Imaging and Physiology Summit 2009

November 20,21, 2009
Seoul, Korea

James E. Muller, MD

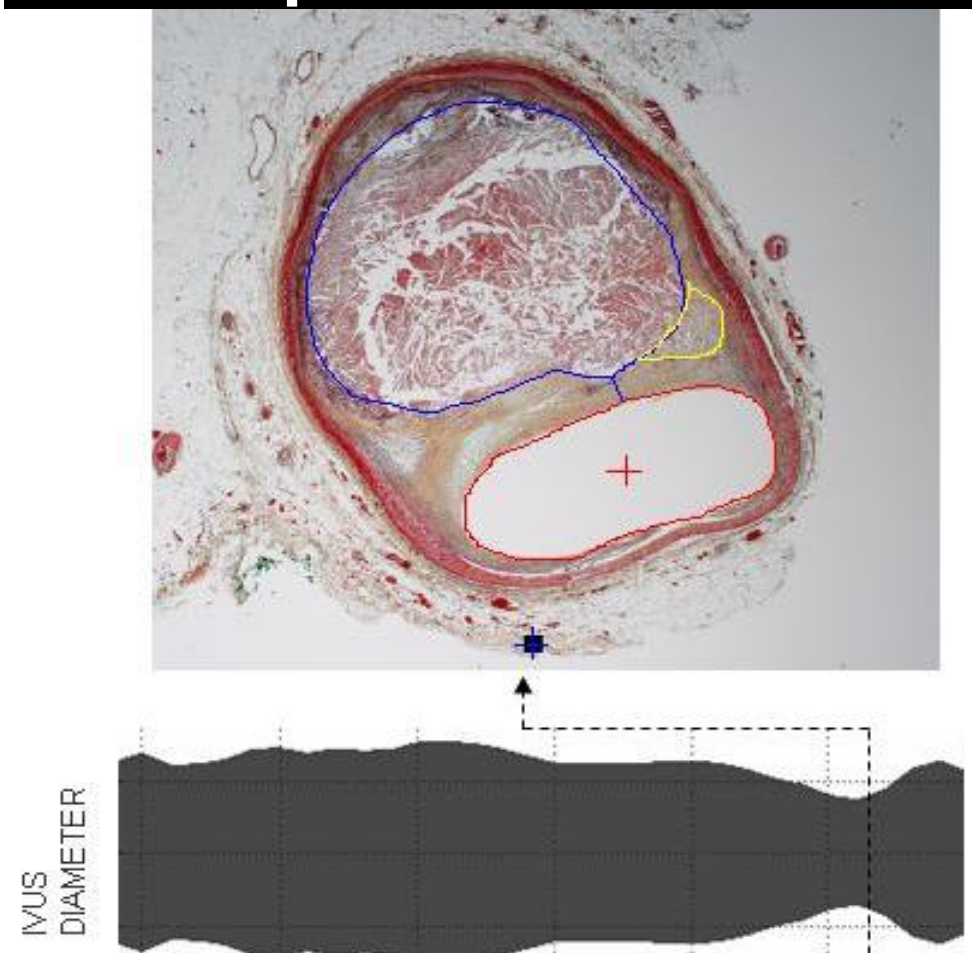
CEO, InfraReDx, Inc.

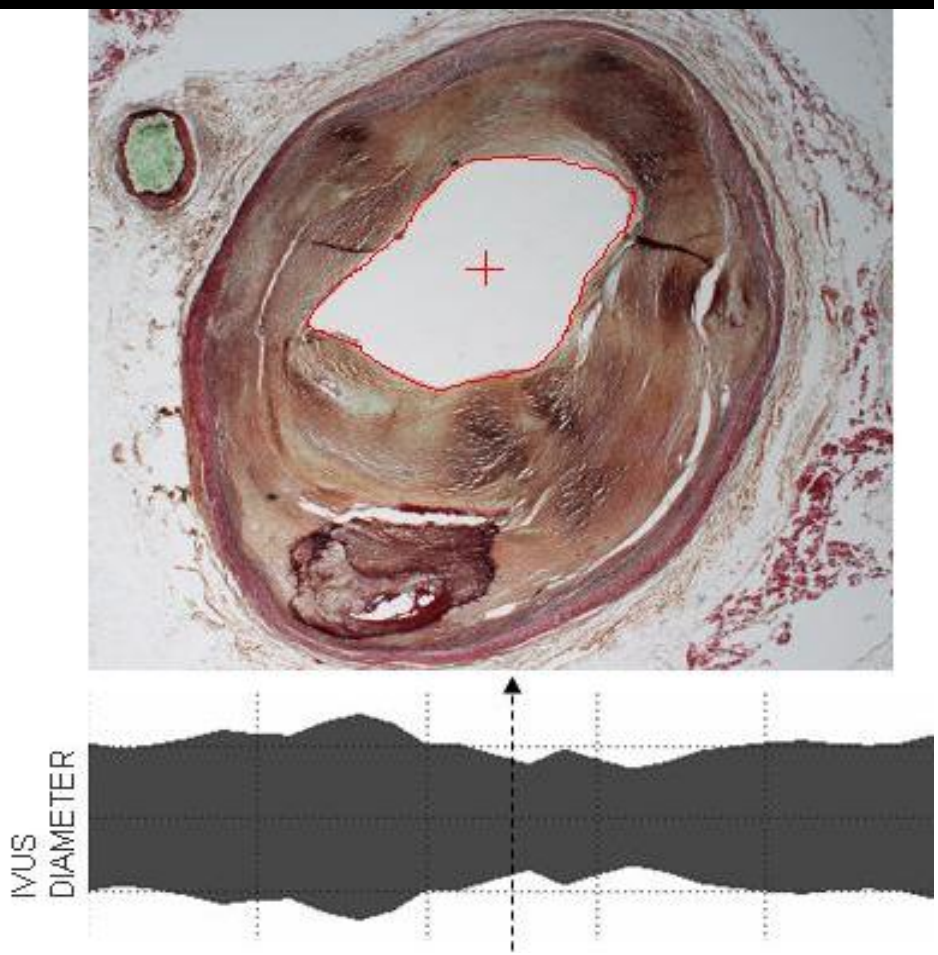
Assessment of Vulnerable Plaque by Near-infrared Spectroscopy

The Imaging Goal

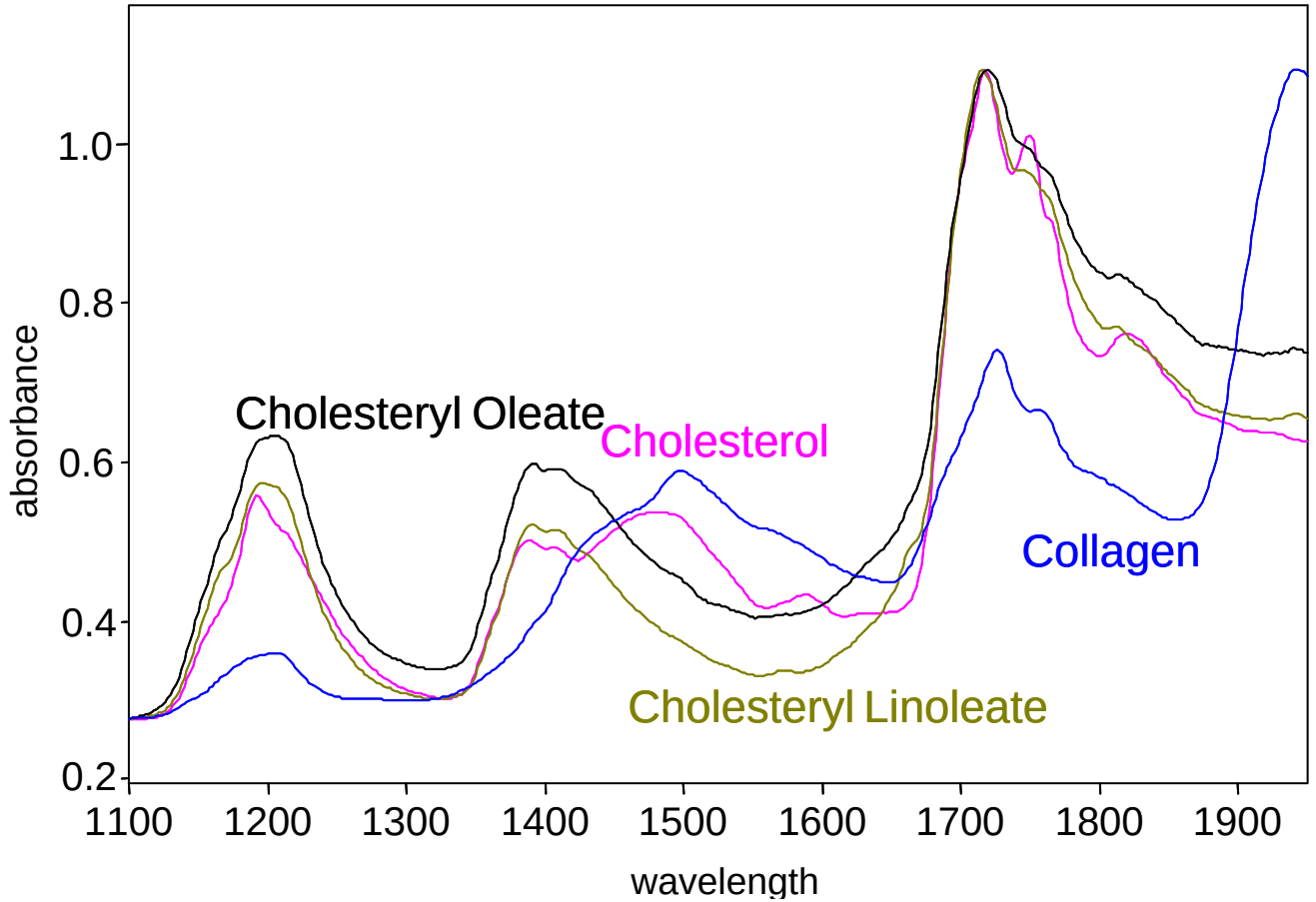
Does the plaque have a

lipid core or is it **fibrotic**?





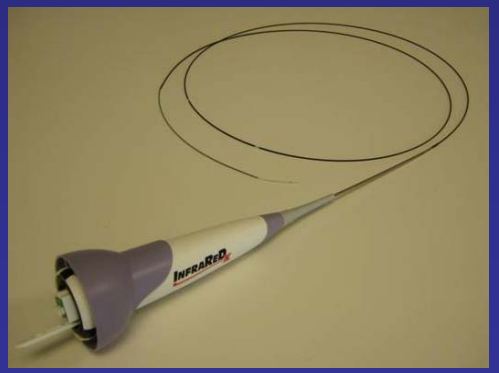
NIR Spectroscopy is an Excellent Method to Identify the Chemical Composition of Unknown Substances

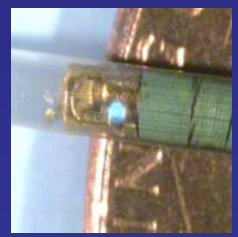


NIR spectroscopy has not been available for use by interventional cardiologists.

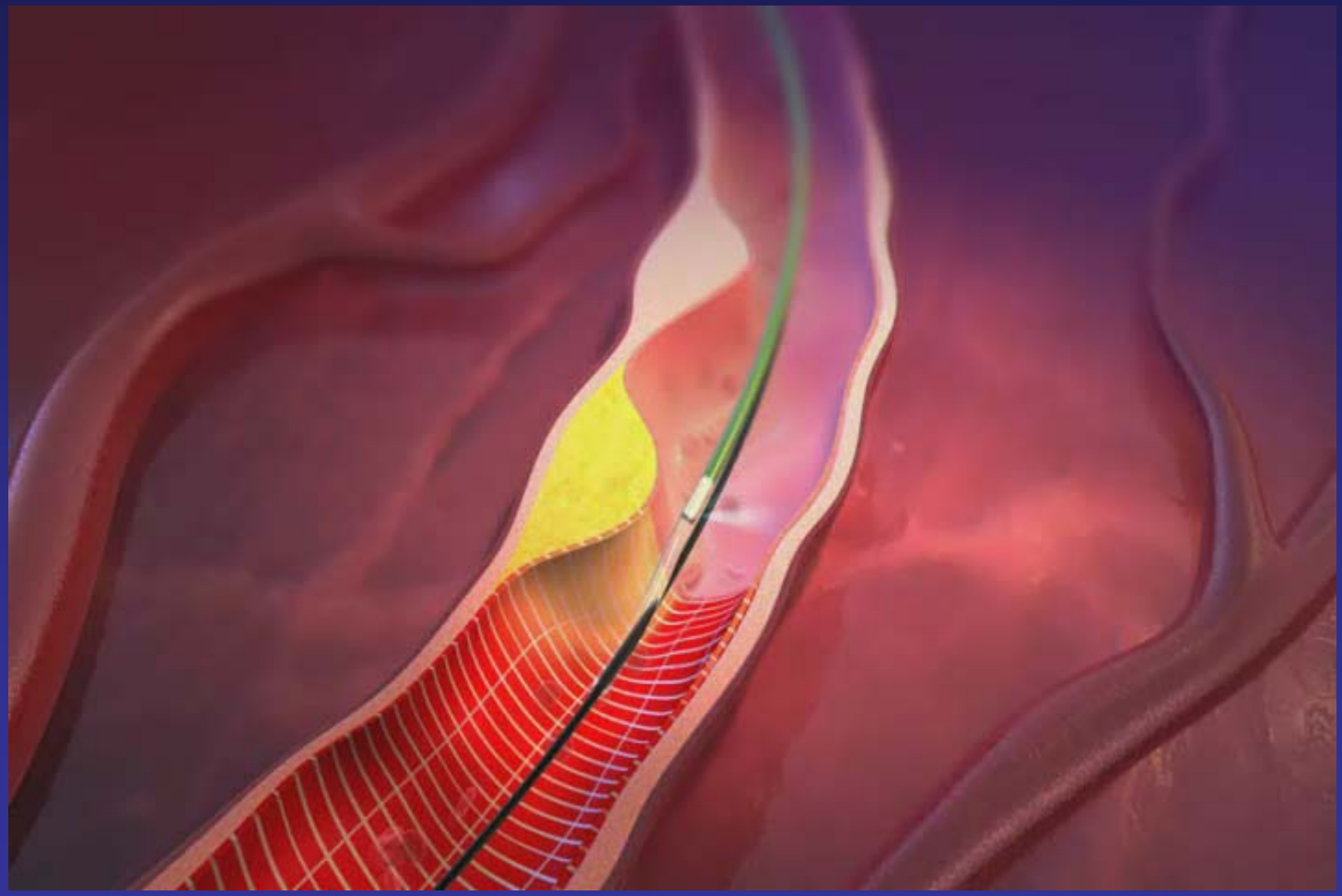
InfraReDx Spectroscopy System

- Three components: console, PBR, catheter (3.2 Fr, monorail, 0.014” compatible)
- Automatically scans artery like IVUS
- Spectra processed by algorithm and displayed as a chemical image of lipid rich plaque probability (“Chemogram”)

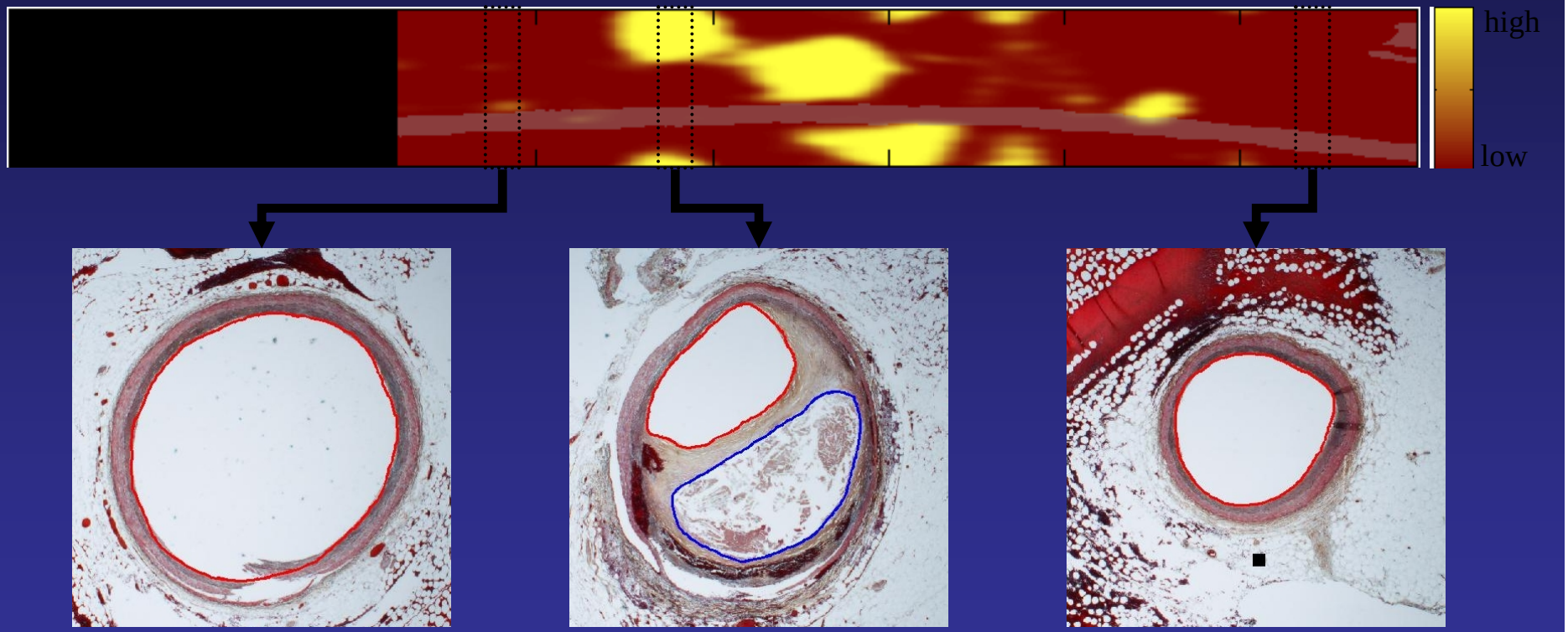




NIR Sampling During Pullback and Rotation Within Coronary Artery



Comparison of NIR Derived Chemogram with Histology

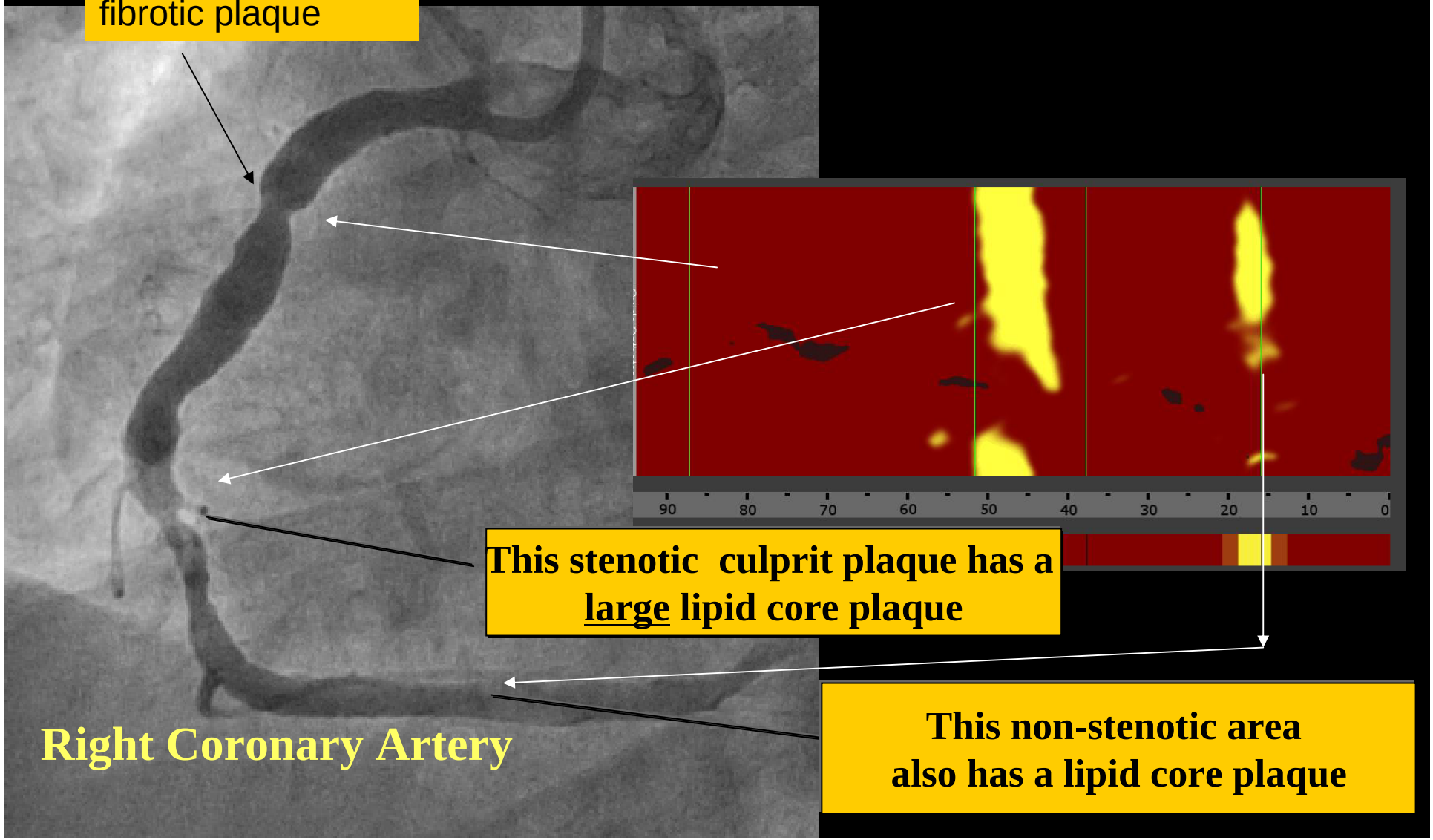


Lipid-core plaques depicted as yellow on the Chemogram

NIR Plaque Characterization Prior to Stenting

Case Courtesy of Simon Dixon, MD, Beaumont Hospital –

This stenosis has a fibrotic plaque

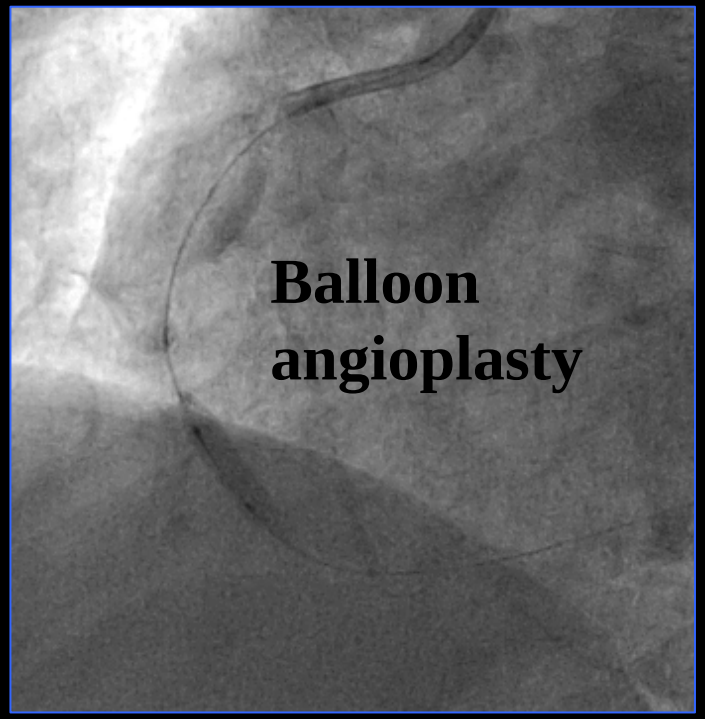


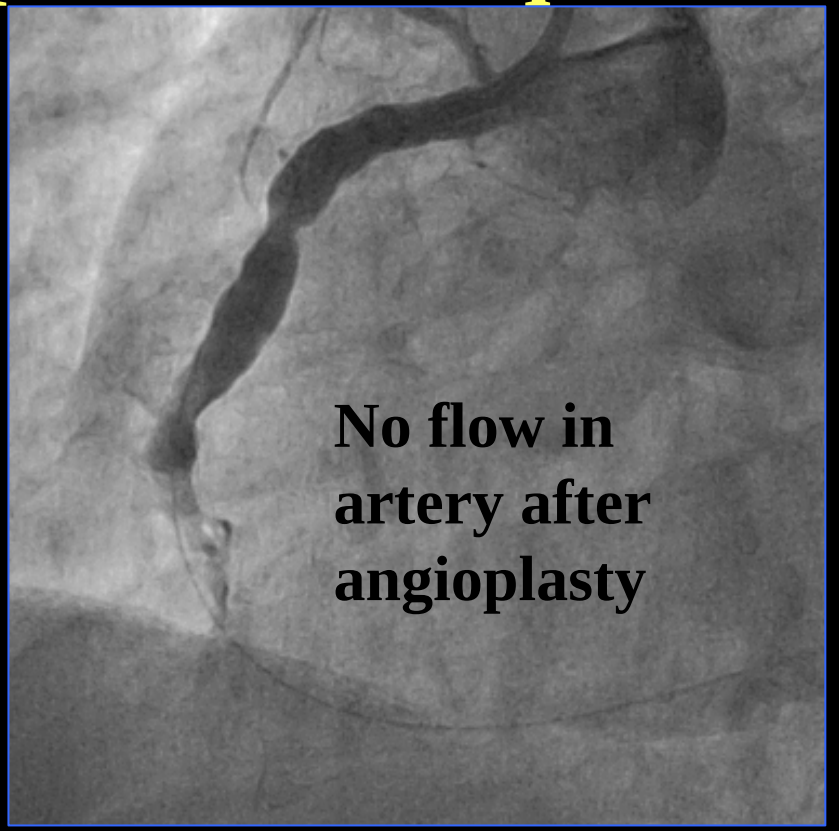
This stenotic culprit plaque has a <u>large</u> lipid core plaque

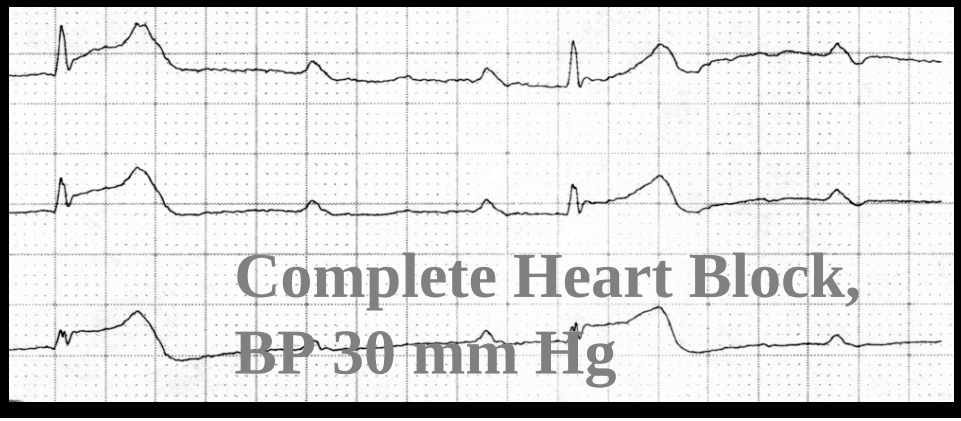
This non-stenotic area also has a lipid core plaque

Right Coronary Artery

Balloon Dilation of Stenotic, Circumferential Lipid Core Plaque

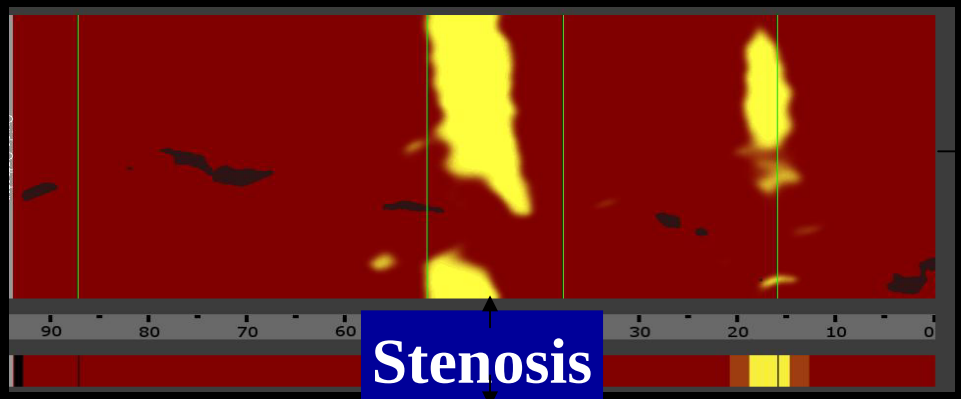






Courtesy of Dr. Simon Dixon
Beaumont Hospital, Royal Oak, MI

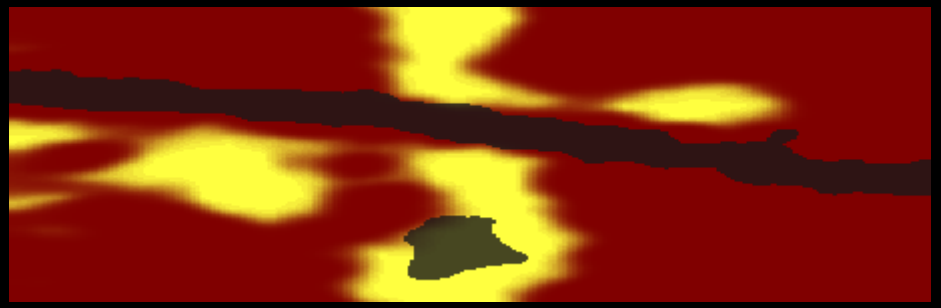
Chemogram of RCA with ring LCP at stenosis in 62 yo male



Distal embolization following dilation leading to MI and CPR

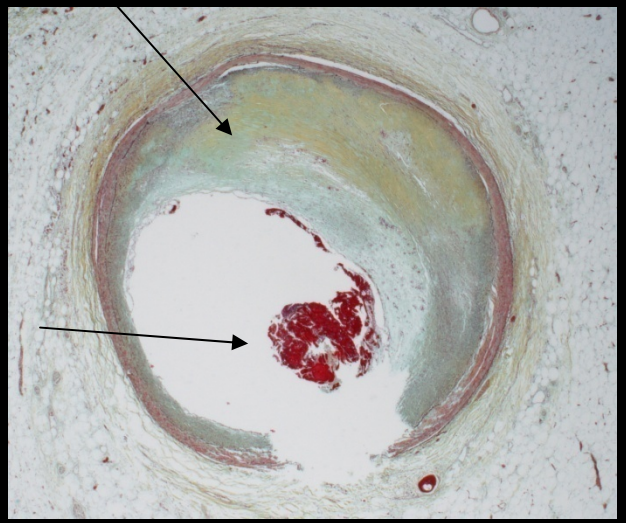
→ Sudden Coronary Death

Similar chemogram with ring LCP from autopsy specimen of 48 yo male



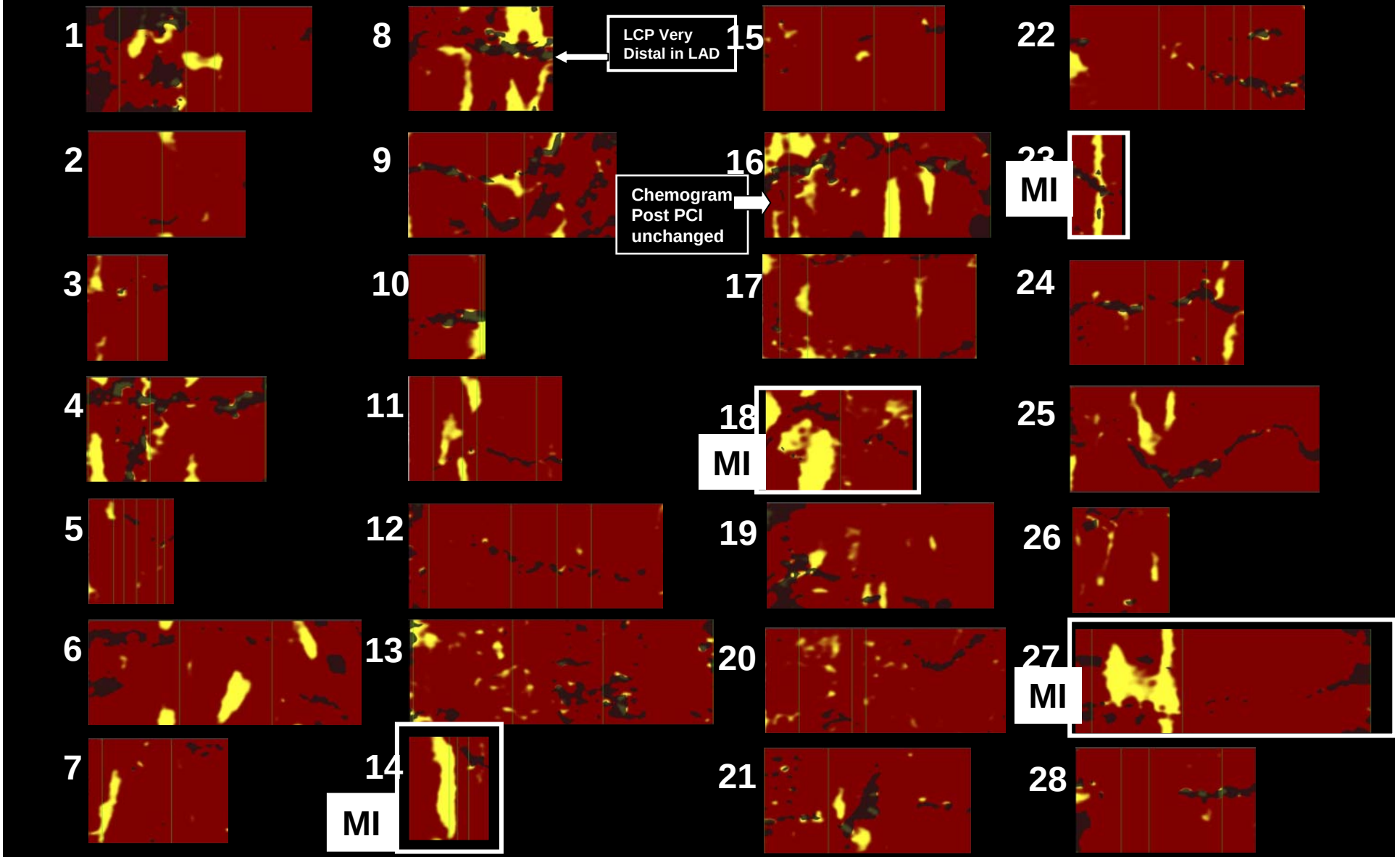
Massive LCP and remnant of fatal thrombus

Thrombus remnant



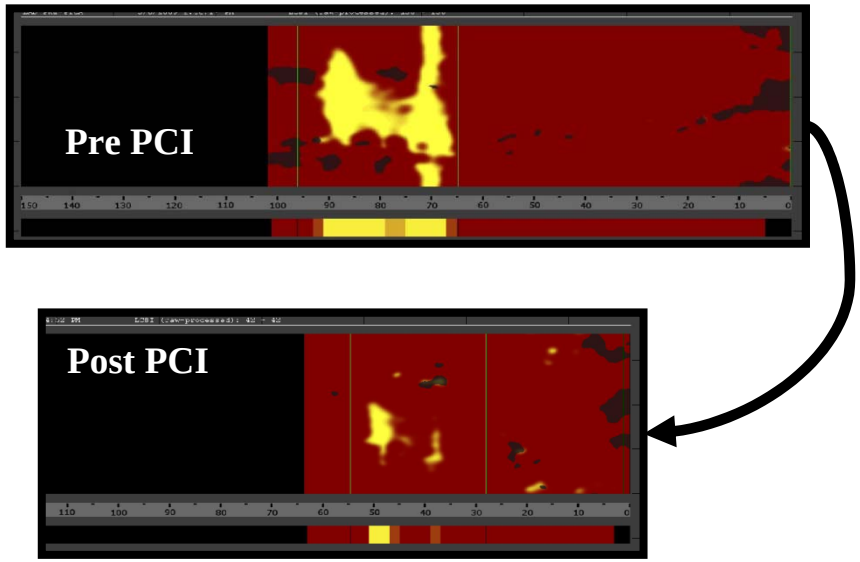
Chemograms Prior to Balloon Dilation of Stenosis in all 28 Patients with Data to Identify Peri-stenting MI in COLOR Registry

4 Patients Developed Peri-stenting MI



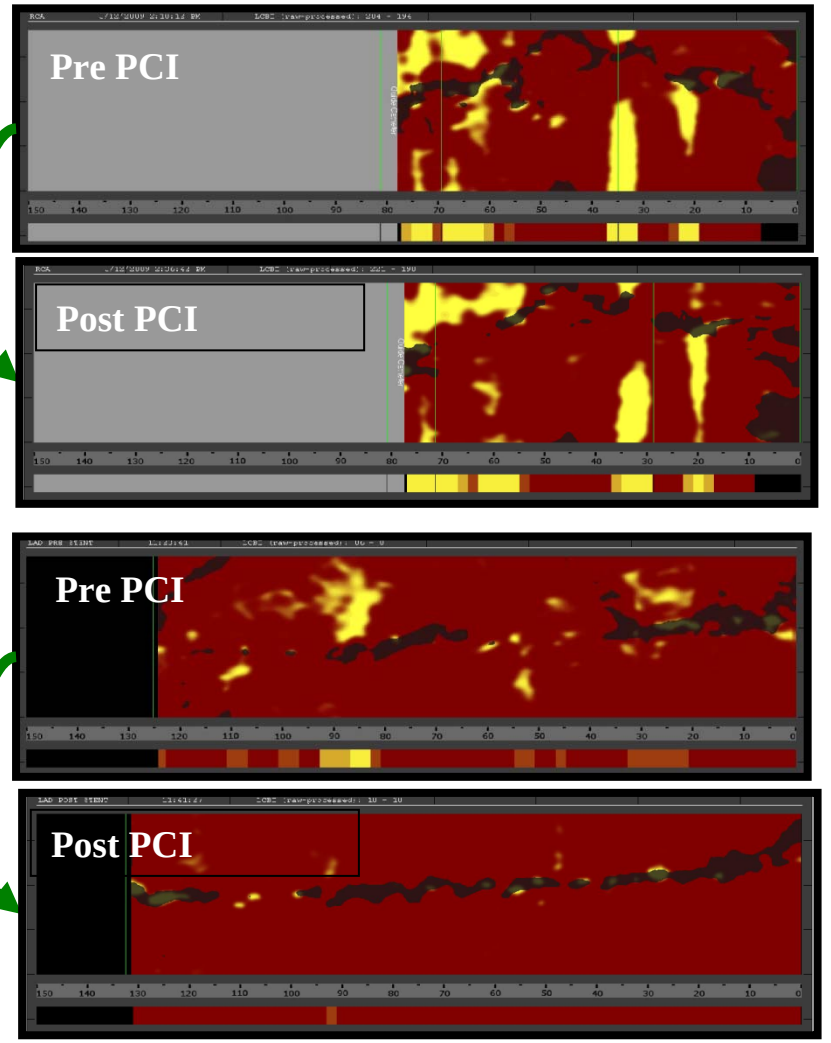
Peri-stenting MI and Changes in Chemograms

NIR COLOR Registry



Major Decrease in Lipid Core Plaque

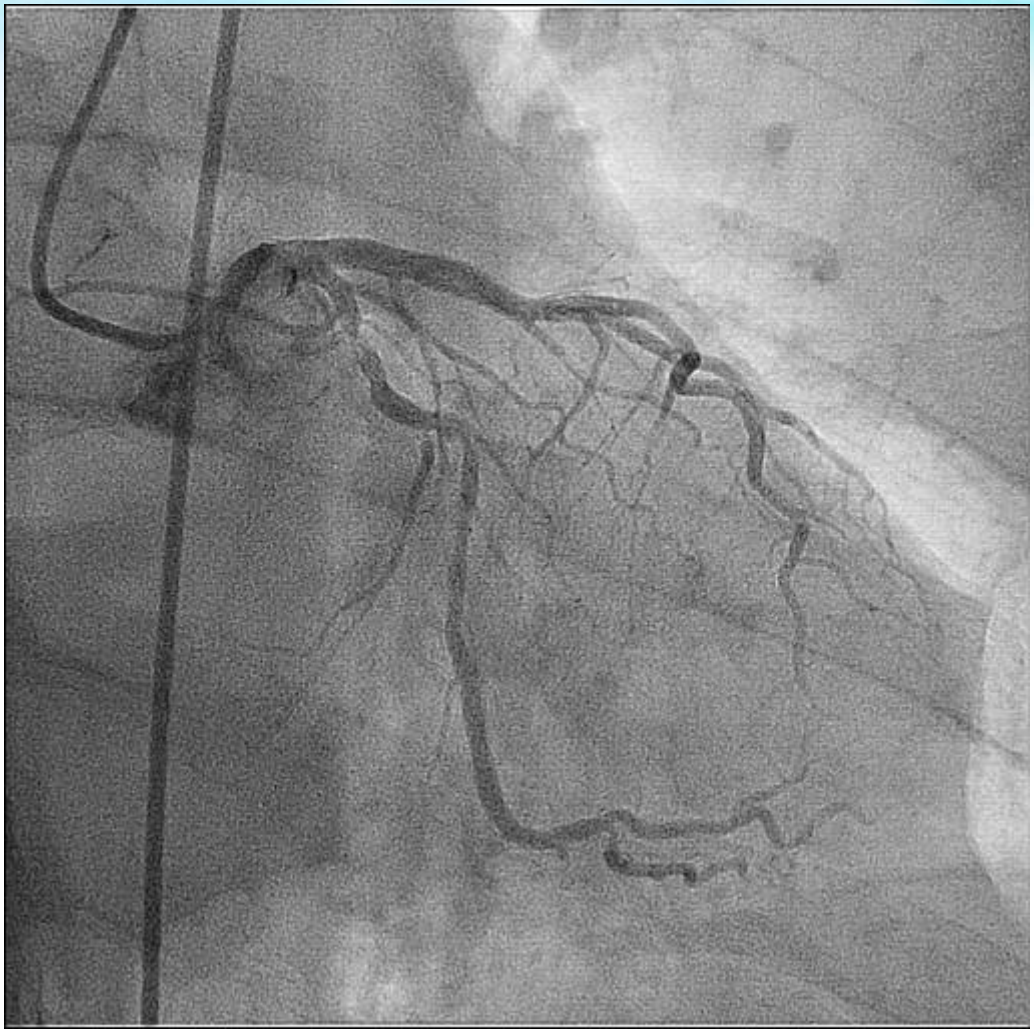
Peri-stenting MI



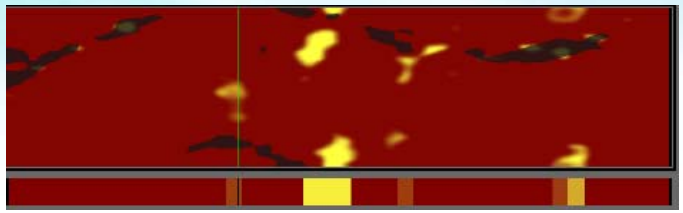
Small Change in Lipid Core Plaque

No Peri-stenting MI

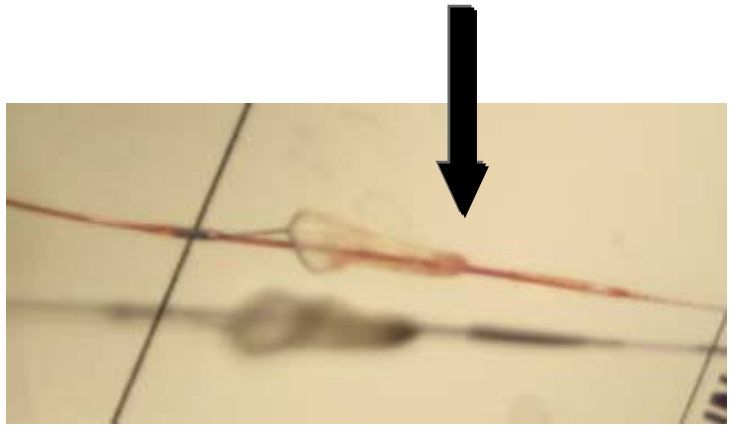
The Use of a Distal Protection Filter to Collect Emboli after Dilation of a Lipid Core Plaque



LipiScan™ is approved only for LCP detection.



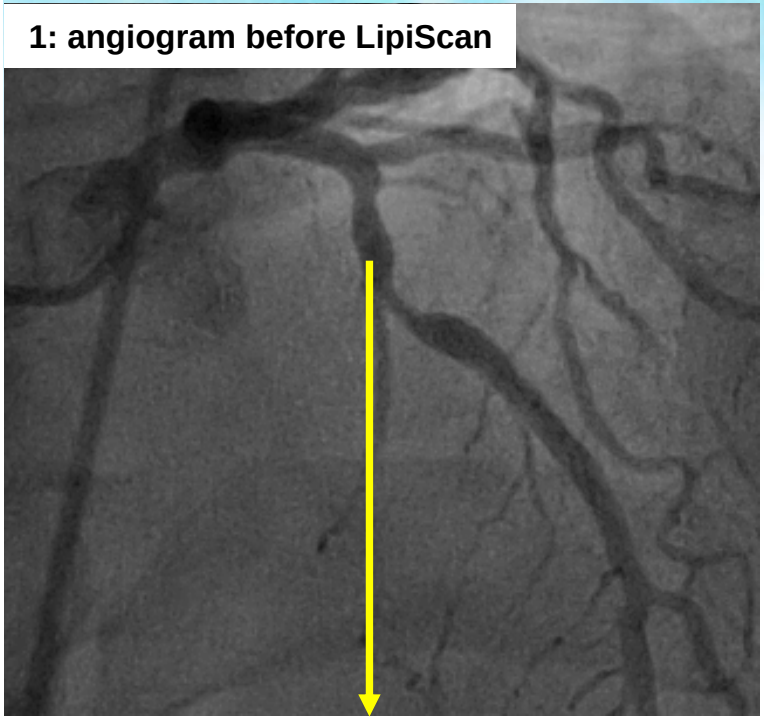
Yellow material in basket of a distal protection device post dilation of a stenotic lipid core plaque.



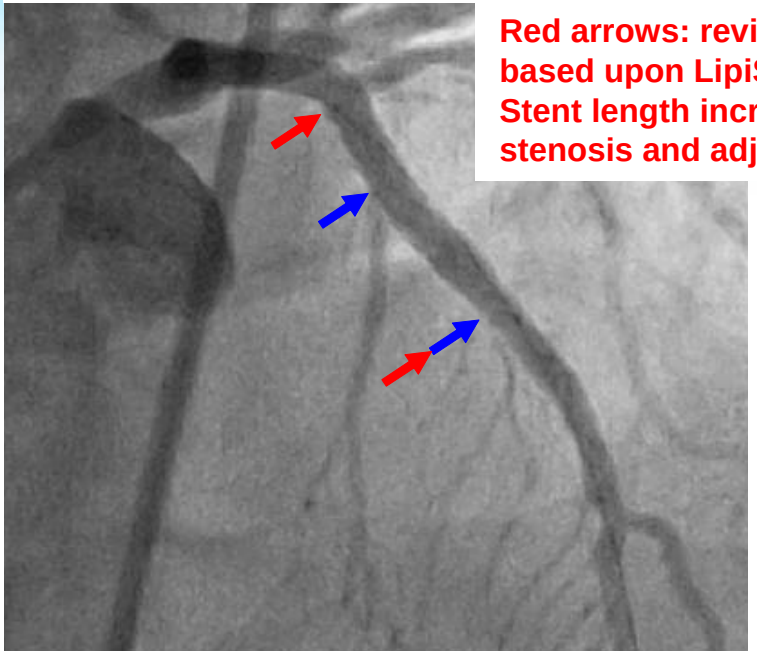
Courtesy of Dr. Manos Brilakis, Dallas, Texas

Case 2: NIR guidance to avoid ending stent in lipid core plaque

1: angiogram before LipiScan



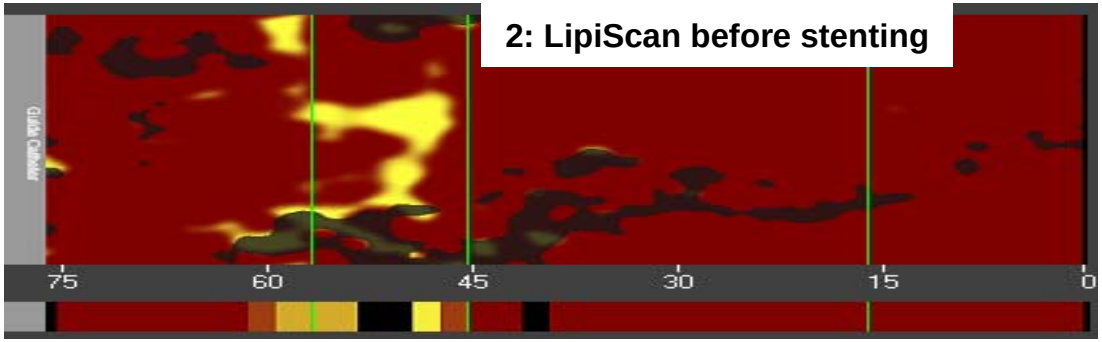
3: angiogram after stenting

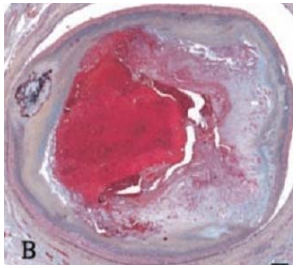


Blue arrows: original stent plan

Red arrows: revised stent plan based upon LipiScan information. Stent length increased to cover stenosis and adjacent LCP.

2: LipiScan before stenting

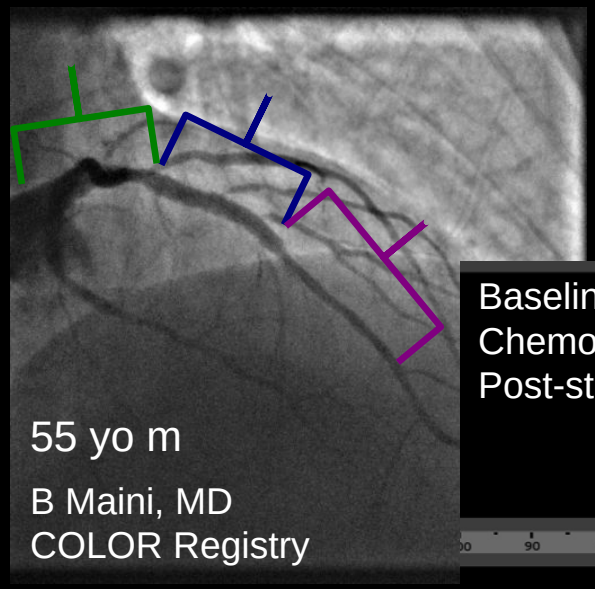




Case Courtesy of Beaumont Hospital – Simon Dixon, MD

INFRAREDx

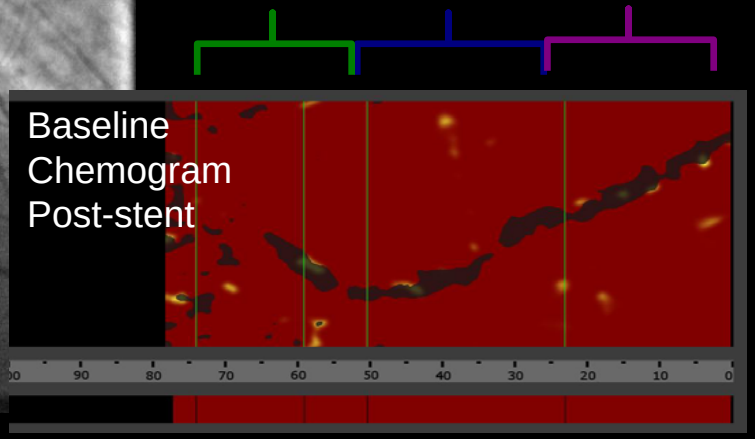
Longitudinal Data
NIR Measurements at Sites that were Not Stented

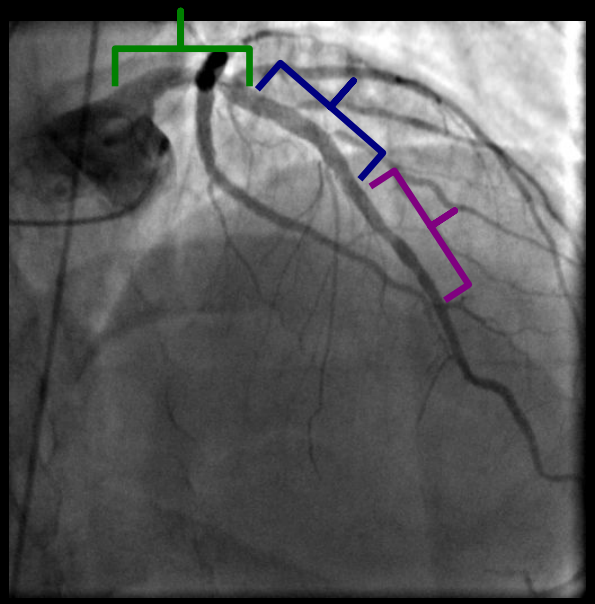


55 yo m

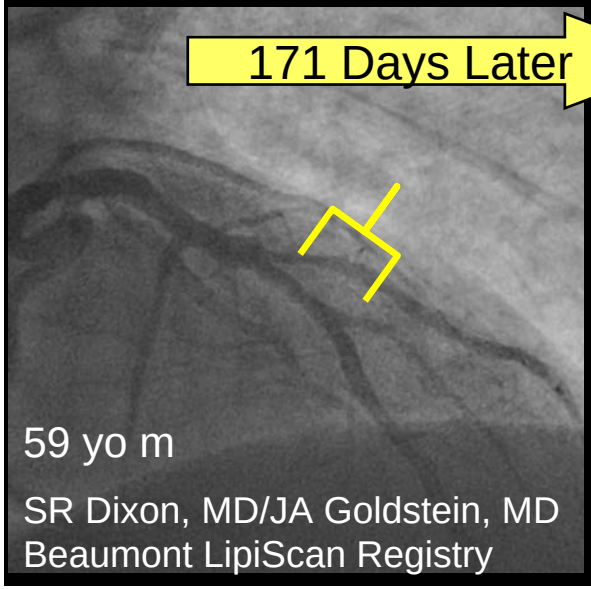
B Maini, MD
COLOR Registry

141 Days Later



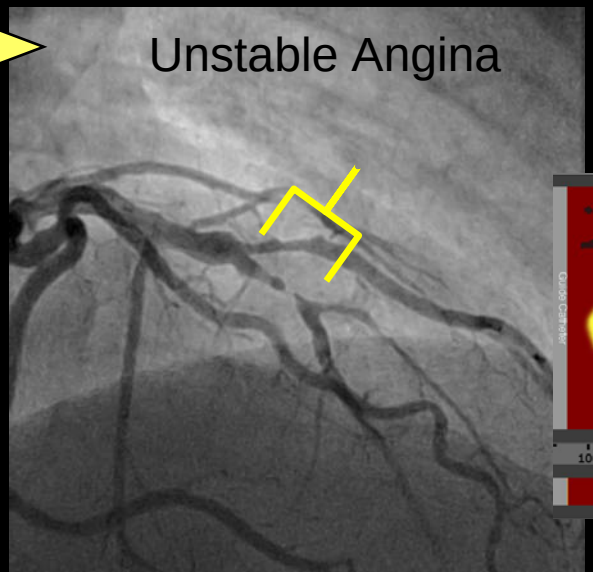


171 Days Later



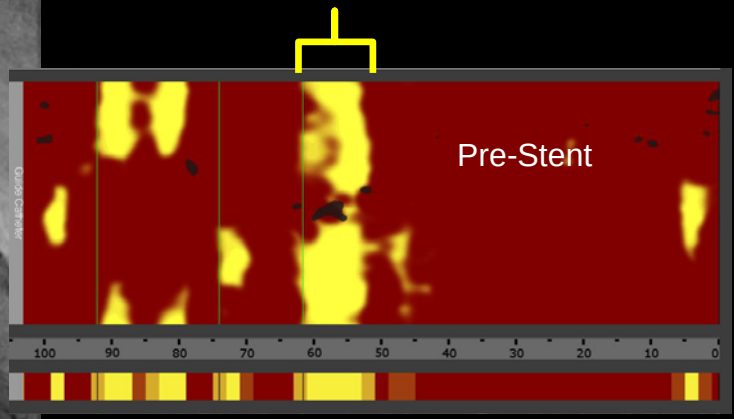
59 yo m

SR Dixon, MD/JA Goldstein, MD
Beaumont LipiScan Registry



Unstable Angina

Follow-up Chemogram



MJH

Multimodality Coronary Imaging

- IVUS
  - Lumen Dimension
  - Plaque Size
  - Stent Expansion
- NIR
  - Automated Identification of Lipid Core Plaques
- NIR-IVUS

(Eyes and Ears) Catheter