Torino 2012

Burning issues in ACS: Role of Risk Score

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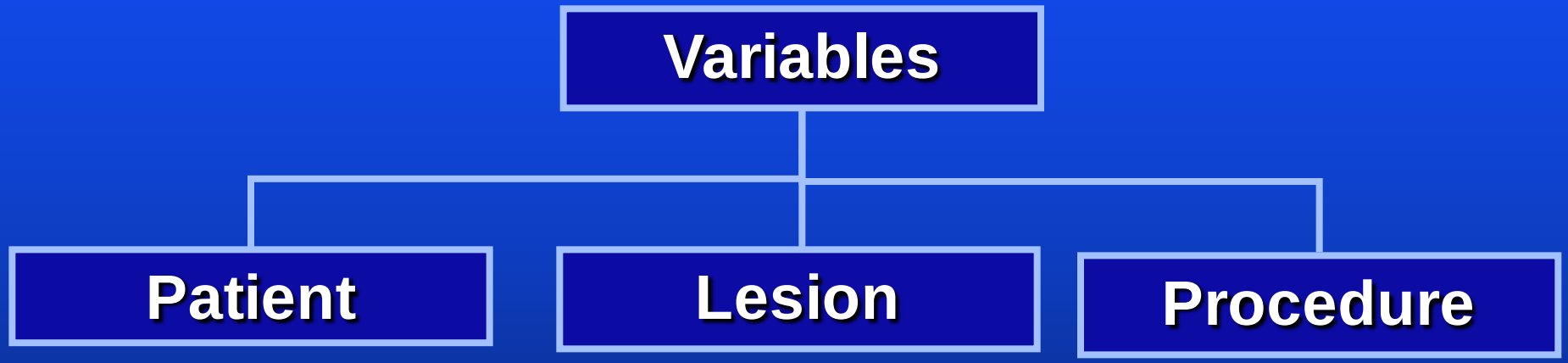
mayo

72 year old with present with ACS

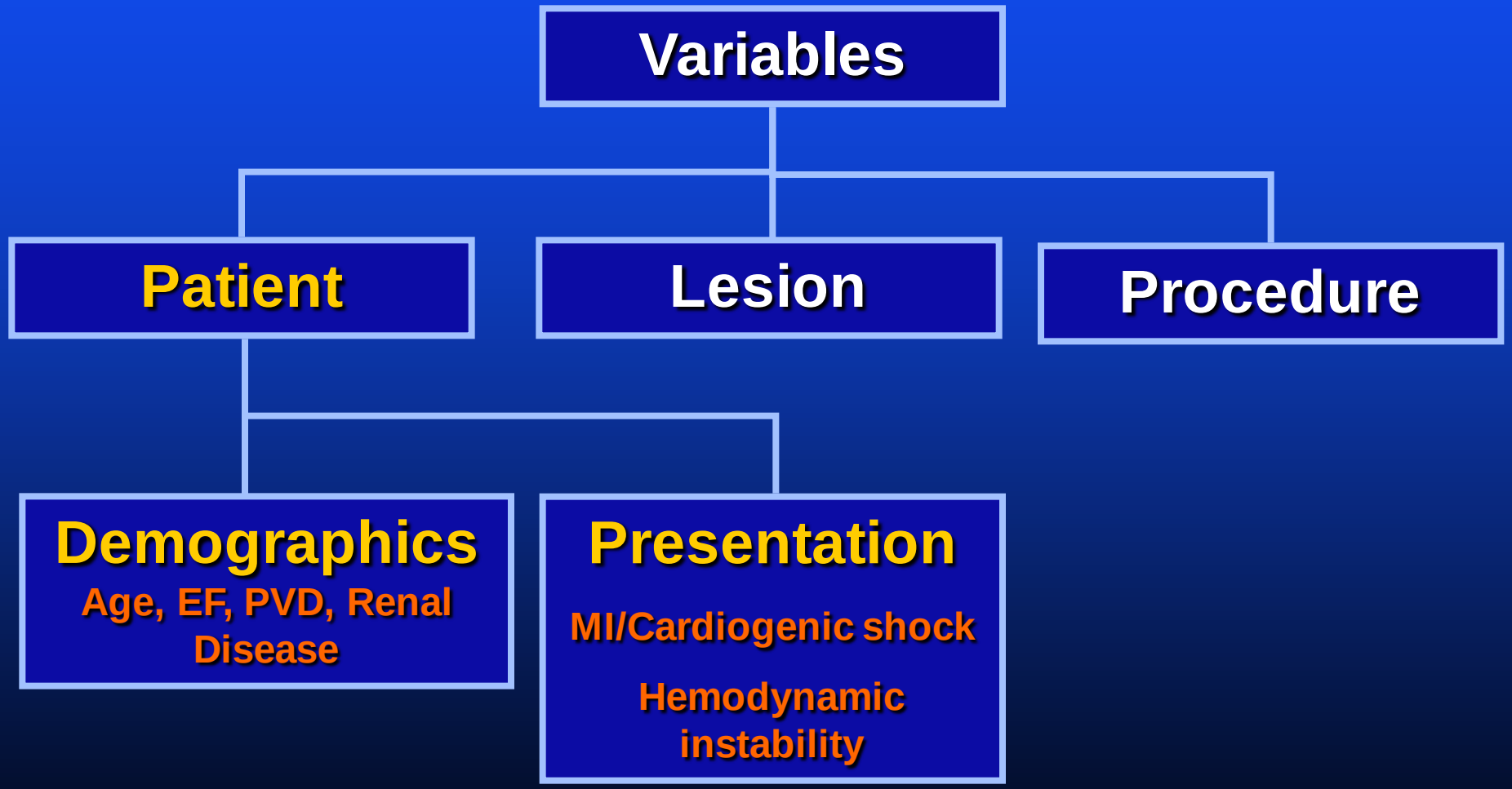
Role of risk scores.

Predictors of Mortality/MACE

Role of risk scores.



Predictors of Mortality/MACE



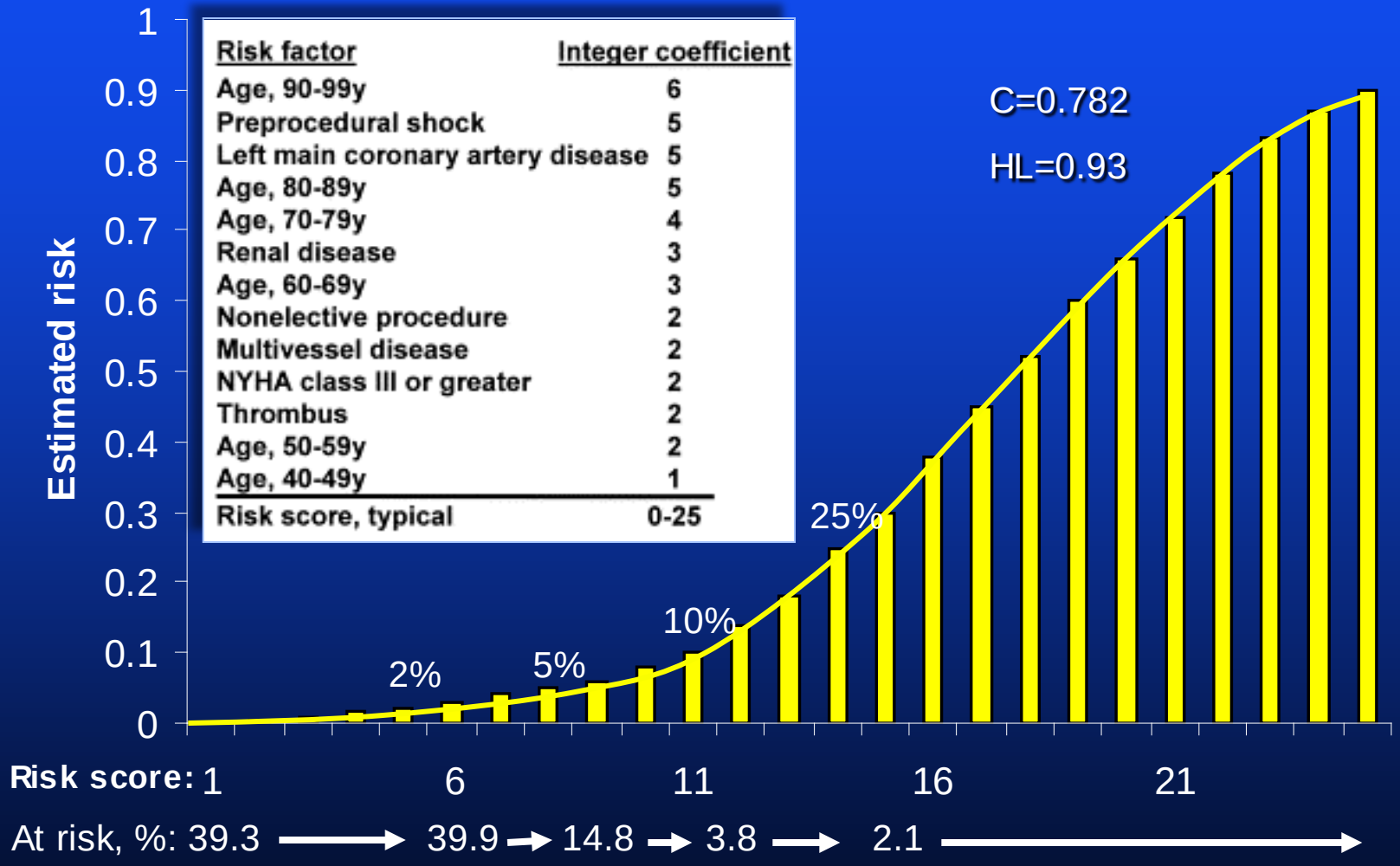
Noninvasive Assessment of Risk

Severity of Ischemia	Symptoms ECG*
Site and no. vessels diseased	Chronic angina Prior MI Diabetes ECG*
LV function	History of CHF ECG* Echocardiography
Lesion stability and extent of necrosis	↑ troponins ↑ CPK-MB
Serum biomarkers, ?	CRP IL-6 BNP Myeloperoxidase

*ST depression or steep T-wave inversion

Mayo Risk Model

Risk factor	Integer coefficient
Age, 90-99y	6
Preprocedural shock	5
Left main coronary artery disease	5
Age, 80-89y	5
Age, 70-79y	4
Renal disease	3
Age, 60-69y	3
Nonelective procedure	2
Multivessel disease	2
NYHA class III or greater	2
Thrombus	2
Age, 50-59y	2
Age, 40-49y	1
Risk score, typical	0-25



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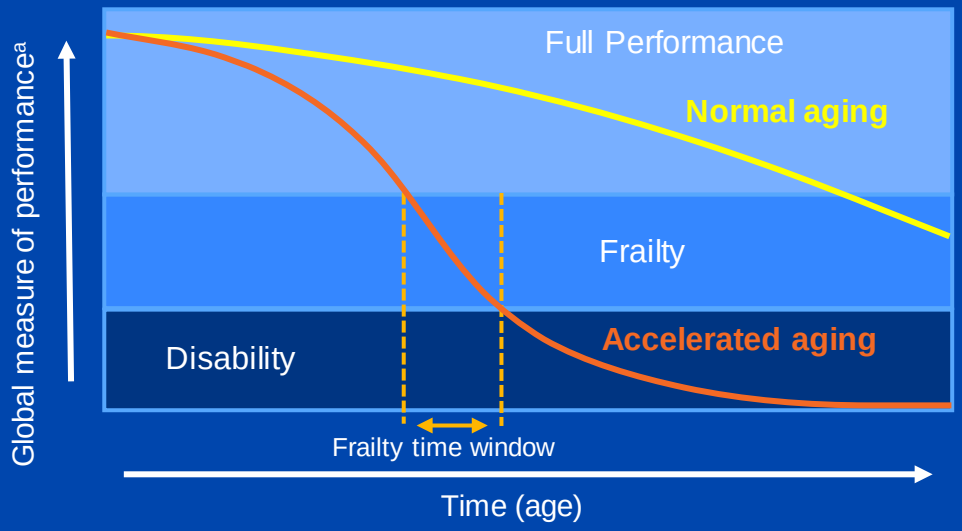
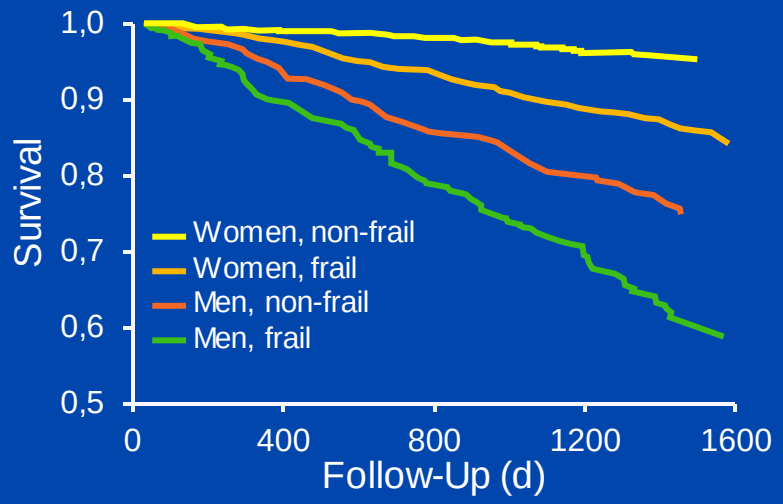
Singh M. J Am Coll Cardiol. 2002, 40:387-93

Poor Survival Rates Among Both Men and Women Who Were Frail According to 9 Frailty Markers





Definition of Frailty as Proposed by the Cardiovascular Health Study
Unintentional weight loss
Exhaustion
Physical activity
Walk time
Grip strength
Frailty

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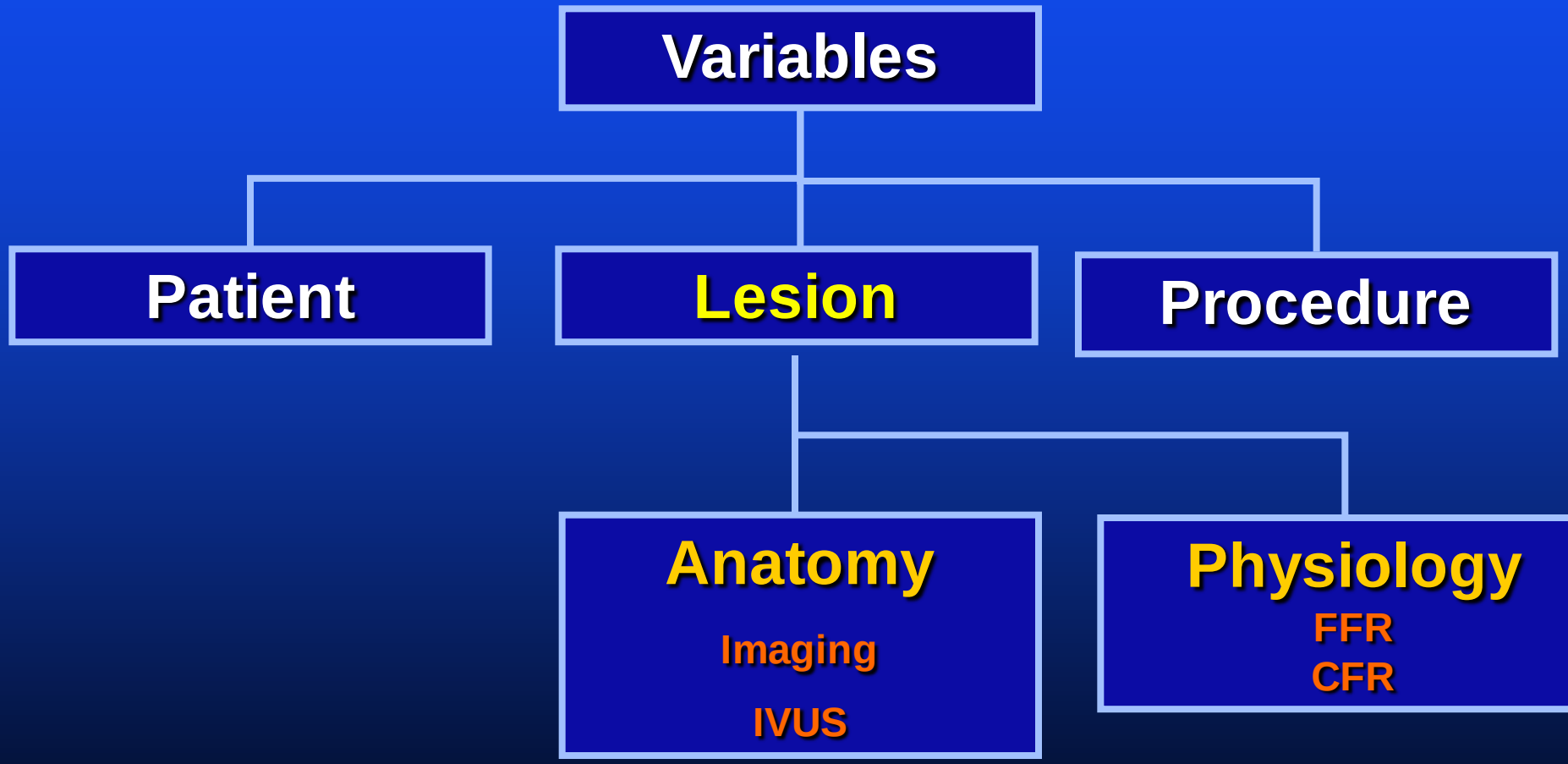
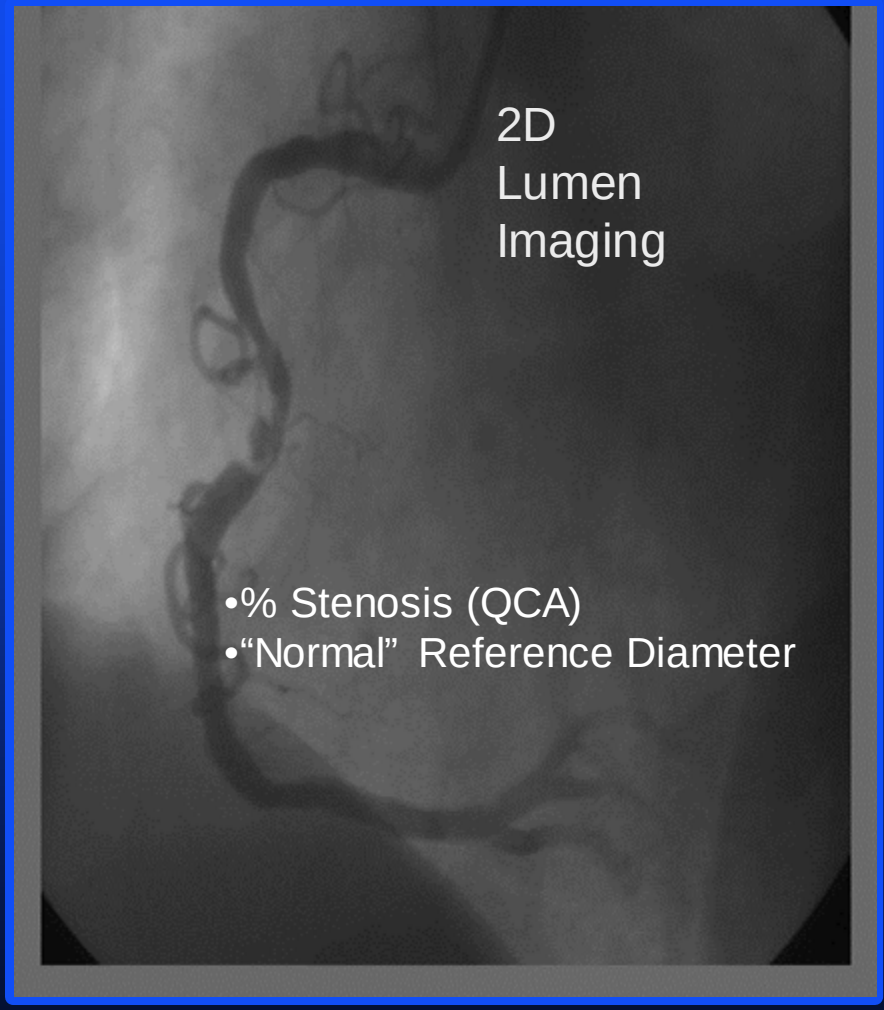
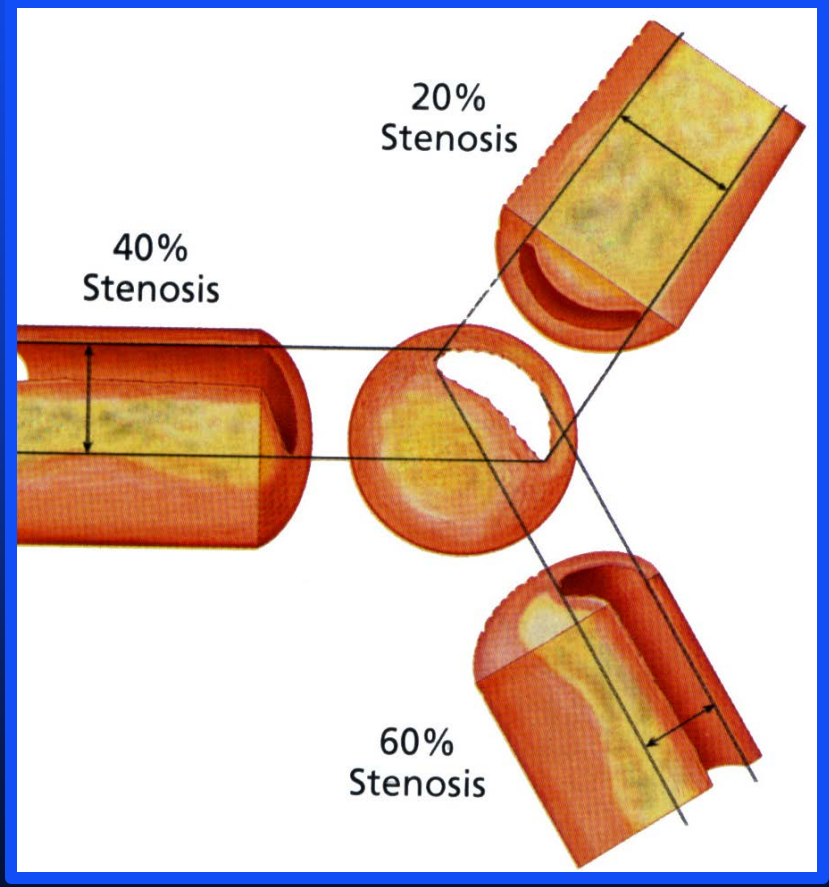
Singh, et al. Mayo Clin Proc. 2008;83(10):1146-1153

Predictors of Mortality/MACE



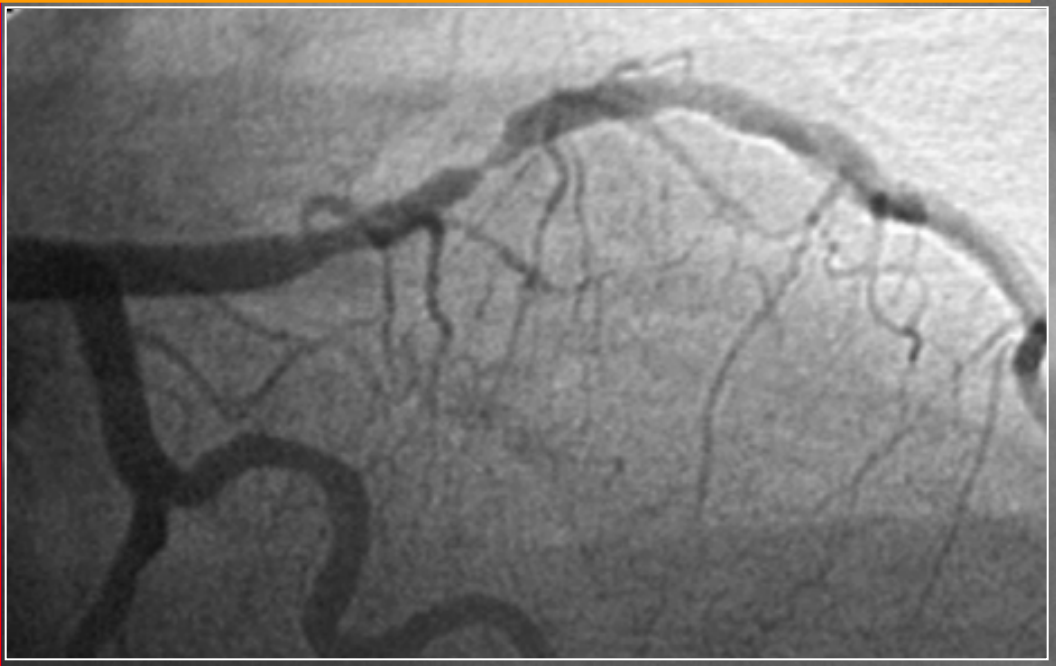
Angiography: Everyday Imaging Tool

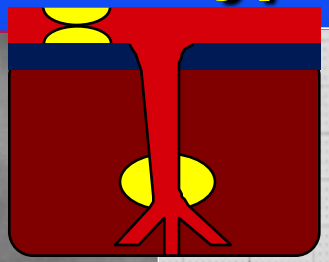


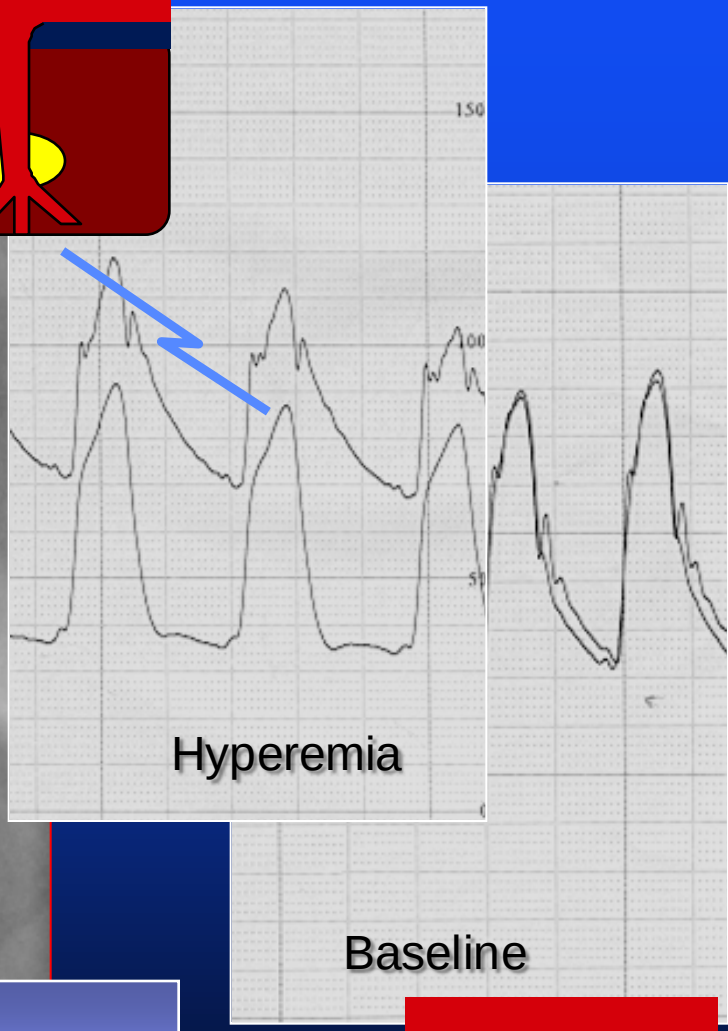


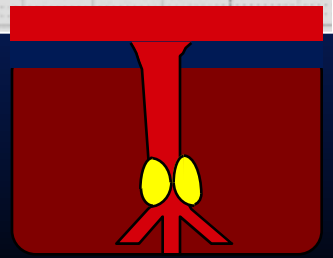
Coronary Stenoses Resting and hyperemic Flow

Hyperemia "uncover" the true gradient across the lesion





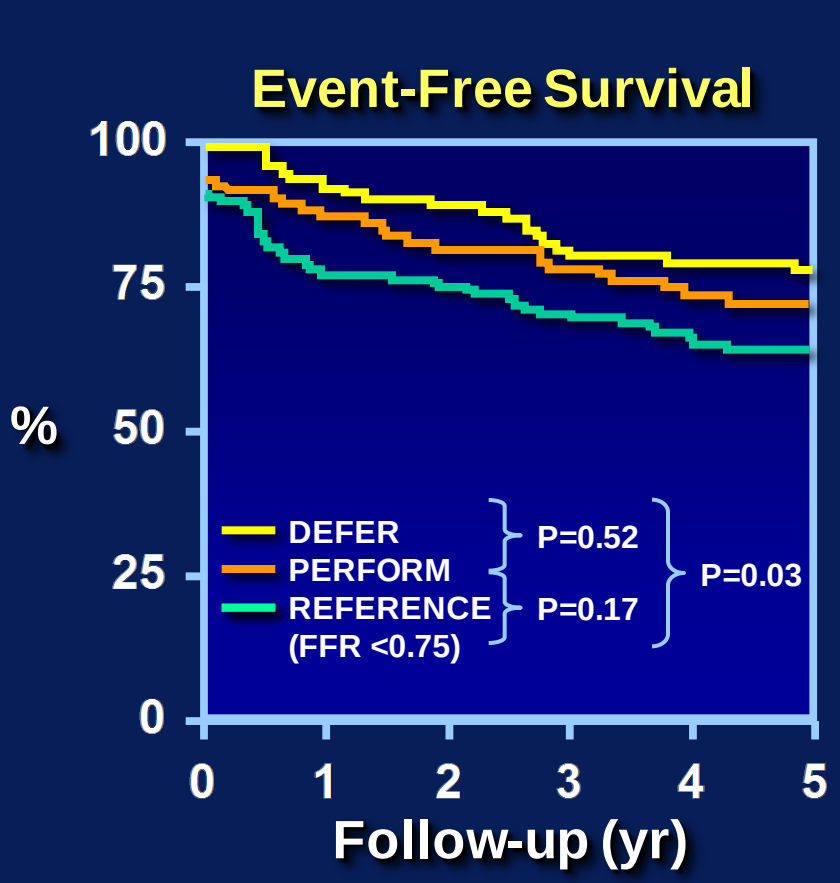


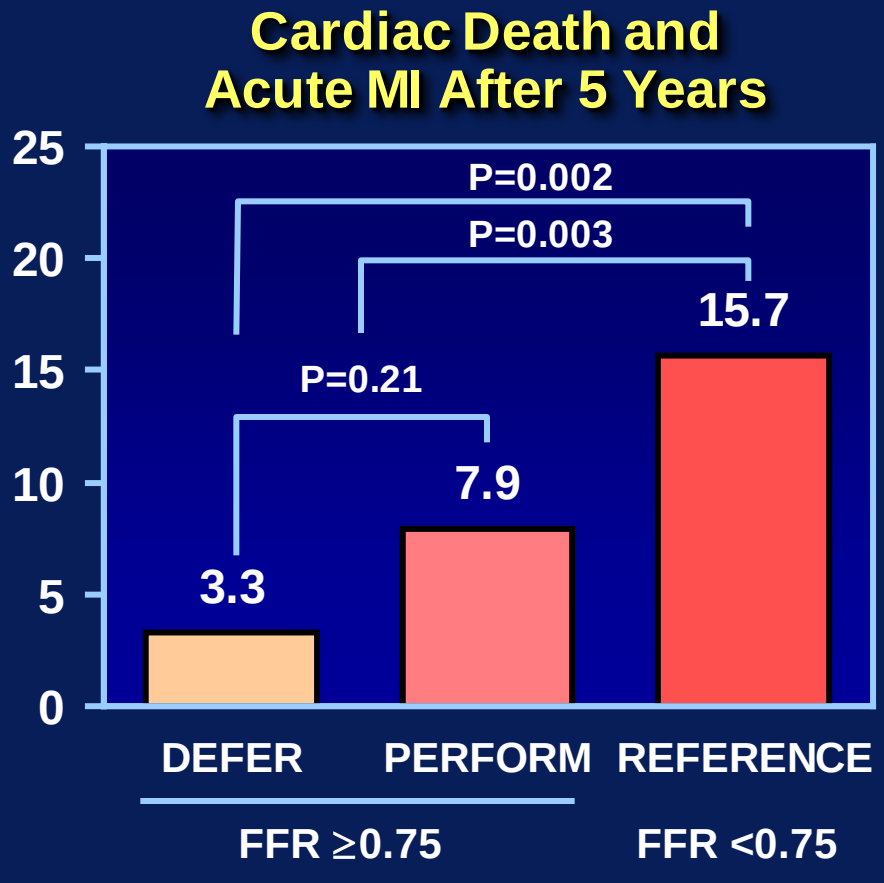


- *Myocardial Fractional Flow Reserve during hyperemia*

$$FFR: = \frac{P_d}{P_A}$$

5-Year Outcomes – DEFER Trial





Conclusions: "Five-year outcome after deferral of PCI of an intermediate coronary stenosis based on FFR ≥0.75 is excellent. The risk of cardiac death or myocardial infarction related to this stenosis is <1% per year and not decreased by stenting."

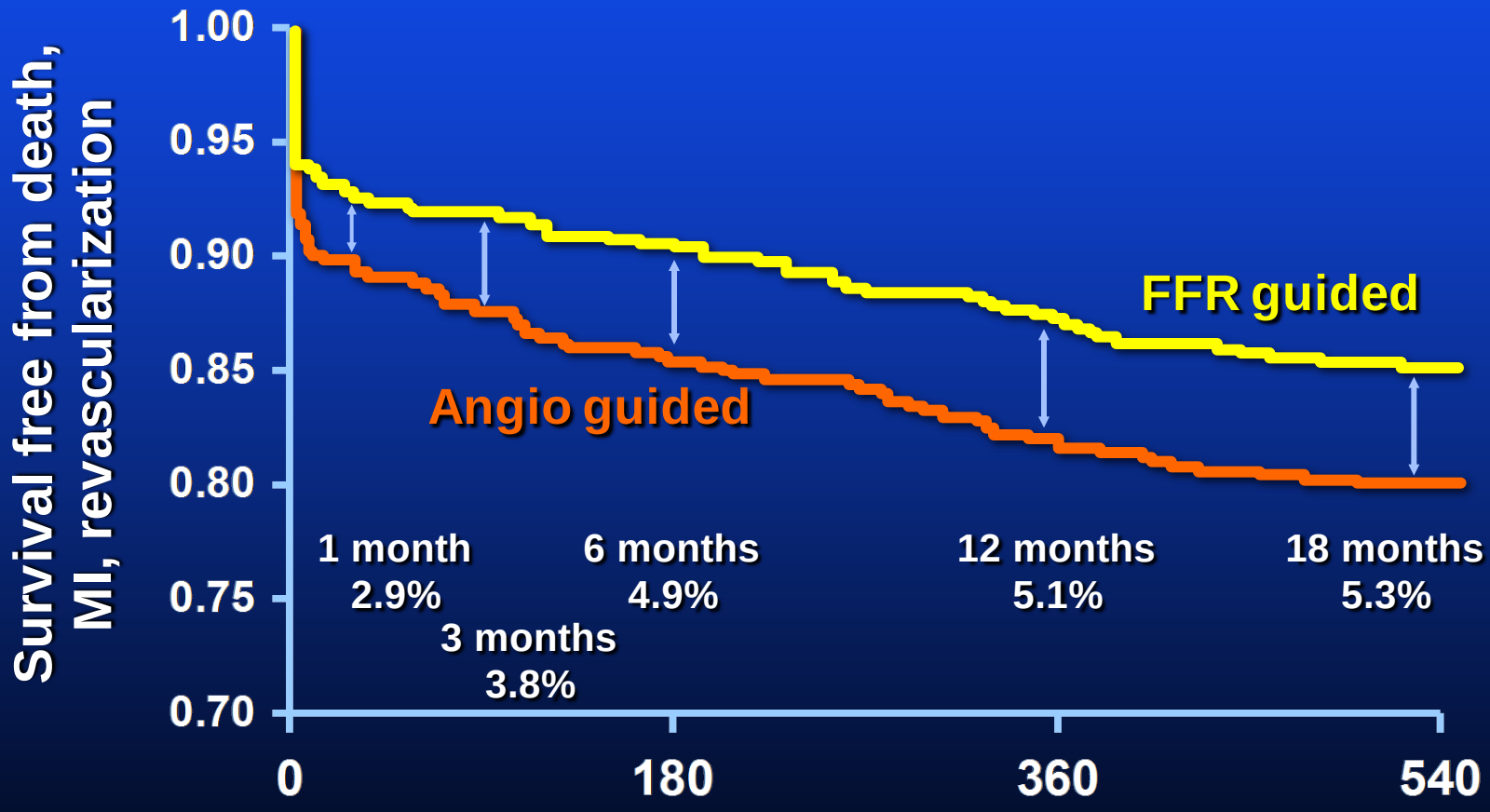
Pijls: JACC, 2007

The NEW ENGLAND JOURNAL of MEDICINE

FAME Study

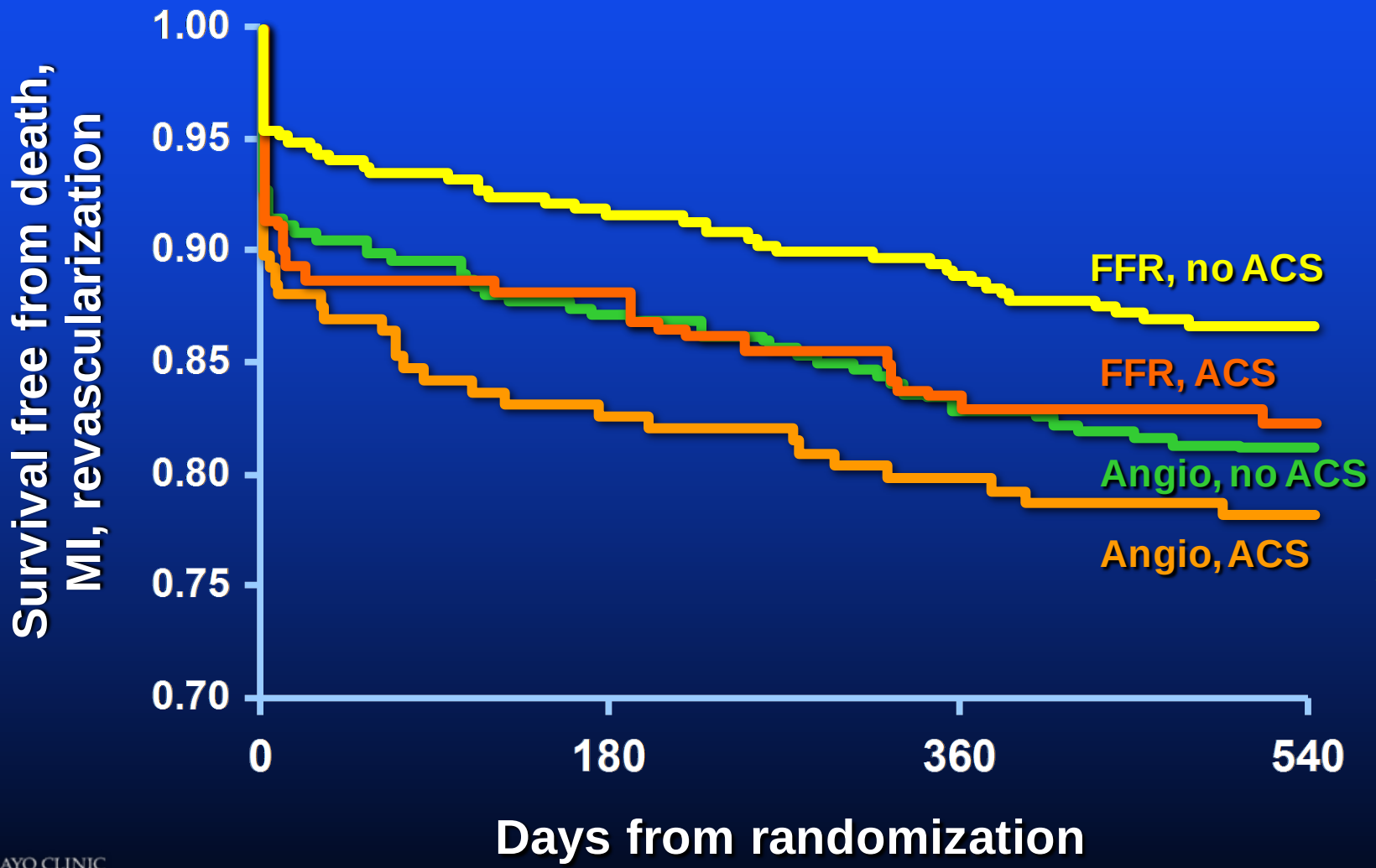
Event-Free Survival 18 Months

Absolute Difference in MACE-Free Survival



FAME Study

Unstable Angina and Non-STEMI

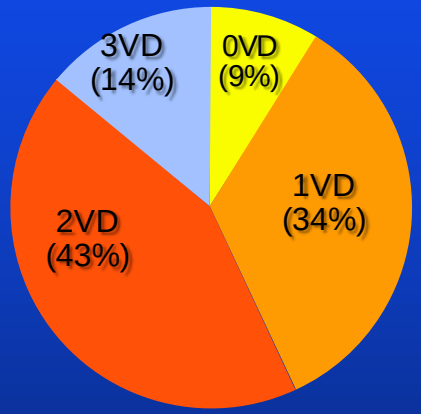


72 YO with HTN present with angina

Syntax score 20

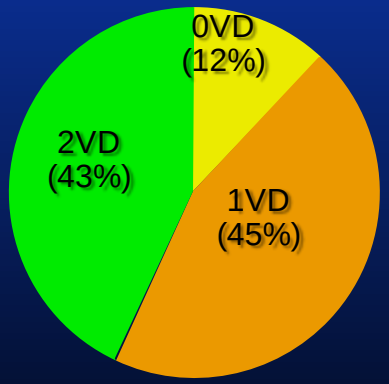
Functional SYNTAX score recalculated counting only lesions with an FFR<0.8

3VD



Only 14% of patients with angiographic 3VD had functional 3VD

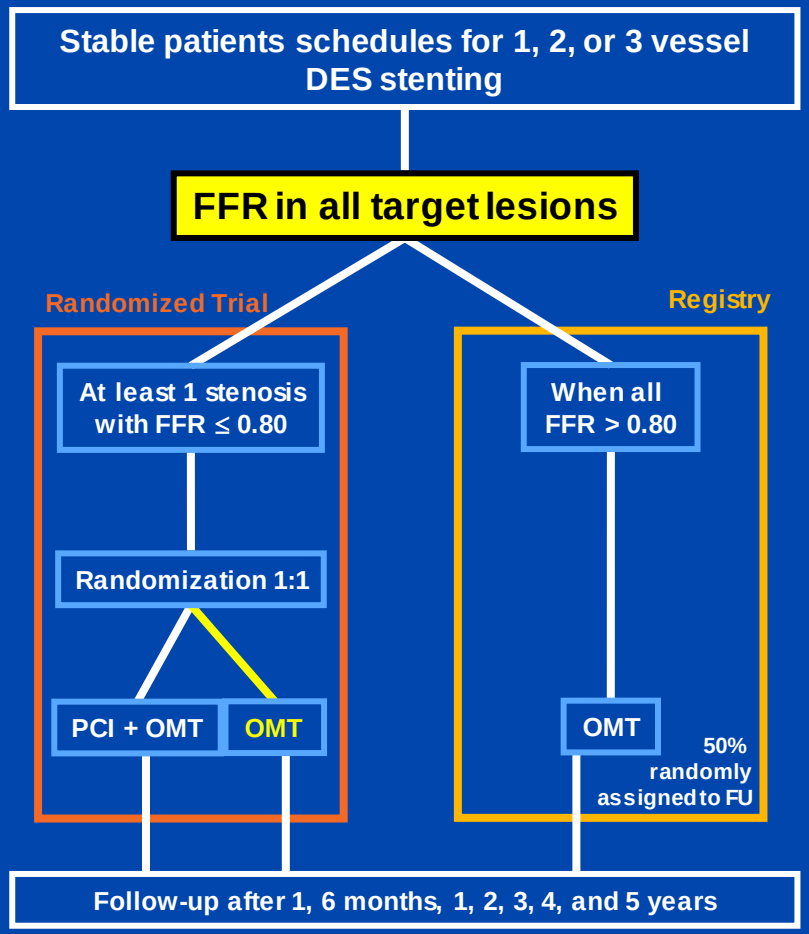
2VD



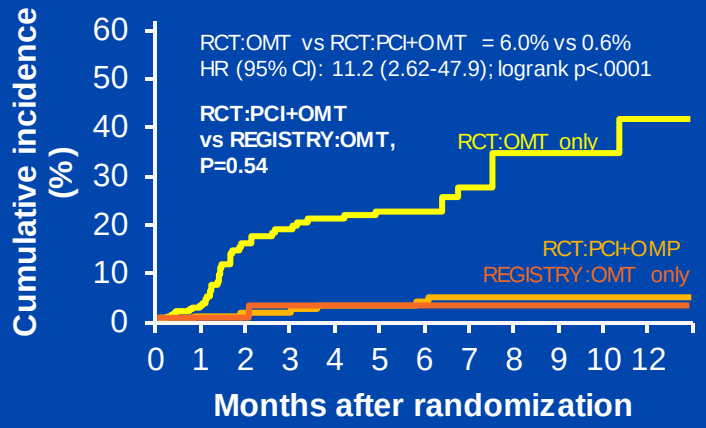
Only 43% of patients with angiographic 2VD had functional 2VD

J Am Coll Cardiol 55(25):2816, 2010

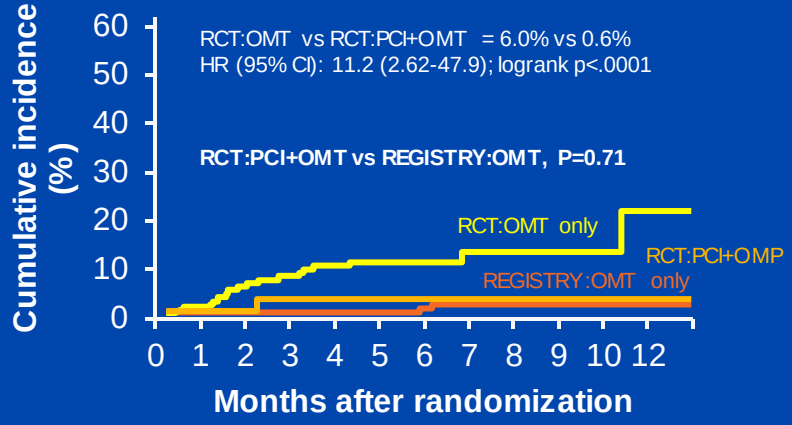
FAME II



Rate of Any Revascularization



Rate of Urgent Revascularization



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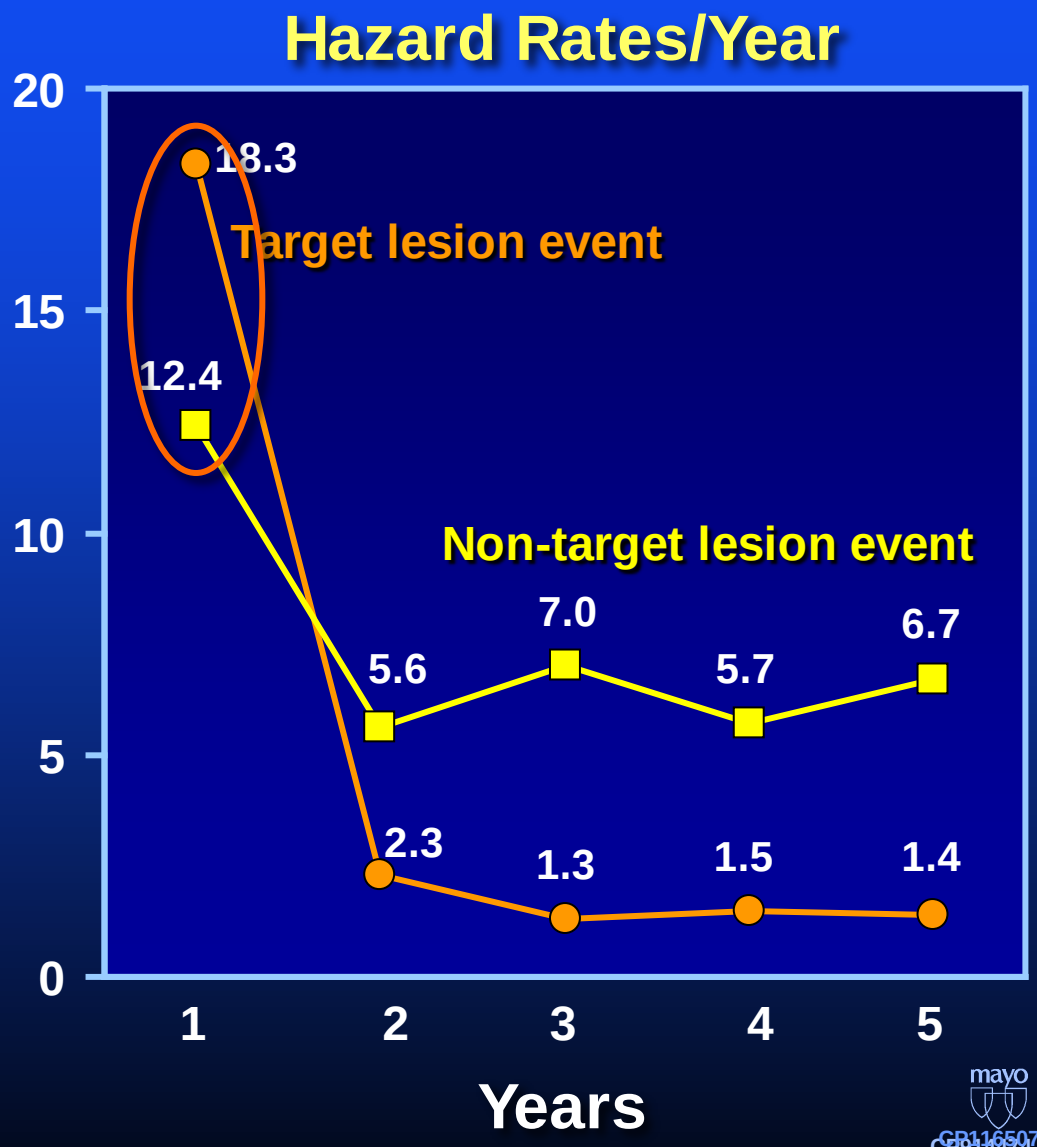
5-Year Clinical Outcomes After Coronary Stenting

- 1,228 pt
- 3 trials
- 2nd generation stents



Cutlip: Circ, 2004

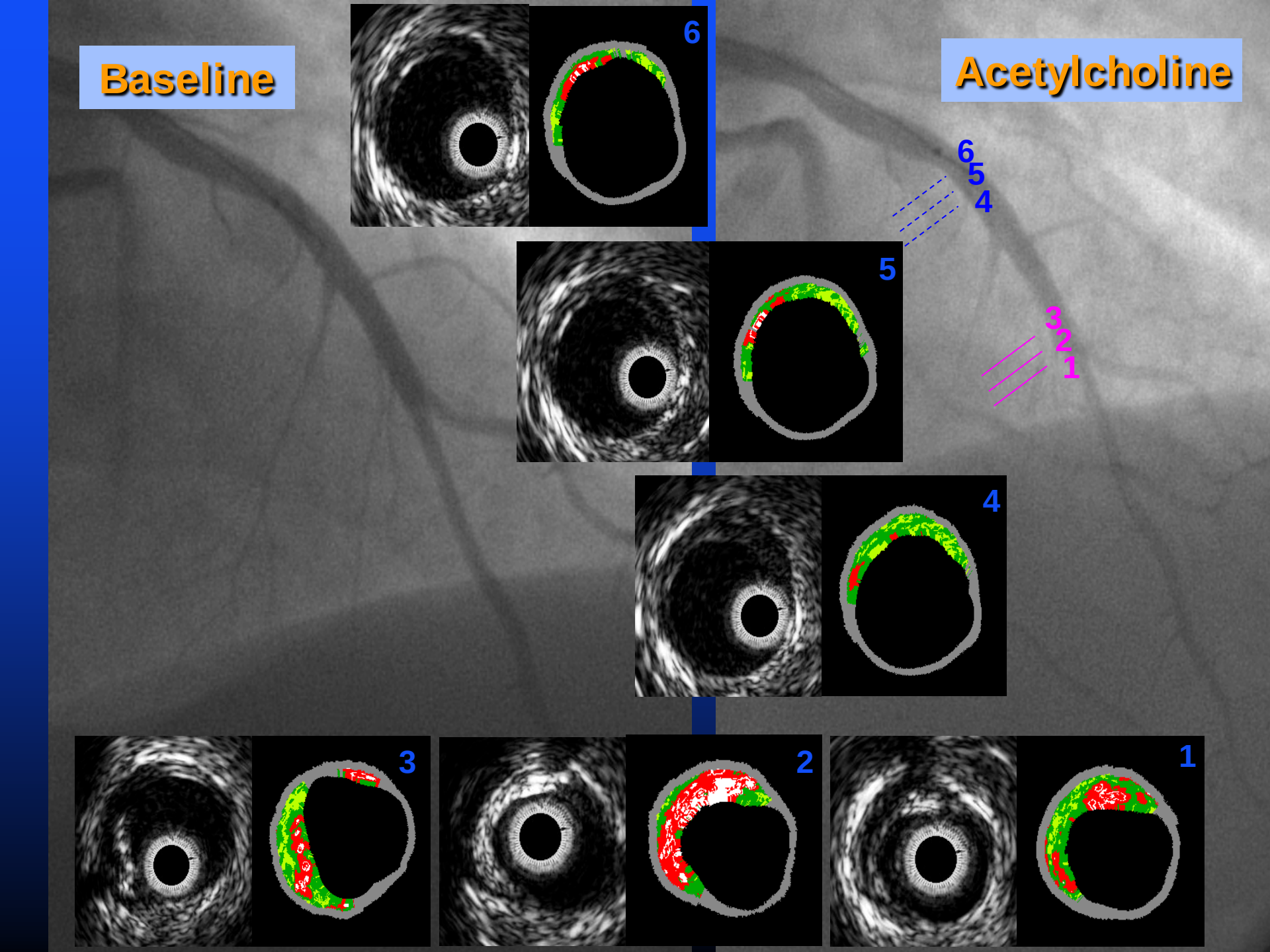
Management of Acute Coronary Syndromes

"Culprit" lesions

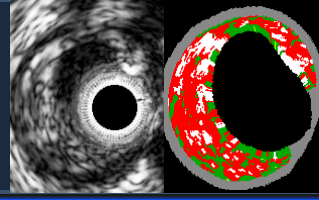
PCI/CABG

Underlying inflammatory state – "future" culprits

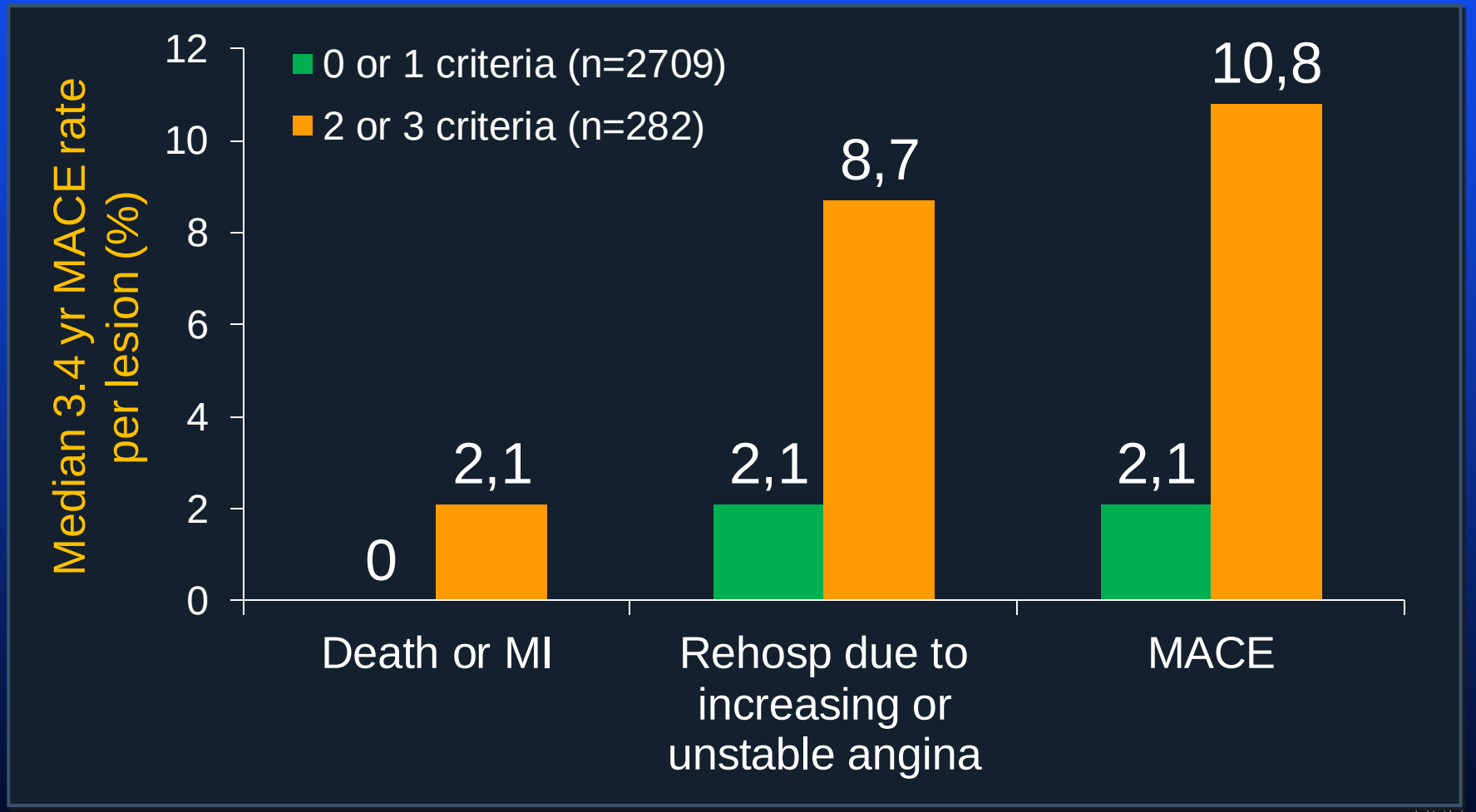
- Risk factor reduction
- Statins
- Aspirin
- Clopidogrel – ? site of action


Baseline
Acetylcholine
6
5
4
3
2
1

PROSPECT: Correlates of Non-Culprit Lesion Related Events



Number of factors present: PB_{MLA} ≥70%, MLA ≤4.0mm^2 or TCFA



PB = plaque burden at the MLA

Pre Intervention Imaging

- IVUS provides the “roadmap” for PCI.
- Anatomy
- Degree of disease
- Lesion length
- Vessel size
- Plaque morphology

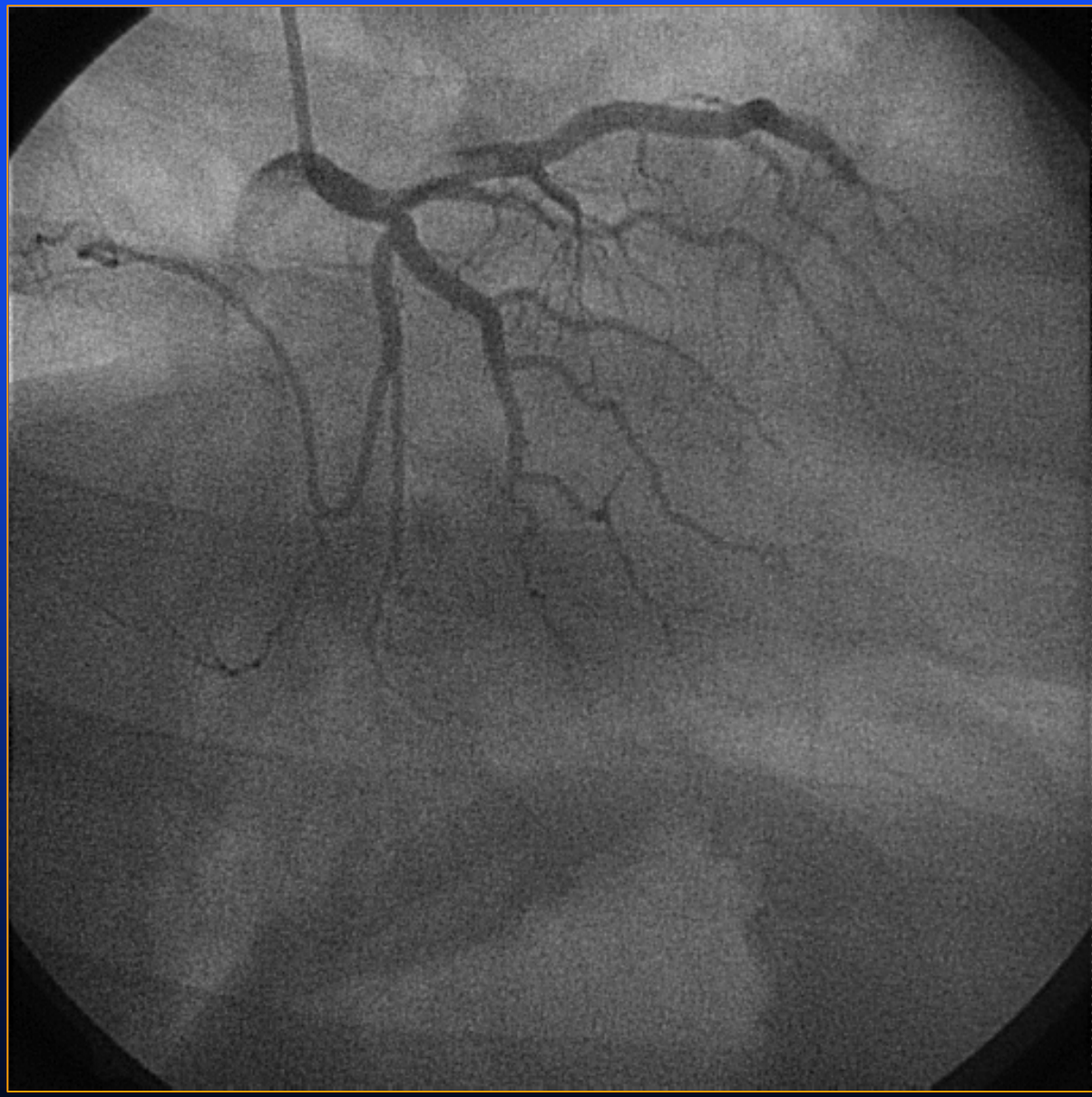
for risk of distal embolization (coronary / renal)

IDENTIFYING DIFFERENT TYPES OF PLAQUE MORPHOLOGY OF THROUGH IVUS

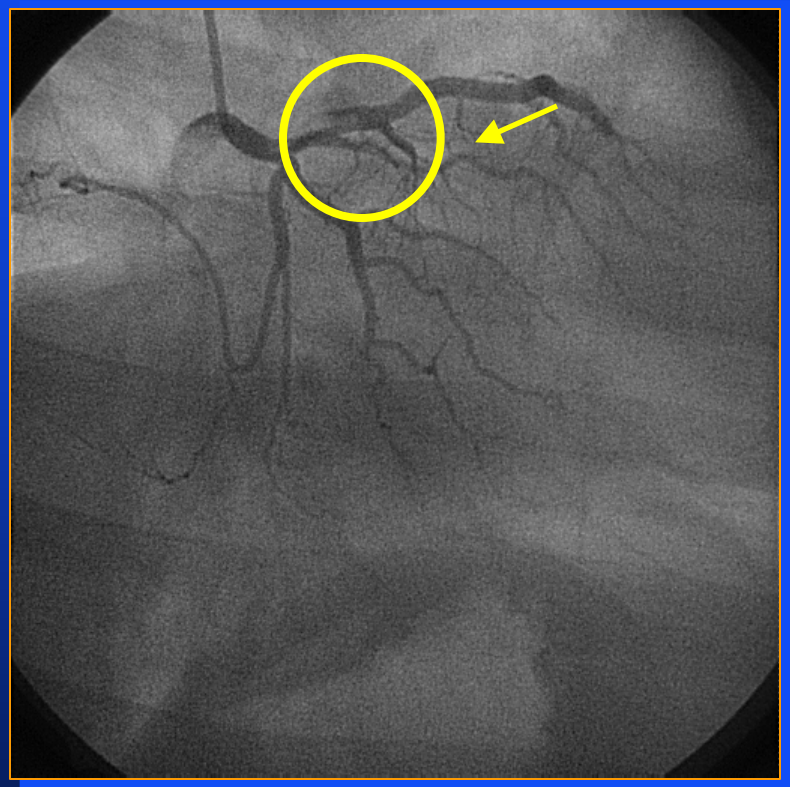
A 57 years old man with chest pain.

ST segments elevations in the anterior leads

Elevated troponin



The Uncertainty of Hazy Angiograms

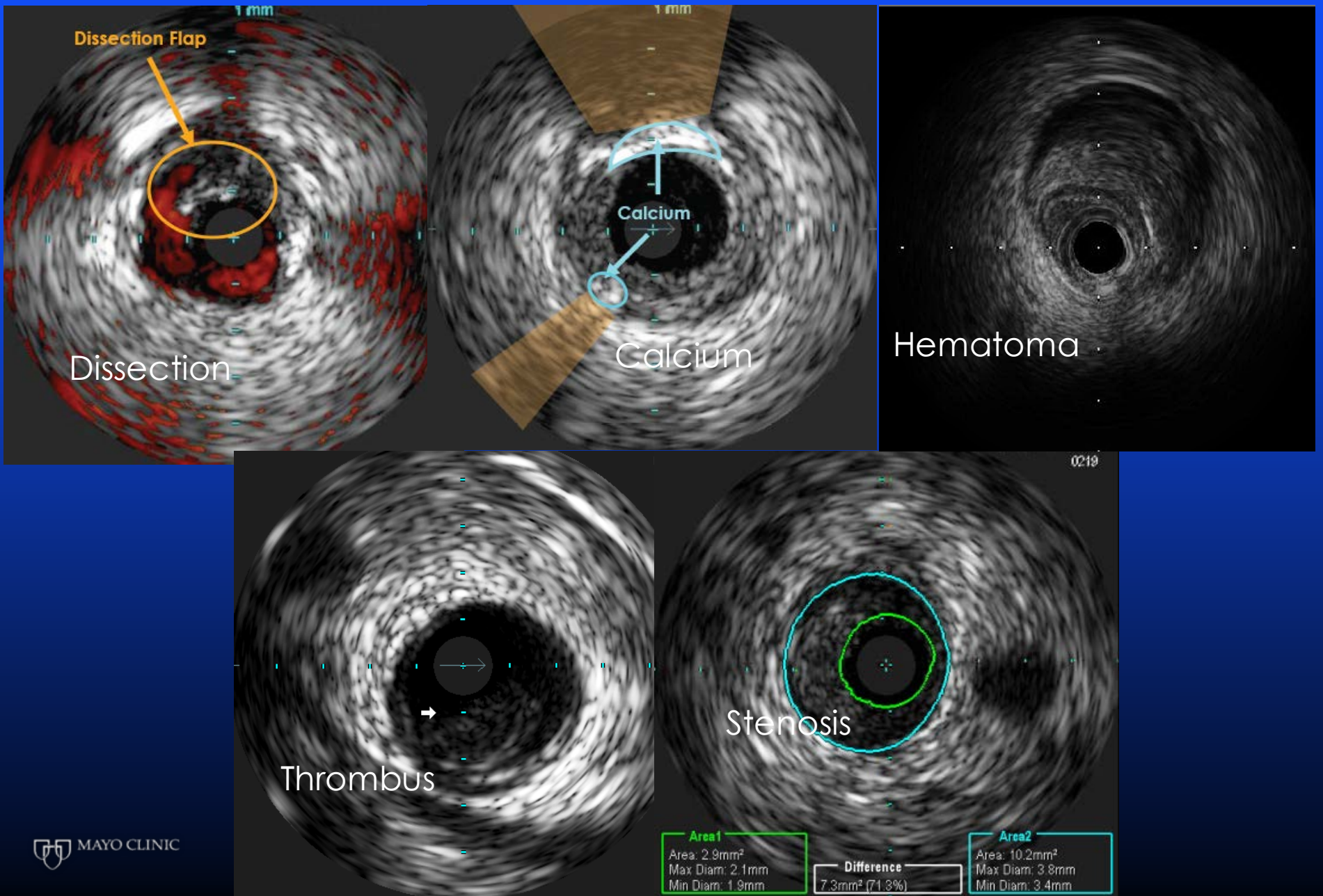


Can you determine what this is?

- **Dissection?**
- **Calcium?**
- **Thrombus?**
- **Stenosis?**
- **Hematoma?**

Distinguishing these features is critical in determining PCI strategy

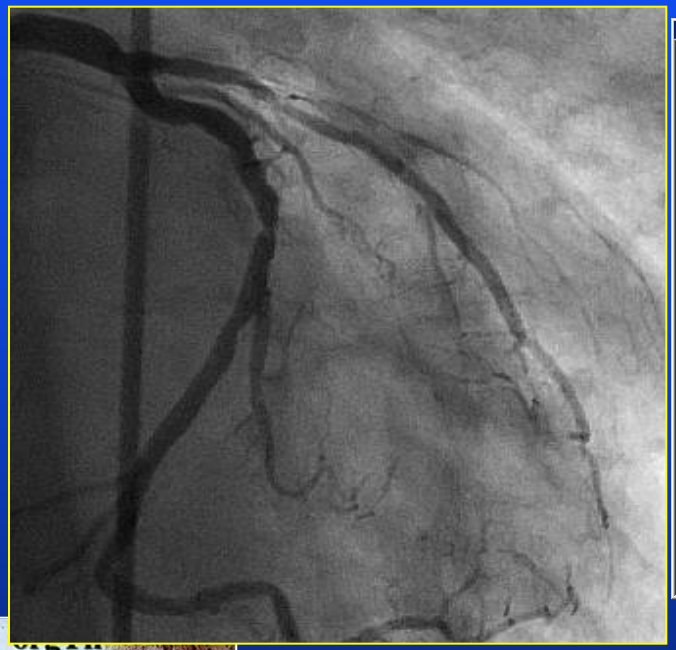
All can present with a “hazy” angiogram

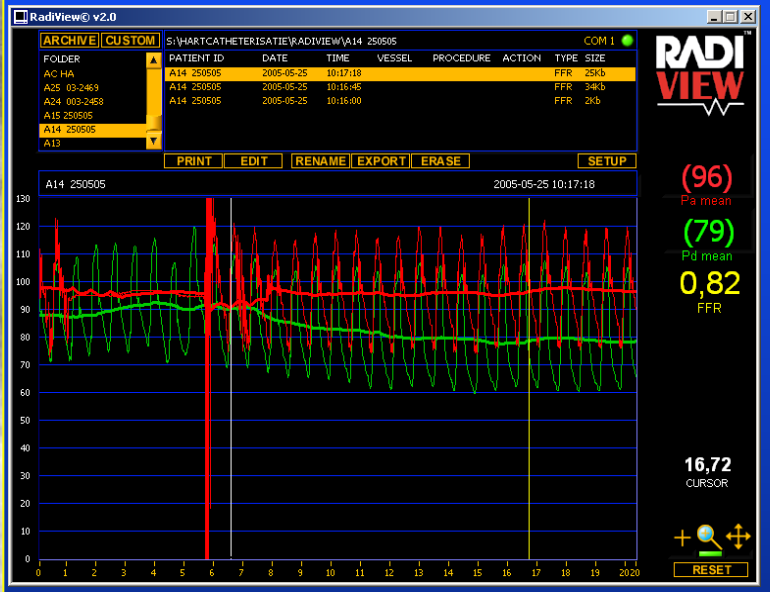


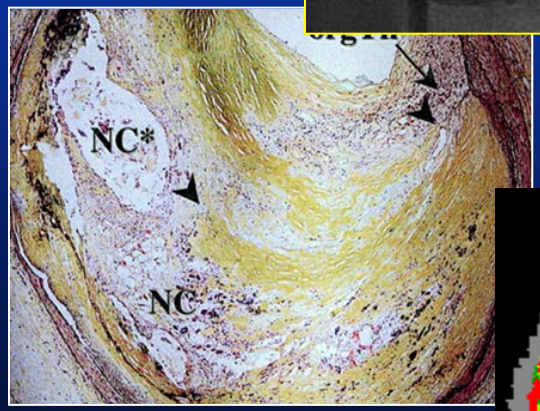
Pre Intervention Imaging

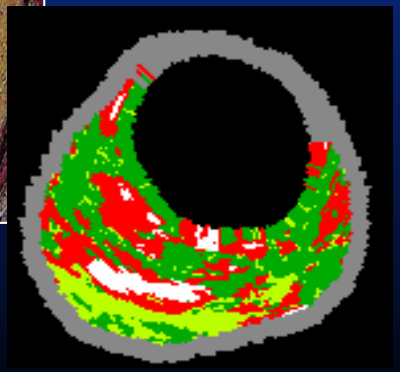
- Intravascular images provide the "roadmap" for PCI.
- Anatomy
- Plaque morphology

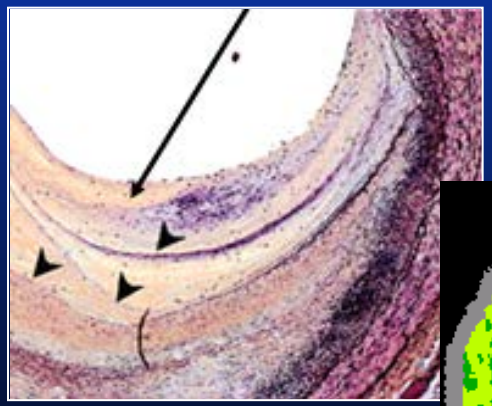
Are all intermediate lesions the same?



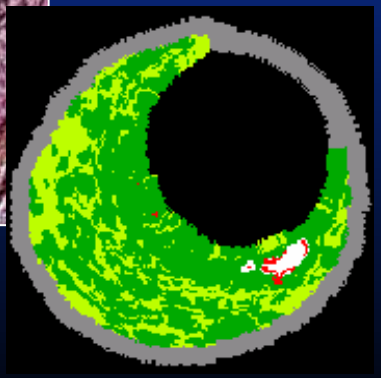


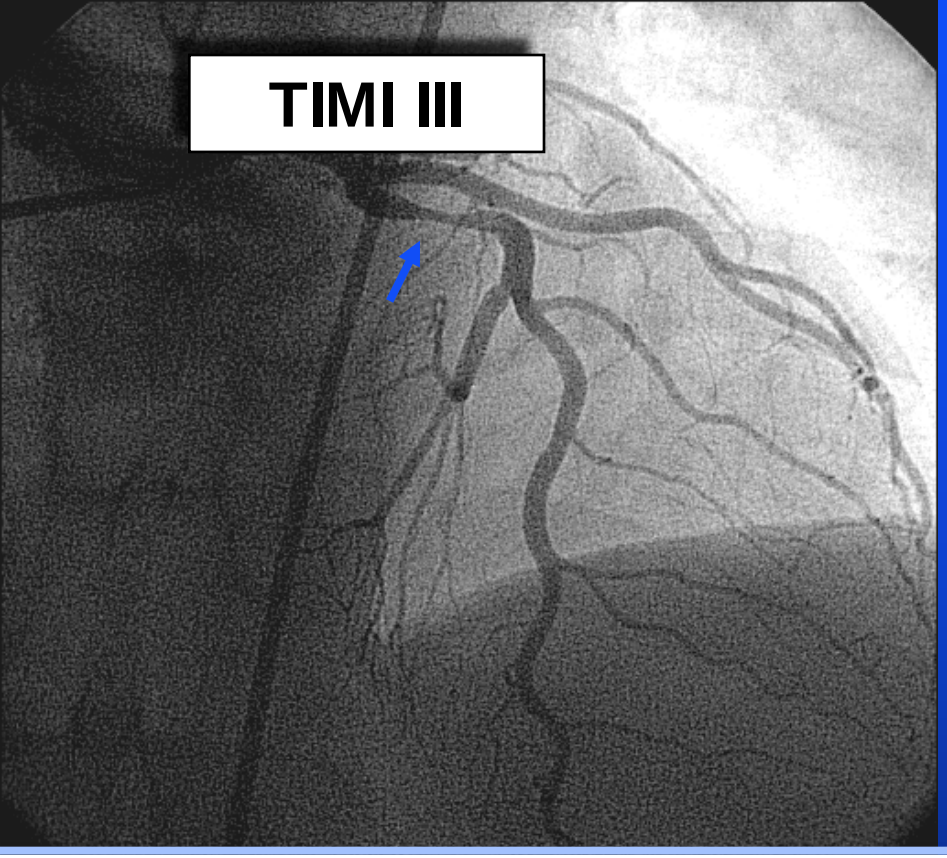


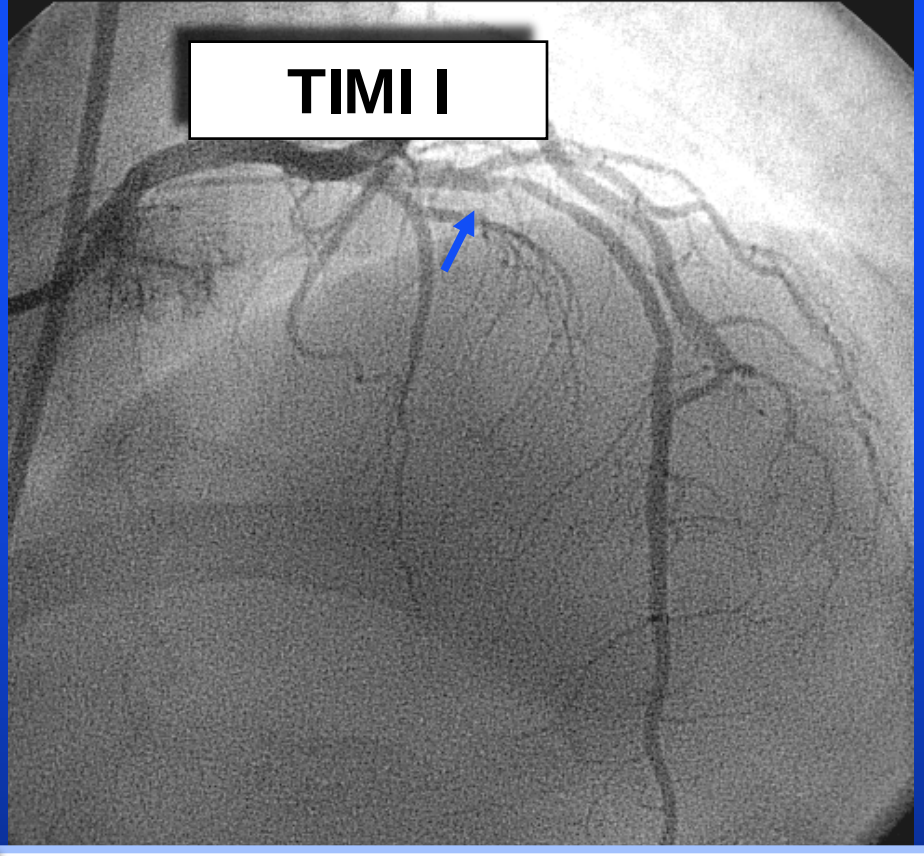


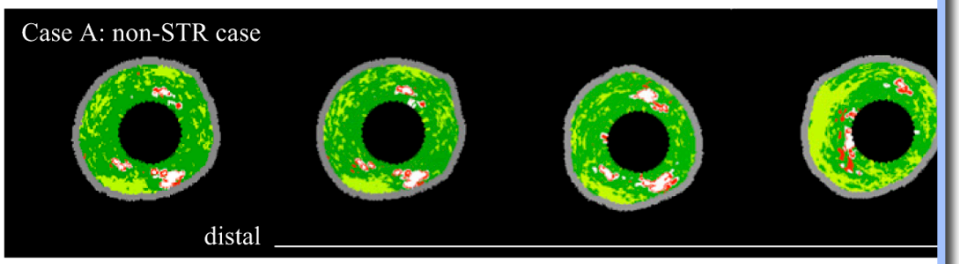


Virmani et al Arterioscler Thromb Vasc Biol 2000;20:1262-1275









Percentage of each plaque component at the MLA site

Plaque area: 12.2 mm^2 Lumen area: 3.7 mm^2

fibrous: 73.8 % necrotic core: 3.5 %

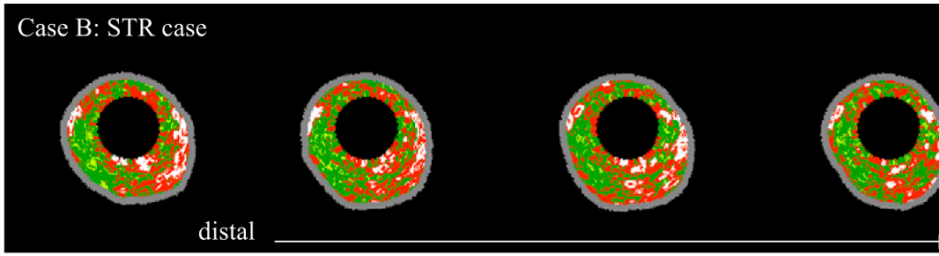
fibro-lipid: 14.8 % dense-calcium: 7.8 %

Each plaque component

Total volume 131.1 mm

fibrous: 79.2 mm^3

fibro-lipid: 41.8 mm



Percentage of each plaque component at the MLA site

Plaque area: 9.8 mm^2 Lumen area: 3.7 mm^2

fibrous: 46.0 % necrotic core: 36.7 %

fibro-lipid: 5.1 % dense-calcium: 12.2 %

Each plaque component

Total volume 112.8 mm

fibrous: 59.4 mm^3

fibro-lipid: 7.1 mm^3

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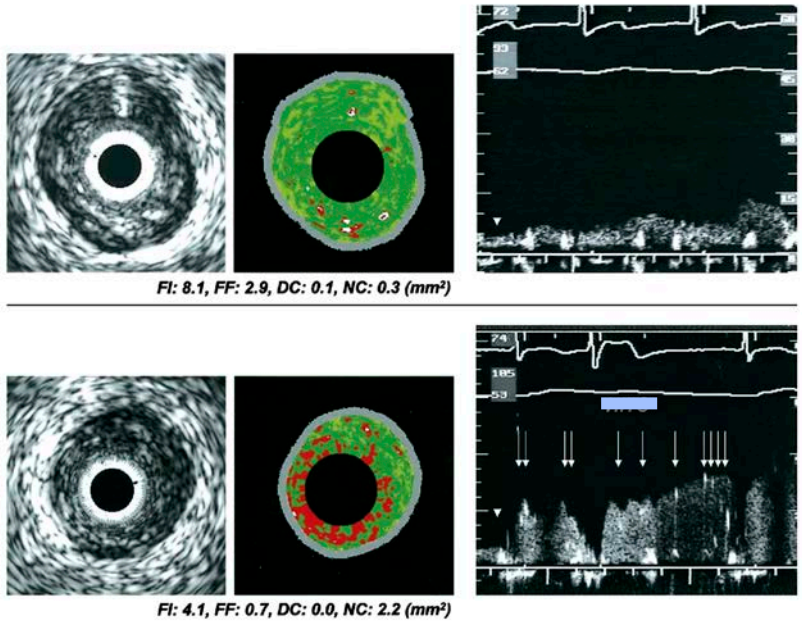
Interventional Cardiology

The Relationship Between Coronary Plaque Characteristics and Small Embolic Particles During Coronary Stent Implantation

Takahiro Kawamoto, MD, PHD,* Hiroyuki Okura, MD, PHD,* Yuji Koyama, MD, PHD,* Iku Toda, MD, PHD,† Haruyuki Taguchi, MD, PHD,† Koichi Tamita, MD,‡ Atsushi Yamamuro, MD,‡ Yuki Yoshimura, MD,* Yoji Neishi, MD, PHD,* Eiji Toyota, MD, PHD,* Kiyoshi Yoshida, MD, PHD, FACC*



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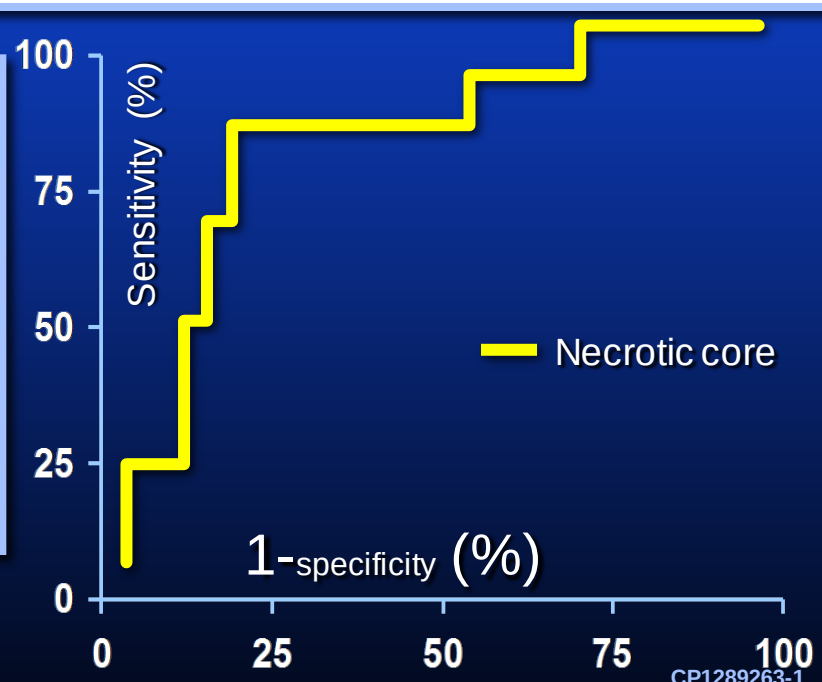
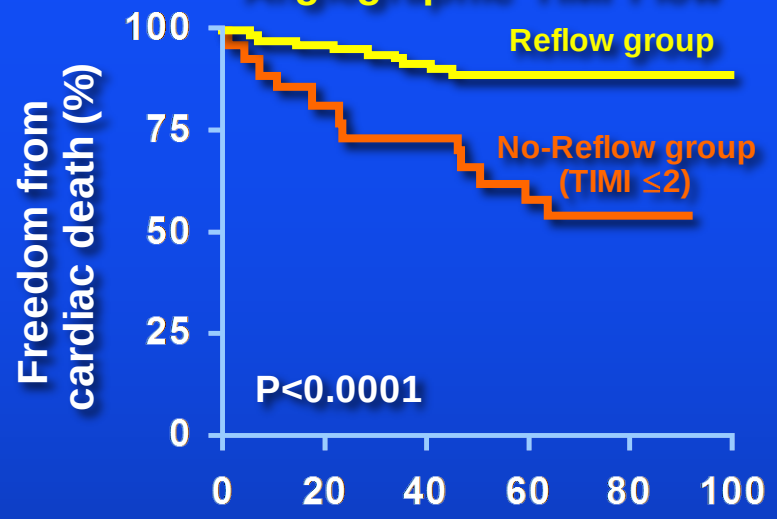
Usefulness of Virtual Histology Intravascular Ultrasound to Predict Distal Embolization for ST-Segment Elevation Myocardial Infarction

Ren Kawaguchi, MD, Shigeru Oshima, MD, PHD, Masaaki Jingu, RT, Hideki Tsurugaya, MD, Takuji Toyama, MD, PHD, Hiroshi Hoshizaki, MD, PHD, Koichi Taniguchi, MD, PHD

Gunma, Japan

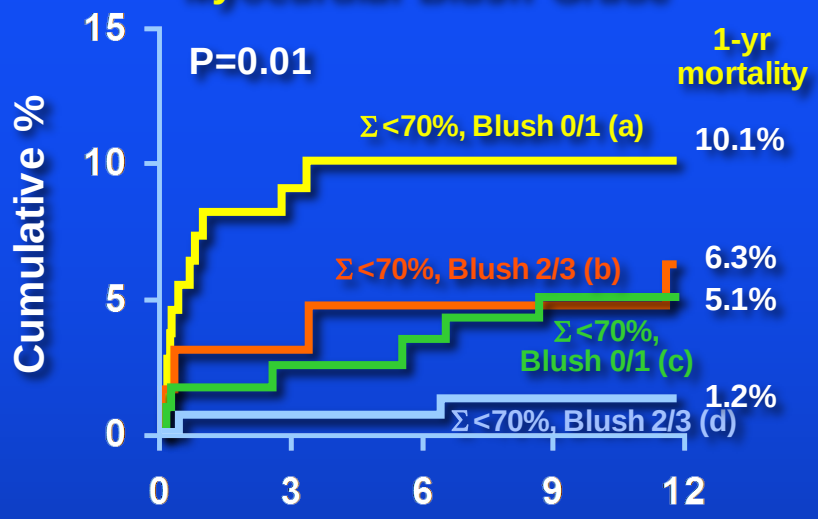


Angiographic TIMI Flow



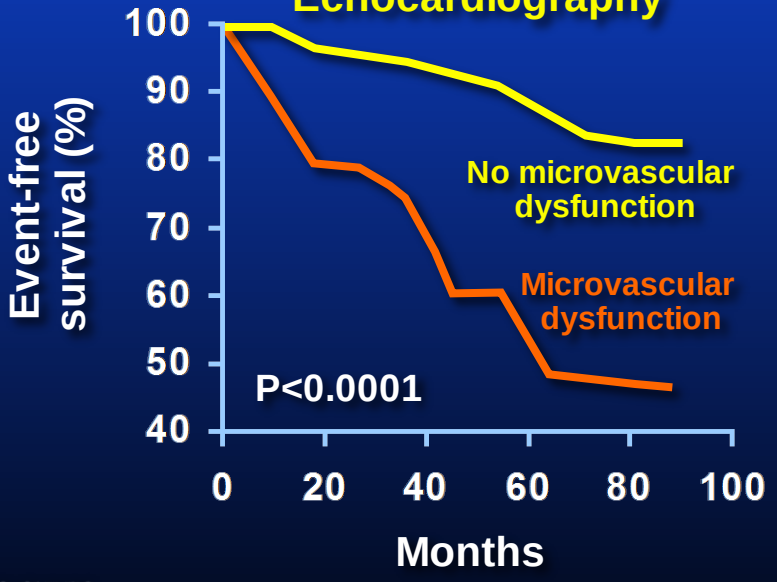
Morishima et al: JACC, 2000

ST-Segment Recovery and Myocardial Blush Grade



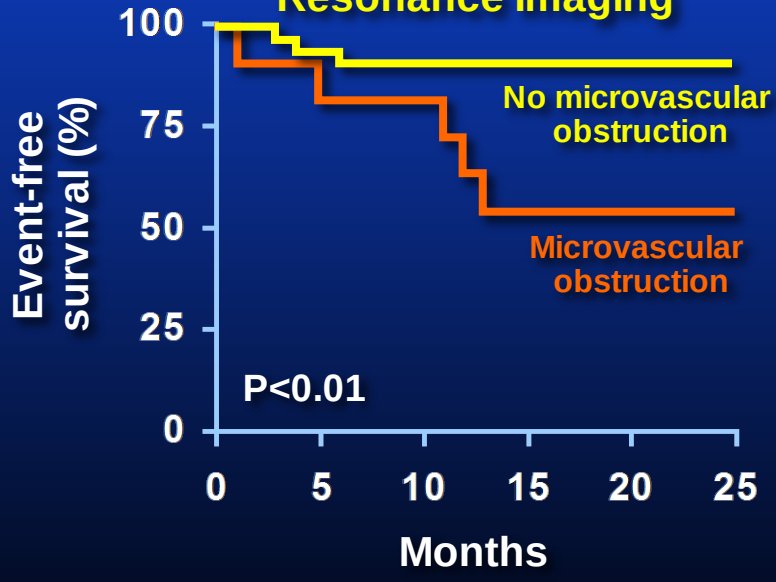
Sorajja et al: Eur Heart J, 2005

Myocardial Contrast Echocardiography



Bolognese et al: Circulation, 2004

Magnetic Resonance Imaging



Wu et al: Circulation, 1998

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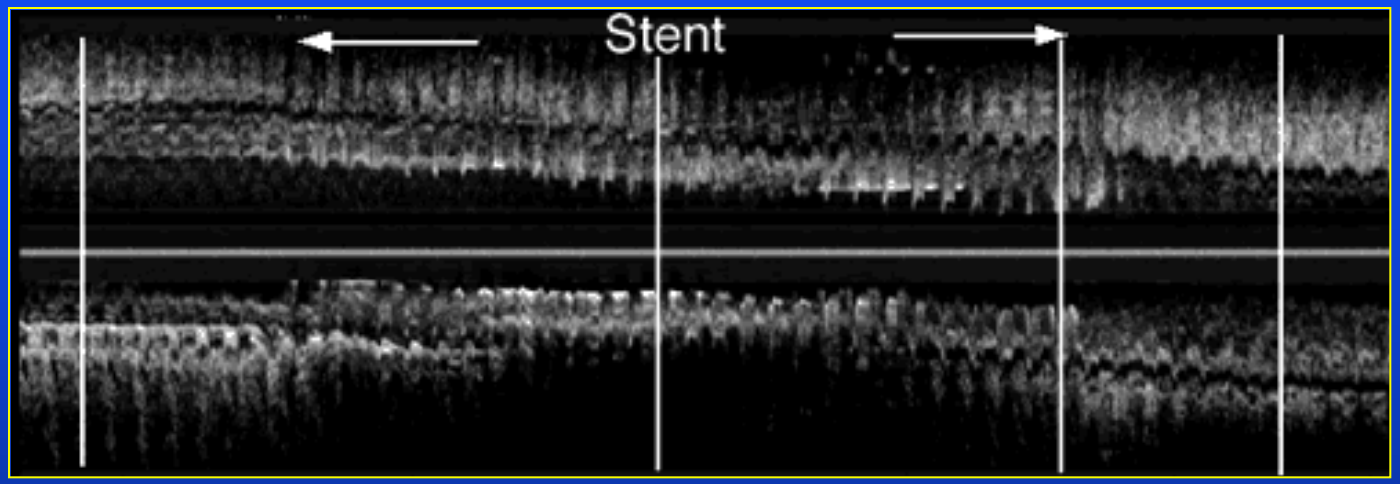
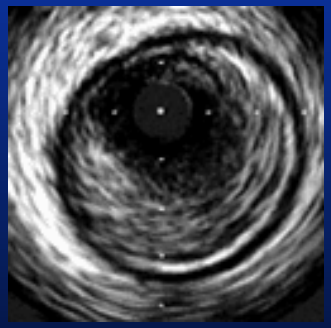
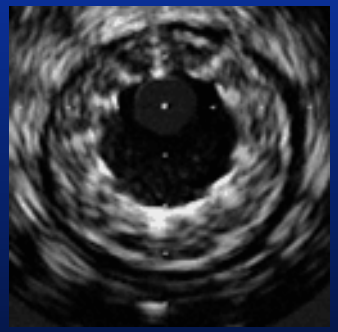
Post-stent

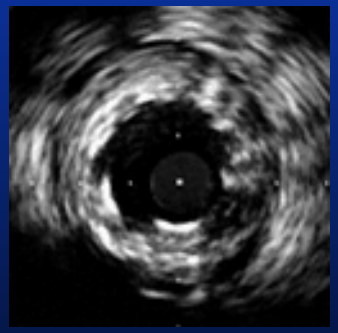




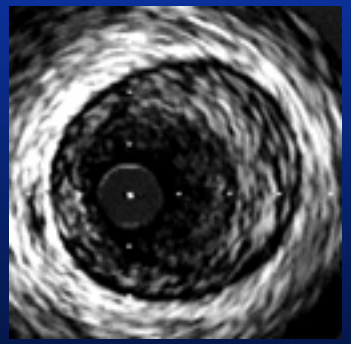
Pro Ref.



MSA 5.5 mm^2

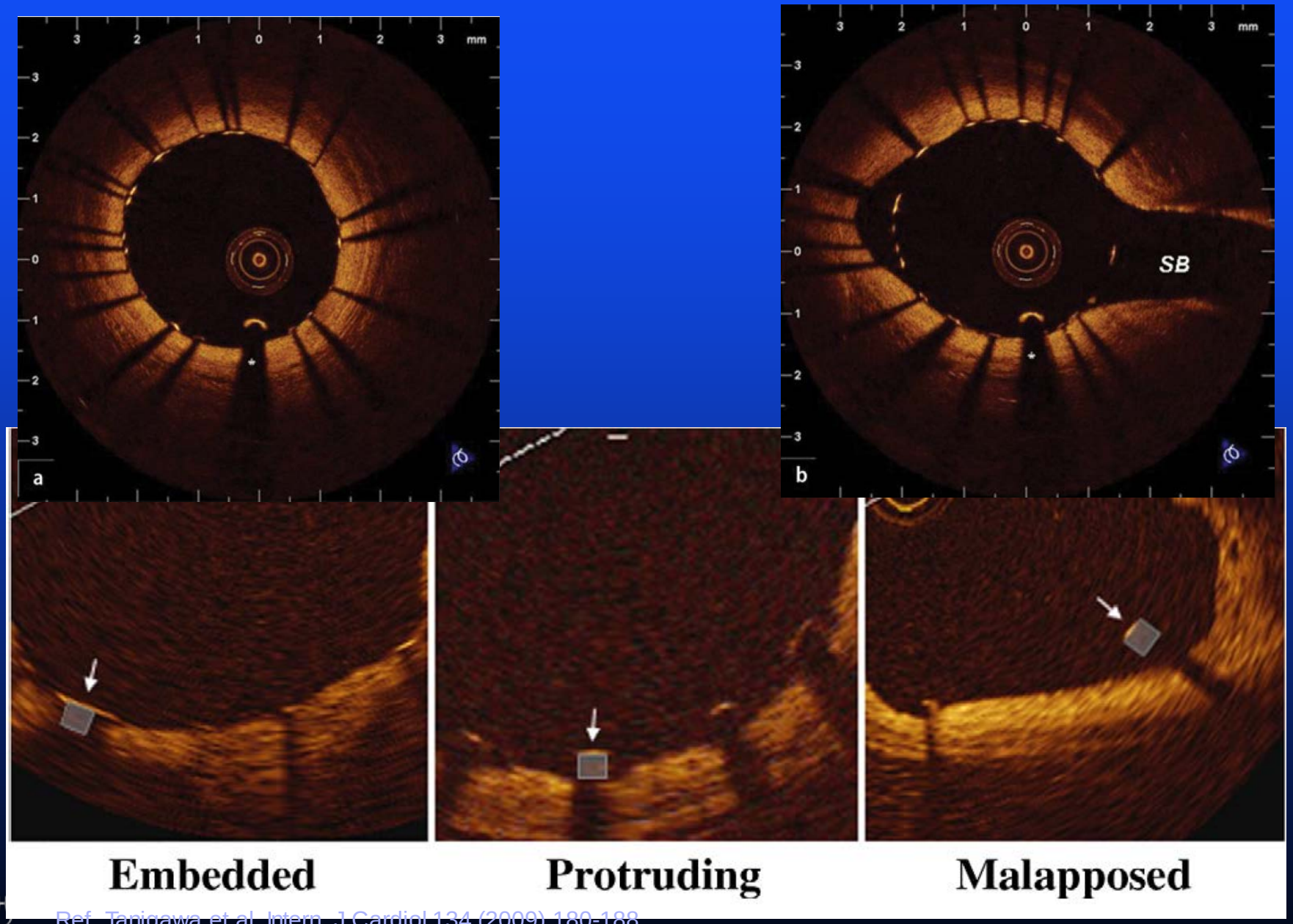


Distal Stent Edge



Distal Ref

Classification of stent strut apposition.



Ref. Tanigawa et al. Intern J Cardiol 134 (2009) 180-188.

European Heart Journal (2010) 31, 1470–1476
doi:10.1093/eurheartj/ehq066

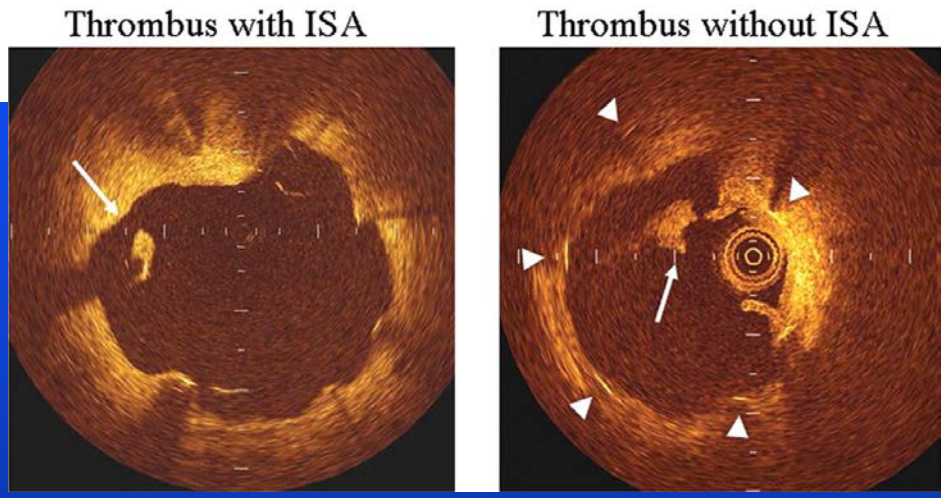
CLINICAL RESEARCH
Coronary heart disease

The fate of incomplete stent apposition with drug-eluting stents: an optical coherence tomography-based natural history study

ISA incomplete stent apposition

Thrombus was visualized in 20.6% of struts with ISA at follow-up and in 2.0% of struts with a good apposition

Follow-up OCT images



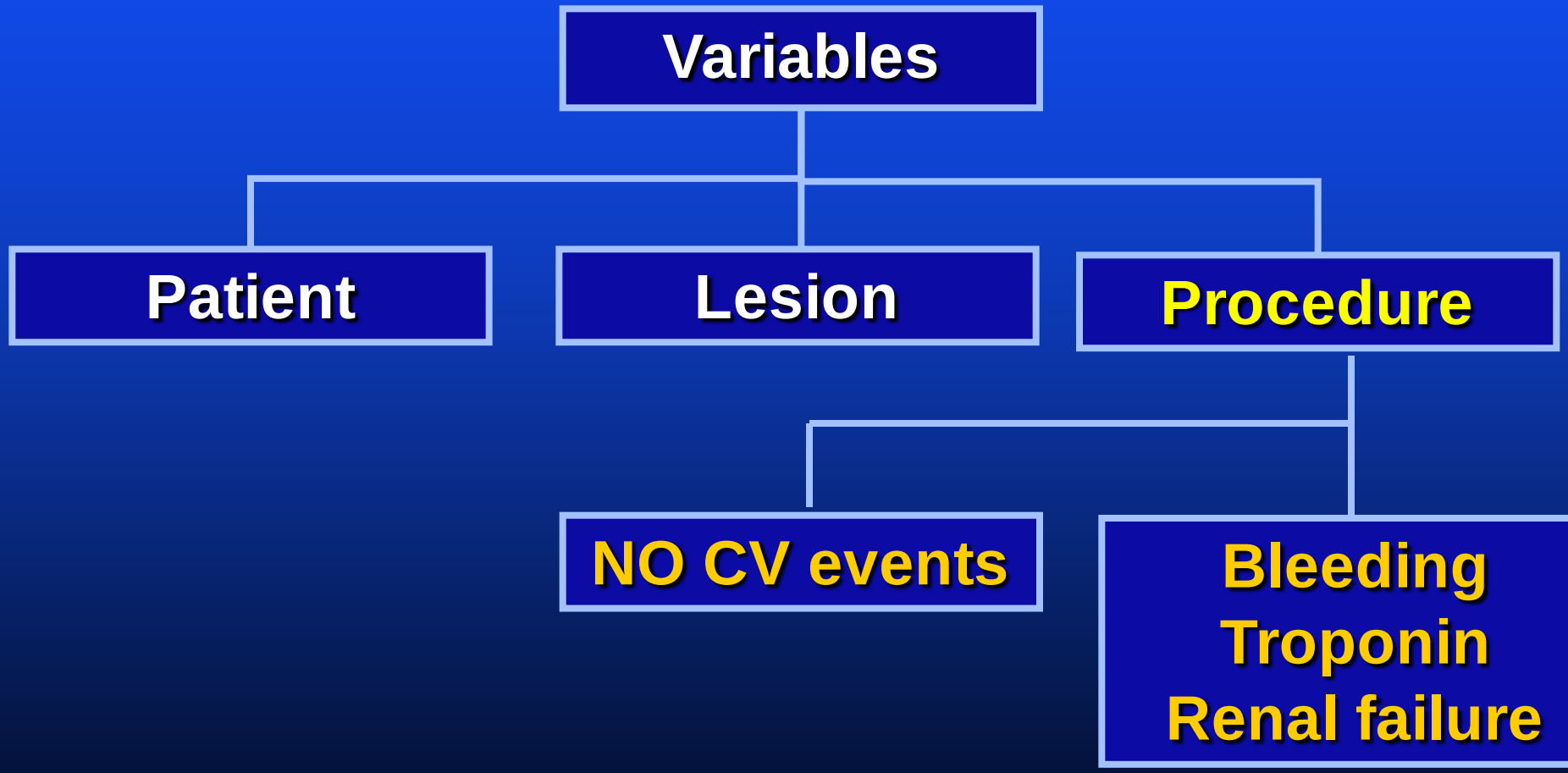
incomplete stent strut apposition

Incomplete stent apposition without neointimal hyperplasia was significantly associated with the presence of OCT-detected thrombus at follow-up, and may constitute a potent substrate for late stent thrombosis.

MAYO CLINIC

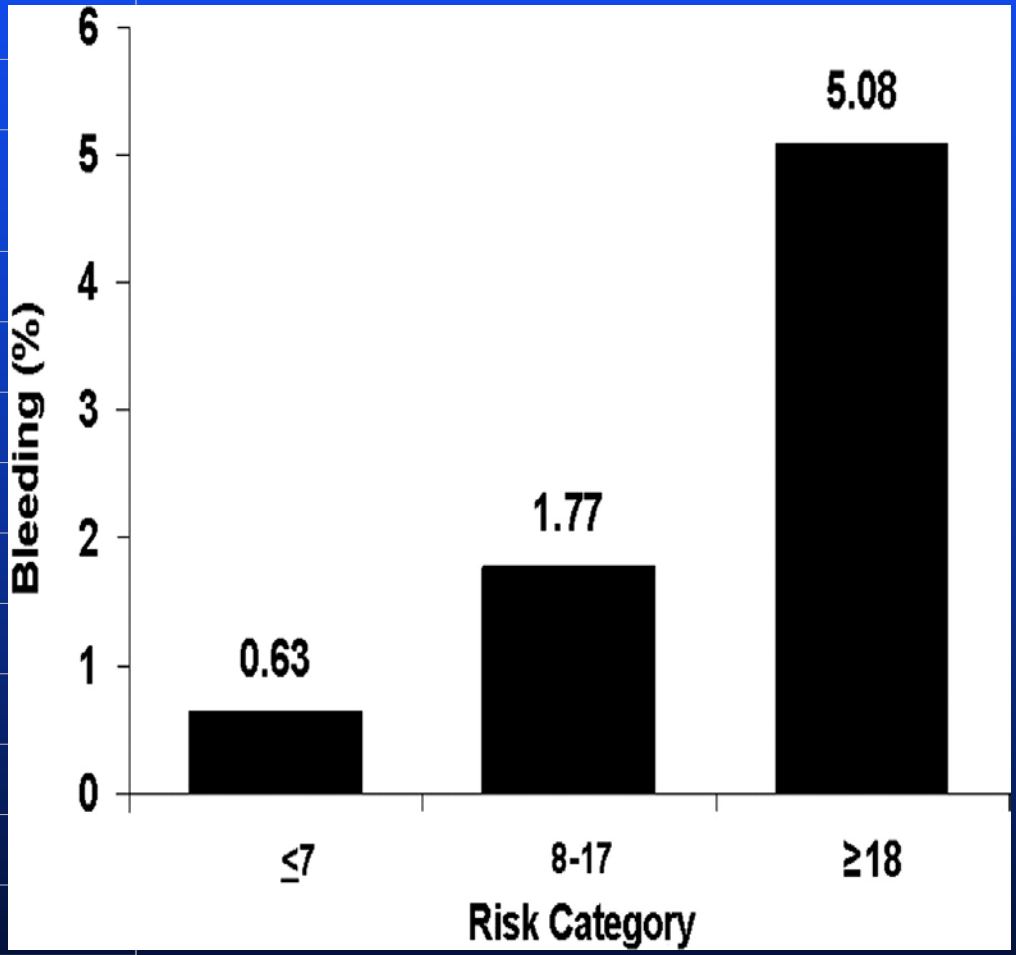
Ozaki et al EHJ . 2010

Predictors of Mortality/MACE



Bleeding in Patients Undergoing PCI

Variable	Points Assigned
CHF indicates congestive heart failure; NYHA, New York Heart Association.	
ACS type	
ST-elevation MI	10
Non–ST-elevation MI/unstable angina	3
Cardiogenic shock	8
Female gender	6
Previous CHF	5
No previous PCI	4
NYHA class IV CHF	4
Peripheral vascular disease	2
Age, y	
66–75	2
76–85	5
≥85	8
Estimated glomerular filtration rate	1 (per 10 unit decrease if <90)

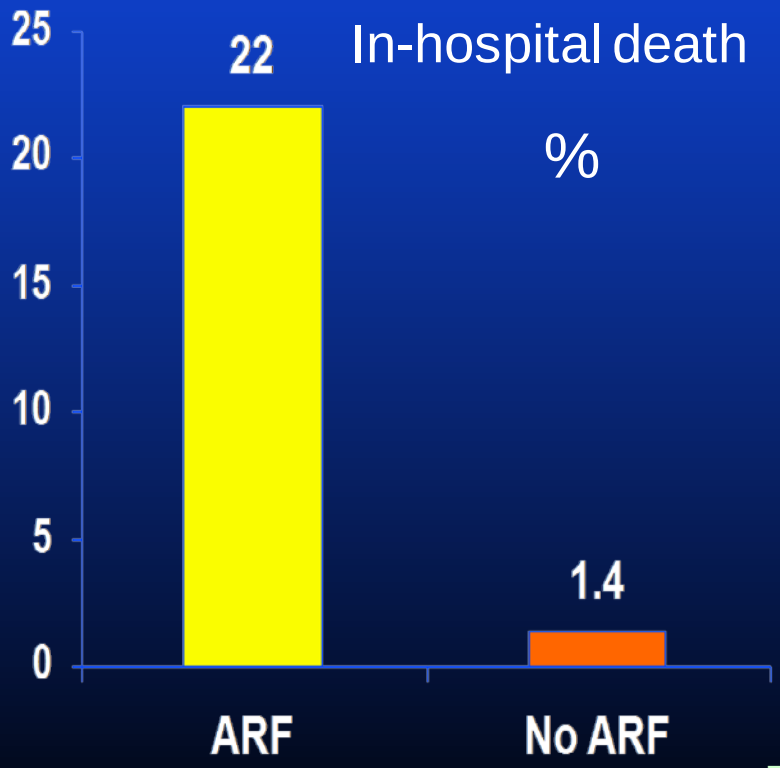


Mehta, Circulation, 2009

Risk of Contrast Nephropathy

Cr ↑ >0.5mg from baseline

or 25% increase from pre-procedure levels



Rihal, Circ 105:2259-64, 2002

Risk Model for Contrast Nephropathy

Risk factors	Integer score
Hypotension	5
IABP	5
CHF	5
Age >75 yr	4
Anemia	3
Diabetes	3
Contrast media volume	1 for each 100 cc^3
Serum creatinine >1.5 mg/dL	4
Or	
E GFR <60 mL/min/1.73 m^2	2 for 40-60 4 for 20-40 6 for <20

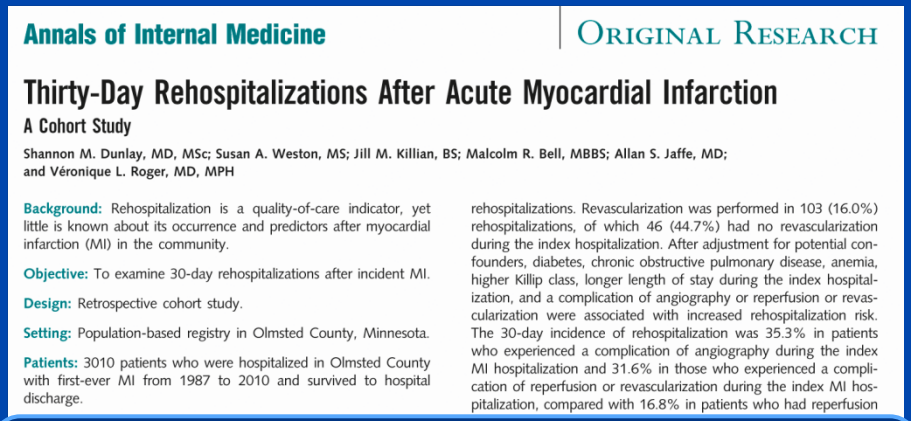
E GFR (mL/min/1.73 m2) = 186 x $(SCr)^{-1.154}$ x $(Age)^{-0.203}$ x (0.742 if female) x (1.210 if African American

Calculate

Risk score	Risk of CIN (%)	Risk of dialysis (%)
≤5	7.5	0.04
6-10	14.0	0.12
11-16	26.1	0.109
≥16	57.3	12.6

MAYO CLINIC

Mehran R et al: JACC 44:1393-9, 2004



Annals of Internal Medicine | ORIGINAL RESEARCH

Thirty-Day Rehospitalizations After Acute Myocardial Infarction

A Cohort Study

Shannon M. Dunlay, MD, MSc; Susan A. Weston, MS; Jill M. Killian, BS; Malcolm R. Bell, MBBS; Allan S. Jaffe, MD; and Véronique L. Roger, MD, MPH

Background: Rehospitalization is a quality-of-care indicator, yet little is known about its occurrence and predictors after myocardial infarction (MI) in the community.

Objective: To examine 30-day rehospitalizations after incident MI.

Design: Retrospective cohort study.

Setting: Population-based registry in Olmsted County, Minnesota.

Patients: 3010 patients who were hospitalized in Olmsted County with first-ever MI from 1987 to 2010 and survived to hospital discharge.

rehospitalizations. Revascularization was performed in 103 (16.0%) rehospitalizations, of which 46 (44.7%) had no revascularization during the index hospitalization. After adjustment for potential confounders, diabetes, chronic obstructive pulmonary disease, anemia, higher Killip class, longer length of stay during the index hospitalization, and a complication of angiography or reperfusion or revascularization were associated with increased rehospitalization risk. The 30-day incidence of rehospitalization was 35.3% in patients who experienced a complication of angiography during the index MI hospitalization and 31.6% in those who experienced a complication of reperfusion or revascularization during the index MI hospitalization, compared with 16.8% in patients who had reperfusion

- 3,010 patients were hospitalized in Olmsted County with first-ever MI from 1987-2010 and survived to hospital discharge
- The hazard ratios and cumulative incidence of 30-day rehospitalizations were determined by using Cox proportional hazards regression models
- 30.2% of rehospitalizations were unrelated to the incident MI and 42.6% were related

Conclusion: Comorbid conditions, longer length of stay, and complications of angiography and revascularization or reperfusion are associated with increased 30-day rehospitalization risk after MI. Many rehospitalizations seem to be unrelated to the incident MI.

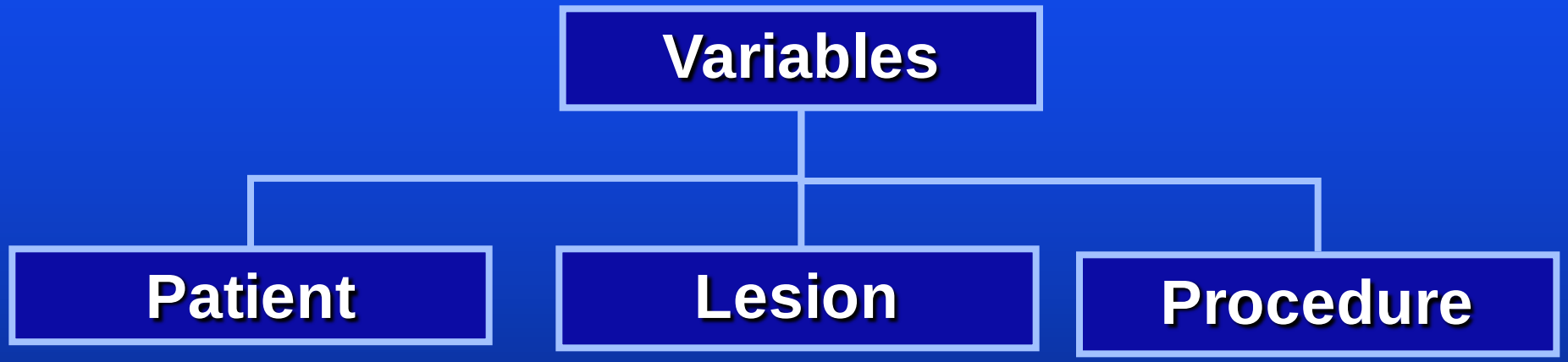
Among those treated with PCI initially (n=1,541), complications were associated with increased risk for rehospitalization

Complication	HR
Stroke Vascular complications Bleeding	1.66
Acute renal injury	1.92

MAYO CLINIC

Predictors of Mortality/MACE

Role of risk scores.



Risk Stratification is the

to Management?