



A Teaching Affiliate
of Harvard Medical School

Current OCT: Excellent, but still needs to be more improved

Ik-Kyung Jang, MD, PhD
Professor of Medicine
Harvard Medical School

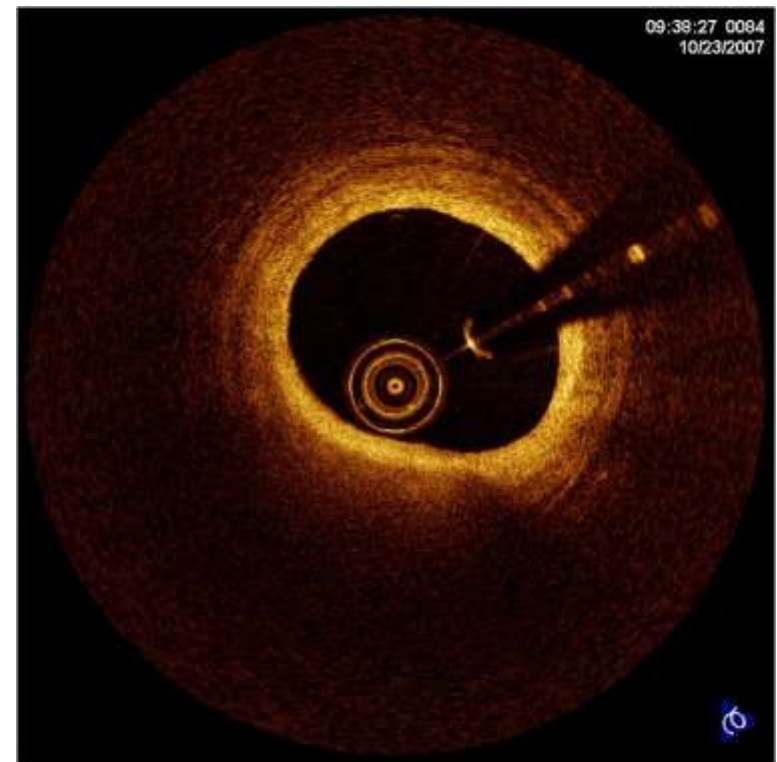


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Optical Coherence Tomography

- Resolution: 15 vs 150 μm
- Speed: 20 vs 0.5 mm/s
- 2 mm penetration depth
- Blood free zone



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OCT

- Research tool
- PCI optimization



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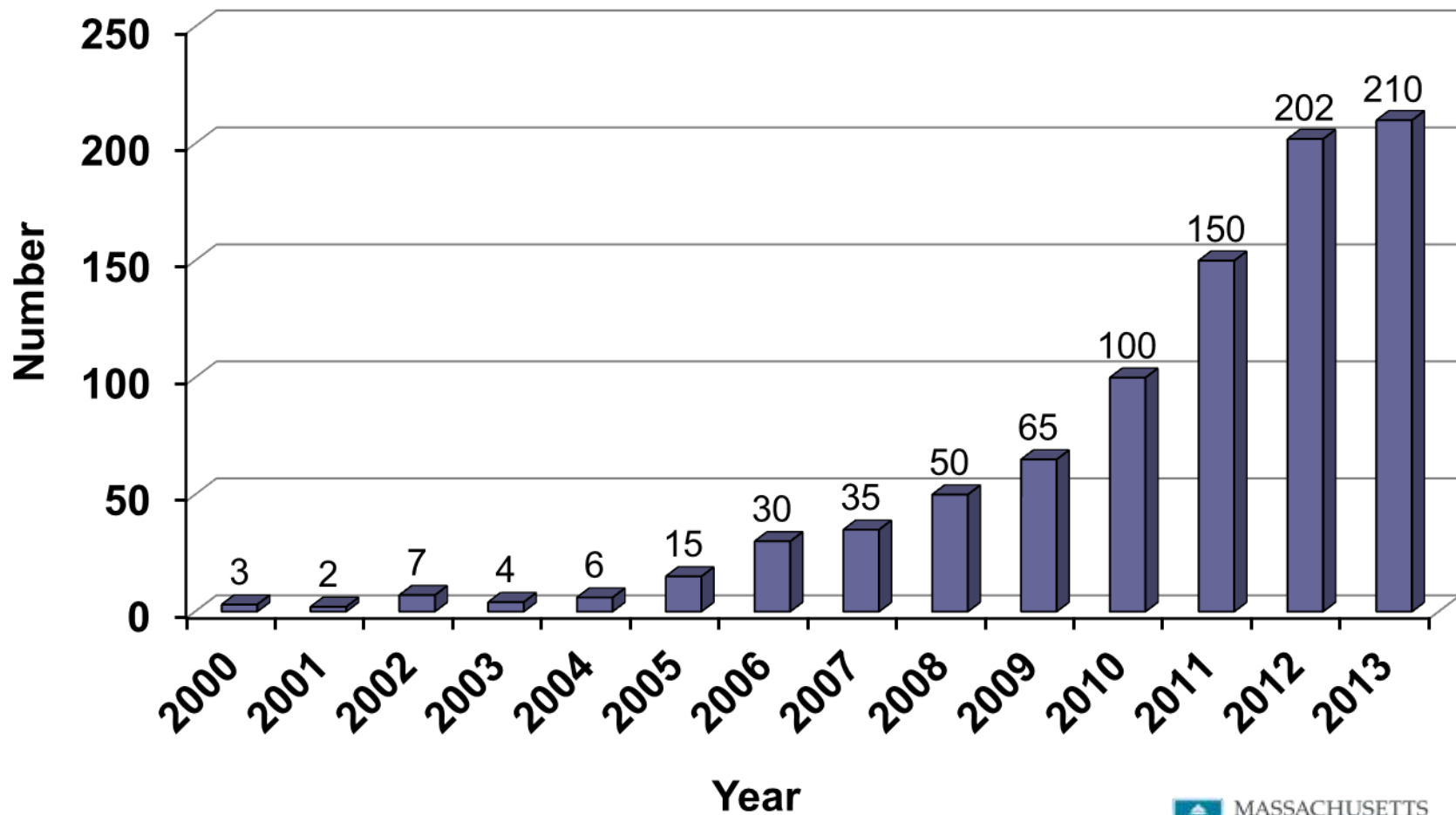


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Intra-Coronary OCT Publications

Intra-Coronary OCT Publications Per Year

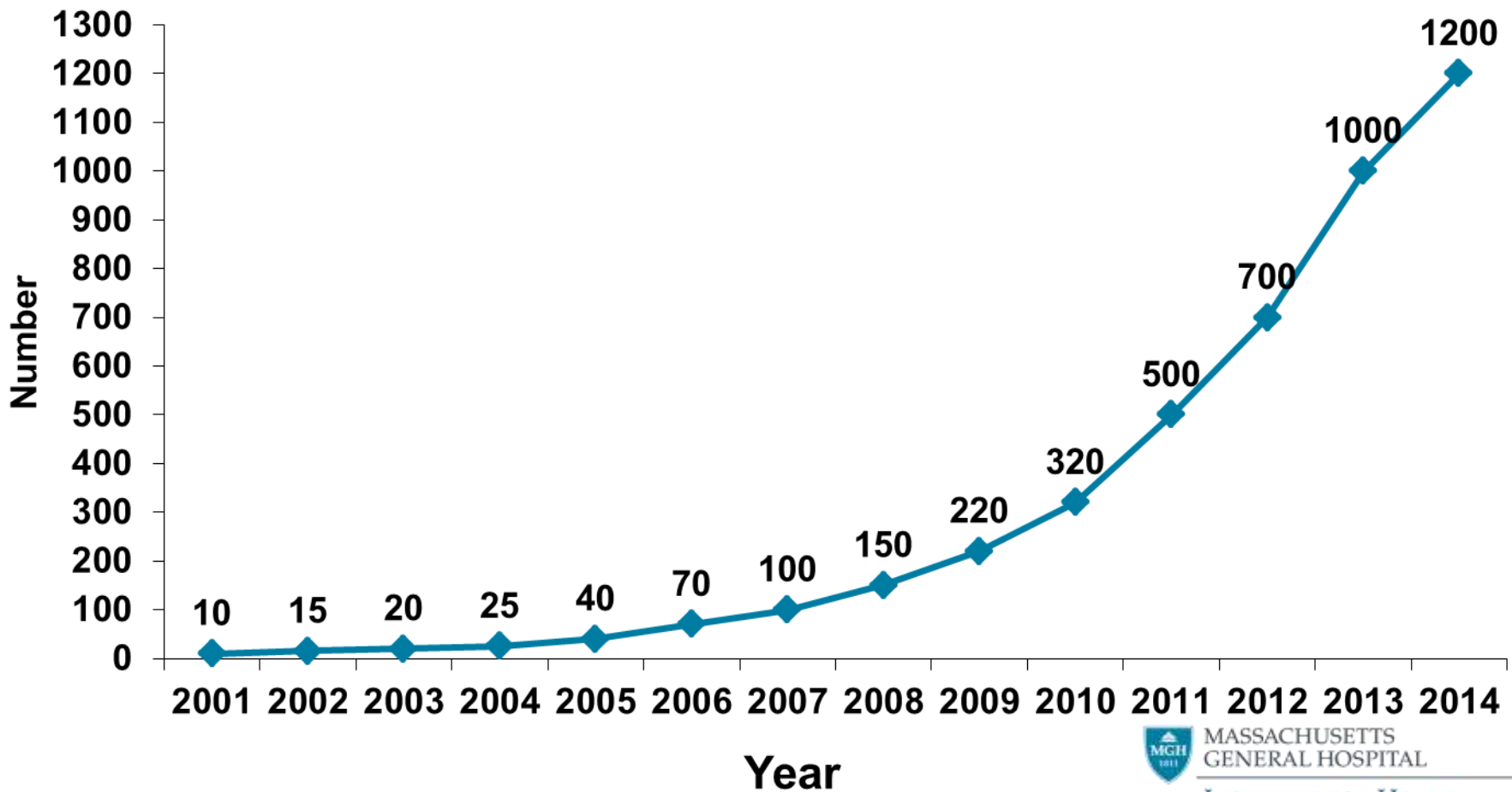


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Intra-Coronary OCT Publications

Estimated Total # Publications

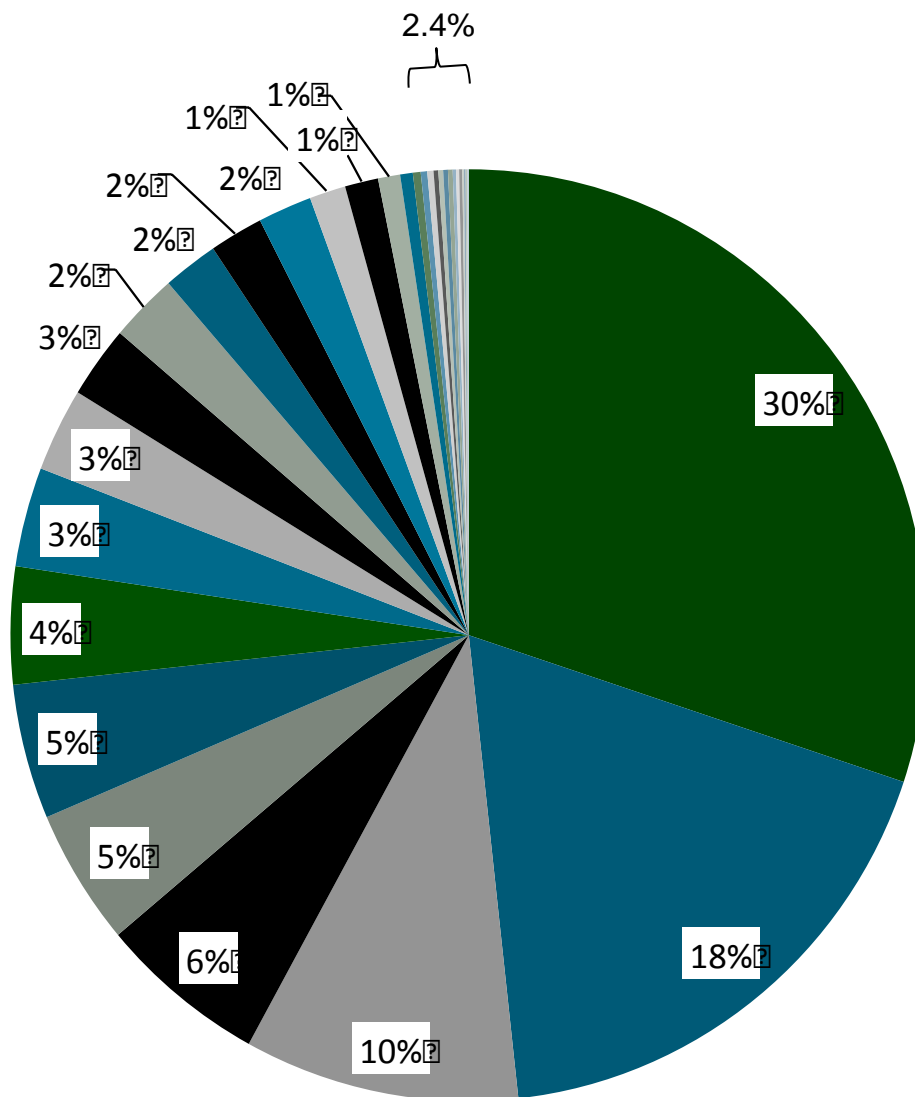


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Country Distribution

Distribution



- Japan
- Usa
- Netherlands
- Italy
- South Korea
- England
- Greece
- China
- Spain
- Switzerland
- Germany
- Denmark
- Australia
- Belgium
- France
- Poland
- New Zealand
- Brazil
- Portugal
- Canada
- Turkey
- Austria
- Finland
- Latvia
- Singapore
- Hungary
- Israel
- Russia
- Argentina
- Cyprus
- Egypt
- India

Fields to be explored

- In vivo vascular biology
- Transplant vasculopathy
- Non cardiac vessels (pulmonary, PAD)
- Strut coverage
- Bioabsorbable stent
- Evaluation of local or systemic therapy



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OCT

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- **PCI optimization**



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Goal

- To show that OCT is equivalent (or superior) to IVUS



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Meta-Analysis of 3 Randomized Trials and 12 Observational Studies (n=24,869 pts) of IVUS vs Angiography-guided DES Implantation

	IVUS		Angiography		OR	95% CI	Favors	P-value
	Events	Total	Events	Total				
MACE	9.0%	5226	11.1%	5769	0.79	0.69, 0.91	IVUS	0.001
Mortality	2.0%	11,461	3.3%	12,930	0.64	0.51, 0.81	IVUS	<0.001
MI	1.2%	11,316	2.2%	12,785	0.57	0.42, 0.78	IVUS	<0.001
TVR	5.1%	10,869	3.3%	12,338	0.81	0.68, 0.95	IVUS	0.01
Stent thrombosis	1.1%	11,769	1.7%	13,042	0.59	0.42, 0.82	IVUS	0.002
					IVUS - Angiography			
					Mean	95% CI		
MLD (mm)		2415		2308	0.12	0.08, 0.16	IVUS	<0.001

IVUS in PCI

- Pre-PCI lesion evaluation
 - RVD, lesion length
- Immediate post-PCI
 - expansion, dissection, apposition
- Long term F/U
 - rupture



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OCT in PCI

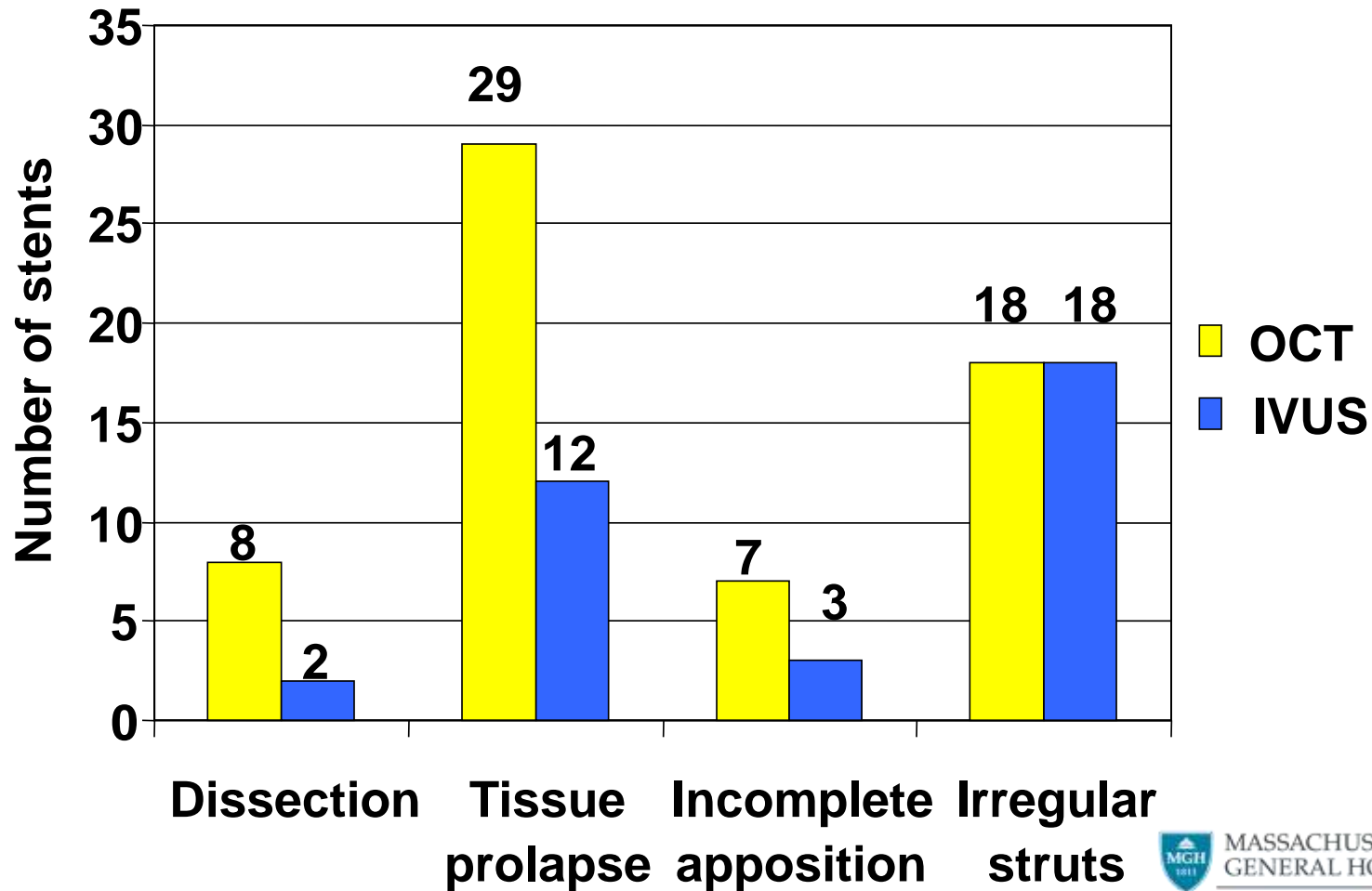
- Pre-PCI lesion evaluation
 - RVD, lesion length, **plaque characteristics**
- Immediate post-PCI
 - expansion, **dissection, apposition**
- Long term F/U
 - **neoatherosclerosis, strut coverage, apposition**



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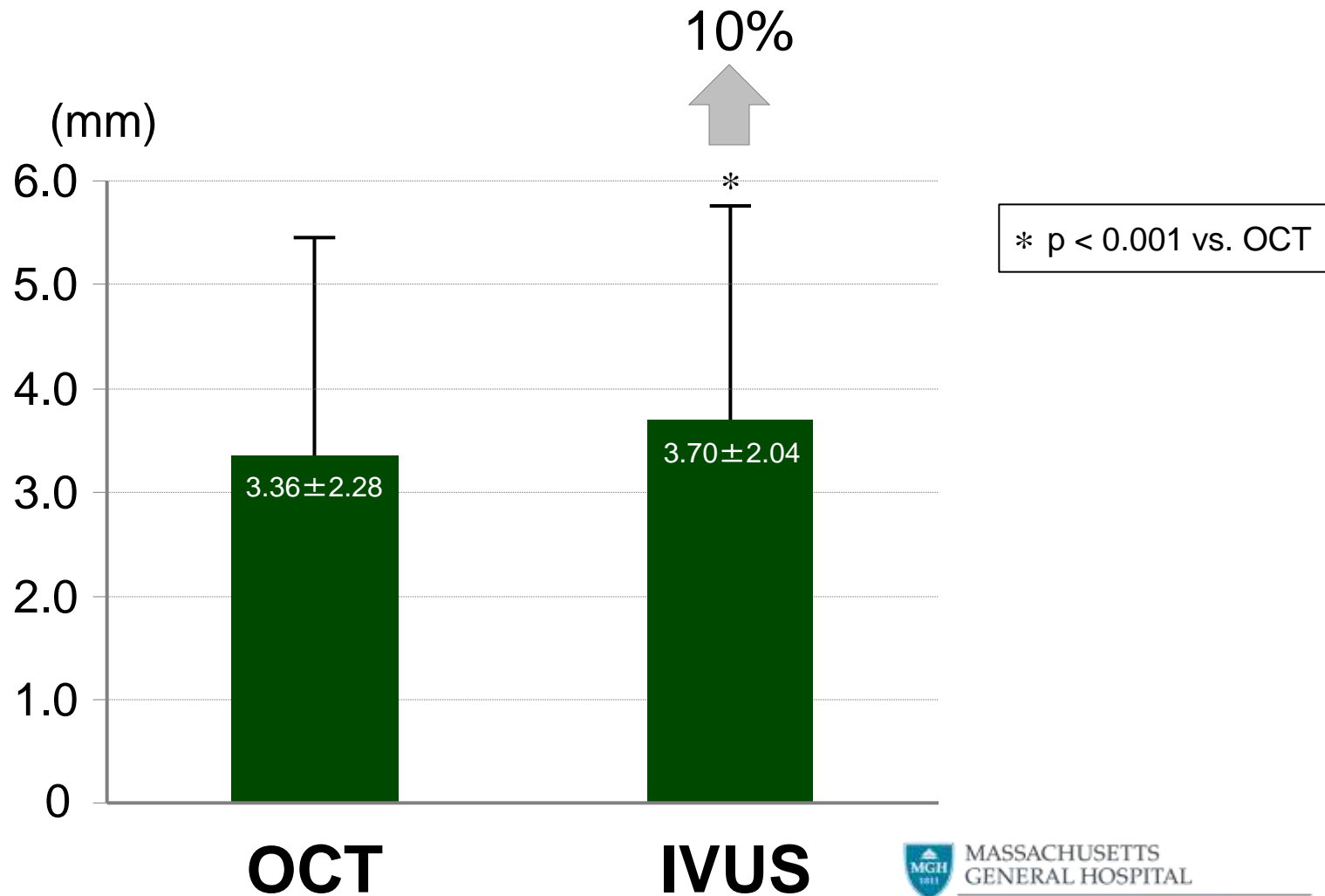
Comparison (qualitative)



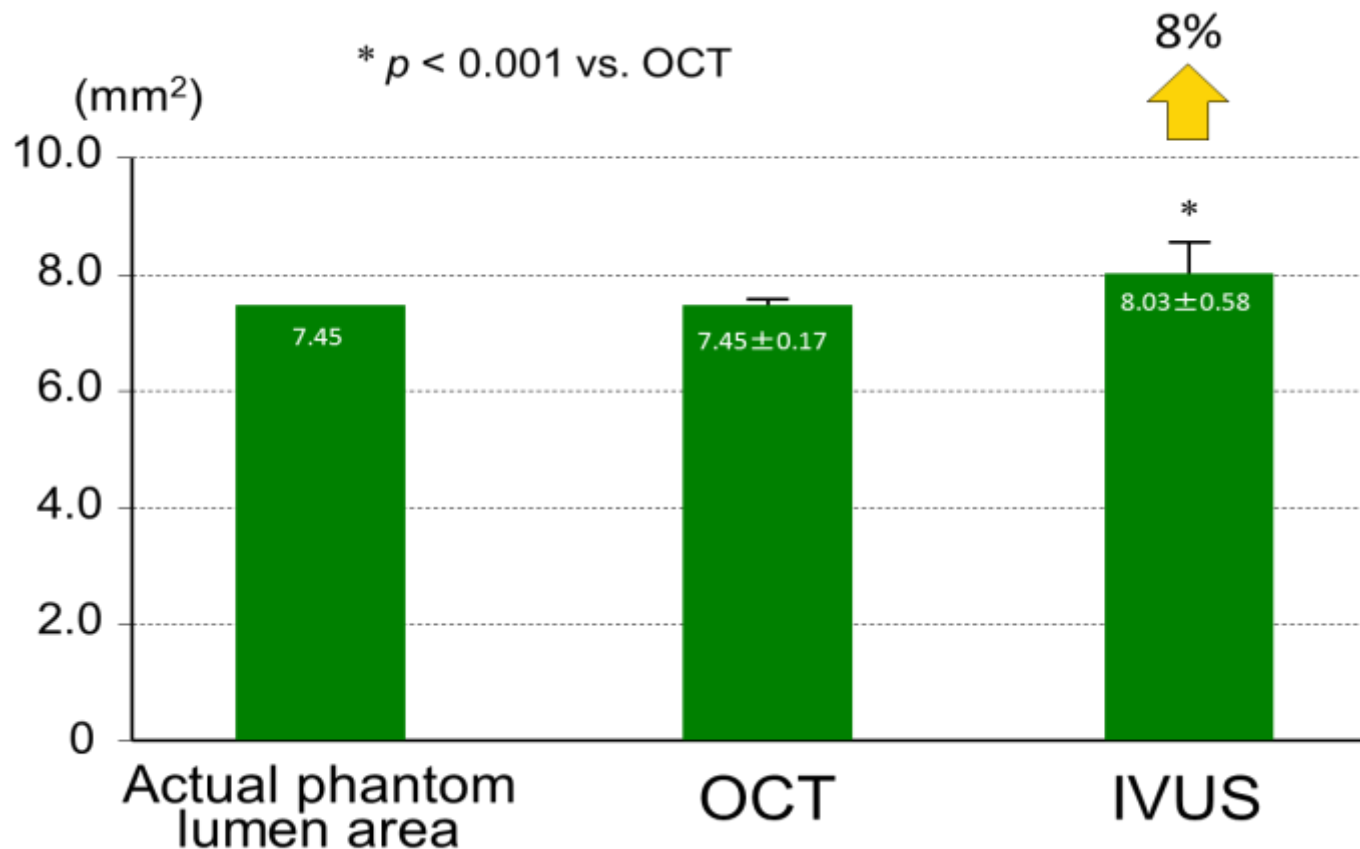
Comparison (qualitative)

	OCT	IVUS	<i>p</i> -value
Tissue protrusion	100%	14%	<0.001
Thrombus	7%	0%	0.008
Stent malapposition	45%	27%	0.075
Dissection	13%	7%	0.527

MLA: OCT vs IVUS (Quantitative)



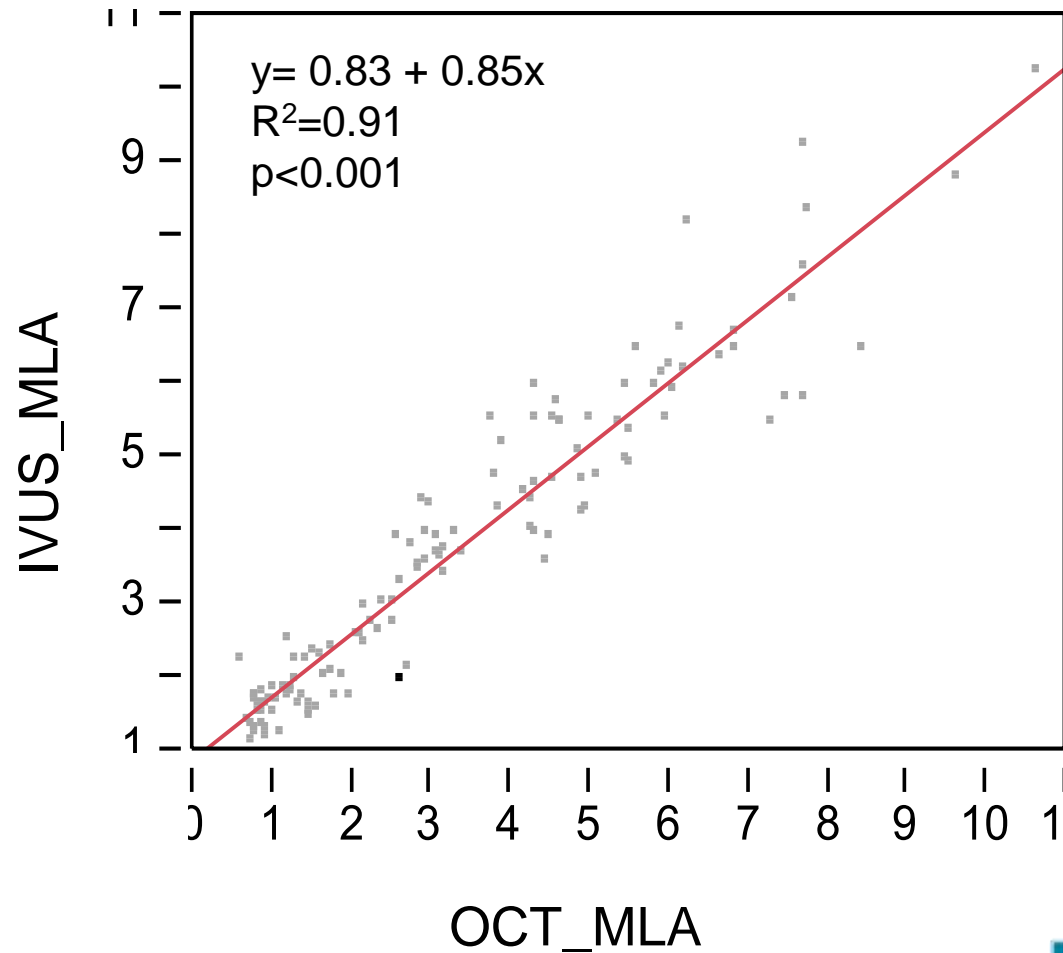
MLA: Phantom vs OCT vs IVUS



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MLA: OCT vs IVUS



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OCT

The established IVUS criteria can be adopted with slight modification for quantitative OCT measurements.

Clinical significance of qualitative OCT findings is not known.



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Current OCT

- Need to displace blood
- Shallow image depth
- User friendliness
- Lack of data



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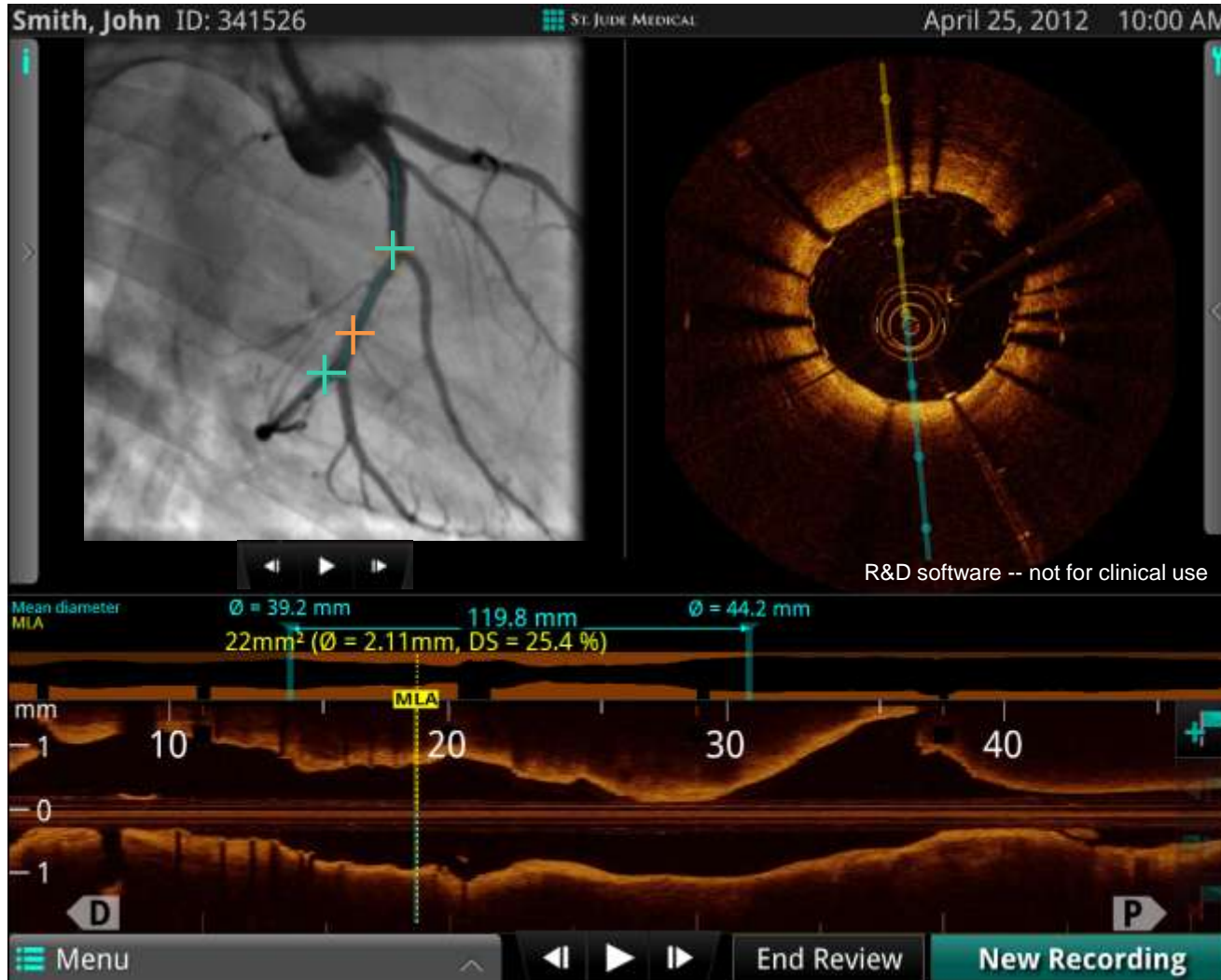
Future Development



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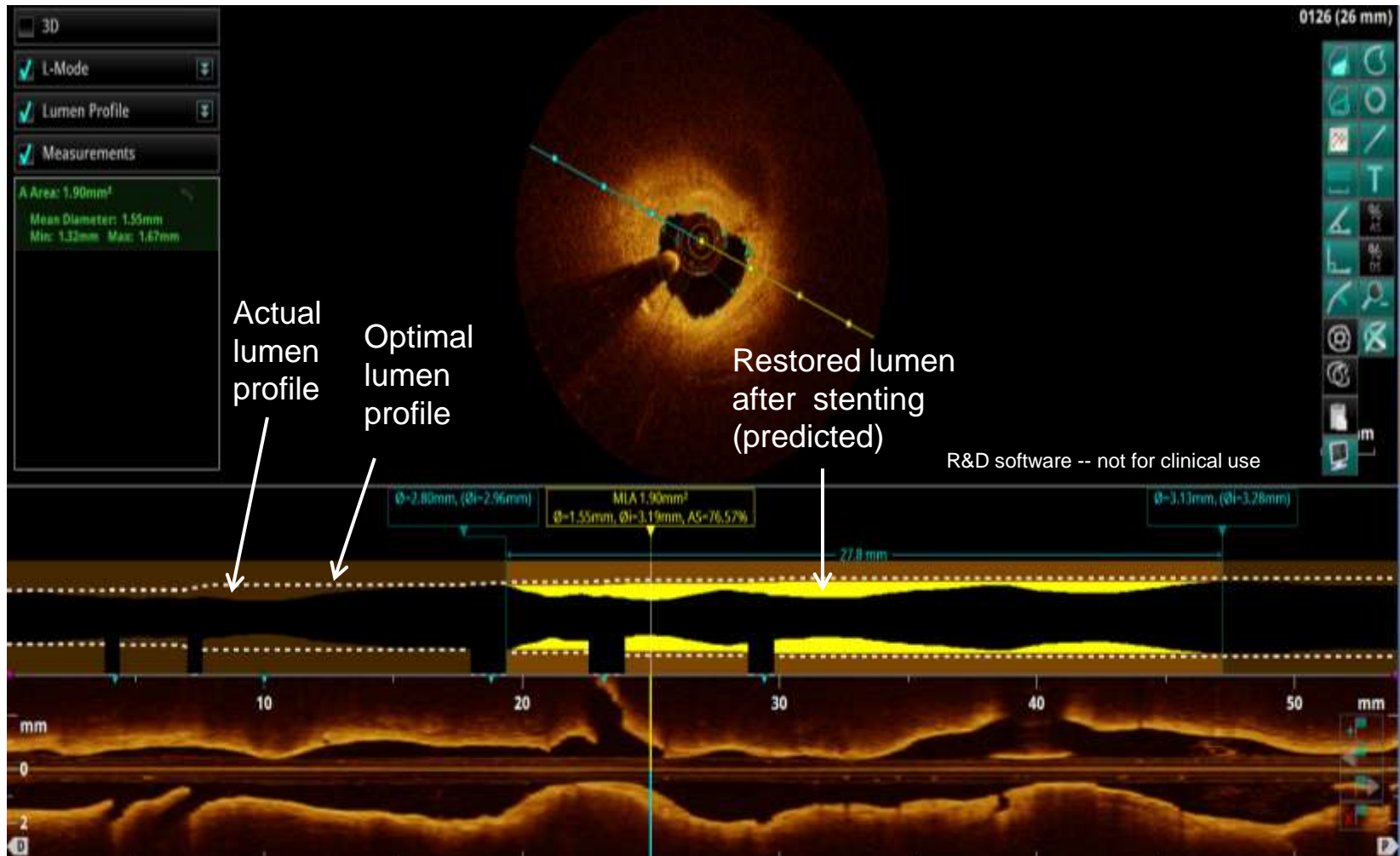
Angiographic co-registration



- Vascular features relevant to intervention are identified with OCT and landmarked on angiography image
- Active frame can be scrolled using L-mode cursor or angio cursor

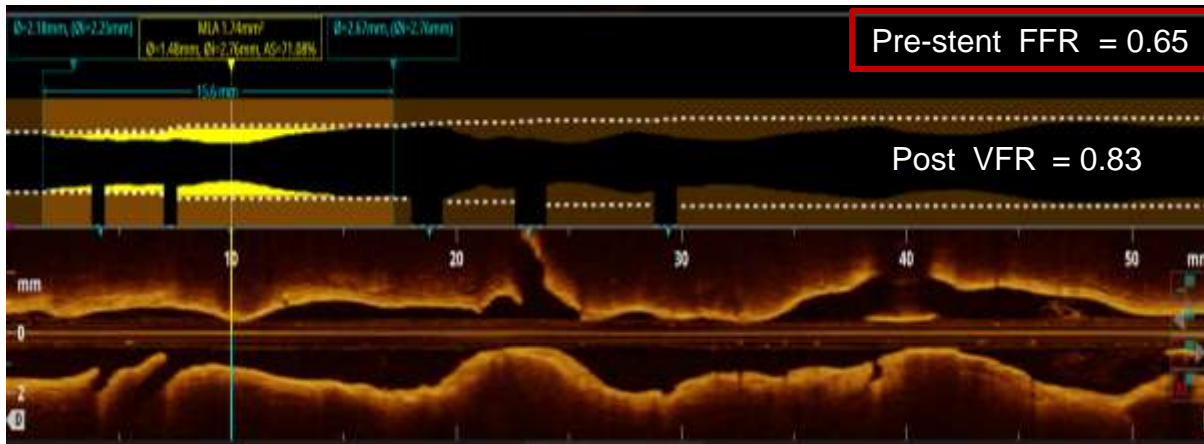


Interactive Stent Planning

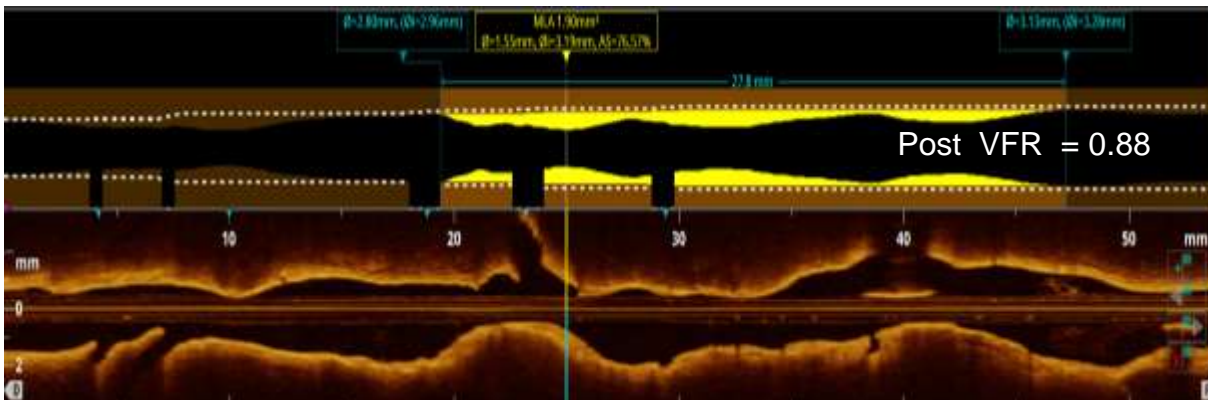


R&D software -- not for clinical use

Application of VRR principles: 'Virtual Stenting' based on single (pre-stent) FFR measurement



- Computational flow software predicts FFR after stenting of individual lesions,



R&D software -- not for clinical use

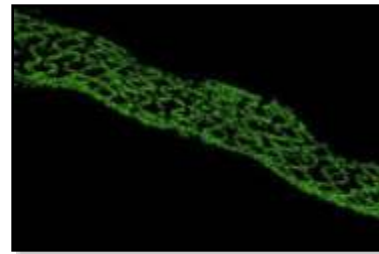
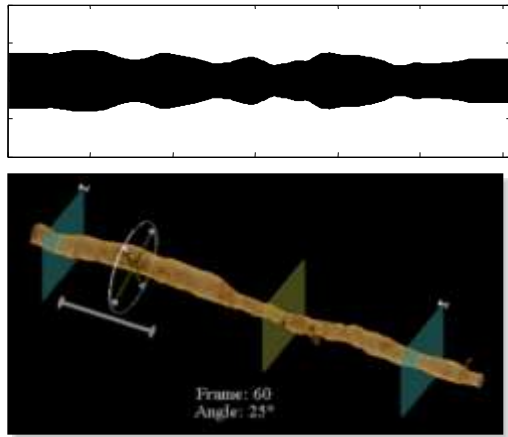


ST. JUDE MEDICAL
MORE CONTROL. LESS RISK.

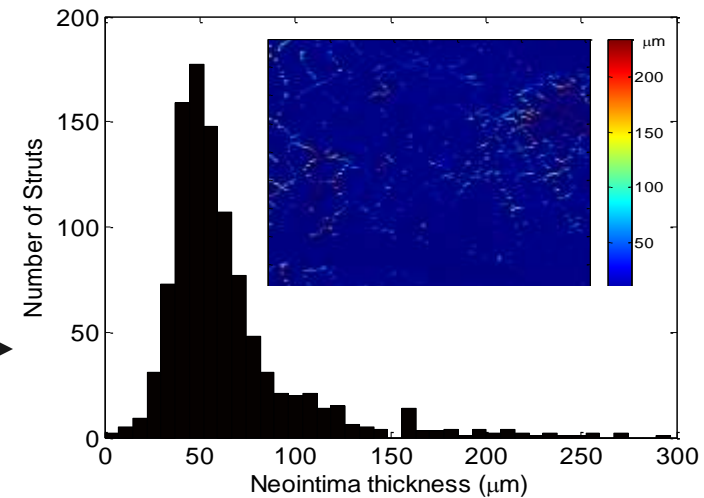
Emerging Volumetric Stent Characterization Tools

Automated Segmentation

Quantitative Metrics



Automatic strut
detection



Malapposition and stent
coverage metrics

- 2D and 3D lumen profiles
- Identification of MLA and reference areas
- Interactive tools for stent planning

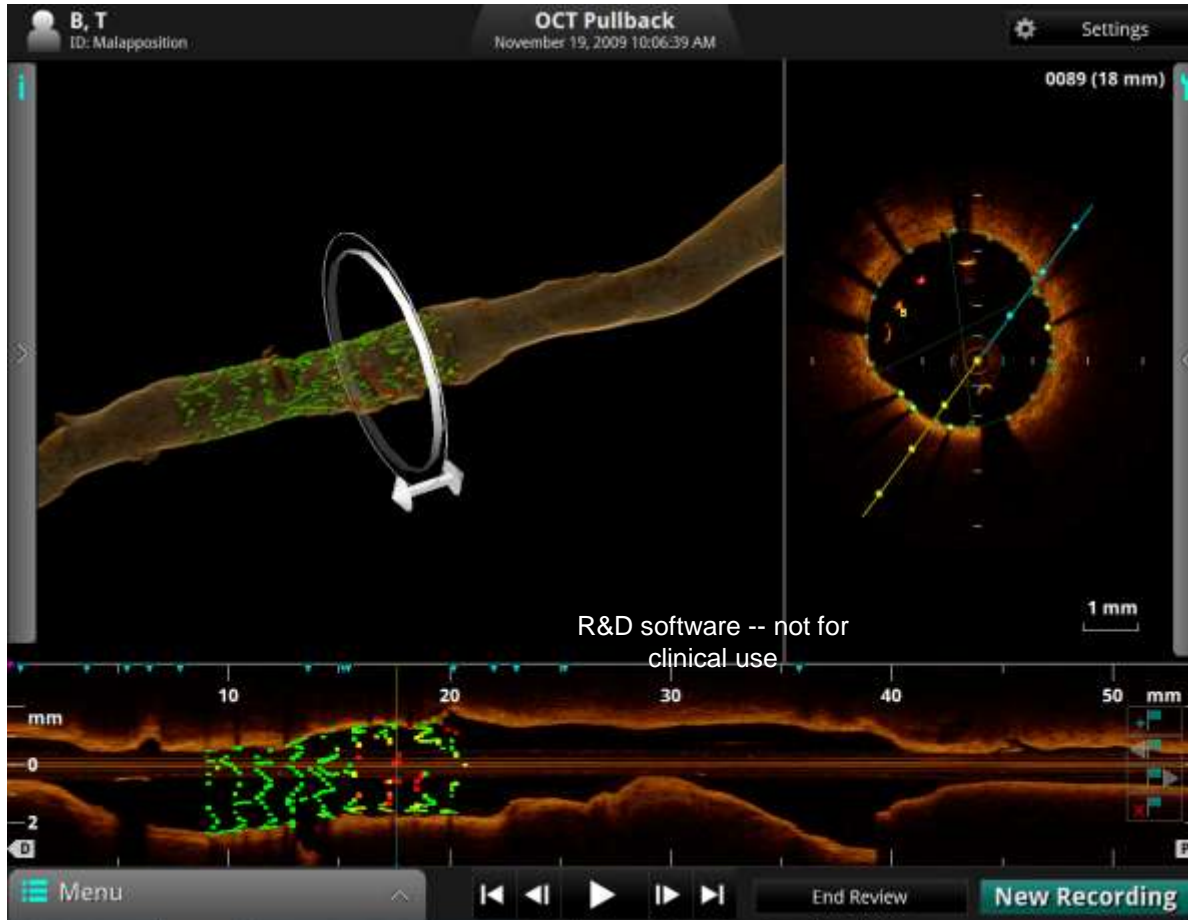


ST. JUDE MEDICAL

MORE CONTROL. LESS RISK.

Automatic Stent Strut Detection

- Highlights regions of stent malapposition



R&D software -- not for clinical use

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OCT Outcome Studies

- Prospective randomized trial
MACE 11% → 9%: 7262 pts (0.8)
9652 pts (0.9)
- Meta analysis
- Registry



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What we need:

Evidence (data)!



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Thank You



MGH history book to come

AS PART OF the MGH's bicentennial celebrations, a commemorative book of hospital history will be published in 2011. "Something in the Ether, A Bicentennial History" was written by author and publisher Webster Bull. Much of the content was the result of countless hours of research of historical records and archival material. The book is available at the MGH General Store and select booksellers.

(Continued on page 2)



THE MGH AND HARVARD MEDICAL SCHOOL CIRCA 1853:
In the 1800s, the Charles River extended to the hospital, allowing patients and supplies to be dropped off at the MGH wharf.



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