

Angioscopic and VH Characteristics of Culprits in ACS Patients

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Dr.Ueda (Angioscopy Expert)...

**Whenever I saw thrombus
(symptomatic or asymptomatic),
the underlying plaque is yellow...
Not white**

Woom.... Interesting....

Plaque Morphology of AMI/SCD w/Thrombi

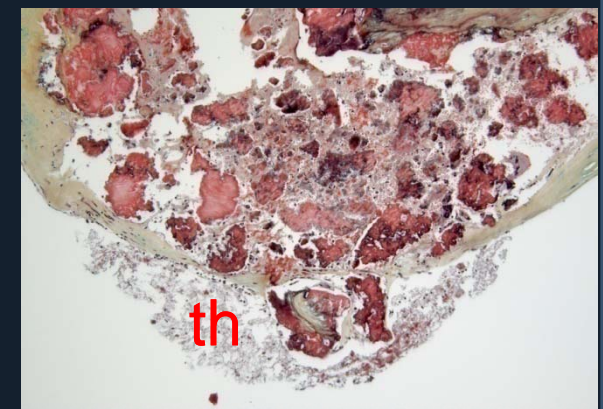
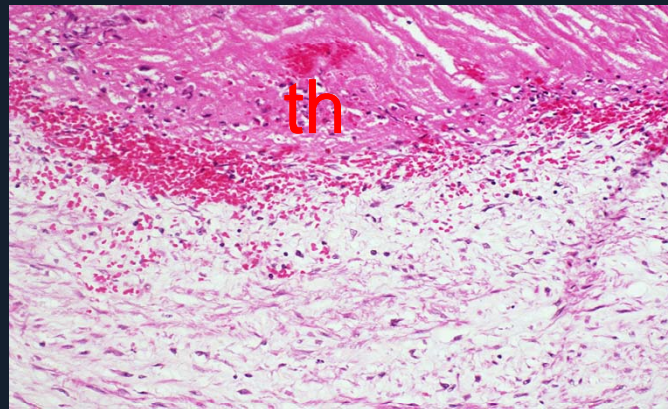
Plaque Rupture
60%(f) – 80%(m)



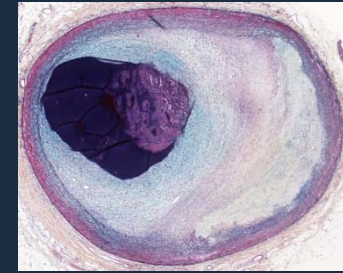
Plaque Erosion
20%(m) - 40%(f)



Calcified Nodule
2% - 7%



VH-IVUS Classification



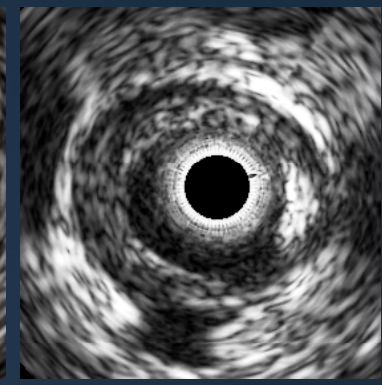
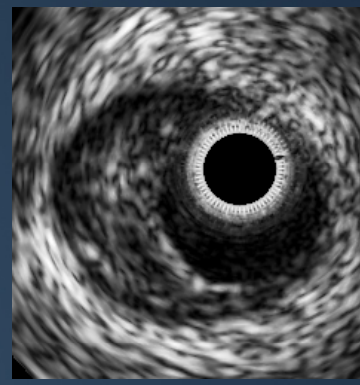
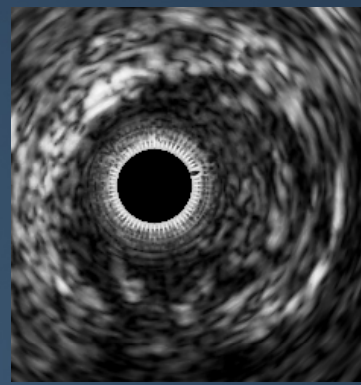
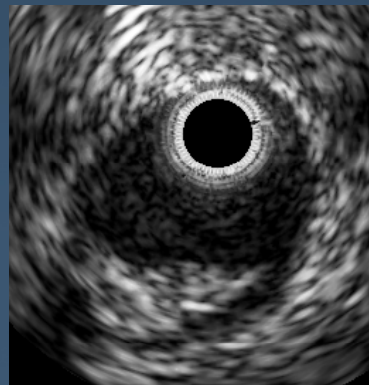
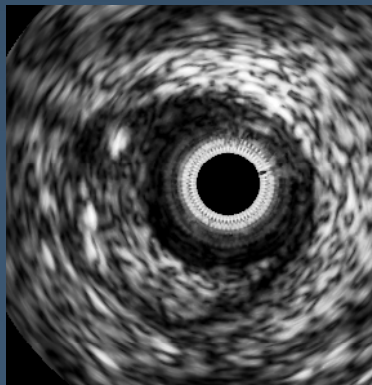
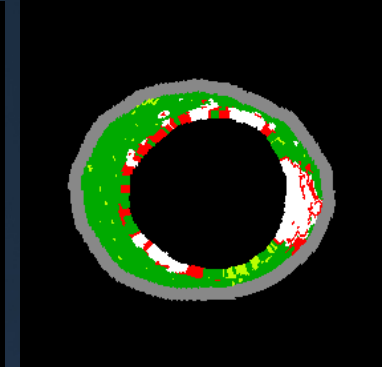
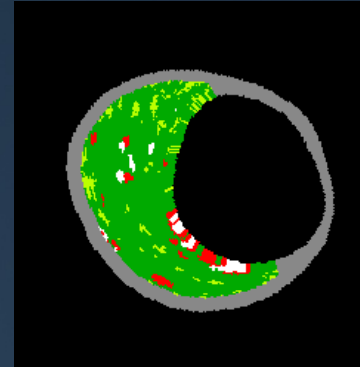
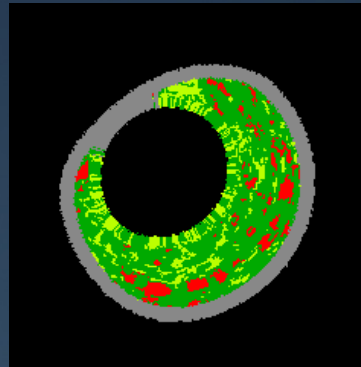
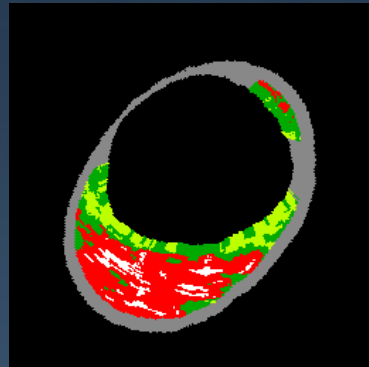
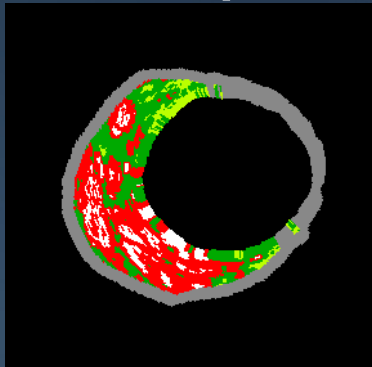
Thin-cap FA

Thick-cap FA

PIT

Fibrous

Fibrocalcific



More than
10%
Confluent
Necrotic

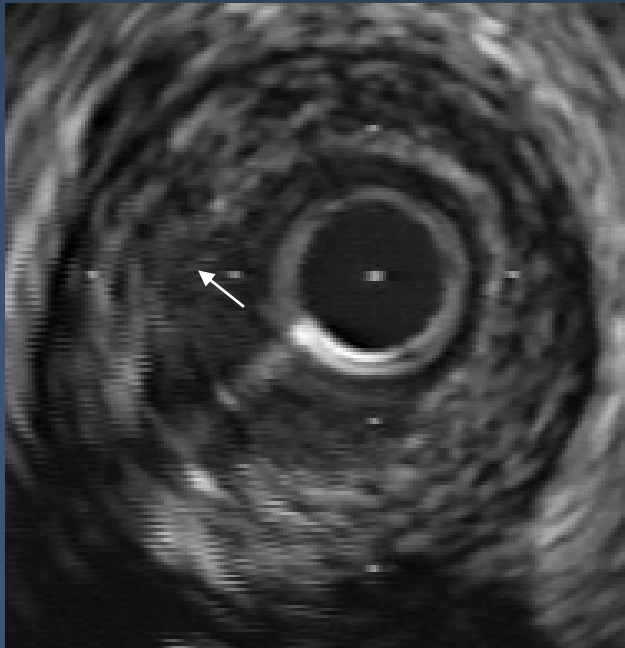
More than
15%
Fibrofatty

NO more than
10% Confluent
Necrotic Core

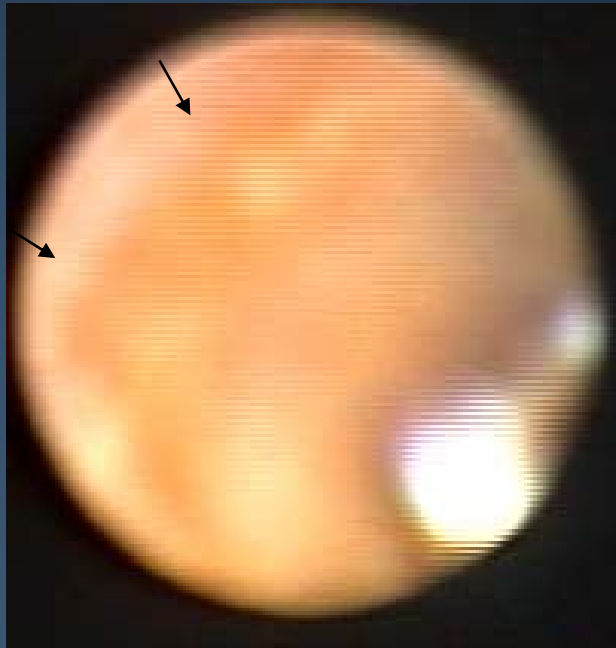
More than
10%
confluent
calcium

Erosion

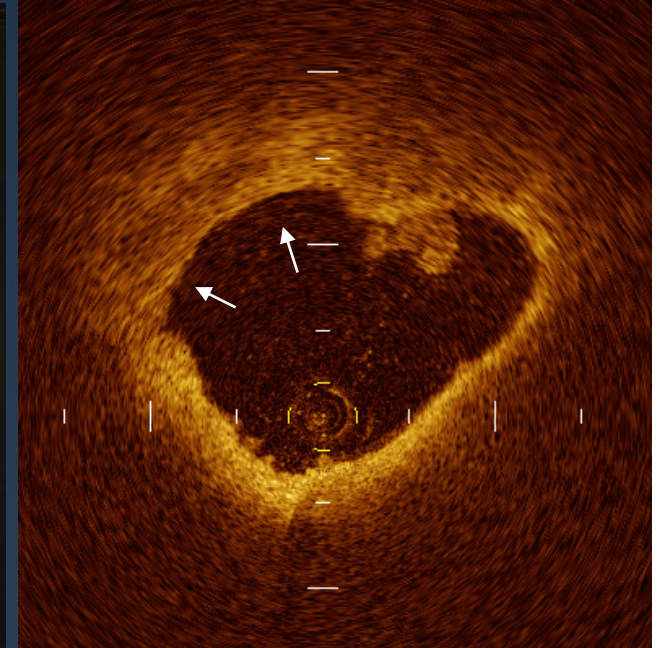
IVUS



Angioscopy



OCT

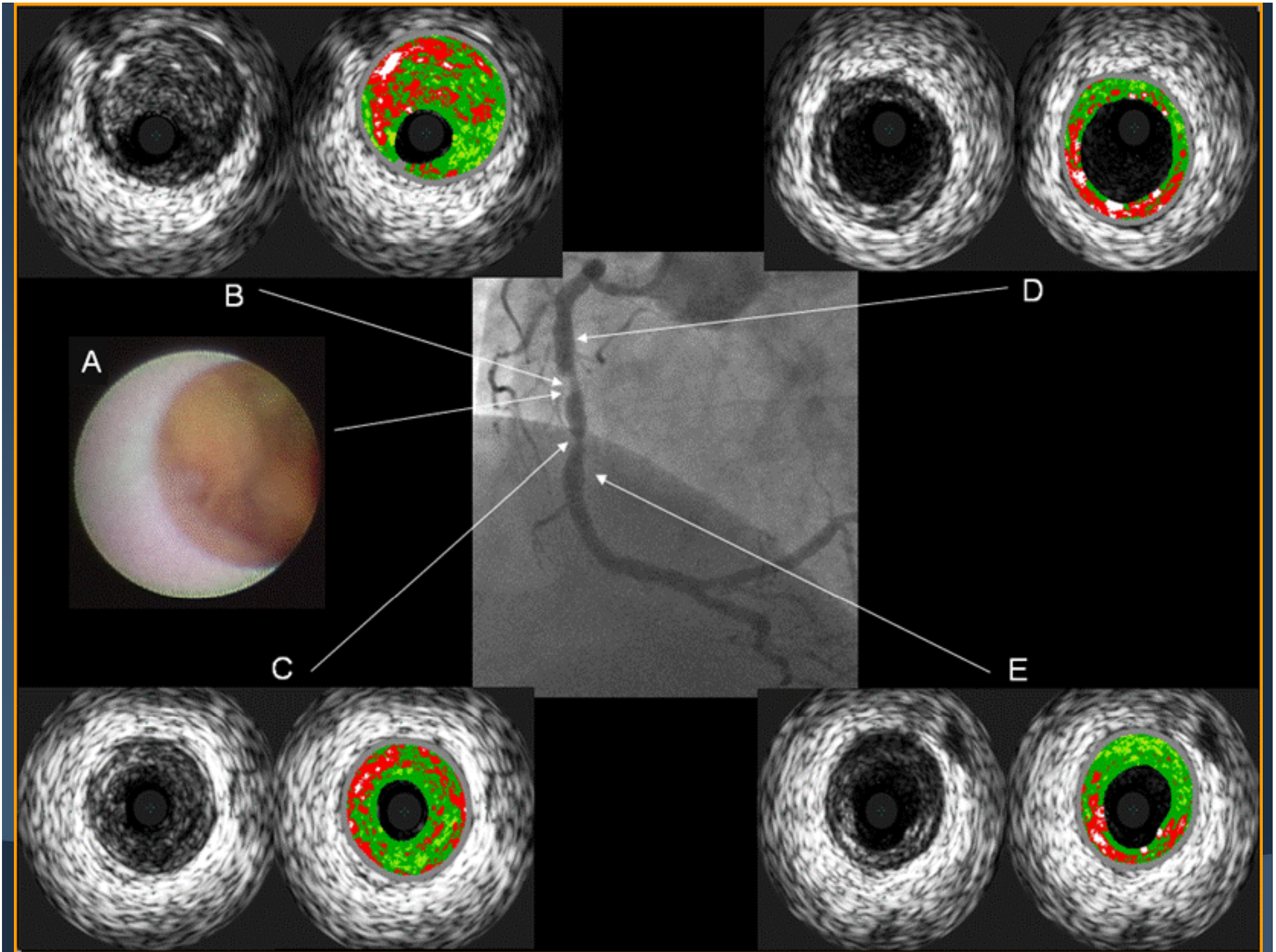


Kubo T, et al JACC 2007

Comparison between Ruptured thrombosis vs. Erosive thrombosis

- Pathology-

	Erosion (n=50)	Rupture (n=65)	p-value
Age (yrs)	43±9	52±10	<0.0001
Male	74%	89%	0.03
Vessel Area (mm ²)	9.5±5.2	13.7±6.0	<0.0001
Plaque Burden (%)	77.1±13.8	71.3±14.9	0.02
Necrotic Core (%)	18.3±24.4	38.3±23.4	<0.0001
Occlusive Thrombus (%)	52%	46%	0.53



Clinical Background

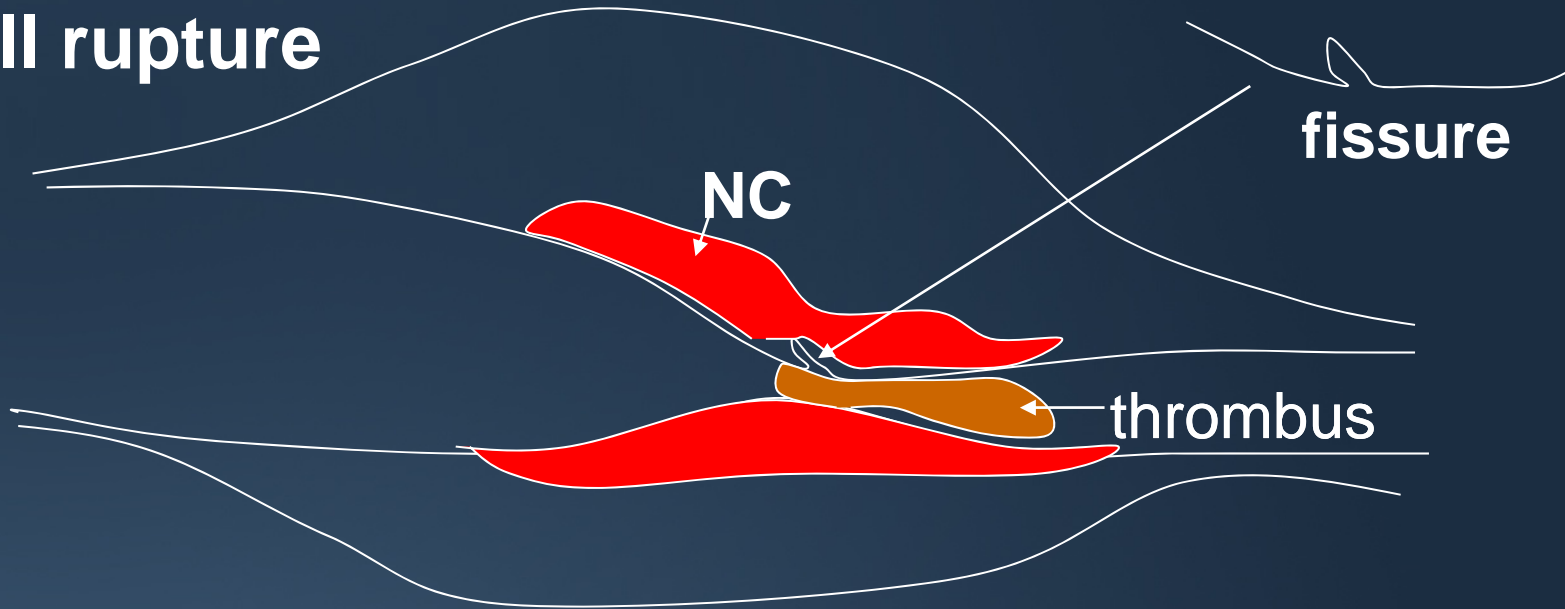
	No Plaque Rupture (n=19)	Plaque Rupture (n=18)	p-value
Age	60±12	57±11	0.29
Men	12 (63%)	18 (100%)	0.004
Women	7 (37%)	0 (0%)	
Clinical Syndrome			0.65
Myocardial Infarction	74%	56%	
Unstable Angina	33%	16%	
Risk Factors			
Current Smoking	42%	39%	>0.99
Hyperlipidemia	90%	72%	0.35
Diabetes Mellitus	42%	24%	0.41
Multiple lesion per pt	21%	6%	0.16

Comparison between Ruptured thrombosis vs. Erosive thrombosis

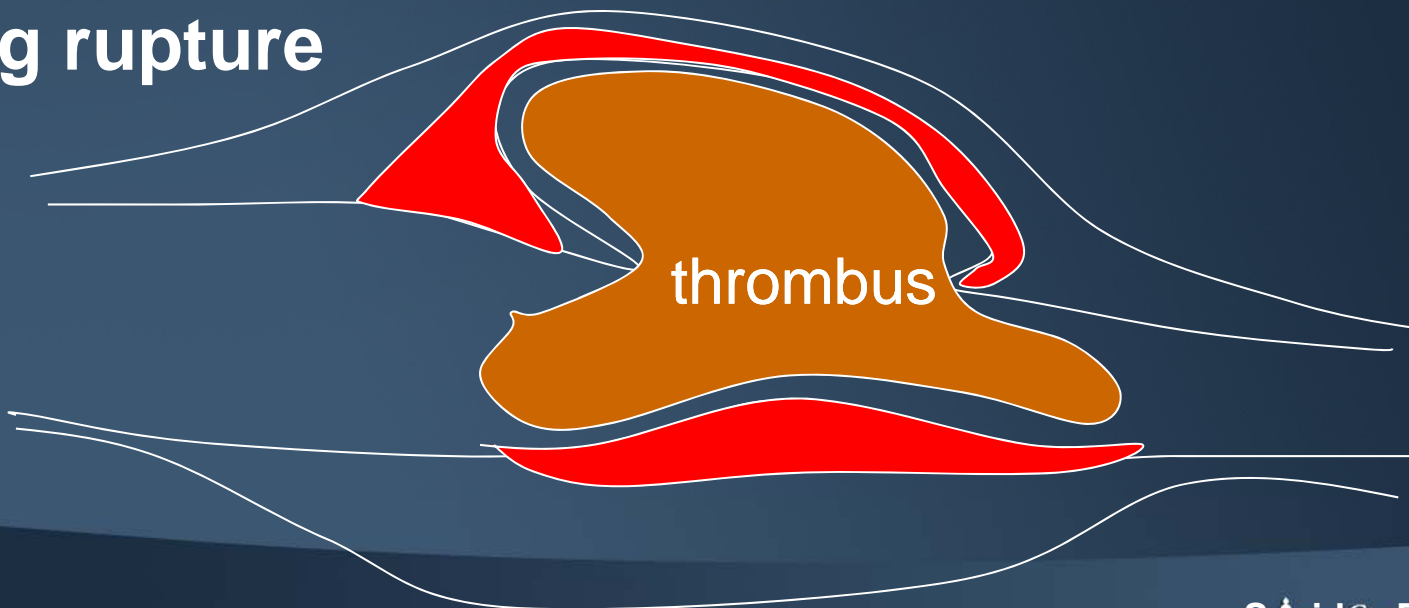
	No Plaque Rupture (n=23)	Plaque Rupture (n=17)	p-value
TCFA	73.9%	64.7%	0.53
MLA site			
Lumen Area (mm ²)	3.5±1.4	3.1±0.6	0.34
Vessel Area (mm ²)	16.0±4.4	20.3±5.5	0.09
Plaque Burden (%)	78.2±5.5	83.6±4.7	0.002
Necrotic Core (%)	23.1±11.9	19.1±10.1	0.26
Maximum NC site			
Lumen Area (mm ²)	4.8±2.0	5.4±1.7	0.40
Vessel Area (mm ²)	16.0±4.3	18.6±5.3	0.11
Plaque Burden (%)	70.3±8.0	70.3±7.9	0.97
Necrotic Core (%)	34.3±12.9	28.7±9.1	0.13



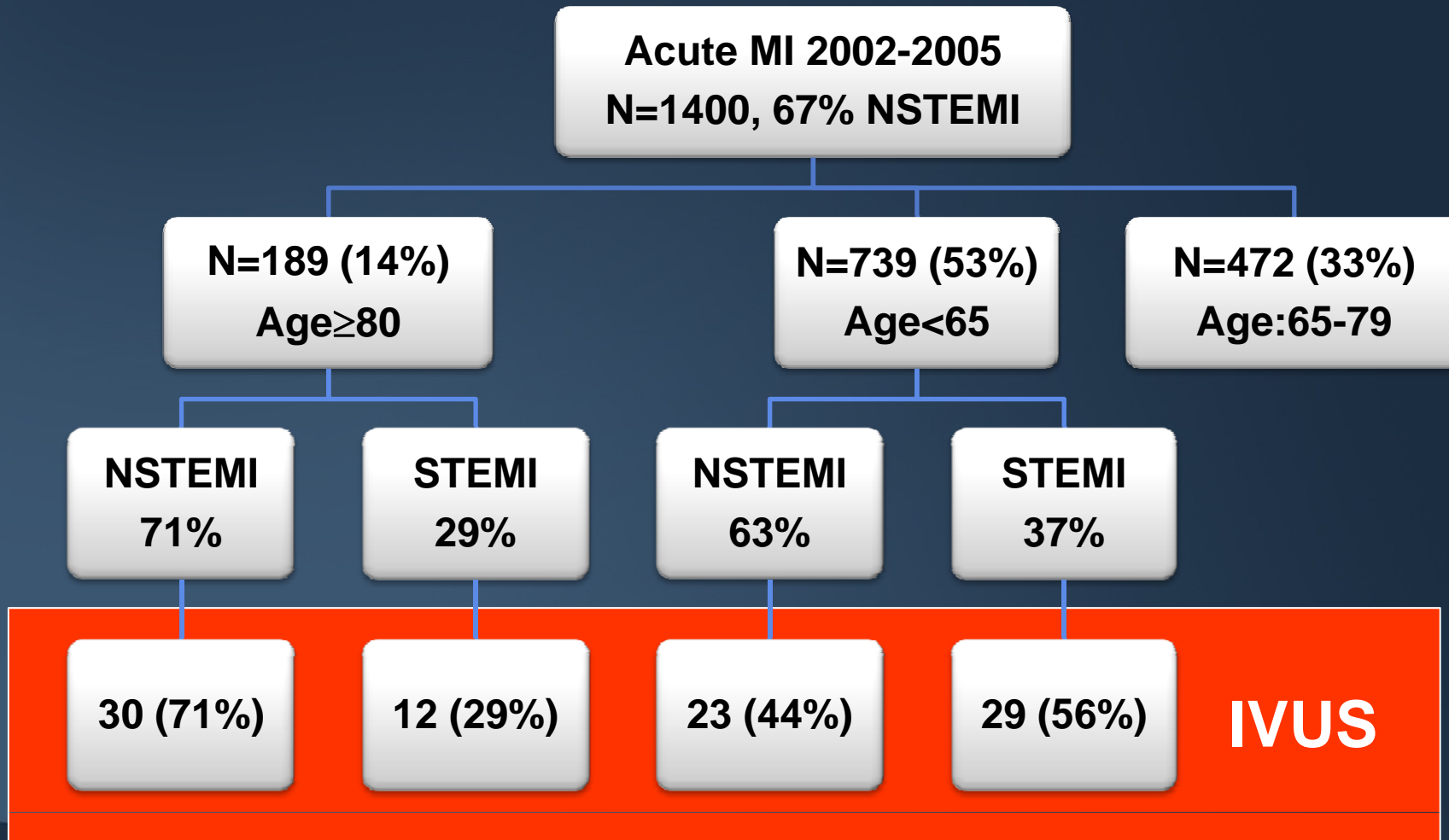
Small rupture



Big rupture



WHC AMI IVUS



Clinical Background

	Age>80	Age<65	p-value
Age, yrs	85.3±3.5	54.6±7.6	<0.001
Male	52%	60%	0.8
Known Coronary Artery Disease	38%	11%	0.004
Peripheral Vascular Disease	24%	4%	0.007
Renal failure	38%	13%	0.008
Creatinine (mg/dl)	1.4±1.0	1.0±1.1	0.02
White blood cell, 10 ⁹ /l	7.8±2.9	9.7±3.8	0.008
LDL, mg/dl	98±29	112±46	0.14
HDL, mg/dl	40.8±12.3	40.4±11	0.14

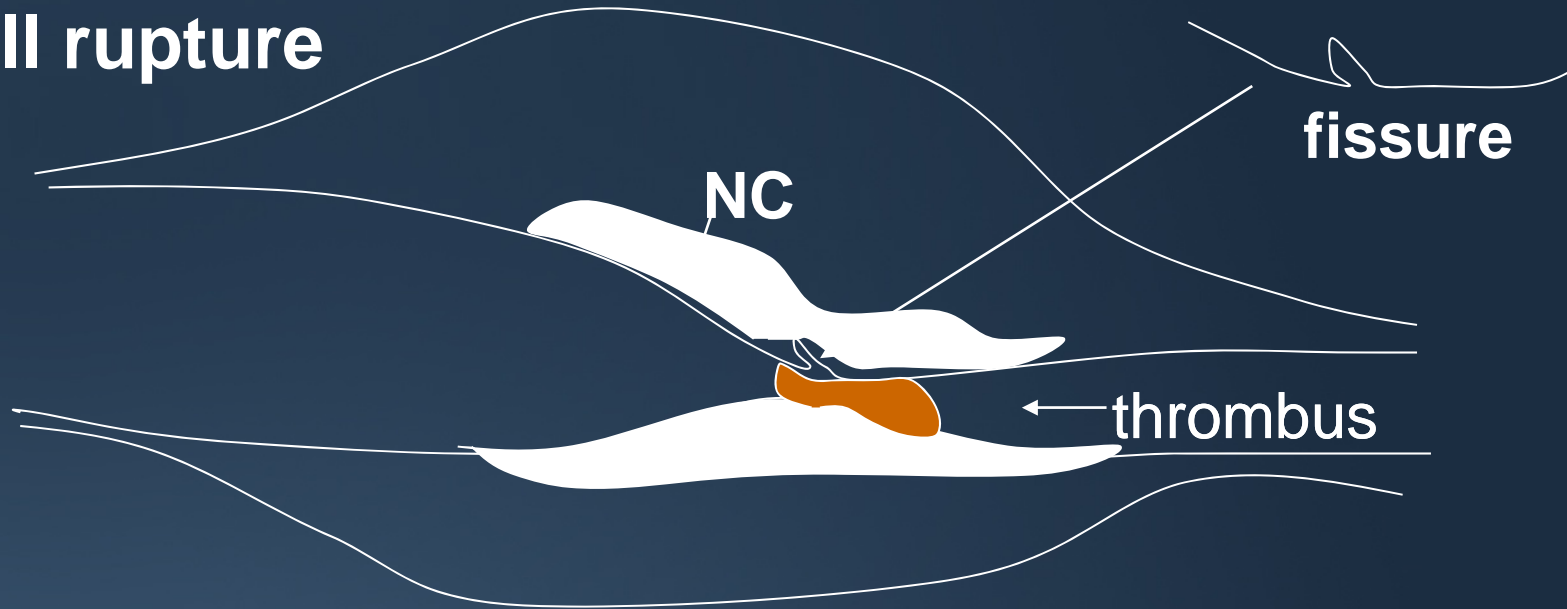
Angiography

	Age>80	Age<65	p-value
Multiple Vessel Disease	79%	40%	<0.001
LAD/LCX/RCA	52/7/41%	44/17/52%	0.33
Prox/Mid/Distal	31/62/7%	33/52/15%	0.41
Thrombus	1 (2%)	10 (20%)	0.007
Calcification	59%	8%	<0.001
RVD, mm	2.9±0.8	3.0±0.8	0.78
MLD, mm	1.1±0.4	1.0±0.6	0.13
Percent Stenosis, %	59±15	68±18	0.01
Lesion Length, mm	14.7±6.8	10.6±4.3	0.001

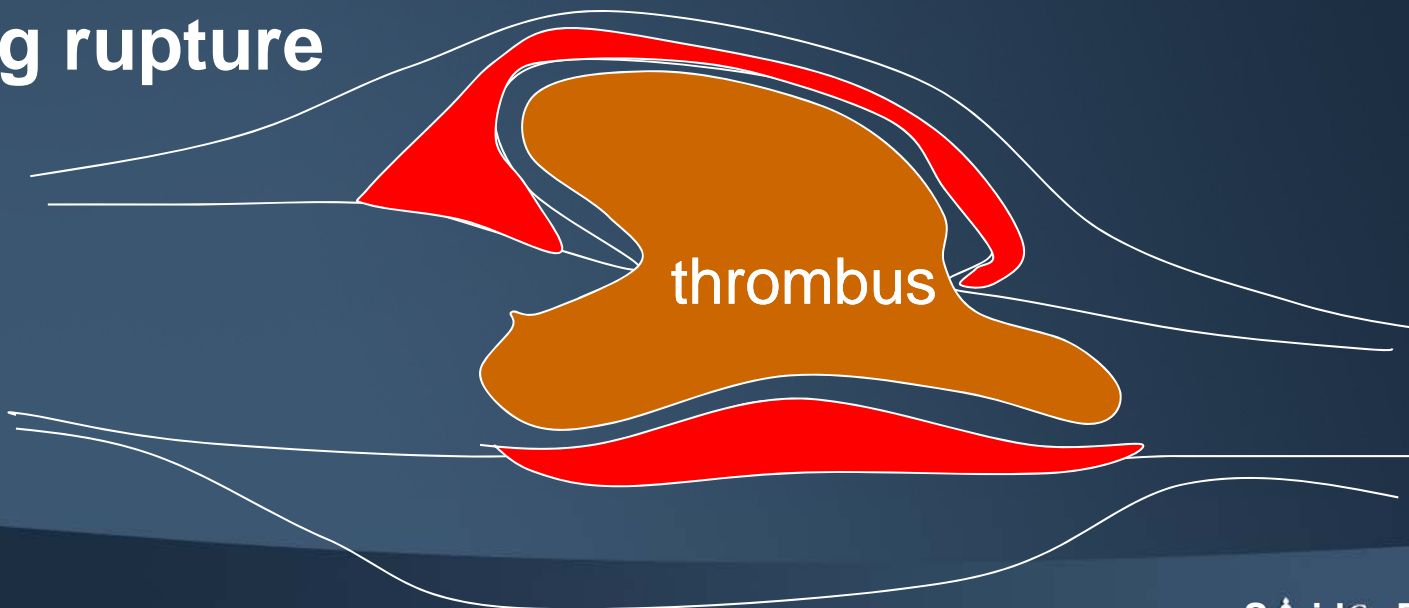
IVUS

	Age>80	Age<65	p-value
Thrombus	1 (2%)	7 (14%)	0.04
Calcified Plaque	57%	10%	0.009
Calcified Length, mm	5.5±2.9	3.5±2.8	0.006
Lesion Max Calcified Arc, °	199±91	115±71	<0.0001
Prox Ref Calcified Arc, °	90±50	65±23	0.2
Distal Ref Calcified Arc, °	68±30	49±18	0.4
MLA, mm ²	2.6±1.2	2.8±1.8	0.5
Remodeling Index, mm²	0.85±0.2	1.03±0.2	0.0004

Small rupture



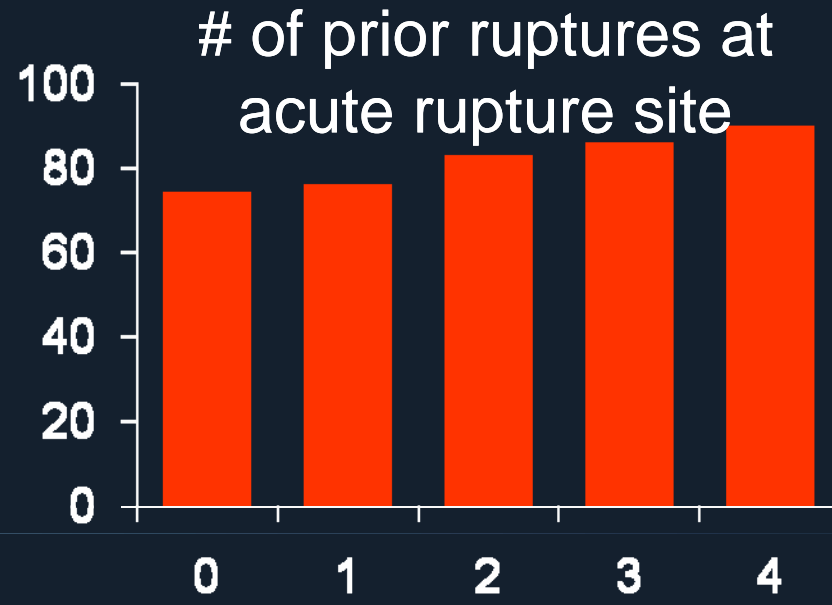
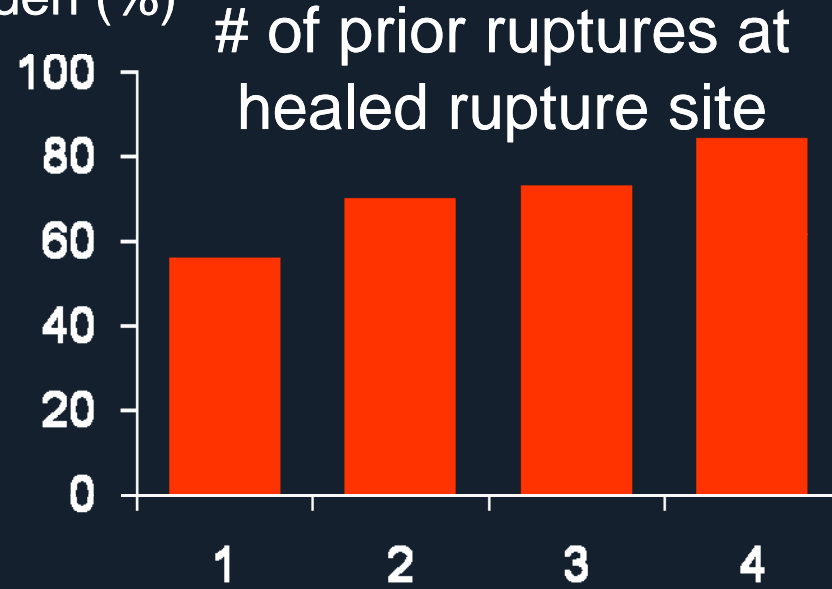
Big rupture



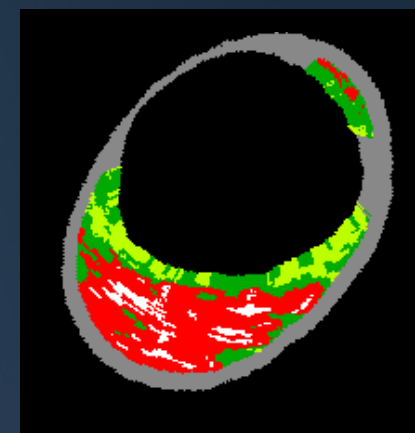
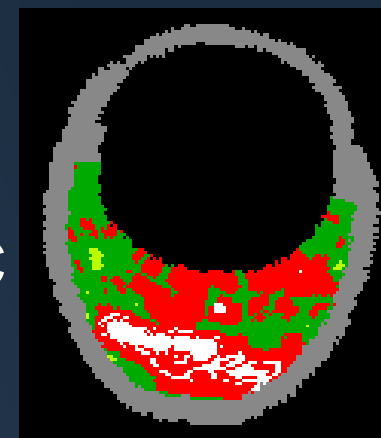
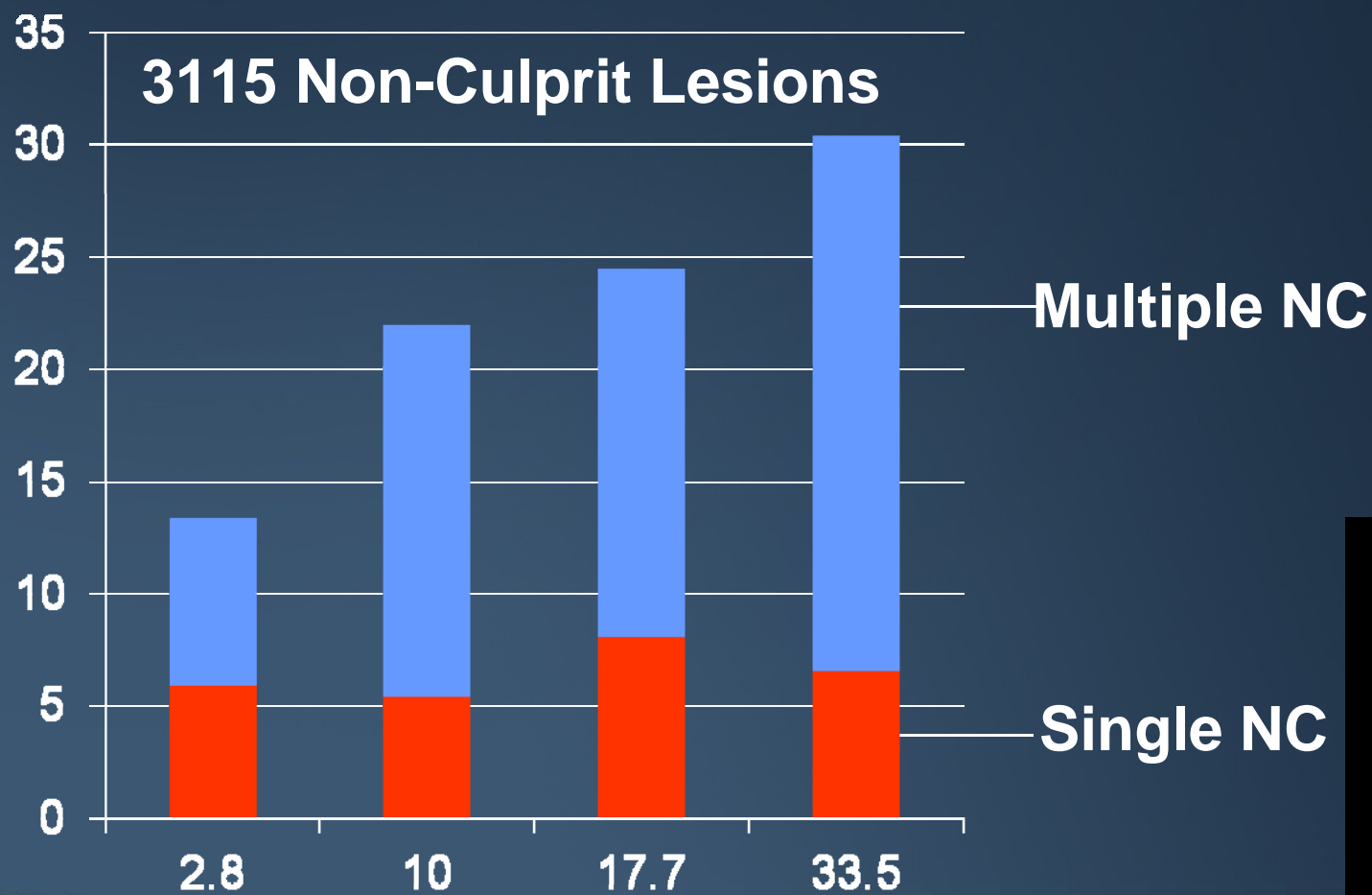
Subclinical plaque rupture increase plaque burden.



Plaque Burden (%)



Difference of TCFA Morphology According to the quartile of QCA DS



 QCA Diameter Stenosis

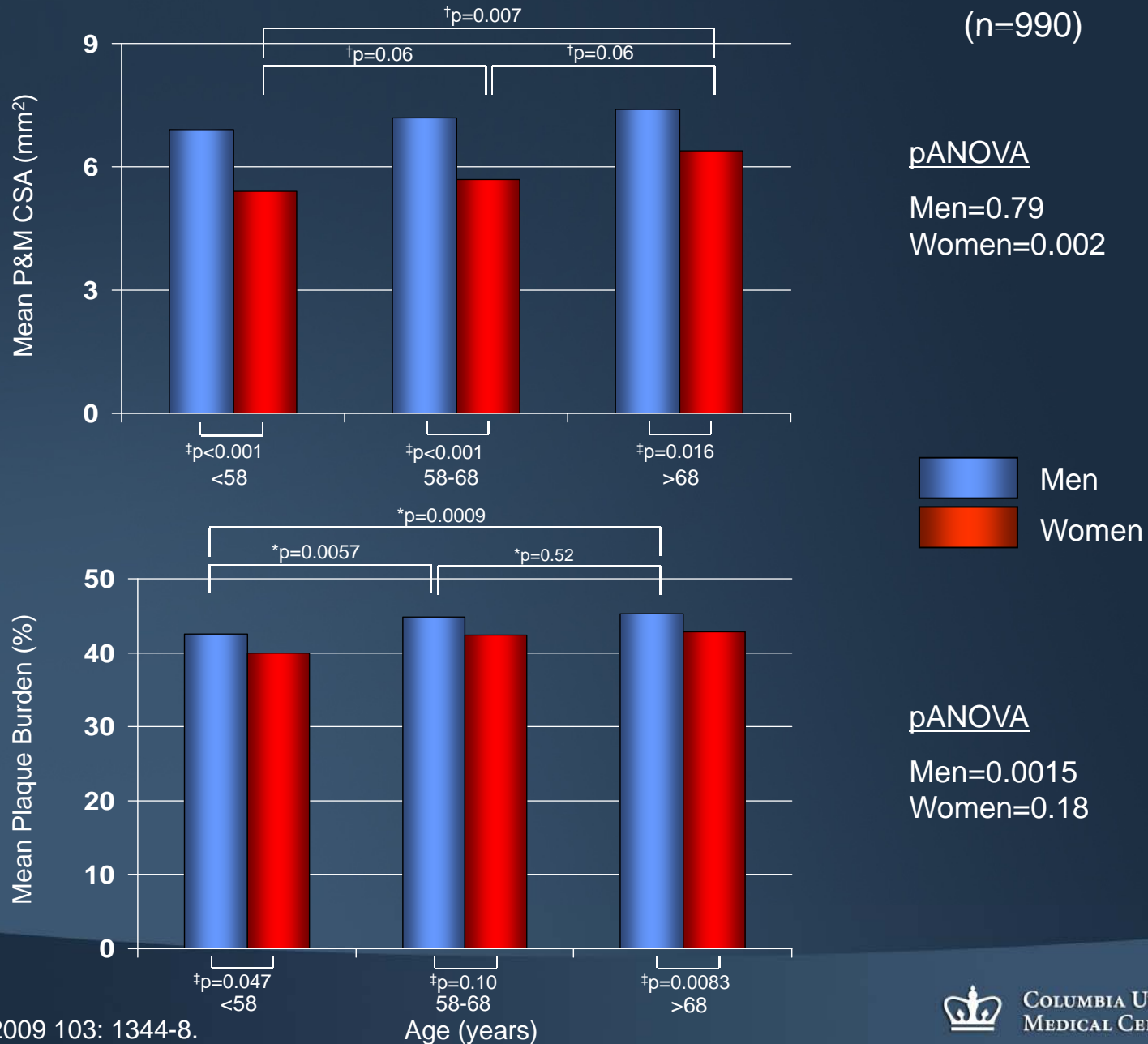
Plaque Burden in AMI - Histology-

Author	n	Plaque Burden(%)	Necrotic Core (%)	Occluded Thrombus
Erosion	50	71.3±13.8	18.3±24.4	30 (46%)
Rupture	65	77.1±14.9	38.3±24.4	26 (52%)

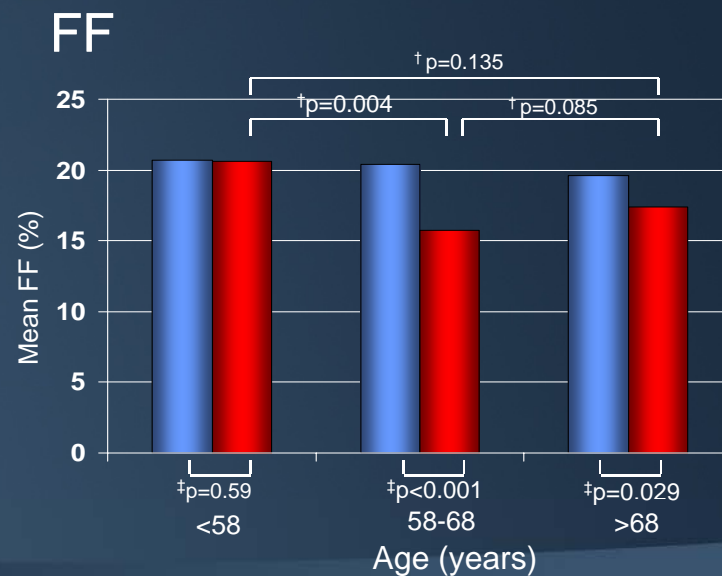
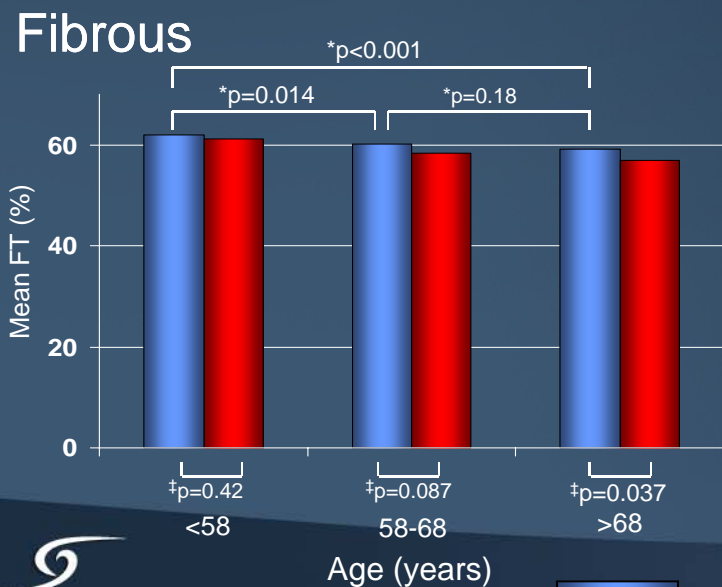
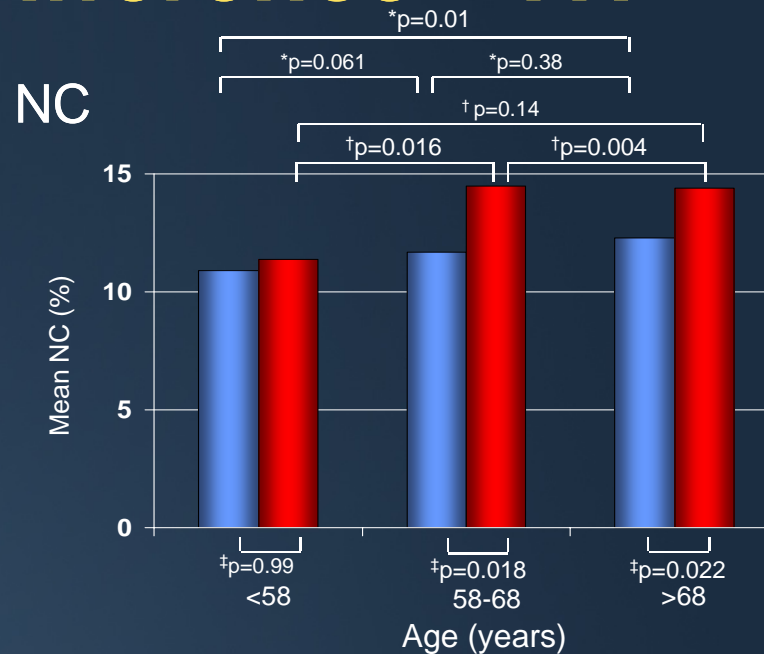
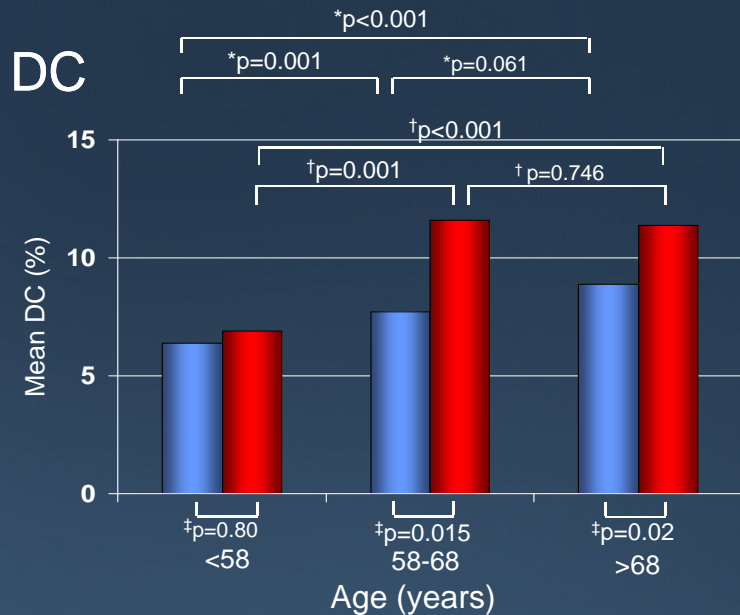
Plaque Burden and MLA in AMI by IVUS

Author	n	Plaque Burden (%)	MLA(mm ²)
Kotani	78	Culprit/Non-Culprit=86.6/73.8	2.0/3.4
Tanaka	100	No-reflow /Reflow=89/85	2.2/2.3
Hong	122	85.8	2.2

Age & Gender Difference - Plaque Burden-



Age & Gender Difference - VH -



Men

Women



Big Rupture
+Thrombus

Man>Woman

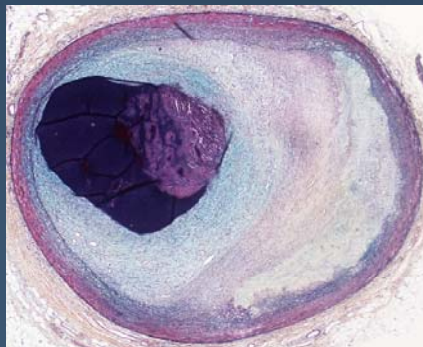


Small Rupture
(or Erosion)
+Thrombus

Woman>Man

Thrombotic Event

Classical
Erosive
Thrombosis



Woman>Man

Plaque
burden

70%



Rupture/
Healed



Rupture/
Healed



Rupture/
Healed



95%
Stenosis



Younger (Before
menopause)

Old (80yo~)
Woman=Man

