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IVUS and Tissue Characterization

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- 1. Why do we need tissue characterization for coronary plaque?
- 2. How can we get tissue characterization?
- 3. What can we do using tissue characterization in cath lab?



- KCT, M/63
- Chest pain on exertion, stated 1 month ago and aggravated during last 2 weeks
- CV rick factors:
 - HTN for 10 years
 - FHx: elder brother-AMI on his late 40's
- Cardiac enzymes: within normal range
- ECG: no ST/T change
- Echo: EF 65% without RWMA

Baseline coronary angiogram

internet and a second second



Baseline coronary angiogram

a real contractor and the







LAD







Diagonal











Comparison VH-IVUS vs. iMAP Pre LAD

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iMap[™] Algorithm Tissue Type Definitions vs. VH



Calcified

Focal Area of dense calcium Appears Purpl e on Movat. Usually falls out section. But ca lcium crystals are evident at borders

Fibrotic

Density packed bundles of collagen fibers with no evidence of intra fiber lipid Accumulation. No evidence of macrophage infiltration Appears dark yellow on Movat st ained section.

Fibro-Fatty

Loosely packed bundles of collagen fibers with regions of lipid deposition present. These areas are cellular and no cholesterol clots or necrosis are present. Some macrop hage infiltration. Increase in extra caller mat rix. Appears turquoise on Movat stained sec tion.

Necrotic

Highly lipidic necrotic region with remnants of form cells and dead lymphocytes present

No collagen fibers are visible and mechanic al indignity is poor cholesterol clots and mi cro calcifications are visible

Comparison VH-IVUS vs. iMAP





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	Area mm2	Percentage	Confidence
Fibrotic	0,05	43%	76%
Lipidic	0,01	6%	57%
Necrotic	0,06	48%	89%
Calcified	0,00	0%	77%

Comparison VH-IVUS vs. iMAP



	Area mm2	Percentage	Confidence
Fibrotic	0,05	43%	76%
Lipidic	0,01	6%	57%
Necrotic	0,06	48%	89%
Calcified	0,00	0%	77%



Area mm2	Percentage	Confidence
0,05	39%	77%
0,01	6%	57%
0,01	12%	66%
0,00	0%	77%
0,04	35%	
0,01	4%	
	Area mm2 0,05 0,01 0,01 0,00 0,04 0,01	Area mm2 Percentage 0.05 39% 0.01 6% 0.01 12% 0.00 0% 0.04 35% 0.01 4%





Predilatation with Lacrosse 2.5/15mm, 12atm





Promus element 3.5/28mm, 8atm





HP with Lacrosse 3.5/15mm, 20atm

Post IVUS



Diagonal

LAD





Pre LAD



Post LAD

Pre Diagonal



Post Diagonal



- SYS, F/59
- Atypical resting chest pain
- CV rick factors:
 - HTN for 5 years, Dyslipidemia
- Previous PCI:
 - 2 years ago, Cypher 3.5/23 mm at pLAD

Baseline coronary angiogram

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Baseline IVUS













	Area mmz	Percentage	Confidence
Fibrotic	0,06	64%	72%
Lipidic	0,01	8%	56%
Necrotic	0,01	15%	57%
Calcified	0,01	11%	86%



Fibrotic
Lipidic
Necrotic
Calcified
Unknown
Masked

a mm2	Percentage	Confidence
0,05	59%	72%
0,01	7%	56%
0,01	13%	58%
0,01	10%	87%
0,00	0%	
0,01	7%	

Case: Calcified Plaque



Adopted from Ton van der Steen, Thorax center ErasmusMC, EuroPCR2010

Take Home Massages

- Tissue characterization might be helpful to detect vulnerable plaque in coronary arteries.
- Tissue characterization by IVUS is based on ultrasonic radiofrequency data.
- Different tissue characterizations by IVUS present different data. So, we need to have more clinical experience and handle the date with care.

Every body is not same, every plaque is not same!

