

Bifurcation PCI

: Is it a matter of Technique or Concept?

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Bifurcation lesion: “The GREAT EQUALIZER”!

No intervention = *Balloon angioplasty* = *Stenting*

Most Conservative

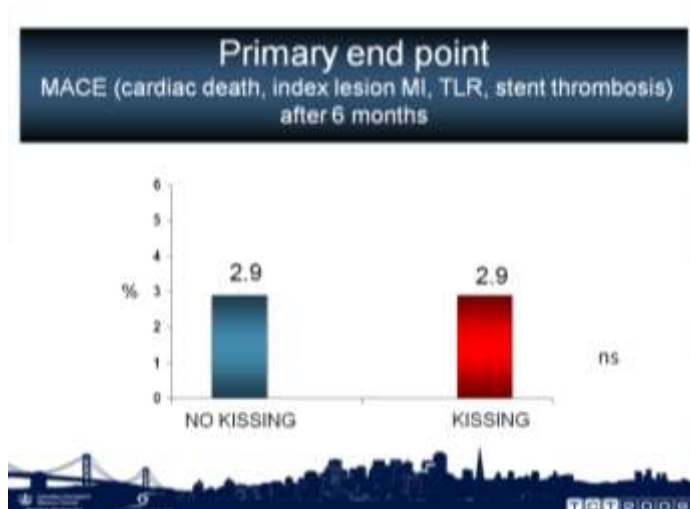
Most Aggressive

↑
NORDIC III
(No tx)

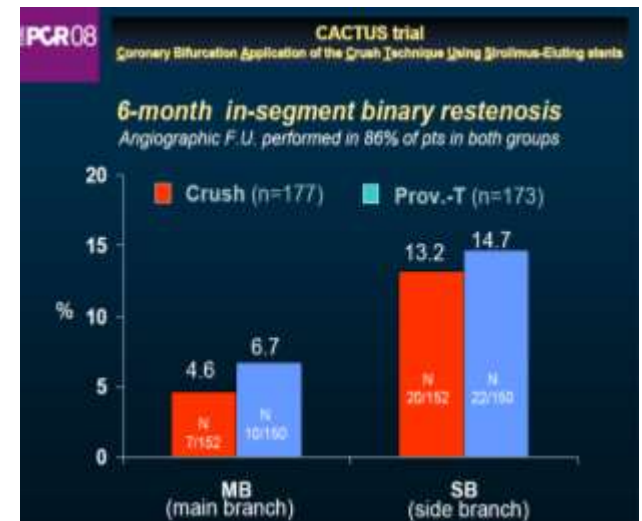
↑
NORDIC I
(Angioplasty in <TIMI 3 flow)

↑
CACTUS
(Angioplasty)

↑
CACTUS
(SB stent)



NORDIC III: Leave it alone vs. Kissing



CACTUS: Crush vs. Provisional

What Really Matters in Bifurcation PCI ?

Either Provisional Stenting or Any Planned 2 stent Technique Would Be OK in the Era of DES, Depending On Jeopardy Myocardium Supplied by Side Branch and Patient's Symptoms.

It's a Matter of Concept rather than Technique !

Courtesy of SJ Park, MD, PhD, Asan Medical Center

Why “technique (or technology)” doesn’t matter?



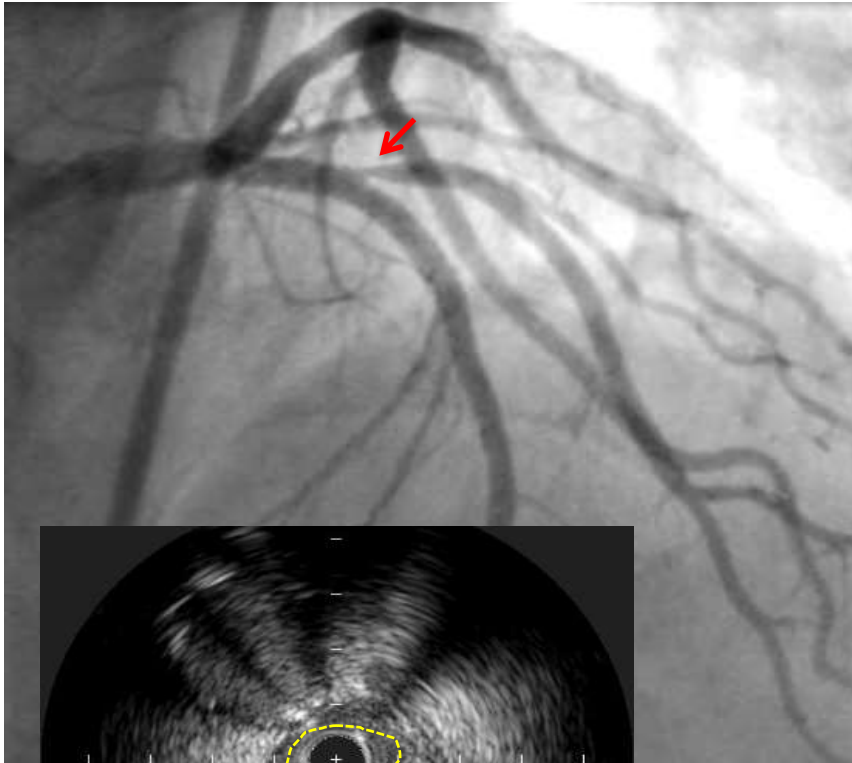
Significant stenosis?



- **Anatomically!**
- **Physiologically!**
- **Clinically!**
- **Prognostically!**

Stenosis → Ischemia → Clinical relevance → Revascularization → Prognosis

Significant stenosis?



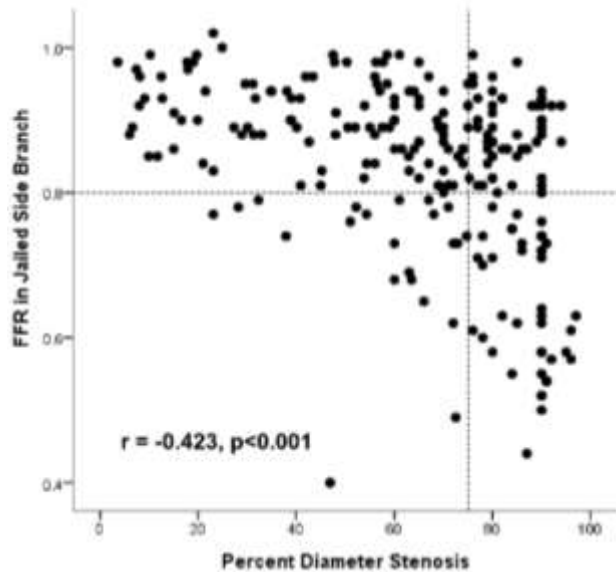
Min Lumen Area: 2.0mm^2
MLD: 1.2mm

- **Anatomically!**
- Physiologically
- Clinically
- Prognostically

Anatomical severity ~~=~~ Physiological significance

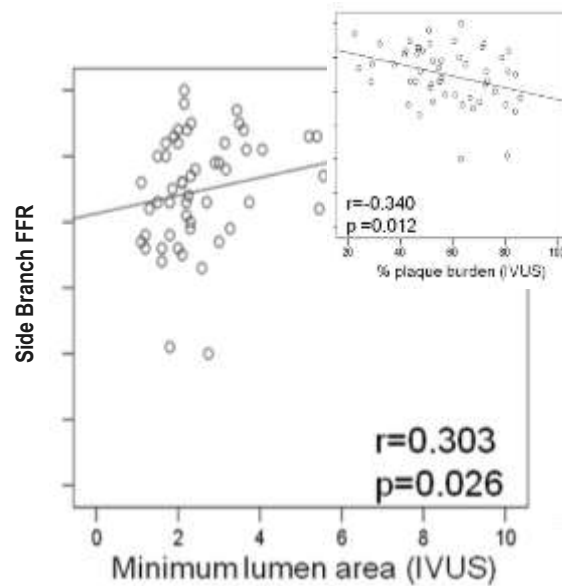
Technique doesn't matter!

Angiography



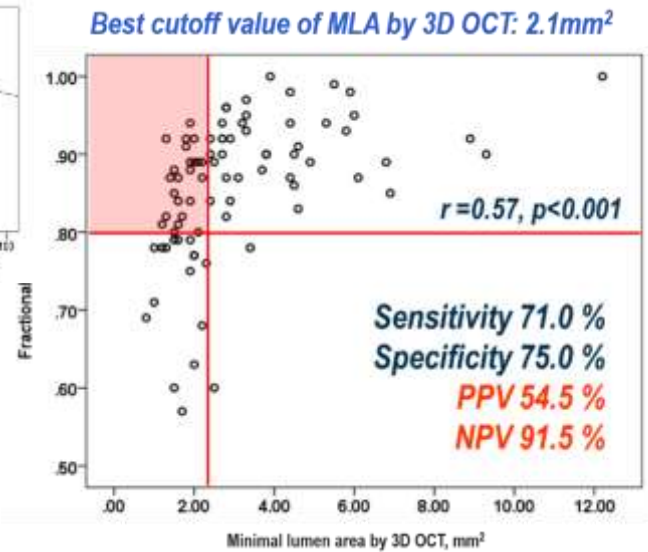
Lee JM, Koo BK, et al., Eurointervention 2015

IVUS



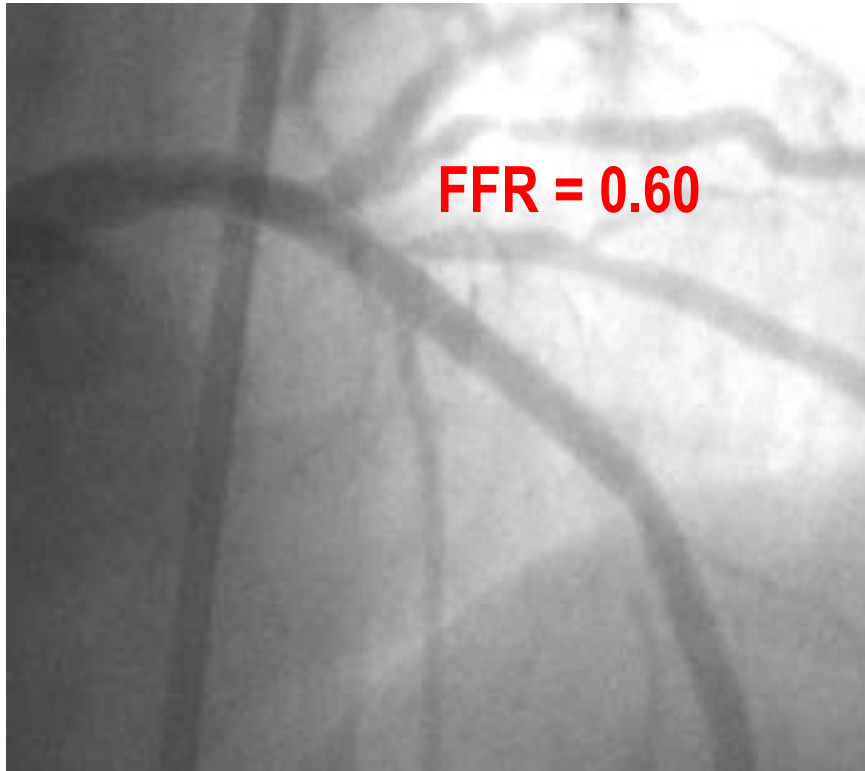
Koh JS, Koo BK, et al., JACC Intv, 2012

OCT



Ha J, Kim JS, et al. JACC Img 2014


Significant stenosis?



- **Anatomically!**
- **Physiologically** (by FFR)!
- Clinically?
- Prognostically?

Anatomical severity \neq Physiological significance

Can FFR-guided SB intervention strategy improve patients' outcome like FAME I & II?

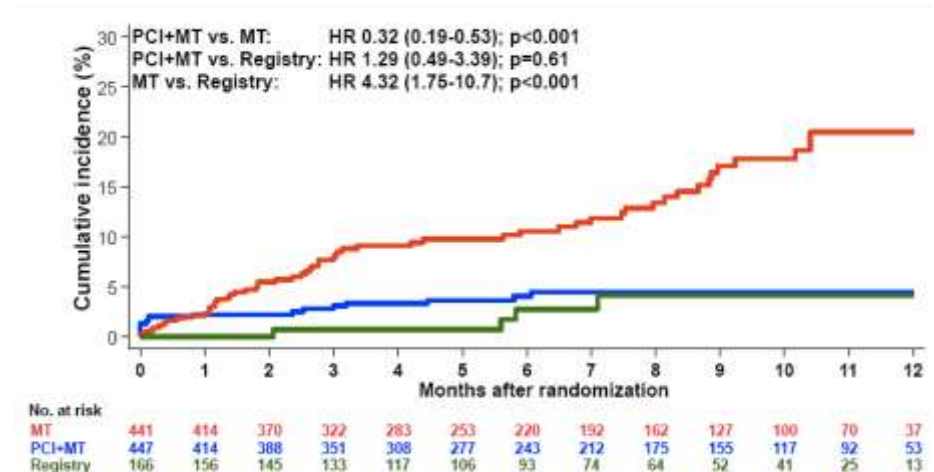
FAME 

Fractional Flow Reserve versus Angiography for Multivessel Evaluation

Principal investigators: Nico H.J. Pijls, Eindhoven, The Netherlands
Bernard de Bruyne, Aalst, Belgium
William F. Fearon, Stanford, USA

Study-coordinator: Pim Tonino, Eindhoven, The Netherlands

FAME



Probably, “NO” in (general) bifurcation lesions.....

FFR-guided vs. Angio-guided SB intervention

• Nine months clinical outcomes

	FFR-guided group	Angio-guided group	P
	N=108*	N=108**	
Side branch PCI	30%	45%	0.02
TVR	5 (4.6%)	4 (3.7%)	0.7
MI	0	0	1
Cardiac death	0	0	1

* 1 non-cardiac death, 1 follow-up loss, ** 2 follow-up loss

Koo BK, et al. Eur Heart J 2008;29:726-32

FFR-guided vs. Angio-guided SB intervention

- DK-CRUSH VI: 12 months clinical outcomes

	Angio-guided group	FFR-guided group	P
SB PCI	63.1%	63.1%	0.07
SB str	38.0%	38.0%	0.01
T	5.6%	6.9%	0.8
MI	11.9%	13.8%	0.74
Cardiac death	1.3%	0.6%	0.56

Technique still doesn't matter, WHY?

Clinical significance: Main vs. Side branch

- Responses to 1-minute balloon occlusion -

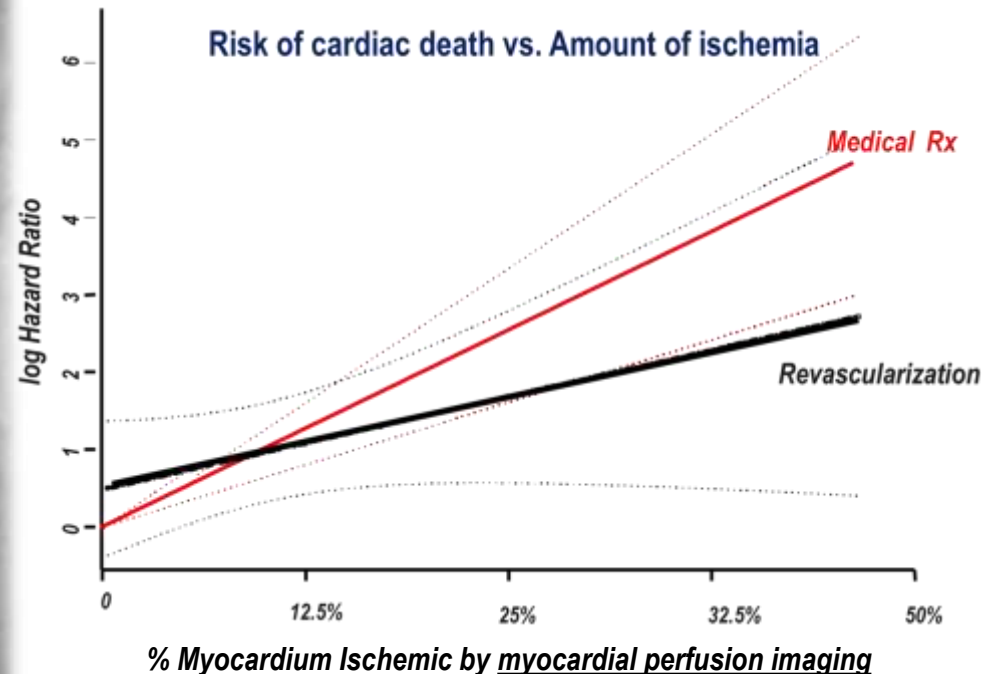
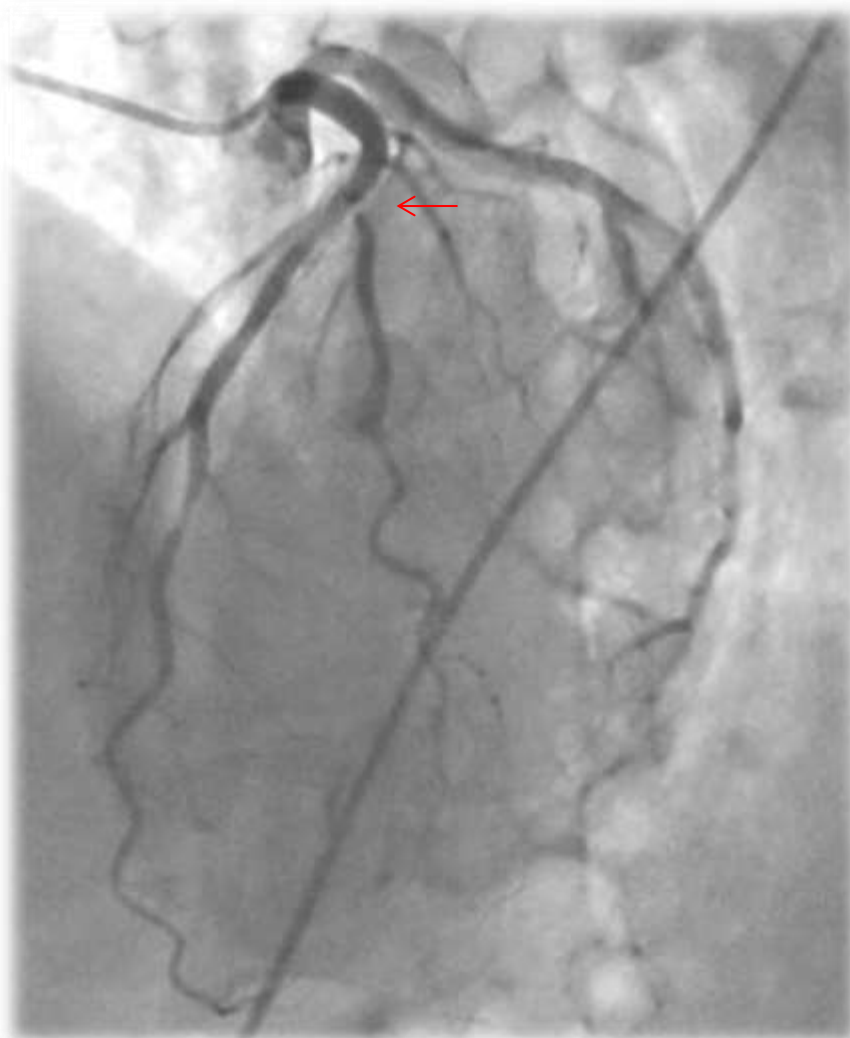
	LAD	Diagonal	P value
Chest pain (VAS score)	5	2	<0.0001
ST elevation \geq 1mm	92.3%	35.4%	0.001
QTc interval, msec	454.0 \pm 45.4	440.4 \pm 35.7	0.07
QTc dispersion, msec	83.8 \pm 39.2	70.7 \pm 28.5	<0.0001

Side branch has much less clinical relevance in terms of symptom, ischemia and arrhythmic potentials

Koo BK, et al., JACC Intv, 2012

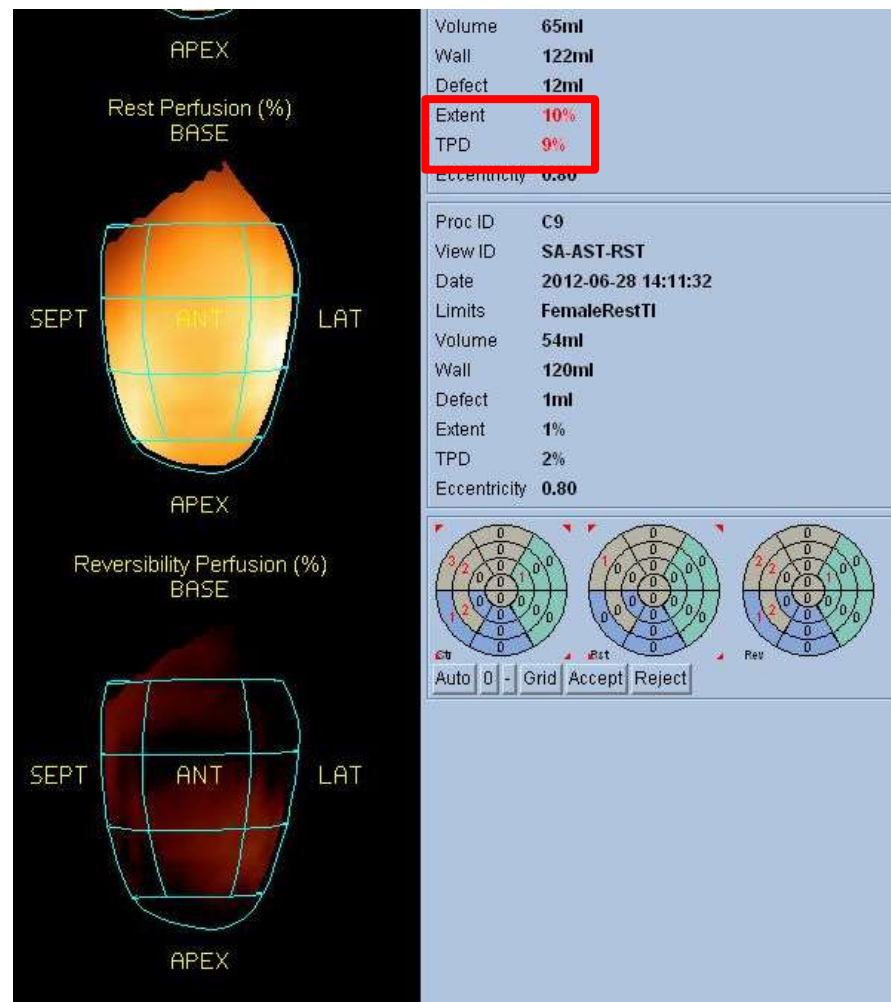
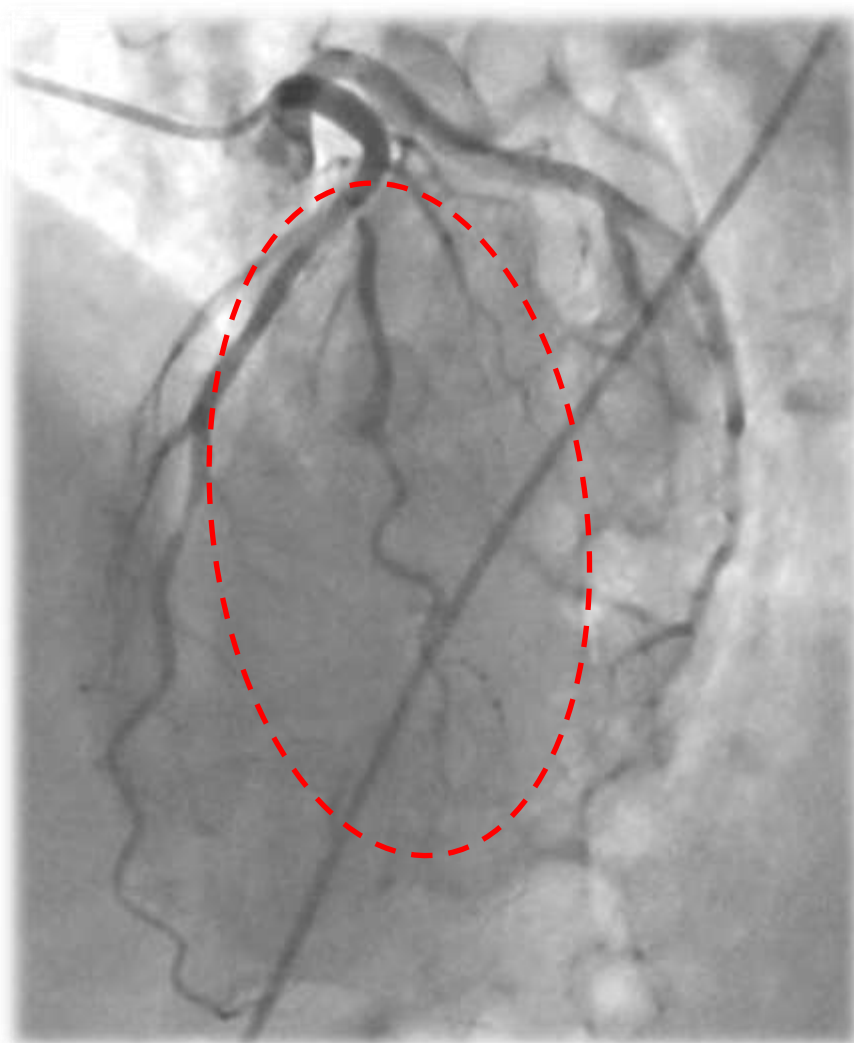
How can we find the clinically significant side branch?

Focus more on “myocardial mass at risk” than other angiographic parameters

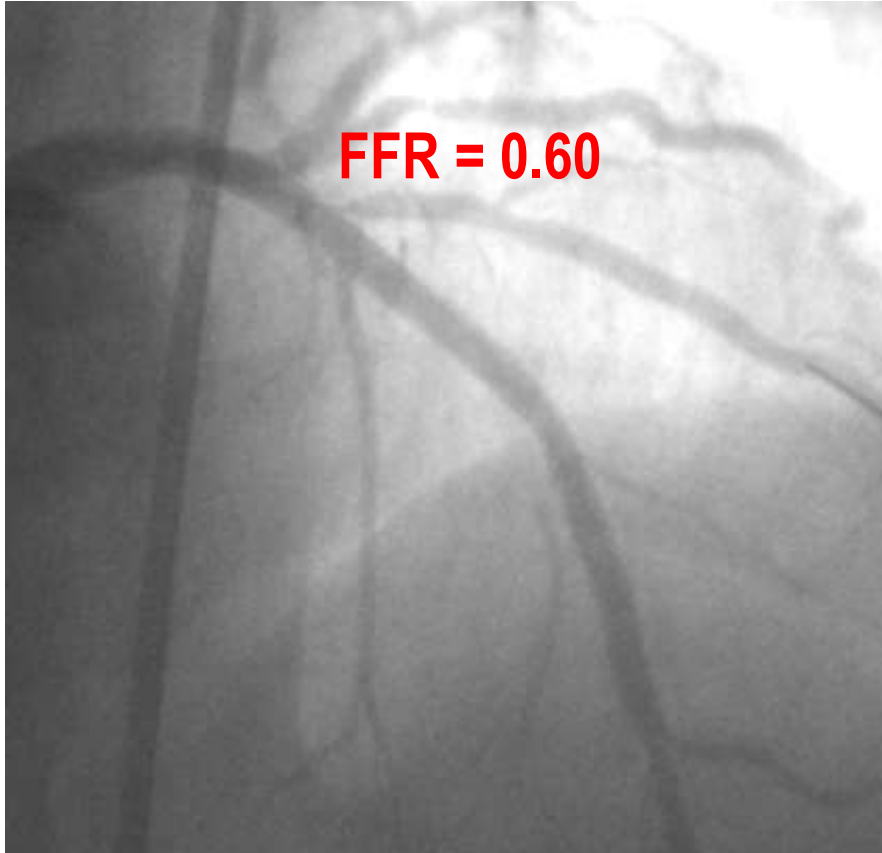


Hachamovitch, Circulation 2003

How much % of myocardium is ischemic?



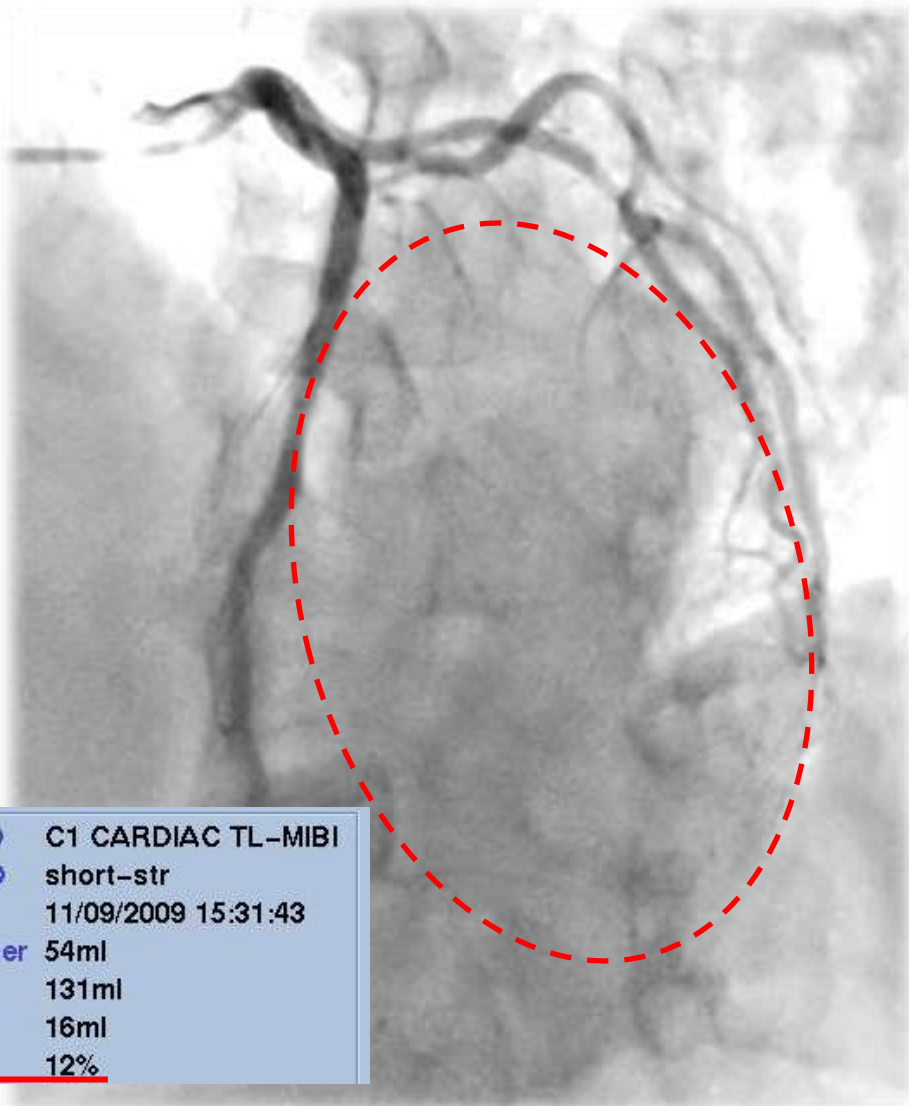
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Determinants of prognosis

: Ischemic burden, collateral recruitability and treatment strategy



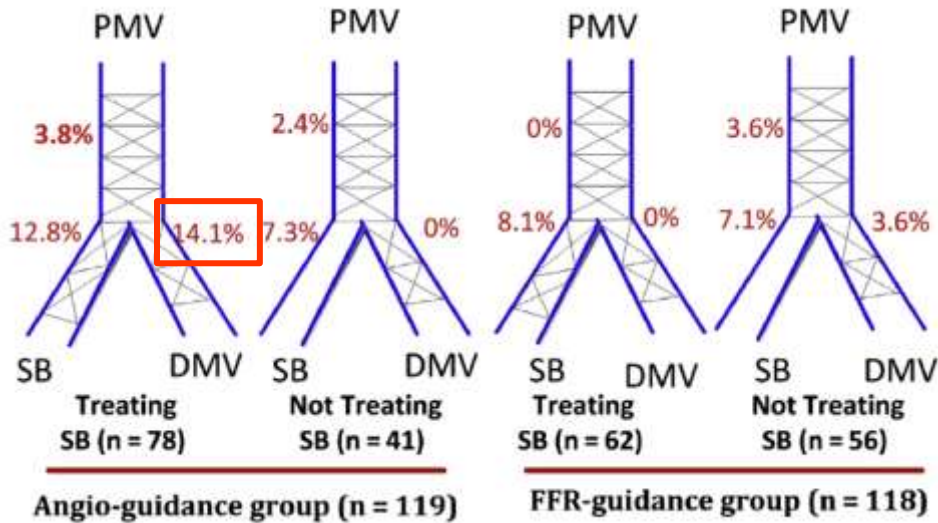
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View ID	short-str
Date	11/09/2009 15:31:43
Chamber	54ml
Wall	131ml
Defect	16ml
Extent	12%



Date	2010-02-17 13:20:51
Limits	FemaleStressMB
Volume	50ml
Wall	109ml
Defect	0ml
Extent	0%
TPD	0%
Eccentricity	0.81

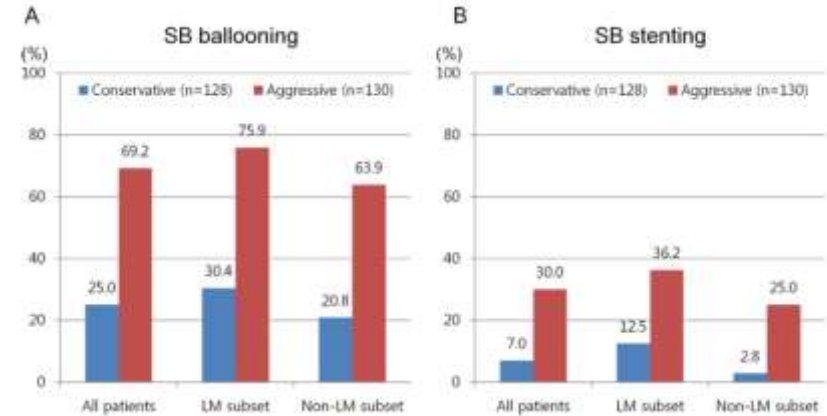
More intervention, More clinical event?

DK-CRUSH VI trial

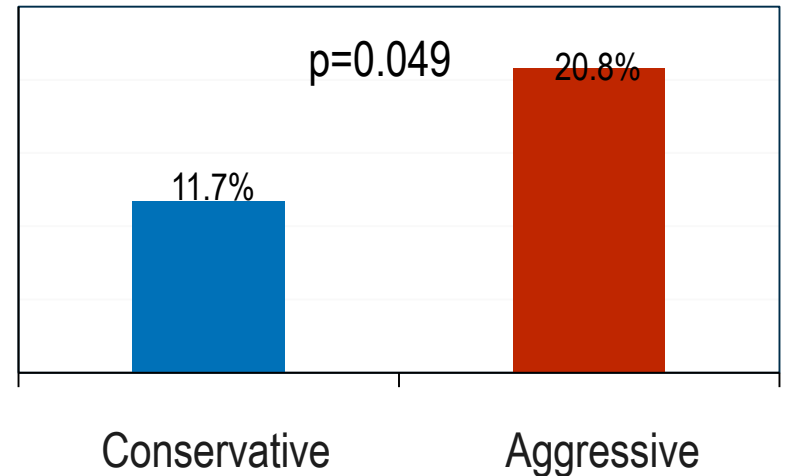


Chen SL, et al. JACC interv 2015

SMART STRATEGY



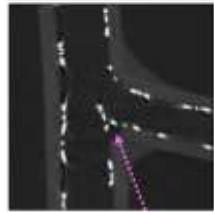
Target vessel failure at 3 years



Gwon HC, et al. JACC interv 2016, in press

Pitfalls of current PCI for bifurcation lesions

T-stenting



Gap

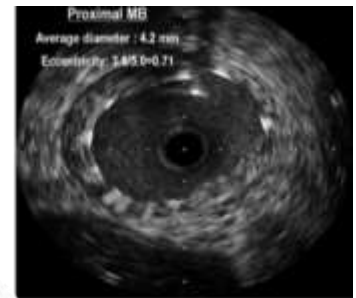
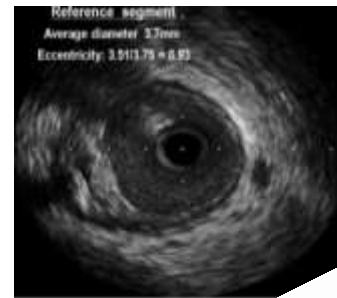
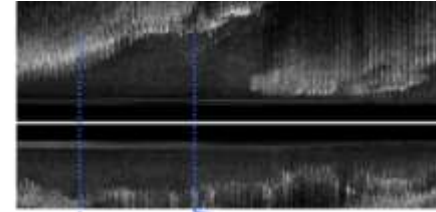
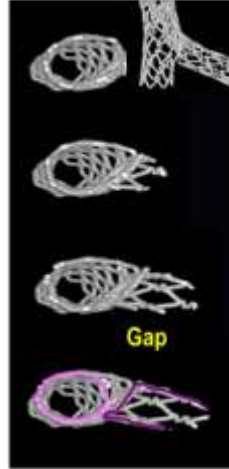
Kissing stenting

Compressed LCX stent

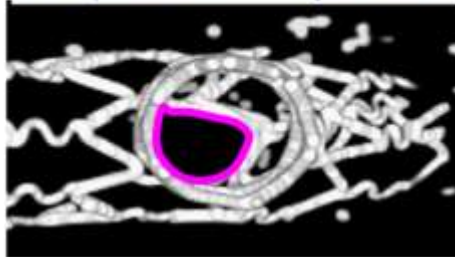


Courtesy of Dr. Murasato

Crush technique

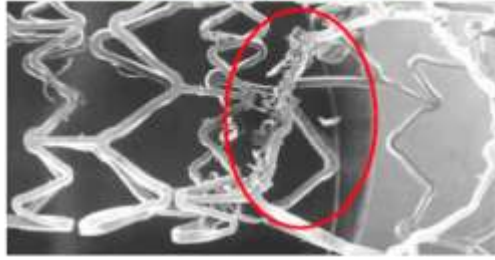


Inadequate dilation of the jailed strut



Murasato Y, J Interv Cardiol, 22:135,2009

Polymer injury after FKB

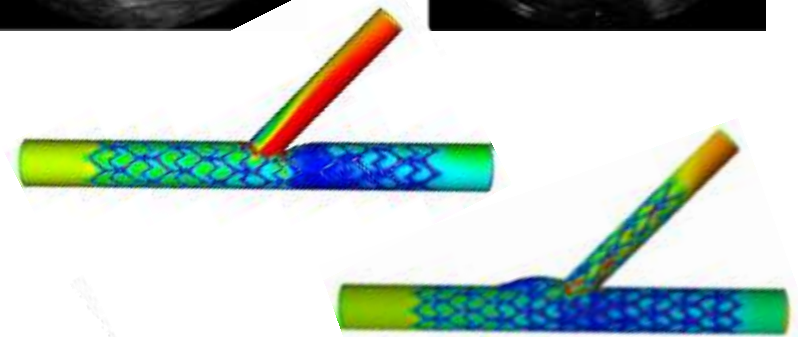


Ormiston J, AP summit 2005

Flow retardation

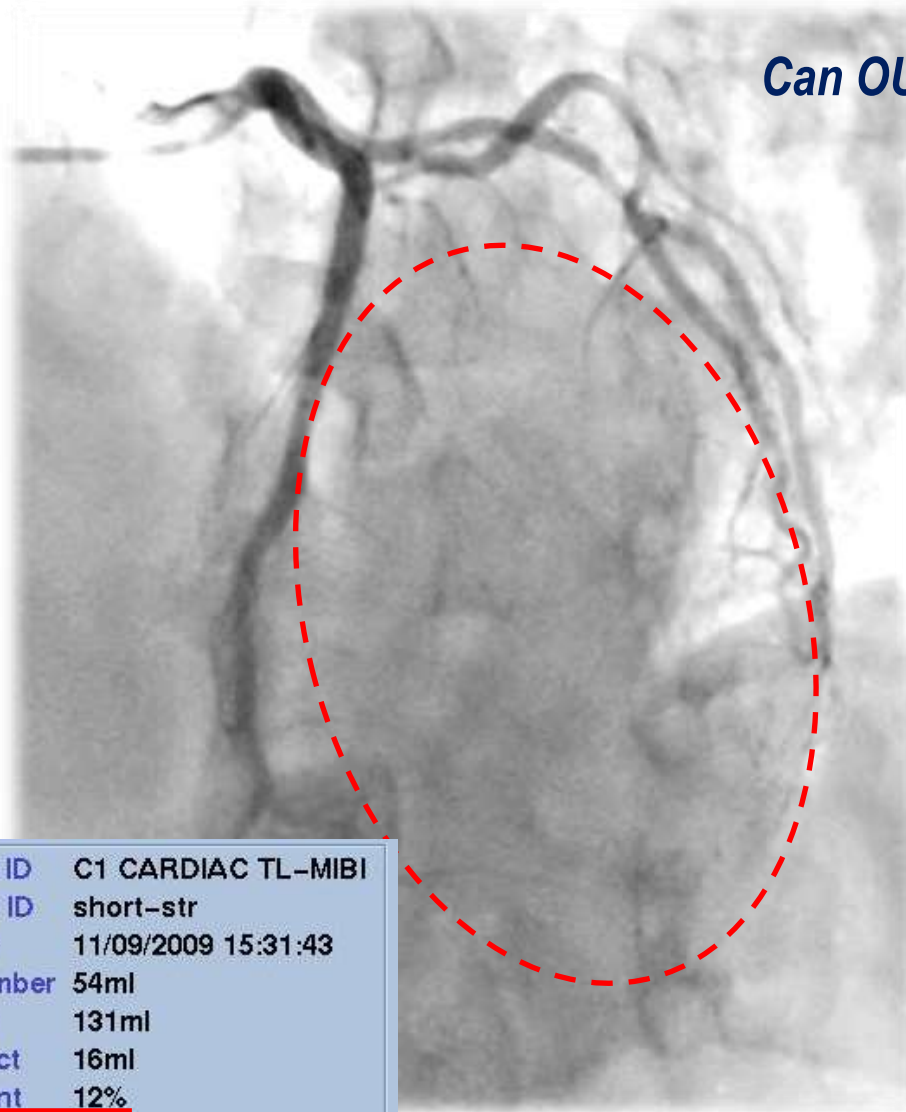
Limitation of DES efficacy

Restenosis or thrombosis



Determinants of prognosis

: Ischemic burden, collateral recruitability and treatment strategy



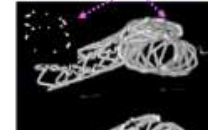
Can OUR revascularization improve the prognosis?

T-stenting

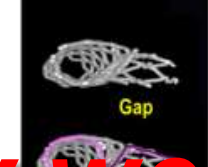


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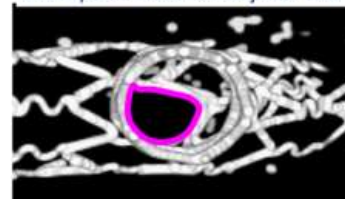


Crush technique

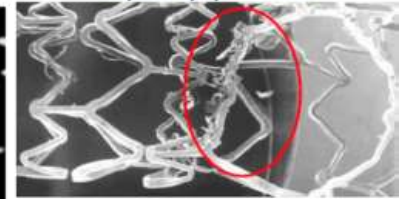


Do it very well!

Inadequate dilation of the jailed strut



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