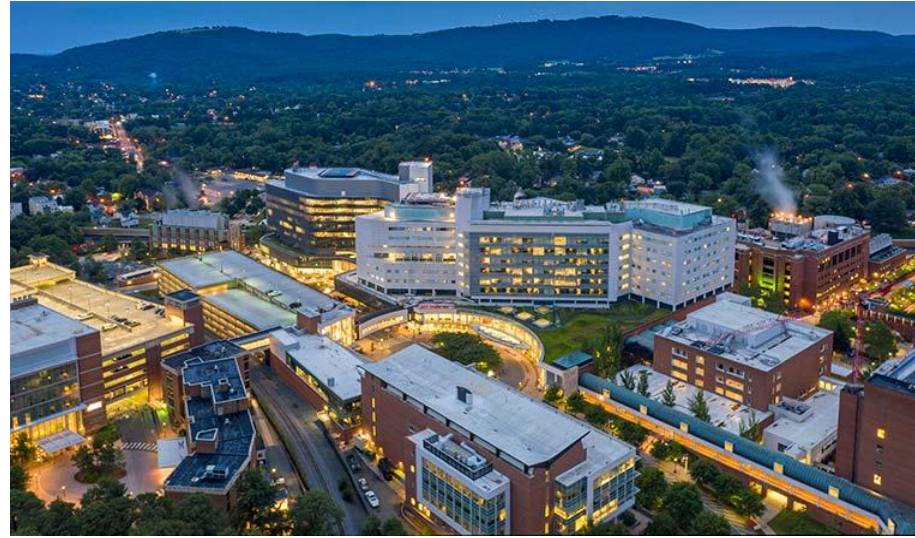


Advances in Imaging for Ischemic Heart Disease



Jonathan R. Lindner, MD, FASE, FACC
Frances Myers Ball Professor of Medicine
Vice-Chief for Research
Division of Cardiovascular Medicine
University of Virginia
Charlottesville, VA

Research Support and Disclosures

Research Support/Disclosures:

- NIH: R01-HL130036
- NIH: R01-HL165442
- NIH R01-HL1711377
- NASA: 18-18HCFBP_1_009
- Lantheus Medical Imaging (IIT research grant)

Scientific Advisory Board:

- BioMarin Pharma Inc.
- Regeneron

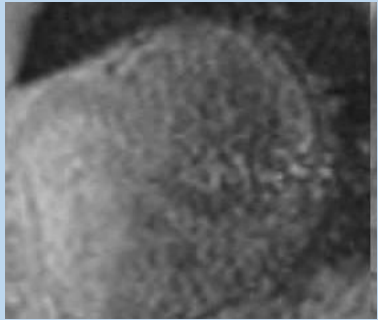
Multimodality Imaging in Ischemic Disease

Functional: Perfusion

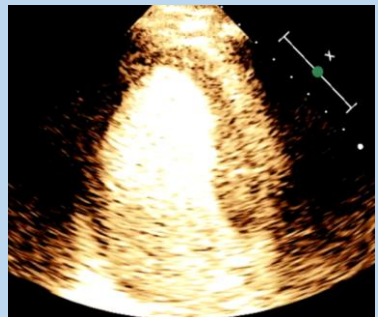
PET/
SPECT



CMR

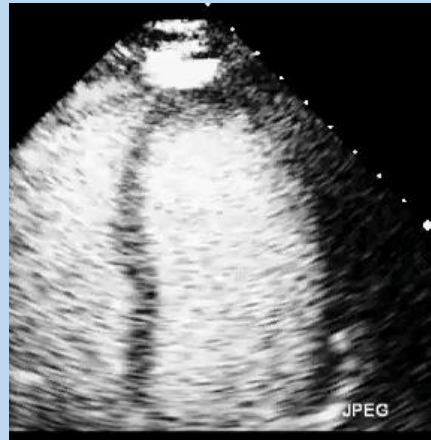


MCE

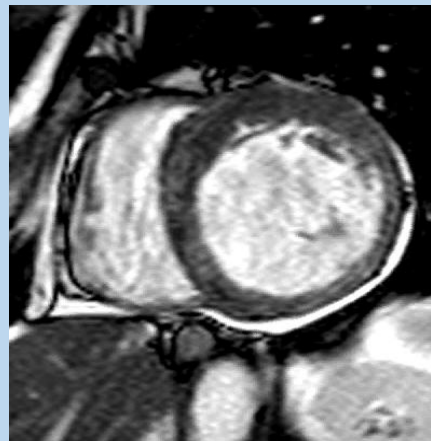


Functional: Contractile Reserve

Stress
Echo

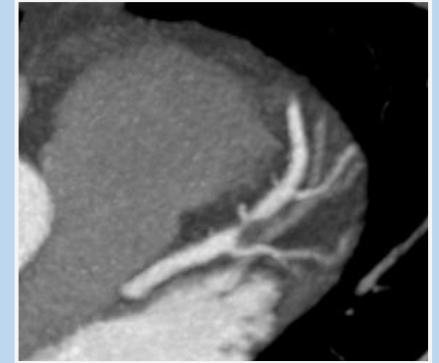


Stress
CMR

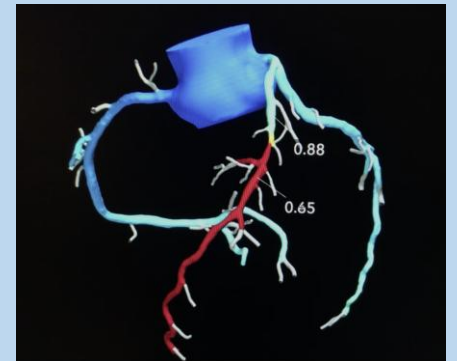


Anatomic

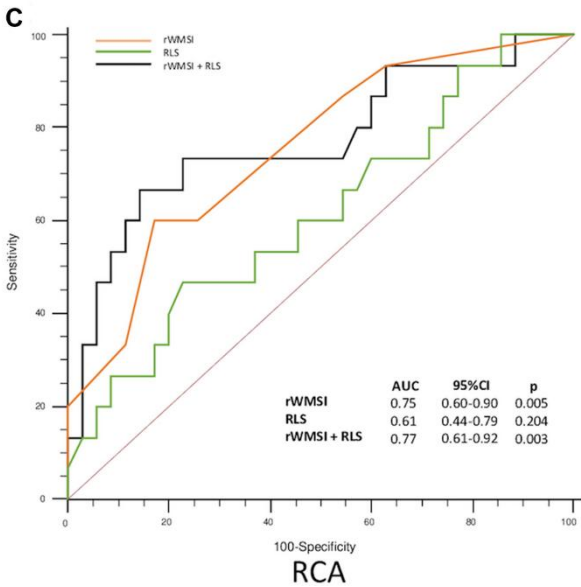
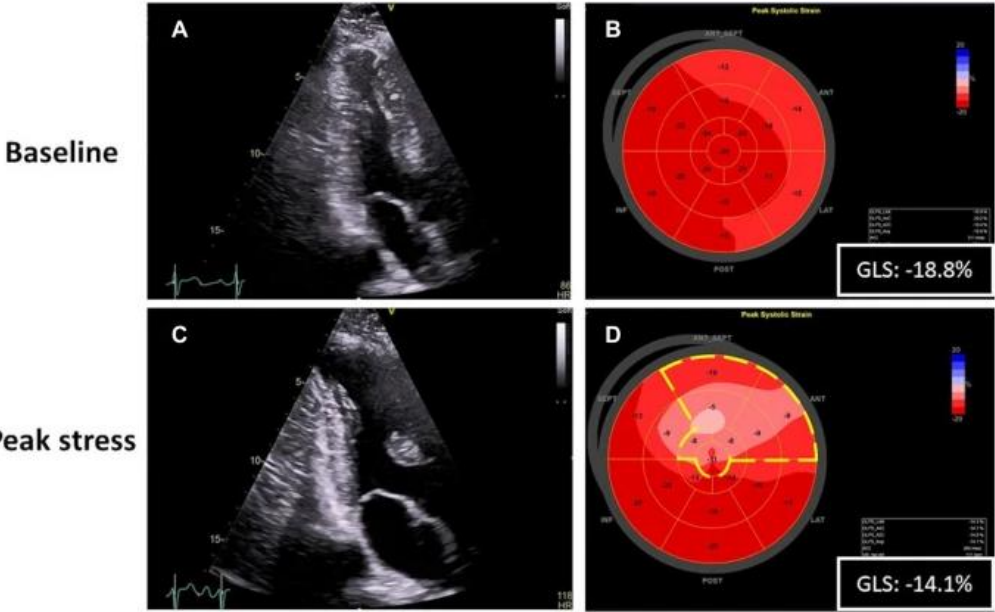
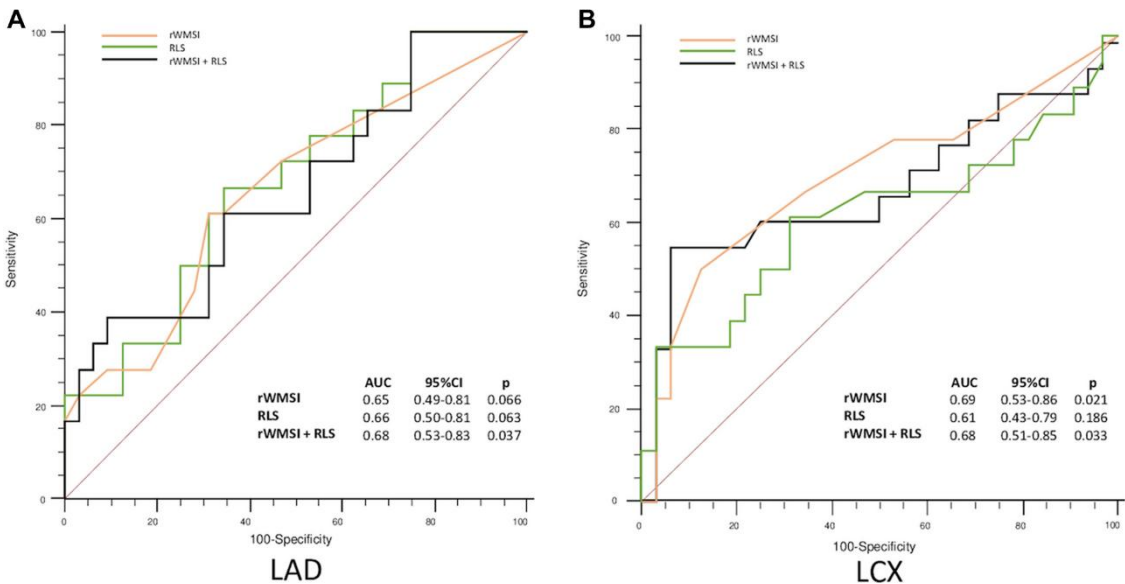
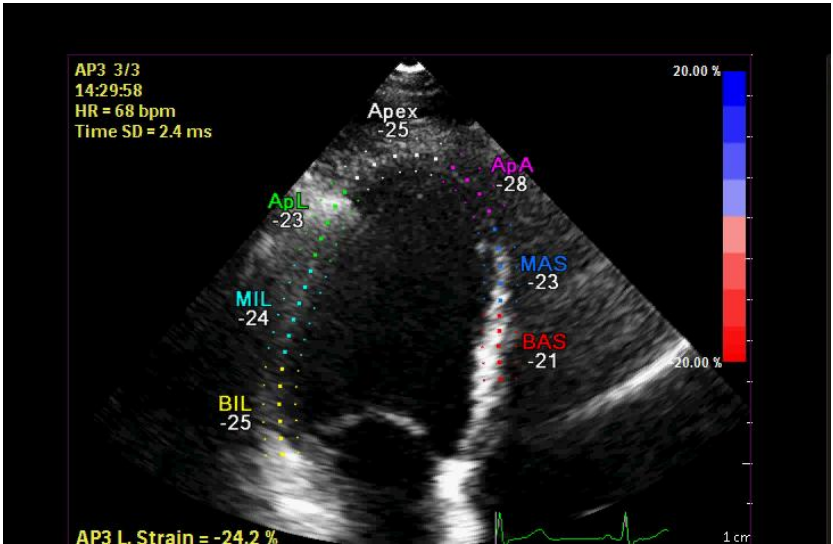
CTA



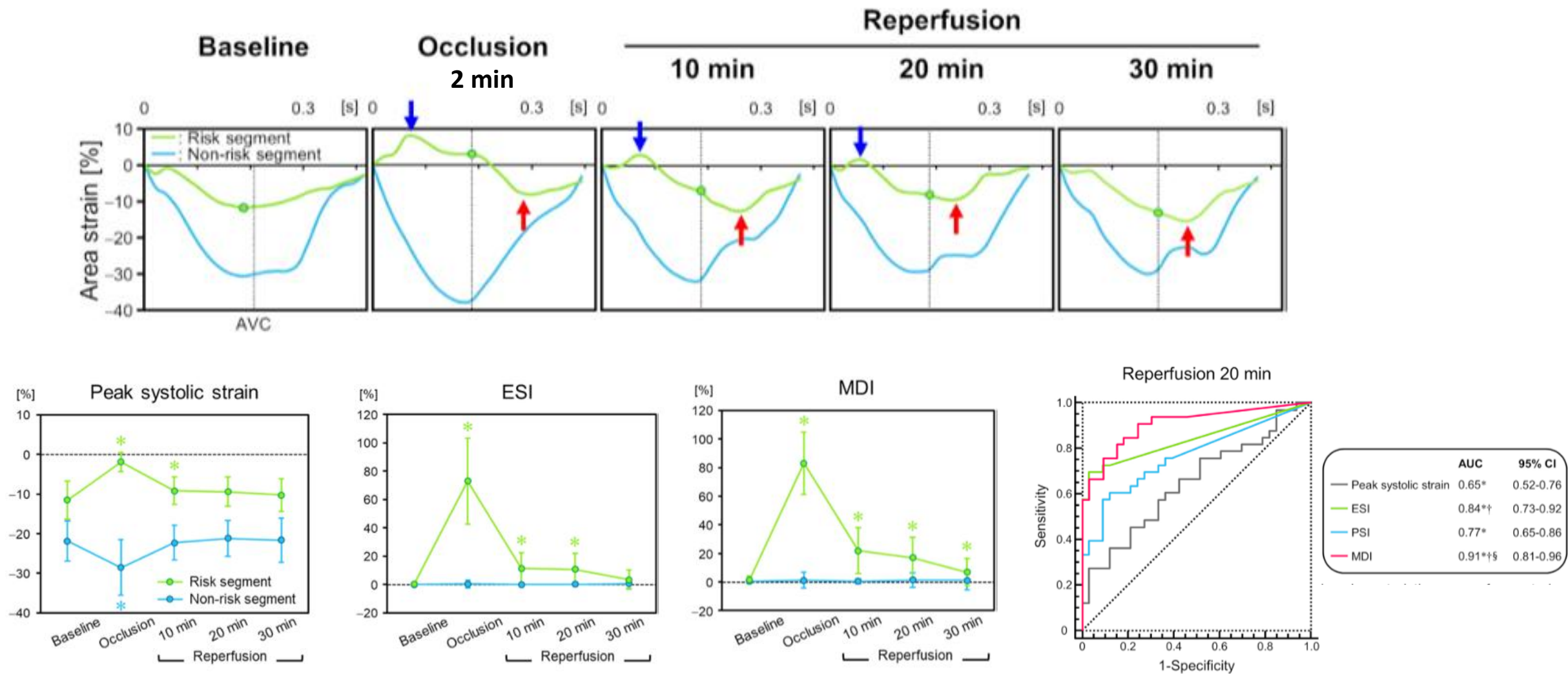
CT
FFR



Speckle Strain Imaging During Stress echo

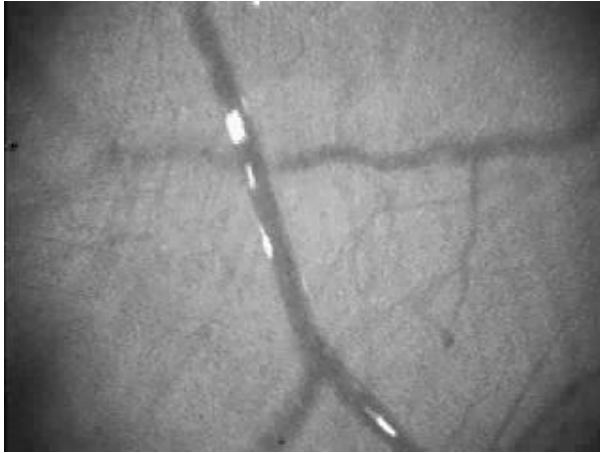


Speckle Strain Imaging For Recent Ischemia (Sensitive Stunning Imaging)

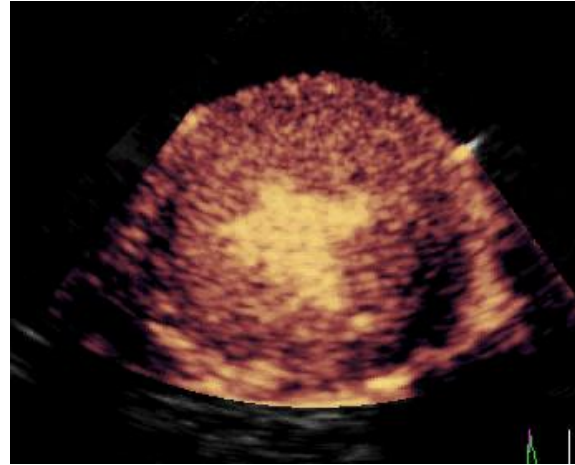


MCE Perfusion Imaging

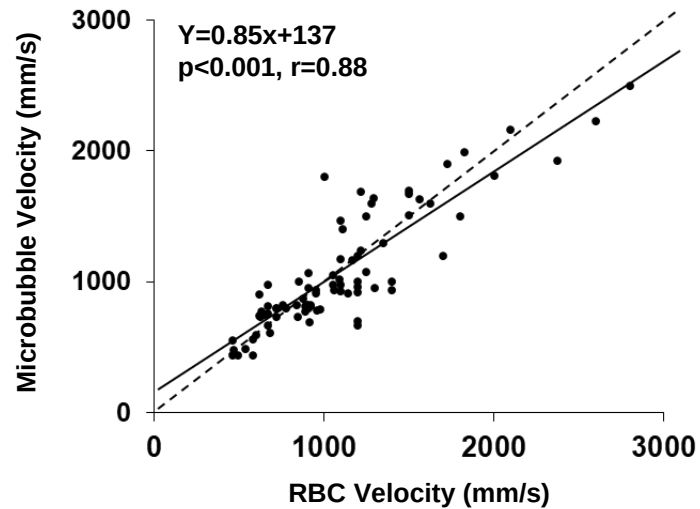
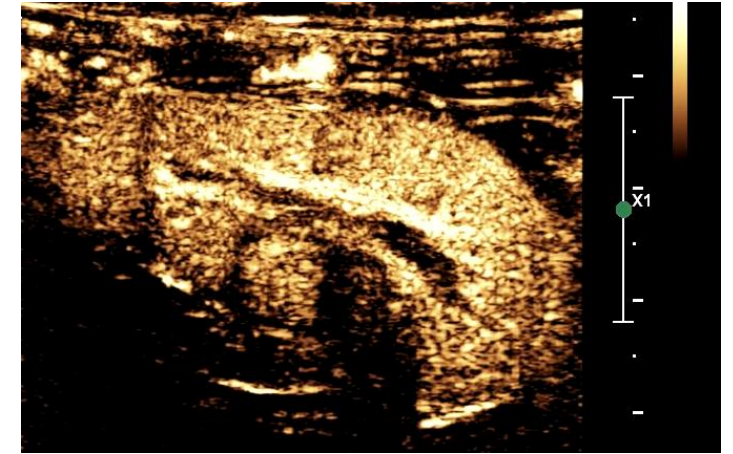
Intravital Microscopy



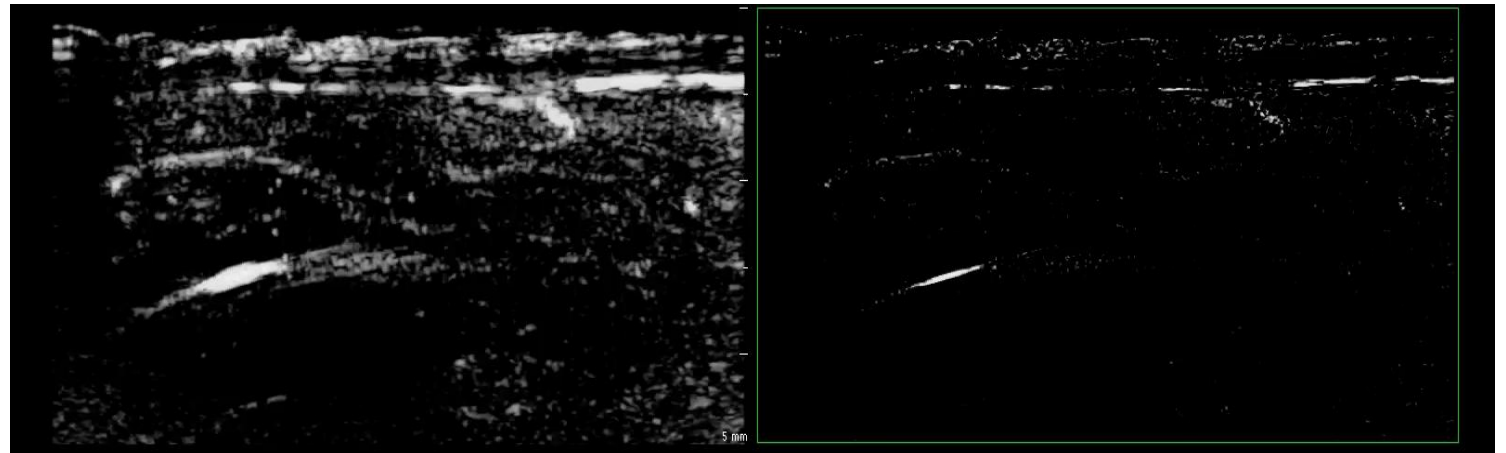
Myocardial Perfusion



Renal Perfusion

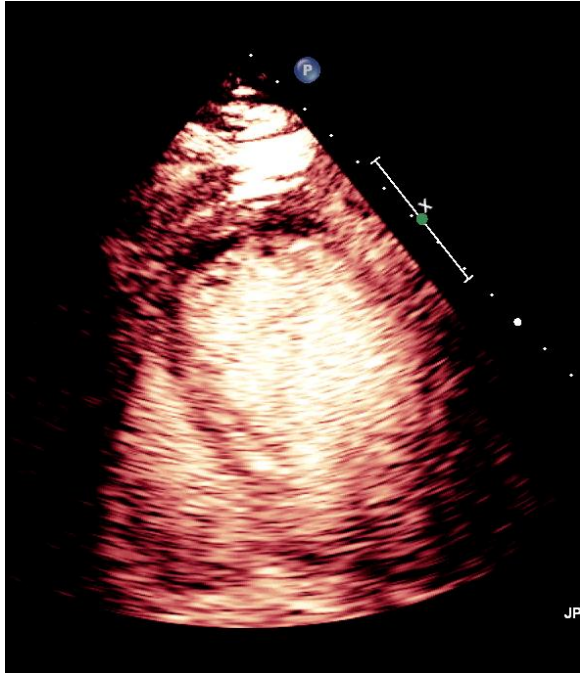


Skel Muscle Perfusion

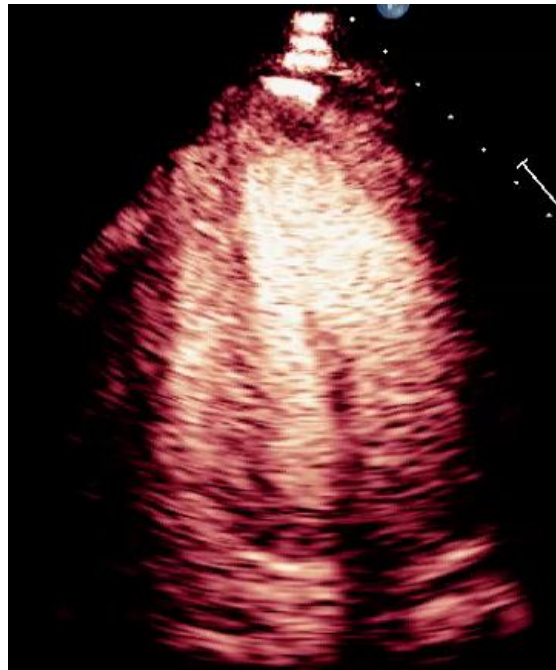


POC Perfusion Imaging in Chest Pain: Opportunities for Precision Medicine

**Lack of
perfusion**



**Regional
hypoperfusion**

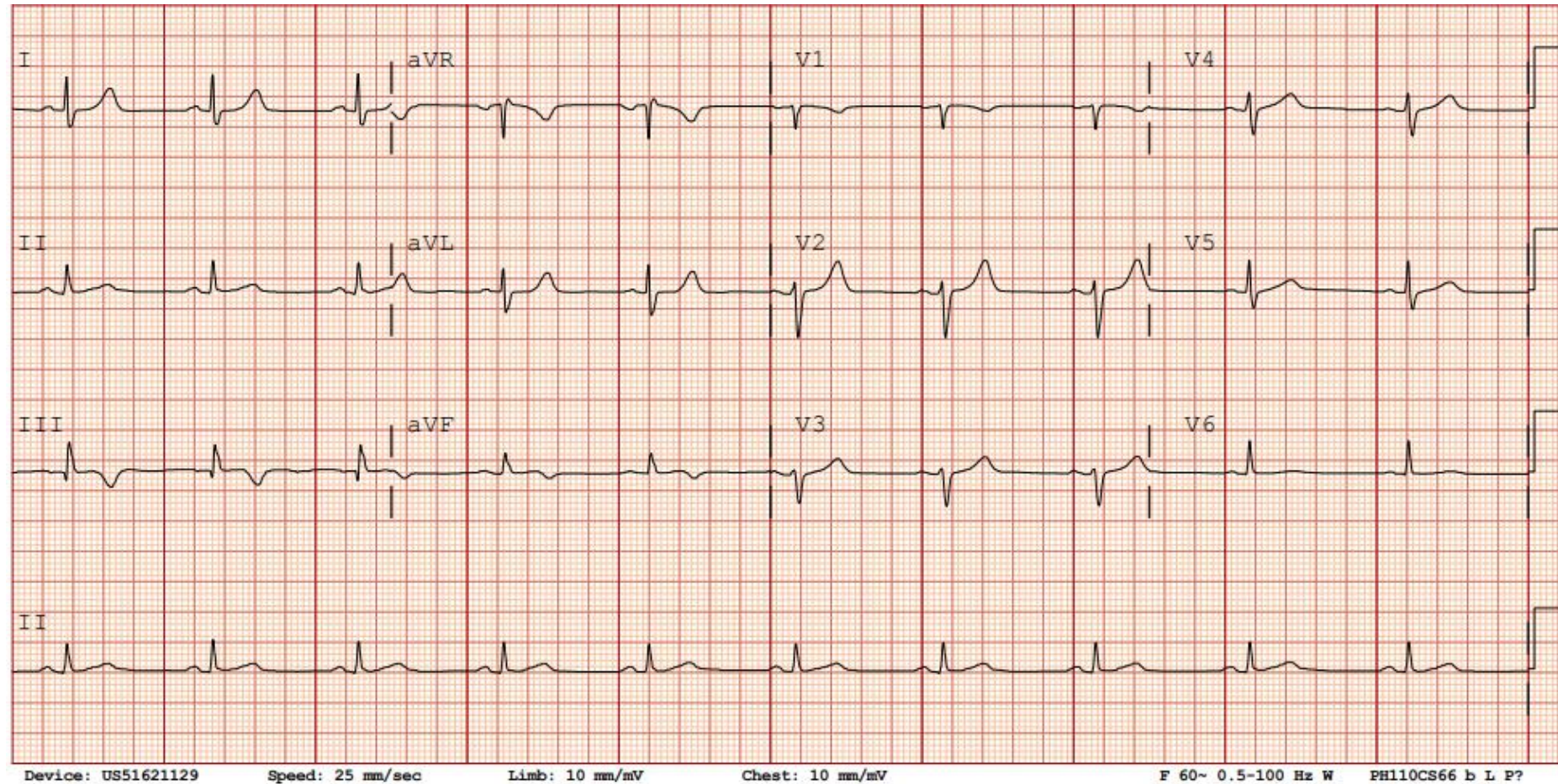


**Hyperemia with
stunning**

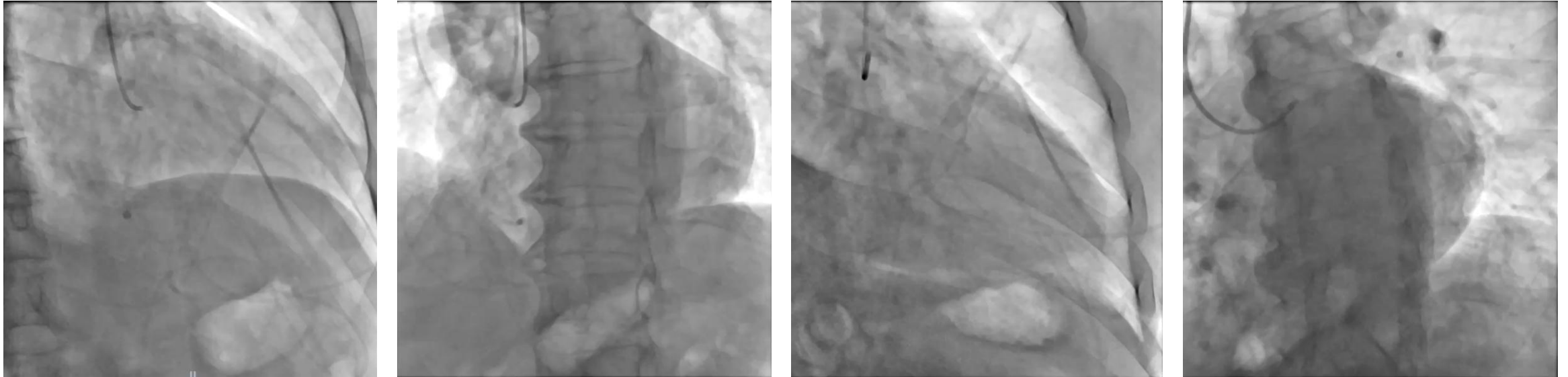


Patient 1: NSTEMI

- 63 y.o. male with history of non-treated HLD and past tobacco use
- Presents to ED with CP and hsTroponin 1,716 ng/L

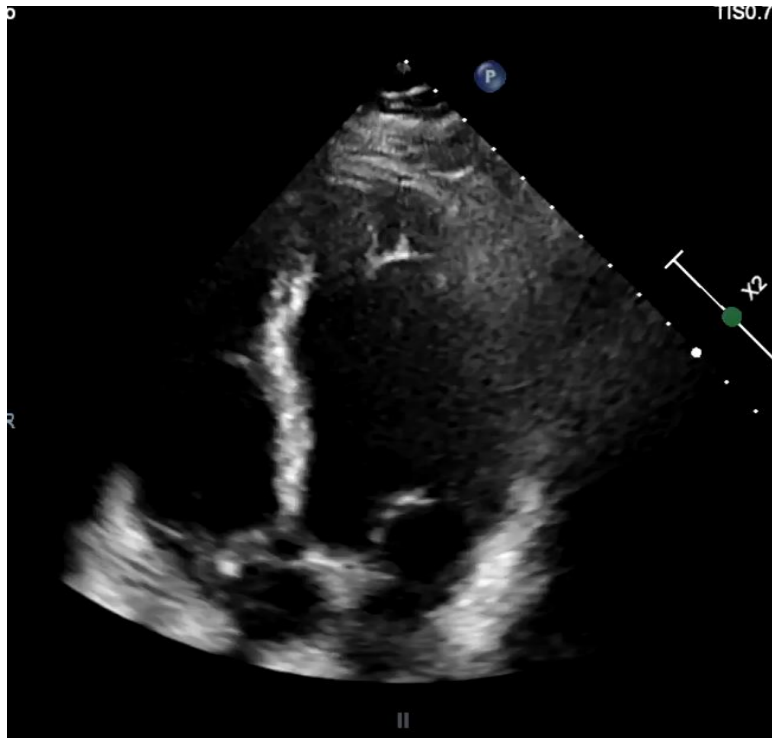


- Urgent angiography performed
- RCA occluded with extensive thrombus; tight stenosis of OM1

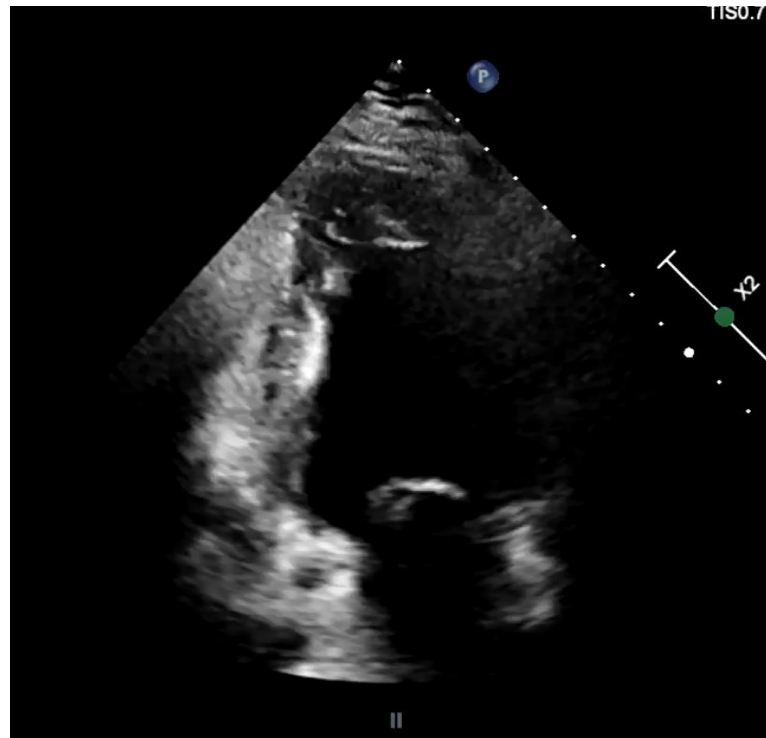


- PCI deferred to allow “some resolution or stabilization of RCA thrombus”

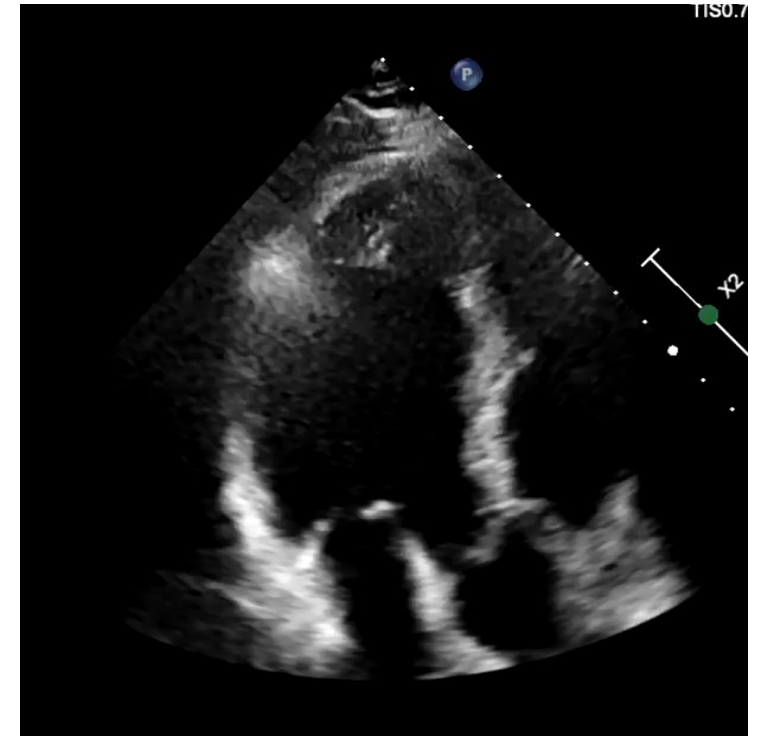
Apical 4ch



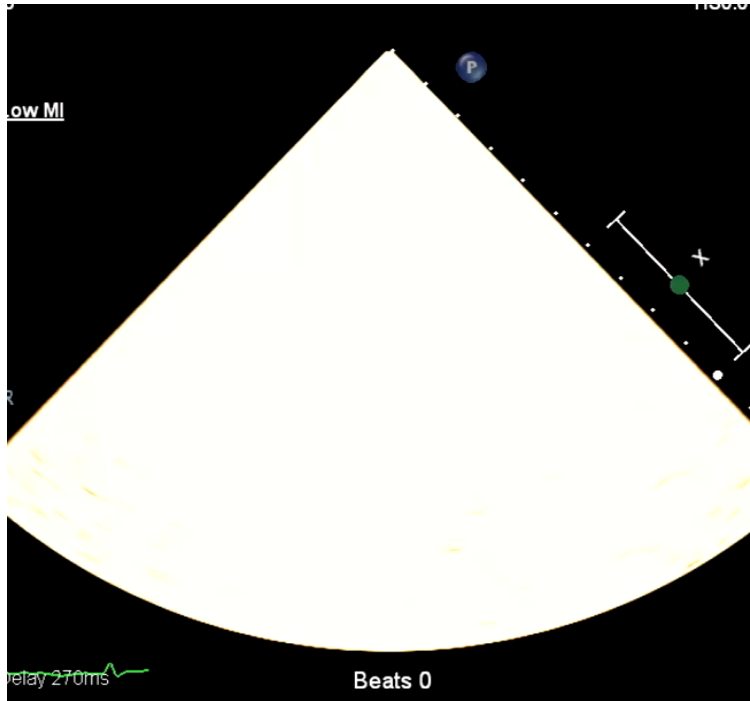
Apical 2ch



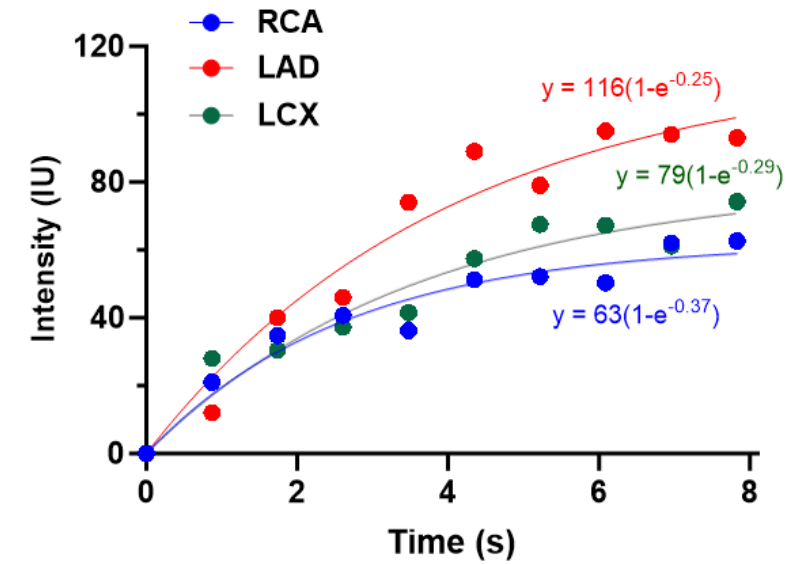
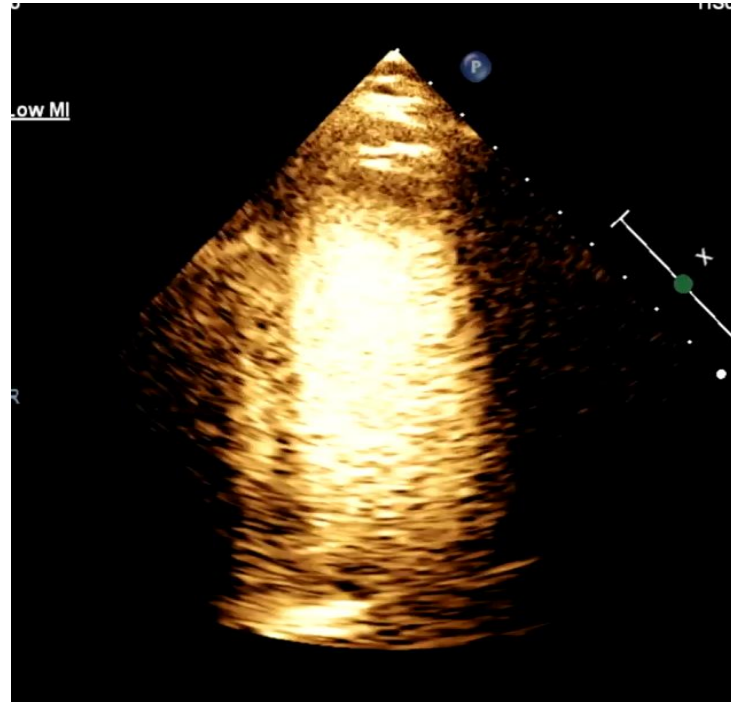
Apical 3ch



Apical 2ch

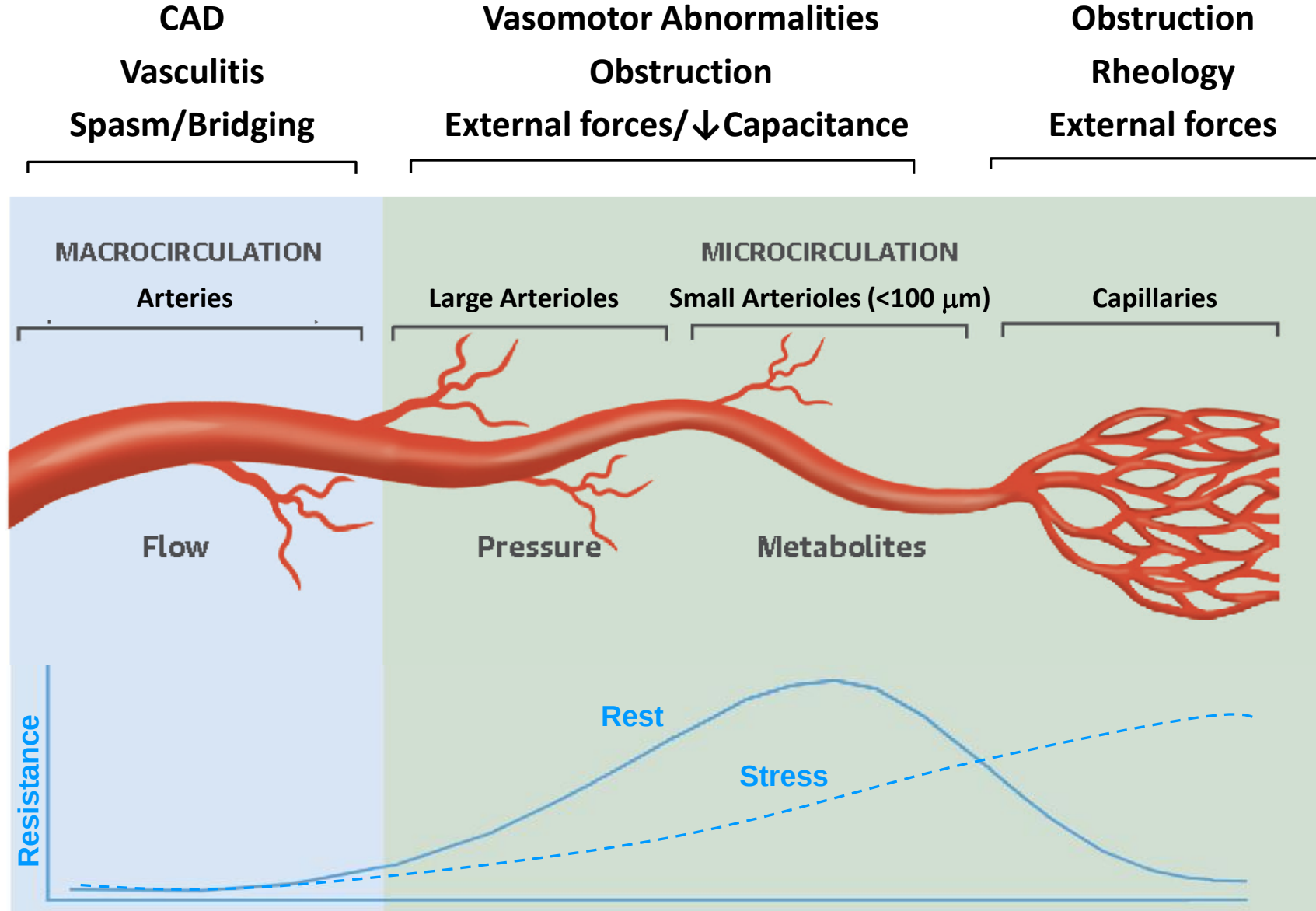


Apical 2ch real-time

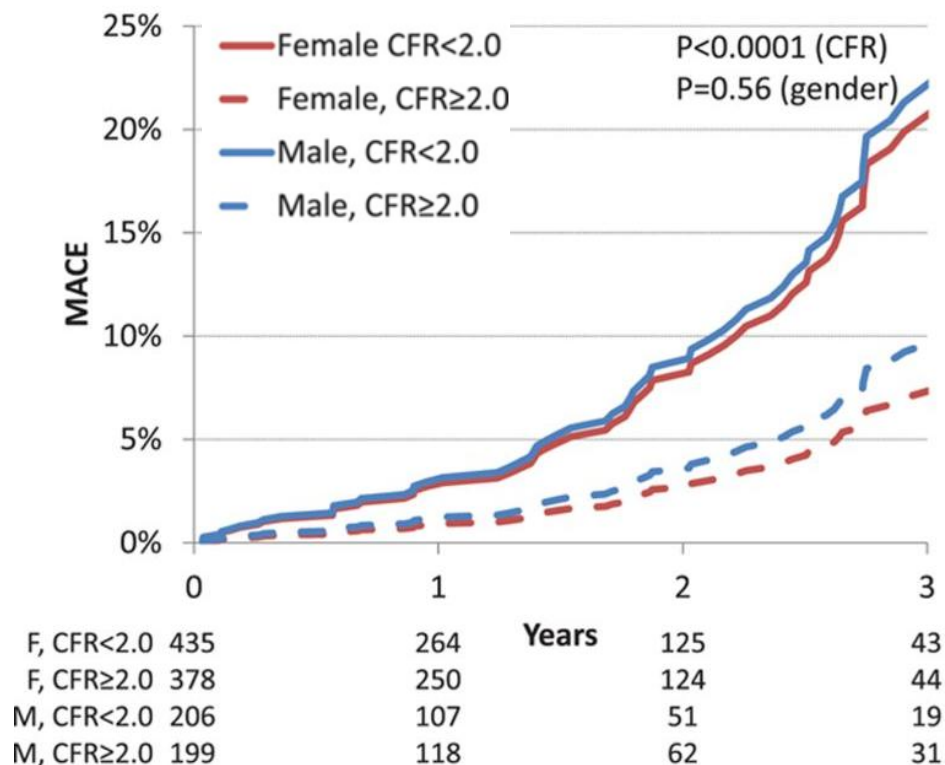


- Viability present in the RCA distribution
- Comfort provided that deferring PCI of RCA and LCx would not result in much further damage

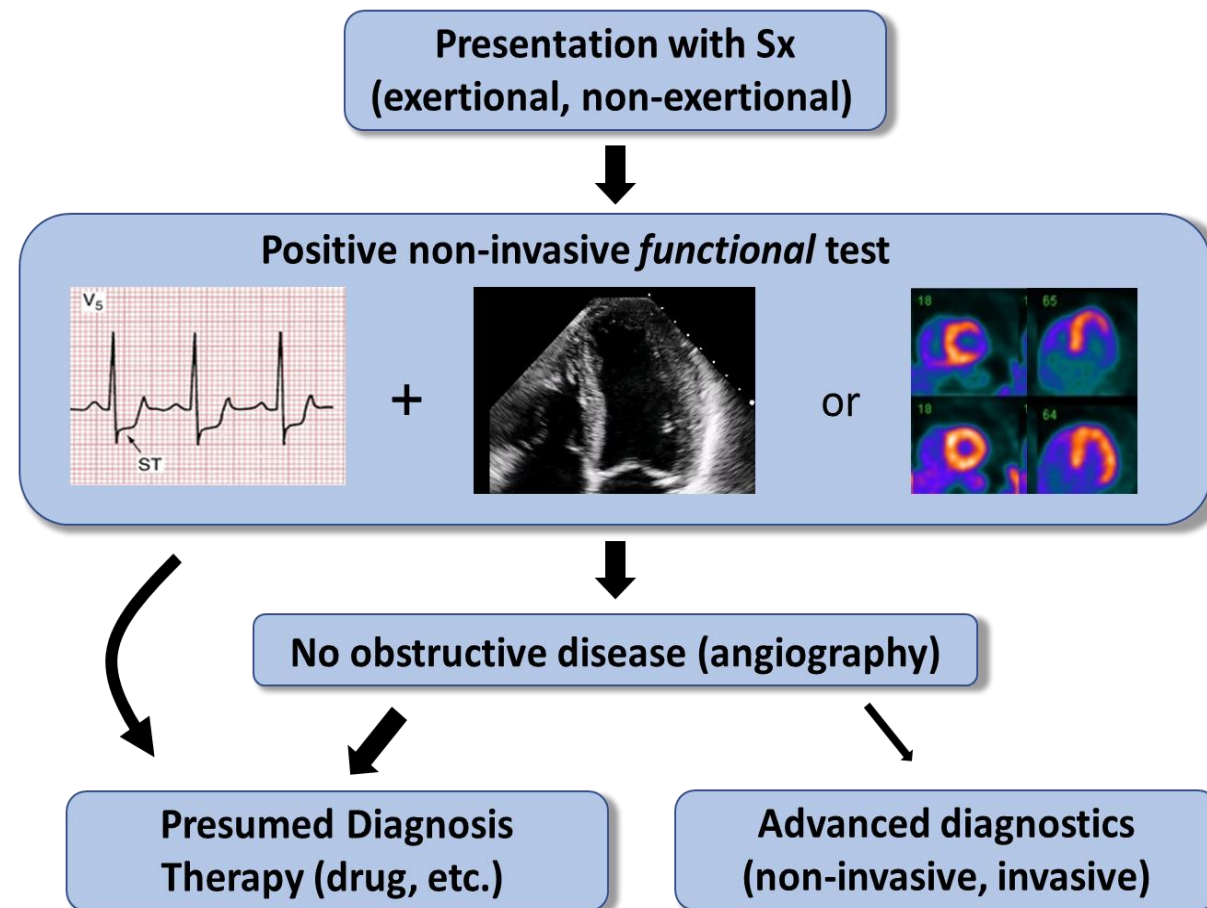
Spectrum of Microvascular Pathology



INOCA: Prognosis and Pathway to Identification

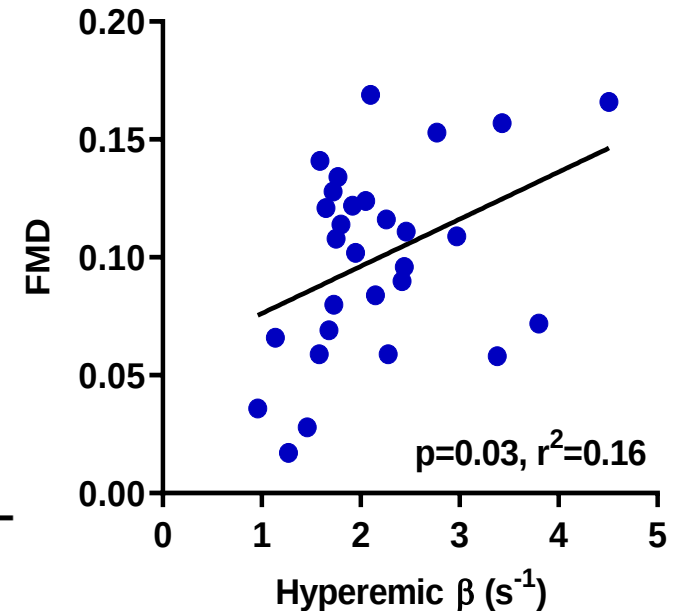
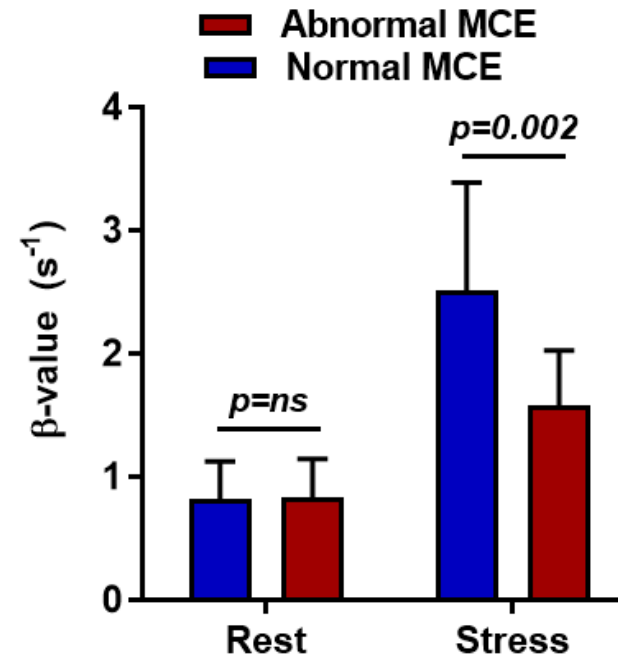
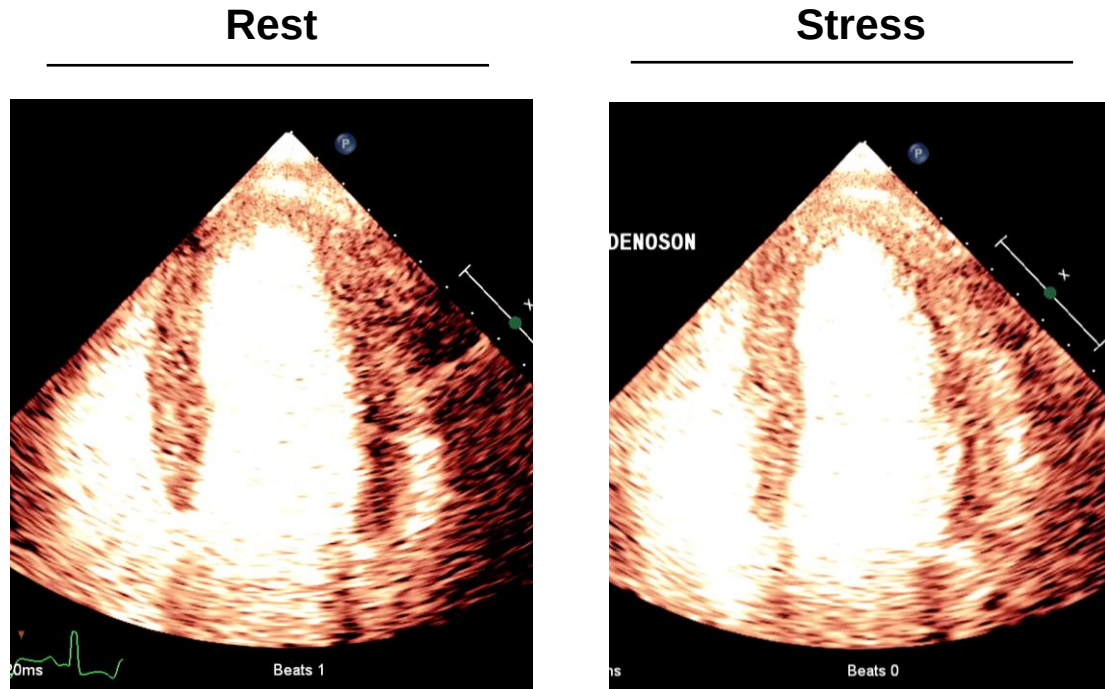


Murthy V, et al., Circulation 2014;219:2518



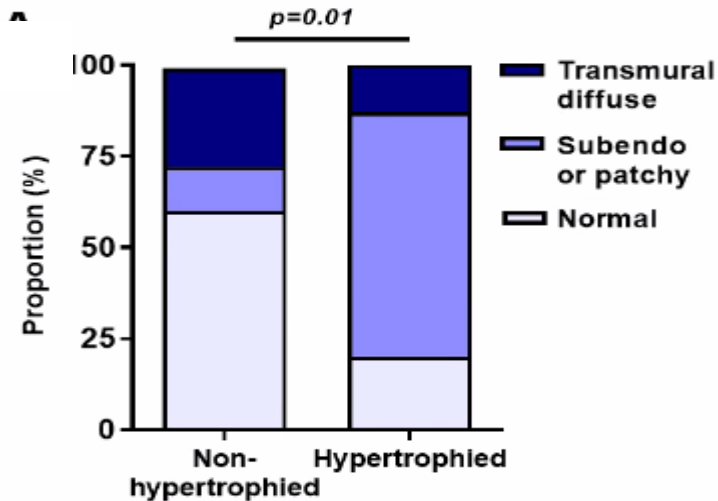
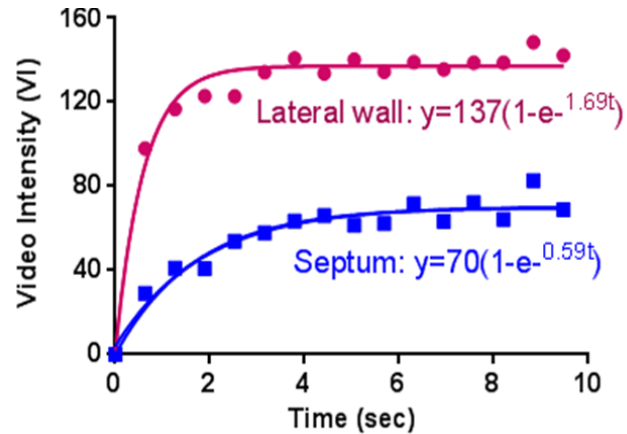
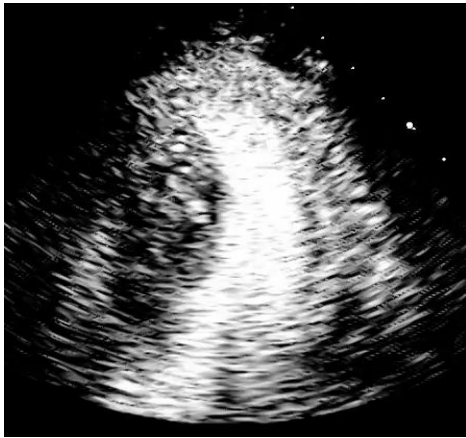
Vasodilator MCE for Microvascular Dysfunction

- Approximately 40% of those referred for coronary CTA with no obstructive CAD had abnormal hyperemic perfusion (INOCA)



Stress MCE for Microvascular Dysfunction

Hypertrophic CM



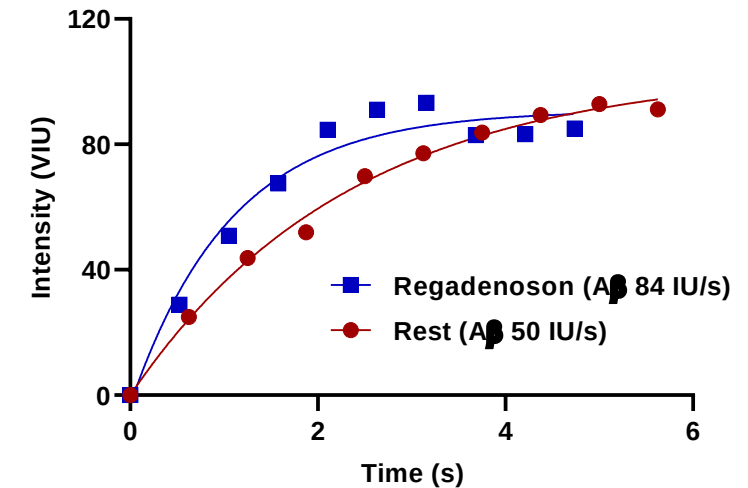
Roldan P et al, Cardiovasc Ultrasound 2022;20:S12947

Transplant Vasculopathy

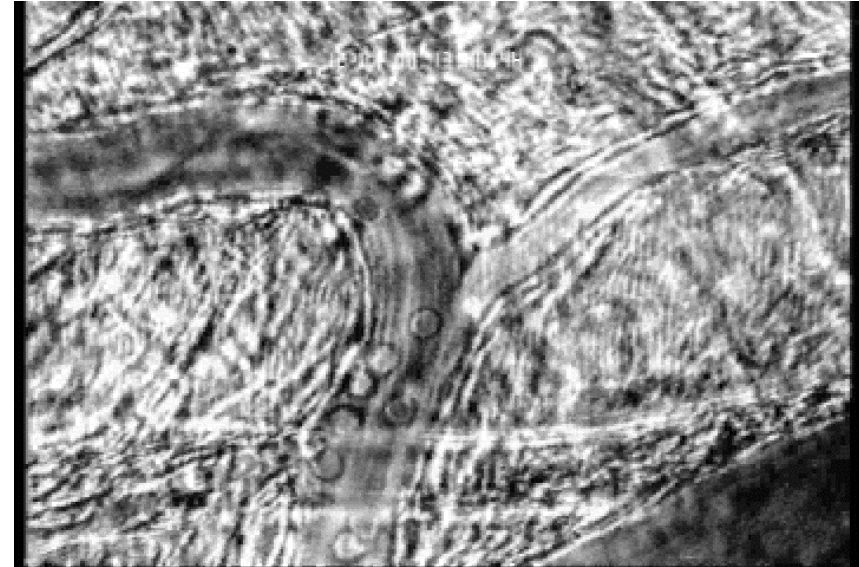
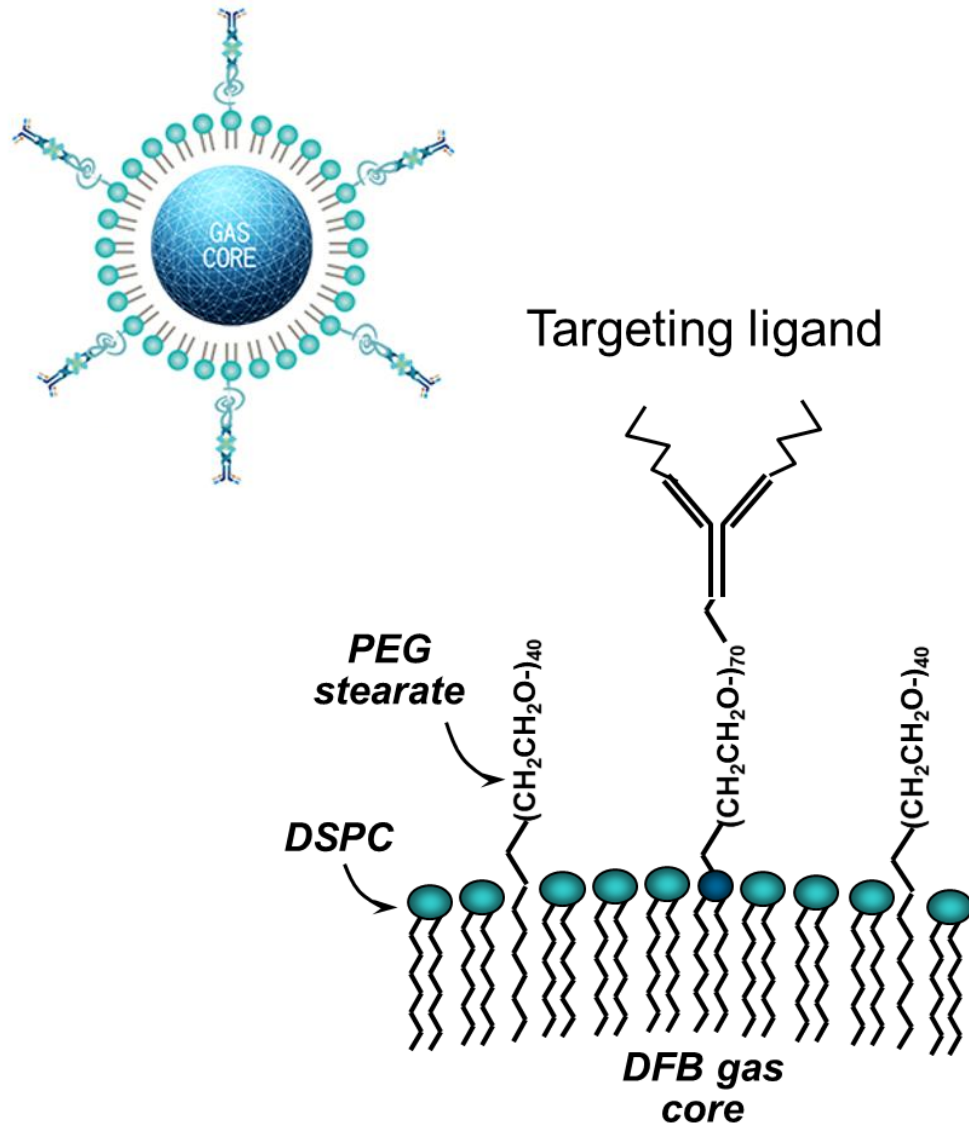
Rest



Stress

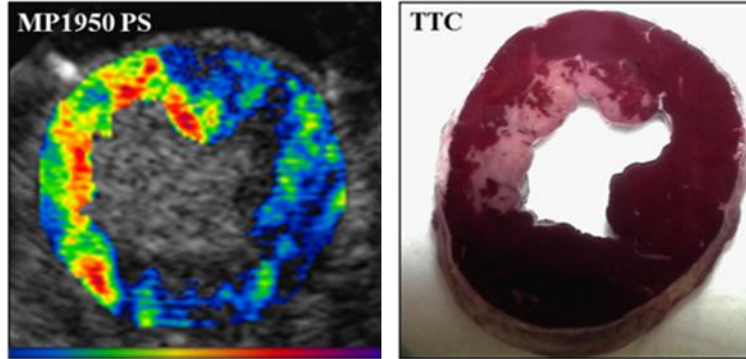


Targeting MBs Through Surface Ligands

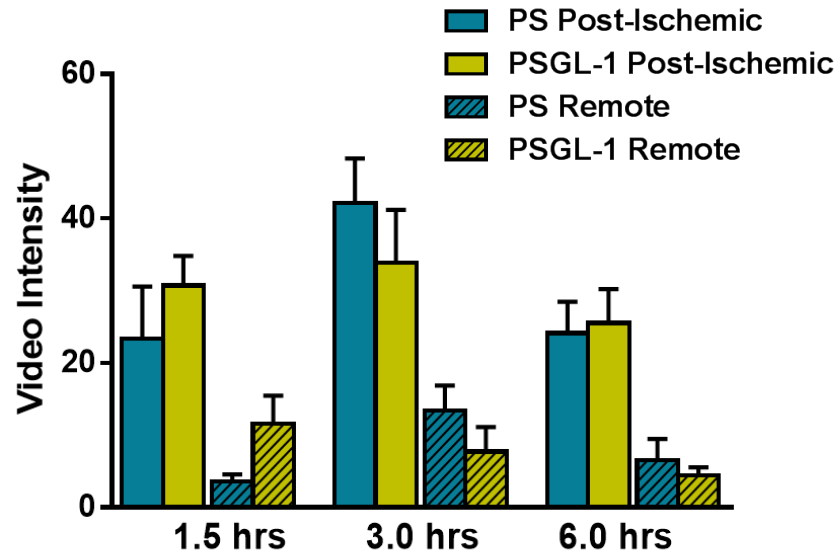


Ischemic Memory through P-selectin and Phosphatidylserine Biology

Pre-clinical Molecular Imaging

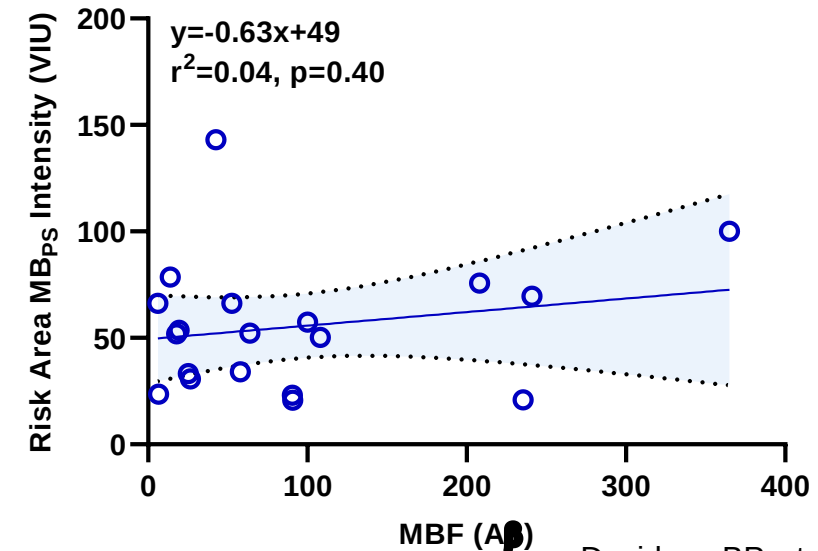
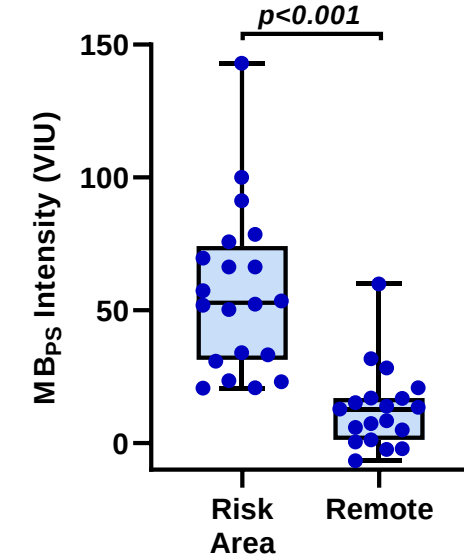
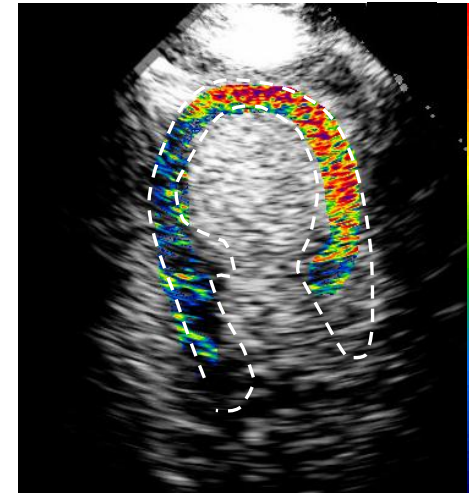


Christiansen JP, et al. Circulation 2002;105:1764



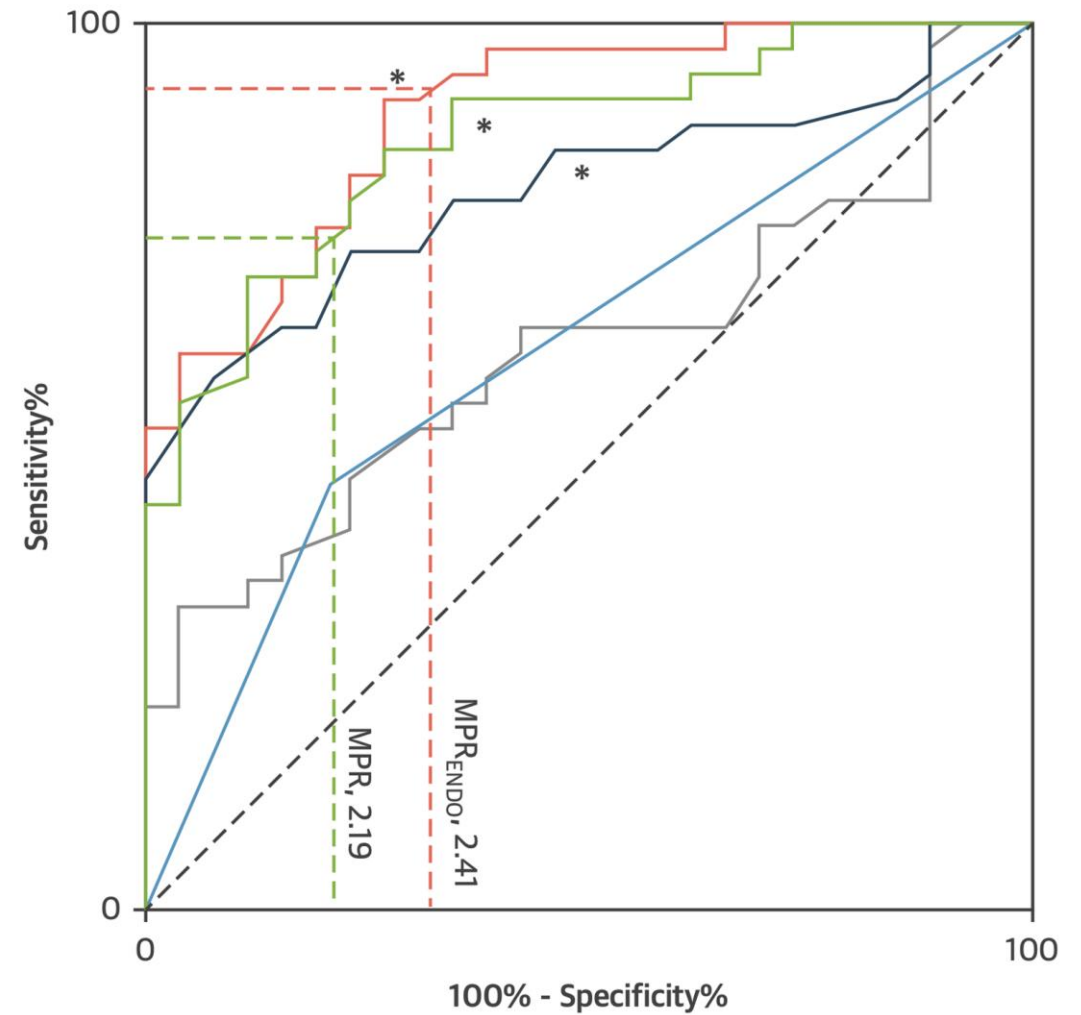
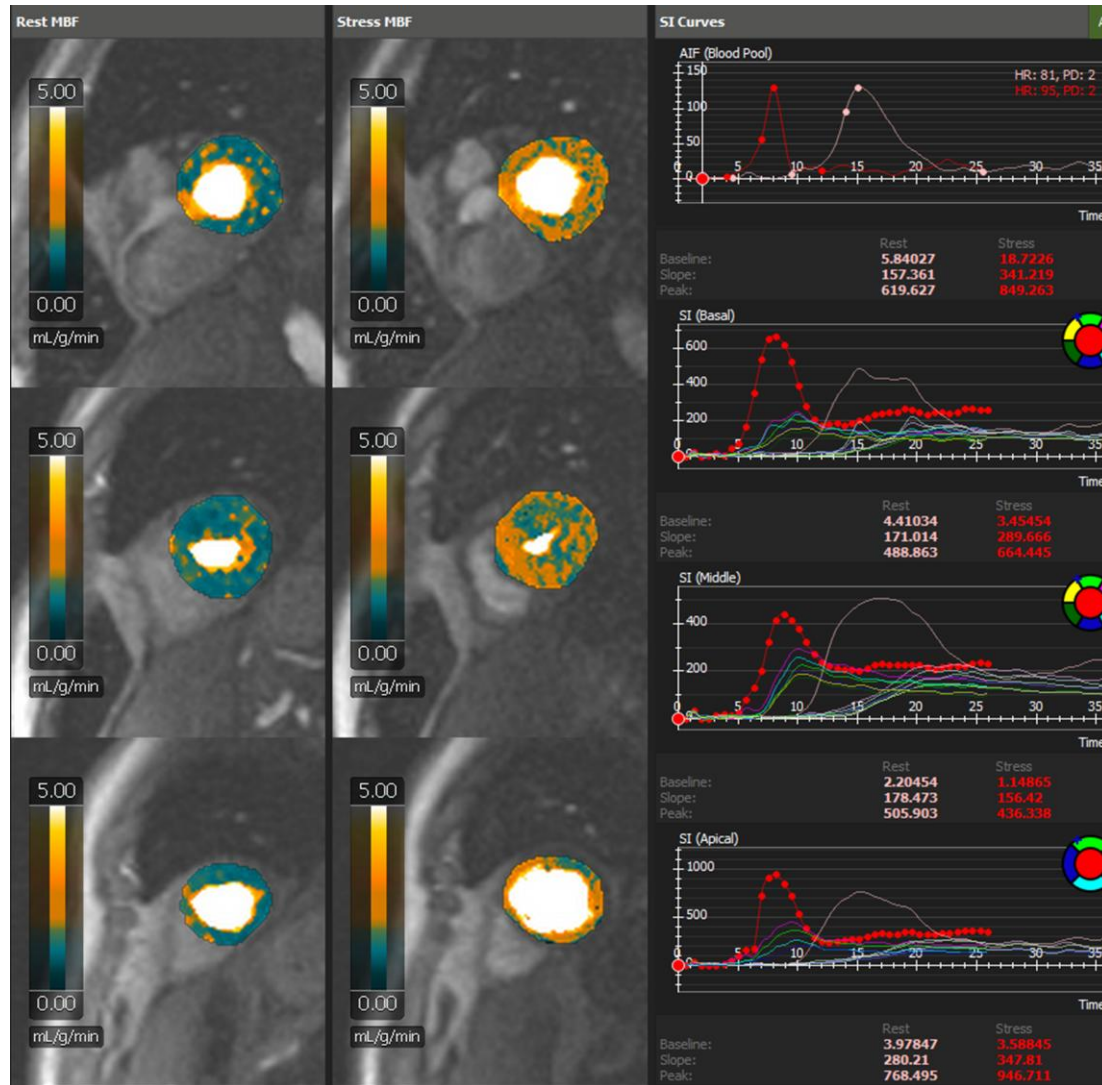
Mott B, et al. JACC CV Imag 2016;9:937

Clinical Ischemic Memory Echo

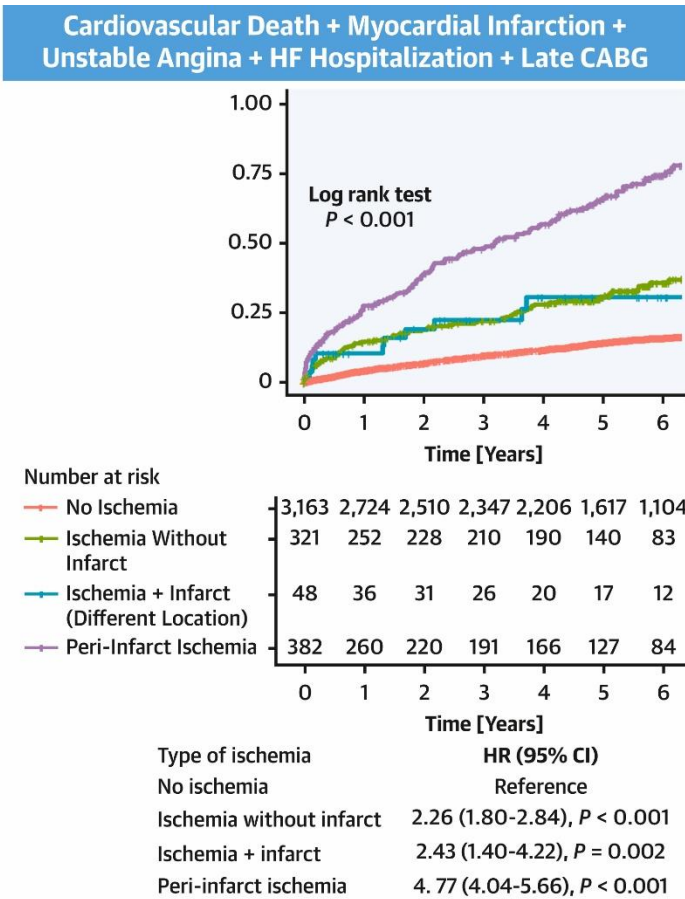
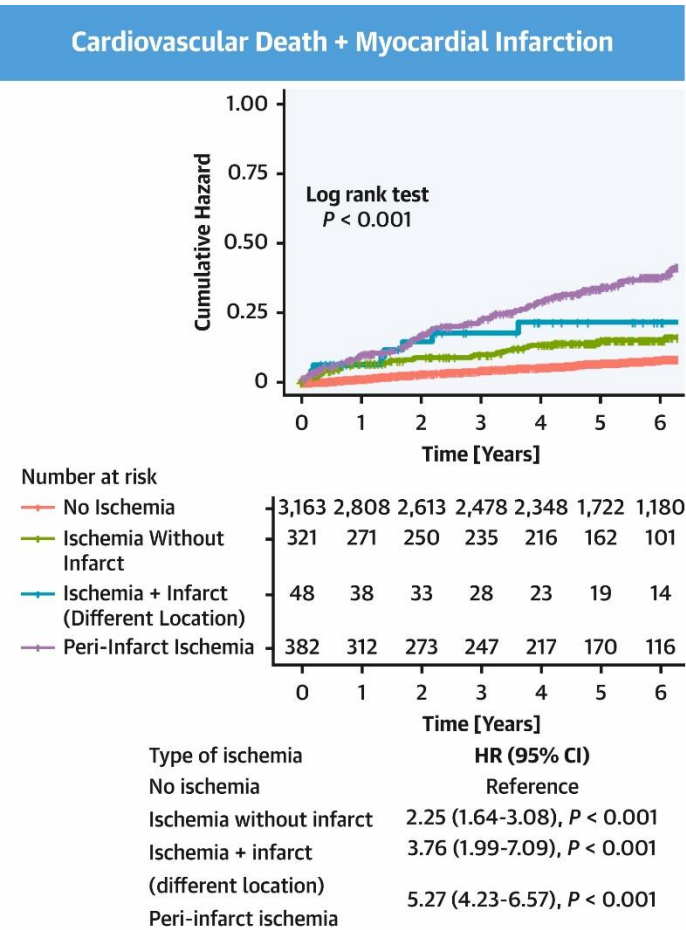
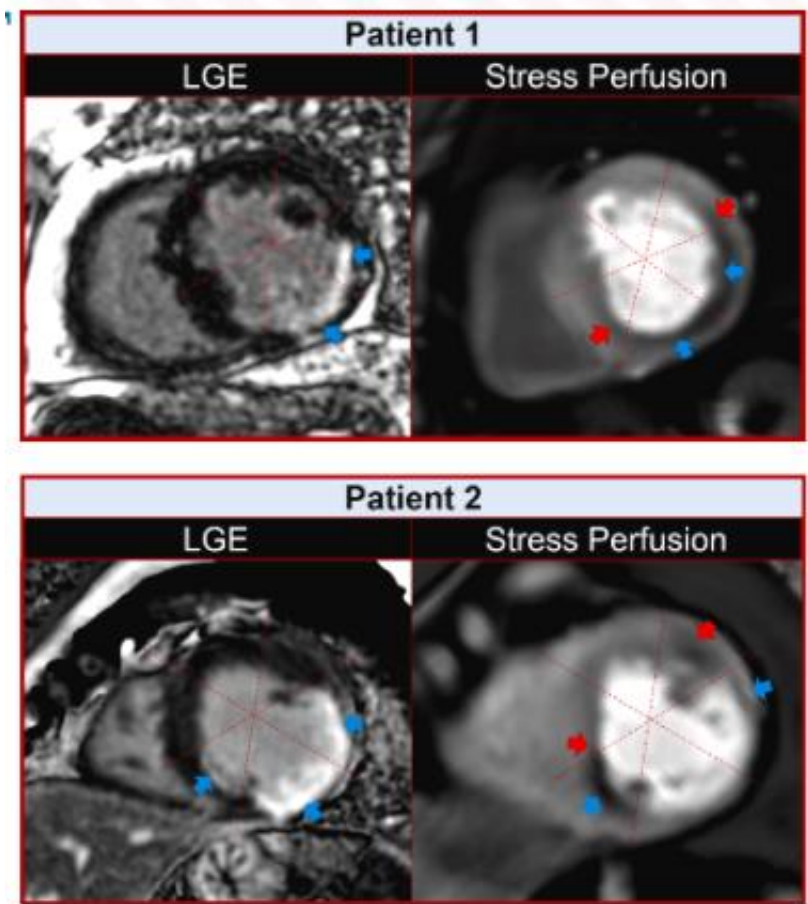


Davidson BP, et al. JACC 2021;78:1990

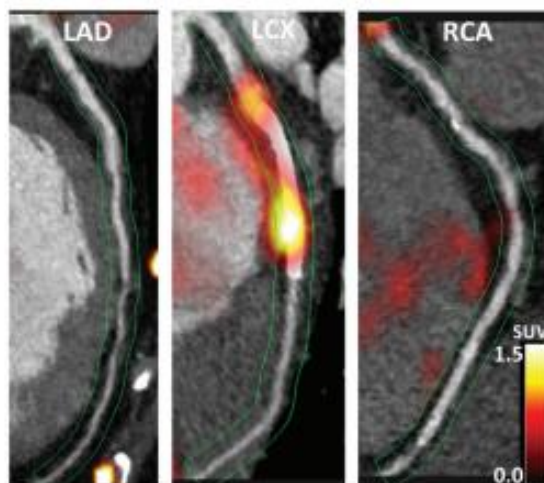
Automated CMR Perfusion and INOCA



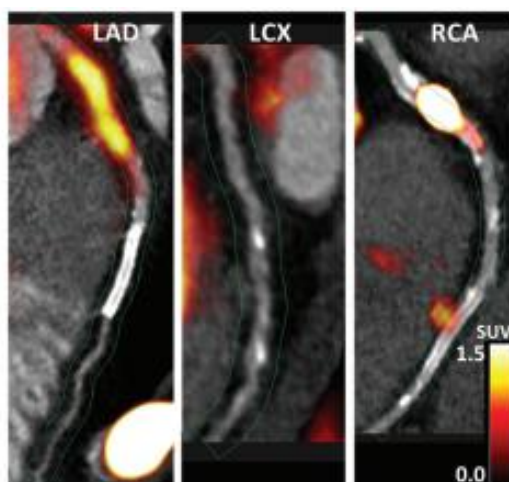
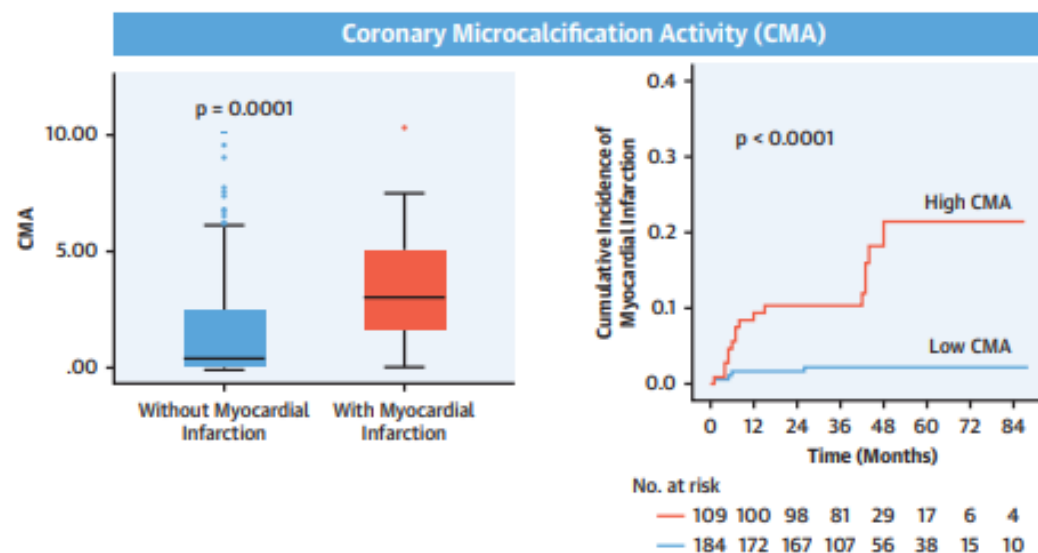
CMR – Spatial Resolution and Per-infarct Ischemia



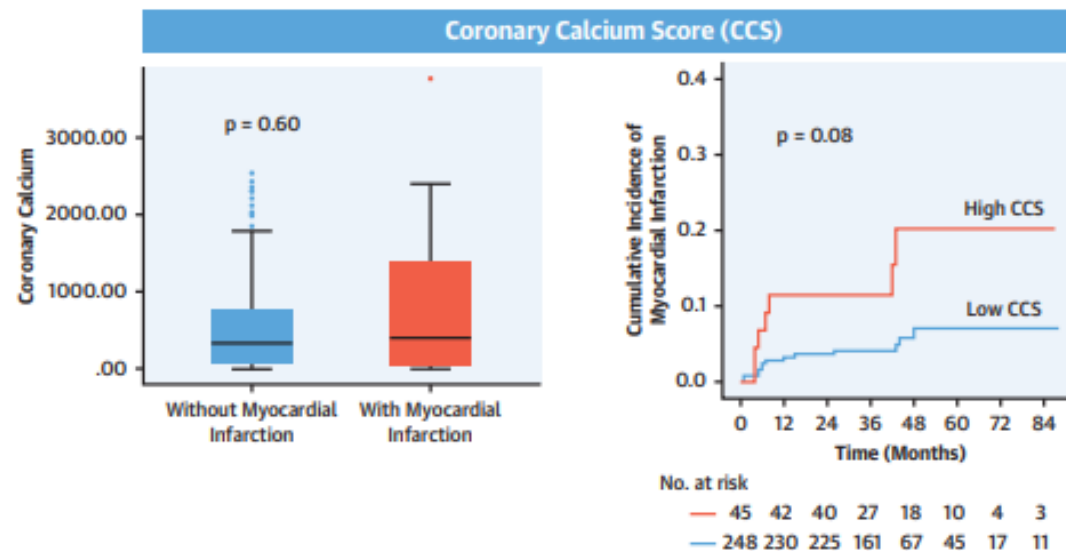
Coronary ^{18}NaF -PET for Predicting Future MI



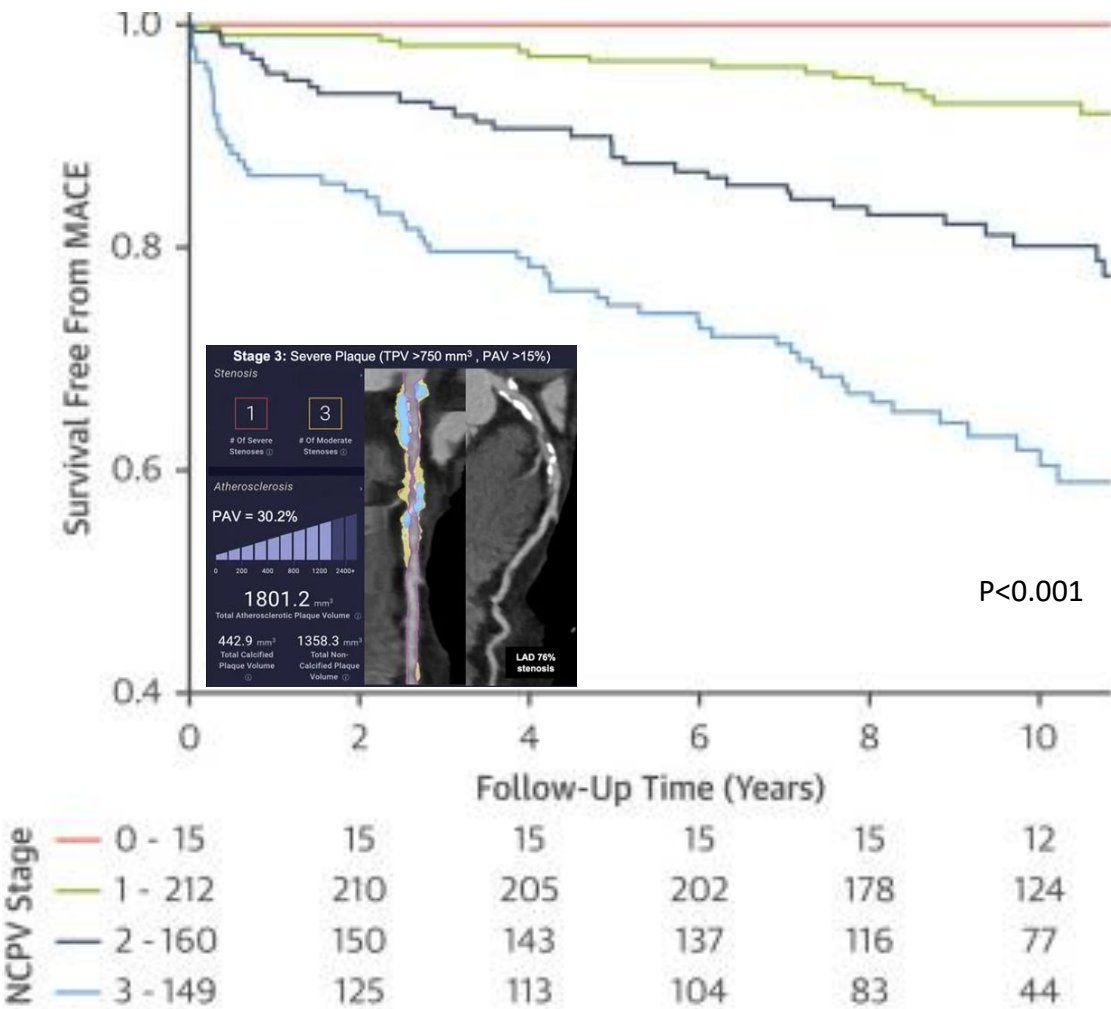
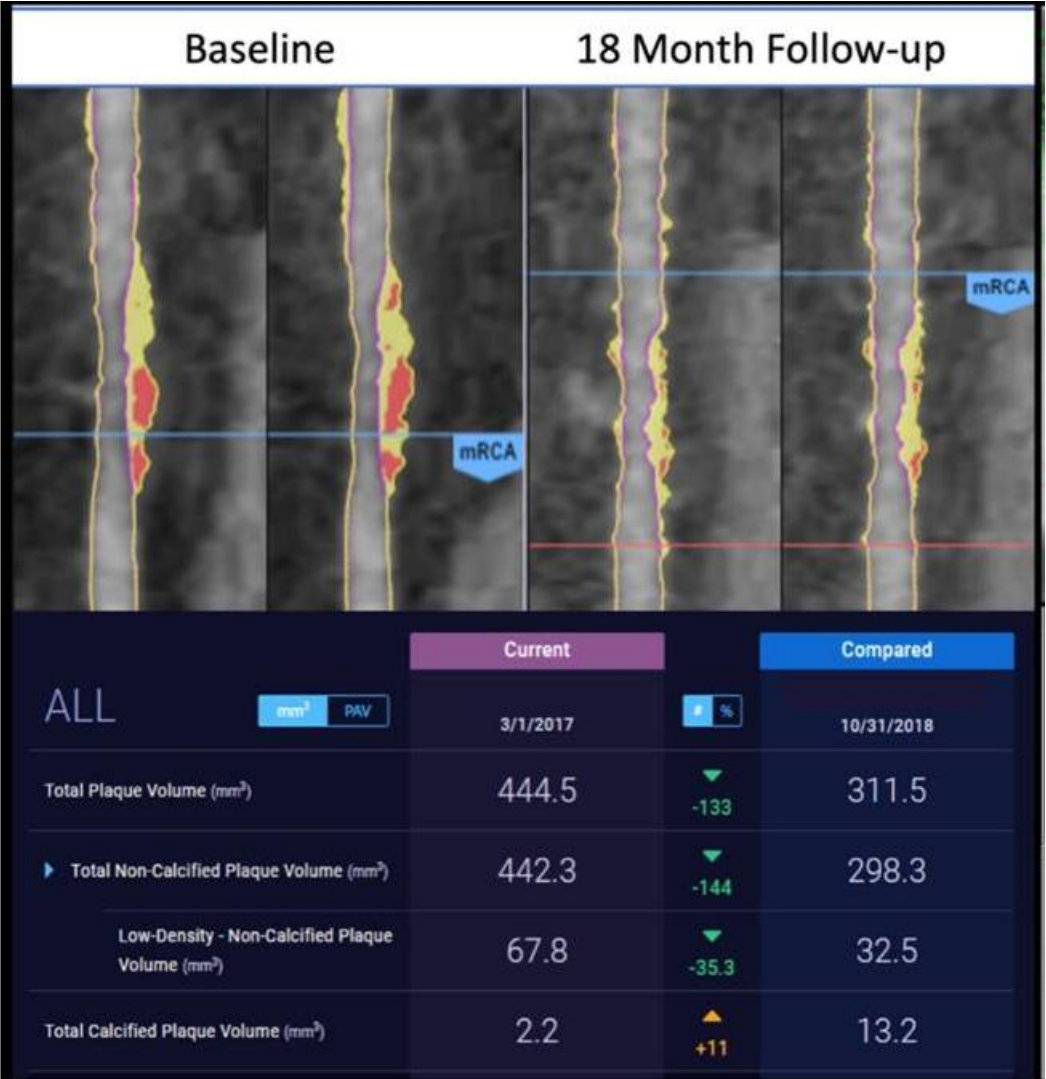
Coronary Calcium Score 26 AU
Coronary Microcalcification Activity 4.79



Coronary Calcium Score 306 AU
Coronary Microcalcification Activity 4.36



CTA and Plaque Composition Through AI Algorithms



Conclusion

CARDS FOR SCIENTISTS FROM THEIR NON-SCIENTIST RELATIONS

