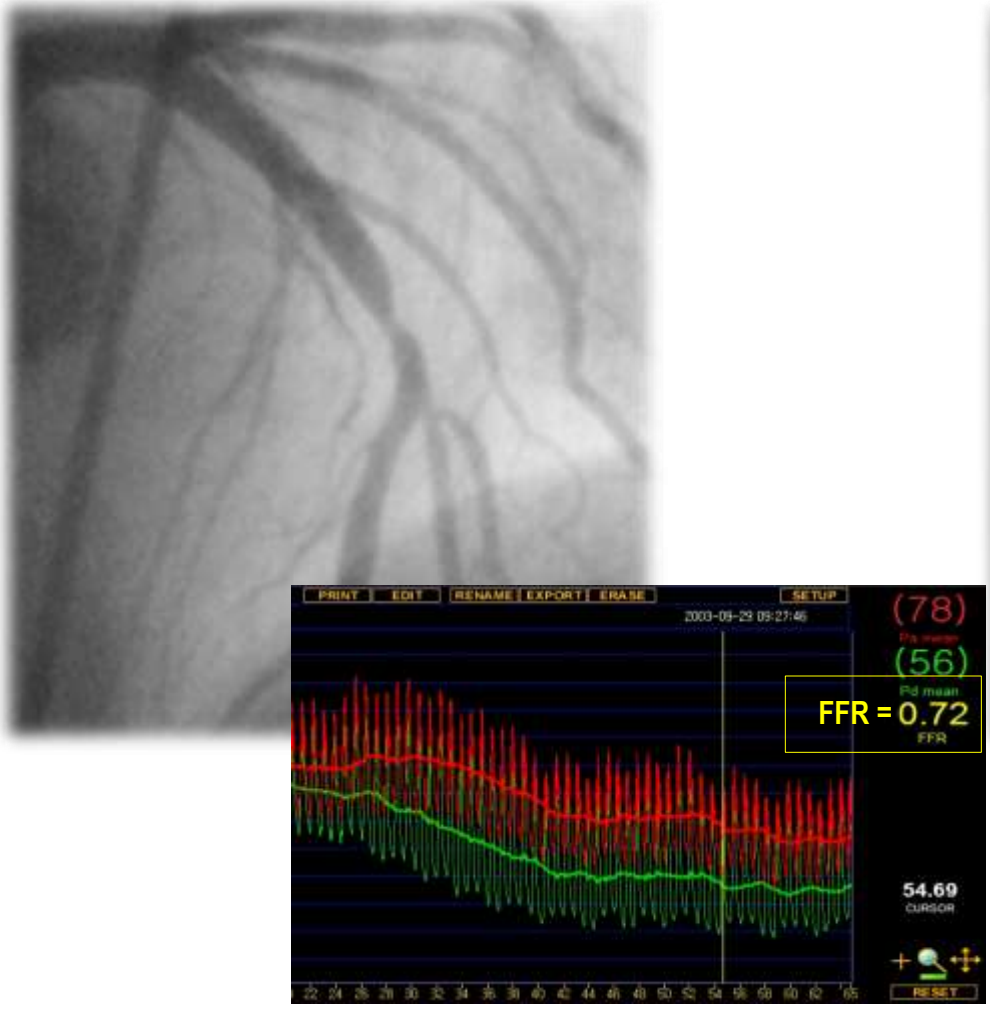
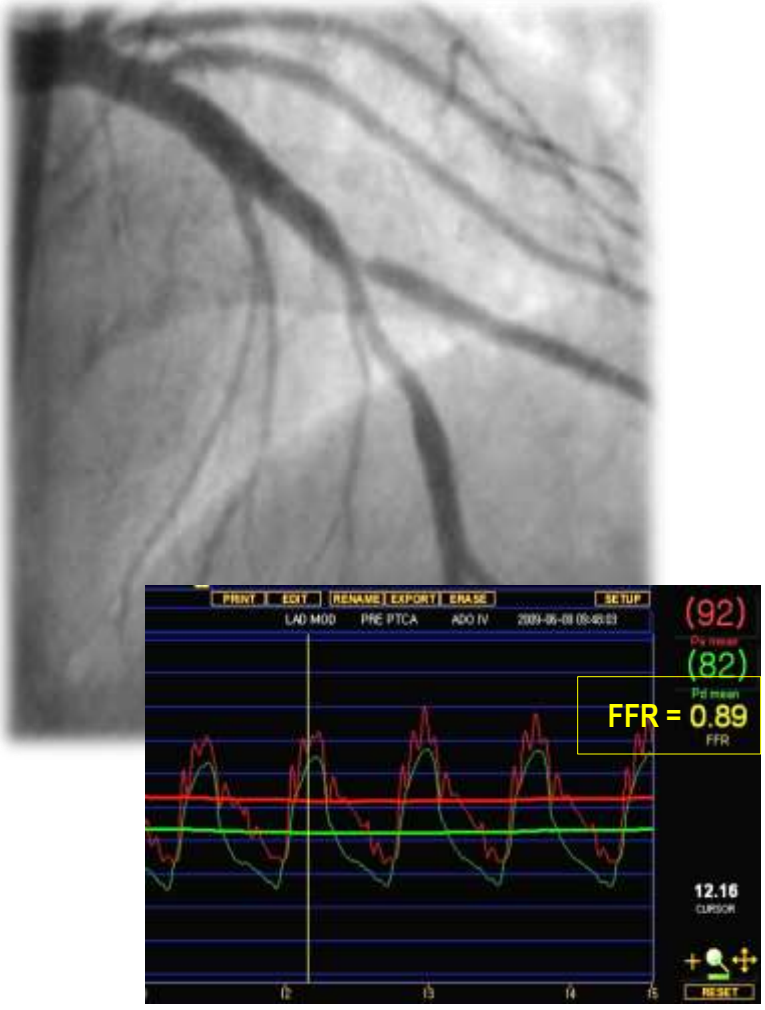
How to use FFR and its concept?

- Intermediate stenosis/Multi-vessel disease
- During complex intervention: Left main/Bifurcation
- Post PCI
- Dobutamine stress FFR
- Wedge pressure
- Beyond FFR
  - Assessment for microvascular disease: CFR, IMR
  - Non-invasive hemodynamic assessment
  - Virtual stenting, virtual bypass surgery

Physiologic assessment for CAD

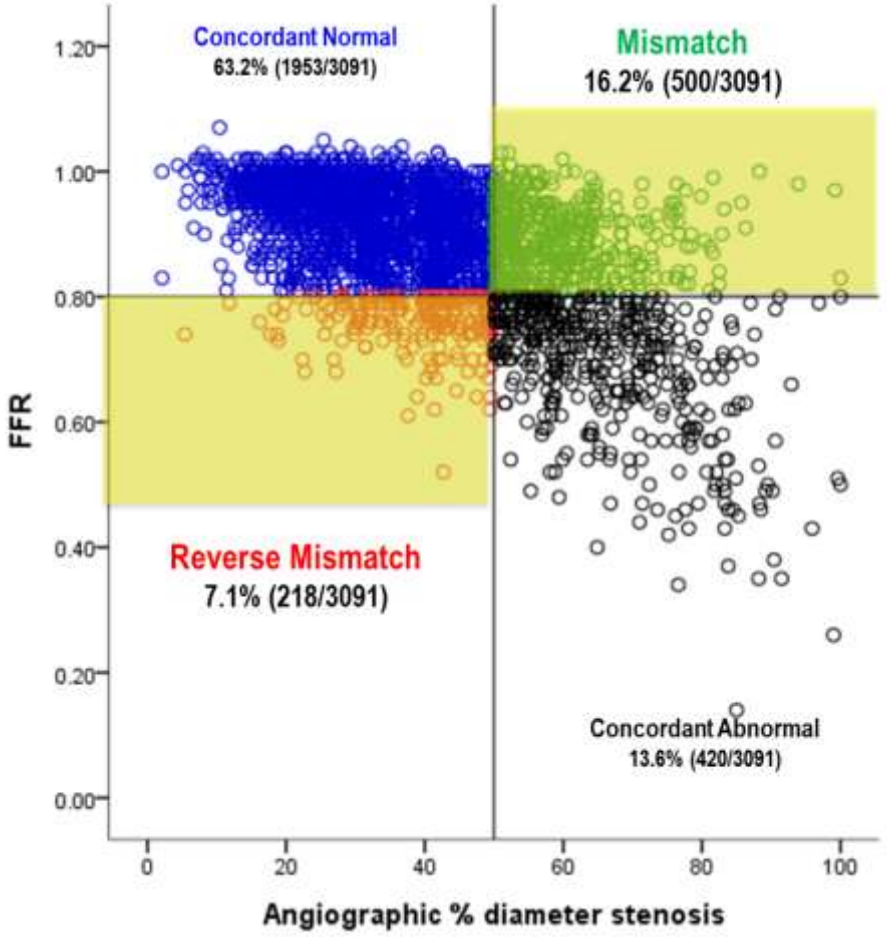
Intermediate stenosis: Which is a significant stenosis?





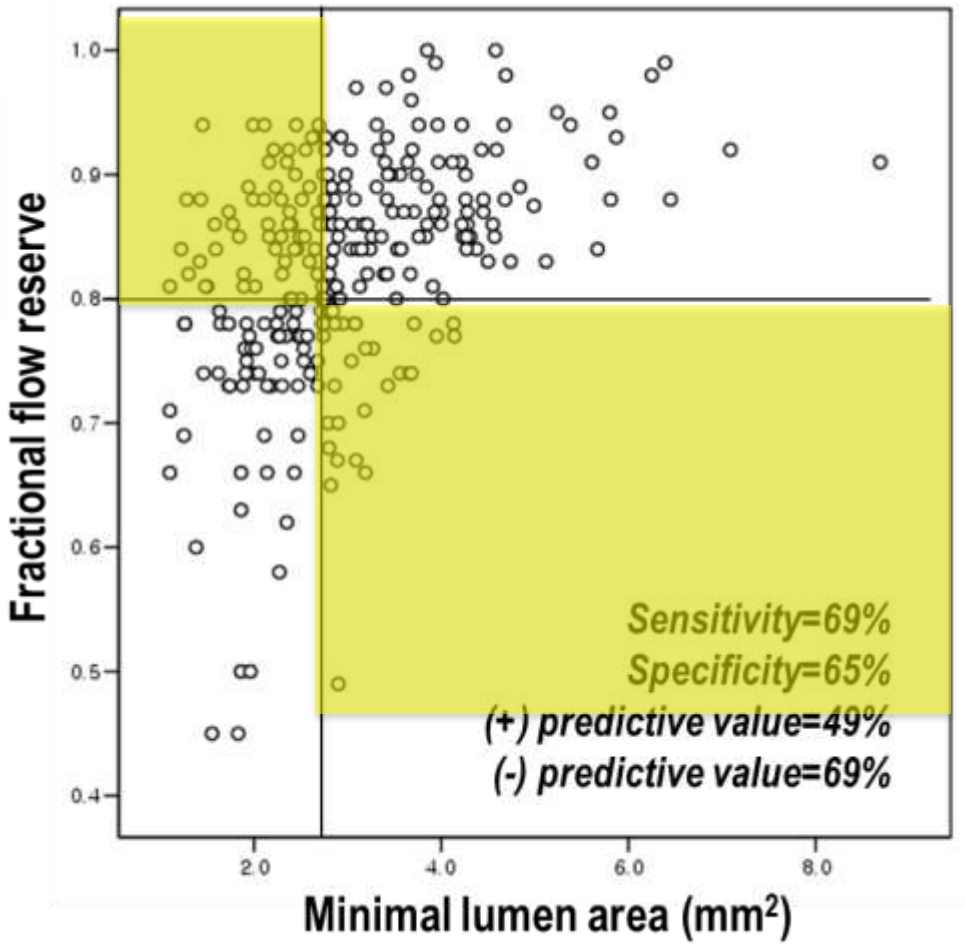
% stenosis ≠ Lumen area ≠ Ischemia

Coronary Angiography



from 3V FFR-FRIENDS study

IVUS



Koo BK, et al. JACC intv 2011

Physiology assessment: **Beyond the intermediate stenosis**

Patients with multi-vessel, multi-lesion disease

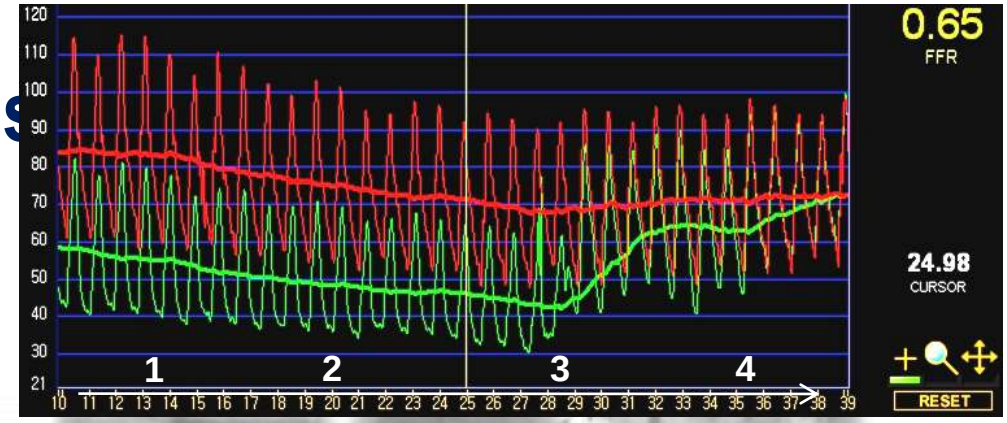
F/52 Stable angina

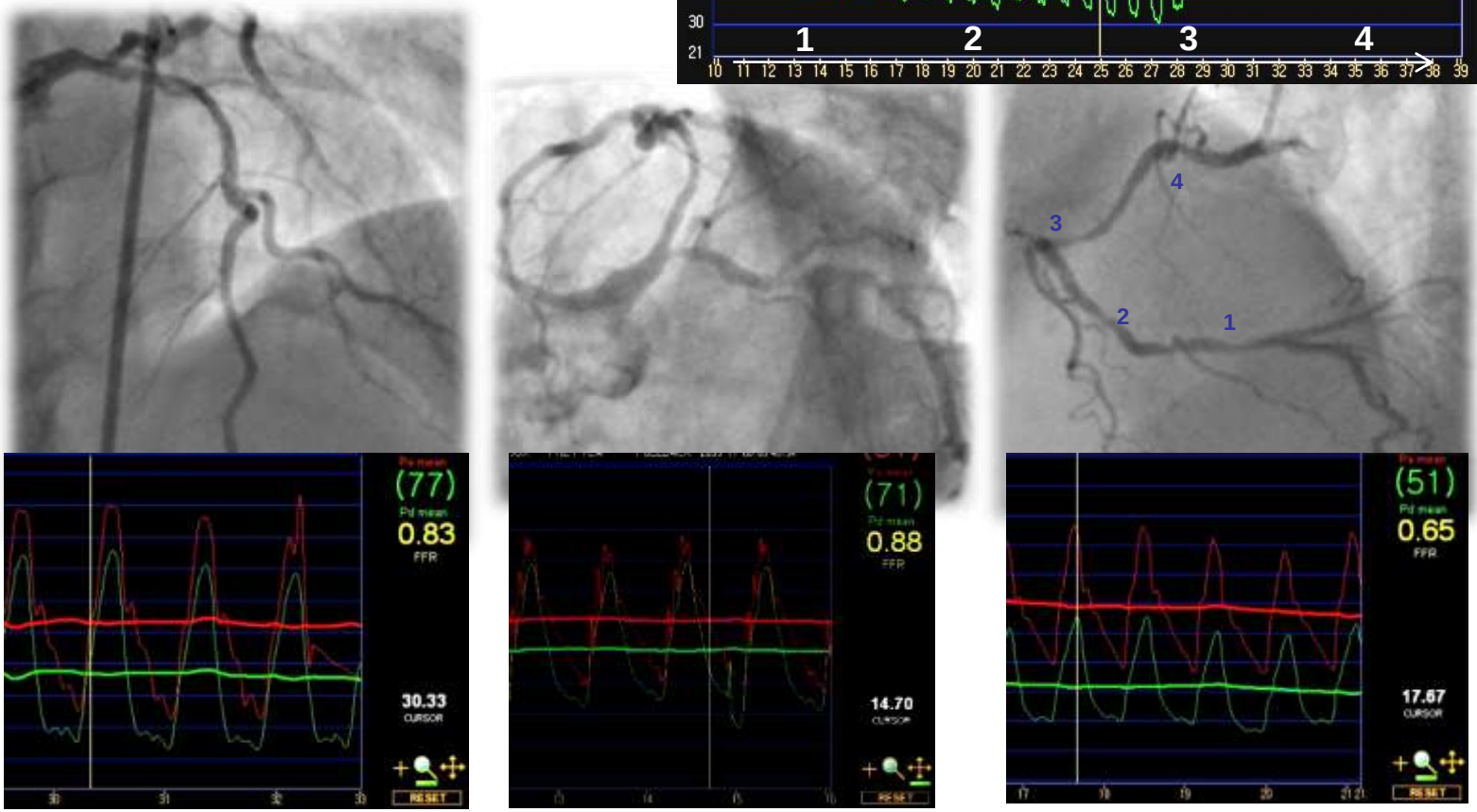
Distal left main disease + 3VD, 9 lesions

Patient with multi-ves

F/52

Stable angina



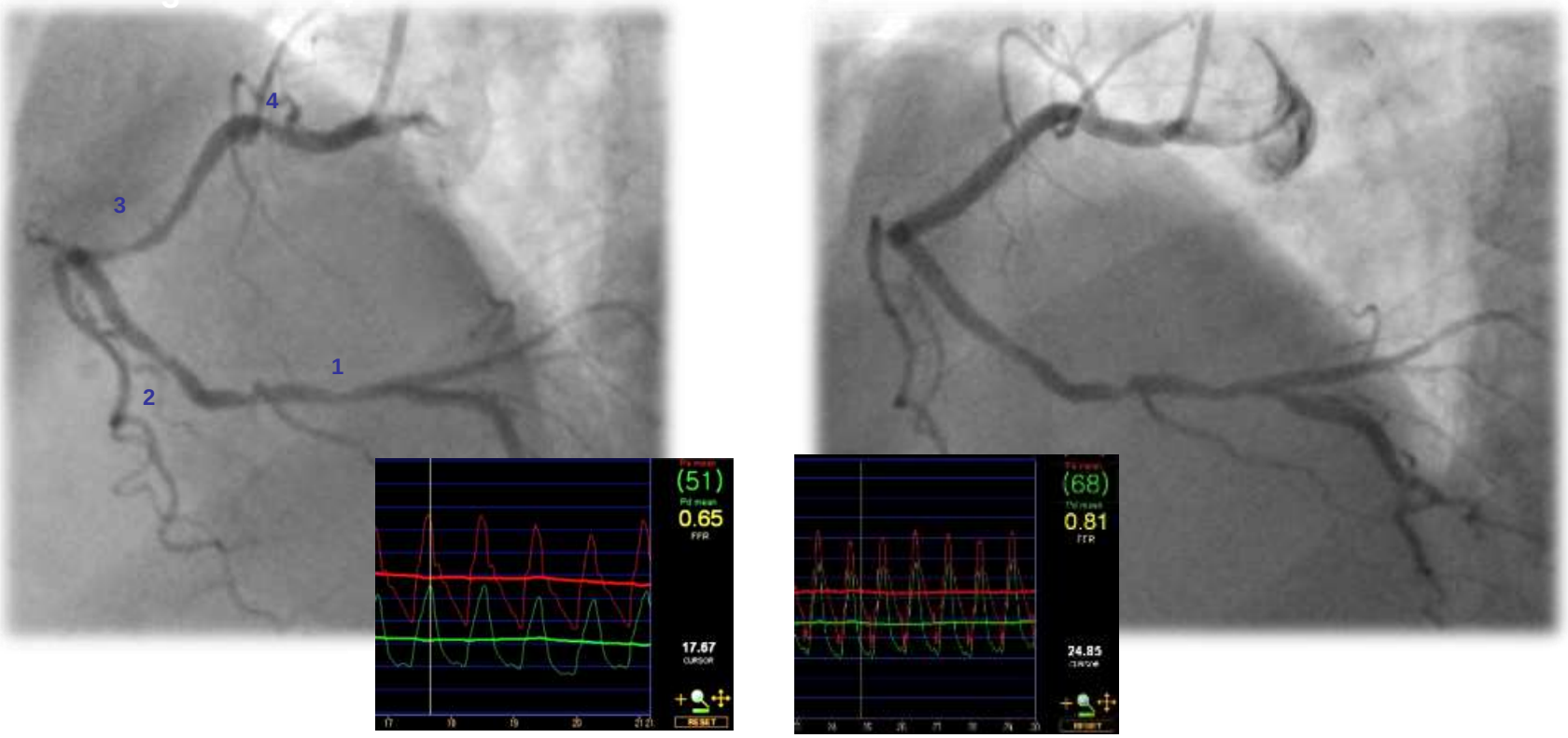


Distal left main disease + 3VD, 9 lesions?

Patient with multi-vessel, multi-lesion disease???

F/52

Stable angina, 3VD, 9 significant lesions by coronary angiography → **1VD, single lesion by FFR**



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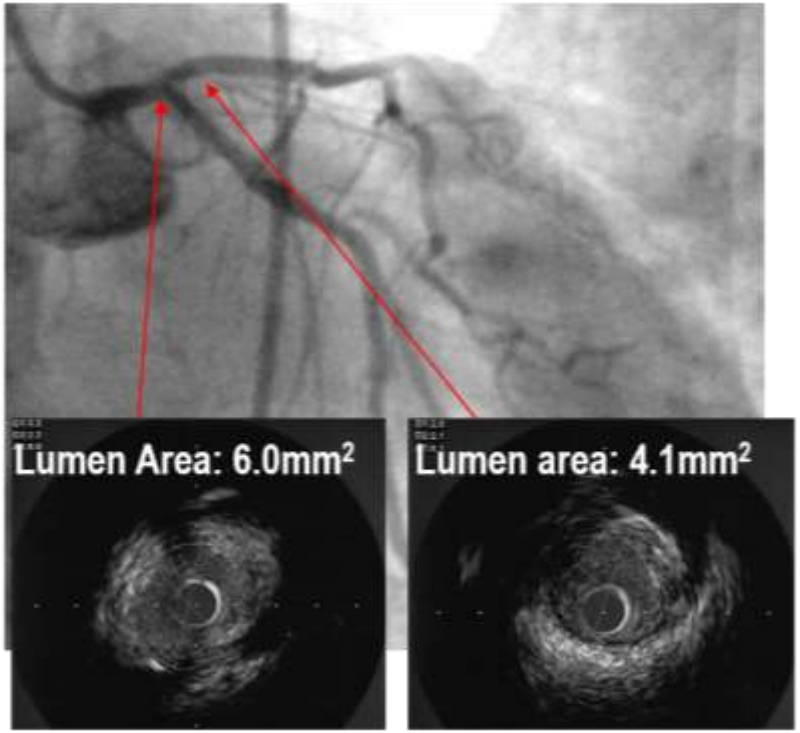
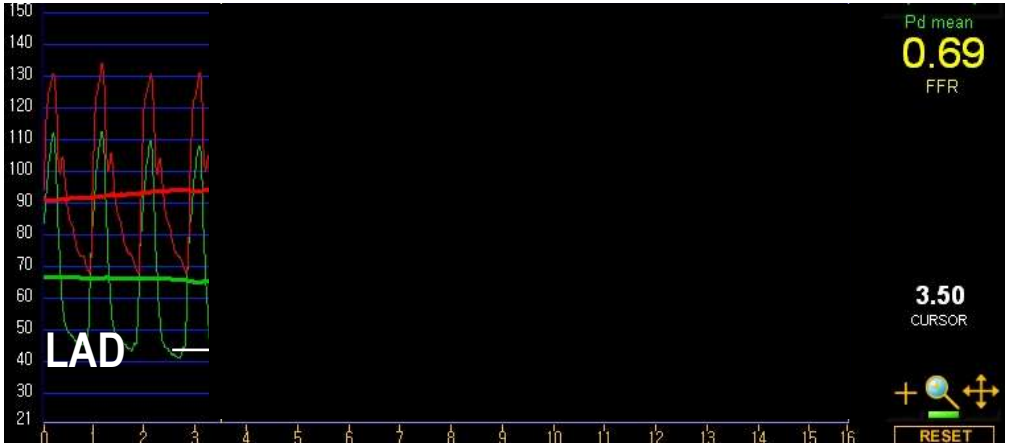
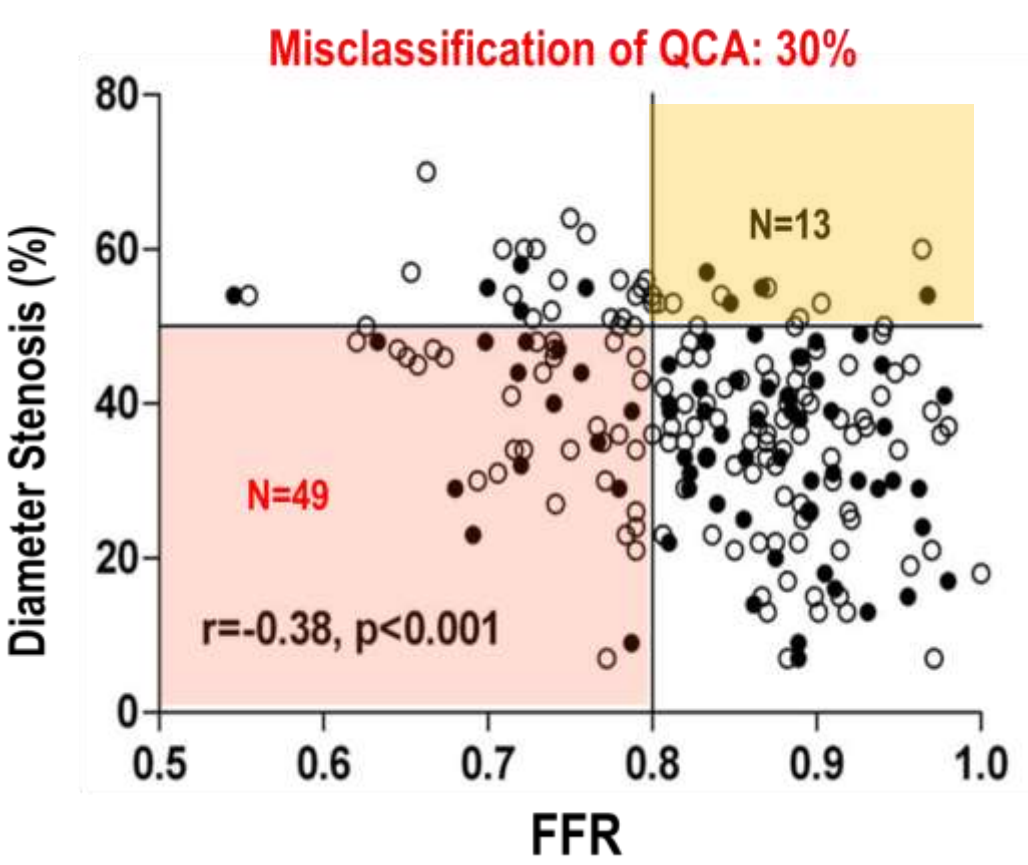
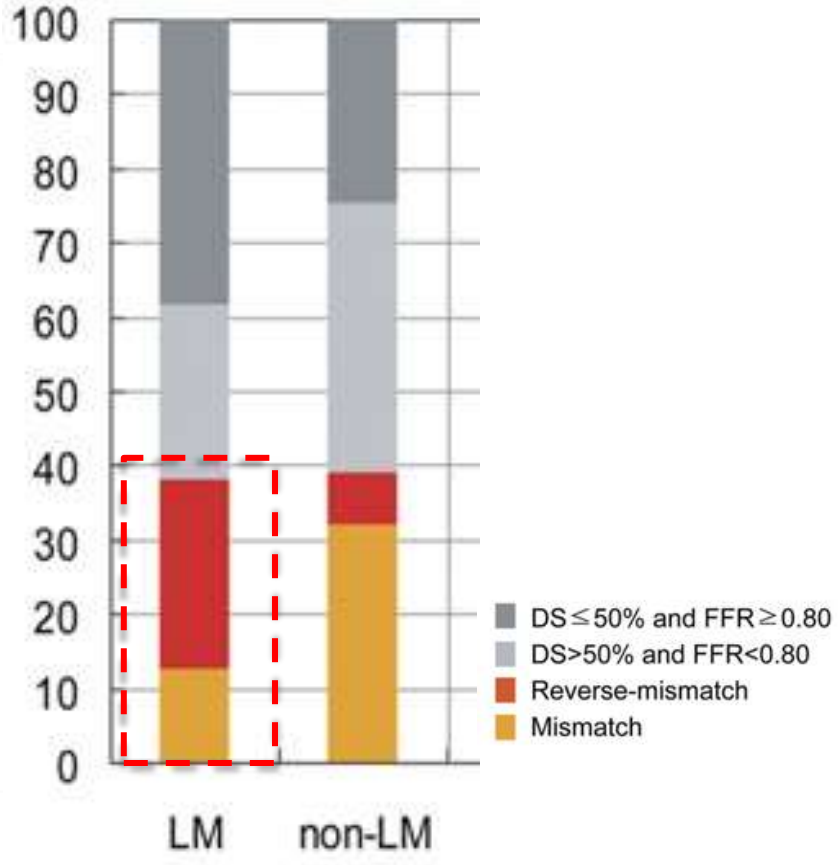
Is there a significant LM disease?





Angiography vs. FFR in Left Main disease



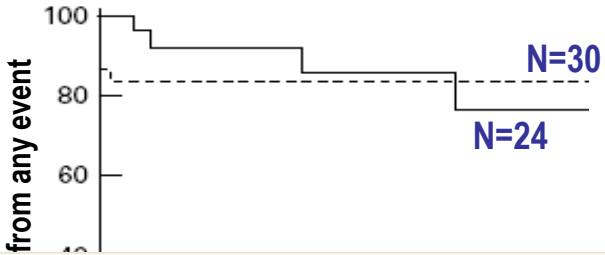


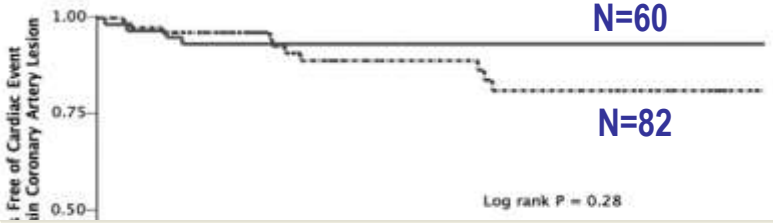
Hamilos et al. Circulation 2009

Park SJ, et al. JACC interv 2012

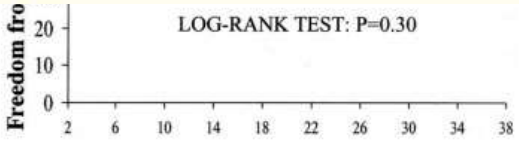
Safety of FFR-guided defer in Left Main Stenosis

FFR ≥ 0.75 or 0.8 → Medical treatment vs. FFR < 0.75 or 0.8 → Revascularization

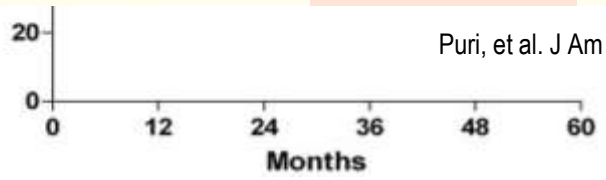




First Author (Ref. #)	N			FU (Months) Mean Duration	Overall Survival	
	Total	Defer Group	Surgical Group		Defer Group (%)	Surgical Group (%)
Bech et al. (23)	54	24	30	29 ± 15	100	97
Jasti et al. (24)	51	37	14	25 ± 11	100	100
Jiménez-Navarro et al. (25)	27	20	7	26 ± 12	100	86
Legutko et al. (26)	38	20	18	24 ± 12	100	89
Suemaru et al. (27)	15	8	7	33 ± 10	100	100
Lindstaedt et al. (28)	51	24	27	29 ± 16	100	81
Hamilos et al. (20)	213	138	75	35 ± 12	90	85
Total or (mean)	449	271	178	(28 ± 13)	(95)*	(89)



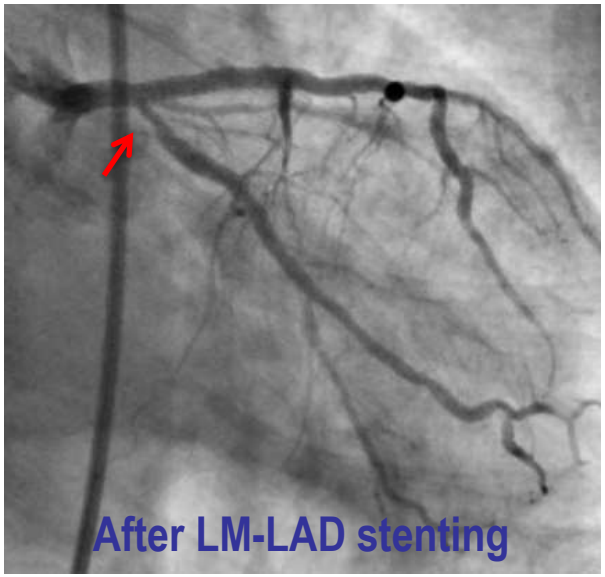
Jasti, Circulation 2004

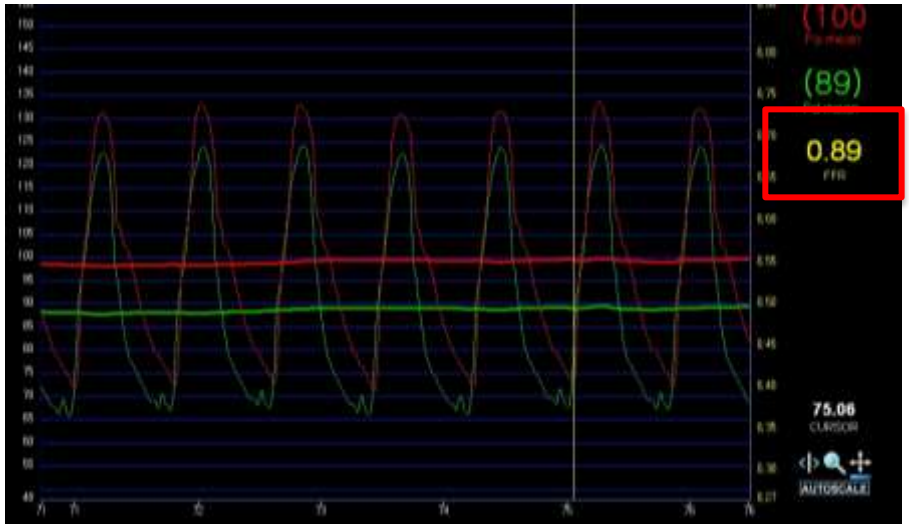


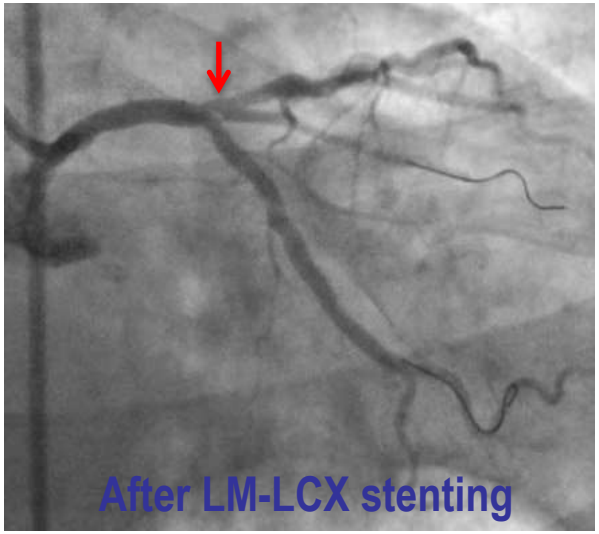
Puri, et al. J Am Coll Cardiol Intv 2012

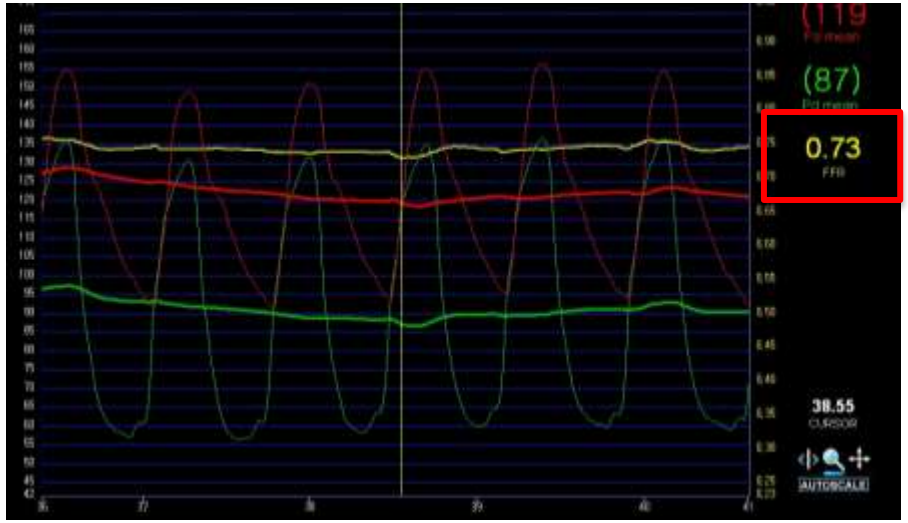
Hamilos, Circulation 2009

Assessment for jailed branches after LM stenting



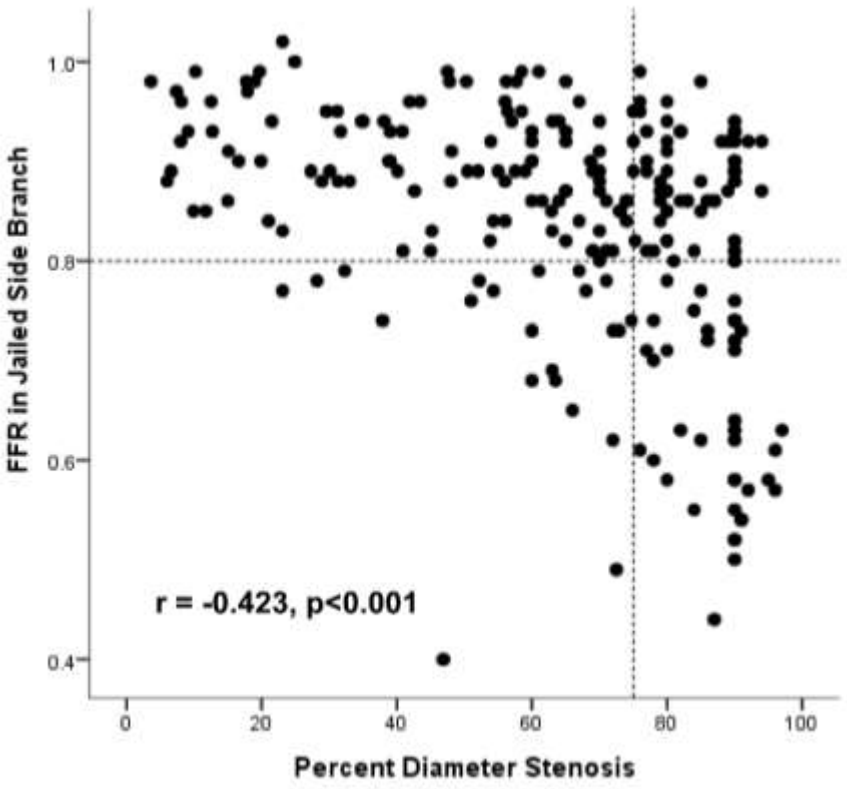


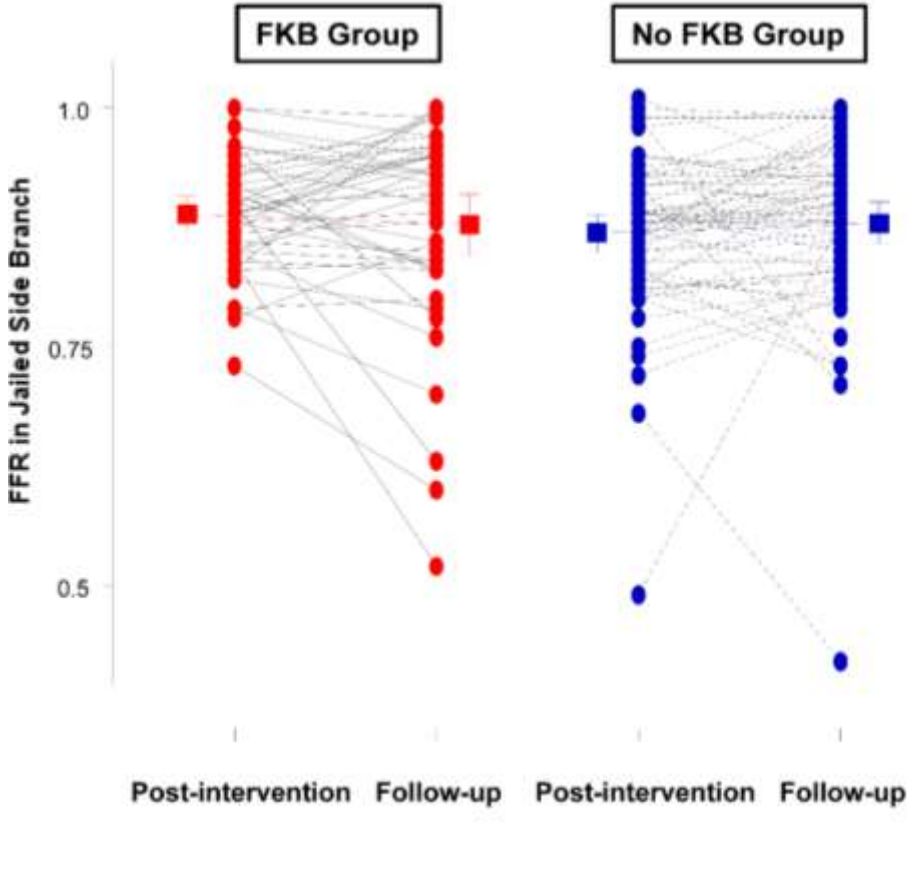




FFR for jailed side branches

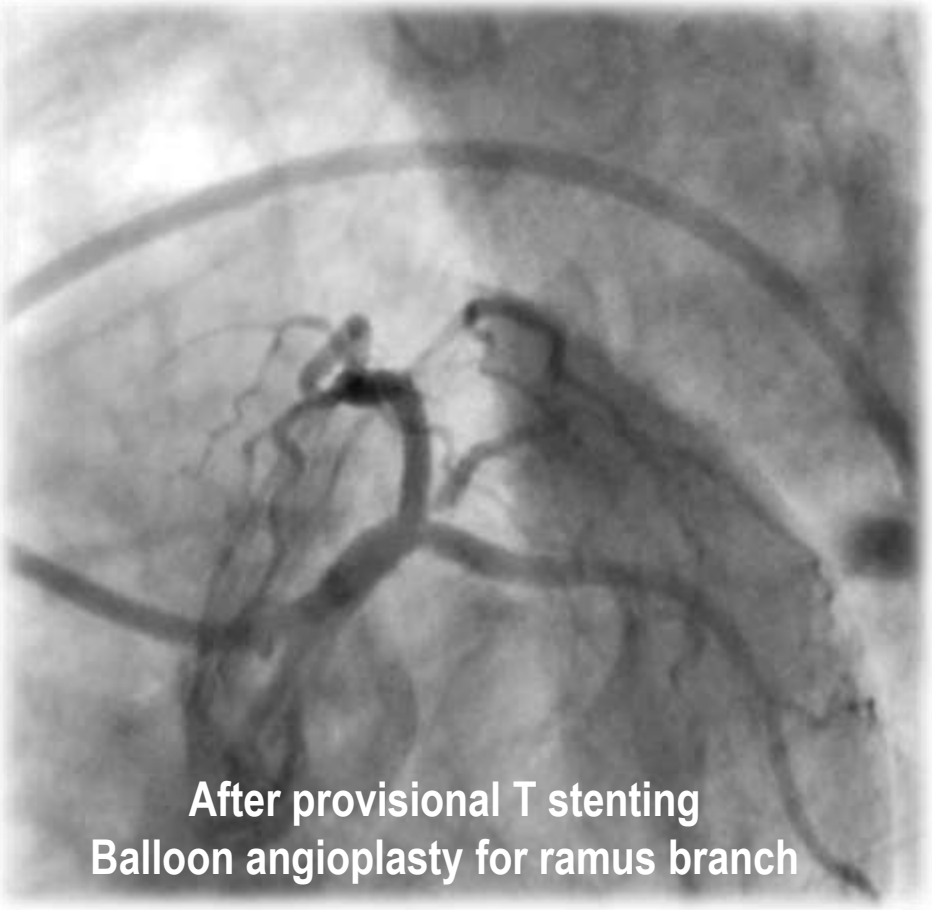
- SNUH registry, Nordic-Baltic bifurcation study and England study -



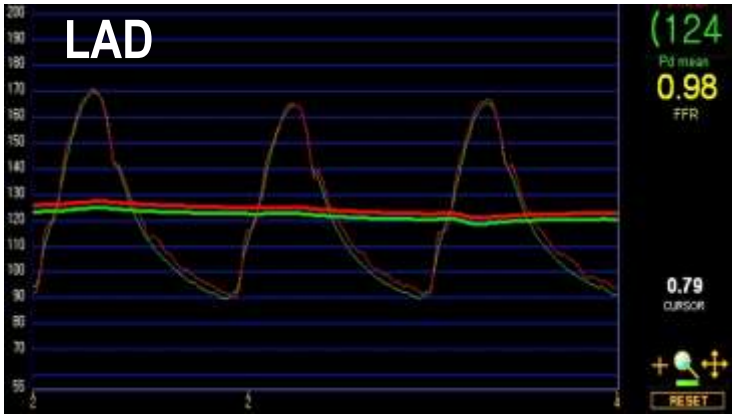


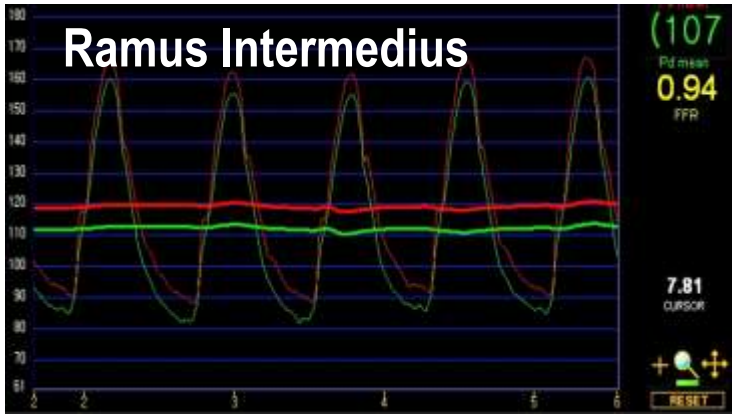
Lee JM….. Koo BK, Eurointervention 2015

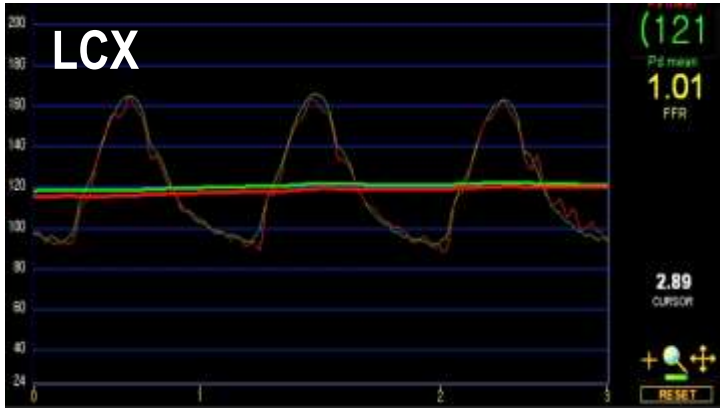
Evaluation of procedure after (complex) stenting



After provisional T stenting
Balloon angioplasty for ramus branch

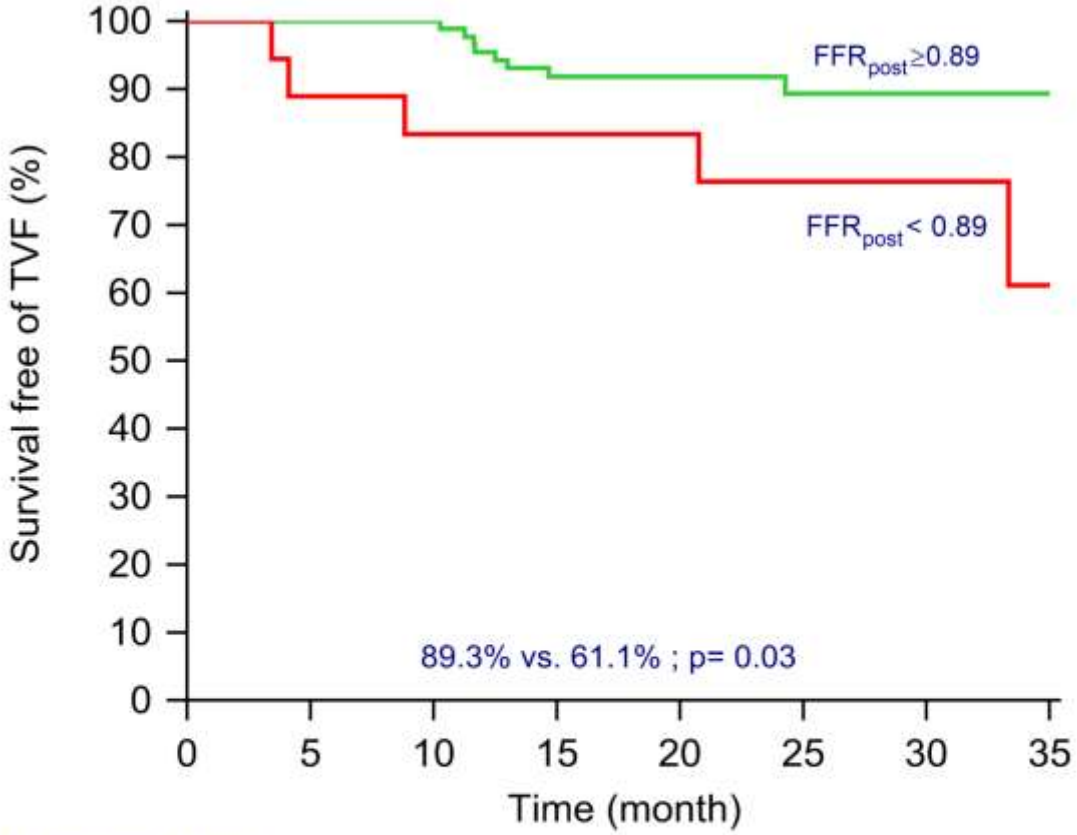






Functionally complete revascularization

FFR after DES vs. Clinical events (3years)

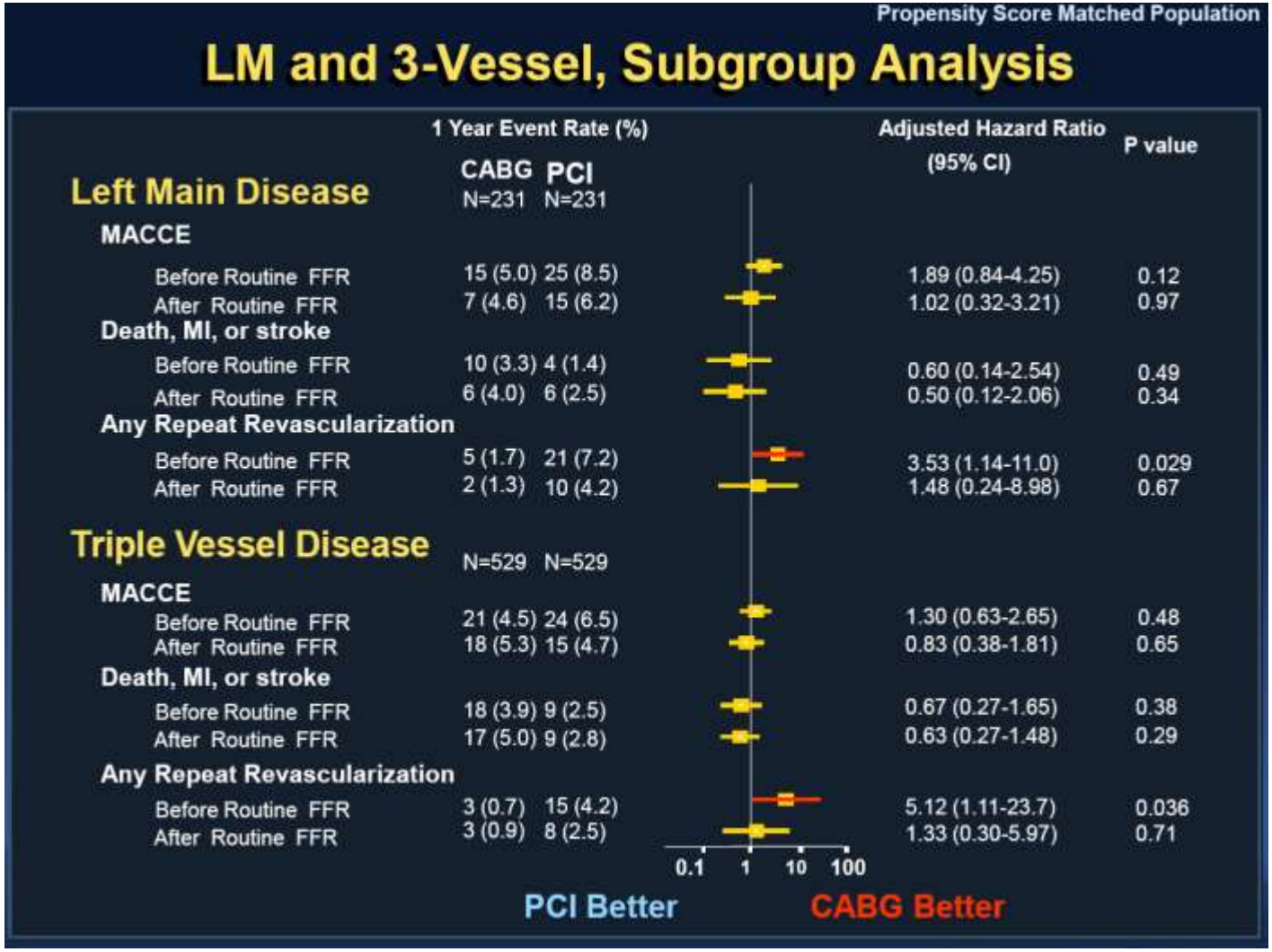


Number at risk

FFR$_{post}$≥ 0.89	89	89	87	69	53	31	24	19
FFR$_{post}$< 0.89	18	16	15	14	13	9	7	3

Doh JH, …, Koo BK, J Inv Cardiol 2015

Changes of outcome after routine use of FFR



Courtesy of SJ Park, Asan Medical Center
Eur Heart J 2013

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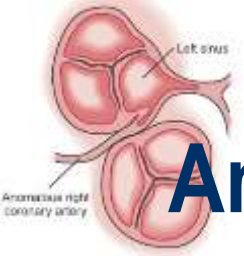
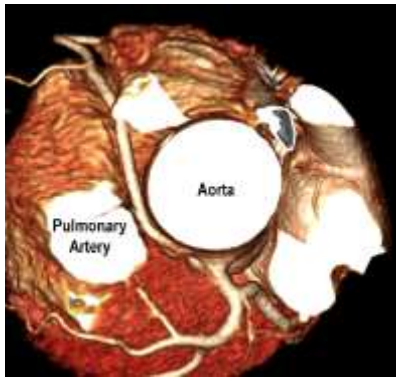
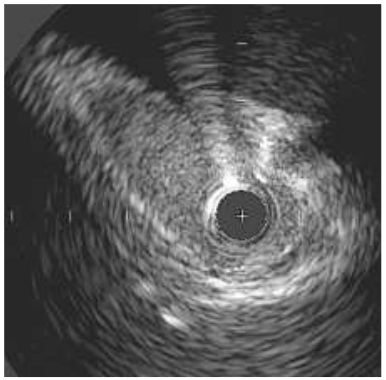
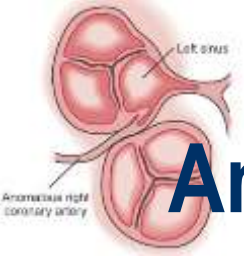


Anomalous RCA from Left coronary sinus





Lee SE….. Koo BK, Heart 2015



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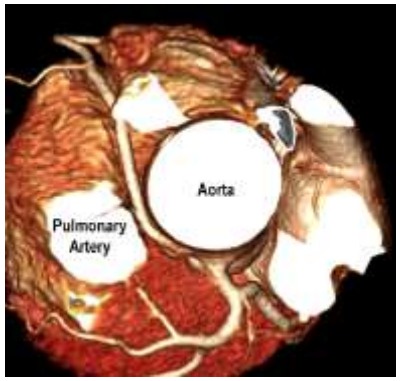
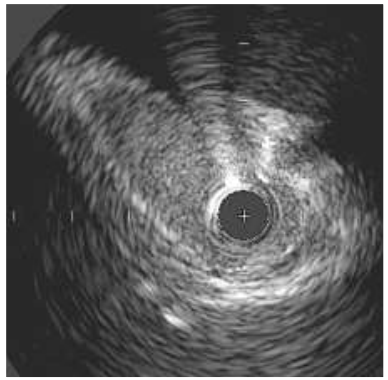
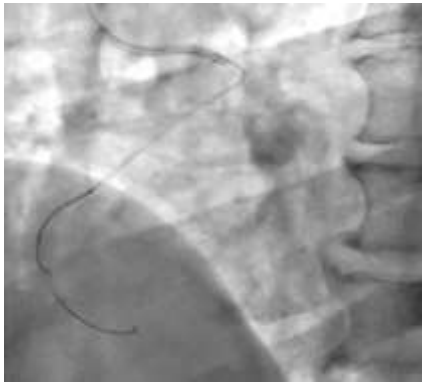
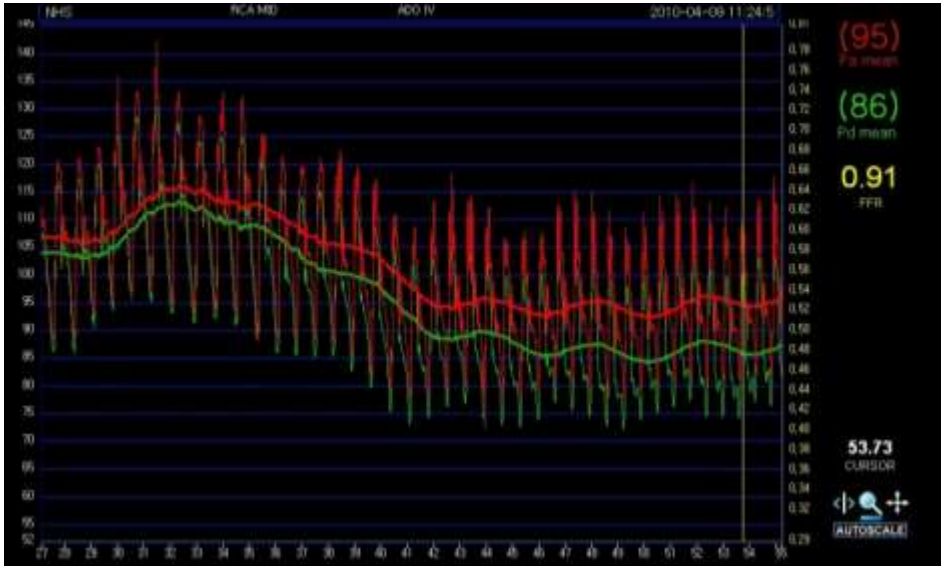






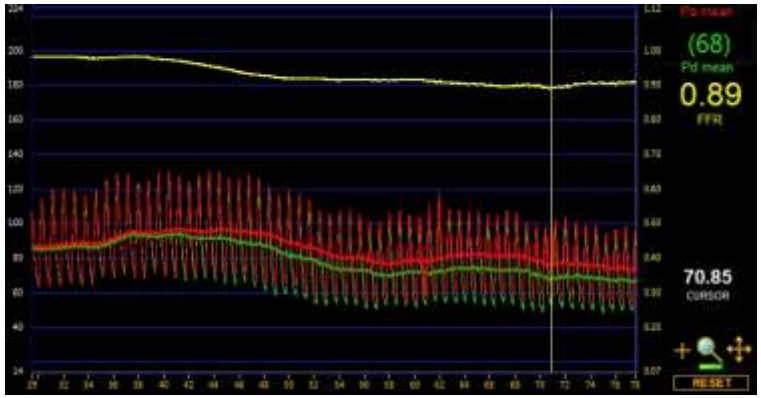
Dobutamine + Atropine + Adenosine

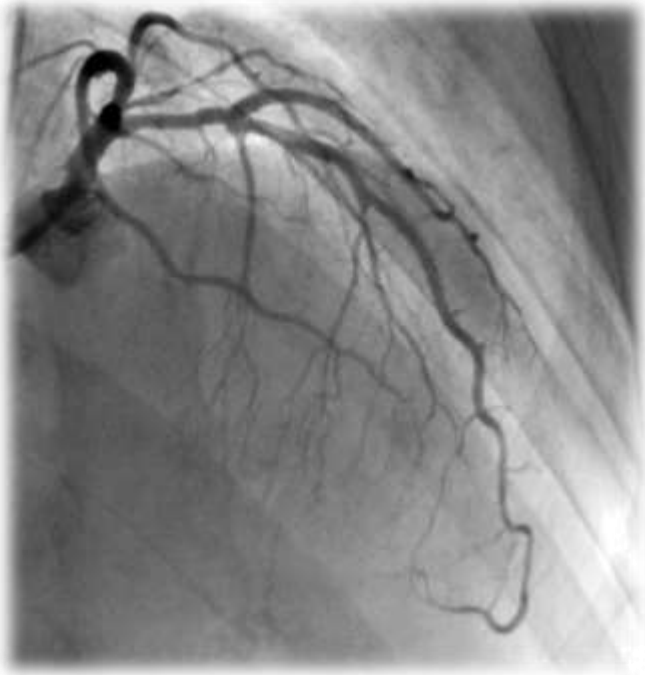


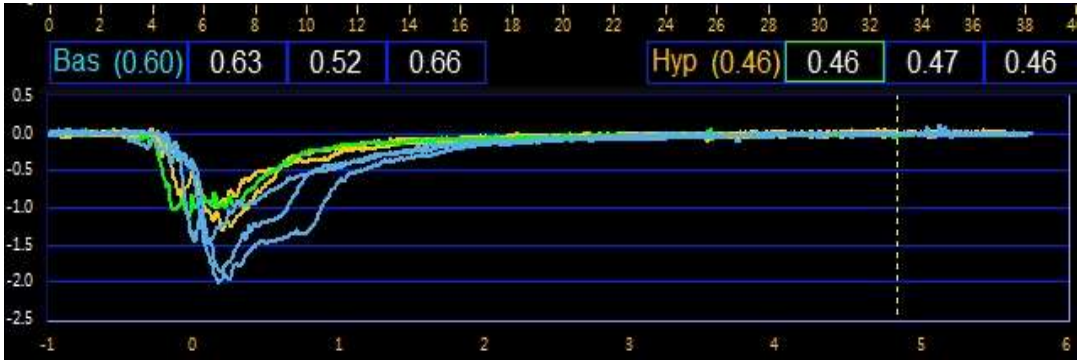
Lee SE….. Koo BK, Heart 2015

Why angina and ischemia in this case?

- Hidden disease
- Diffuse coronary atherosclerosis
- Microvascular dysfunction



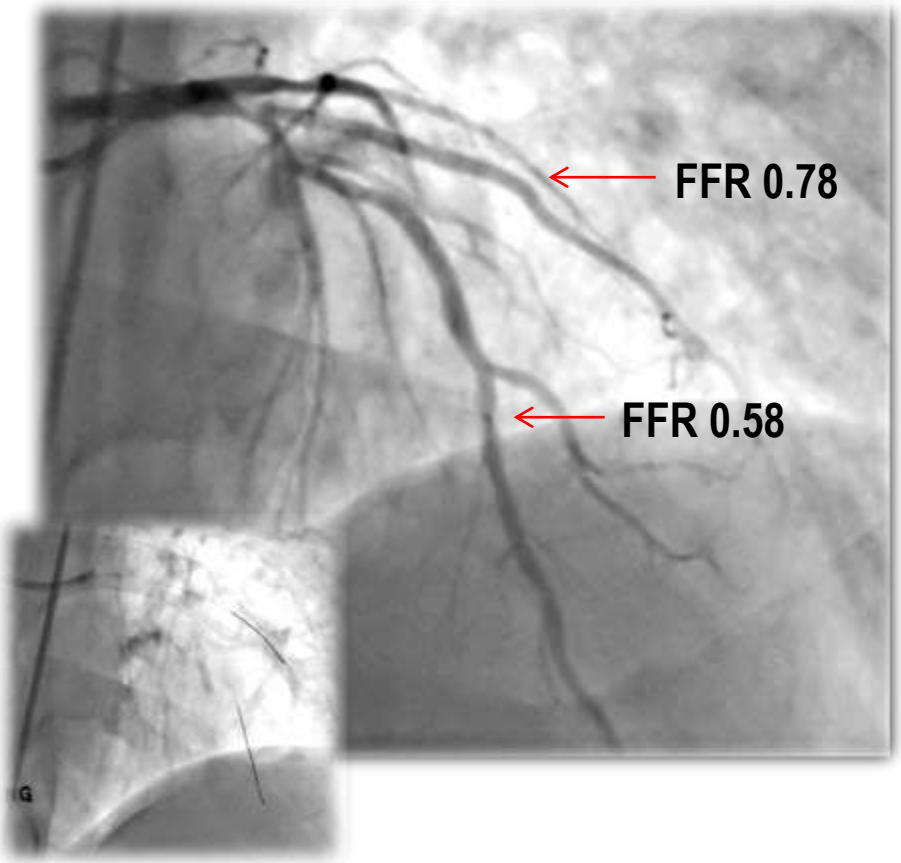


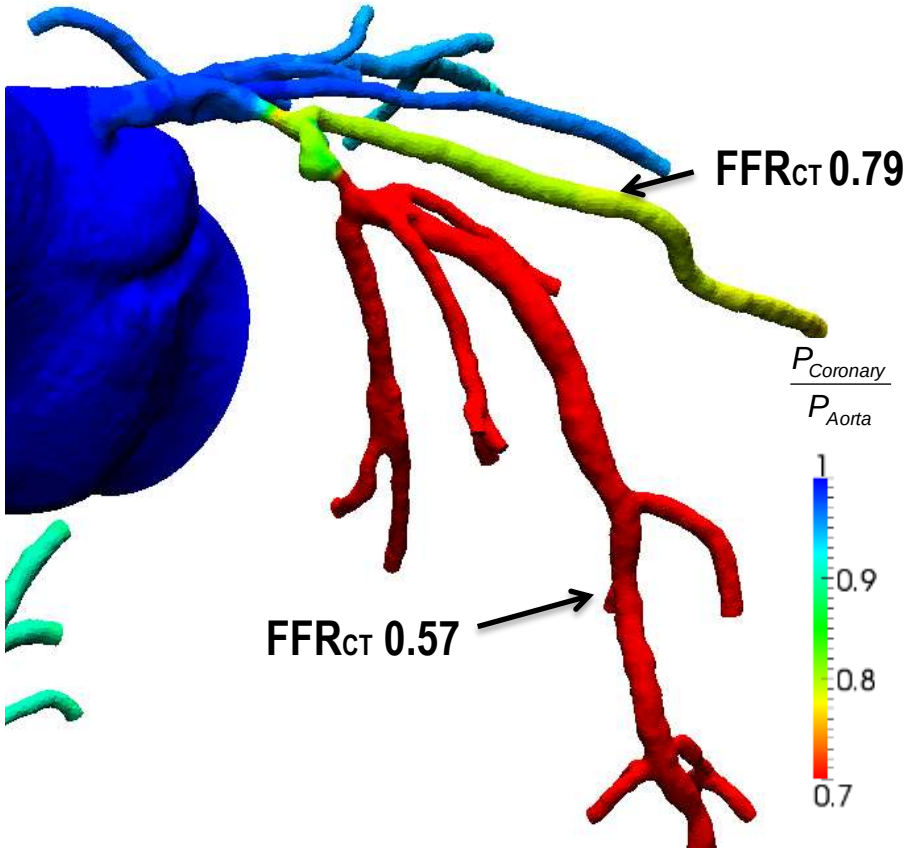


IMR = Pd x Tmn = 68 x 0.46 = 31.3

cCTA-derived non-invasive FFR

: FFR without invasive procedure, pressure wire, adenosine





Koo BK, et al. JACC 2013

Function-guided Approach

- Invasive physiologic assessment is helpful for most of your clinical decisions in the catheterization laboratory.
- Clinical application of FFR and its extended concept will provide better stratification and management for patients with coronary artery disease.