Difference Between Coronary Artery Disease and Peripheral Artery Disease

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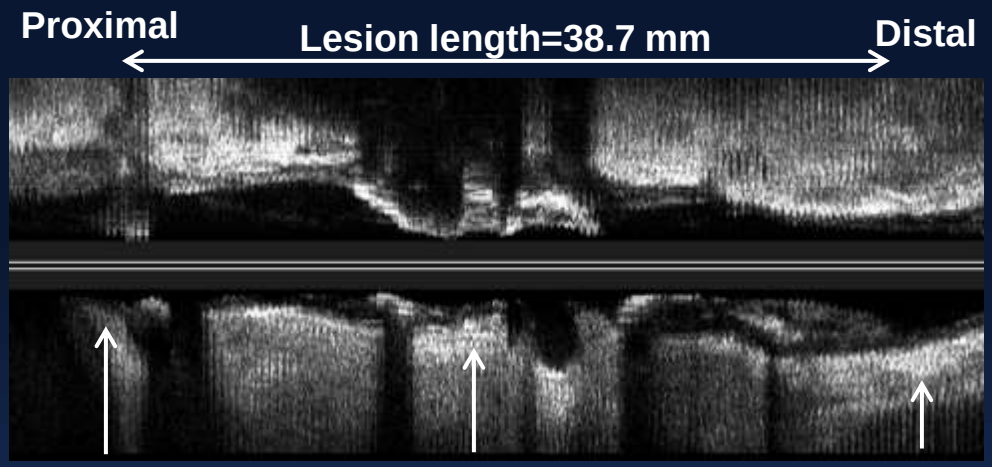
Conflict of Interest Disclosure

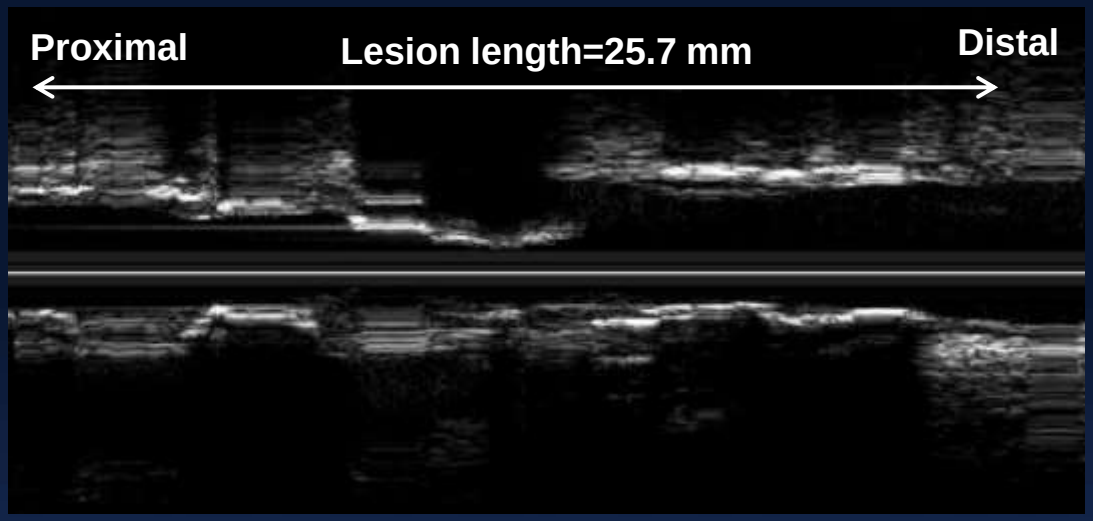
- Akiko Maehara
  - Personal: Consultant for Boston Scientific Corporation, Speaker fee: St Jude Medical
  - Cardiovascular Research Foundation: Boston Scientific Corporation

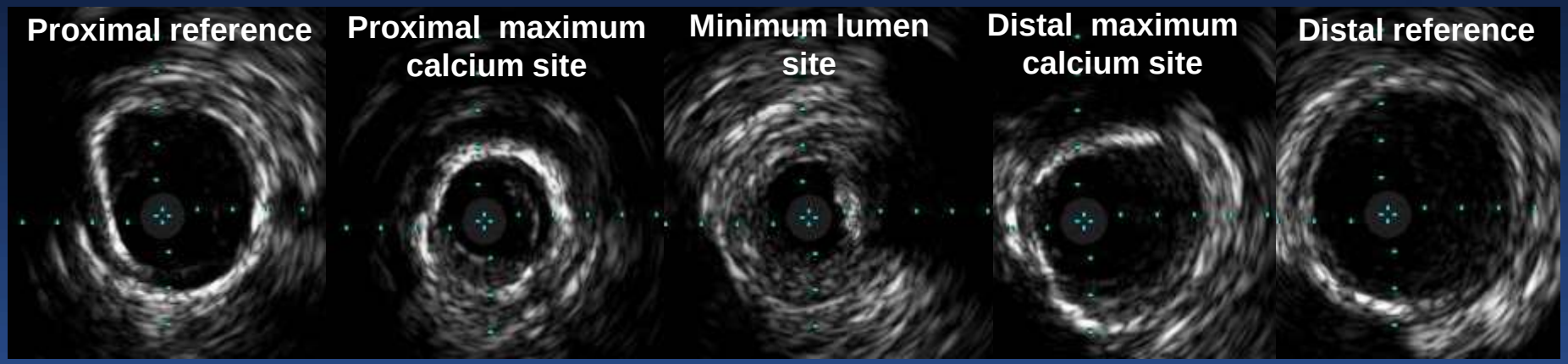
Coronary Artery Disease (CAD)



Lumen area=2.3mm^2
Calcium arc=135˚

Peripheral Artery Disease (PAD)





Lumen area=7.0mm^2
Calcium arc=230˚

Lumen area=4.3mm^2
Calcium arc=70˚

Lumen area=14.5mm^2
Calcium arc=210˚

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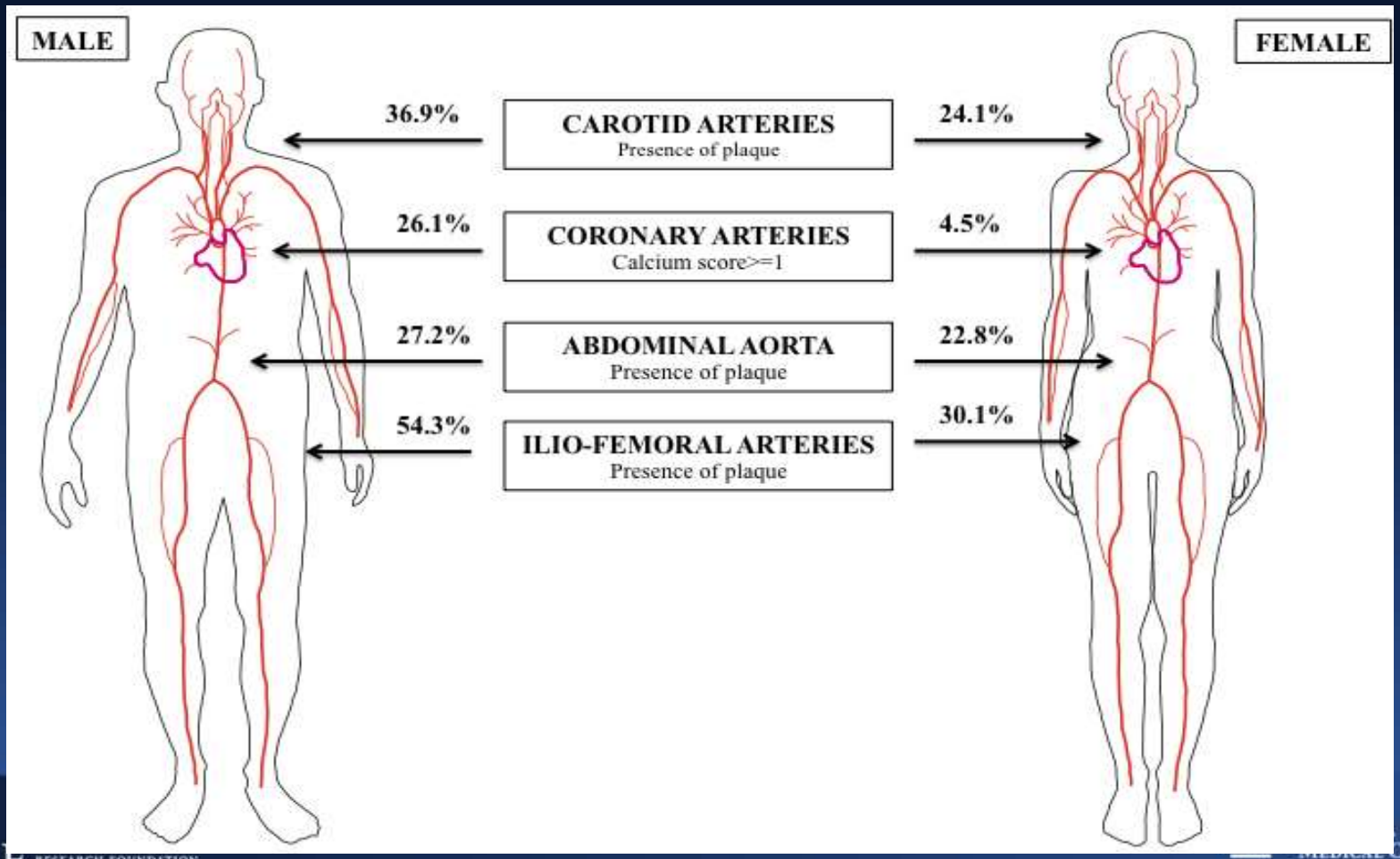
Difference between PAD and CAD

1. Both coronary and femoral, popliteal, and tibial artery are muscular artery (smooth muscle rich media).
2. Peripheral artery is a long, low share stress artery compared to coronary artery.
3. Mönckeberg's medical calcification (non-inflammatory, independent of atherosclerosis) is common in PAD (50%) especially hemodyalysis or DM patients.

PESA (Progression of Early Subclinical Atherosclerosis) n=4002

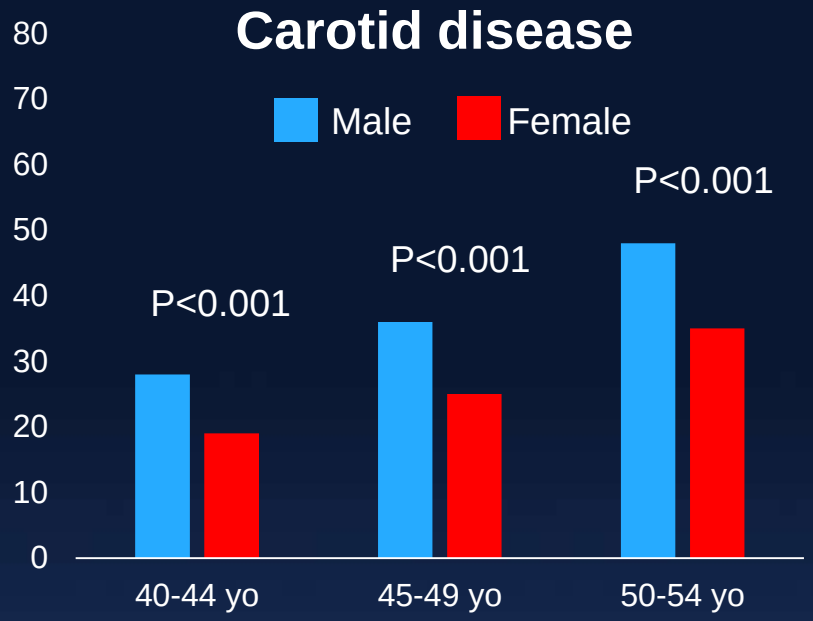
Ilio-femoral More Sensitive Than Carotid (6 regions)

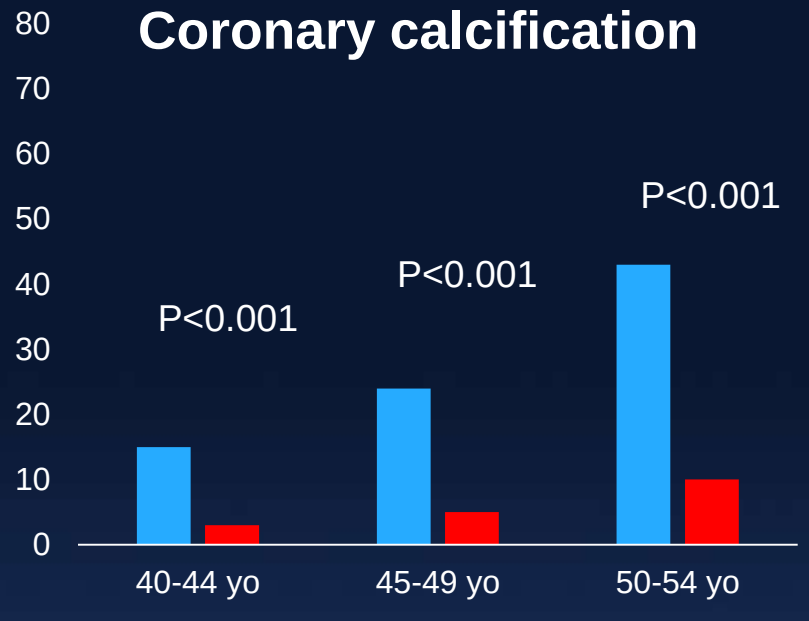
40-54 asymptomatic population (63% male), 3D-ultrasound/CAC, 6 year imaging follow-up
Plaque was defined >0.5mm intima-medial thickness or >50% of surrounding thickness

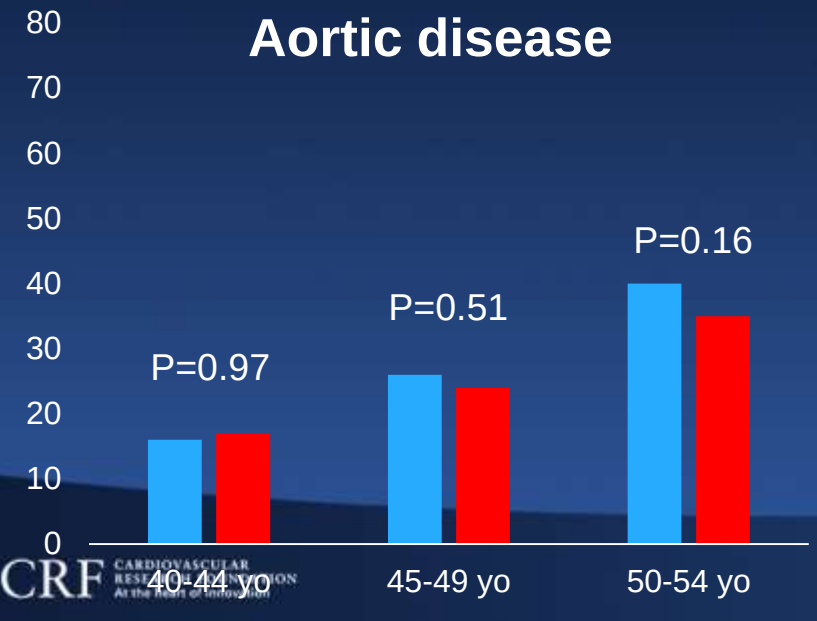


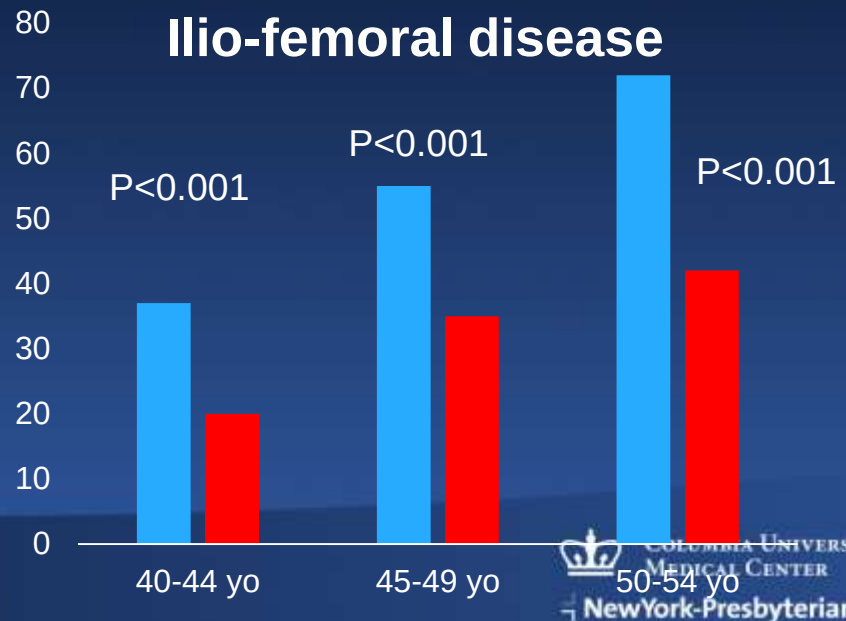
L Fernandez-Friera, et.al, Circulation 2015: 131; 2104-13

Prevalence of disease stratified by age and gender









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Patient characteristics

- **CLARITY** was a prospective, multi-center trial in which 50 peripheral arterial disease (PAD) patients with a lower extremity wound fed by a diseased tibial or peroneal artery to evaluate orbital atherectomy compared to balloon angioplasty alone.
- **ADAPT-DES** was a prospective, multicenter registry of 8582 coronary artery disease (CAD) patients undergoing successful percutaneous coronary intervention (PCI).
- **1:2 matching** with gender, age, DM, hypertension, hyperlipidemia, and renal insufficiency (creatinine clearance <60ml/min by Cockcroft-Gault Formula)

	PAD (n=42)	CAD (n=79)	P-value
Age (Years)	68 [60, 77]	69 [59, 75]	0.54
Male	28 (67%)	51 (65%)	0.97
Diabetes Mellitus	36 (86%)	67 (85%)	0.90
Hypertension	36 (86%)	69 (87%)	0.12
Dyslipidemia	36 (86%)	72 (91%)	0.11
Renal Insufficiency*	21 (50%)	35 (44%)	0.97

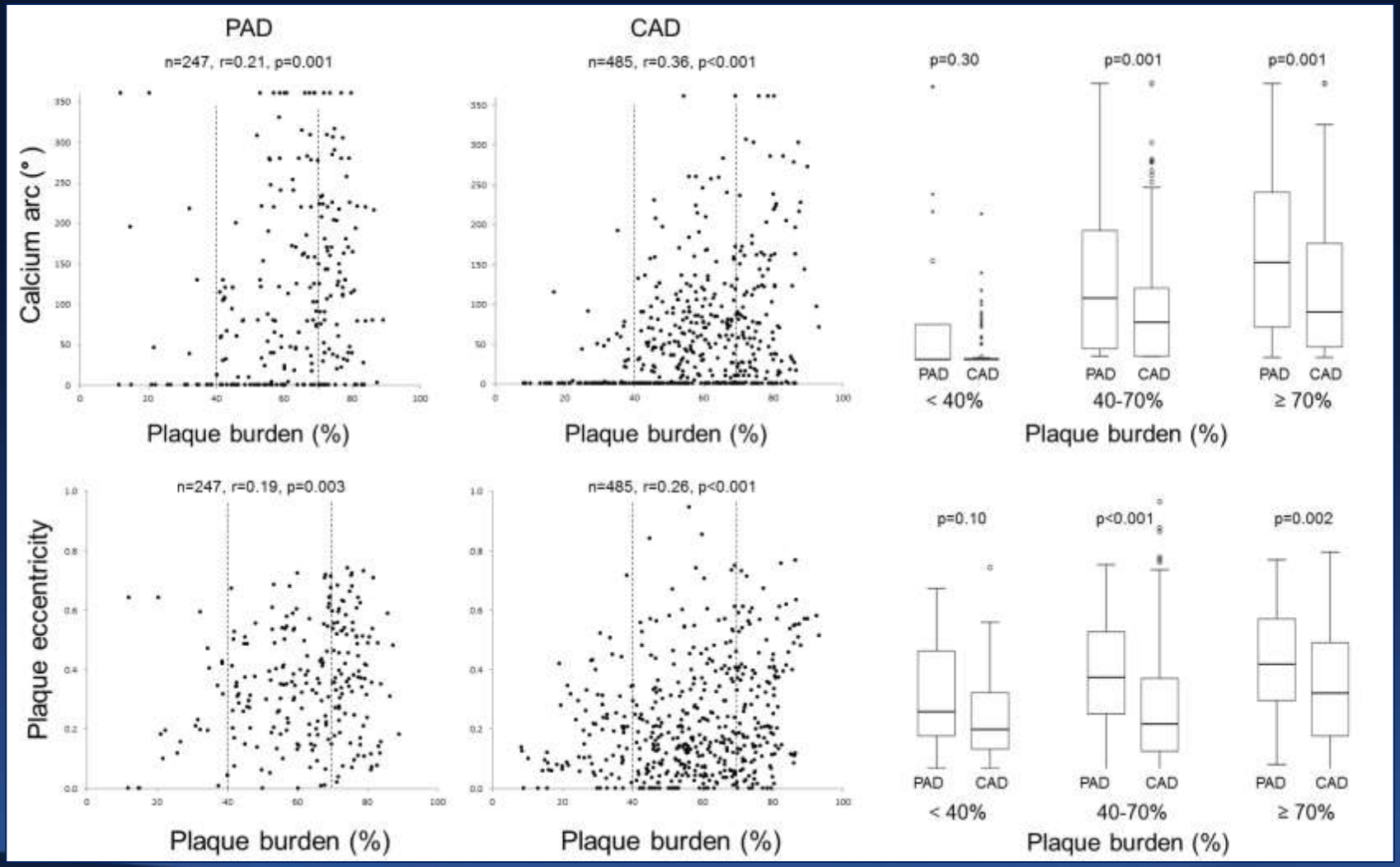
Planer IVUS findings

	PAD (n=42)	CAD (n=79)	P-value
Minimum lumen area site			
Vessel area (mm^2)	8.7 [6.3, 10.8]	11.5 [8.8, 15.9]	<0.001
Lumen area (mm^2)	2.0 [1.8, 2.5]	2.5 [2.1, 3.3]	<0.001
Plaque burden (%)	77.4 [68.8, 80.2]	77.6 [71.1, 81.4]	0.047
Plaque eccentricity	0.41 [0.22, 0.51]	0.22 [0.12, 0.40]	0.002
Remodeling index	0.82 [0.77, 1.01]	0.84 [0.74, 1.08]	0.08
Proximal reference vessel area (mm^2)	10.1 [8.1, 14.1]	16.1 [13.2, 20.1]	<0.001
Proximal reference lumen area (mm^2)	4.4 [3.3, 6.5]	8.8 [7.5, 10.5]	<0.001
Distal reference vessel area (mm^2)	8.2 [6.2, 9.6]	10.7 [7.5, 15.2]	0.01
Distal reference lumen area (mm^2)	3.4 [2.6, 4.8]	6.7 [4.8, 8.8]	<0.001

Volumetric IVUS findings

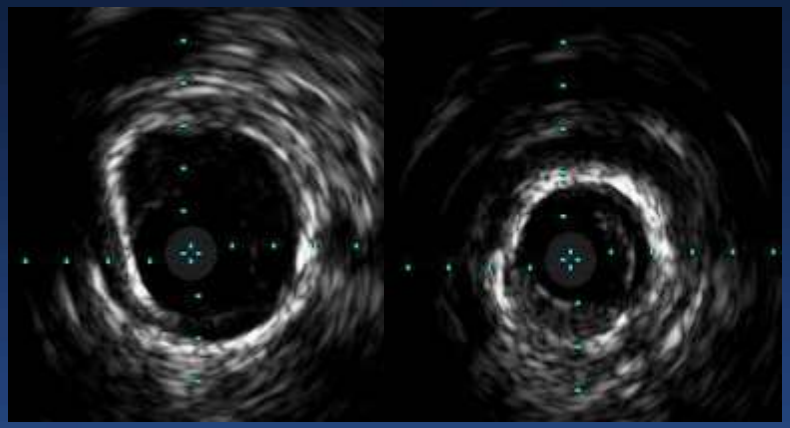
	PAD (n=42)	CAD (n=79)	P-value
Volumetric analysis			
Lesion length (mm)	48.8 [31.5, 87.3]	24.7 [16.1, 42.0]	<0.001
Vessel area (mm^3/mm)	8.9 [7.5, 11.4]	12.9 [10.3, 16.3]	<0.001
Lumen area (mm^3/mm)	3.0 [2.5, 3.9]	5.1 [4.3, 6.2]	<0.001
Plaque area (mm^3/mm)	6.0 [4.8, 7.2]	7.0 [5.6, 10.2]	0.008
Percent plaque volume (%)	64.3 [60.3, 69.1]	59.7 [50.9, 64.6]	0.56
Maximal superficial calcium arc (°)	285 [94, 360]	81 [49, 142]	<0.001
Maximal deep calcium arc (°)	63 [33, 110]	19 [0, 43]	<0.001

Difference between PAD and CAD

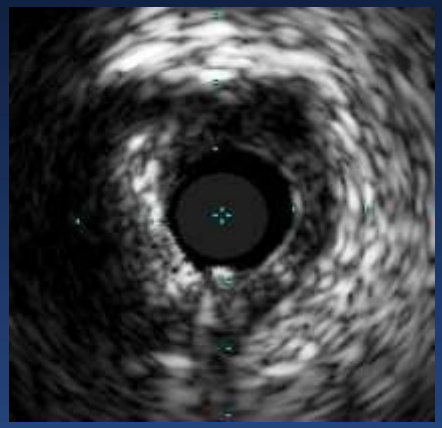


PAD has more *diffuse concentric* plaque and *calcification* starting in mild lesions compared to CAD.

PAD



CAD

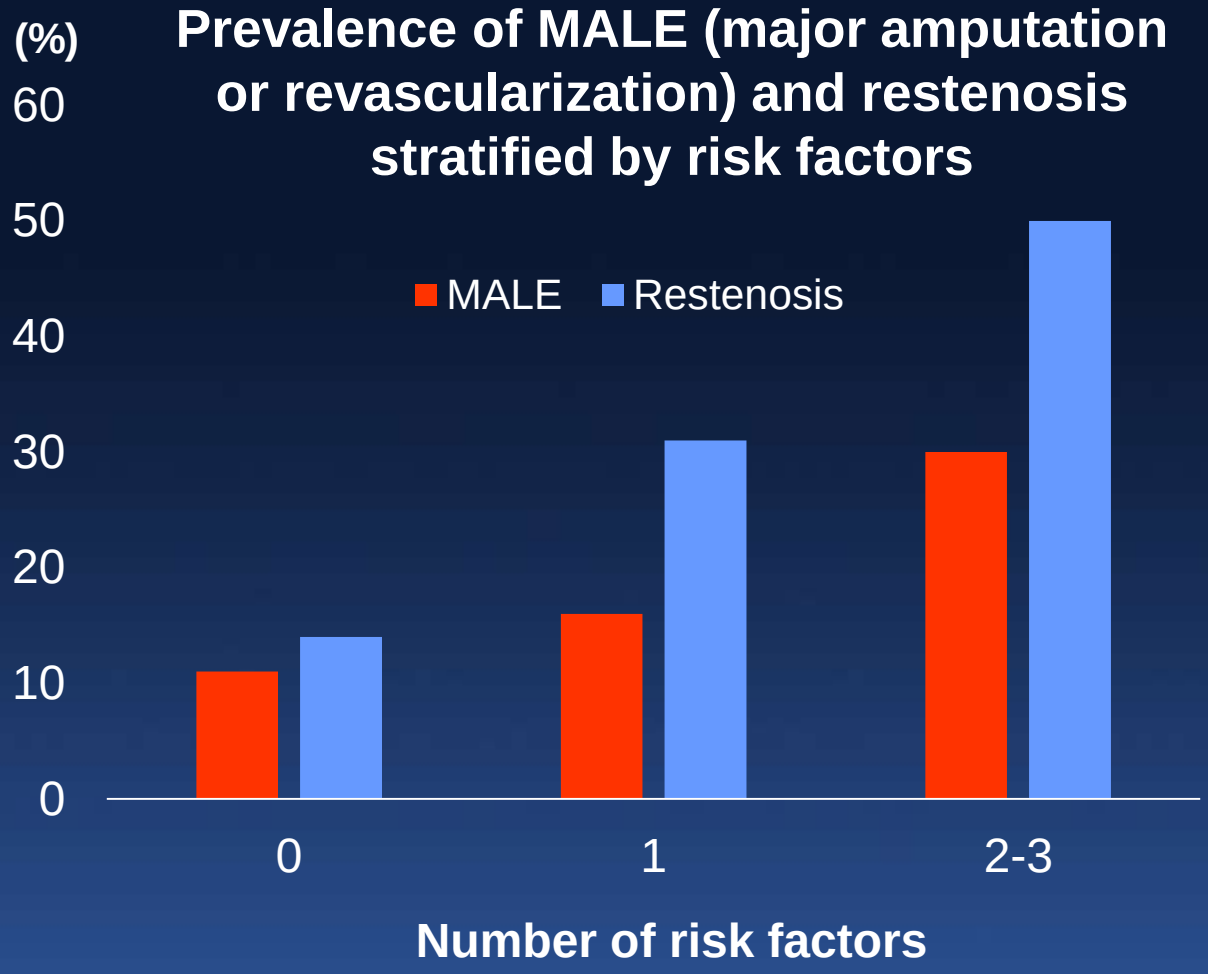


Zephyr Registry

- Multicenter
- 831 lesions in 690 pts
- IVUS: 76%
- Femoral-popliteal lesions
- Taxus self expanding stent

Risk factors

1. Lesion length≥16cm
2. Distal vessel area<27mm²
3. Minimum stent area≤12mm²



Iida O. JACC Cradiovasc Interv. 2015;8:1105-12.

Summary

1. Compared to CAD lesions, PAD lesions were longer, had more concentric, diffuse, and calcified plaque, and vessels volumes were smaller.
2. Although increase of calcium arc or plaque eccentricity was correlated to the increase of plaque burden in both PAD and CAD, calcium arc is larger and plaque is more concentric in PAD vs CAD according to the different amounts of plaque (plaque burden).