



Analysis of changes in decision-making process during
optical coherence tomography-guided percutaneous
coronary interventions:
New Insights from the LightLab Initiative

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on behalf of the LightLab Initiative Investigators.*



Why this study?

Optical coherence tomography imaging during percutaneous coronary intervention impacts physician decision-making: ILUMIEN I study

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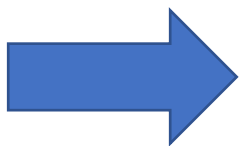
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See page 3356 for the editorial comment on this article (doi:10.1093/eurheartj/ehv433)

Conclusion

Physician decision-making was affected by

OCT imaging prior to PCI in 57% and post-PCI in 27% of all cases.



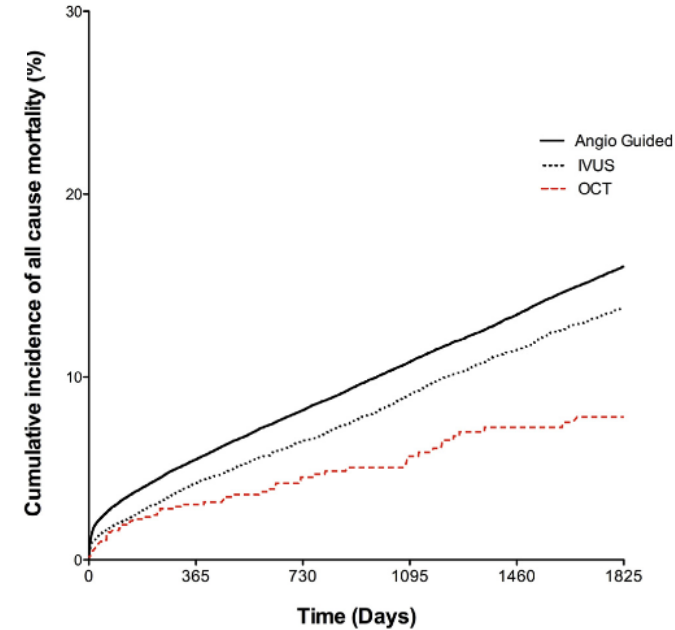
- Use of intracoronary imaging during PCI affects physician decision-making and is associated with reduced mortality
- Barriers to uptake include perceived lack of benefit and adverse impacts on workflow
- The LightLab Initiative was set up to assess the utility of implementing OCT into PCI workflow
- The study was designed and sponsored by Abbott

CORONARY

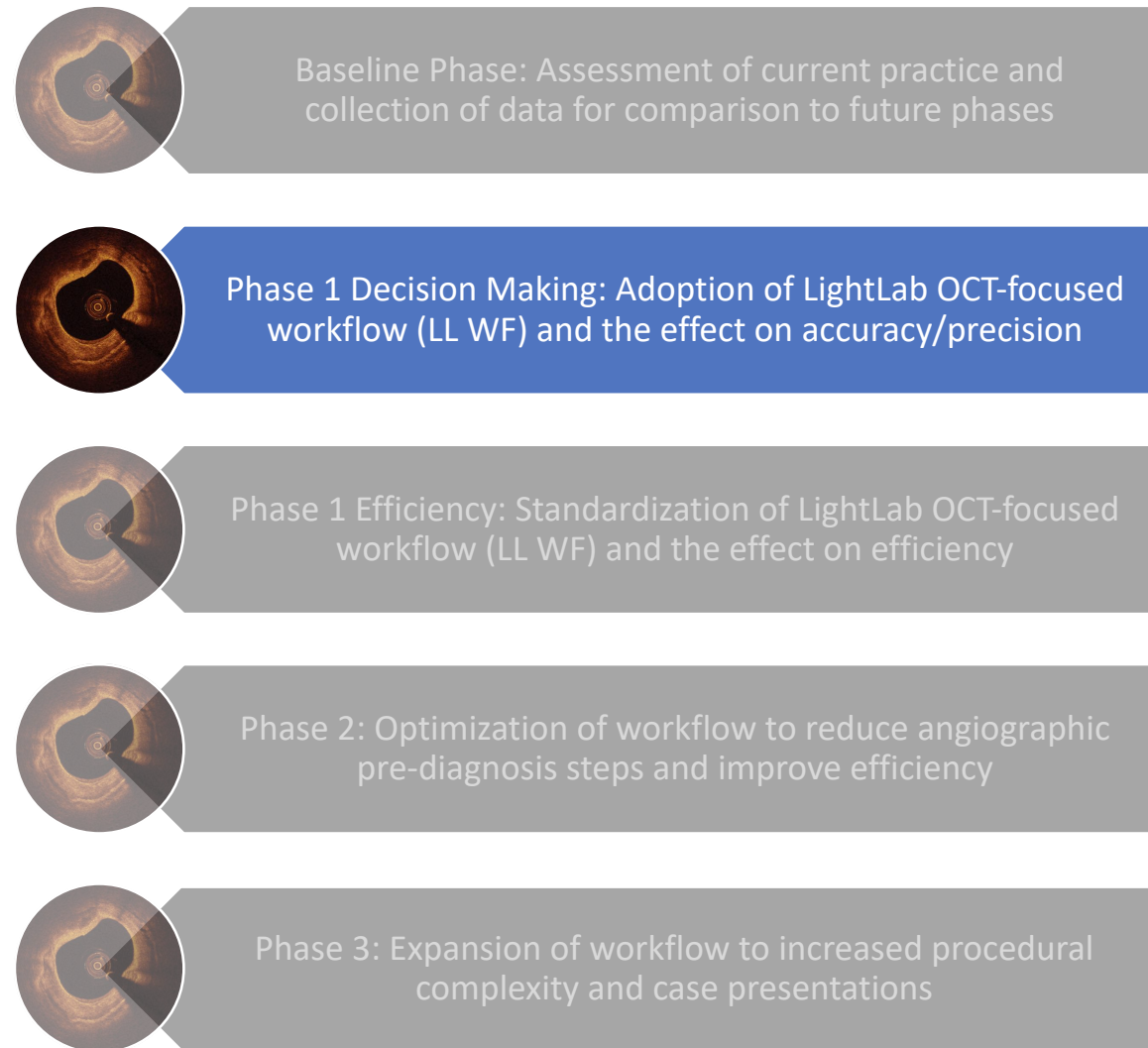
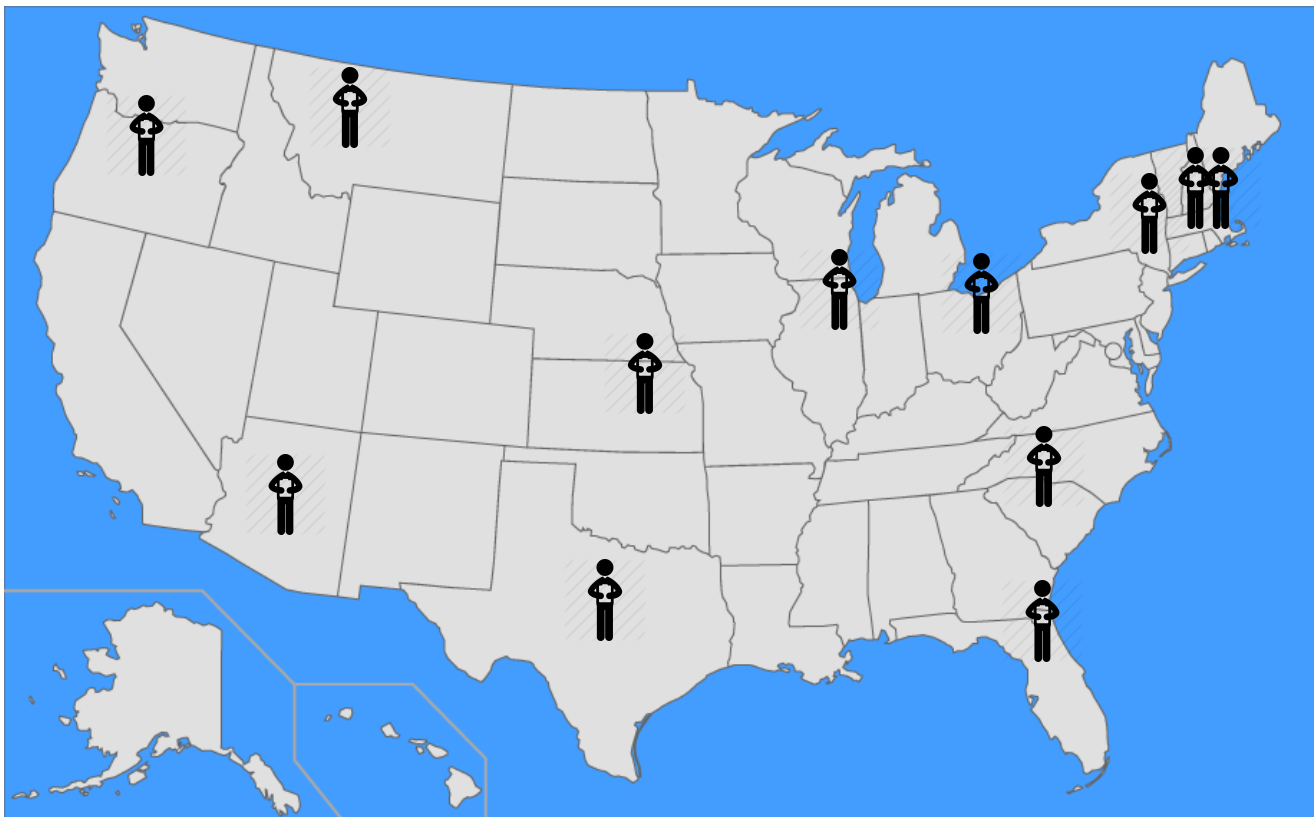
Angiography Alone Versus Angiography Plus Optical Coherence Tomography to Guide Percutaneous Coronary Intervention Outcomes From the Pan-London PCI Cohort

Daniel A. Jones, MD, PhD,^a Krishnaraj S. Rathod, MD,^a Sudheer Koganti, MD,^a Stephen Hamshere, MD,^b Zoe Astroulakis, MD, PhD,^c Pitt Lim, MD,^c Alexander Sirker, MD, PhD,^c Constantinos O'Mahony, MD,^a Ajay K. Jain, MD,^a Charles J. Knight, MD,^a Miles C. Dalby, MD,^d Iqbal S. Malik, MBBS, PhD,^b Anthony Mathur, MD, PhD,^a Roby Rakhit, MD,^e Tim Lockie, MBBCh, PhD,^e Simon Redwood, MD,^f Philip A. MacCarthy, MBBCh, PhD,^g Ranil Desilva, MD, PhD,^g Roshan Weerackody, MD, PhD,^g Andrew Wragg, MD, PhD,^h Elliot J. Smith, MD,^h Christos V. Bourantas, MD, PhD^h

CONCLUSIONS In this large observational study, OCT-guided PCI was associated with improved procedural outcomes, in-hospital events, and long-term survival compared with standard angiography-guided PCI. (J Am Coll Cardiol Intv 2018;11:1313–21)



What did Abbott study?

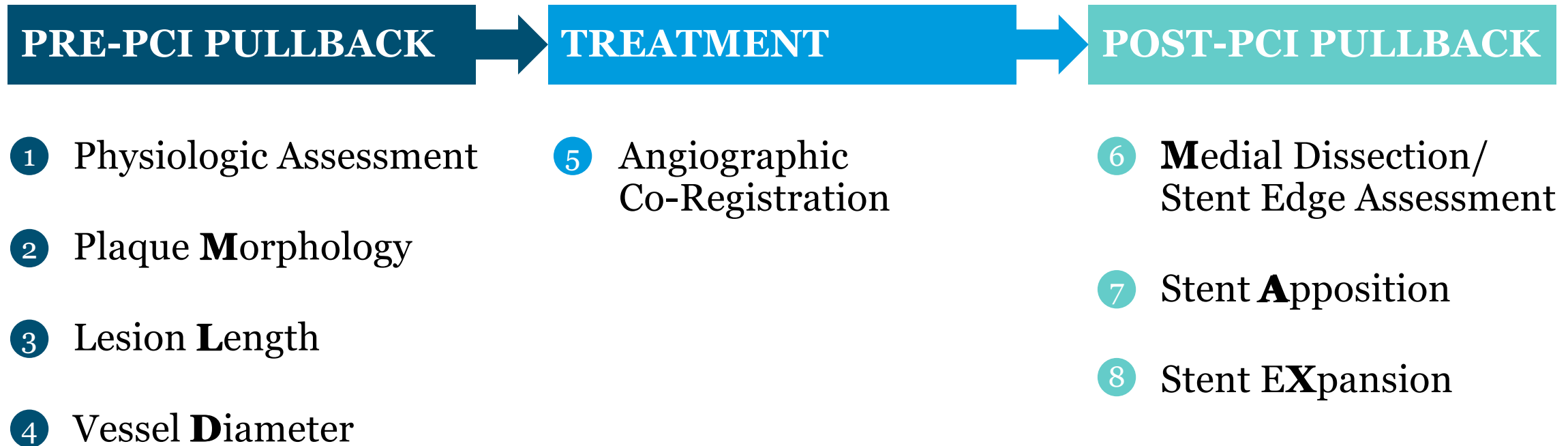


The LightLab Initiative:

- 12 US centers with ongoing prospective PCI procedural data collection by trained & embedded Field Clinical Engineer
- Multiphase program to examine role & impact of OCT use

The LightLab Workflow

Prescriptive utilization of the full range of information from OCT pre PCI and post PCI to guide treatment decisions



How was the study executed?

Who? Study population

- All PCIs by participating physicians potentially eligible
- Decision on the part of physician whether each PCI was clinically appropriate for OCT and for LightLab inclusion

What? Treatment decision-making

- Lesion morphology, number
- Vessel preparation strategy
- Stent diameter & length
- Vessel optimization/post-dilation strategy

How? Prospective data collection

- Recorded on study proforma

DECISION MAKING FORM Abbott

PROCEDURE PREP | DIAGNOSIS | TREATMENT | POST PROCEDURE

LESION 1 ANGIOGRAPHY OCT

LESION ASSESSMENT

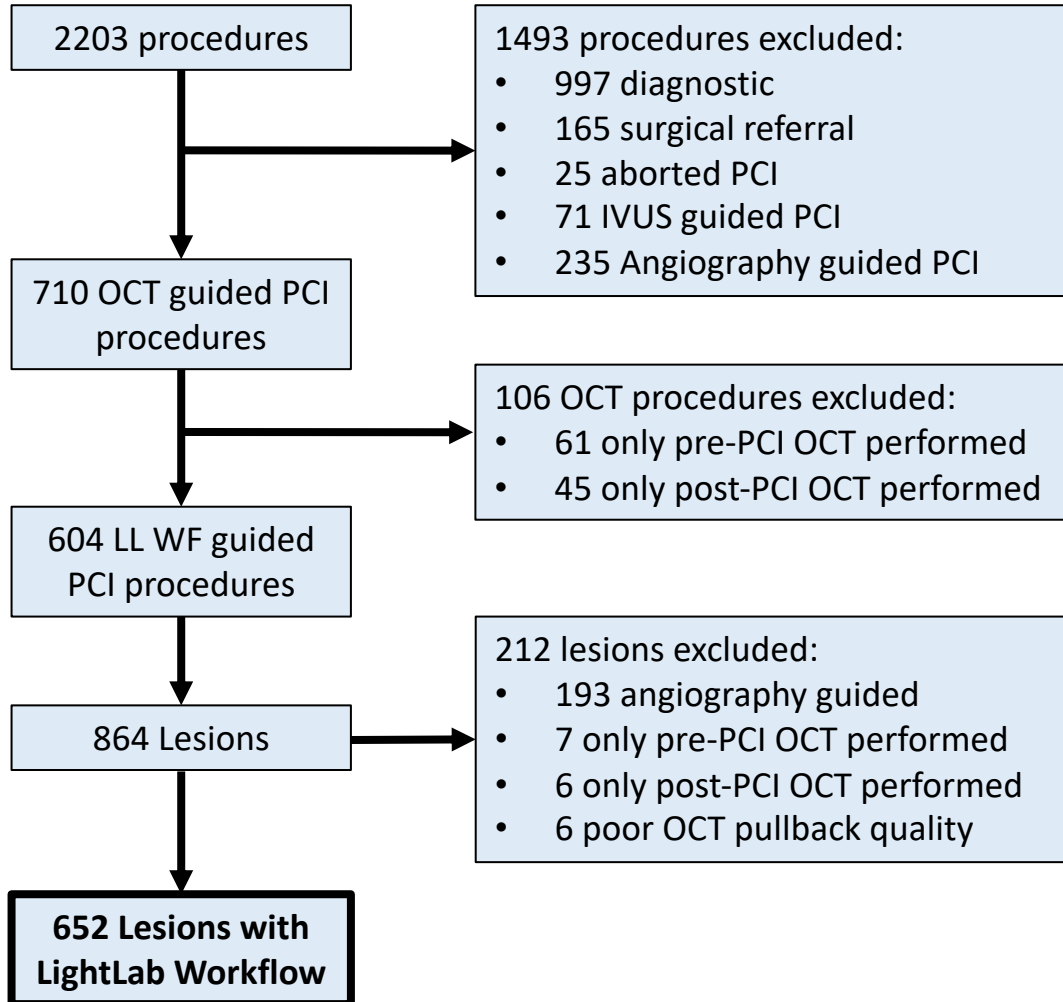
Impact of tomography:	Lesion Type	A						A
• Lesion Size	Morphology	• Smooth contour			• Nonangulated segment <45° • Readily accessible			
	Lesion Size	<i>Distal RVD</i>	<i>Proximal RVD</i>	<i>Length</i>	<i>Distal RVD</i>	<i>Proximal RVD</i>	<i>Length</i>	
		1.5	2	9	2.25	2	17	

TREATMENT PLAN

Impact of tomography:	Intention to Treat	Yes - treat now						Yes - treat now	
• Vessel Preparation	Vessel Preparation	None						Non-Compliant Balloon	
• Treatment	Treatment	N/A						Stent	
• Stent Size	Number of Stents	1							1
	Stent Size	2.25 x 17							2.25 x 23

Study Population

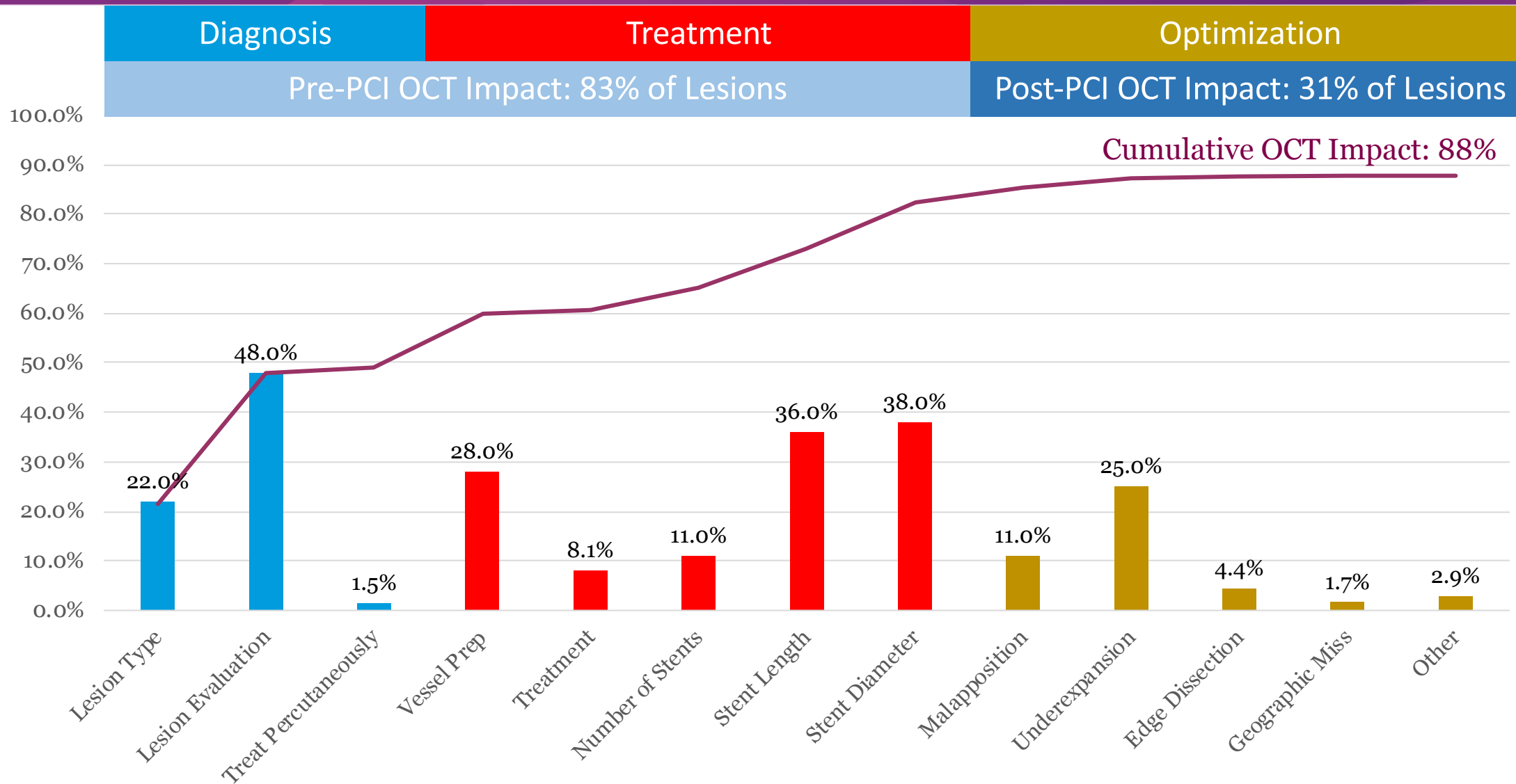
A total of 2203 procedures were assessed in this phase of the LL program (March 6, 2019 – March 12, 2020)



LightLab Workflow Procedures (n=604)	
Planned/staged procedures	181/604 (30%)
Access Site:	
Radial	357/573 (62%)
Femoral	210/573 (37%)
Radial & Femoral	6/573 (1%)
Mechanical Support	9/604 (2%)
Multivessel	63/604 (10%)
STEMI	33/604 (6%)

LightLab Workflow Lesions (n=652)	
Left Main	20/642 (3%)
RCA	188/642 (29%)
LAD	310/642 (48%)
CX	100/642 (16%)
Ramus	14/642 (2%)
Vein Graft	10/642 (2%)
Lesion Type:	
A	34/650 (5%)
B	258/650 (40%)
C	358/650 (55%)
In-stent Restenosis	115/651 (18%)
Long Lesions (OCT Lesion length ≥ 28 mm)	286/652 (44%)
Chronic Total Occlusions	21/652 (3%)
Bifurcations	66/648 (10%)
Ostial Lesions	30/652 (5%)

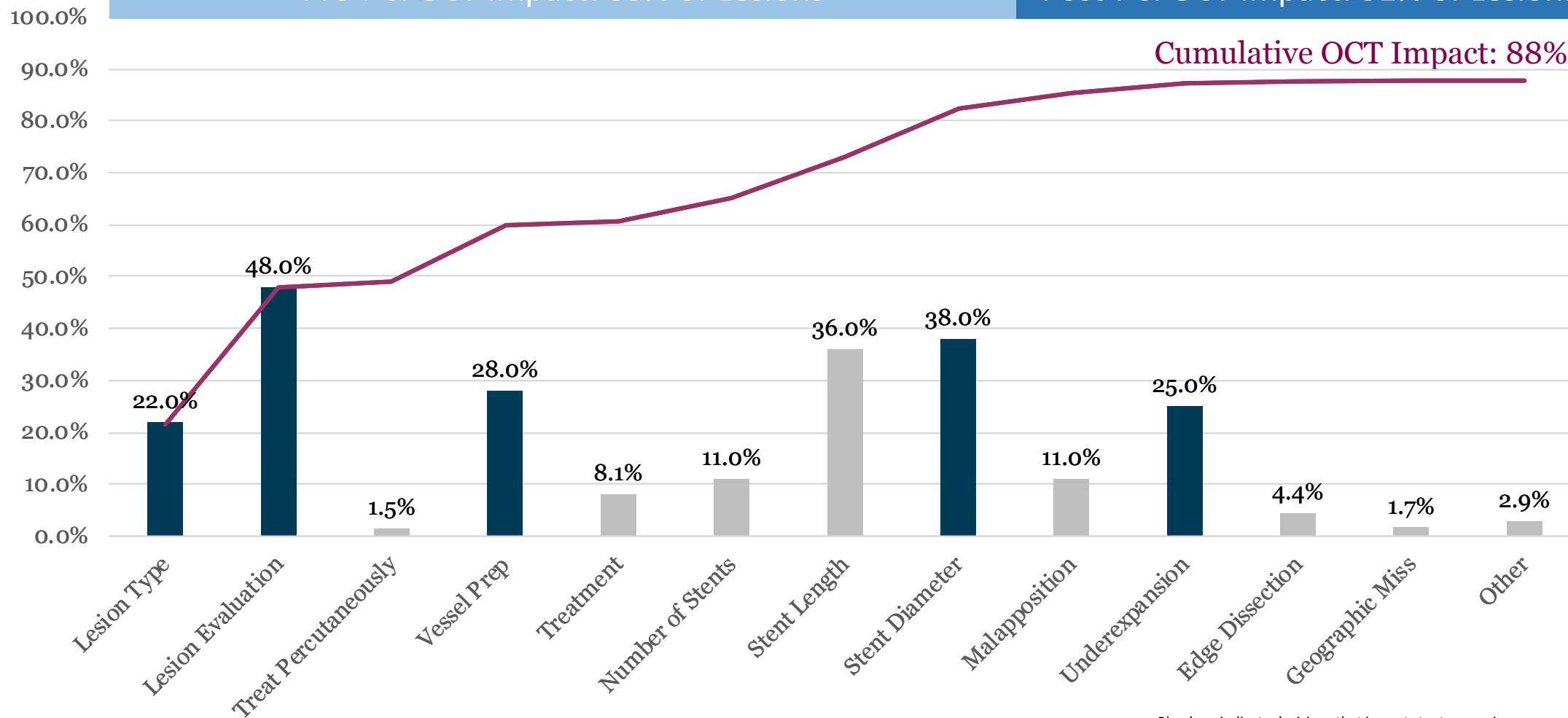
OCT changes angiographic-based decisions in 88% of lesions



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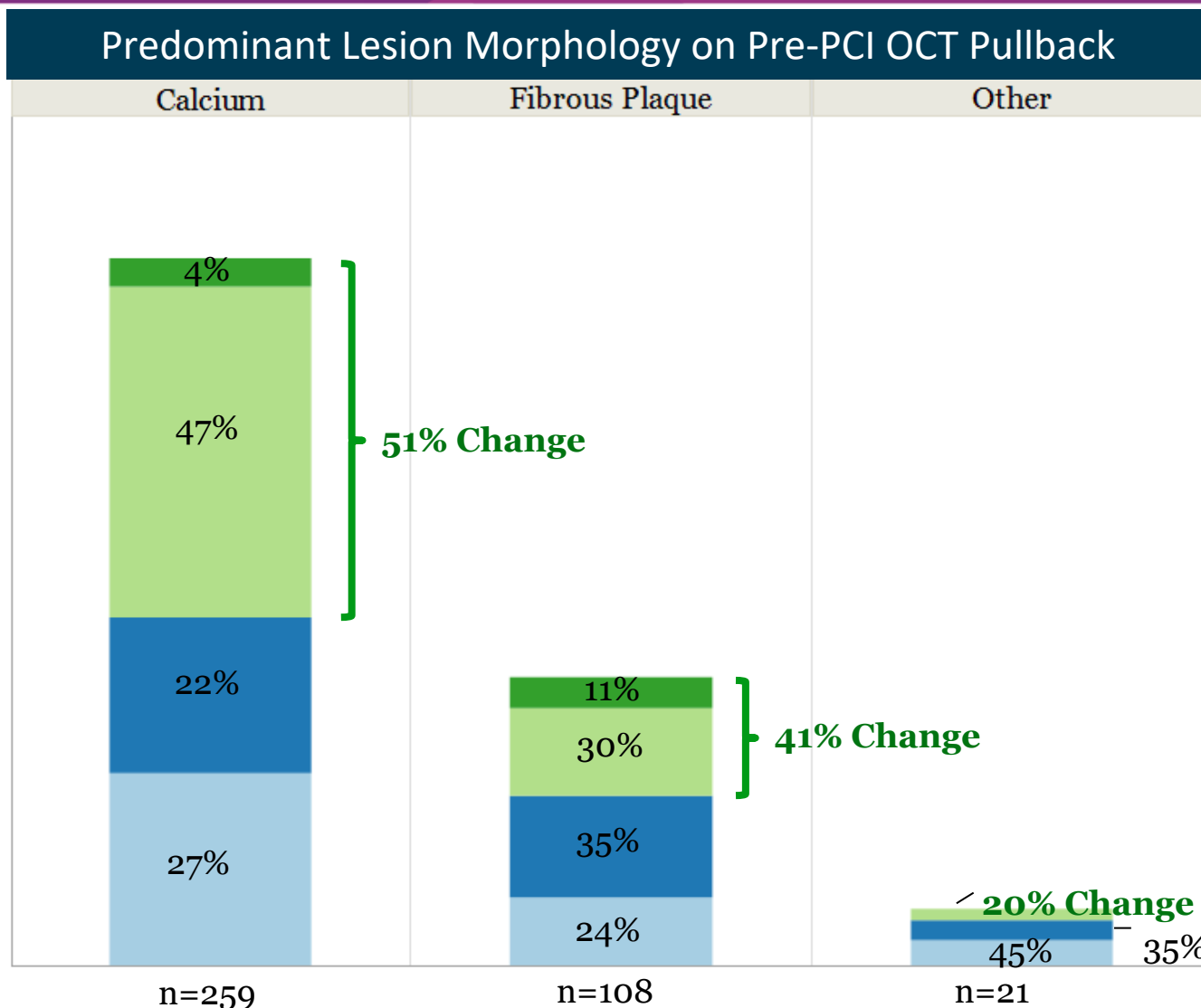
OCT changes angiographic-based decisions in 88% of lesions

Lesion assessment and treatment decisions that impact final stent expansion
 Pre-PCI OCT Impact: 83% of Lesions Post-PCI OCT Impact: 31% of Lesions



Blue bars indicate decisions that impact stent expansion

Inaccurate diagnosis of Calcium severity drives changes in vessel preparation strategy



Vessel Prep Change Type

- No Change in Device
- No vessel prep and no change
- Change in Device
- Change to no vessel prep

Calcified Lesions

Vessel preparation methods performed in 47% with device change:

- 49% Pre-dilatation with compliant or non-compliant balloons
- 26% Pre-dilatation with cutting or scoring balloons
- 25% Atherectomy or laser

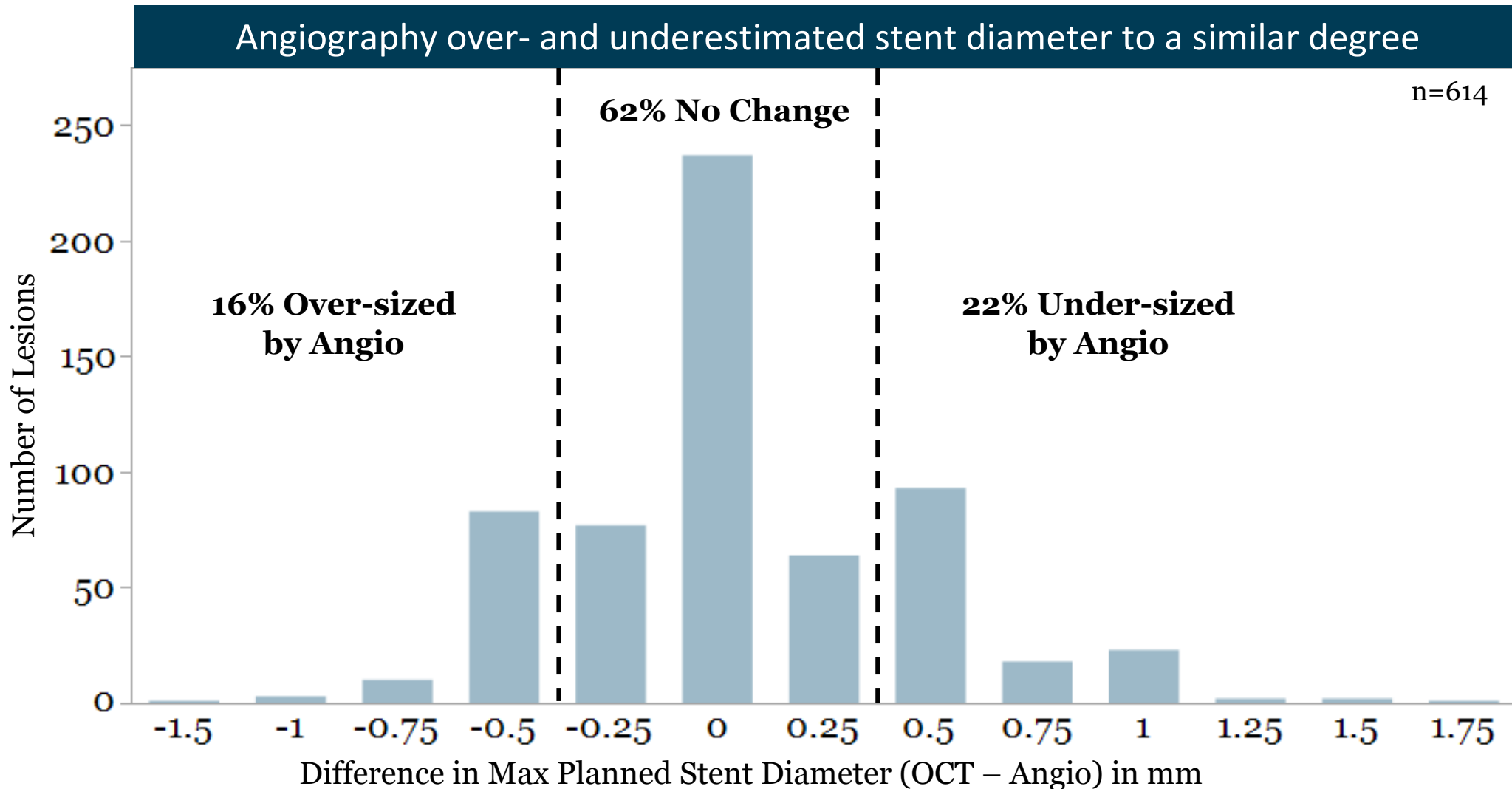
Vessel preparation methods performed in 27% without device change:

- 88% Pre-dilatation with compliant or non-compliant balloons
- 2% Pre-dilatation with cutting or scoring balloons
- 10% Atherectomy or laser

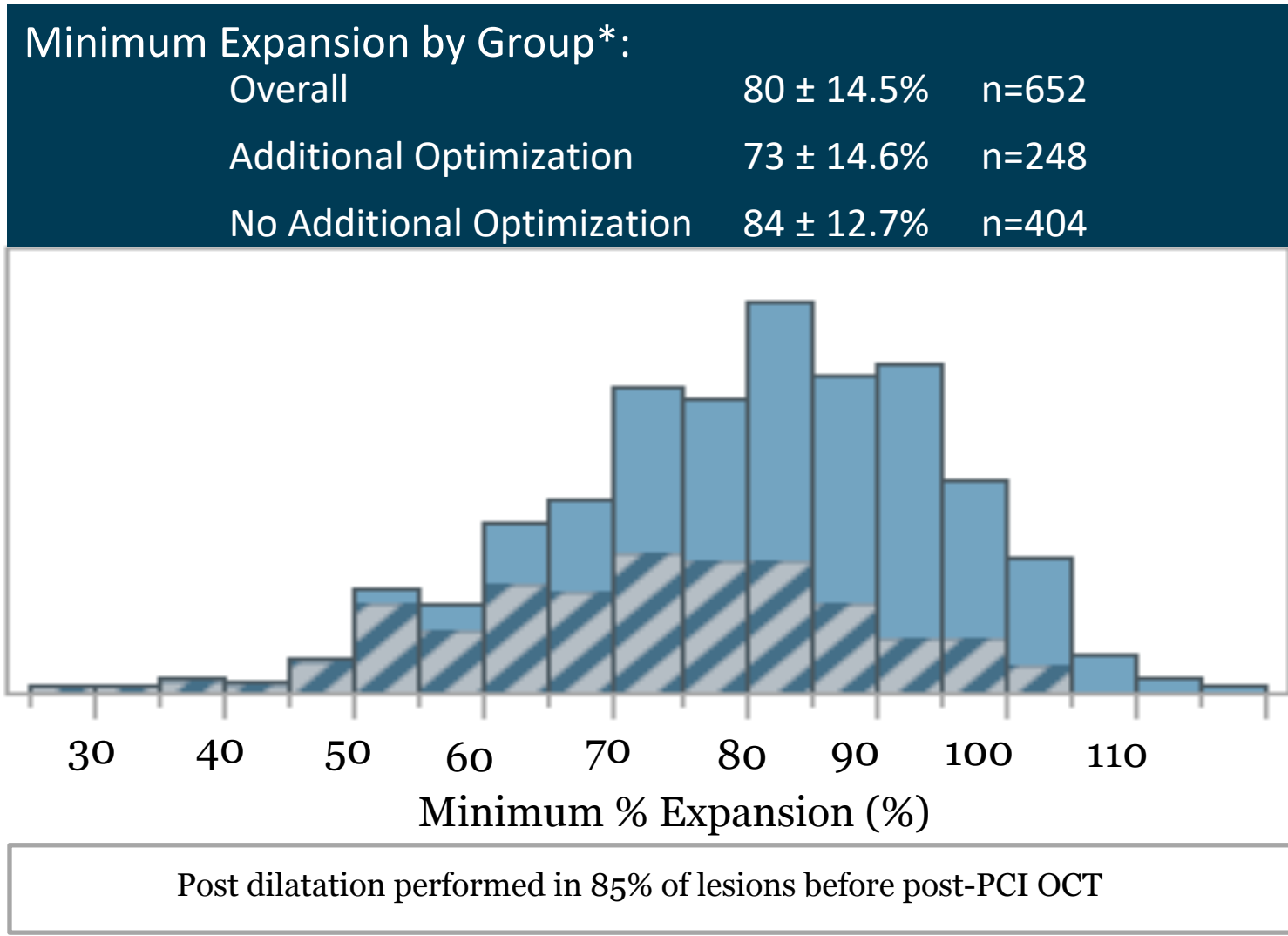
Note: Excludes n=257 lesions where vessel prep was performed before pre-PCI OCT



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Angiographic guidance lead to inaccurate stent diameter in 38% of stented lesions



Ability to detect stent underexpansion enables targeted optimization



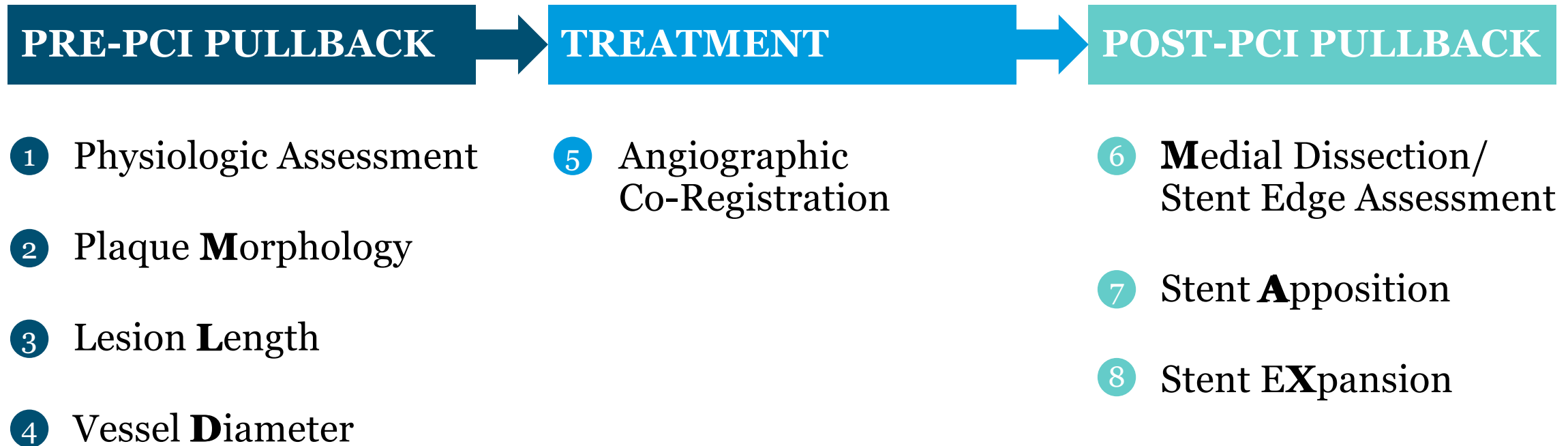
-  Additional optimization performed after post-PCI OCT
-  No additional optimization performed after post-PCI OCT

- Population of lesions that followed the LightLab guided workflow achieved 80% minimum stent expansion on average**
- Physicians performed targeted optimization in subset of lesions (38%) based on post-PCI OCT assessment**

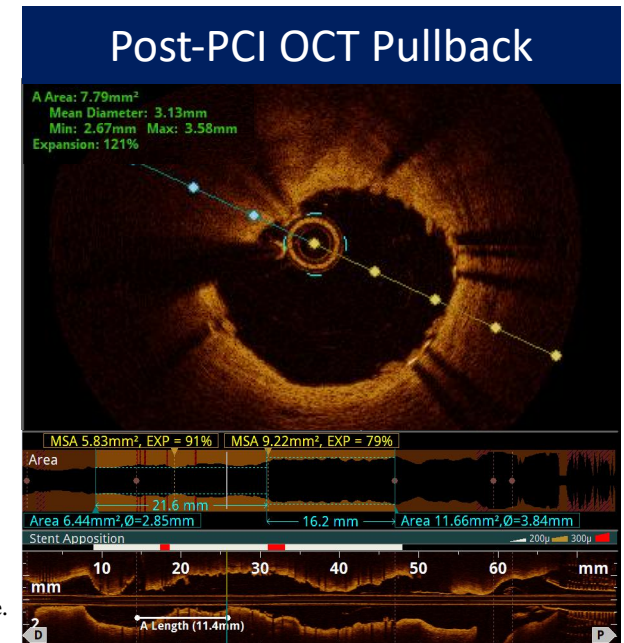
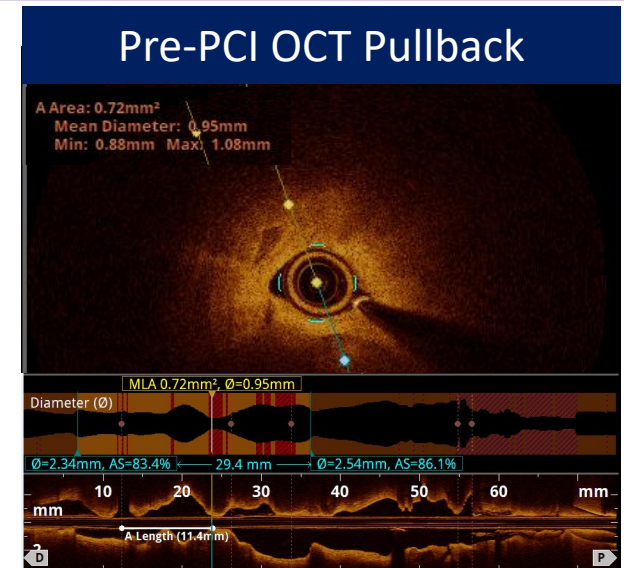
*Note: 80% is the mean expansion for the entire population. 84% is for the sub-group where no additional optimization was performed and represents the final expansion for the procedure. 73% is the sub-group where additional optimization was performed without a final OCT

The LightLab Workflow

Prescriptive utilization of the full range of information from OCT pre PCI and post PCI to guide treatment decisions



- OCT guidance impacted decision-making in 88% PCI cases in this prospective dataset
- The majority of changes occurred during diagnosis/planning & on treatment strategy derived from pre-PCI OCT pullback (83%):
 - Accurate classification of angiographically-underestimated lesions (eg Ca²⁺)
 - Additional/altered vessel preparation strategy
 - Correct vessel sizing leading to changes in planned stent diameter & length
- The population of lesions treated that followed LightLab-guided workflow achieved 80% stent expansion on average
- The unprecedented granularity of the volume of collected procedural data in this real-world cohort demonstrates a clear and important impact of OCT on lesion assessment, procedural planning and stent optimization



OCT images courtesy of Dr. Croce.



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