

# CHARACTERIZATION OF ATHERECTOMY CTO SAMPLES IN CORRELATION WITH CLINICAL OUTCOMES

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# Disclosures

Speaker name: Jon George, MD

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I have the following potential conflicts of interest to report:

- Consulting
  - Avinger
  - Medtronic

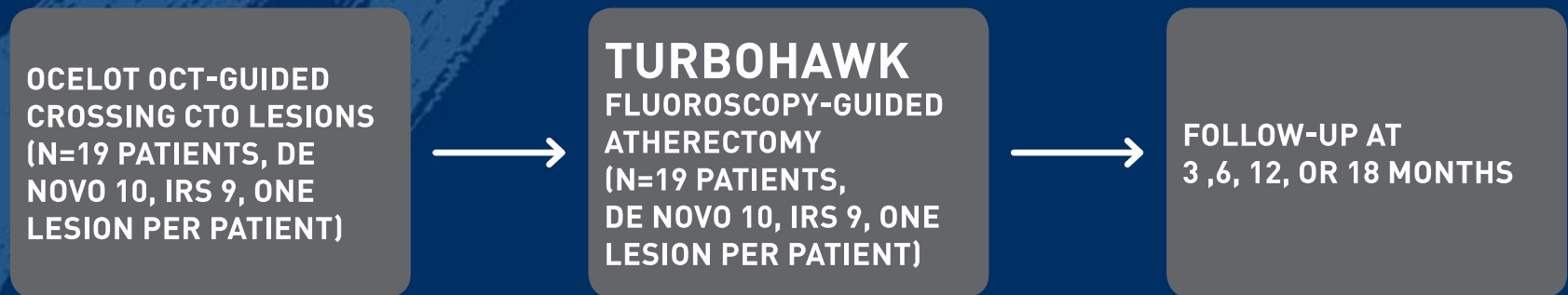
# Objectives

- 1) Investigate atherectomy tissue collected from CTOs crossed via the true lumen as diagnosed using OCT
- 2) Delineate risk factors that correlate with clinical outcomes

# HIPACT CTO Registry / VISION CTO Cohort

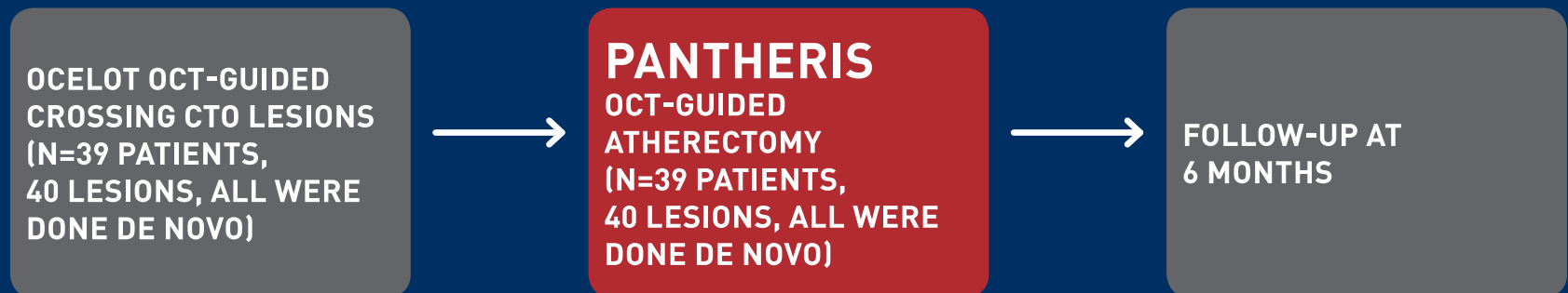
## HIPACT CTO REGISTRY

SINGLE CENTER, ALL COMERS, CTOs



## VISION CTO COHORT

MULTI-CENTER, CTO COHORT, IDE CLINICAL TRIAL



# HIPACT / TURBOHAWK:

## CTO Lesions Demographics & Histology Analysis (N=19)

OCELOT  
OCT-GUIDED CROSSING  
CTO LESIONS (N=19)

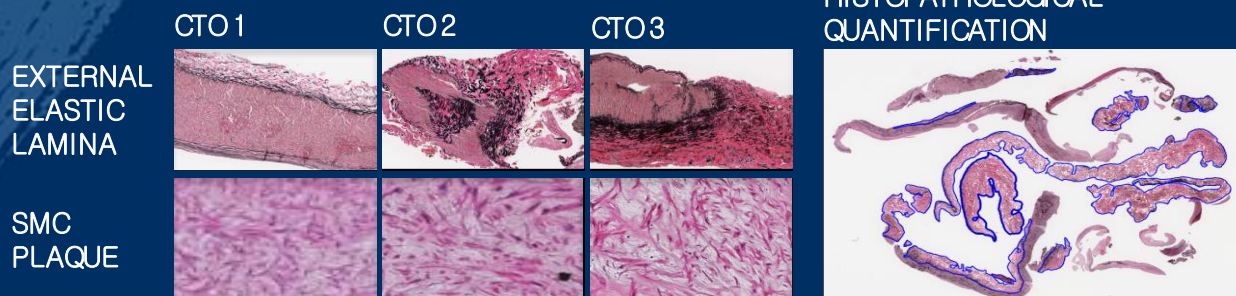


TURBOHAWK  
FLUOROSCOPY-GUIDED  
ATHERECTOMY (N=19)



FOLLOW-UP AT  
3, 6, 12, OR 18 MONTHS

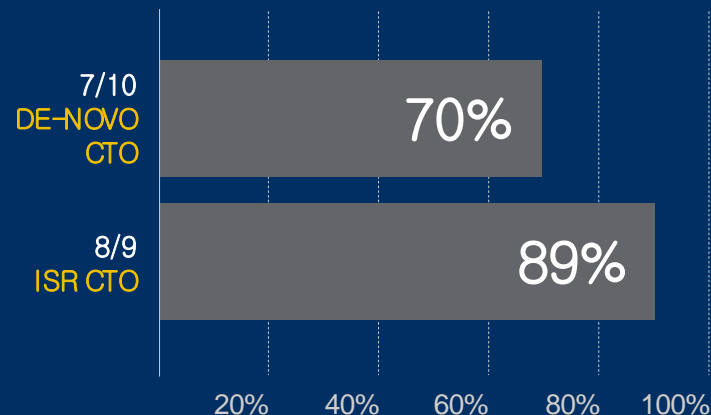
### TISSUE ANALYSIS



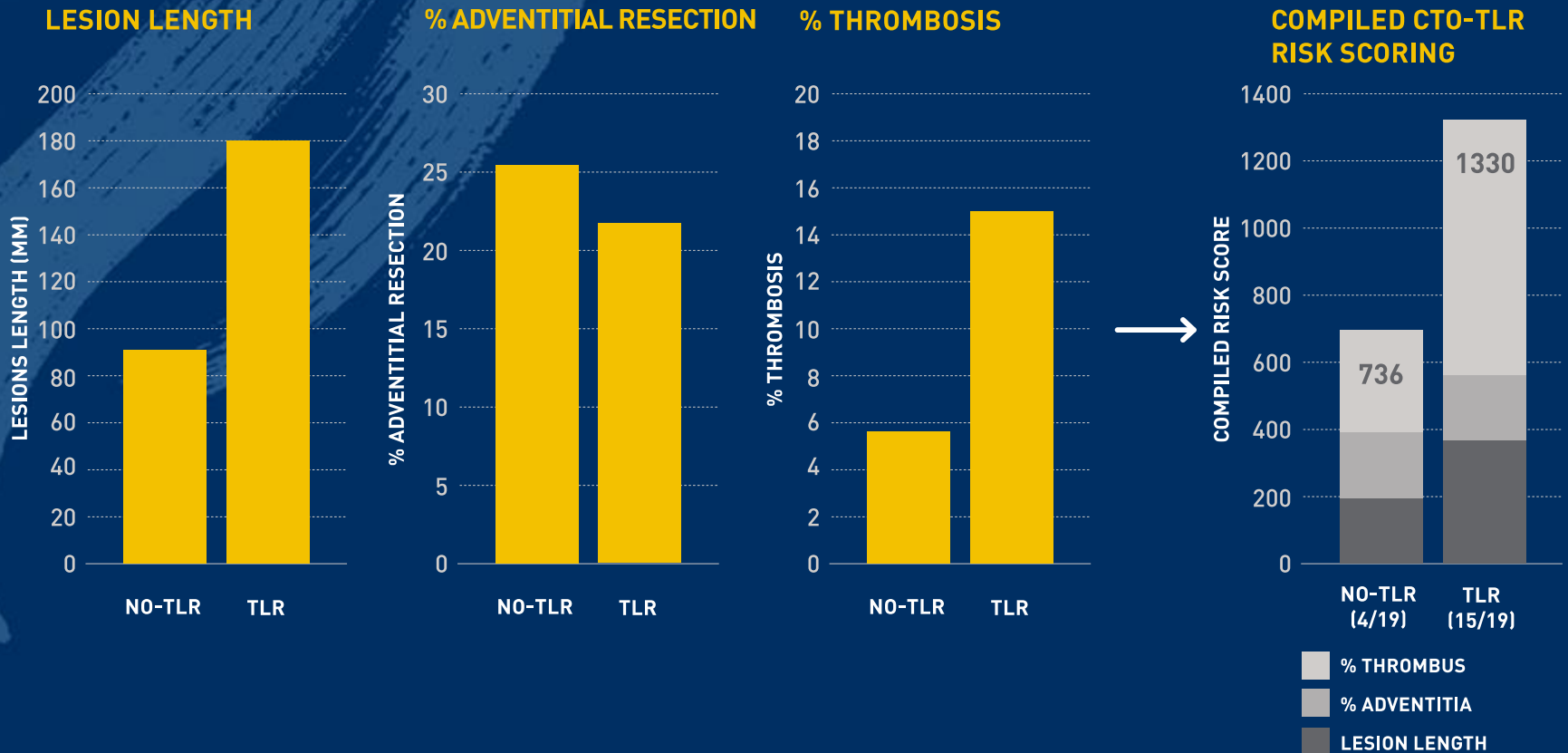
### ATHERECTOMY SPECIMEN HISTOLOGIC COMPONENTS

ADVENTITIAL AREA: 15.9%  
THROMBOSIS: 12.2%  
LESION LENGTH: 150MM

### HIPACT %TLR



# Lesions Tissue Composition **HIPACT CTO**



LESION AND TISSUE ANALYSIS DELINEATED 3 MAJOR CORRELATIVES WITH CLINICAL OUTCOMES

# VISION / PANTHERIS:

## CTO Lesions Demographics & Histology Analysis (N=32)

OCELOT  
OCT-GUIDED CROSSING  
CTO LESIONS (N=32)



PANTHERIS  
OCT-GUIDED  
ATHERECTOMY (N=32)



FOLLOW-UP AT  
6 MONTHS

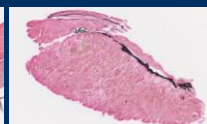
### TISSUE ANALYSIS

EXTERNAL  
ELASTIC  
LAMINA

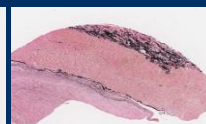
CTO 1



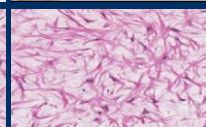
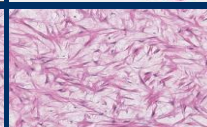
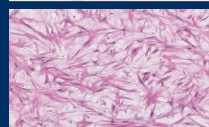
CTO 2



CTO 3



SMC  
PLAQUE



HISTOPATHOLOGICAL  
QUANTIFICATION



### ATHERECTOMY SPECIMEN HISTOLOGIC COMPONENTS

ADVENTITIAL AREA: 0.82%  
THROMBOSIS: 8.8%  
LESION LENGTH: 79MM

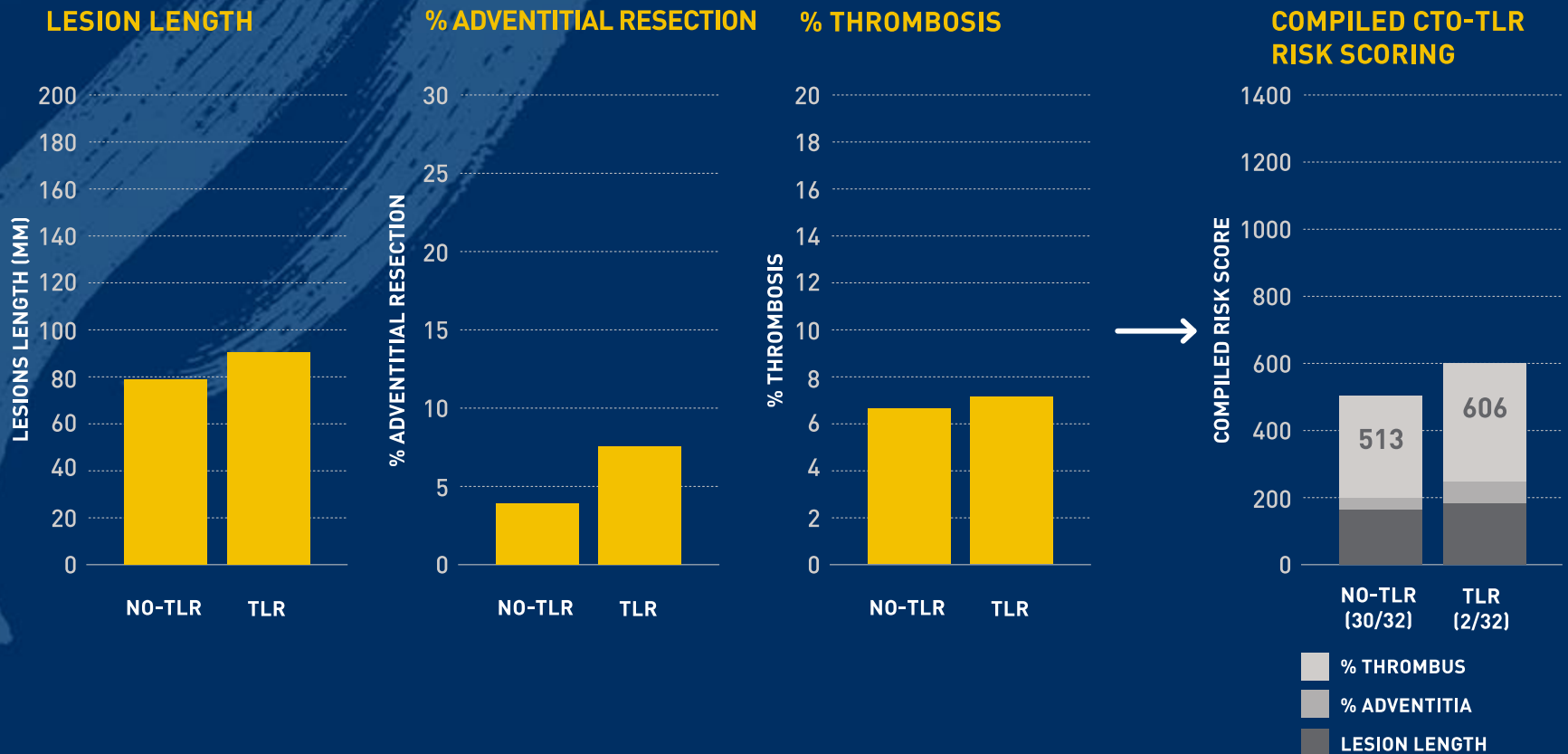
### VISION CTO %TLR

2/32  
CTO  
LESIONS

6.5%

20% 40% 60% 80% 100%

# Lesions Tissue Composition VISION CTO

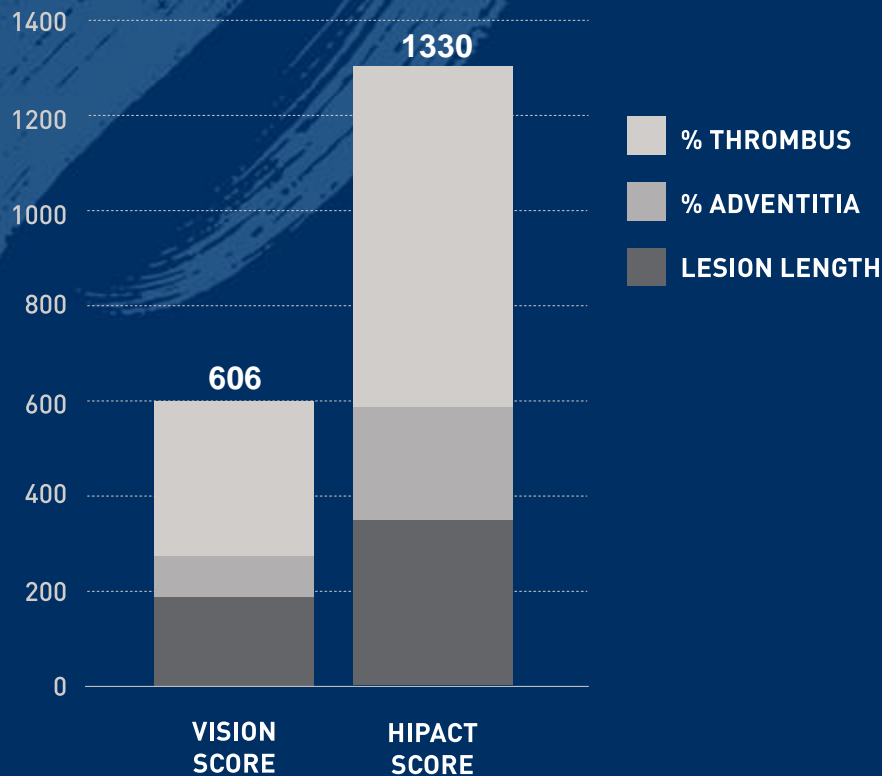


LESION AND TISSUE ANALYSIS DELINEATED 3 MAJOR CORRELATIVES WITH CLINICAL OUTCOMES

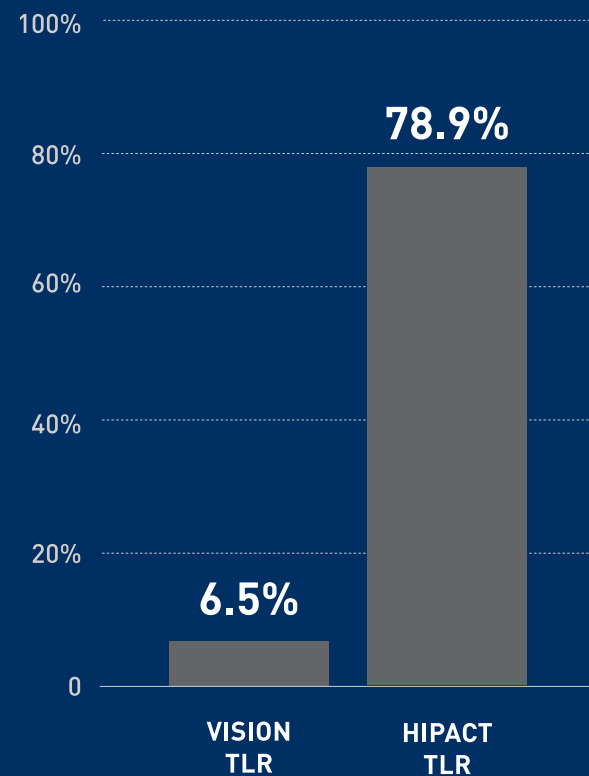


# Comparative Predictive Scoring Model based on Lesions Histopathology

## CTO RISK SCORING



## CLINICAL TLR



LESION AND TISSUE ANALYSIS PREDICTIVE SCORING MODEL FOR CLINICAL OUTCOMES

# Key Points

1. Non-Image guided atherectomy results in greater adventitial resection
2. Image guided revascularization reduces EEL disruption, resulting in reduced adventitial content
3. Lesion and tissue analysis delineated 3 major correlatives with clinical outcomes:
  - Lesion length
  - Adventitial resection
  - % Thrombosis
4. Predictive scoring based on lesion analysis may improve treatment



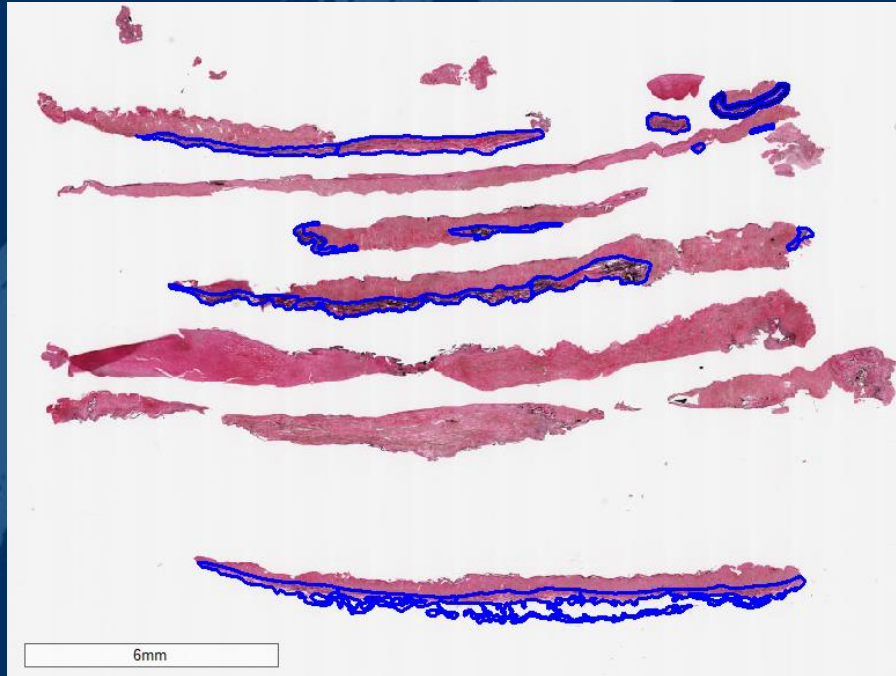
Thank You !

# Methods

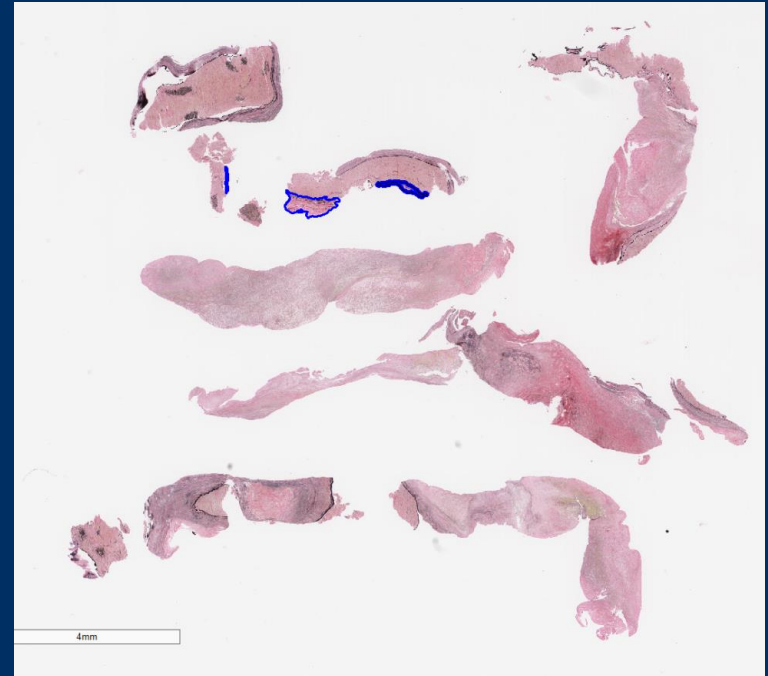
- **Fixation:** The excised tissue fragments were fixed with 10% neutral buffered formalin, and weight in mg.
- **Processing:** Routine histological processing, sectioning, and staining with hematoxylin and eosin (H&E), Masson's trichrome, and elastic van Gieson (EVG) stains.
- **Slide Scan:** The stained slides were scanned and converted into digital images using a slider scanner (ScanScope CS, Aperio).
- **Area Measurement:** EVG stained slides were used to draw boundaries around different tissue components such as intimal plaque, media, adventitia to measure their area with ScanScope analysis tools. Summary of all individual component area was the total section area.
- **Scoring:** LL- in cm+ %Adventitial resection + % Thrombus

# Adventitial Component Quantification

(% adventitial area = adventitia area / total tissue section area)



Turbohawk specimen, tissue weight : 108 mg  
Adventitia area (in blue) 15.67%, EVG stained



Pantheris specimen, tissue weight : 57.8 mg  
Adventitia area (in blue) 1.02%, EVG stained

- Pantheris excised more tissue per cm lesion length than that of Turbohawk (13.46mg vs 6.29mg)
- Much higher % adventitial area in Turbohawk specimen was seen (15.86% vs 0.82%)
- Less tissue specimens from Pantheris procedure detected adventitial component (42.5% vs 100%)

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