Conoscere e Curare il Cuore 2018

VENERDI' 16 MARZO

LO STUDIO CLIMA: INDIVIDUARE IL RISCHIO DI INFARTO CON UN NUOVO SCORE ANATOMICO

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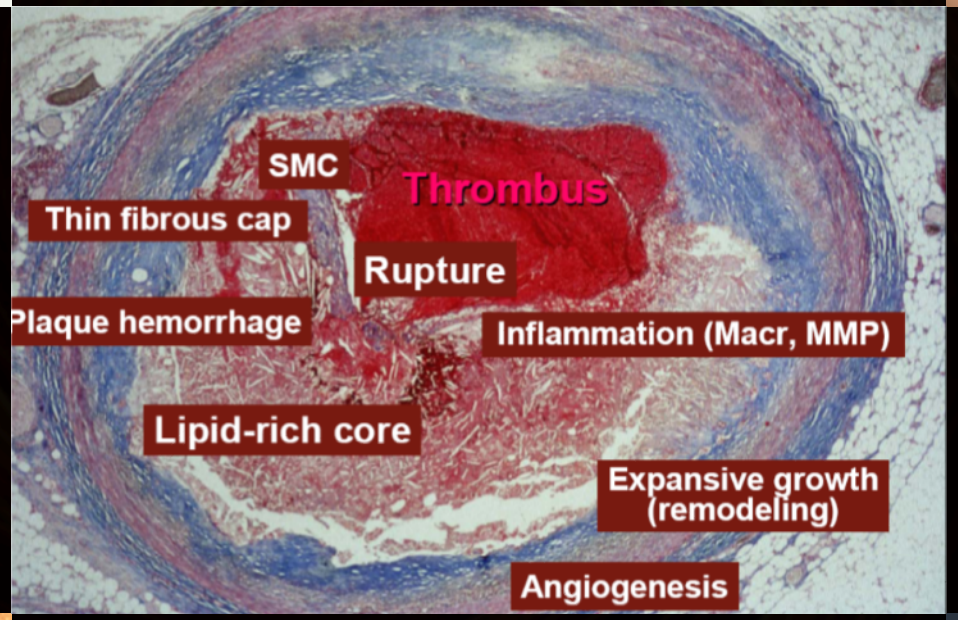

SMC
Thrombus
Thin fibrous cap
Rupture
Plaque hemorrhage
Inflammation (Macr, MMP)
Lipid-rich core
Expansive growth
(remodeling)
Angiogenesis

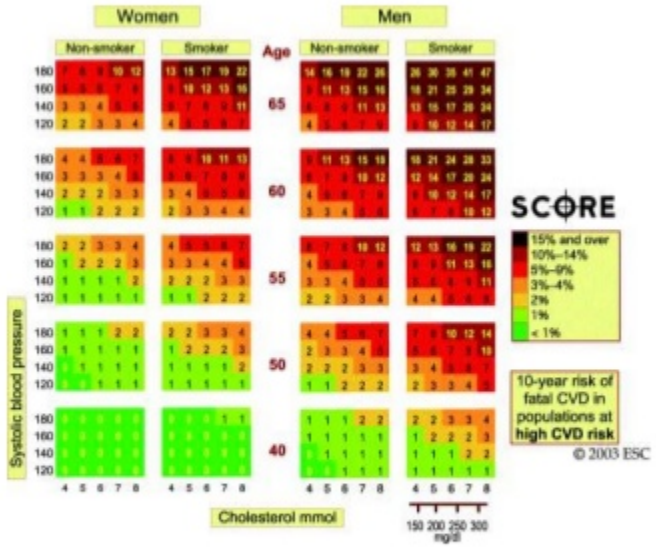

© Getty Images

Cardiovascular risk charts

Framingham Risk Calculator

- Age
- Gender
- Smoker
- Total cholesterol
- HDL-C
- Systolic BP
- HTN Rx

Calculates 10-year risk for CHD death or nonfatal MI

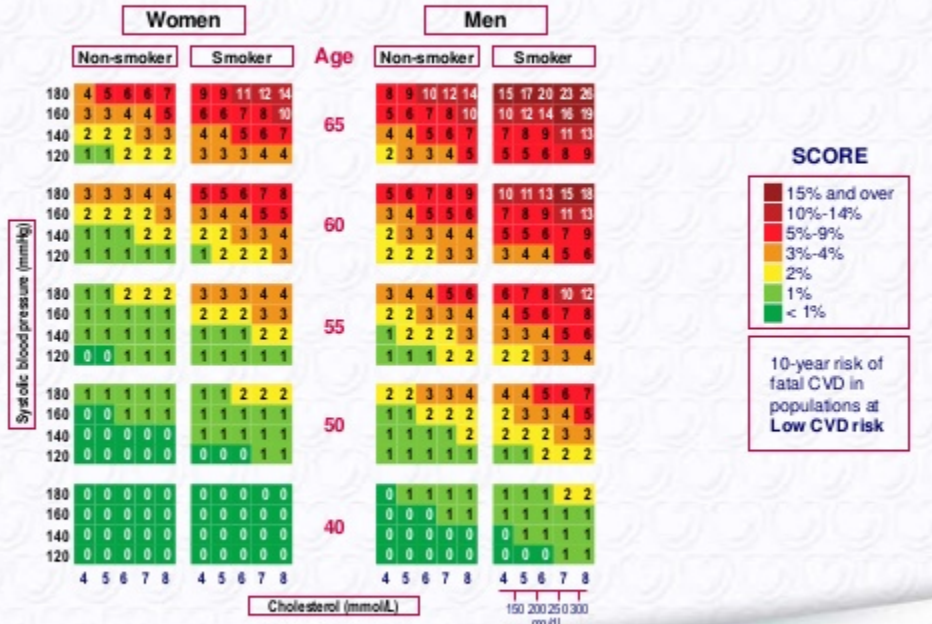


High risk:	> 20%
Intermediate risk:	10-20%
Low risk:	< 10%

Duke Heart Center

https://www.mdcalc.com/framingham-coronary-heart-disease-risk-score

SCORE chart: 10 year risk of fatal cardiovascular disease (CVD) in populations at low CVD risk

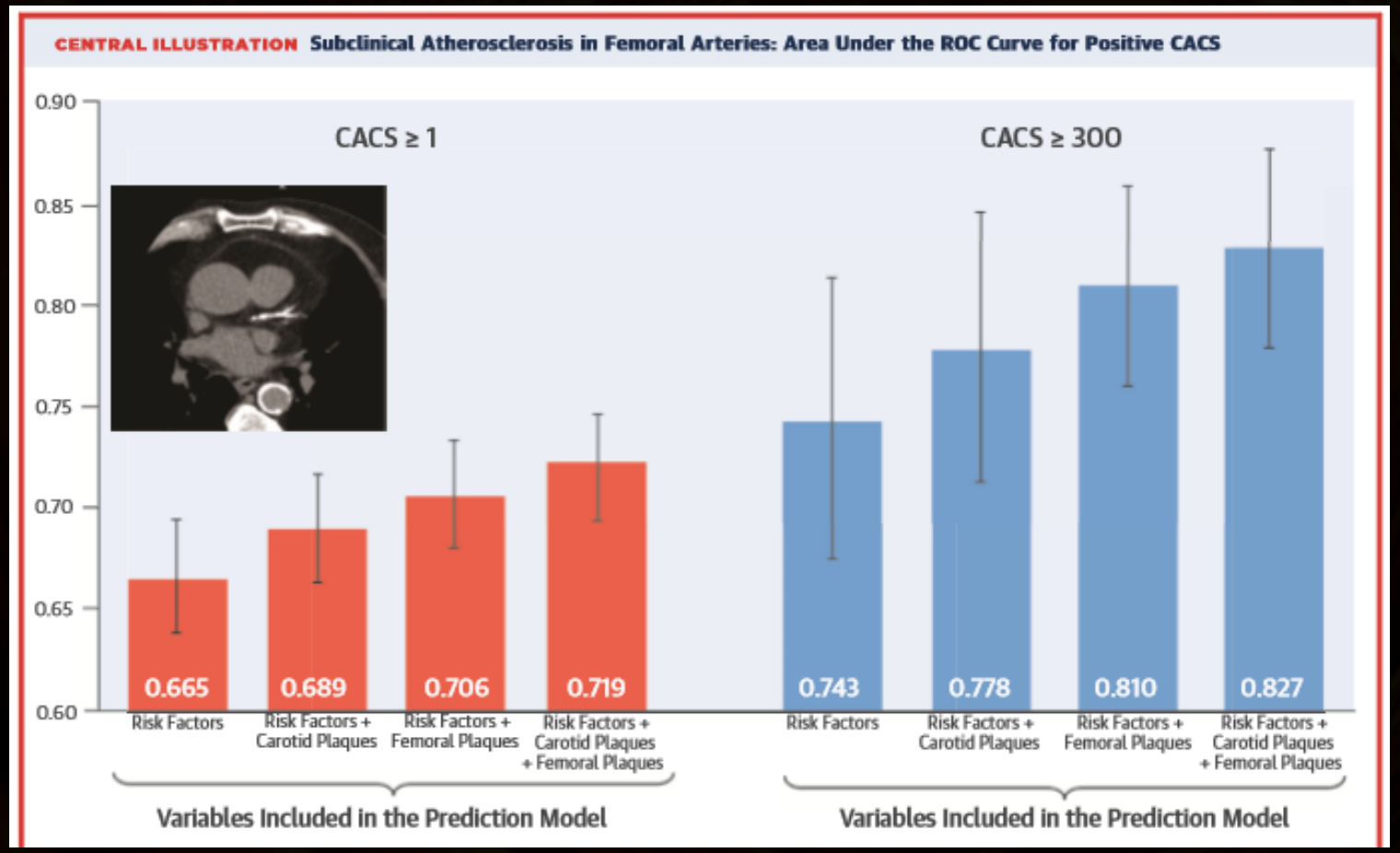


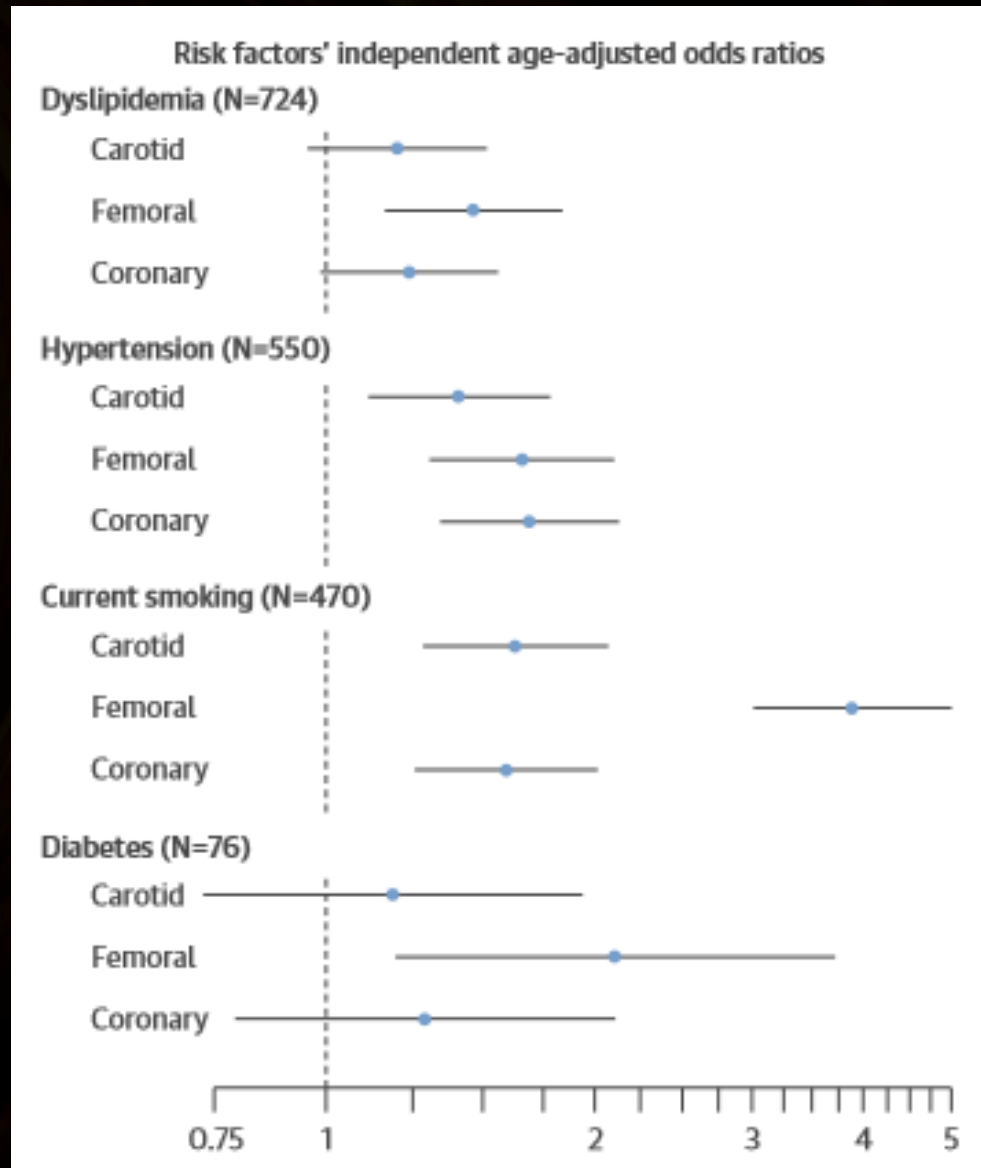
www.escardio.org/guidelines

European Heart Journal (2011) 32, 1769–1818

https://heartscore.escardio.org

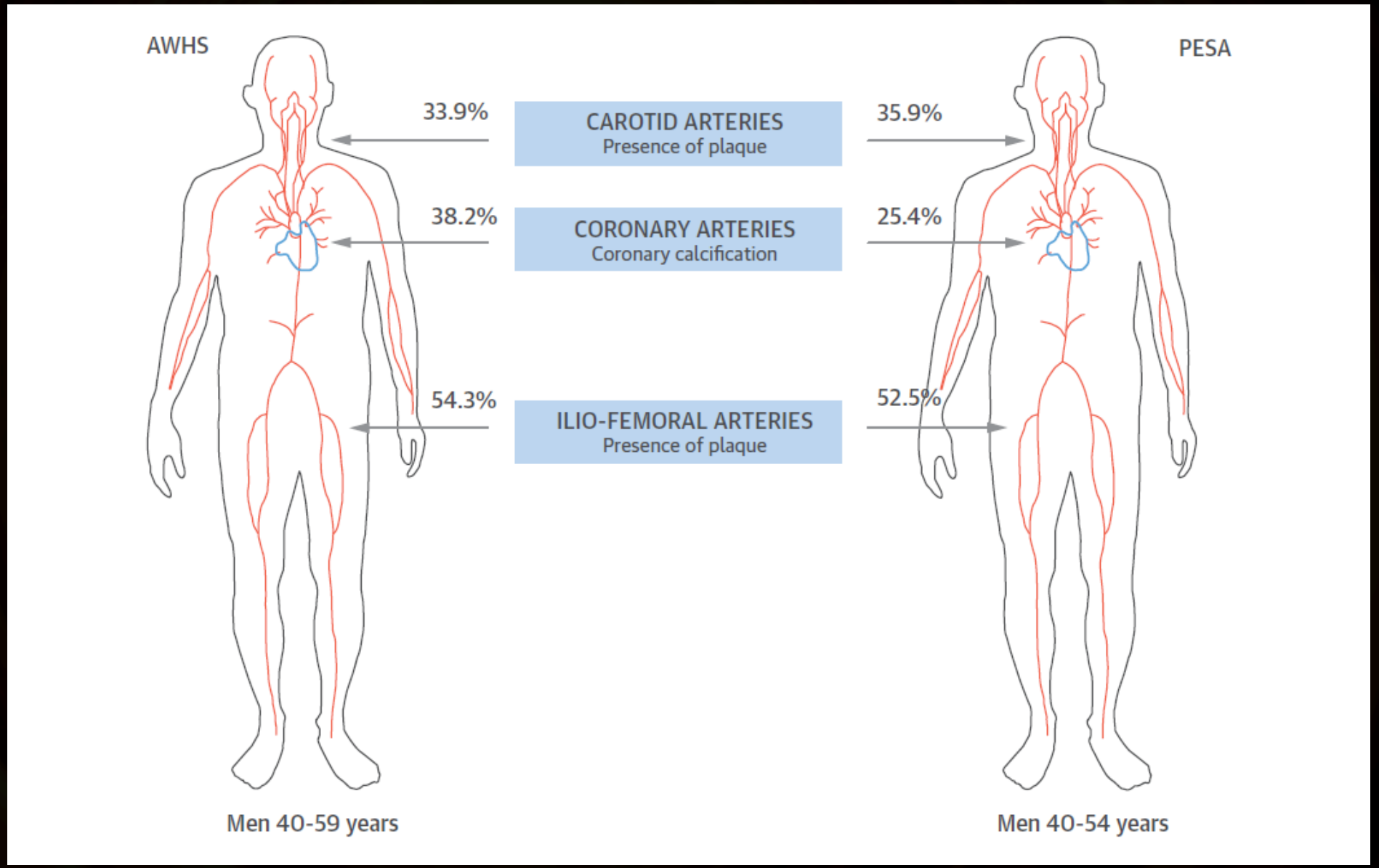
Femoral and subclinical carotid atherosclerosis association with risk factors and coronary calcium. Tha AWHS study





Laclaustra et al. JACC 2016

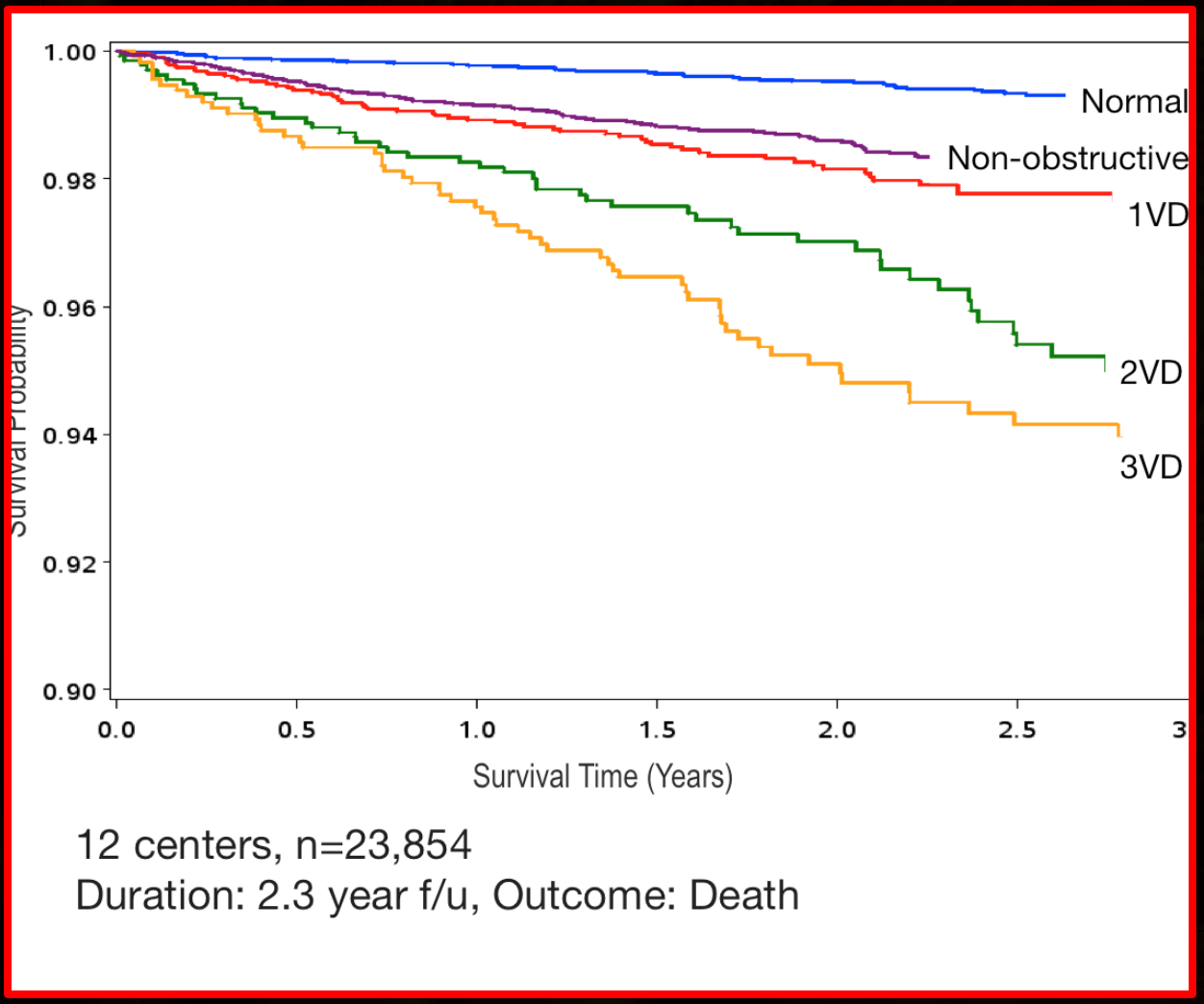
Subclinical atherosclerosis impact



Laclaustra et al. JACC 2016

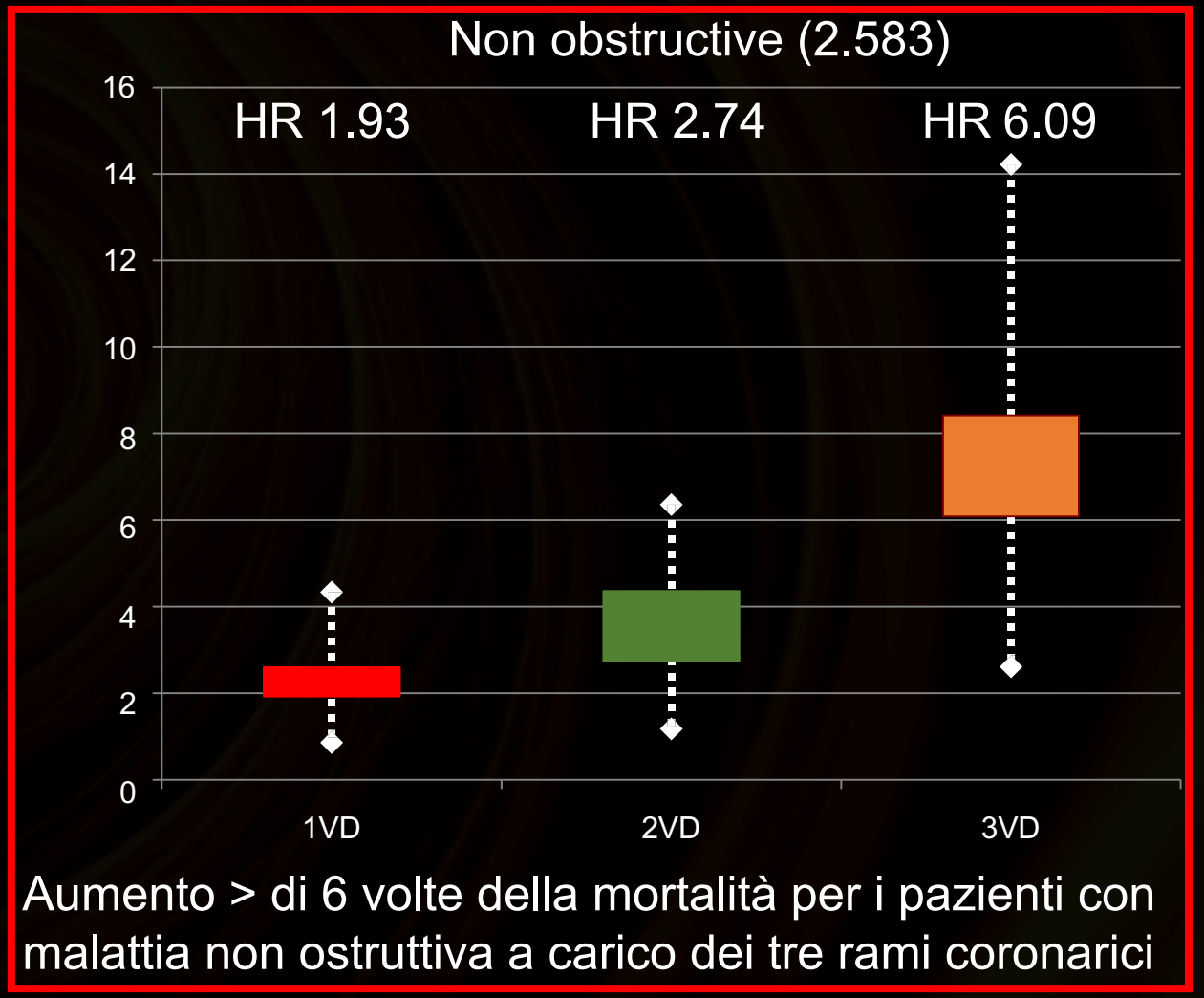
Can TC discriminates plaque vulnerability?

Role of coronary TC in identification of high risk plaques



12 centers, n=23,854
Duration: 2.3 year f/u, Outcome: Death

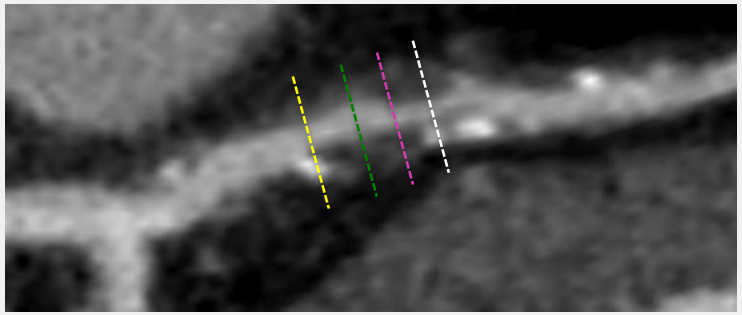
Min JK et al. J Am Coll Cardiol 2011

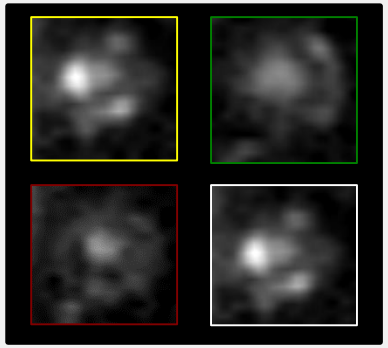


Aumento > di 6 volte della mortalità per i pazienti con malattia non ostruttiva a carico dei tre rami coronarici

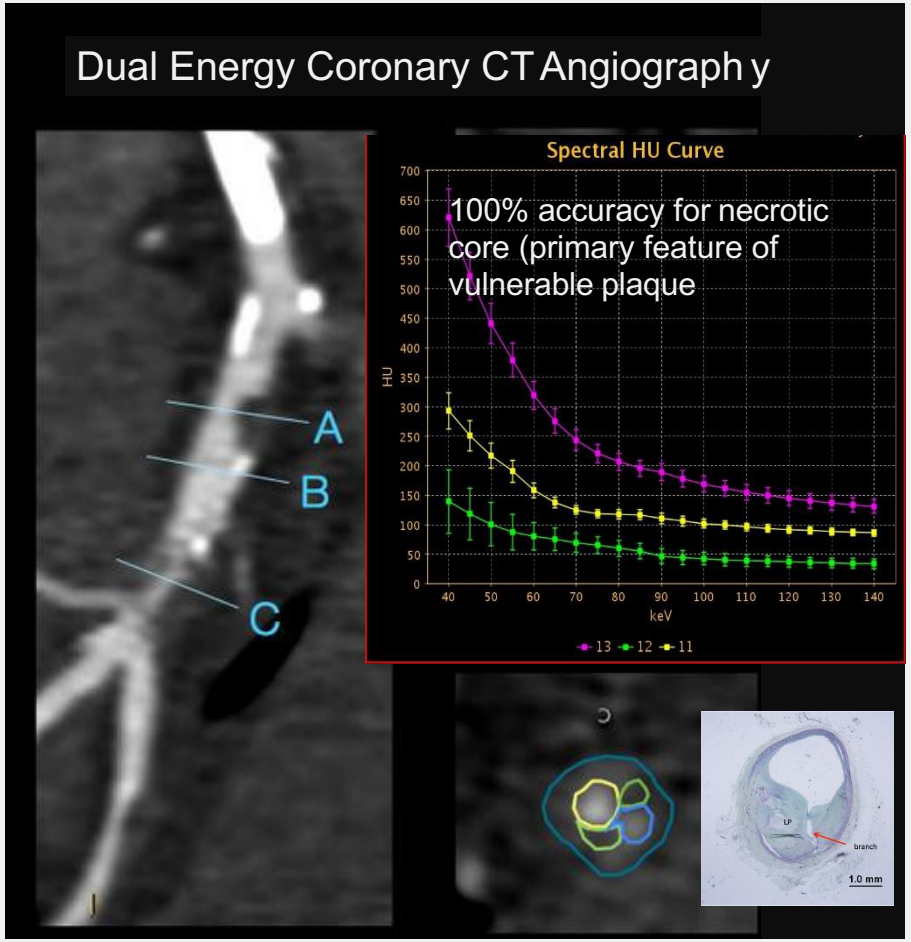
Lin FY et al. J Am Coll Cardiol 2008

TC-based Atherosclerotic Plaque Characterization



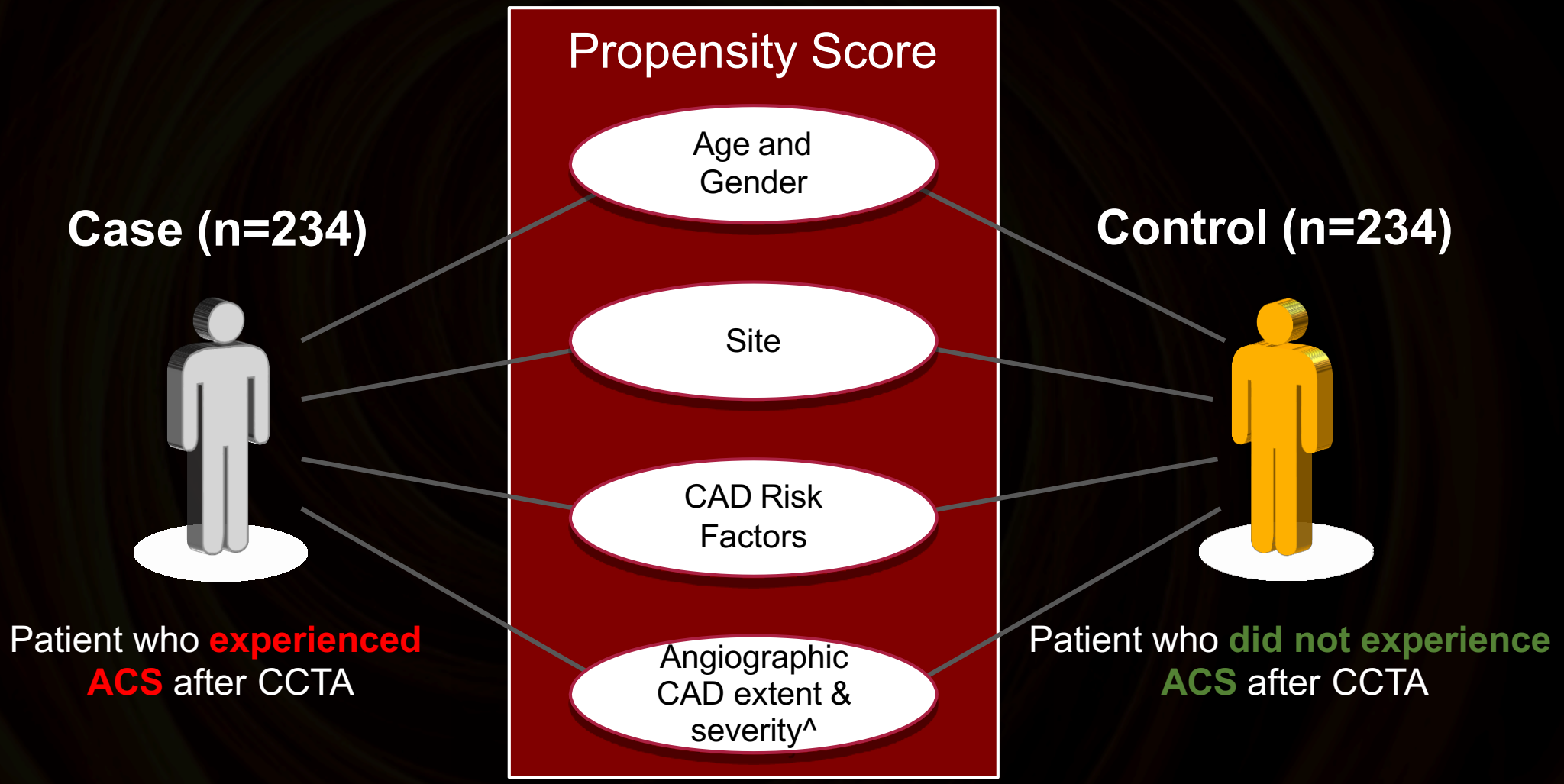


- Atherosclerotic plaque characteristics
  1. Stenosis (%DS, %AS, MLD, MLA)
  2. Non-obstructive stenoses
  3. Plaque burden (volume, area, thickness)
  4. Plaque composition (non-calcified, calcified)
  5. **"Spotty calcifications"**
  6. "Lipid dense" intraplaque core (**low attenuation**)
  7. Arterial remodeling (**positive**, negative, intermediate)
  8. Absolute material density (dual energy CT)



Source: Thomsen C and Abdulla J, Eur Heart J Cardiovasc Imaging 2016; Rodriguez-Granillo GA et al. Eur Heart J Cardiovasc Imaging 2016; Danad I et al. JACC Cardiovasc Imaging 2015

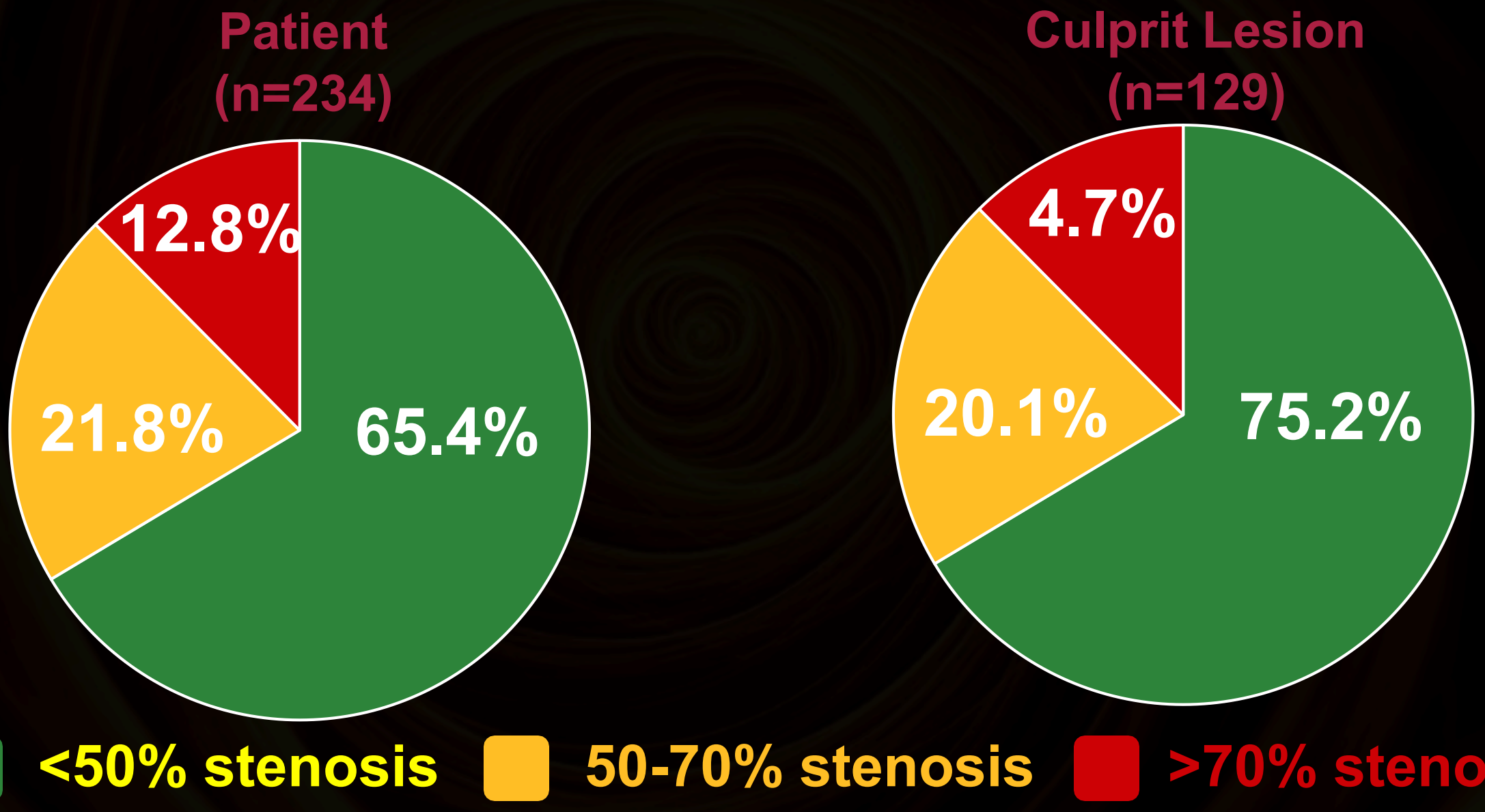
ICONIC STUDY: 25,251 patients undergoing CT, 3.4 years



When angiographic CAD extent and severity is the same, do atherosclerotic plaque characteristics matter?

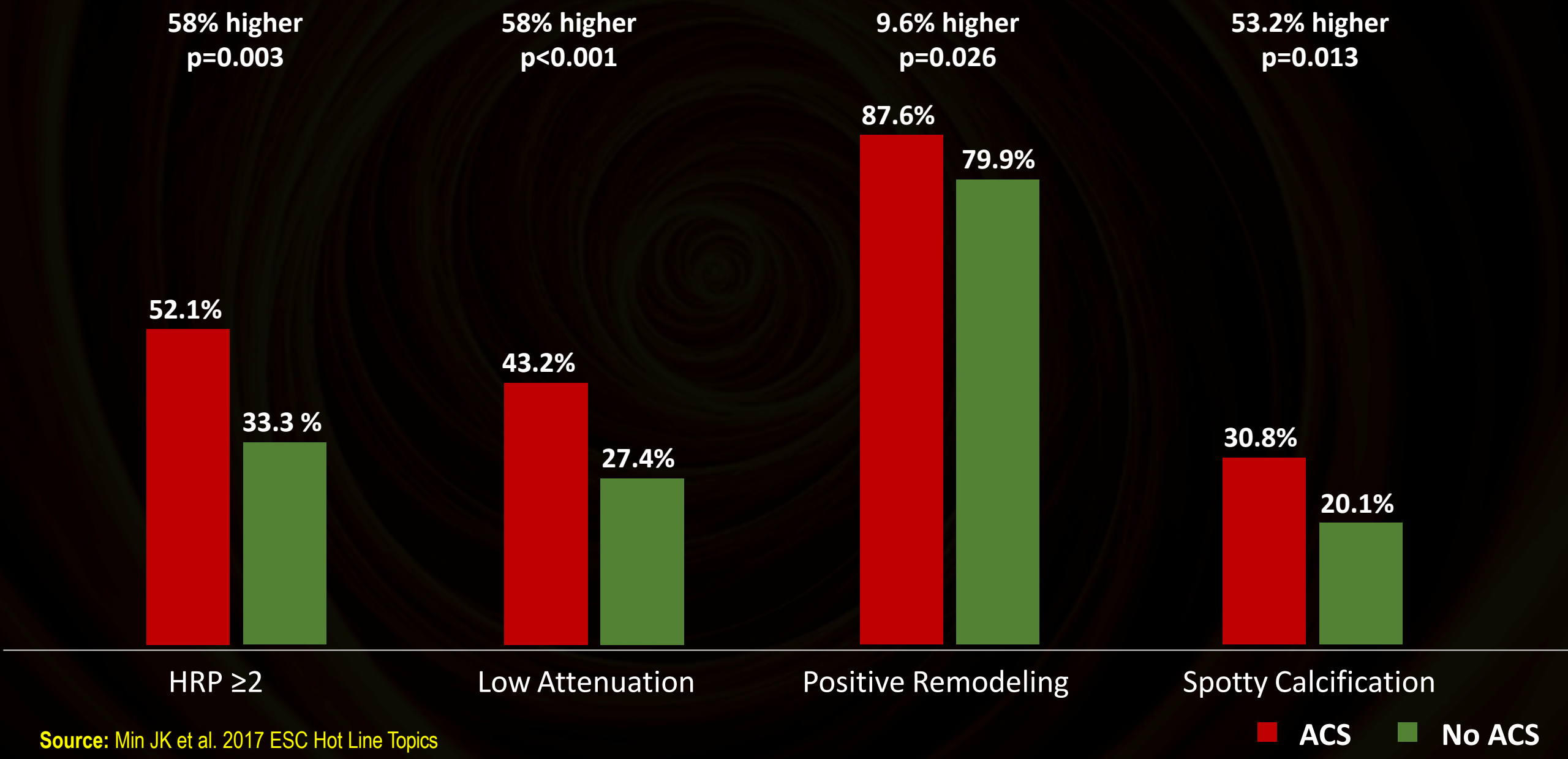
Source: Min JK et al. 2017 ESC Hot Line Topics

ICONIC Results: Maximal % stenosis at time of CT



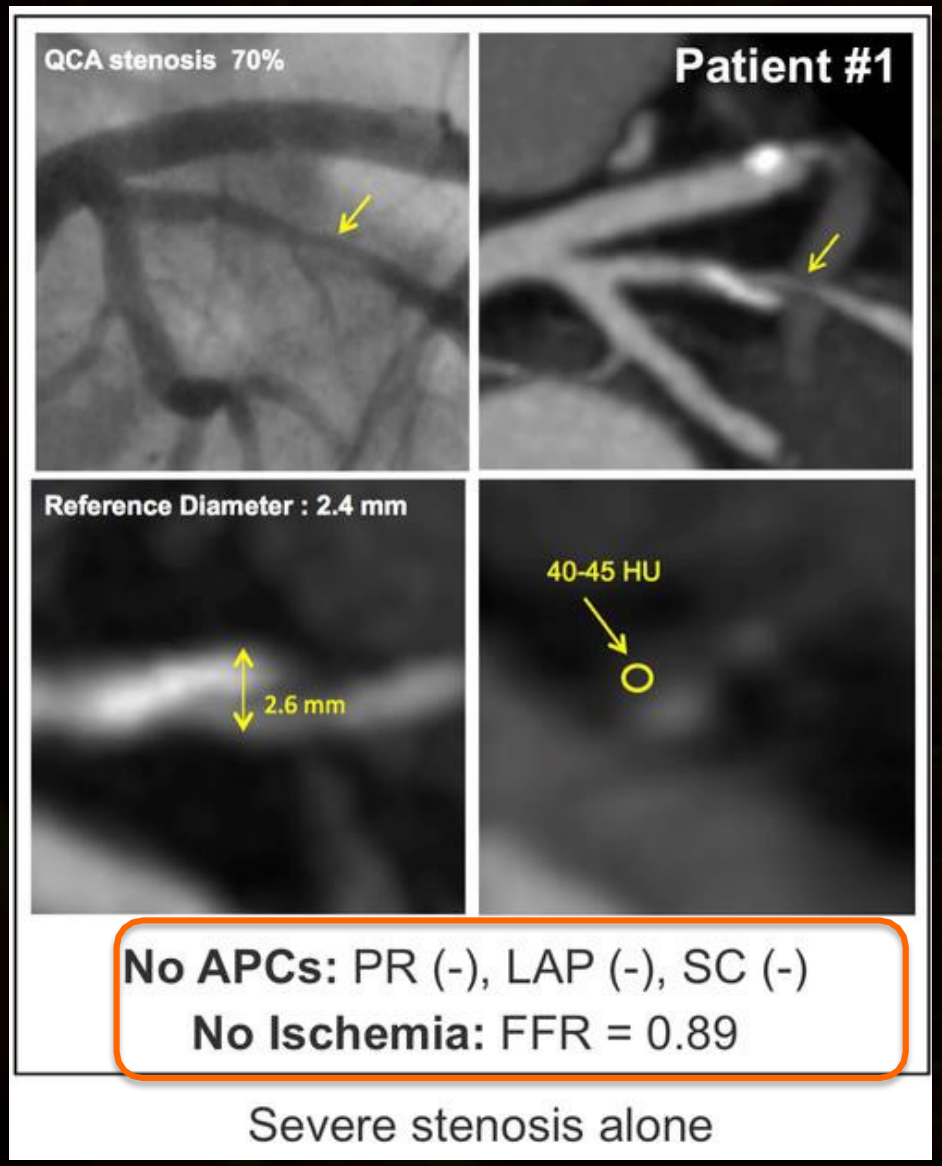
Source: Min JK et al. 2017 ESC Hot Line Topics

ICONIC Evaluation: High Risk Plaque (%)

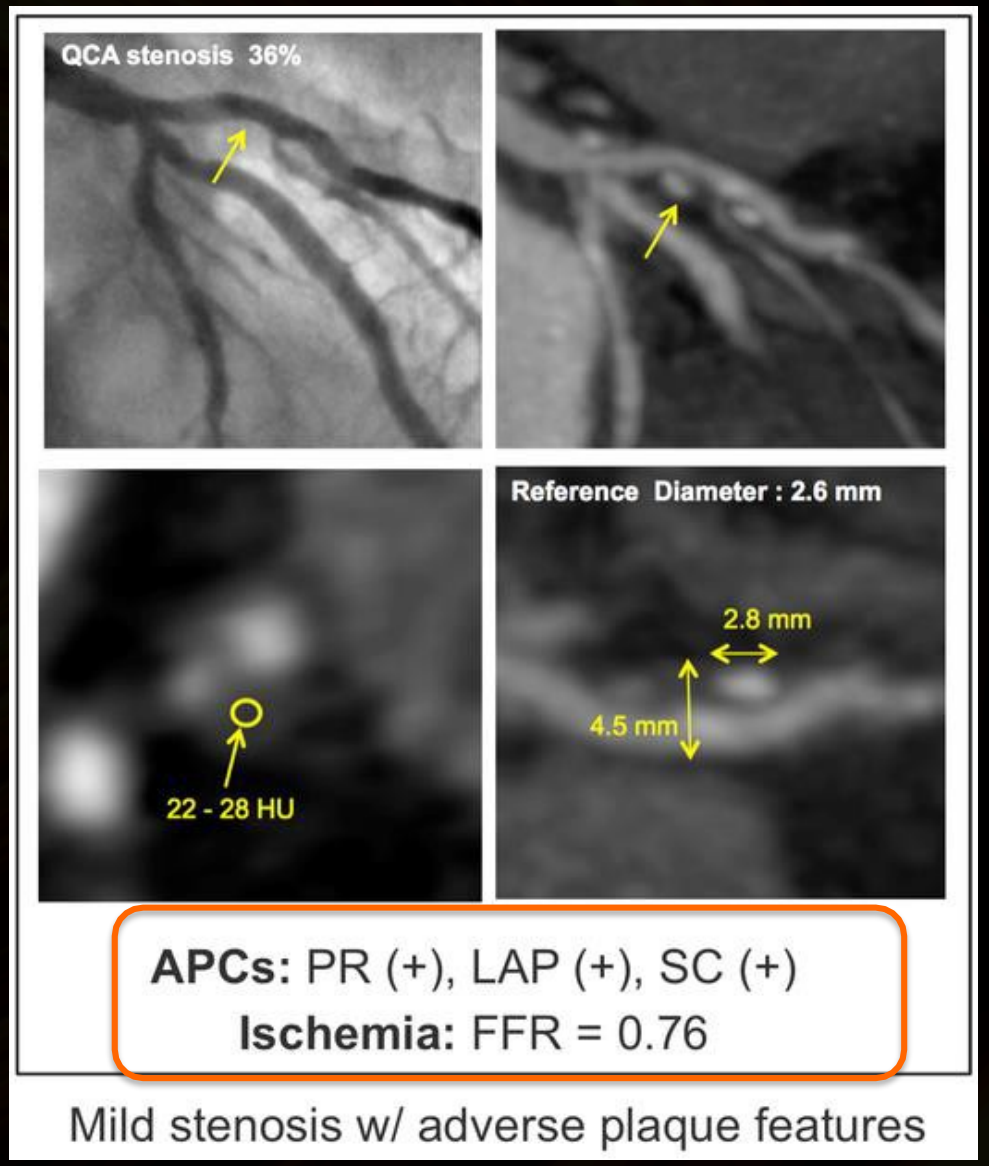


Source: Min JK et al. 2017 ESC Hot Line Topics

Pathophysiologic meaning of TC high risk plaques



Severe stenosis alone

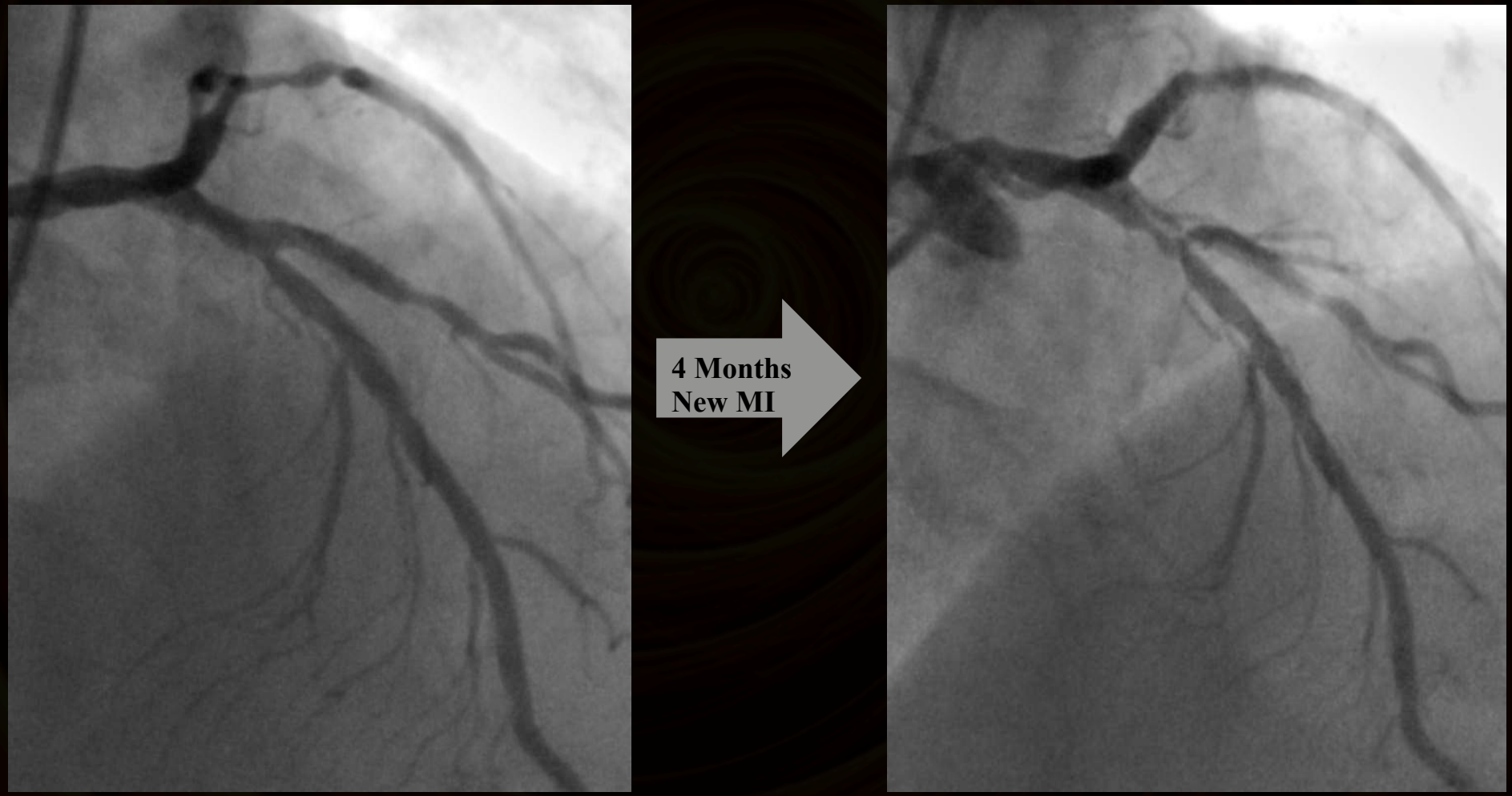


Mild stenosis w/ adverse plaque features

Source: Park HB et al. JACC Imaging 2015; Nakazato R et al. Eurointervention 2015


Secondary
prevention?

Prospective Identification of vulnerable plaque that led to a Myocardial Infarction



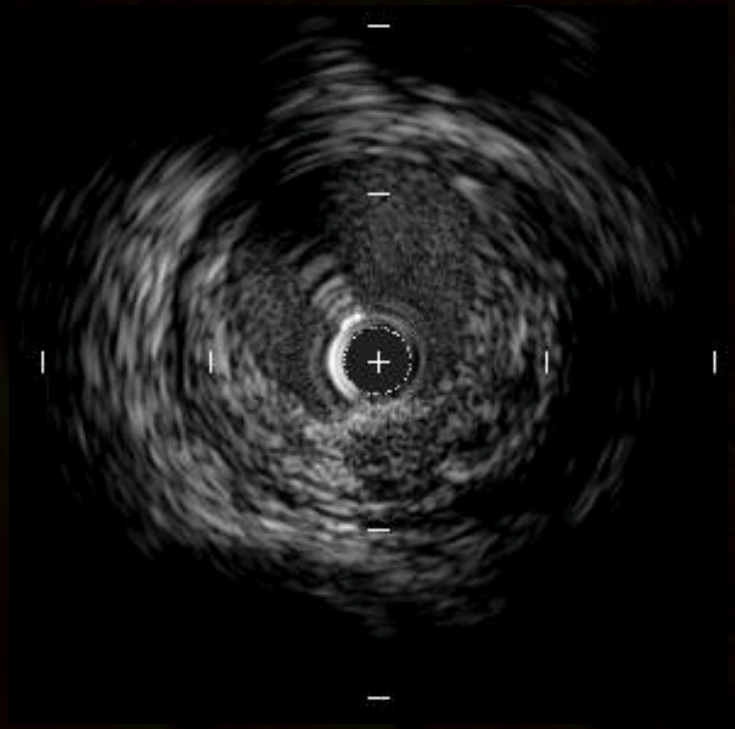
What is the best way to study atheroscerosis in secondary prevention ?

- Should we rely on extension of coronary artery disease?
- Should we rely on presence of peripheral atherosclerosis ?
- Should we try something new ?
  - **Assessment of the exact amount of plaque volume at CT scan**
  - **Assessment of plaque composition with IC imaging**


GREIER

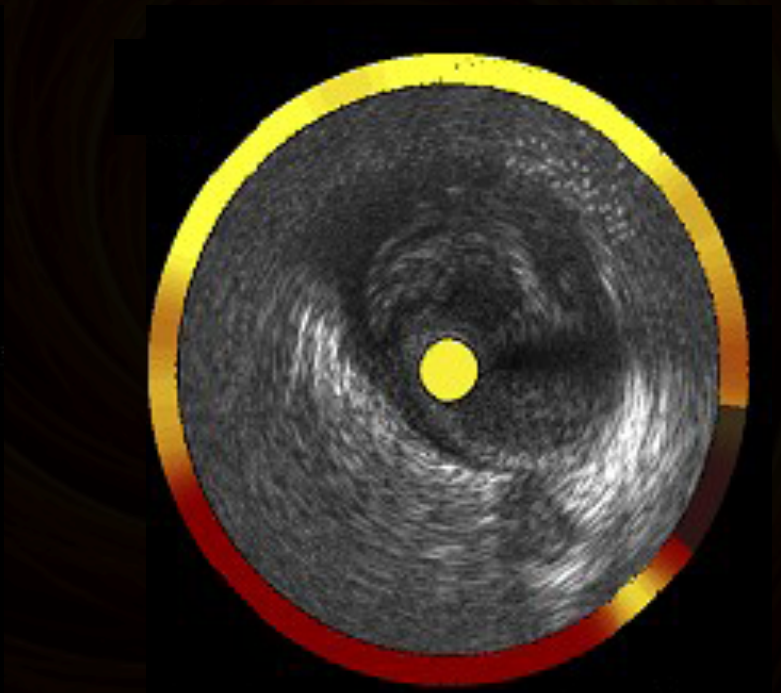
The ‘in vivo’ concept of plaque vulnerability

IVUS



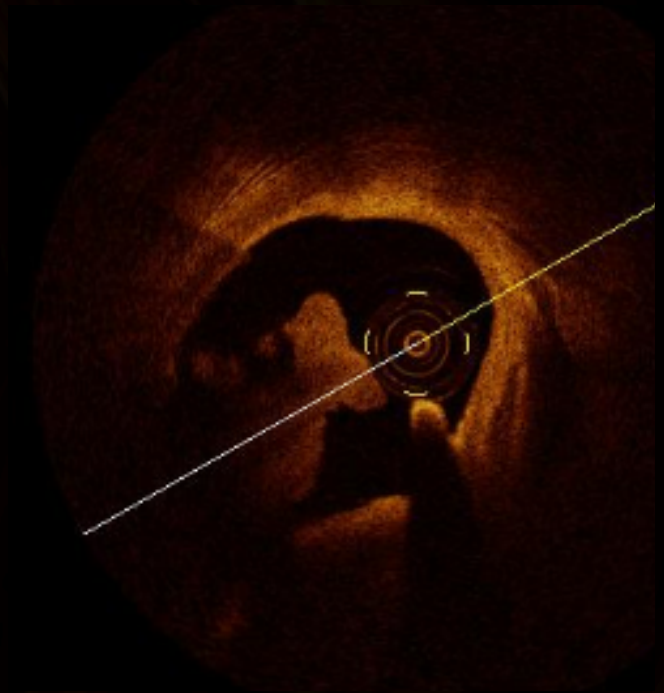
Resolution 150µ with good penetration

NIRS-IVUS



Resolution 150µ with identification of lipid burden

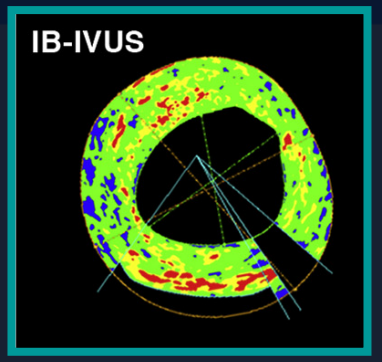
OCT



Microscopic resolution 15µ but small penetration

Predictors of Non-Culprit MACE

PROSPECT



Median 3 .4 Yr MACE Rate (%) per Isn

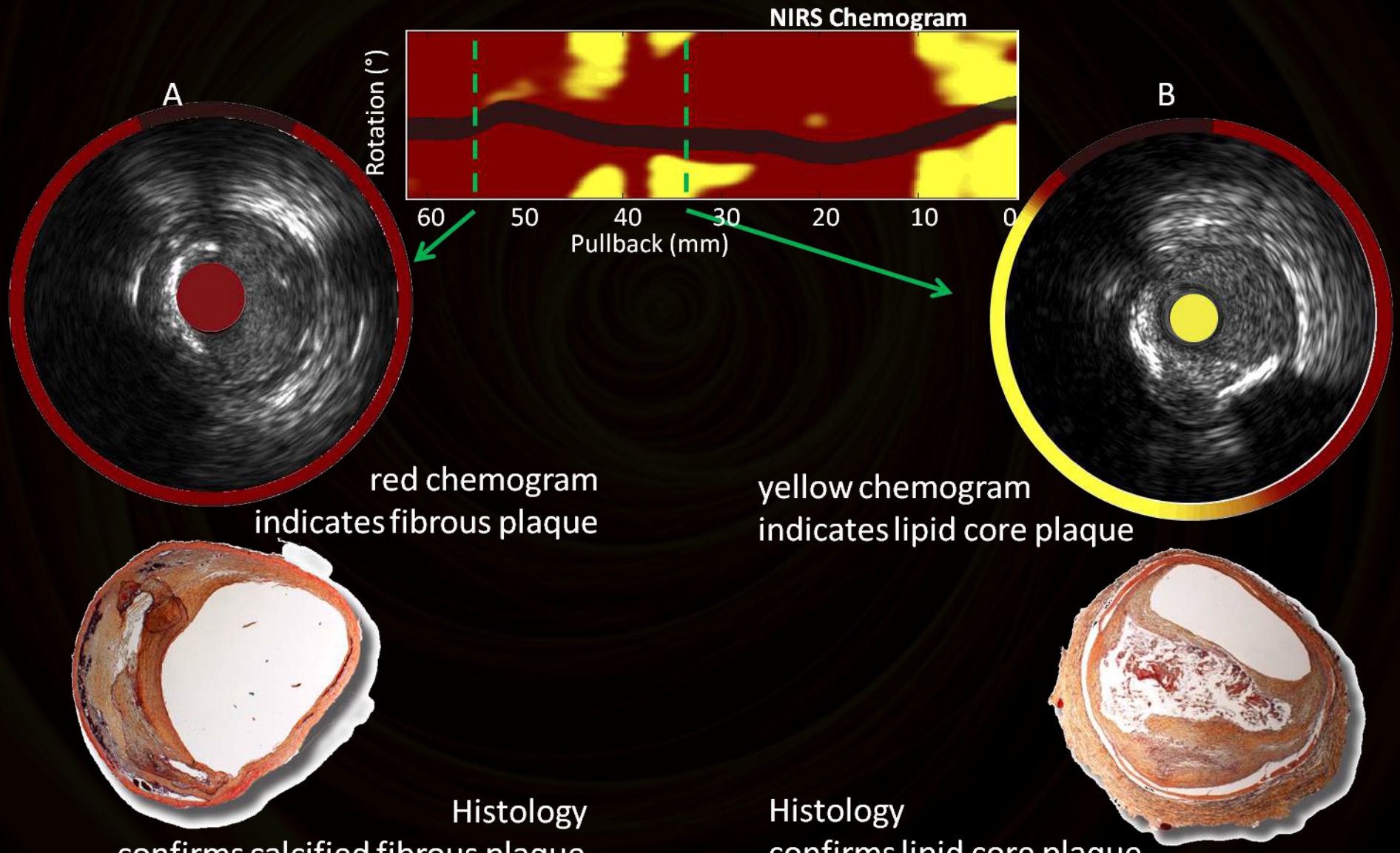
Present Absent

- PB>70% [HR 5.0]
- TCFA [HR 3.3]
- MLA<4.0 mm² [HR 3.2]

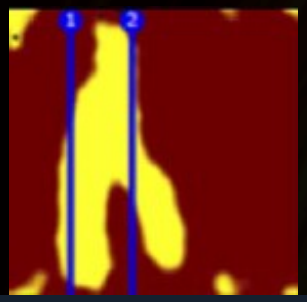
	TCFA	MLA ≤4.0mm2	PB ≥70%	MLA ≤4mm2 + TCFA	PB ≥70% + MLA ≤4mm2	PB ≥70% + TCFA	PB ≥70% + MLA ≤4mm2 + TCFA
Present	4.4	5.4	9.1	9.2	10.2	15.3	17.2
Absent	1.2	1.1	1.2	1.5	1.6	1.5	1.8
Lesion HR	3.8 (2.2, 6.6)	5.0 (2.9, 8.7)	7.9 (4.6, 13.8)	6.4 (3.4, 12.2)	6.7 (3.4, 13.0)	10.8 (5.5, 21.0)	10.8 (4.3, 27.2)
P value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Prevalence*	51.2%	49.1%	30.7%	17.4%	15.4%	11.0%	4.6%

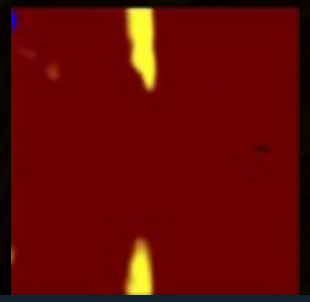
Source: Stone G et al. NEJM 2011;364:226-35

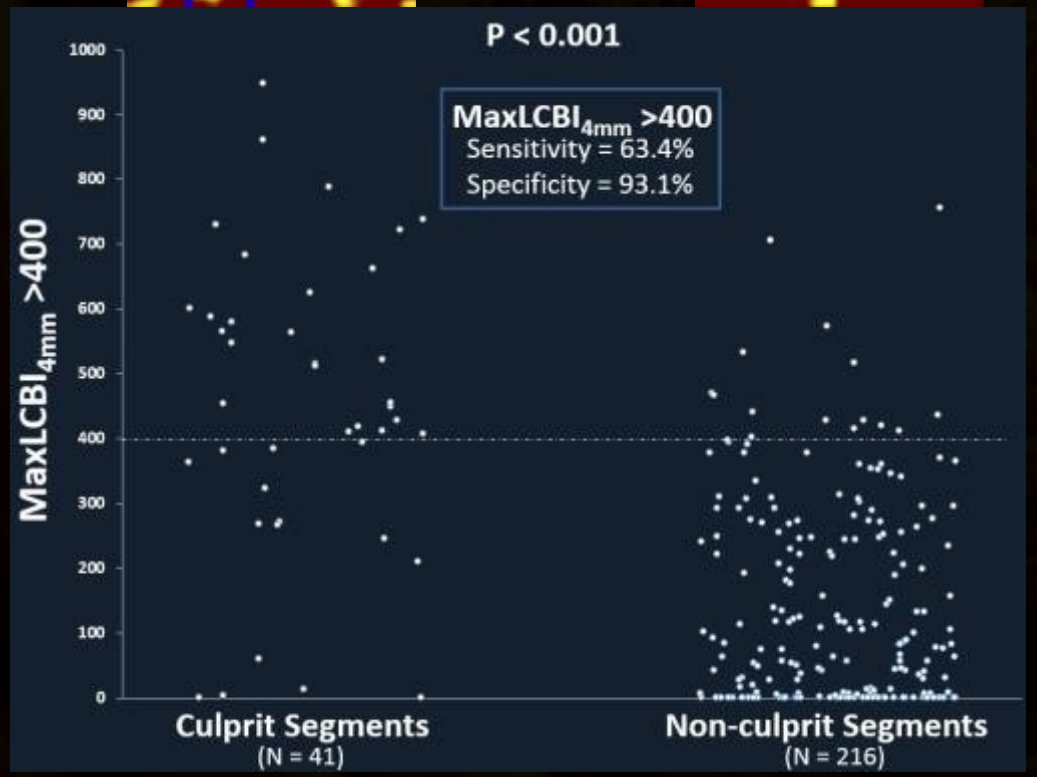
Near Infrared Spectroscopy Can Differentiate Lipid Core Plaque From Fibrotic And Calcified Plaque

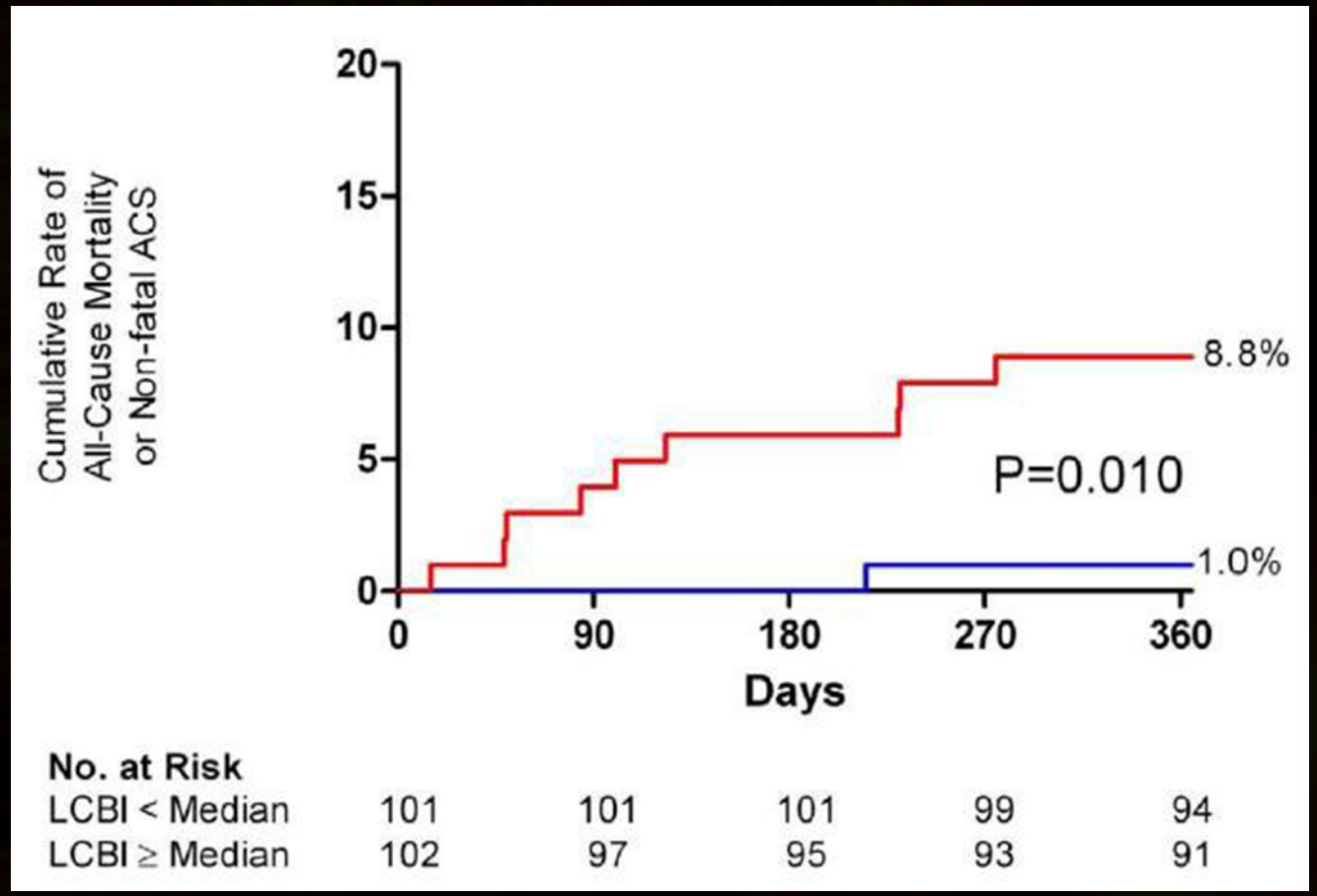


NSTEMI culprit vs.non-culprit segments





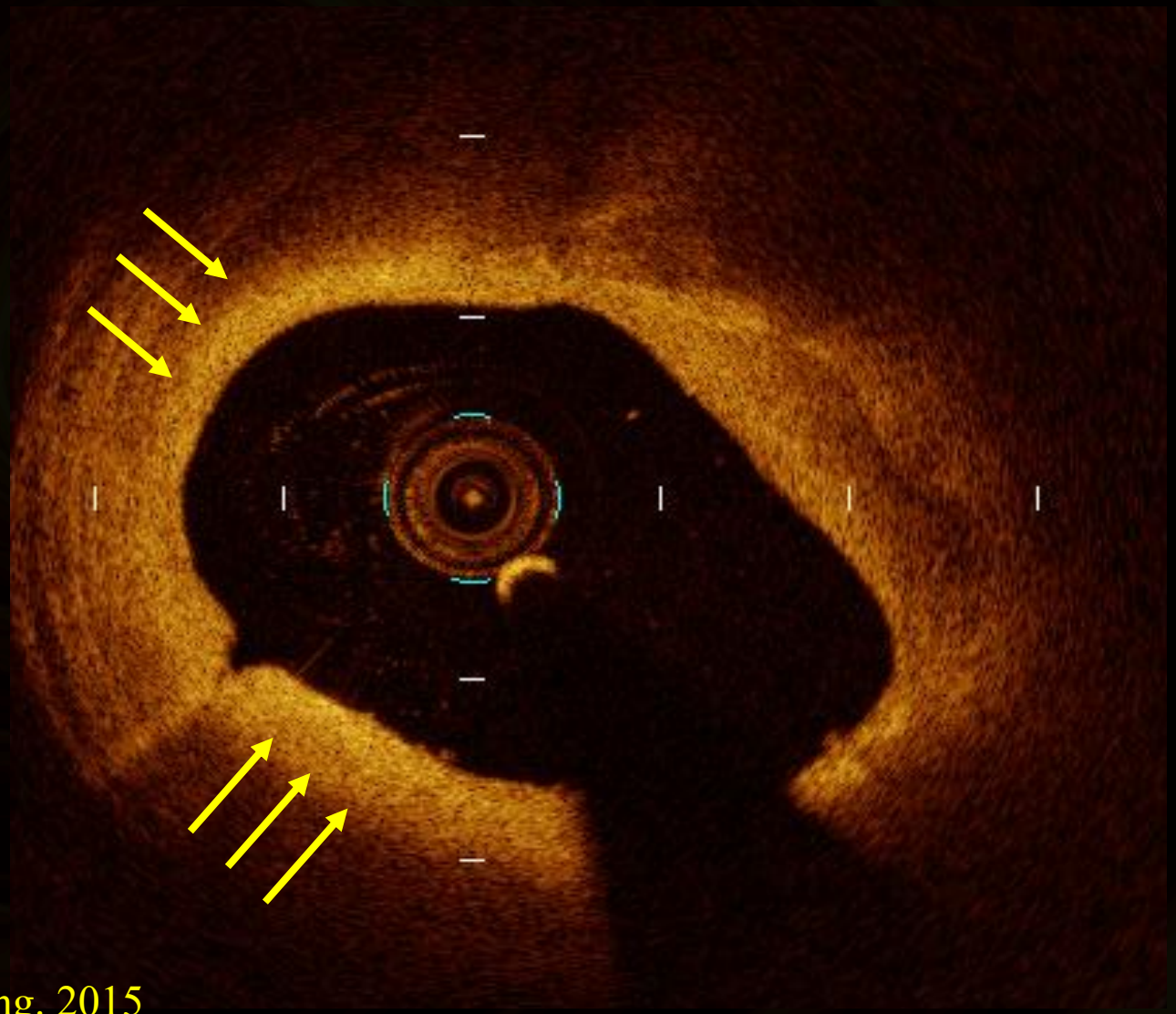




Source: Madder et al. CCI 2014

The ‘in vivo’ concept of plaque vulnerability

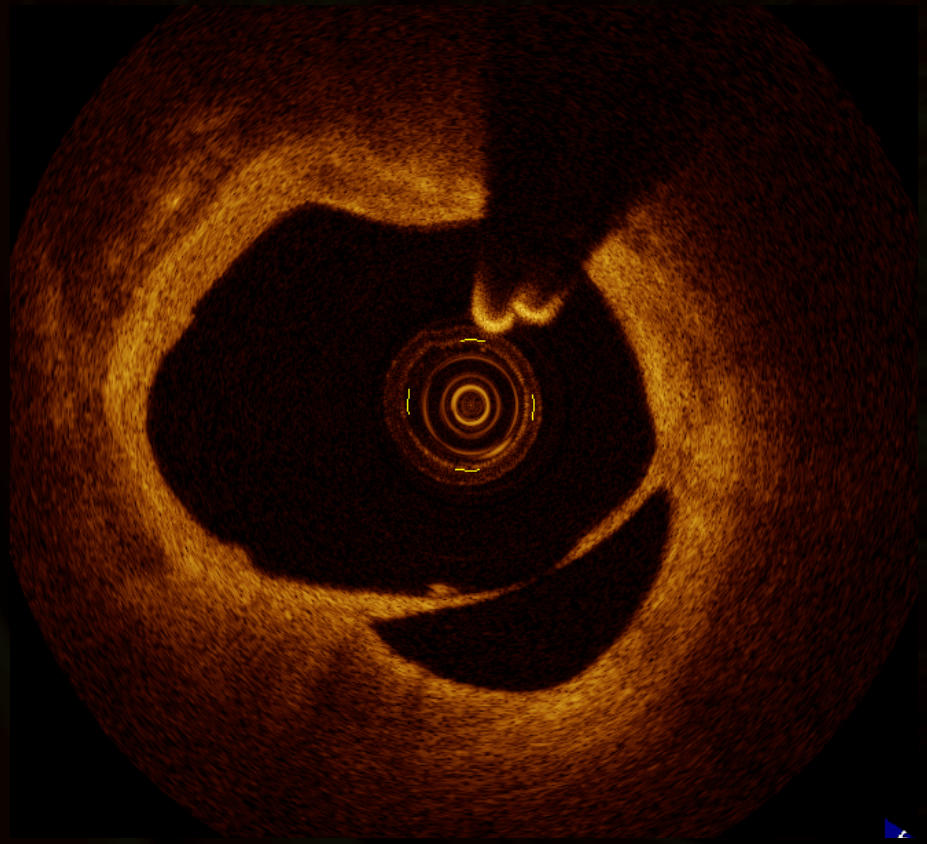
- Large plaque burden
- Large lipid pool
- Thin fibrous cap
- Small lumen area
- Thrombus
- Inflammation



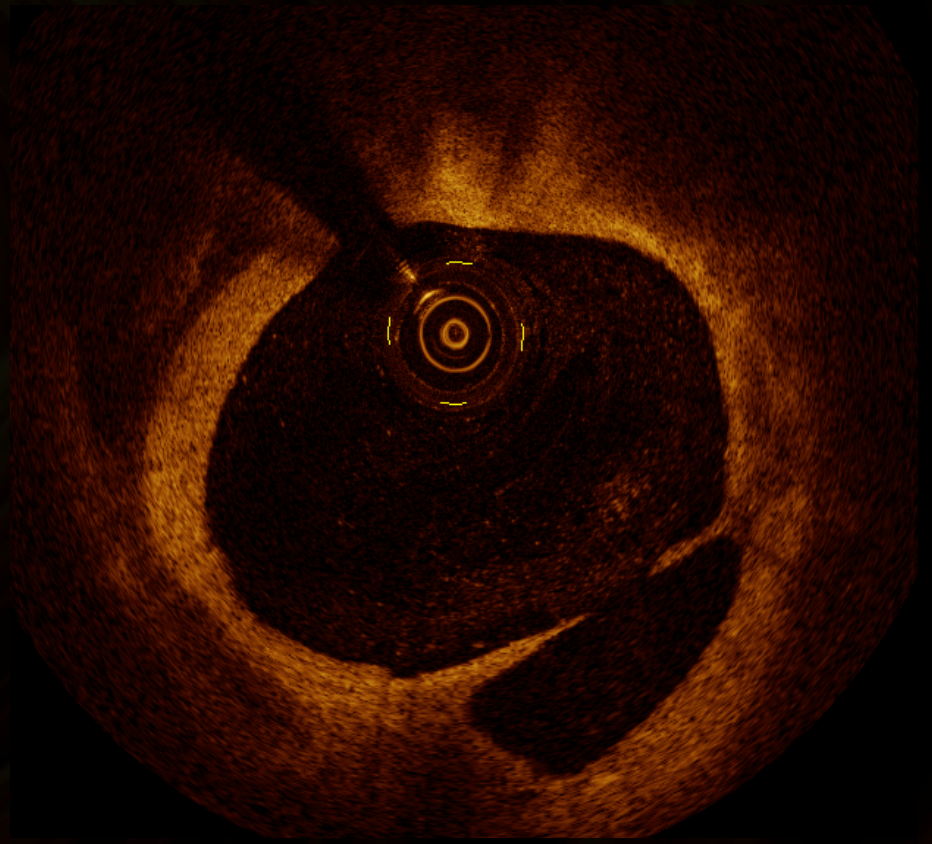
Source: Di Vito e tal: Eur Heart J Cardiovasc Imaging. 2015

The ‘in vivo’ concept of plaque vulnerability

Baseline



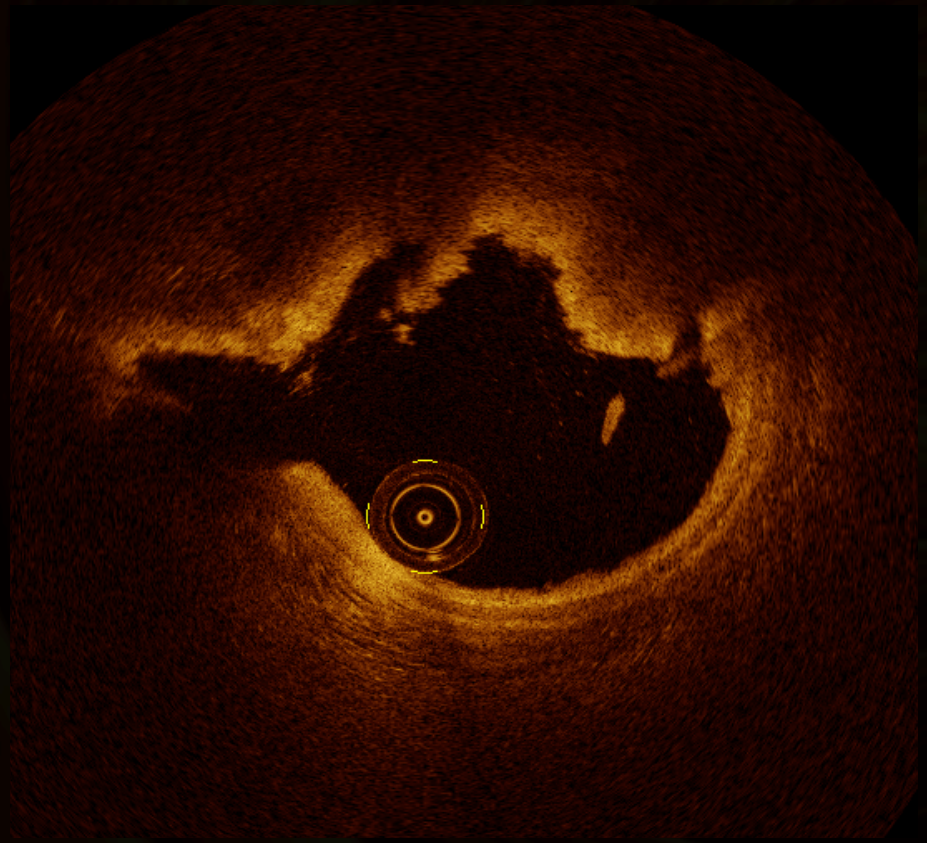
After 8 months



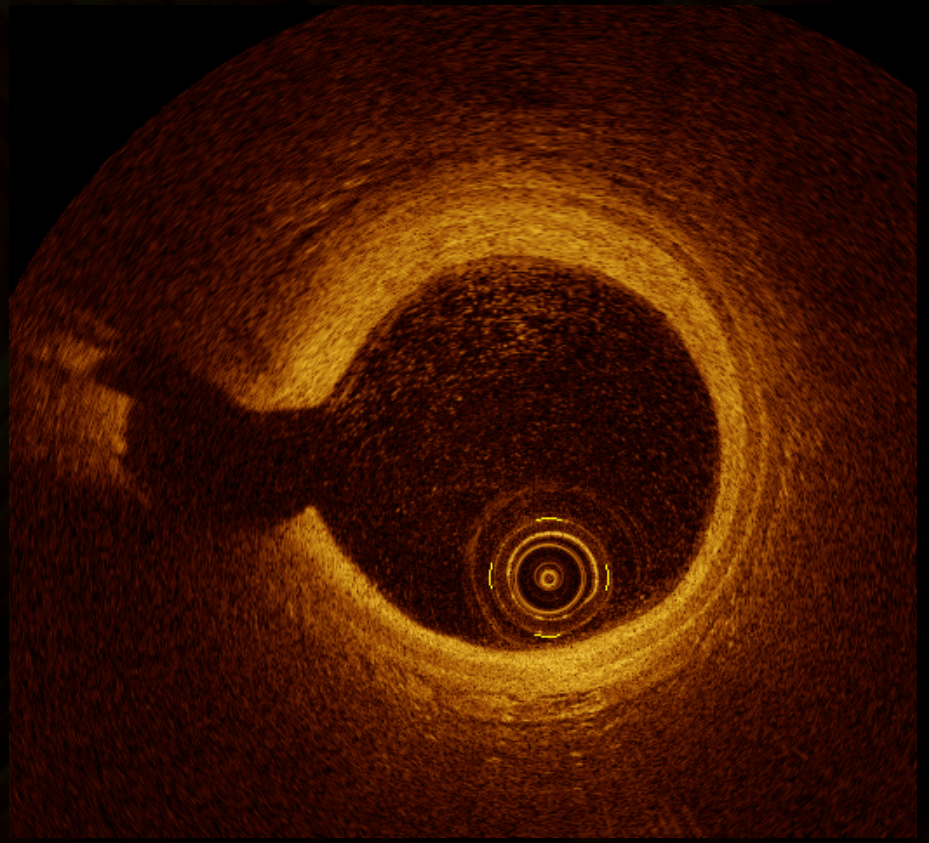
Source: Prati et al. JACC Imaging 2013

The ‘in vivo’ concept of plaque vulnerability

During STEMI

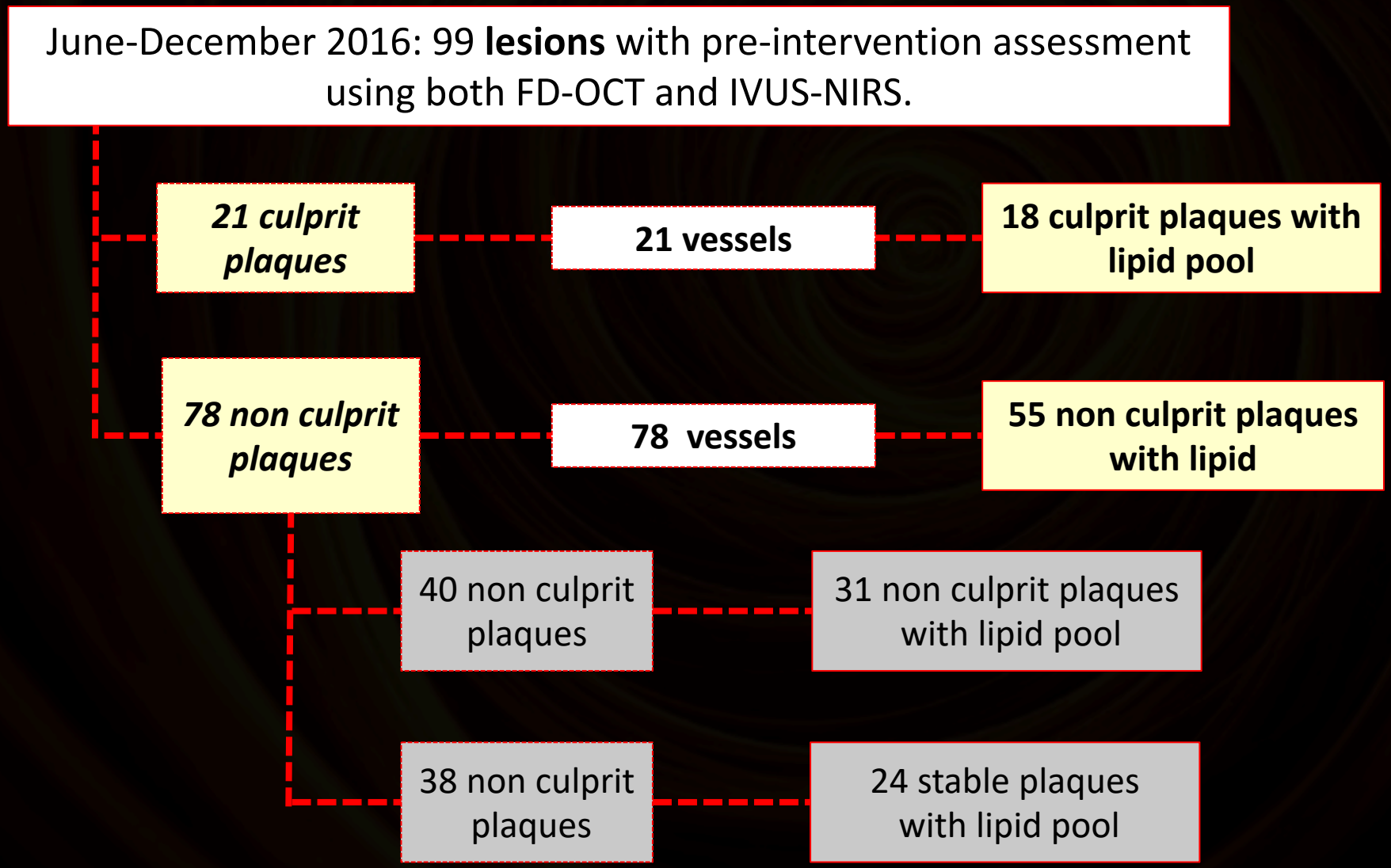


After 6 months



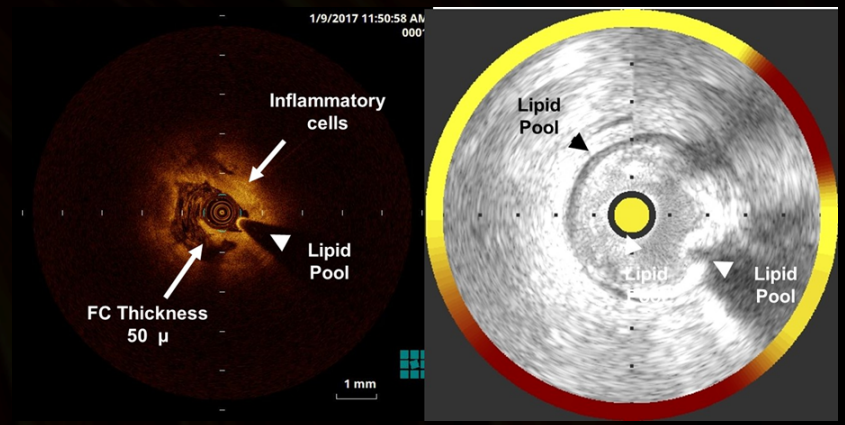
Source: Southerand et al. Eurointervention 2015

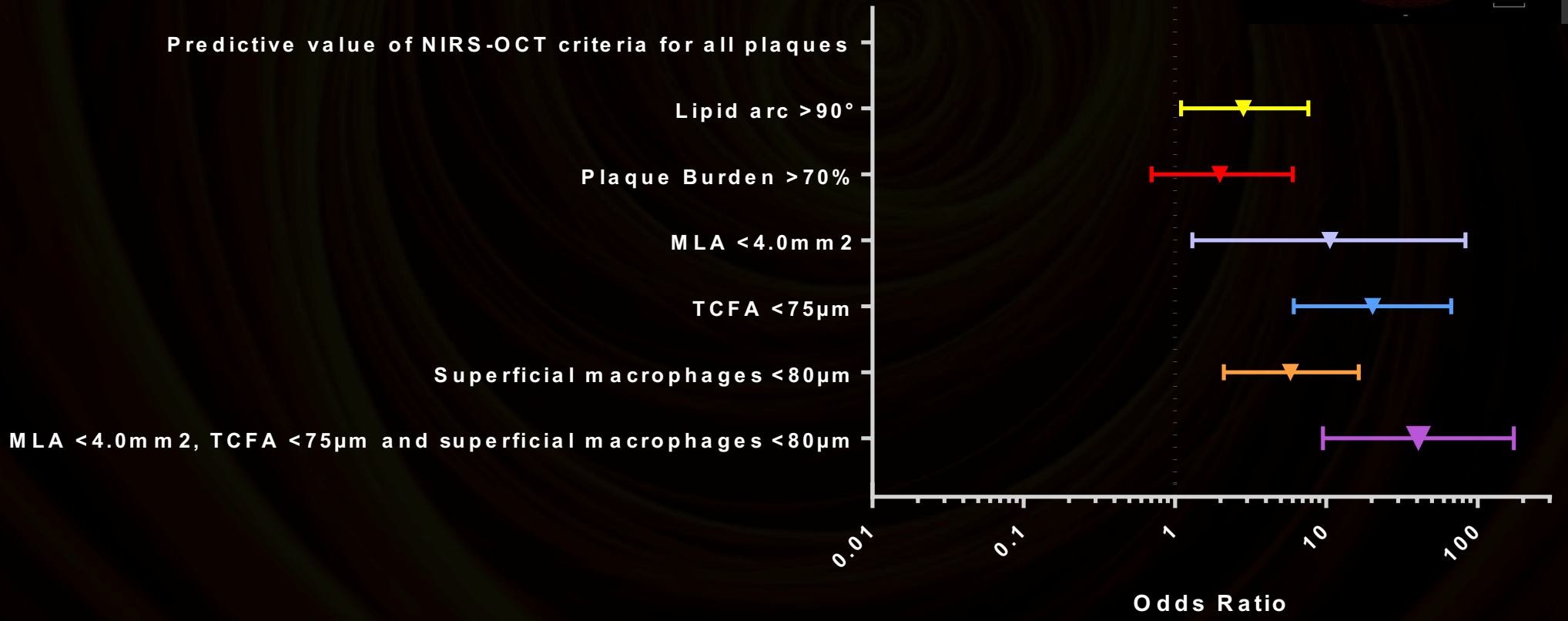
Plaque vulnerability assessment in culprit vs. non-culprit lesions with IVUS-NIRS and OCT



Prati et al.submitted

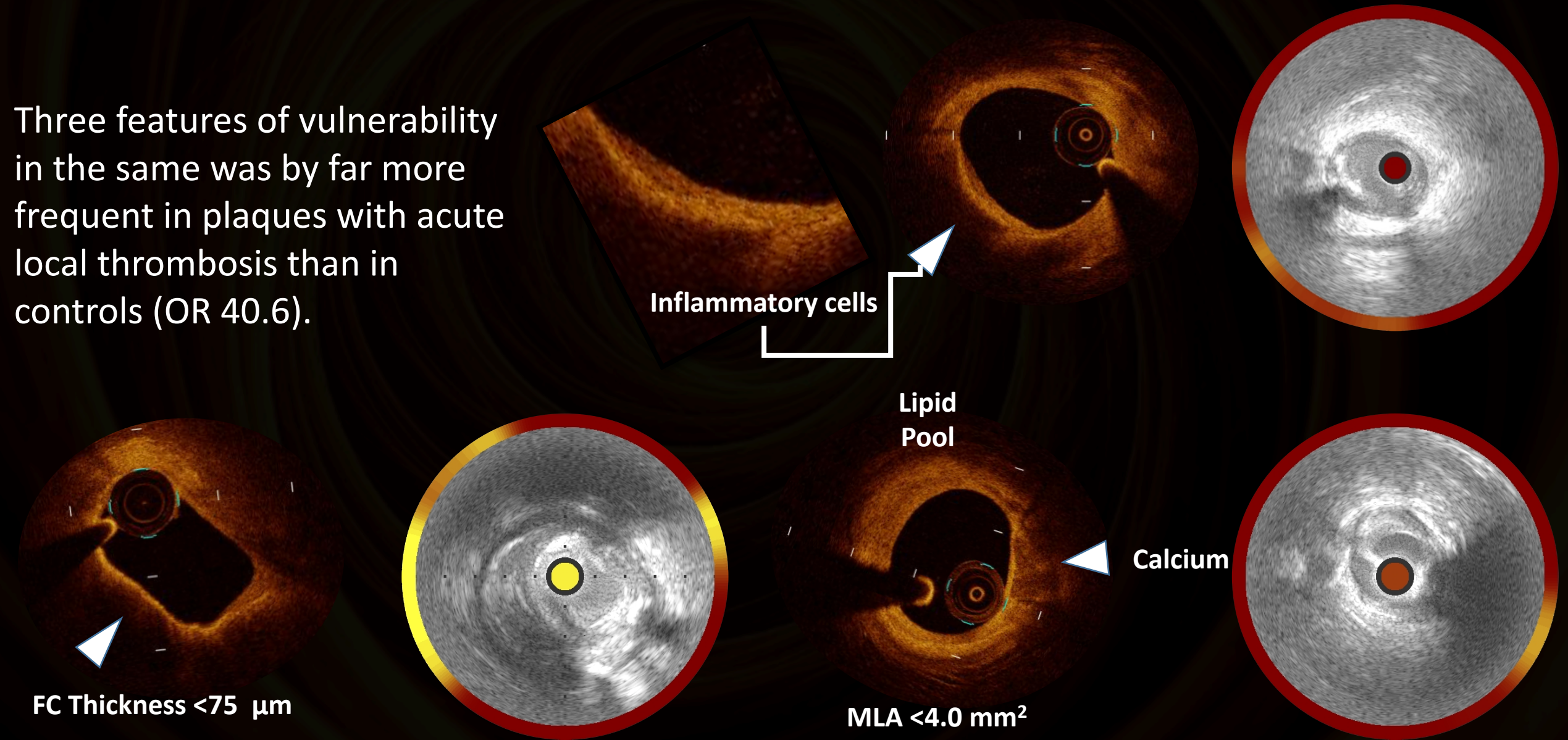
Plaque vulnerability assessment in culprit vs. non-culprit lesions with IVUS-NIRS and OCT





Plaque vulnerability assessment in culprit vs. non-culprit lesions with IVUS-NIRS and OCT

Three features of vulnerability in the same was by far more frequent in plaques with acute local thrombosis than in controls (OR 40.6).



RELATIONSHIP BETWEEN CORONARY PLAQUE MORPHOLOGY OF THE LEFT ANTERIOR DESCENDING ARTERY AND LONG TERM CLINICAL OUTCOME: THE CLIMA STUDY

RATIONALE: identification of vulnerable or thrombogenic plaques using OCT to identify patients at increased risk of myocardial infarction.

ENDPOINT: Correlation between the simultaneous presence of the selected four OCT criteria of plaque vulnerability in the explored lesions and hard clinical outcome (cardiac death + target vessel myocardial infarction).

DESIGN: Multicenter international prospective observational registry

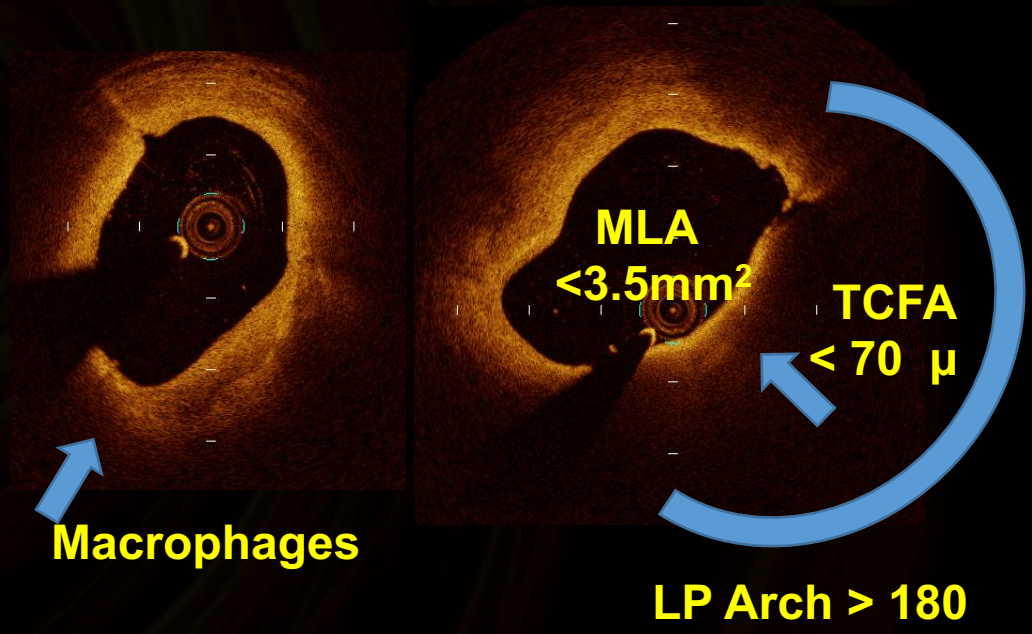
POPULATION: consecutive patients undergoing OCT evaluation of the left descending artery in the context of a clinically indicated coronary angiography.

- From January 2013 to December 2016 a total of 1003 untreated proximal LAD (1776 lipid plaques) were enrolled.

RELATIONSHIP BETWEEN CORONARY PLAQUE MORPHOLOGY OF THE LEFT ANTERIOR DESCENDING ARTERY AND LONG TERM CLINICAL OUTCOME: THE CLIMA STUDY

OCT-defined vulnerable plaque

- Minimum lumen area <3.5 mm^2:
- Fibrous cap minimum thickness <75 µm:
- Lipid arc extension >180°;
- Presence of macrophages;



Challenging aspects

- Only a few vulnerable lesions progress to an acute coronary events (less than 5% in the PROSPECTS)
- Dynamic changes of plaque vulnerability
- Need to obtain a functional assessment of coronary lesions?
- Identification of best medical treatment for vulnerable plaques

Take home messages

- Recent studies showed that it is rationale to identify patients at higher risk of coronary event and put them on a more aggresive anti-thrombotic therapy
- Imaging modalities (CT for primary prevention) and IC imaging modalities (OCT for secondary prevention) potentially better identify patients with a more aggressive atherosclerosis
- Perhaps in the next future IC imaging will be used to identify vulnerable plaques to be treated with stenting or vulnerable patients to be treated with a more aggressive drug treatment.


CLIMATE CHANGE