EBC 2018 Oct 13: 17:30 ~ 17:40

After Silent Left Main Disease Over;

“KBT or not KBT”, that is the question?

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President : New Tokyo Hospital ; Tokyo

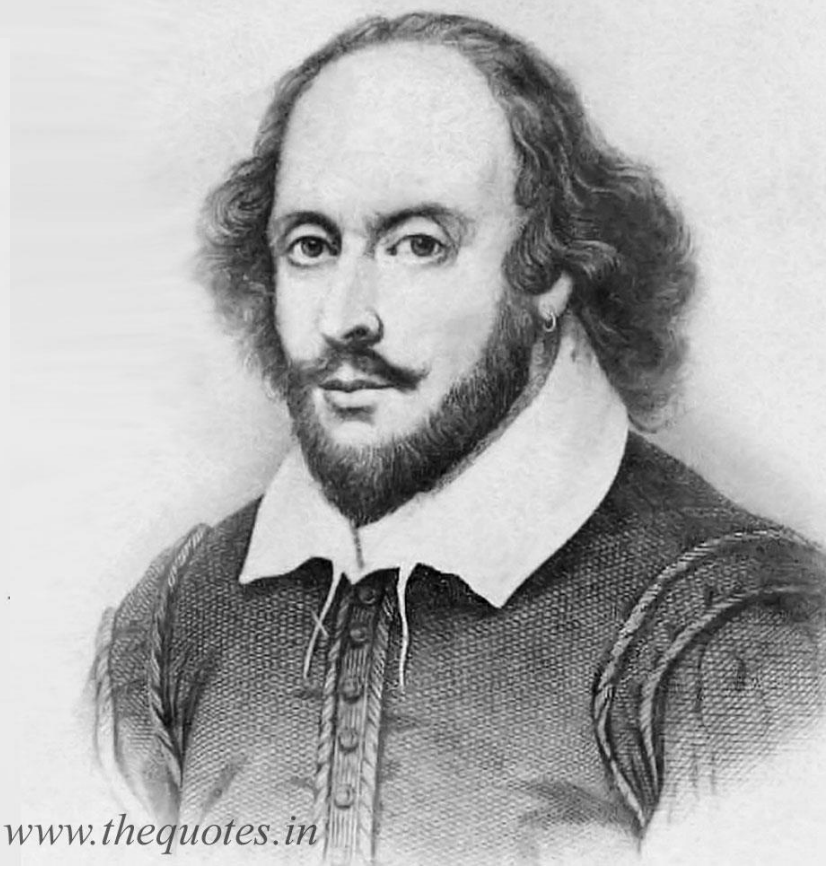
Professor of Advanced Cardio-Vascular Medicine : Kumamoto University

Senior Consultant : National Cardiovascular Center Japan

FACC, FAHA, FESC, FSCAI

After Single Stenting Cross Over;

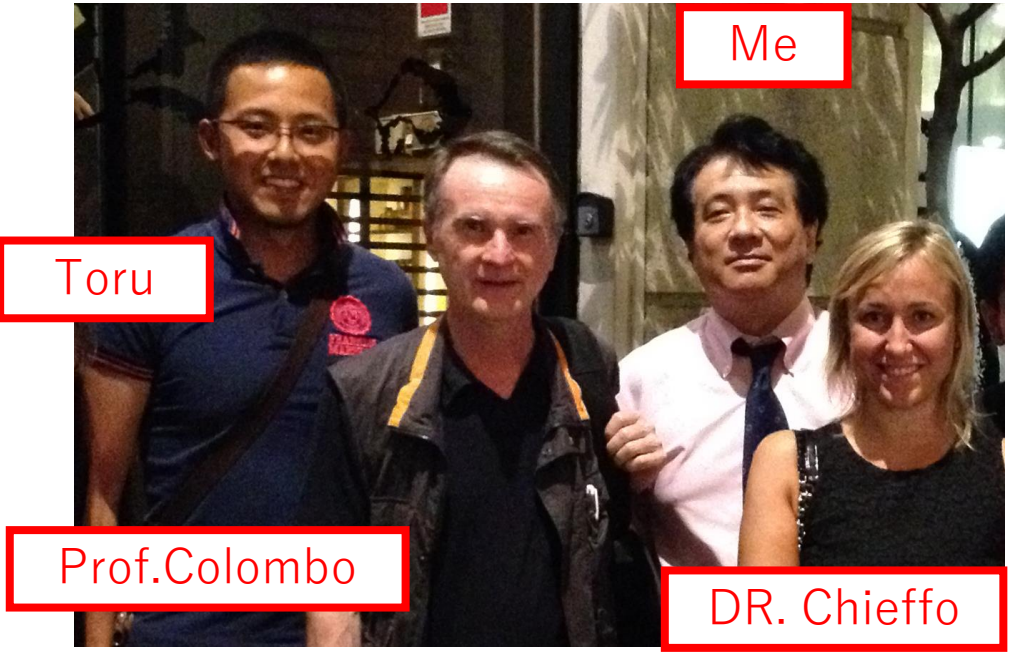
"KBT or not KBT",
that is the question?



The MIlan and New-TOkyo (MITO) Registry

2002 April- 2016 Jun

Among LMT PCI, some specific cases are still challenged with restenosis and MACE. Seeking for solution of these unsolved challenges, we decided to conduct data review of our own cases. Under the guidance of Prof. Antonio Colombo and Dr. Alaide Chieffo, our staff compiled data of our hospital and that of Milan as **MITO Registry.**



The MIlan and New-TOkyo (MITO) Registry

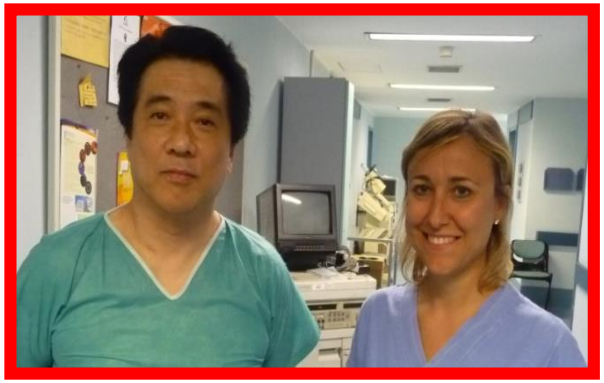
2002 April- 2016 Jun

23papers

	New-Tokyo n=990	Milan n=827
From	2005 April	2002 April

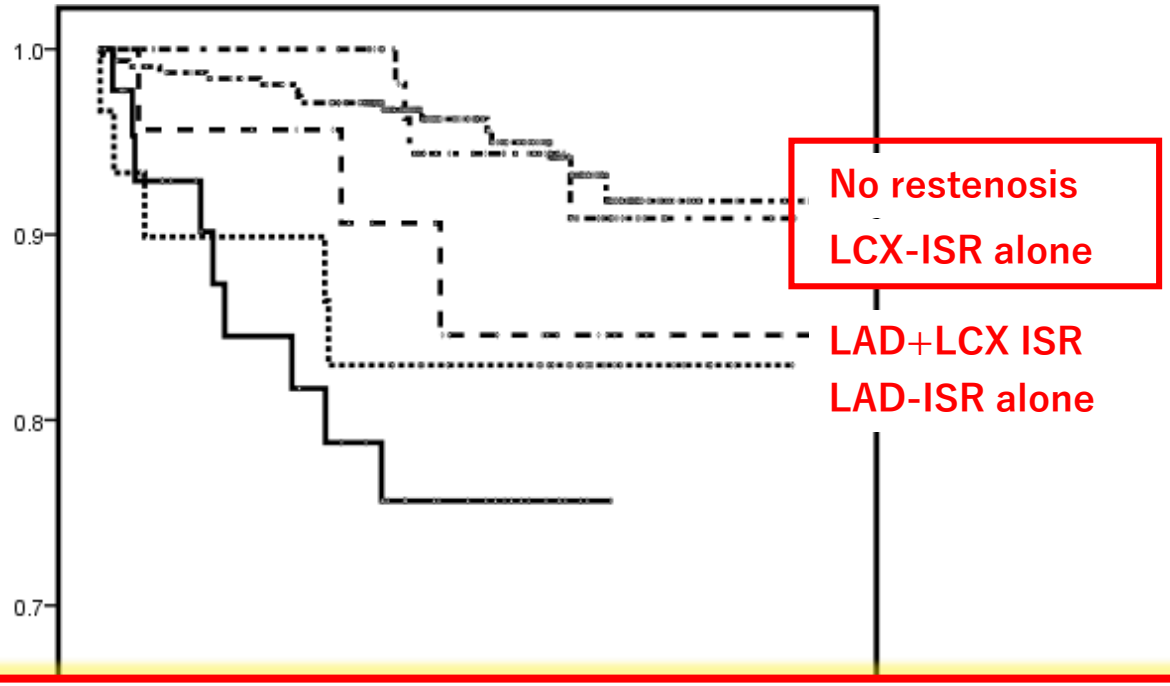
MITO Registry
Total 1817 patients

- 1st DES N=765
- 2nd DES N=952



① LCX Reste. is not directly link to fatal prognosis ??

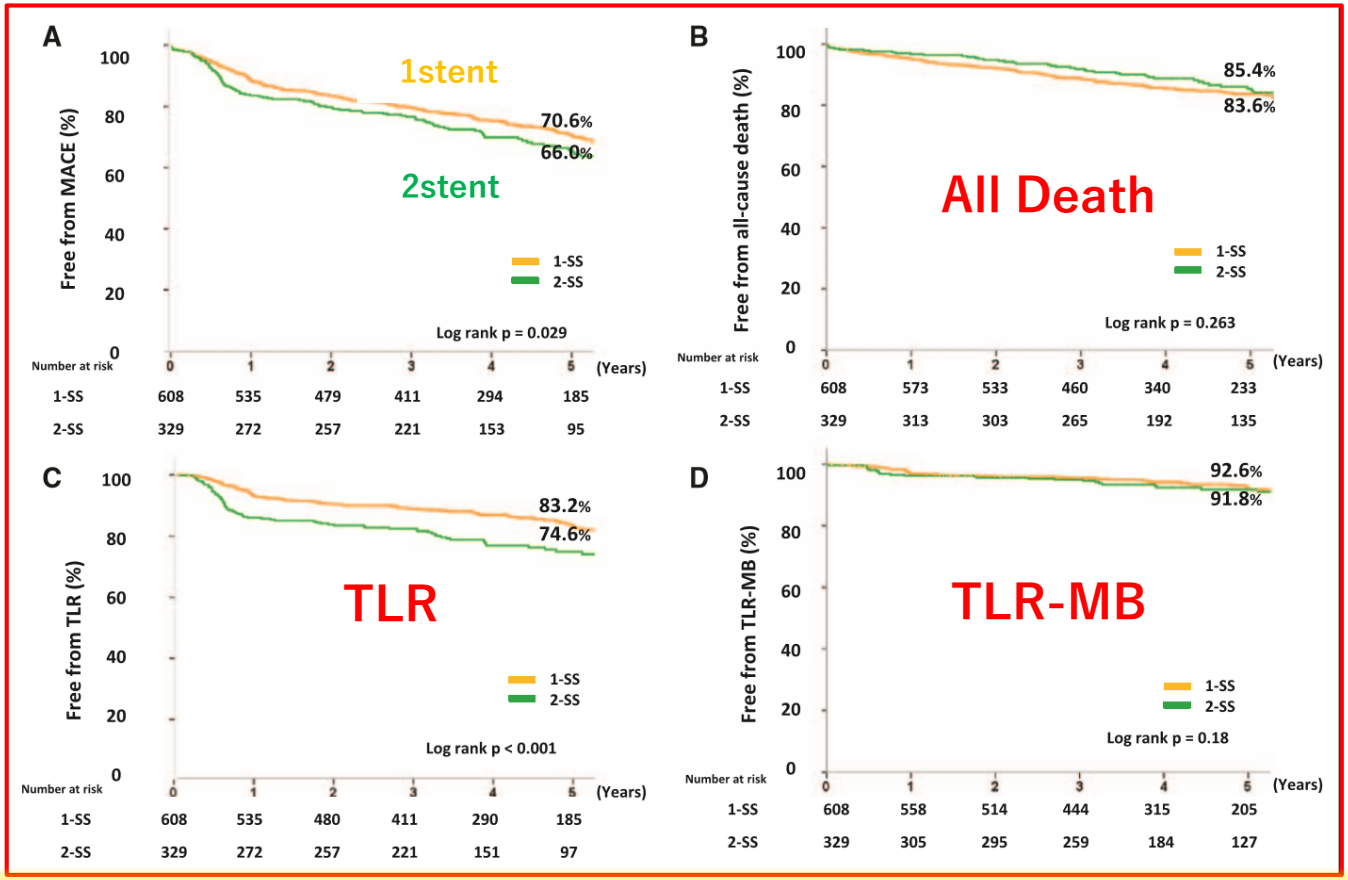
n=753



Among restenosis after LMT PCI, restenosis at LCX ostium is not directly link to fatal prognosis in most of the cases. Therefore our focus should be shift to restenosis at LM toward LAD, which strongly affect on patients' fatal prognosis.

K.Takagi, S.Nakamura A.Colombo et.al Catheter Cardiovasc Interv. 2013 Sep 2

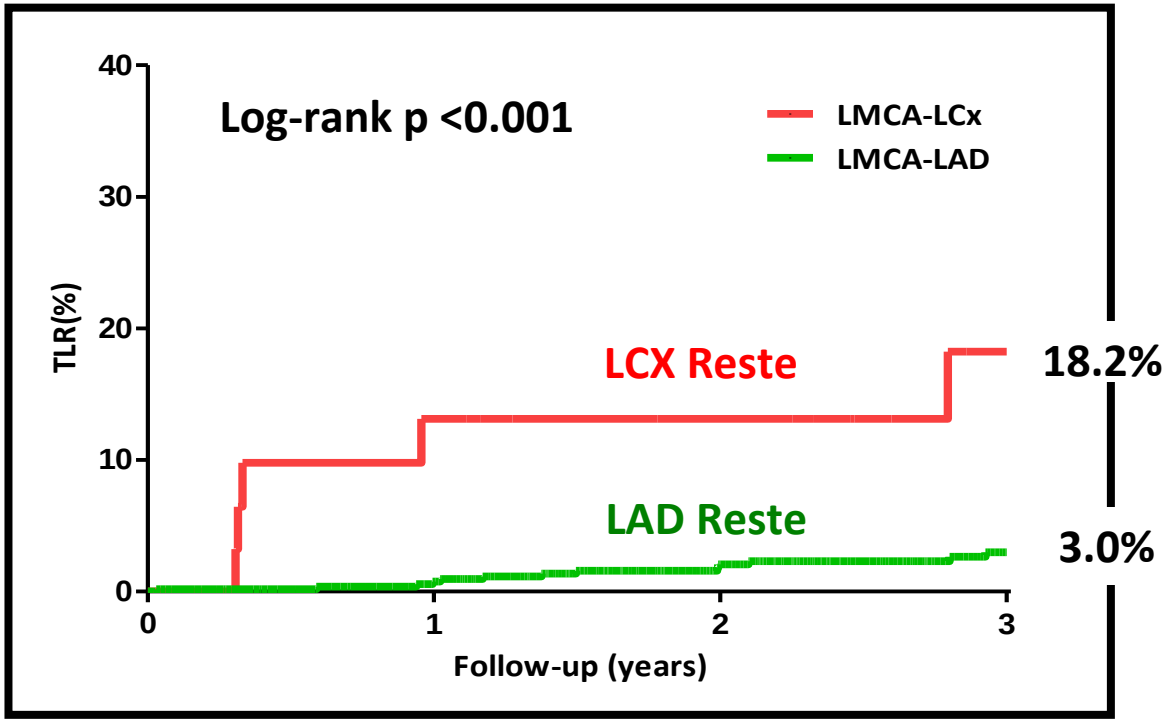
② Same Trend in 2nd generation DES era

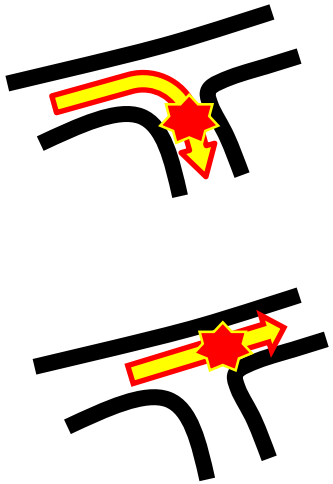


The 2-SS might have been caused by the high development of LCX reste.
However overall this had little impact on long-term mortality.

K.Takagi, S.Nakamura A.Colombo et.al Circ Cardiovasc Interv. 2016

③ LCX independently shows high Restenosis



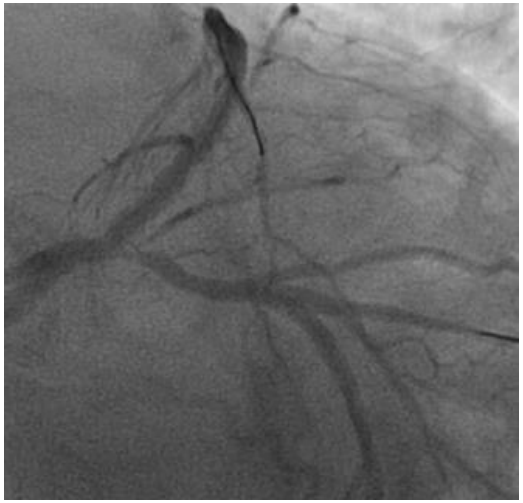


LCX ostium itself independently shows high restenosis rate in patients with LMT-PCI.

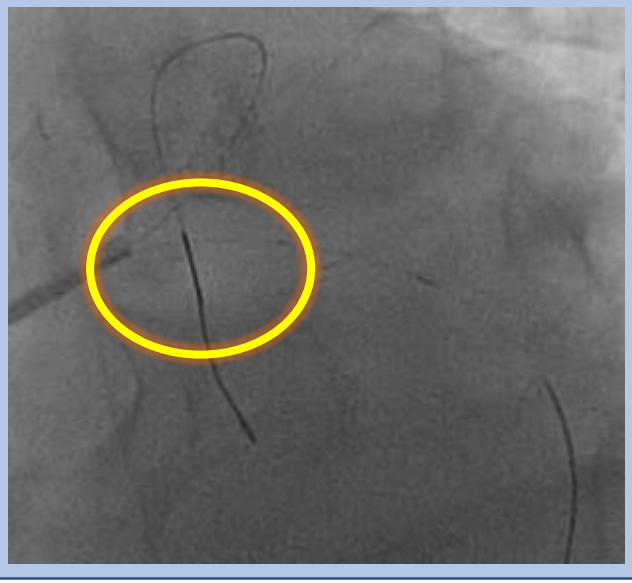
Naganuma T, Chieffo Alaide, Nakamura S, Colombo A, et al. Catheter Cardiovasc Interv. 2013

④ Implant. BVS at Prox. LCX may be problematic

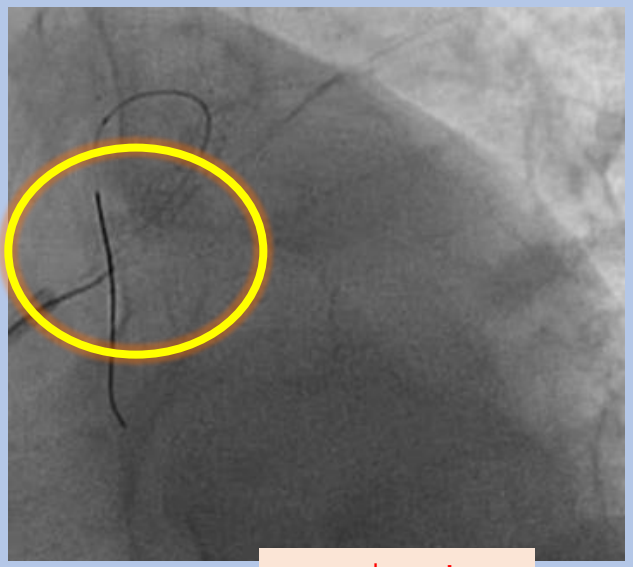
Pre

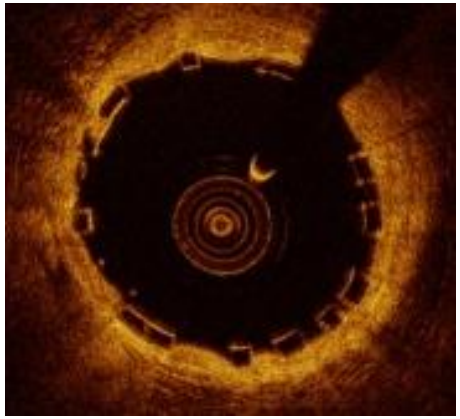


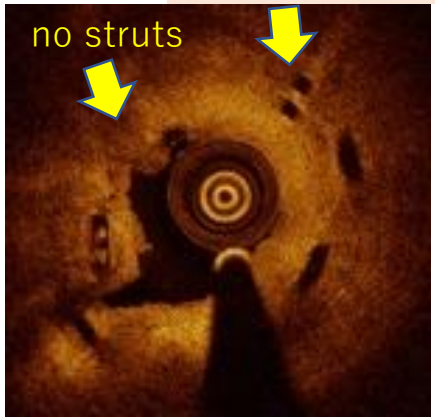
Just After PCI



6 Month







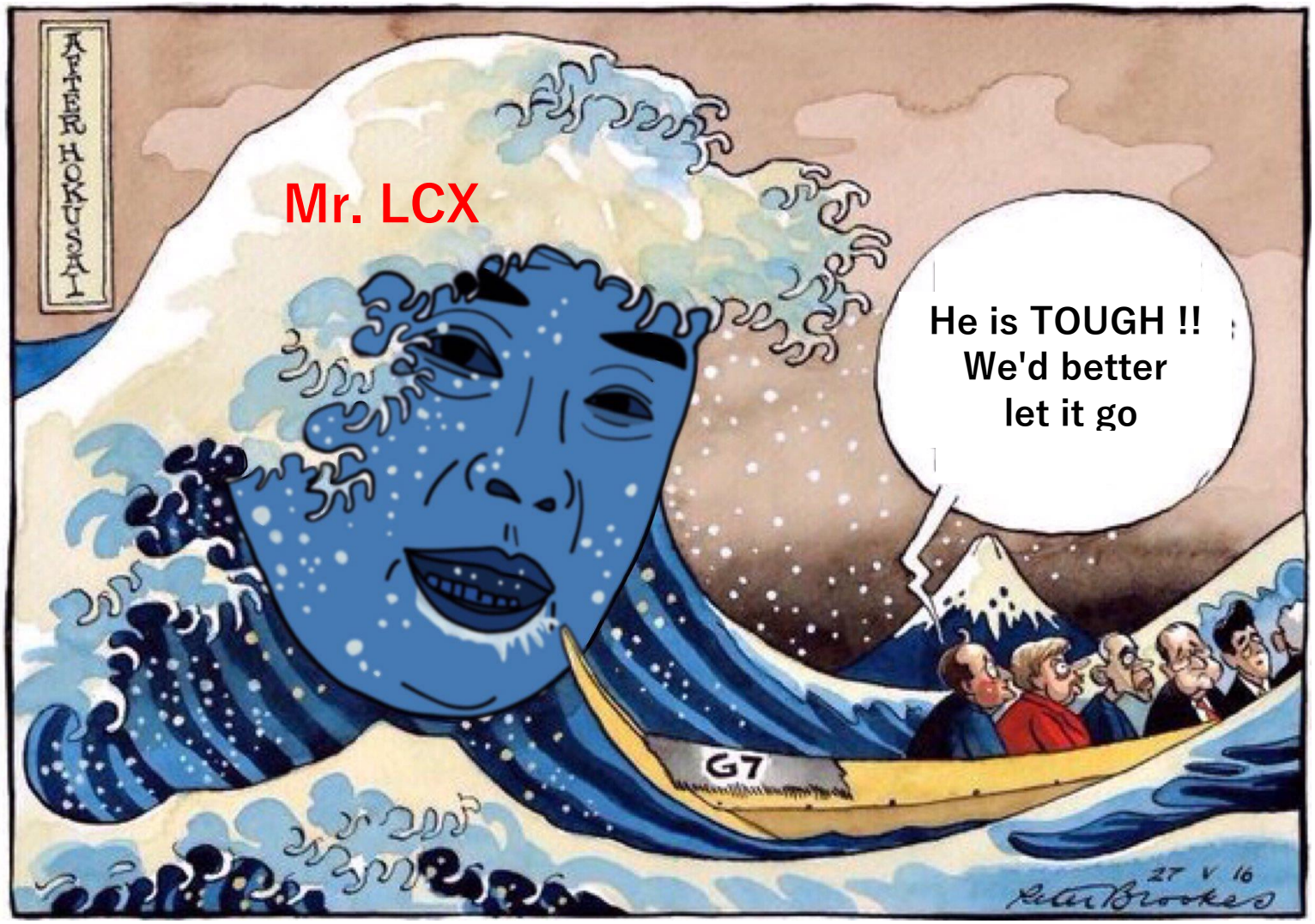
Naganuma T, Nakamura S, Colombo A, et al. JACC cardiovascular imaging vol. 7 2014

Do not chase to much !!
“LCX” is a different animal

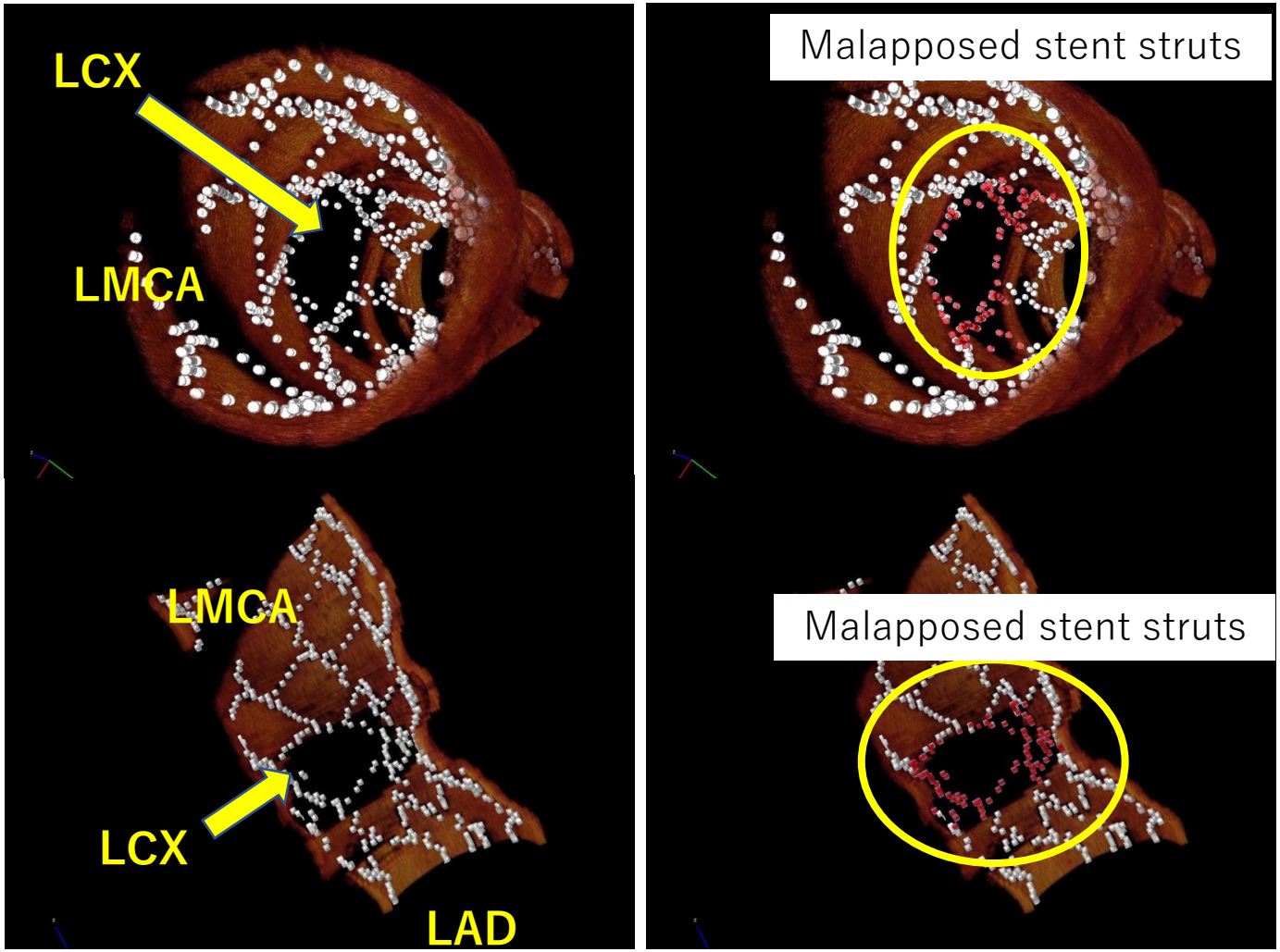
This is very unique part of coronary artery !!!
So called, **HINGE POINT…**
But point is “moving and Twitching”
And not so much important as compared with LAD and RCA for keeping Ejection fraction of the patient’s HEART.

….. LCX is not directly relevant to the patient prognosis

So…. We are always watching you “Mr. LCX”



3D OCT after SES Implant. with inappropriate KBT



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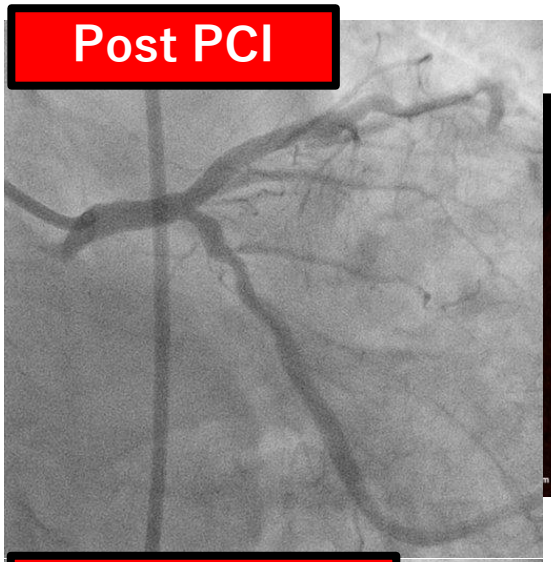
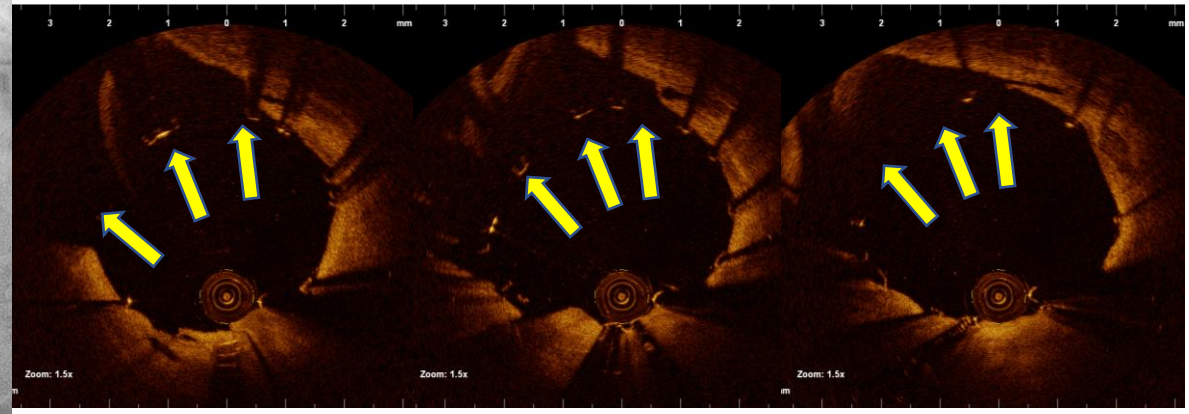
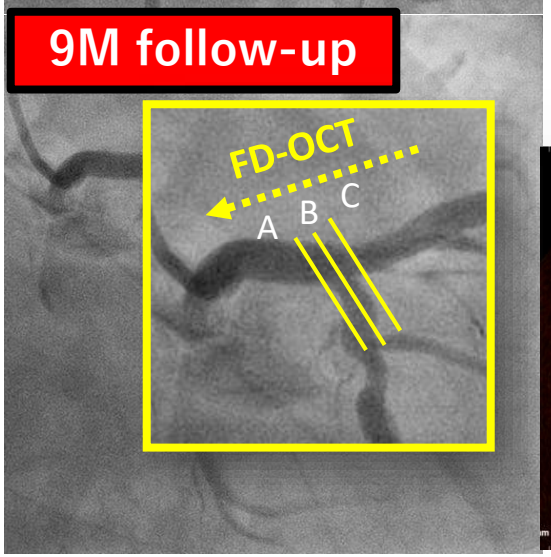
OCT Assessment of LCX ostium at F/U

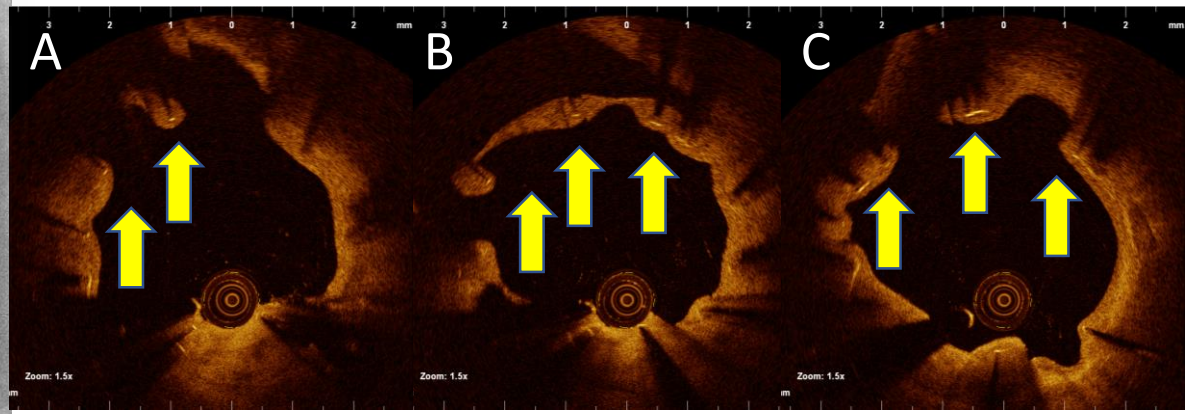


malapposed stent struts





Neointimal proliferation over the malapposed stent struts



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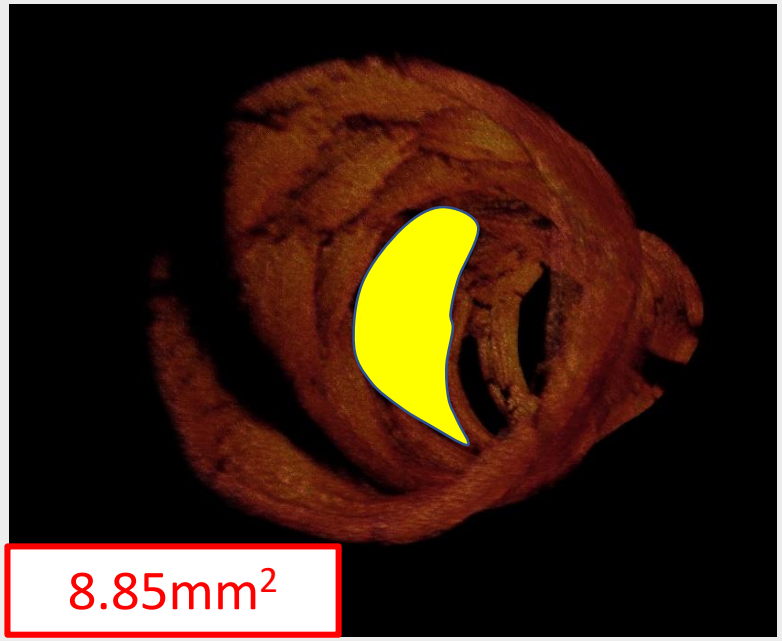
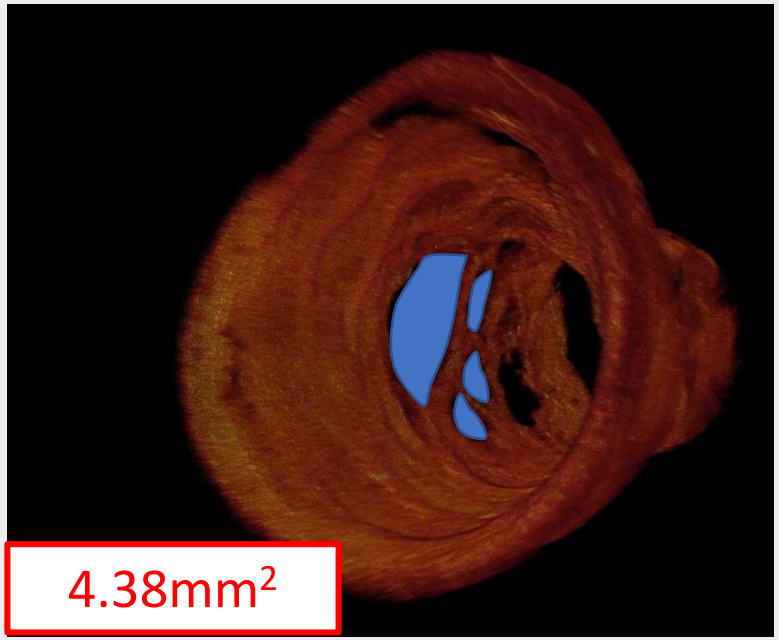
Area Narrowing of LCX ostium by 3D-OCT

Post PCI



Follow-up



We calculated area narrowing(%) with this formula

$$\text{Area Narrowing (\%)} = \frac{\text{Area}_{(post)} - \text{Area}_{(follow\text{-}up)}}{\text{Area}_{(post)}} \times 100$$

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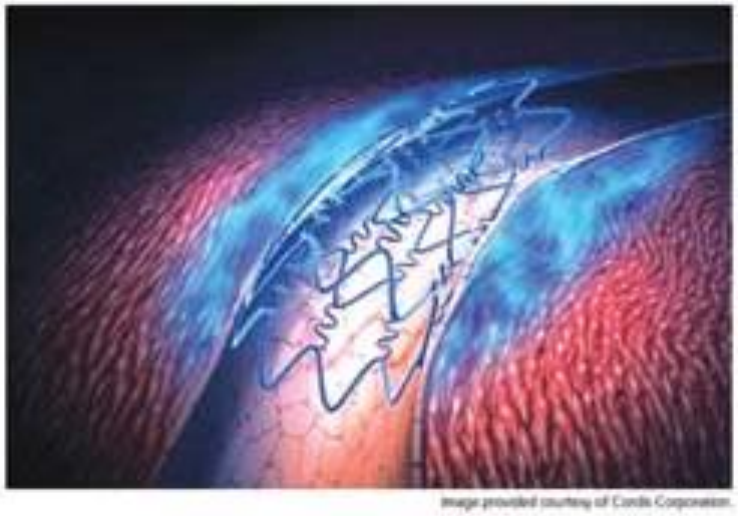
Area Shrinkage of LCX Ostium

Sirolimus-Eluting Stent
Cypher: Johnson and Johnson



Everolimus-Eluting Stent
Xience V: abott vascular

	SES (n=10)	EES (n=15)	p Value
Post-PCI			
LCX ostium area, mm^2	5.41±1.81	5.14±2.59	0.785
9M follow-up			
LCX ostium area, mm^2	3.52±1.03	4.46±2.59	0.220
Area Shrinkage (%)	32.4±15.73	9.78±23.08	0.013

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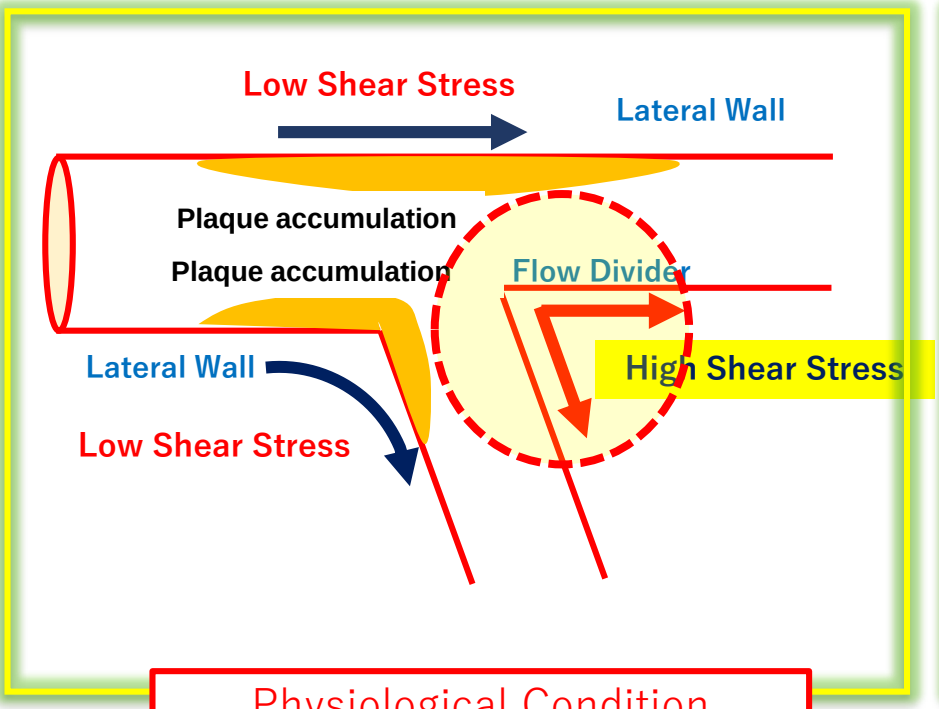
So far we know …

If we can finish with one stent, much better outcome.

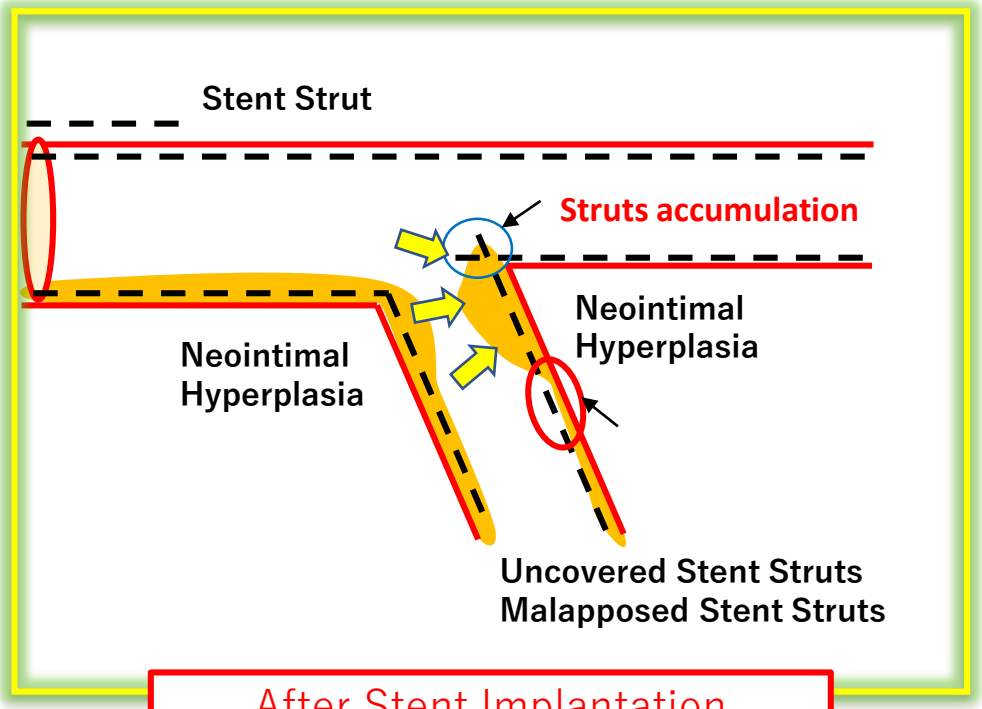
LCX ostium itself independently shows high restenosis rate.

Most frequent restenosis site is LCX ostium which is not directly link to fatal prognosis.

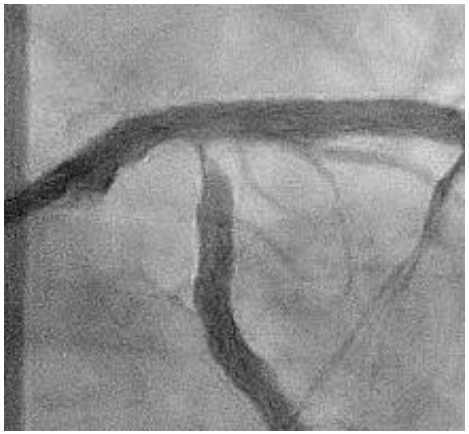
How much area that malapposed stent struts occupies in the area of ostium of LCX seems to be a determinant factor of Future neointimal coverage of these jailed struts.

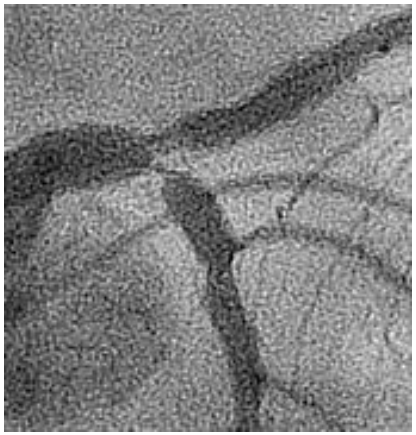


Physiological Condition
(No Stent)



After Stent Implantation
(non-physiological)

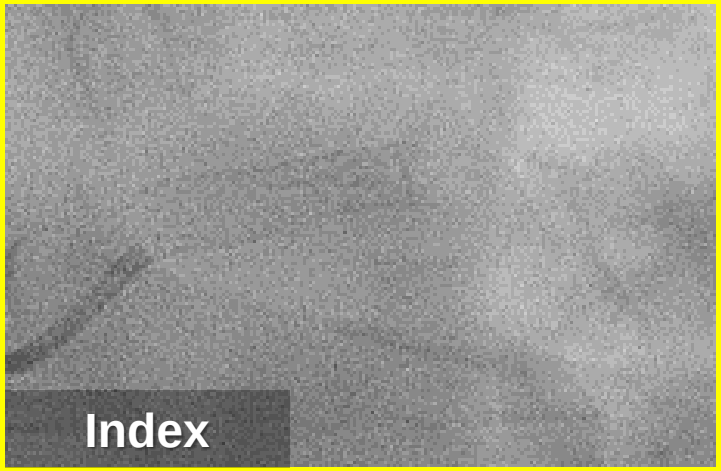


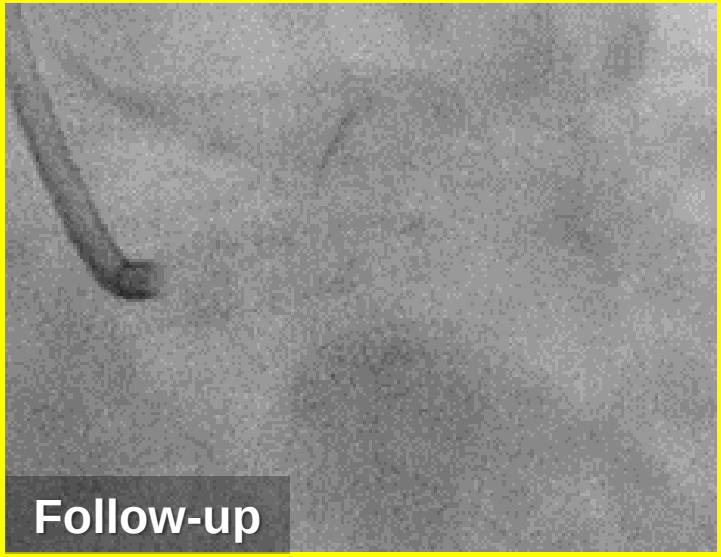


Why ? Restenosis so frequent in LCX

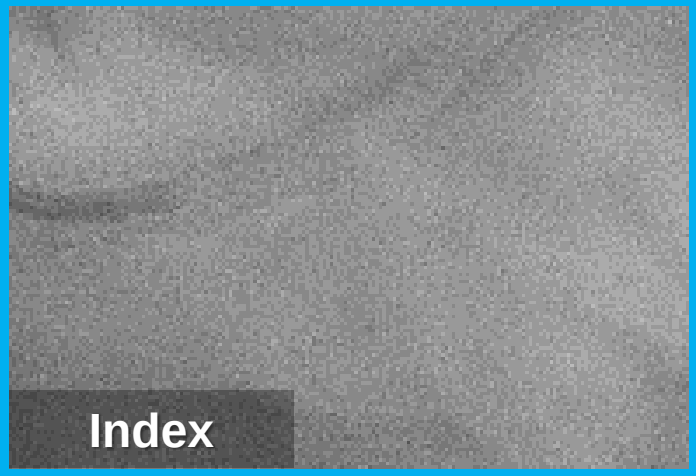
In LMT PCI.... If you use contrast....

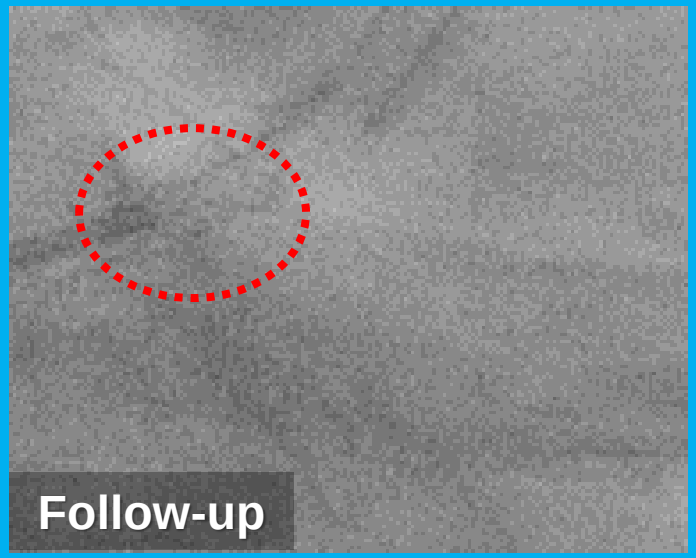
A





B





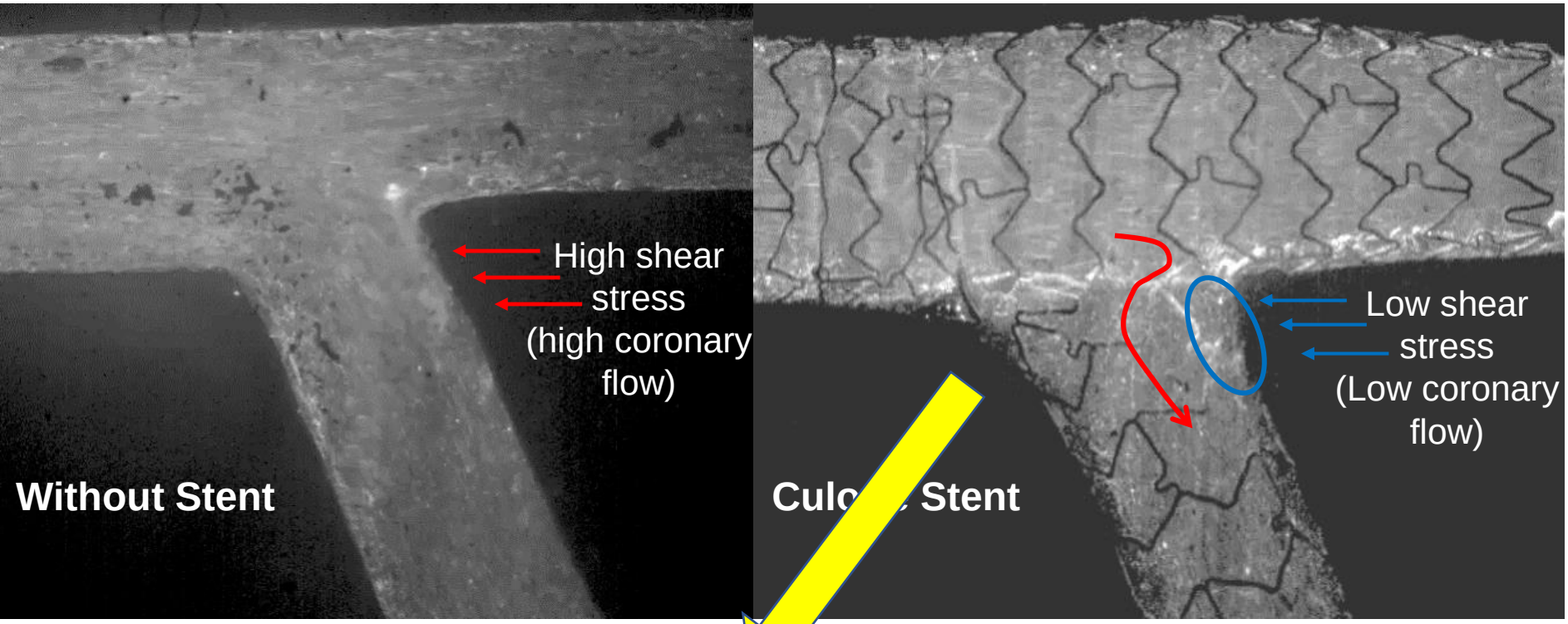
Insensible in the past, but now I sense

Without stent placement

Blood flow at carina is quite fast.

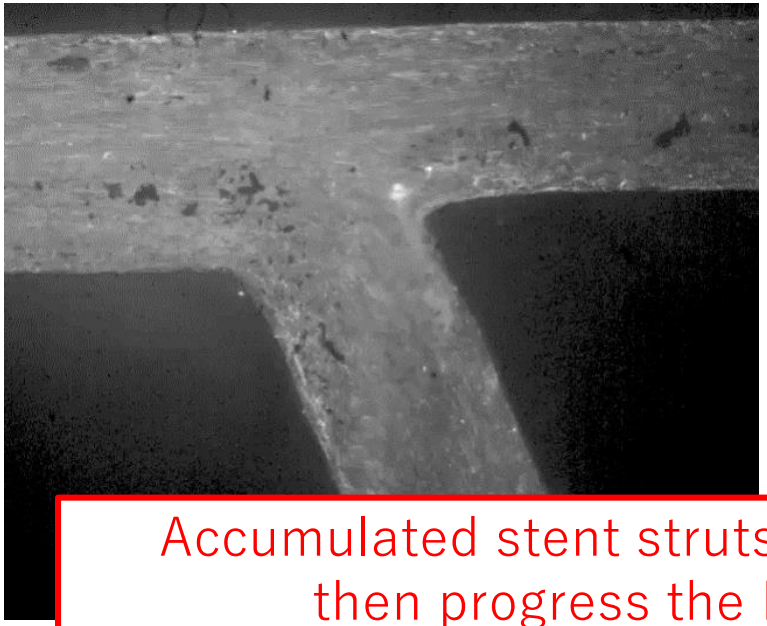
After stent implantation

Flow is delayed, causing turbulence.

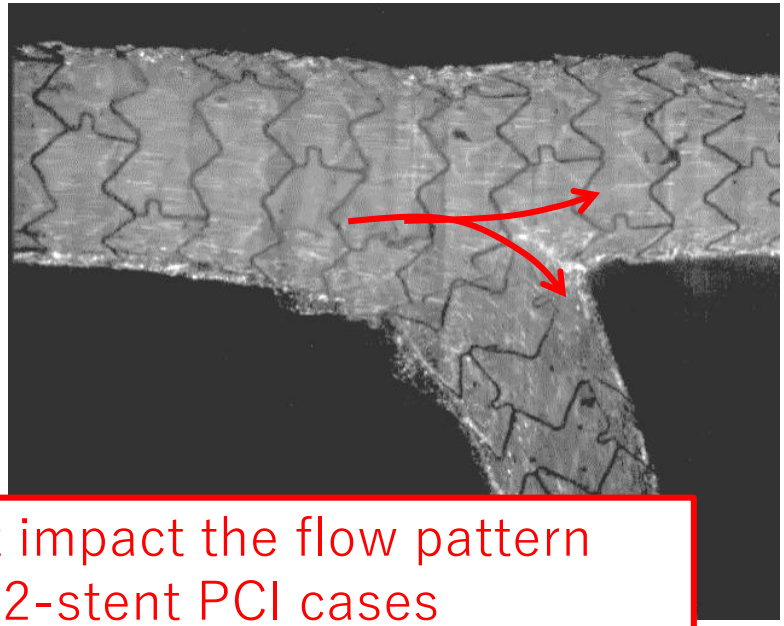


This is so-called low shear stress status. It is speculated that stent struts remaining at orifice of circumflex negatively affect the flow.

Without stent

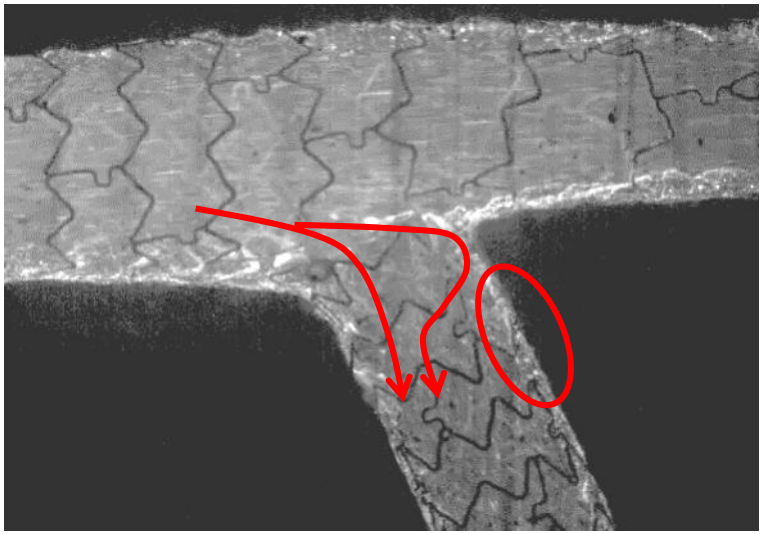


T- stent

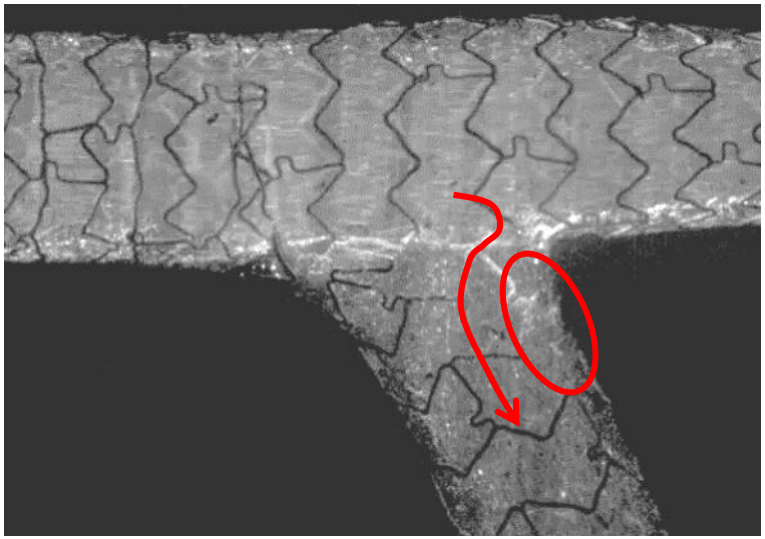


Accumulated stent struts might impact the flow pattern then progress the NIH in 2-stent PCI cases

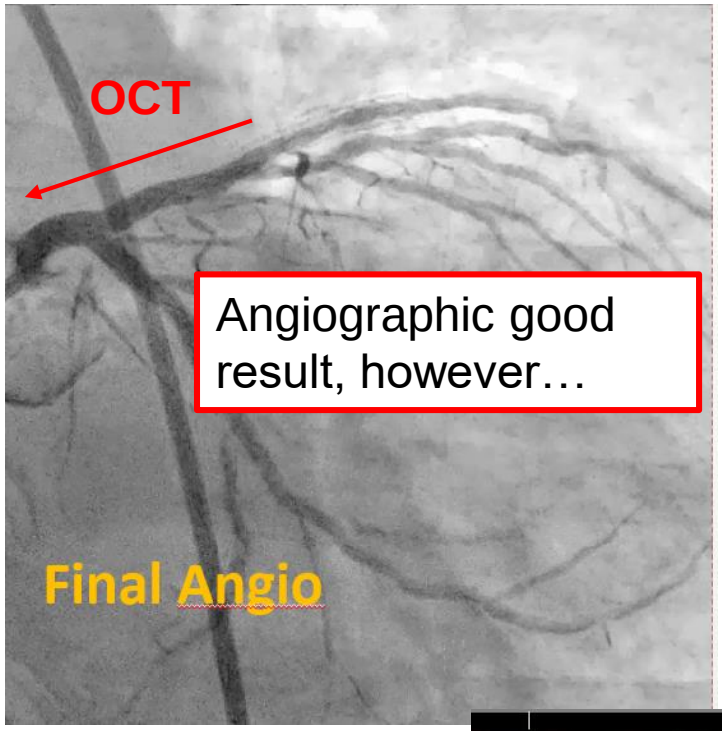
Crush stent

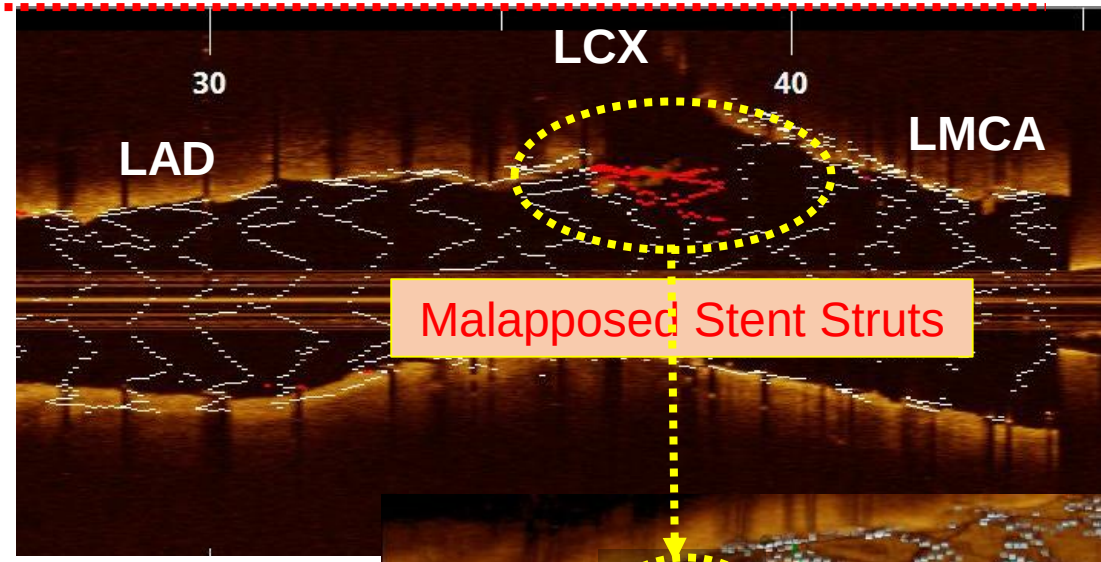


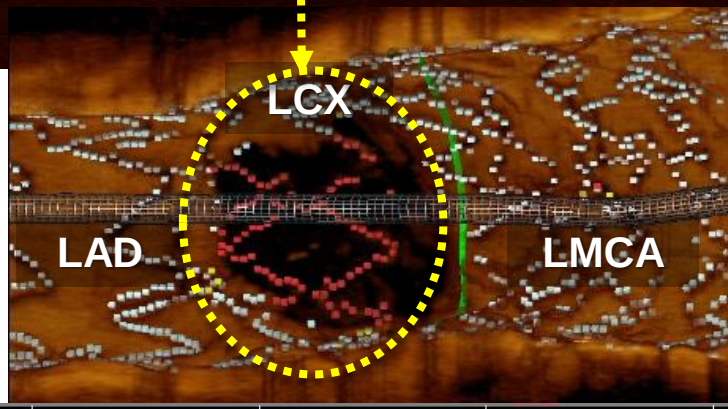
Culottes stent



Favorable or Unfavorable Culotte in LM







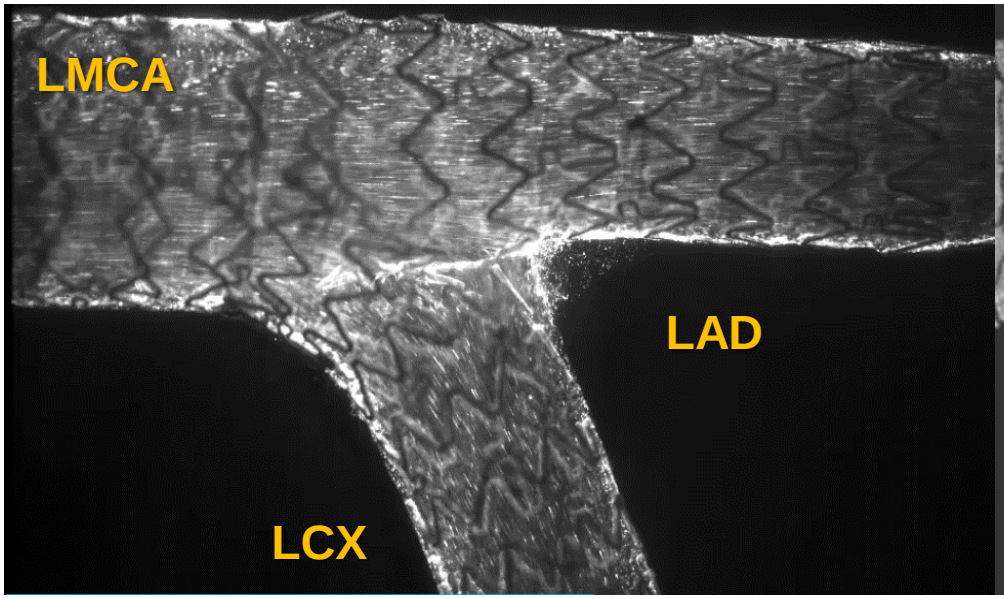
Unfavorable Culotte

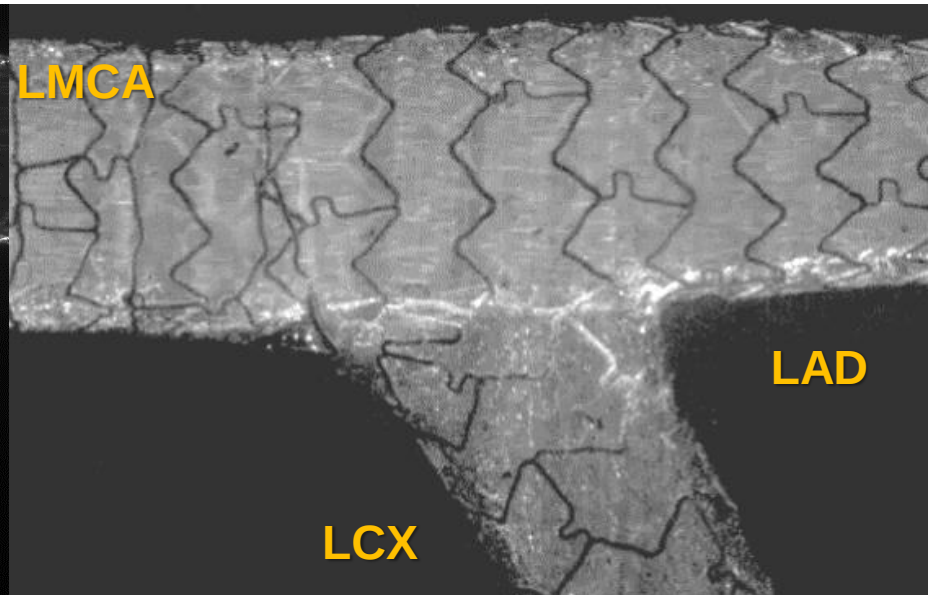
Favorable Culotte

Flow dynamics after Culotte Stent

Favorable Culotte

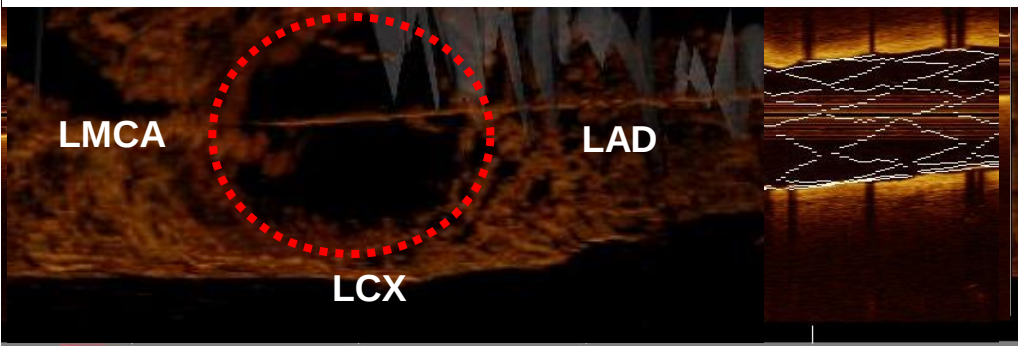
Unfavorable Culotte

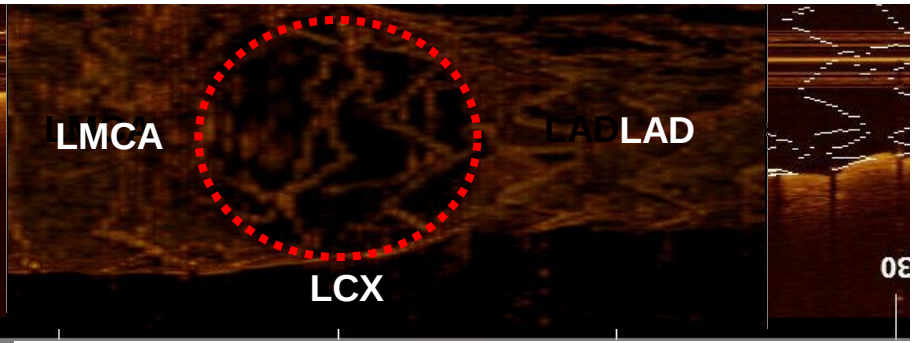


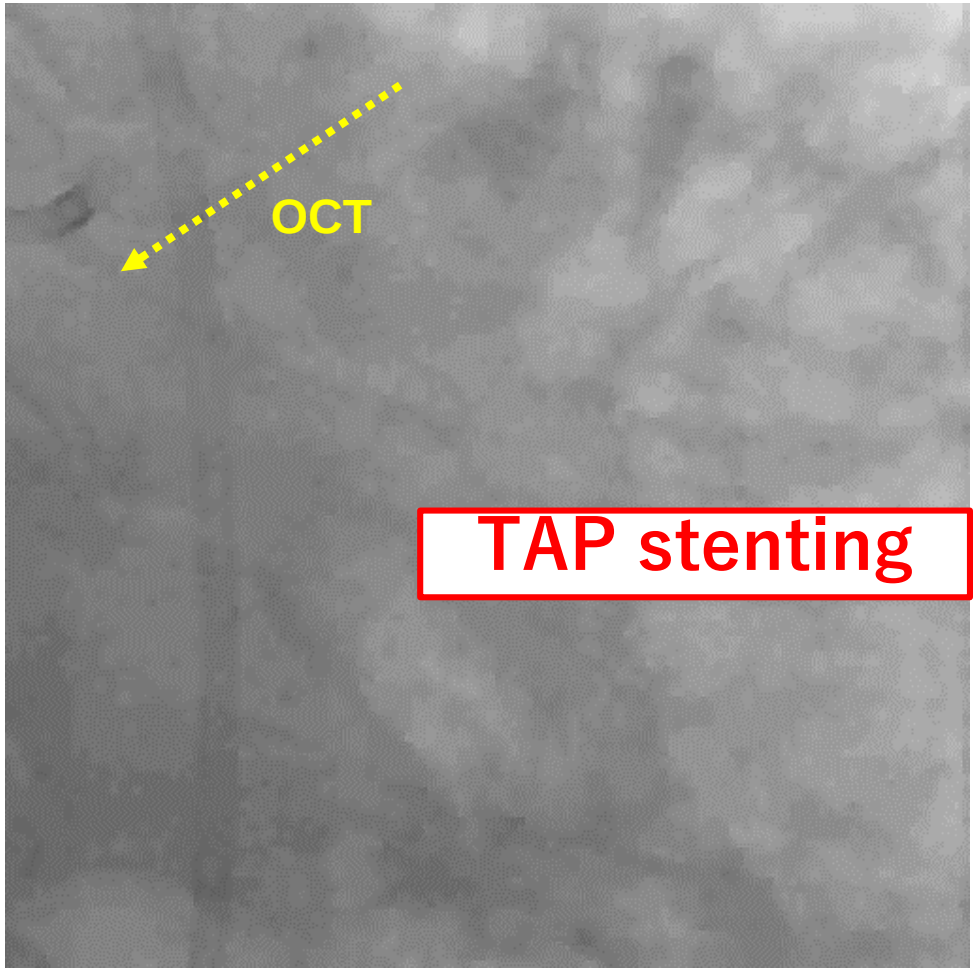


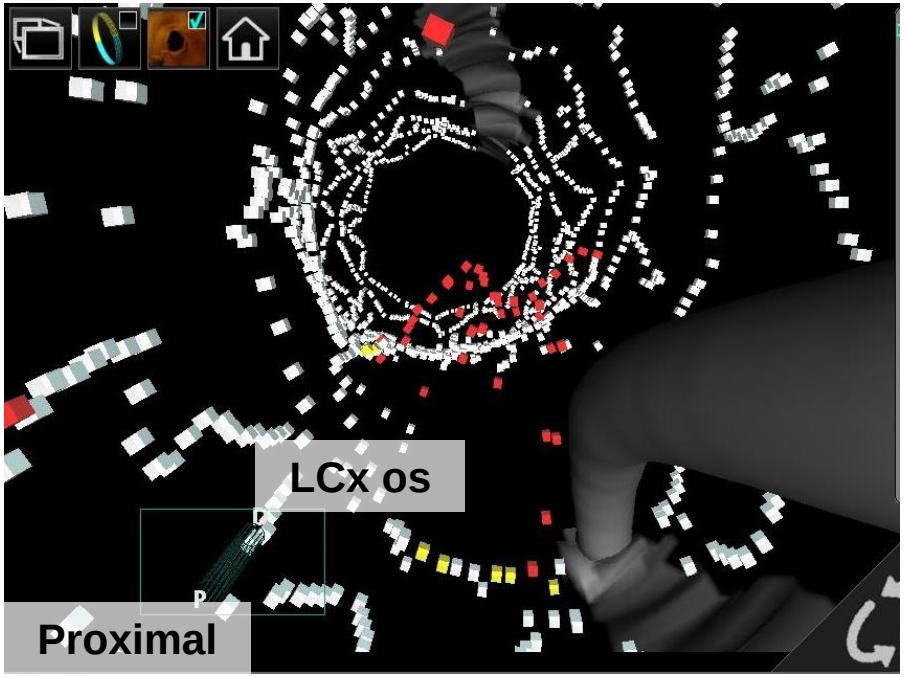
Even in the same Culotte stenting,

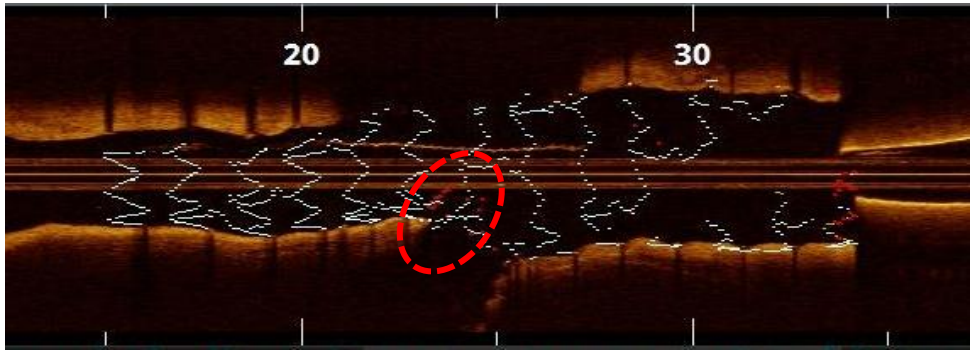
there are significant different OCT findings and coronary flow





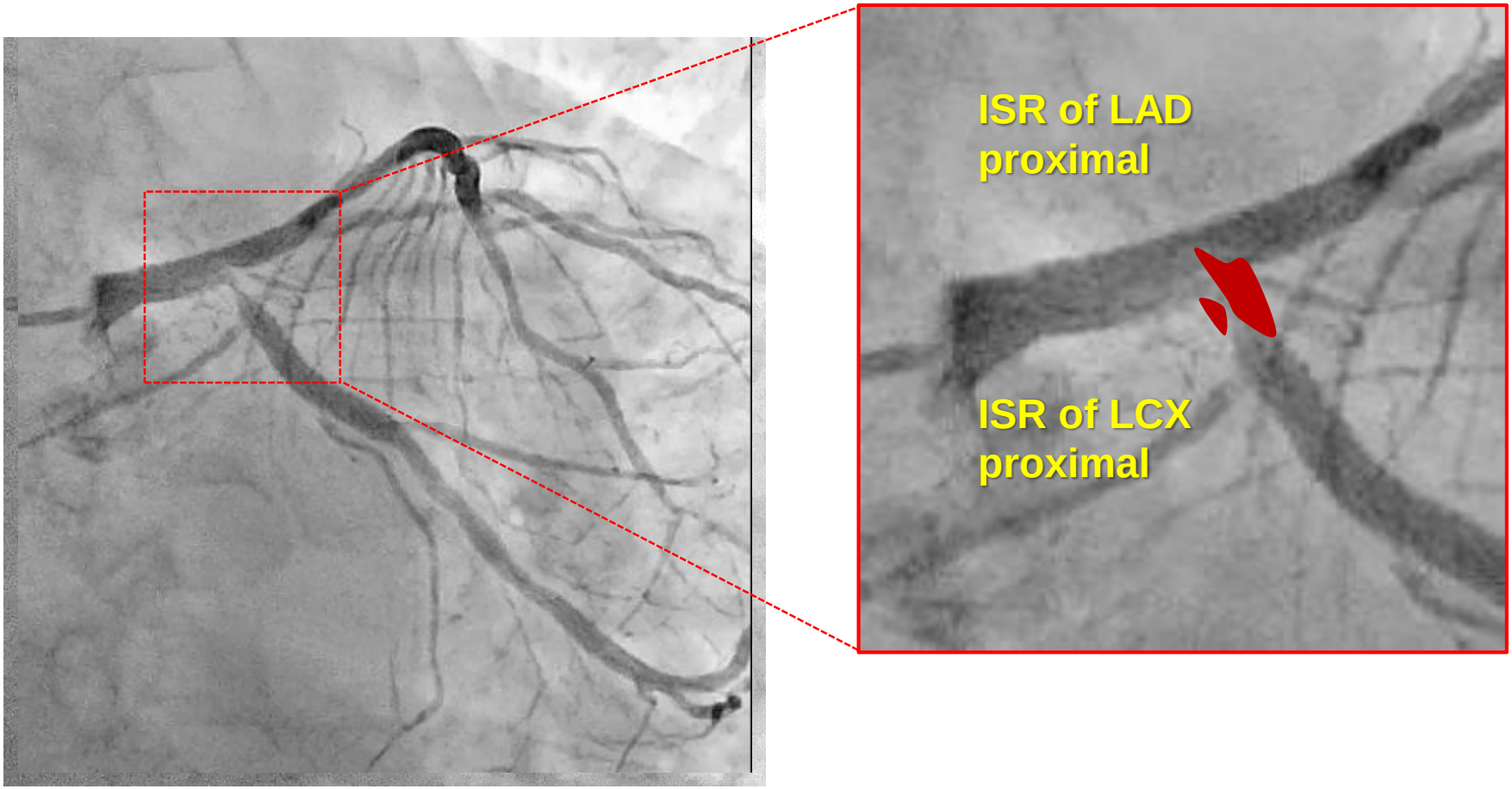

OCT
TAP stenting


LCx os
Proximal


20
30


LCx os
Distal

Follow-up CAG after PCI

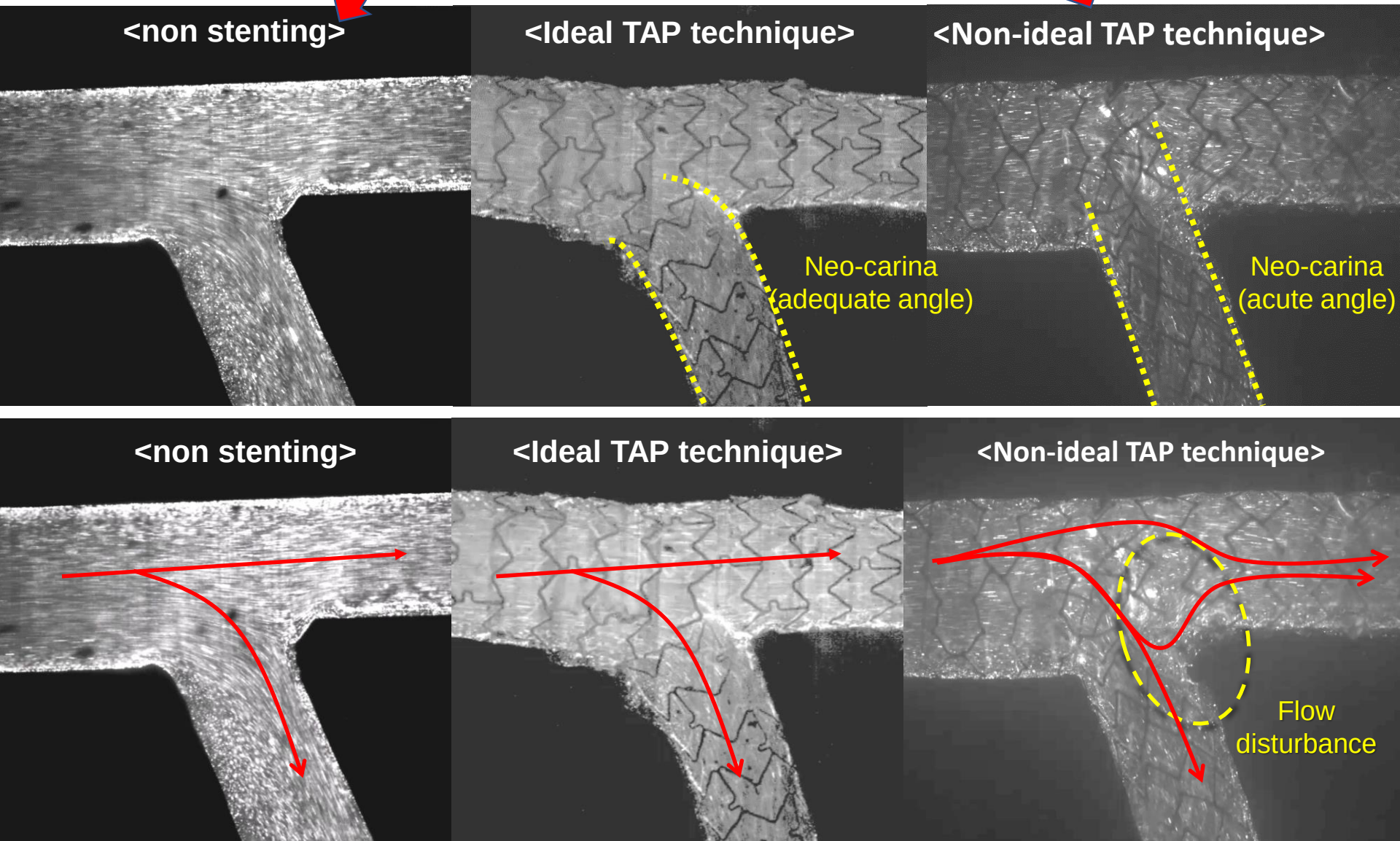


Without stent placement

Blood flow at carina is quite fast.

Unfavorable TAP stent

Flow is roiling, causing turbulence.

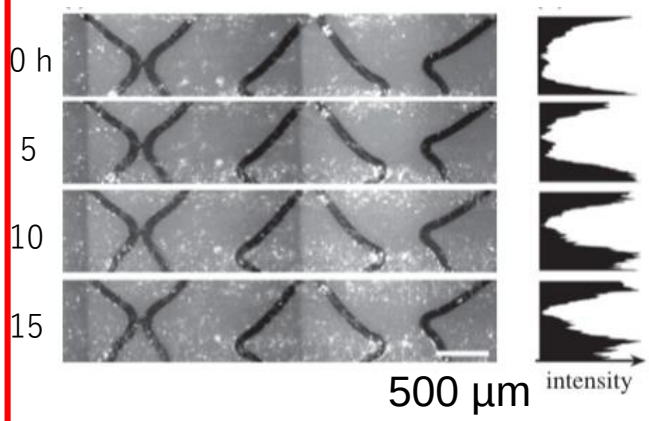


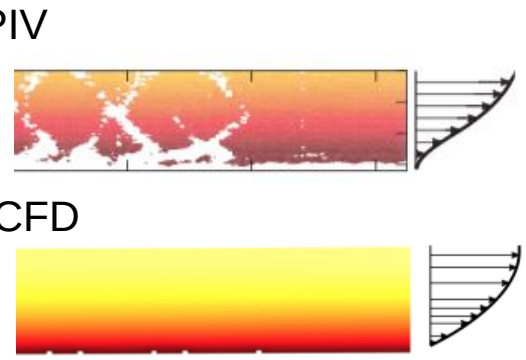
We are collaborating…

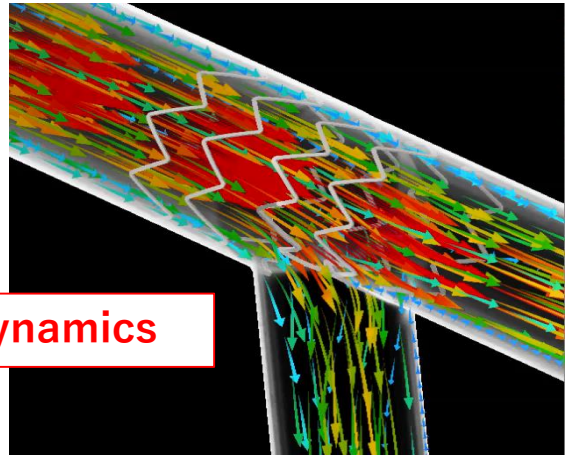
Dept. Cardiology New Tokyo Hosp.	Dept. Science Tokyo University
Dept. Science Tokyo University of Science	Dept. Cardiology Tokai University

We are collaborating…

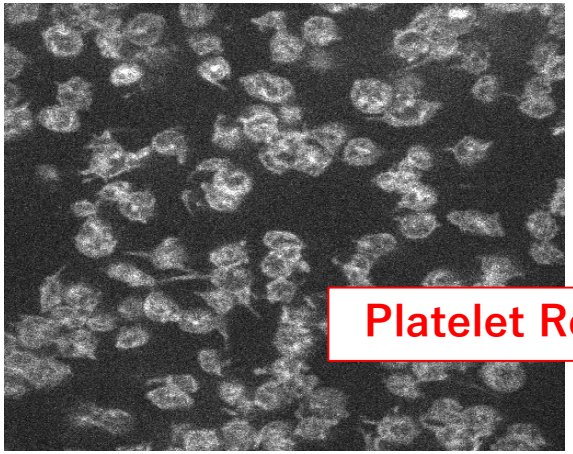
Endothelial function







Flow Dynamics



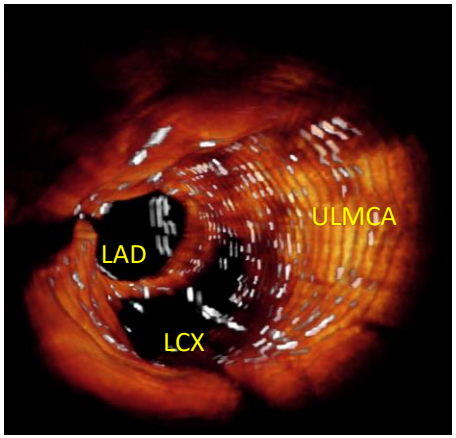
Platelet Reaction

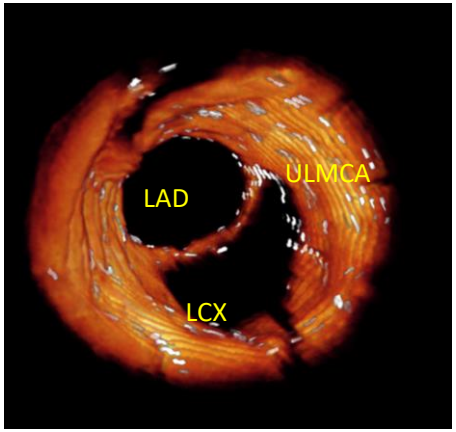
Why ?? KBT or not KBT

- Before this, Let's think about POT -

If we can finish with one stent, much better outcome

Point is… POT or not ?? Good KBT ? KBT or not ??



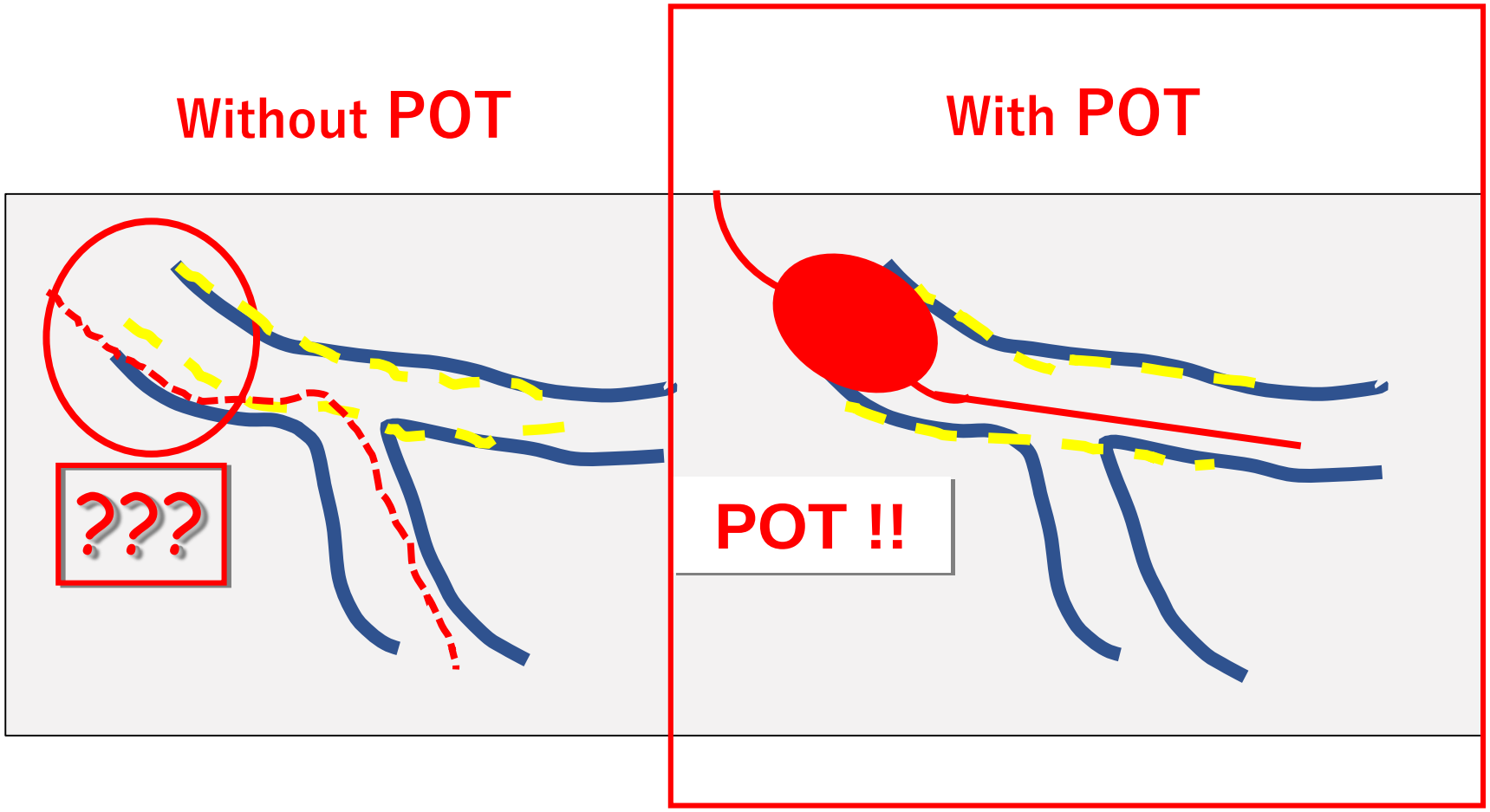


The impact of Main Branch Restenosis on Long Term Mortality Following Drug-eluting Stent Implantation in Patients with De Novo Unprotected Distal Left Main Bifurcation Coronary Lesions: The MIlan and New-TOkyo (MITO) Registry

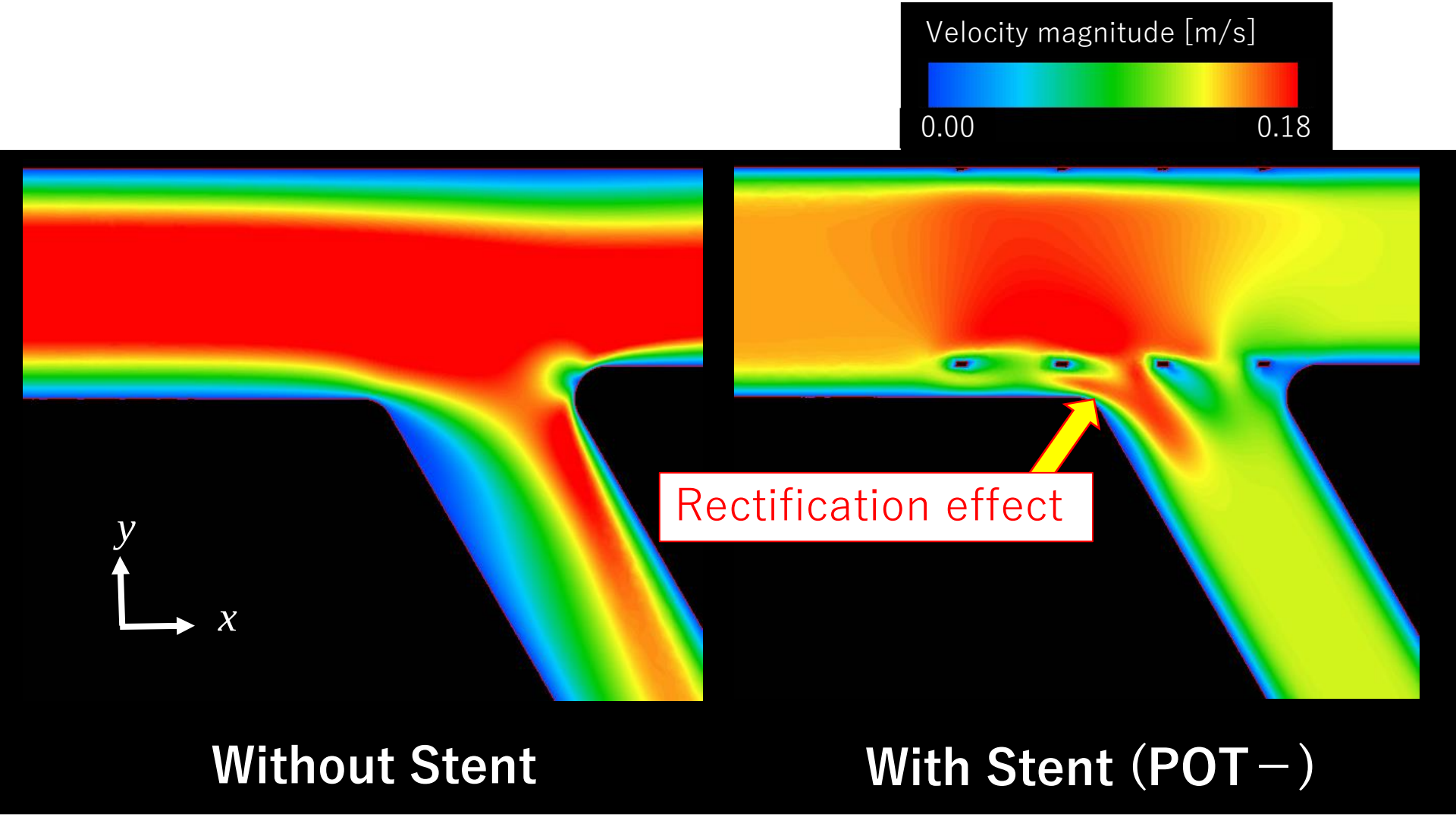
Catheter Cardiovasc Interv. 2013 K.Takagi, S.Nakamura A.Colombo et.al

n=753	*Univariable HR (CI)*	*P Value*	*Coxadjusted HR (CI)*	*P Value*
Calcification	*2.114 (1.085-4.121)*	*0.028*	*2.284 (1.165-4.475)*	*0.016*
True-bifurcation	*2.764 (1.344-5.668)*	*0.006*	*2.331 (1.117-4.862)*	*0.024*
Insulin DM	*2.742 (1.234-6.092)*	*0.013*	*2.259 (1.007-5.068)*	*0.048*
Post MLD	*0.568 (0.346-0.932)*	*0.025*	*0.611 (0.364-1.026)*	*0.062*
POT	*0.428 (0.228-0.805)*	*0.008*	*0.548 (0.281-1.067)*	*0.077*
Full cover approach	*0.409 (0.235-0.709)*	*0.001*	*0.605 (0.336-1.088)*	*0.093*
IABP	*2.115 (1.126-3.971)*	*0.020*		
3 VD	*1.750 (1.015-3.016)*	*0.044*		
Dialysis	*2.760 (0.993-7.670)*	*0.052*		
2-stent strategy	*1.651 (0.957-2.848)*	*0.071*		

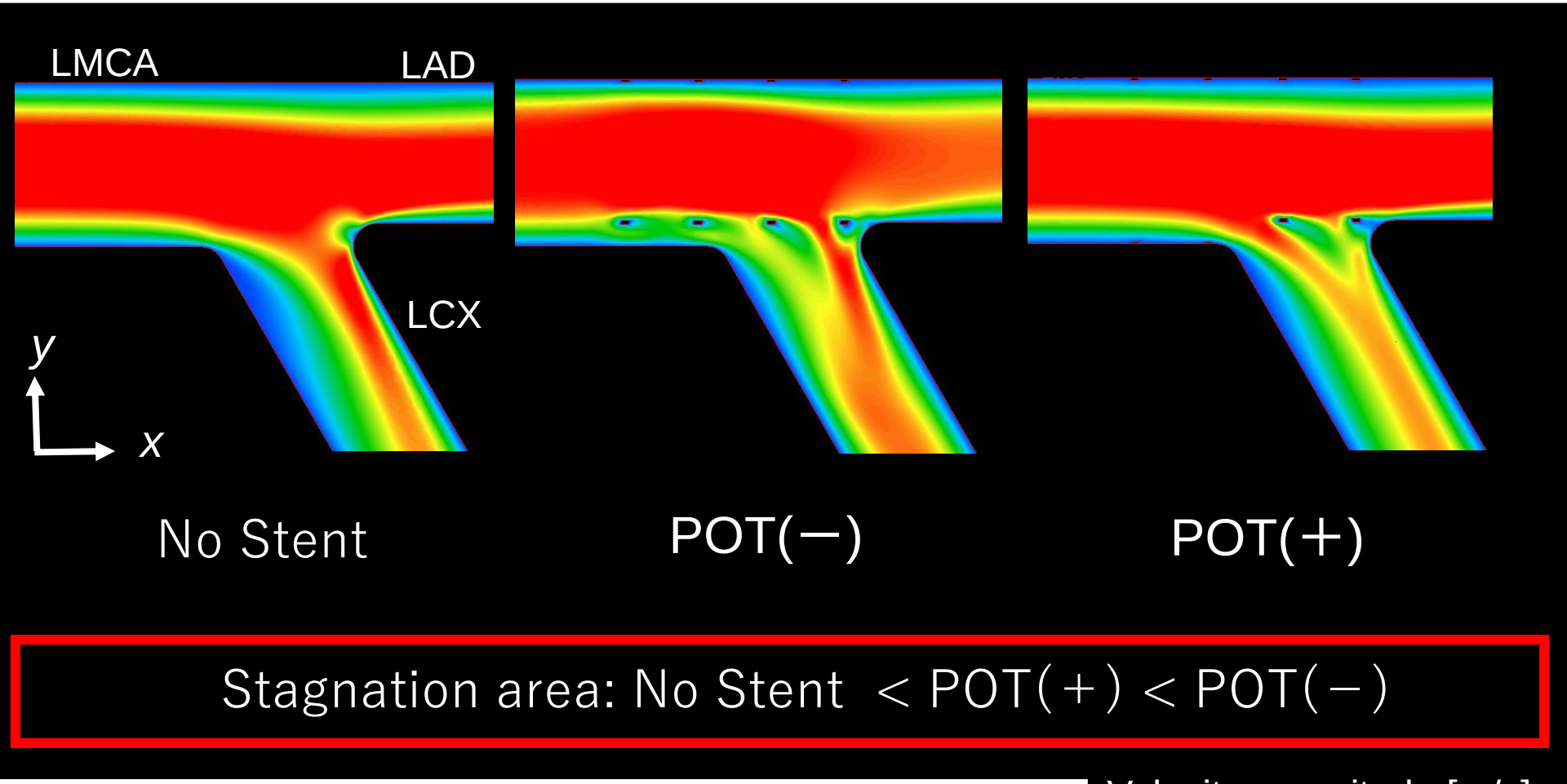
KBT with POT or without POT ???



Flow velocity distribution at the central cross section

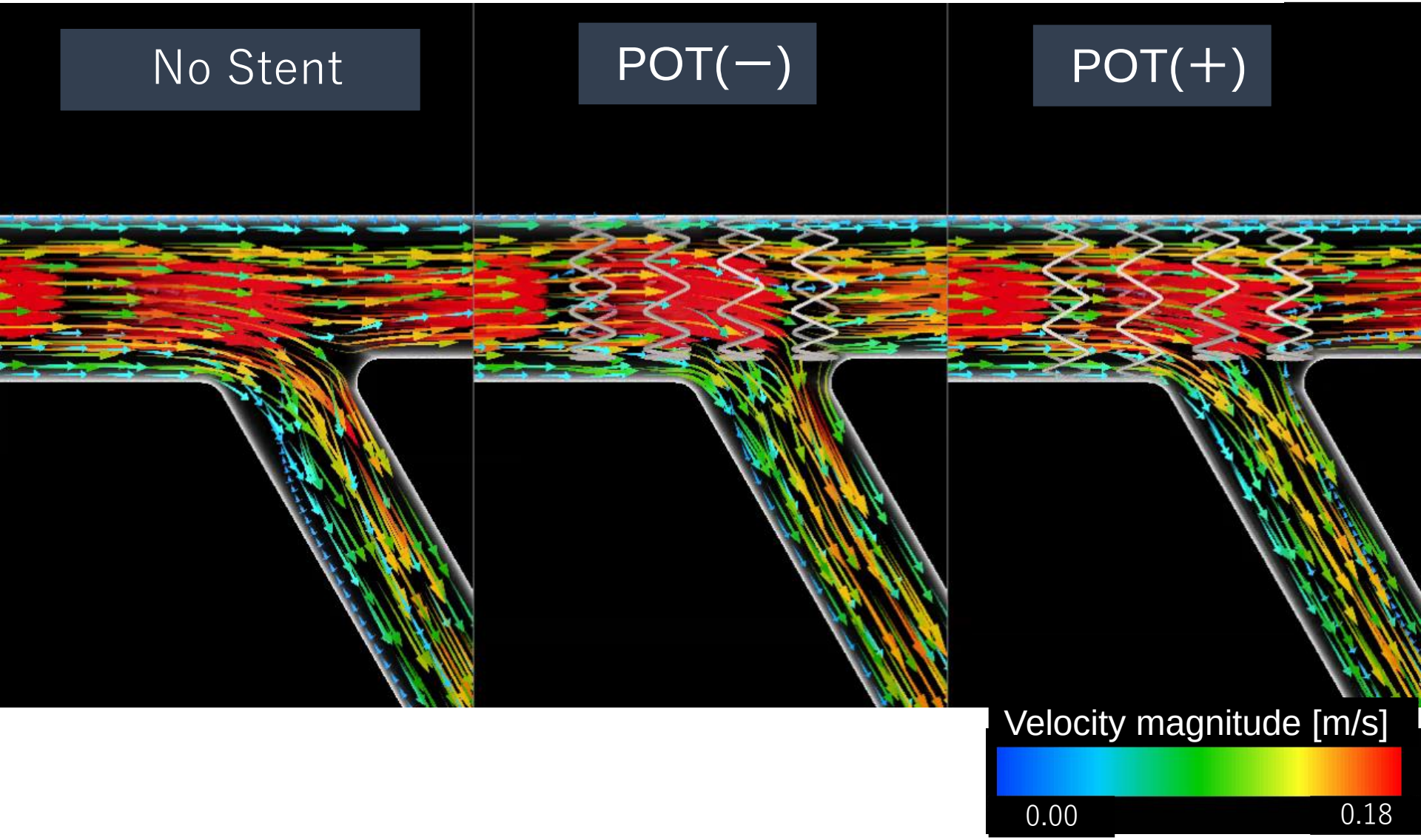


Flow velocity distribution at the central cross section

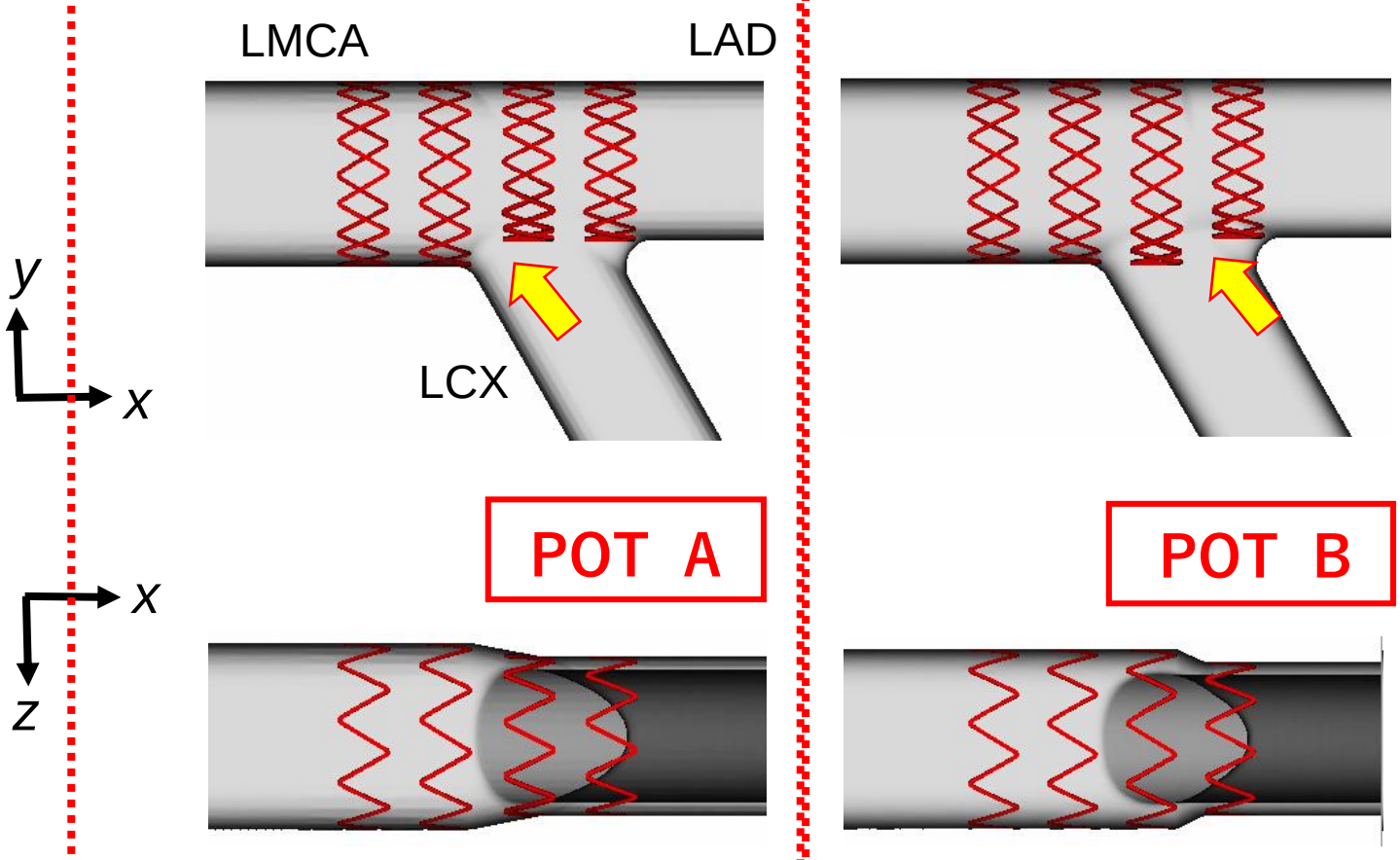


Stagnation area: No Stent < POT(+) < POT(−)

Stream Line distribution at the central cross section



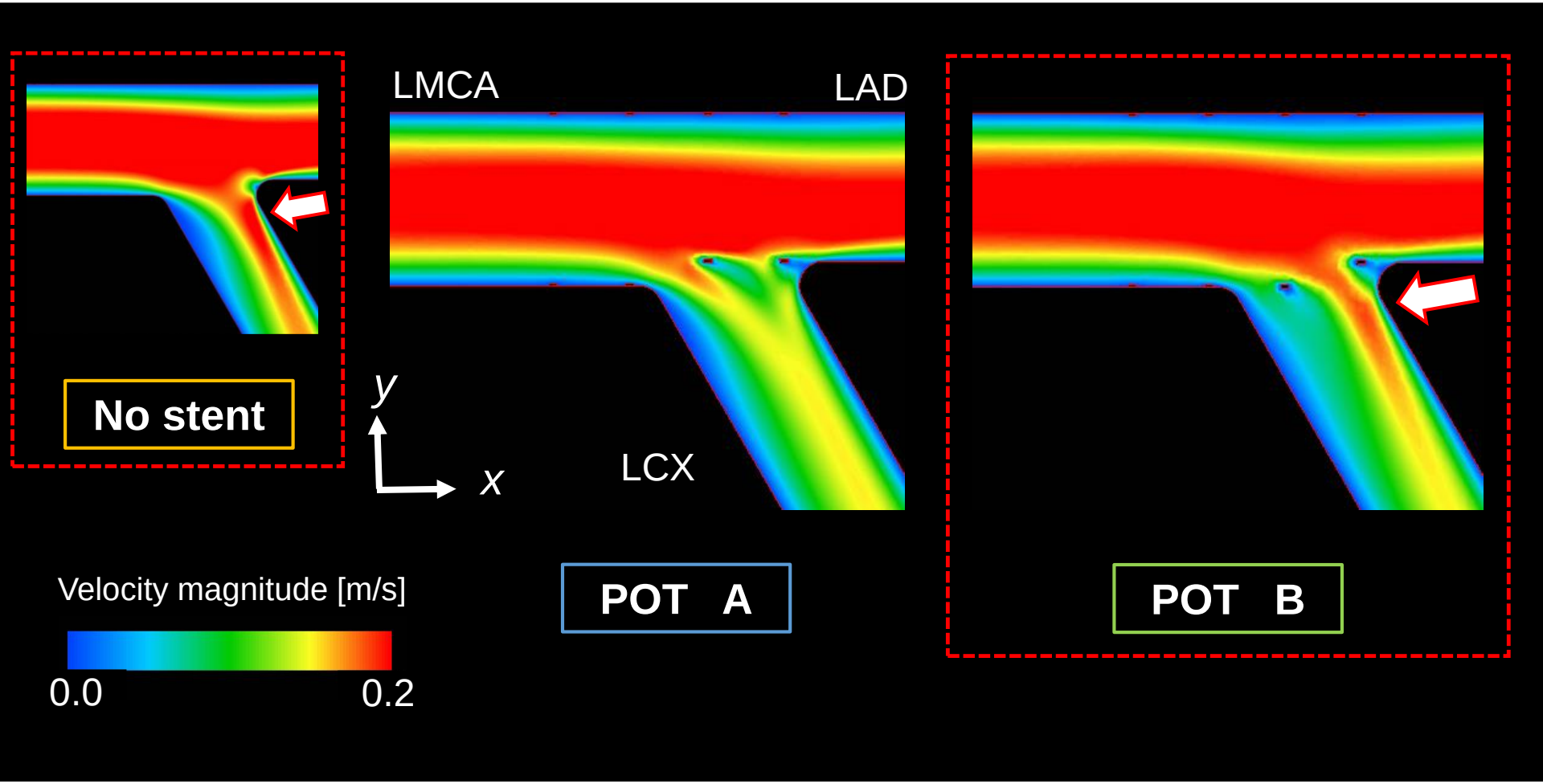
Position of POT ???



Just opposite site of Carina

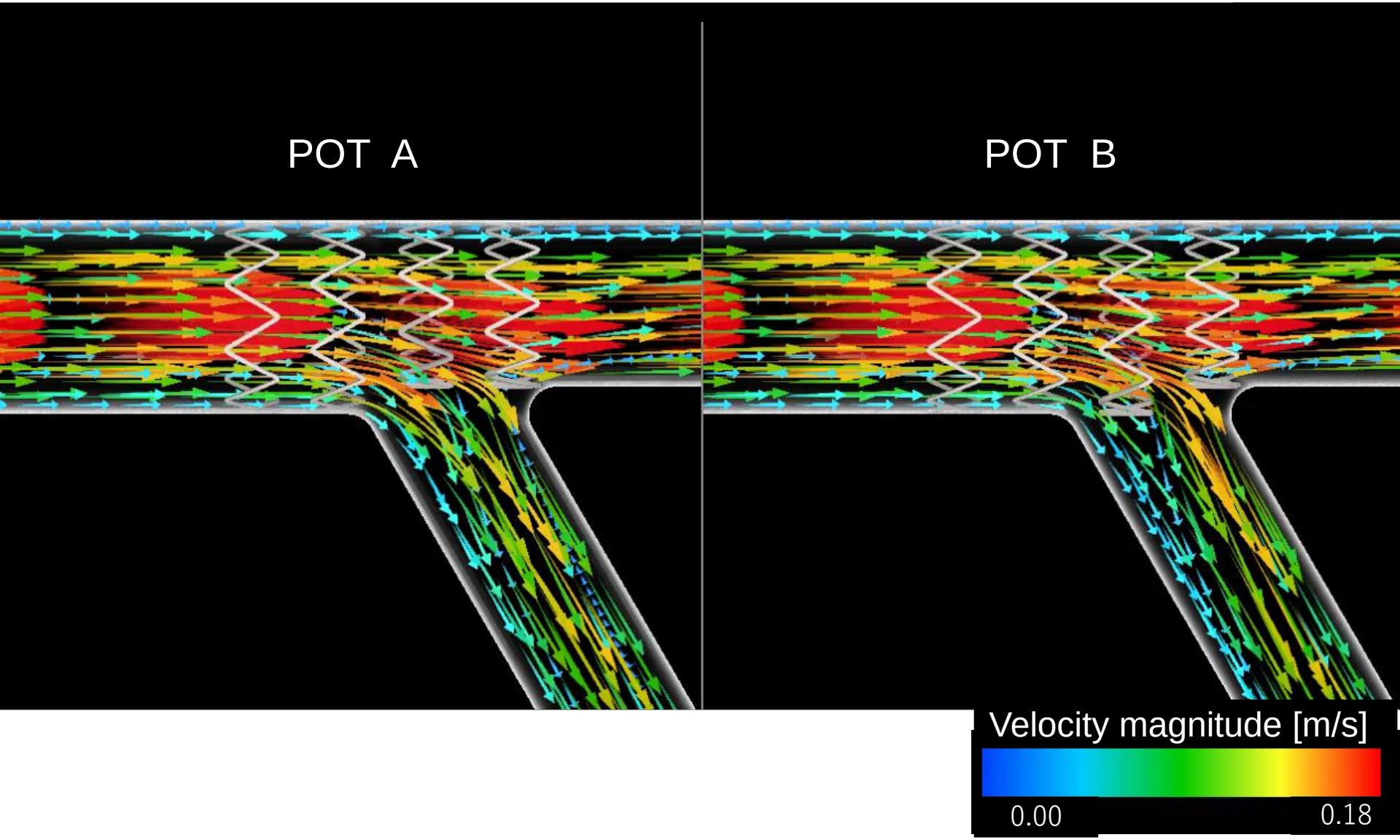
Just at the site of Carina

Flow velocity distribution at the central cross section



Stream Line distribution at the central cross section

POT B is better !!

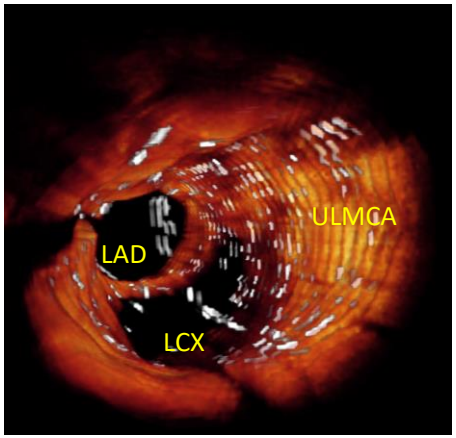


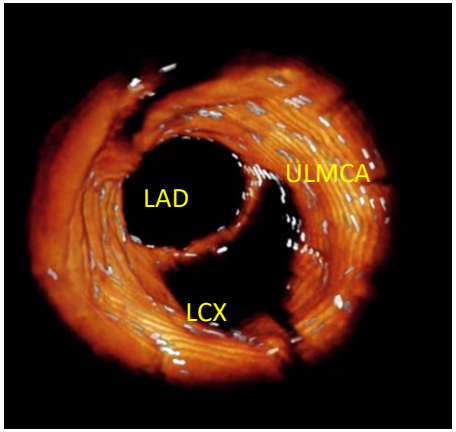
Why ?? KBT or not KBT

POT is so important !!!

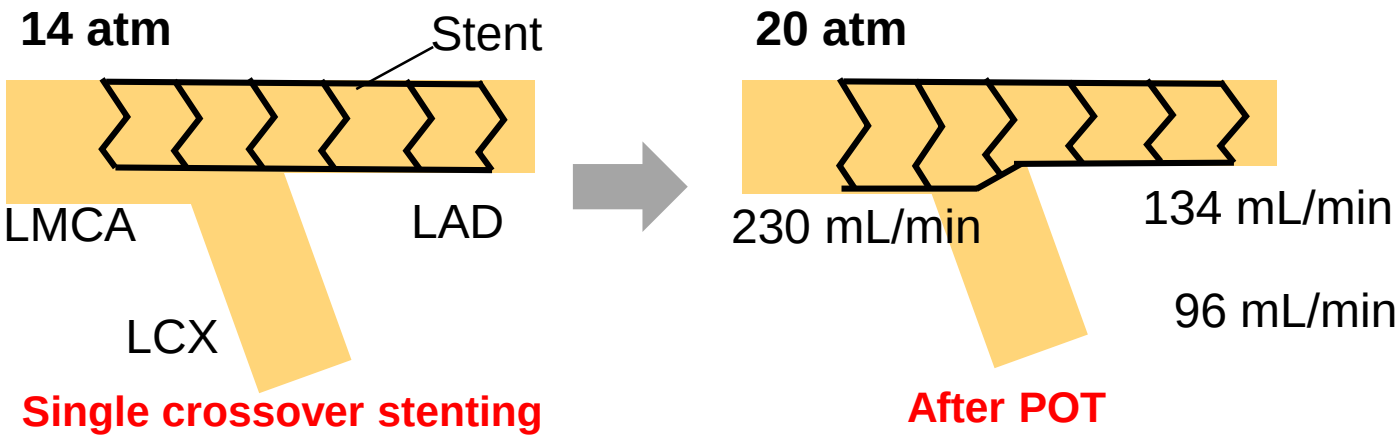
Even NO KBT.... Regular alignments → Rectification Effect ??

Do we really need KBT ?? .... All the time ???





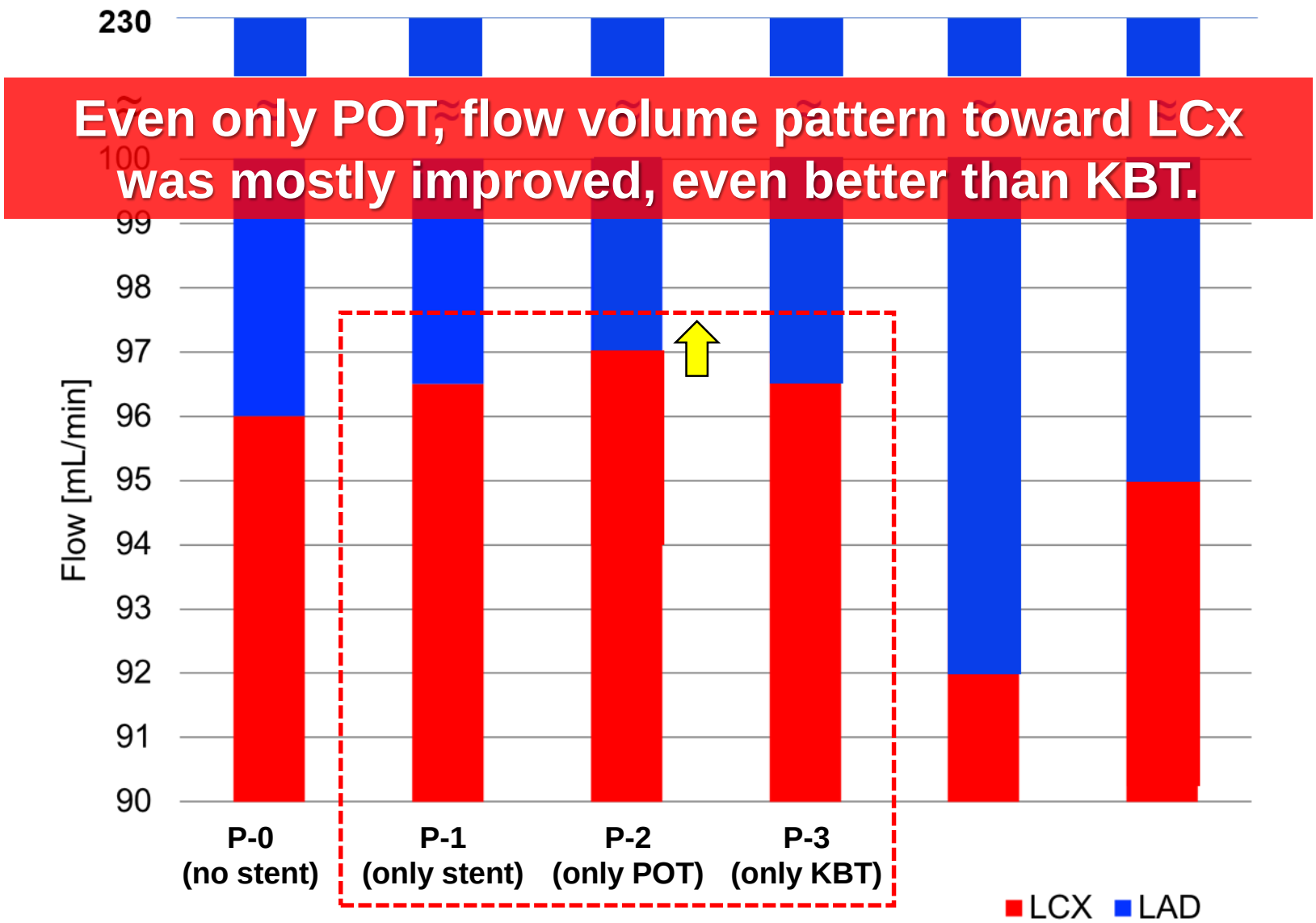
Effect of Pot, KBT, re-Pot



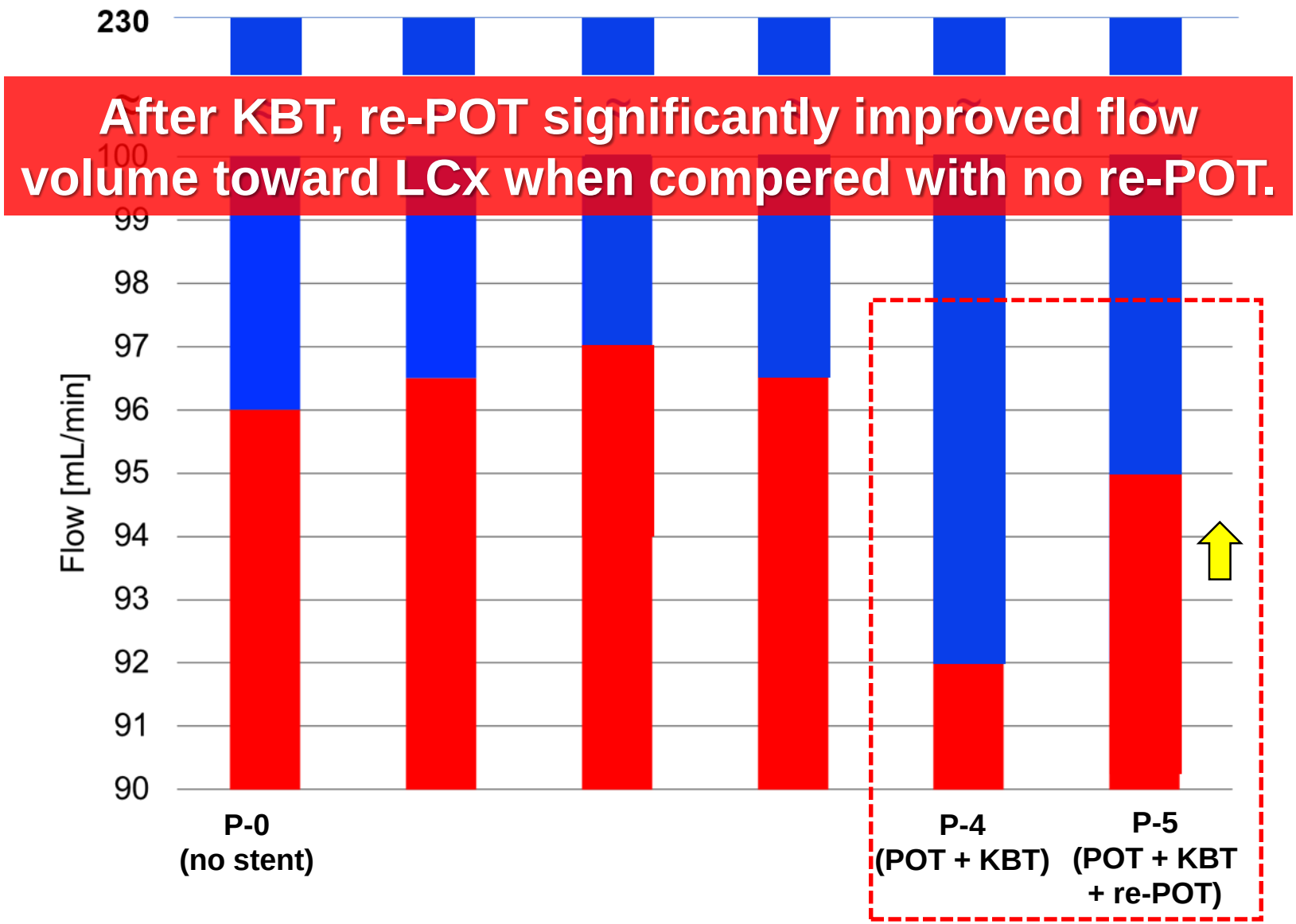
Influence of the Flow Field

	Pot	KBT	Re–POT
P-0 (No stent)	×	×	×
P-1	×	×	×
P-2	○	×	×
P-3	×	○	×
P-4	○	○	×
P-5	○	○	○

Comparison of flow volume pattern

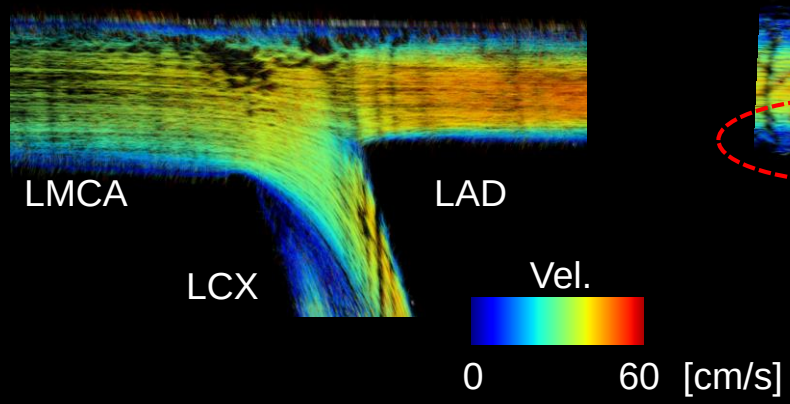


Comparison of flow volume pattern

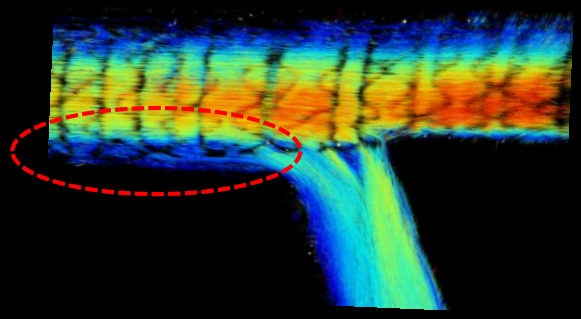


Comparison of the Flow Field in each pattern:
Impact of proximal optimization

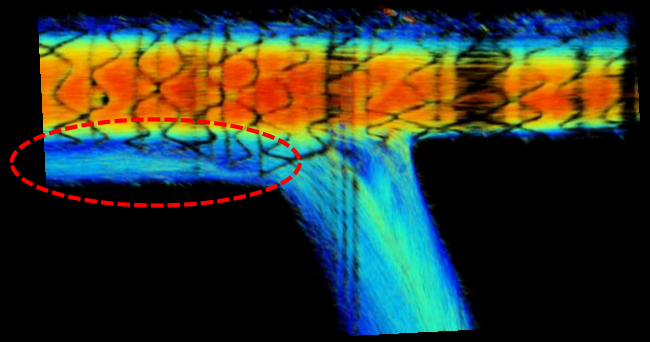
P-0: no stent



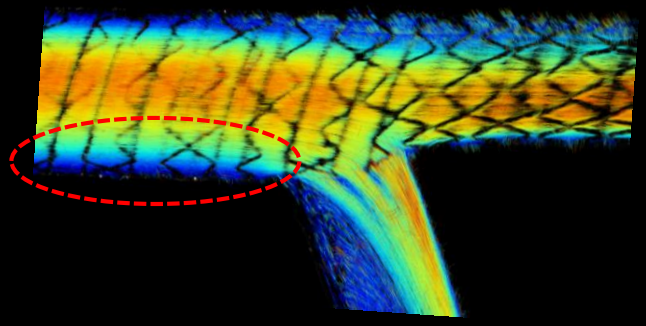
P-1: only stent



P–2: only KBT



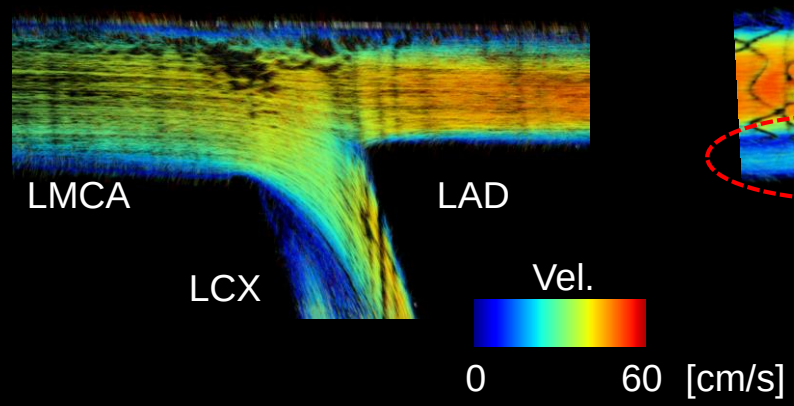
P–3: only POT



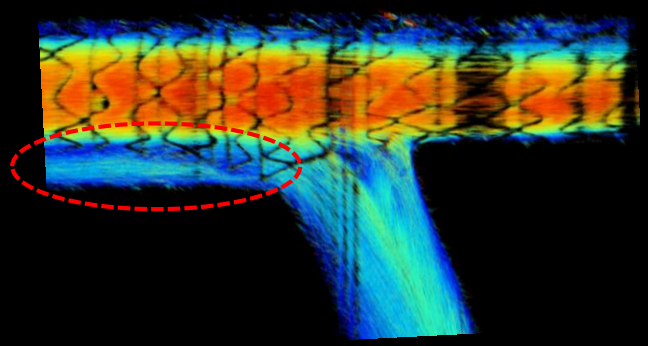
Low flow velocity area between vessel wall and stent could be improved with POT

Comparison of the Flow Field in each pattern:
Impact of proximal optimization

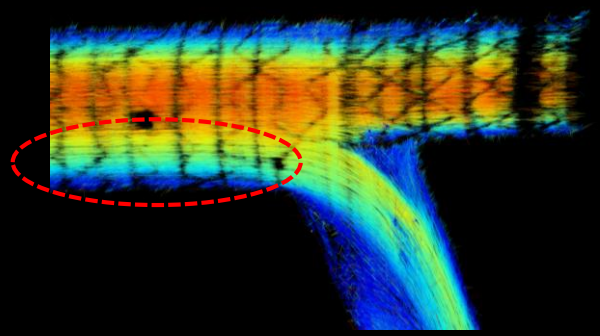
P-0: no stent



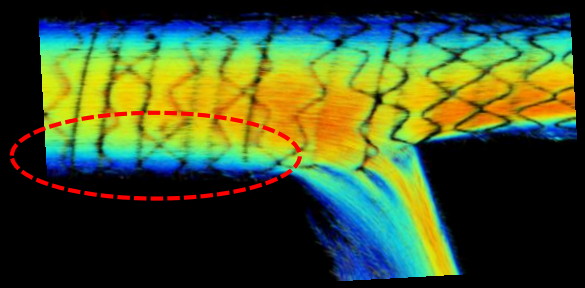
P–2: only KBT



P-4: POT + KBT



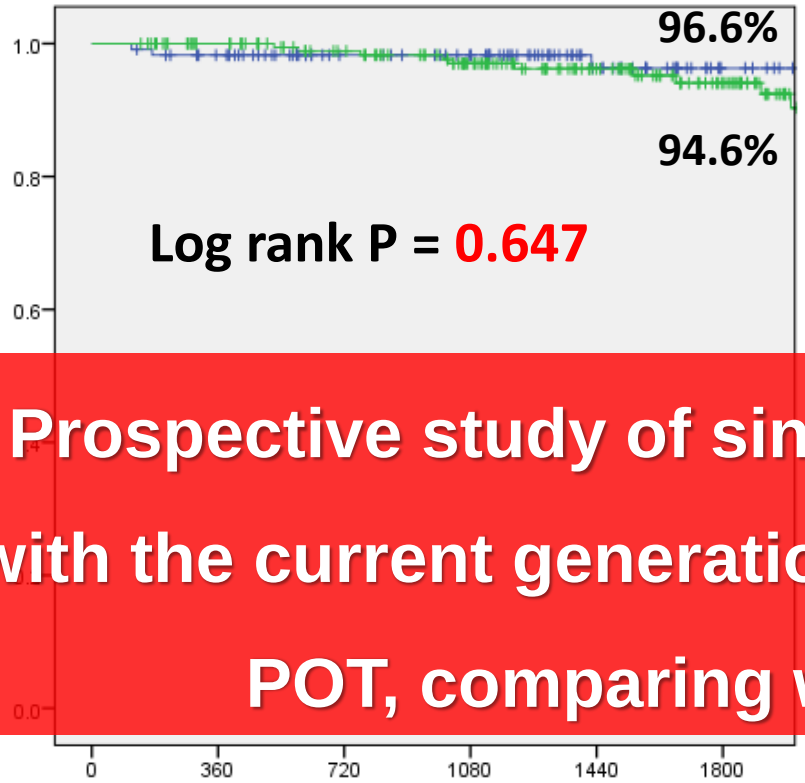
P-5: POT + KBT + re-POT



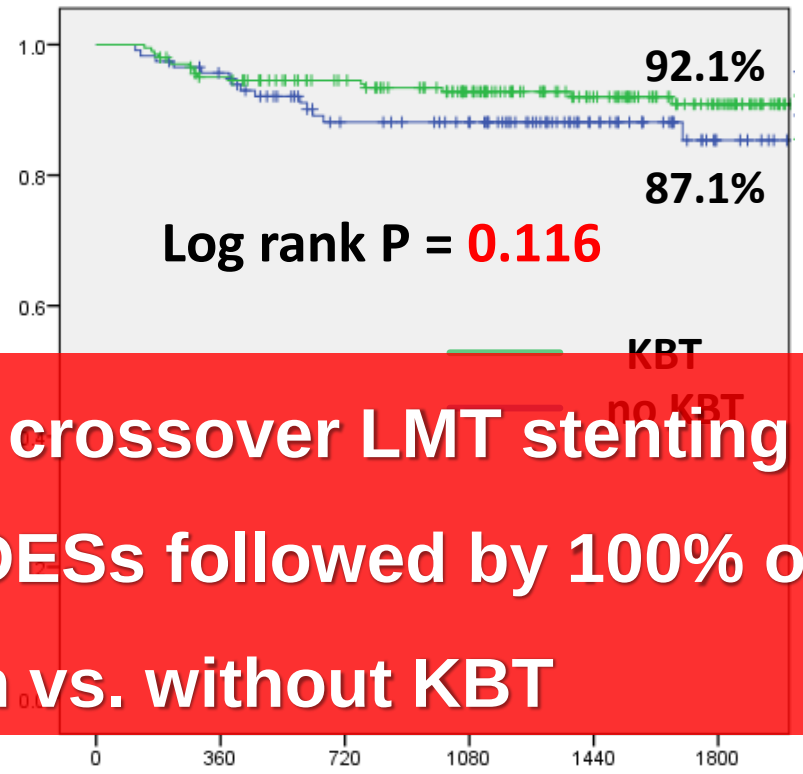
Low flow velocity area between vessel wall and stent could be improved with re-POT

LMT: Single crossover stenting
TLR: with vs. without KBT

TLR in LMCA-LAD



TLR in LCX ostium



Prospective study of single crossover LMT stenting with the current generation DESs followed by 100% of POT, comparing with vs. without KBT

- ✓ Heterogeneity of stent types implanted in the both groups (1st and 2nd generation DES).
- ✓ POT was done in the both groups for > 80% of the cases, but not 100%.

There is never that practicing
witchcraft and sorcery was simple

- Harry Potter

There is never that LMT PCI was simple

- Sunao Nakamura