

INSIGHTS INTO IN-HOSPITAL MORTALITY WITH STEMI

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Turin, October 20-22, 2011

**Advances in cardiovascular arrhythmias
and great innovations in cardiology**

Determined by patient
characteristics

Highly related to the
haemodynamic procedure

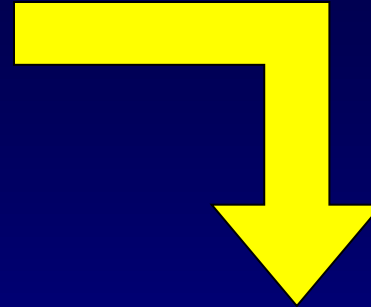
Influenced by what happens before
the procedure



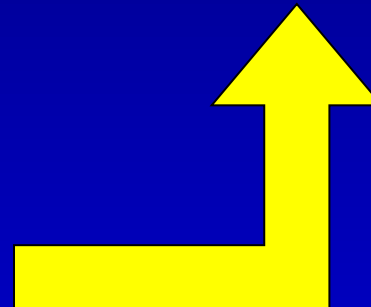
Pre Hospital strategy

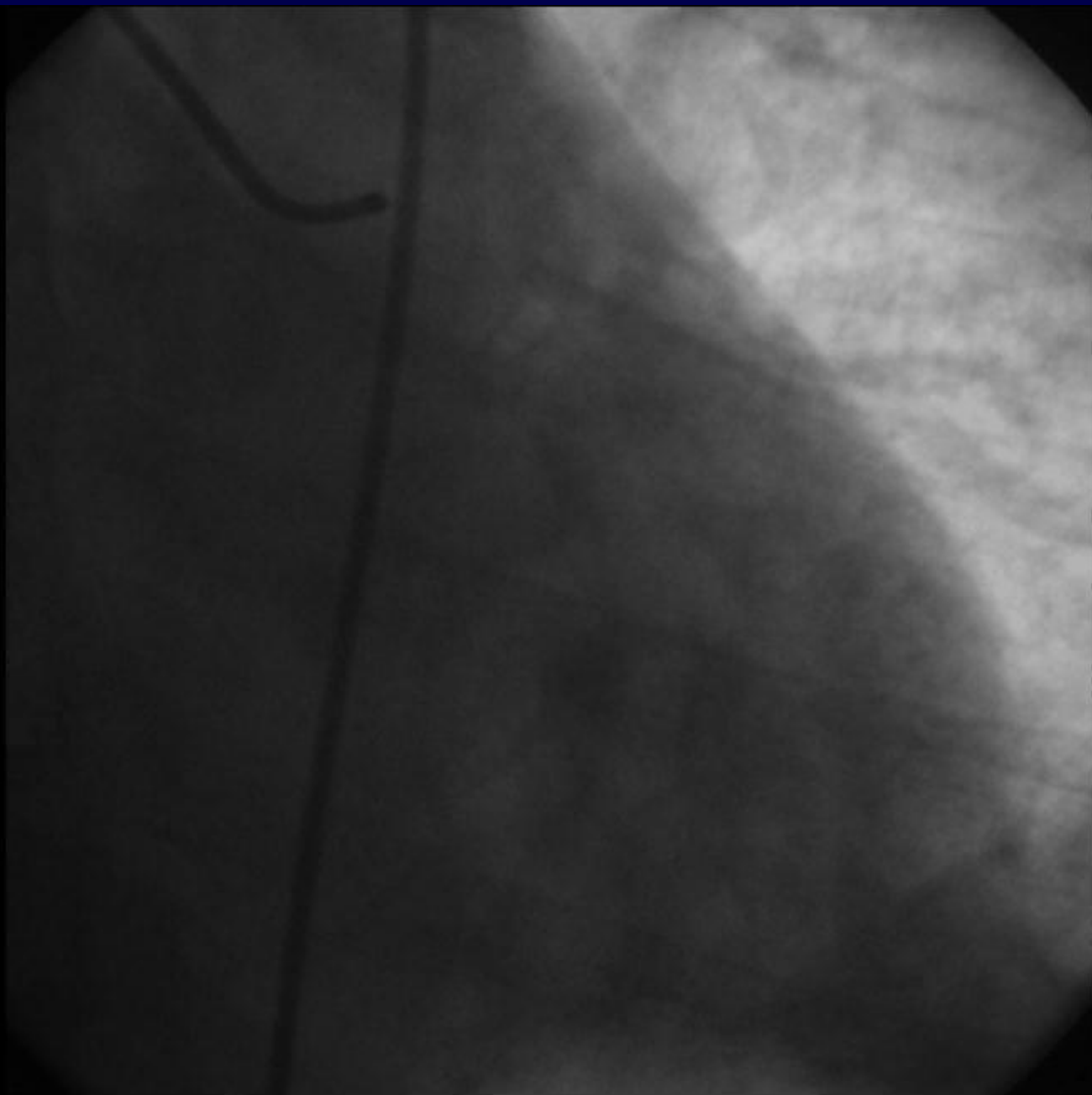


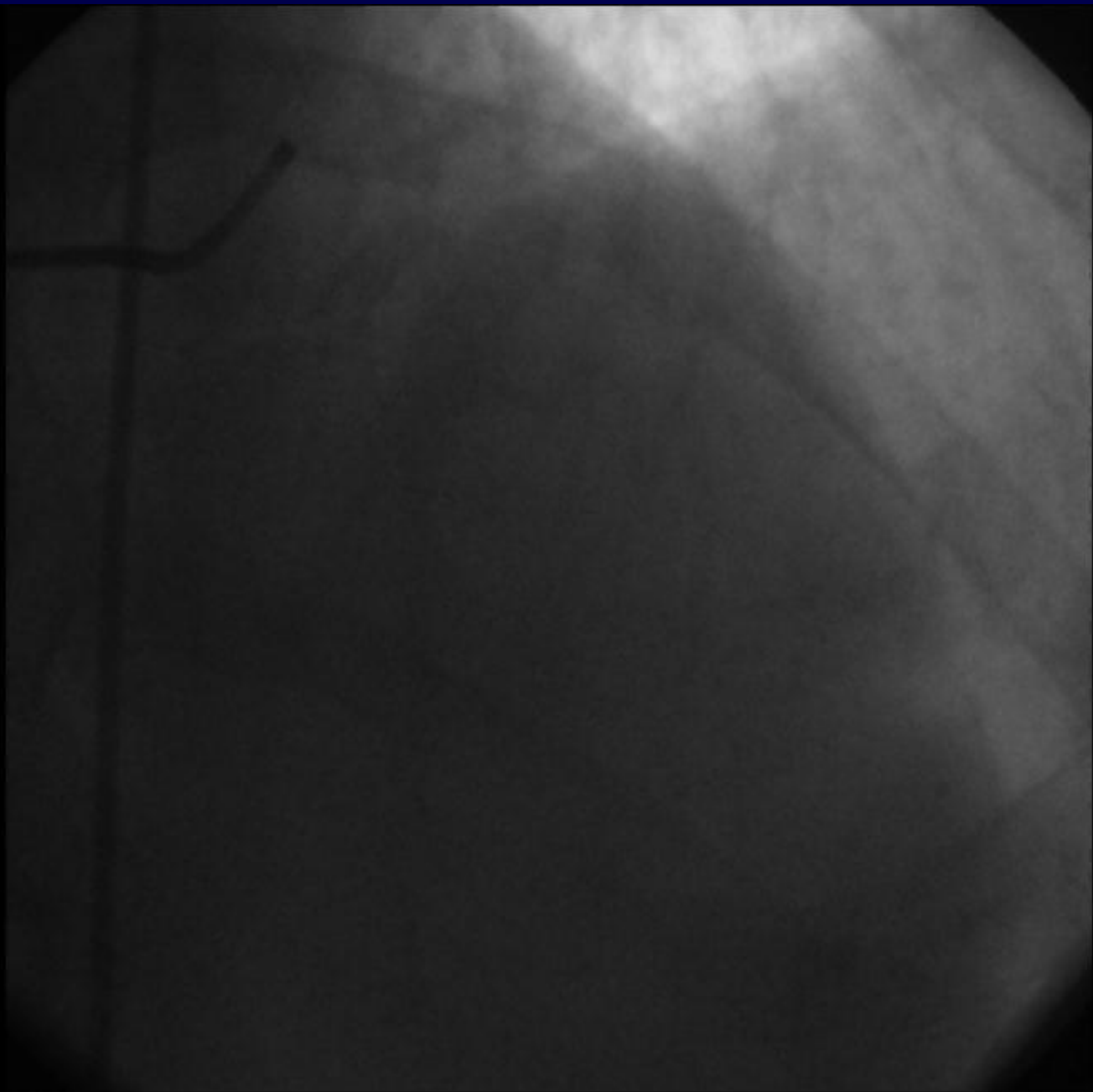
Patient characteristics

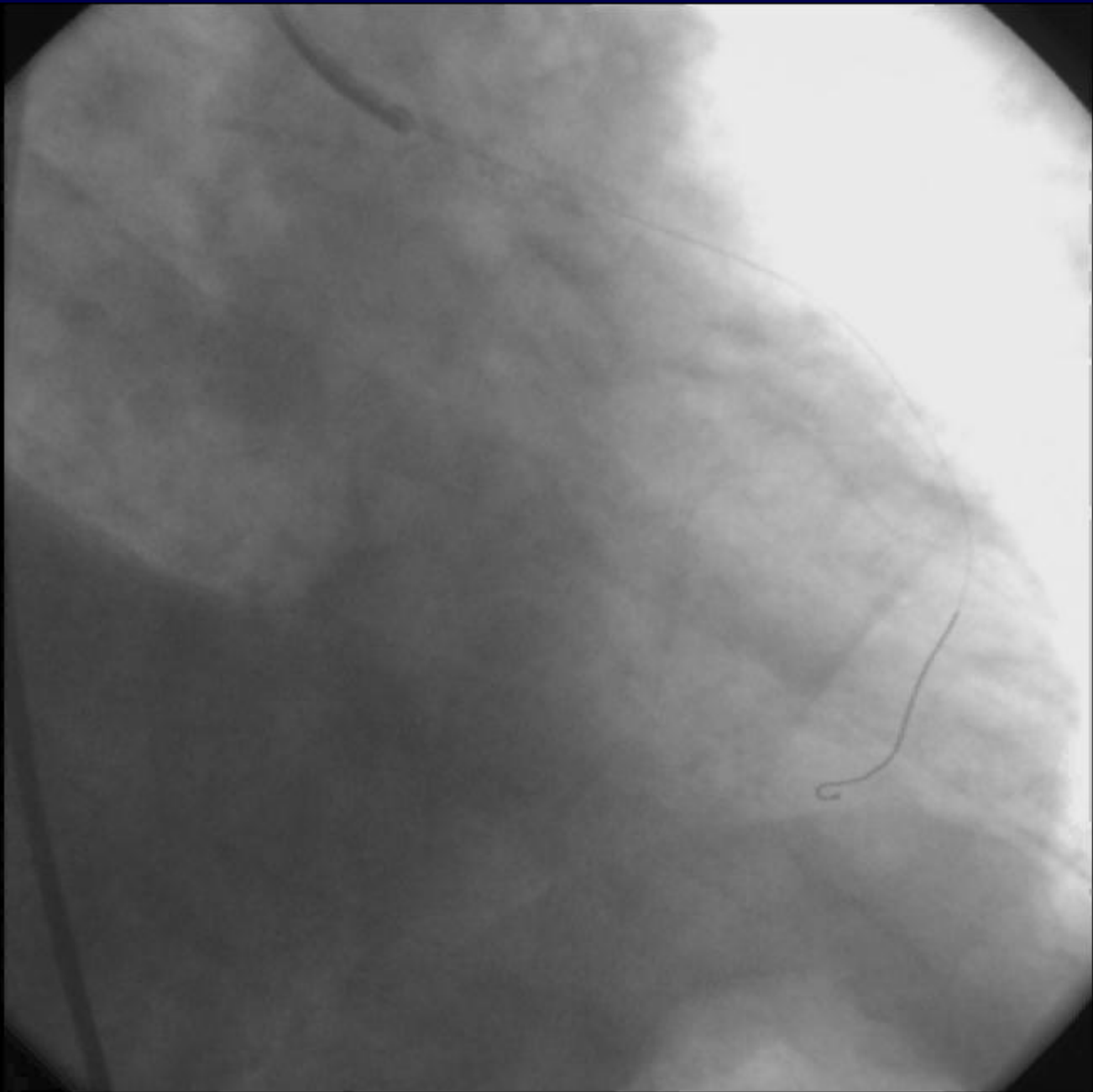


Procedure









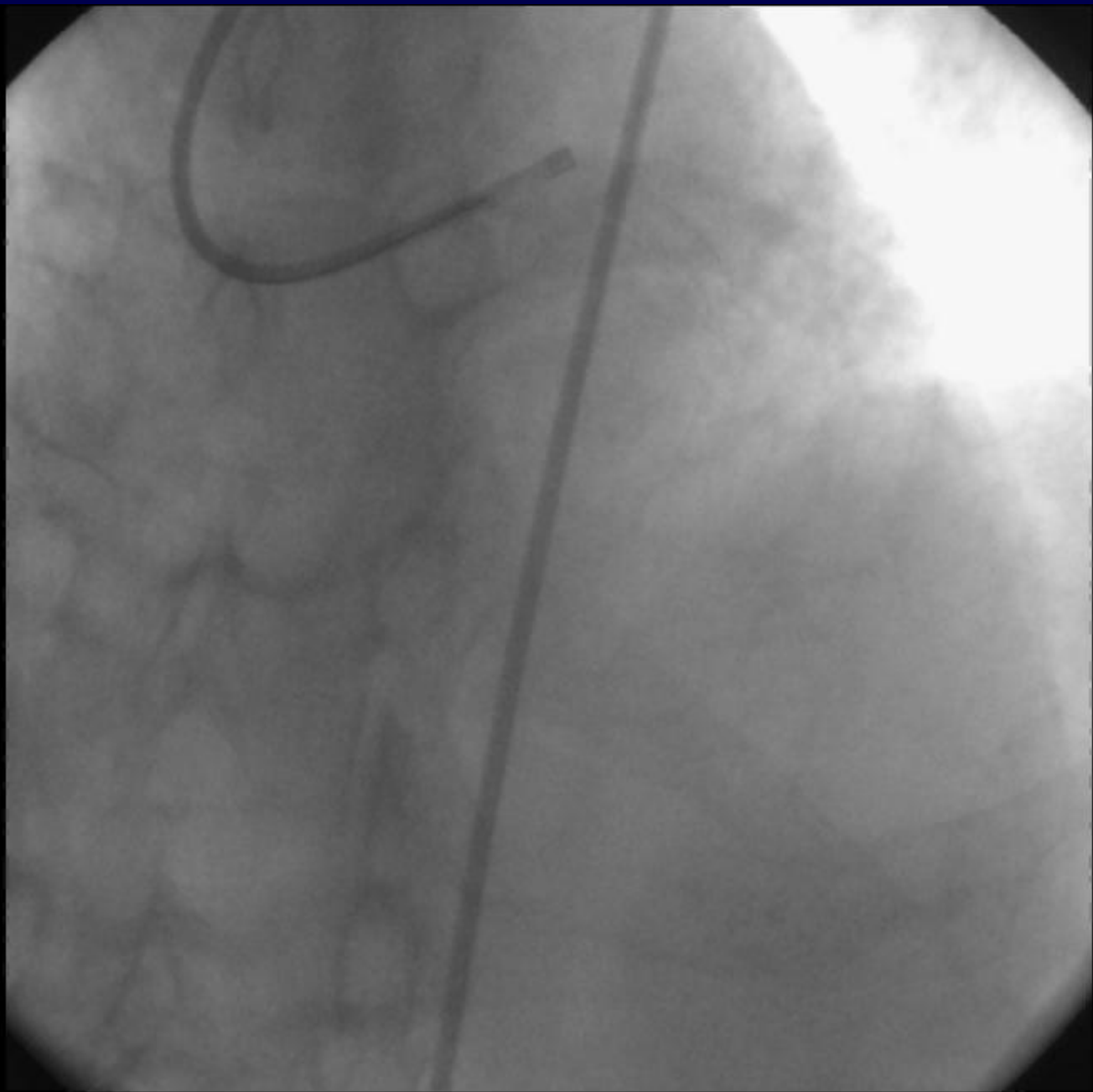


Image size: 512 x 512
View size: 586 x 586
WL: -500 WW: 1700

A

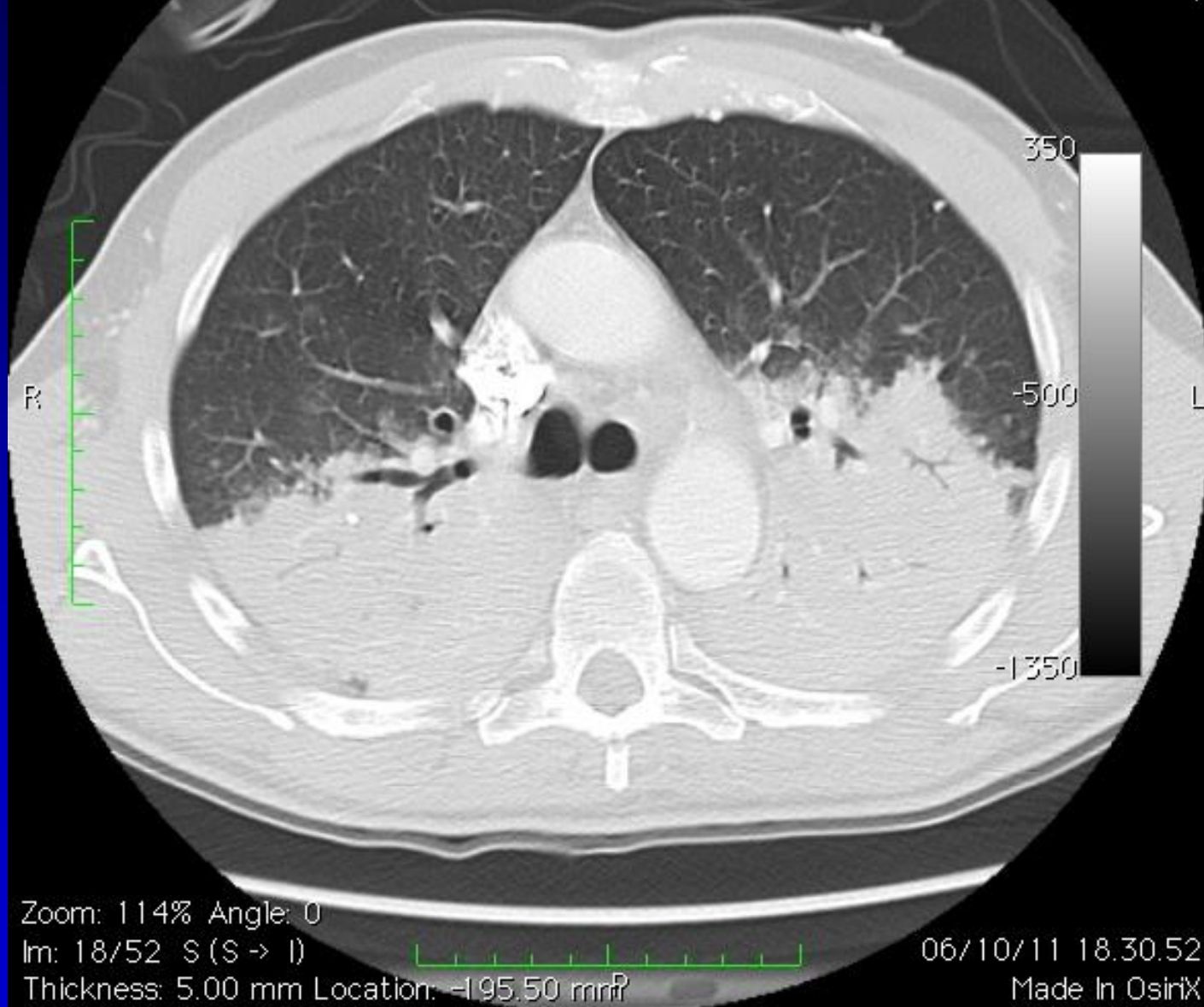
00550361

65 y , 65 y

5.6 Dissecazione Aorta toraco-addominale

9775

4



STEMI in-hospital mortality

Incidence and Predictors

Patient subgroups

Improving outcomes

Avoid delay

Choose Revascularization strategy

Protect microcirculation

Tailored therapy



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STEMI in-hospital mortality

- Community studies have shown that the overall case fatality rate in the first month is 50%
- Of these deaths about half occur within the first 2 h
- This high initial mortality seems to have altered little over the last years in contrast to hospital mortality



STEMI in-hospital mortality

- Prior to the introduction of coronary care units in the 1960s, the in-hospital mortality seems to have averaged 25–30%.
- In the pre-reperfusion era of the mid-1980s showed an average in-hospital fatality of 16%.
- In recent years, the overall 1-month mortality has since been reduced to 4–6%



Major predictors

- Older age
- Higher Killip class
- Elevated heart rate
- Lower systolic blood pressure
- Anterior location of the infarct

..and...

Previous infarction

Height & Weight

Time to treatment

Diabetes

Smoking status

BMJ 2006;333:1091–1094

Circulation 1995;91:1659–1668

Circulation 2000;102:2031–2037

Patient subgroups

Diabetics

- Up to 20% of all patients
- Patients with diabetes may present with atypical symptoms
- Heart failure is a common complication
- Diabetic patients still have doubled mortality compared with non-diabetic patients



Patient subgroups

Renal failure

Higher proportion of cardiovascular risk factors

Concern of higher bleeding rates

Very high risk of contrast medium-induced renal failure

**HIGHER
MORTALITY**



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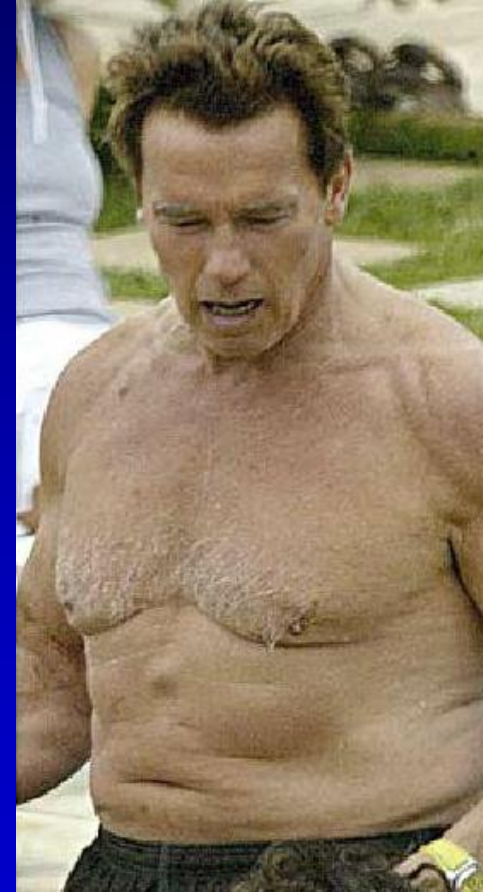
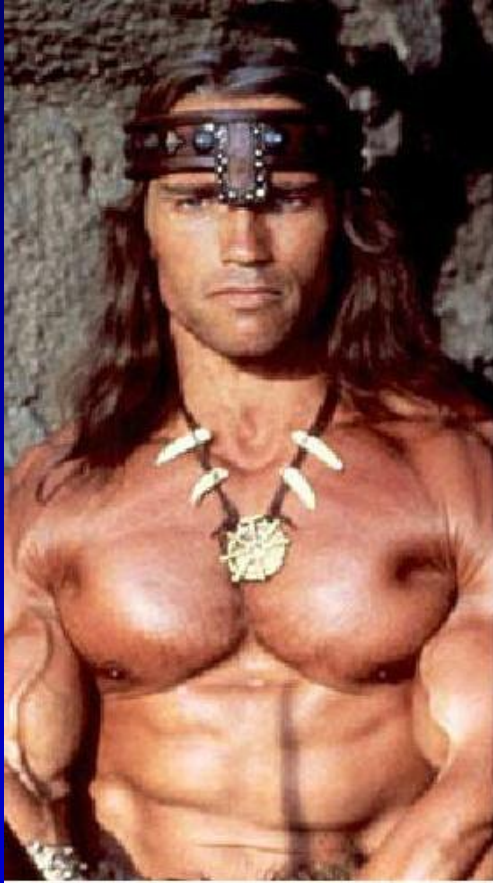
Protect microcirculation

Tailored therapy



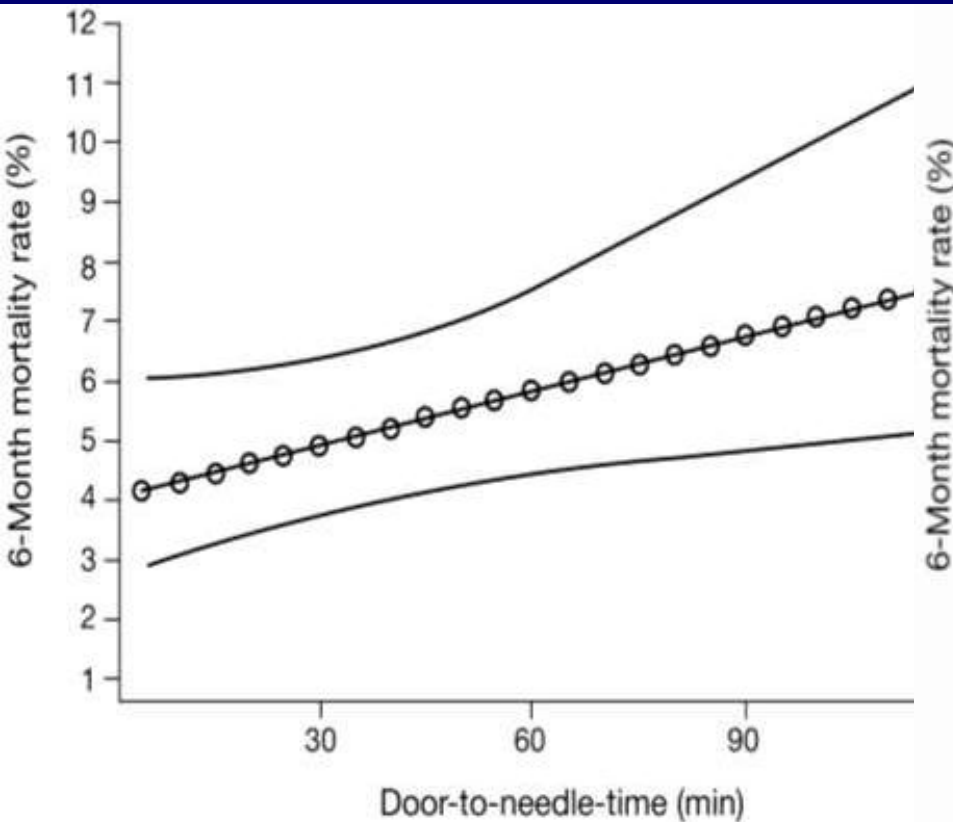
Avoid delay:

TIME IS MUSCLE

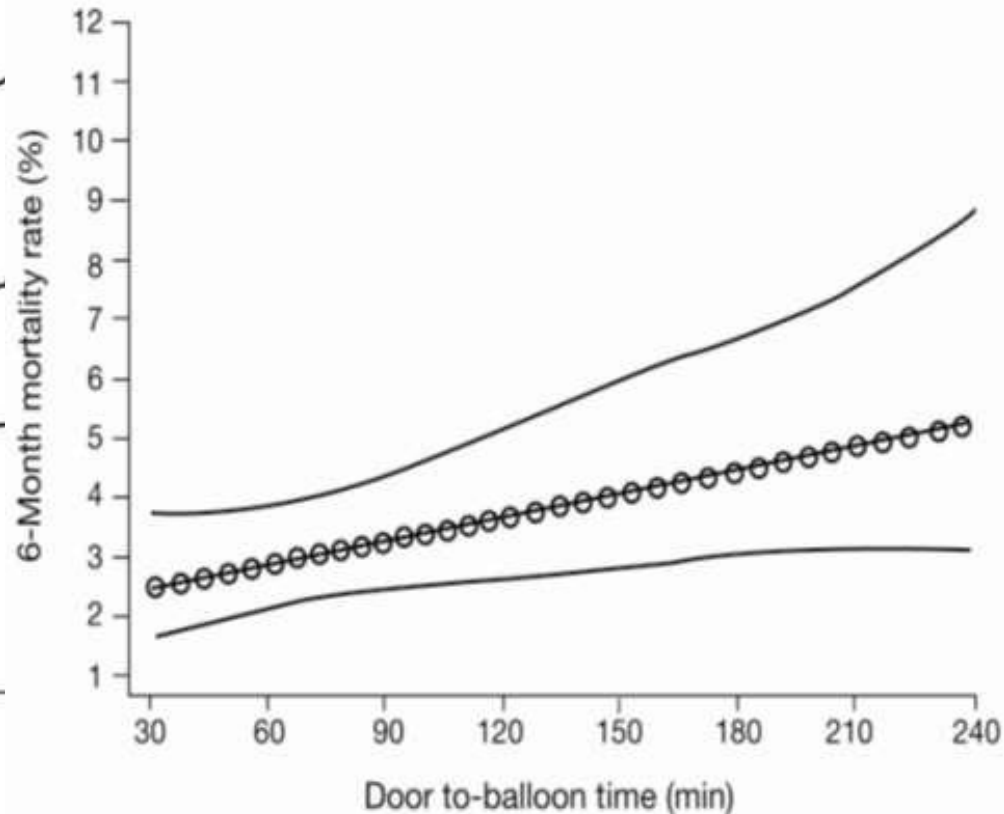


Benefit of Reperfusion Therapy is Dependent on Time

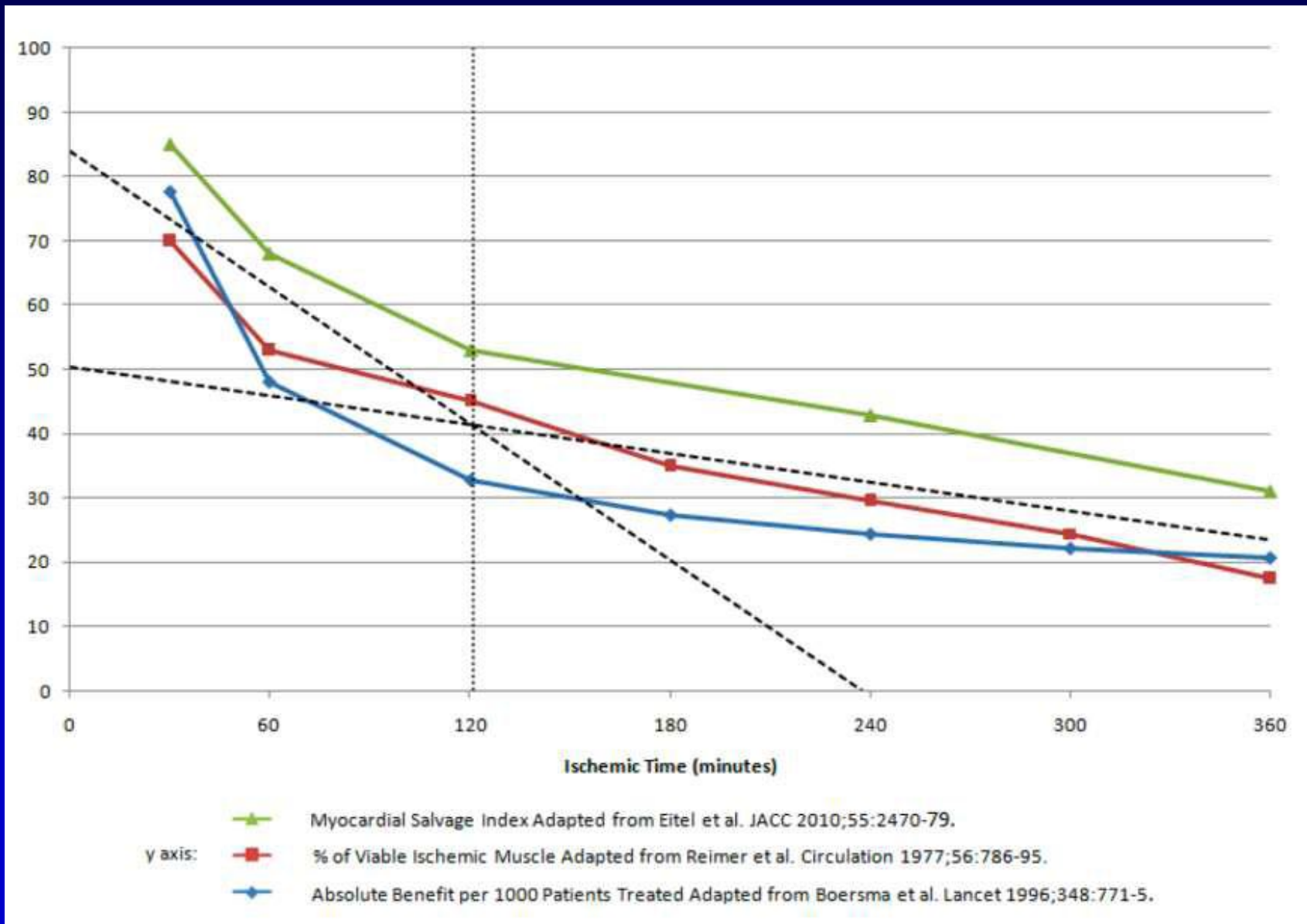
Fibrinolysis Door-to-Needle



Primary PCI Door-to-Balloon



The Importance of Reducing Ischemic Time



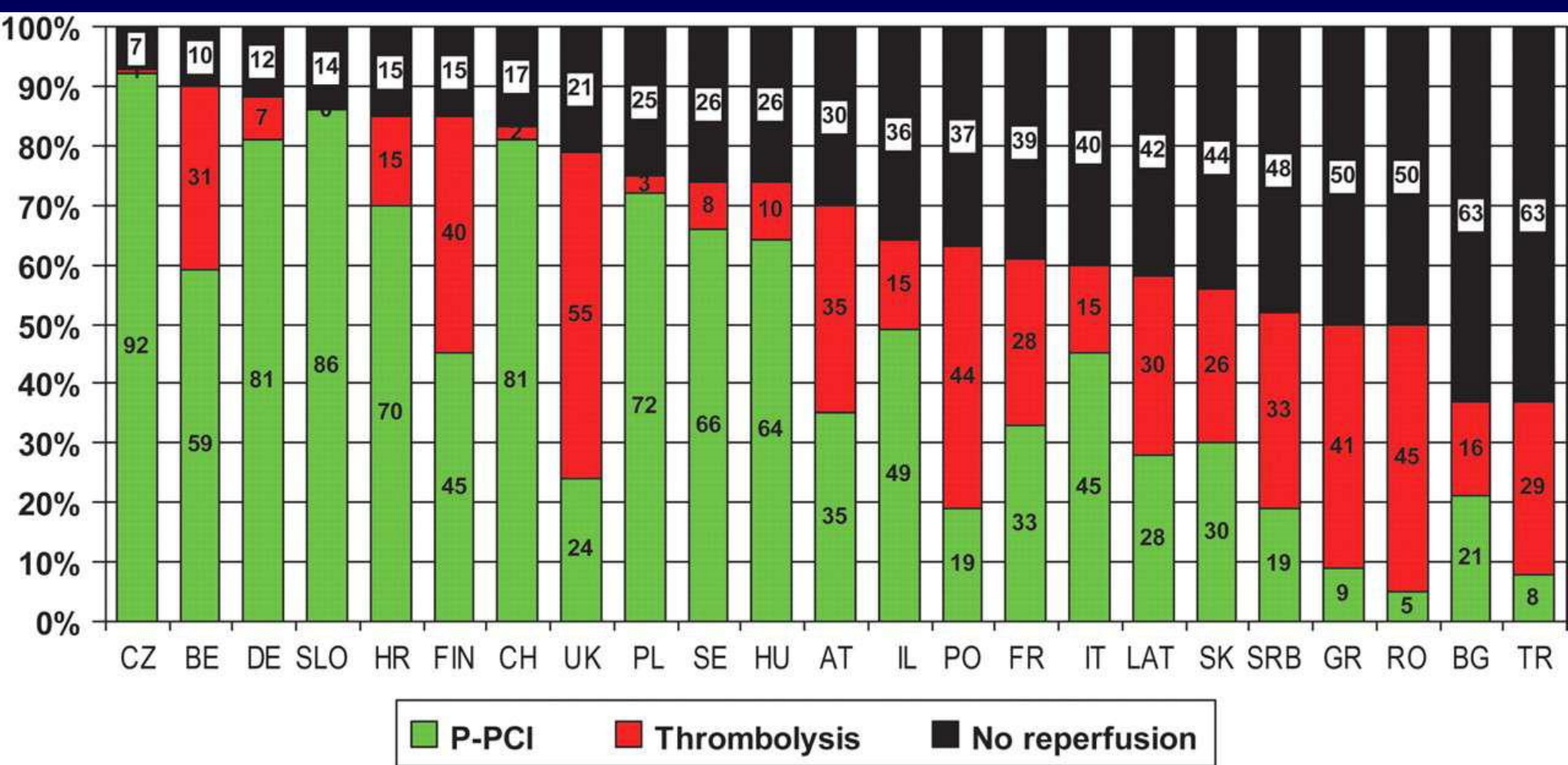
**Choose
the Revascularization strategy**

...

At least one!



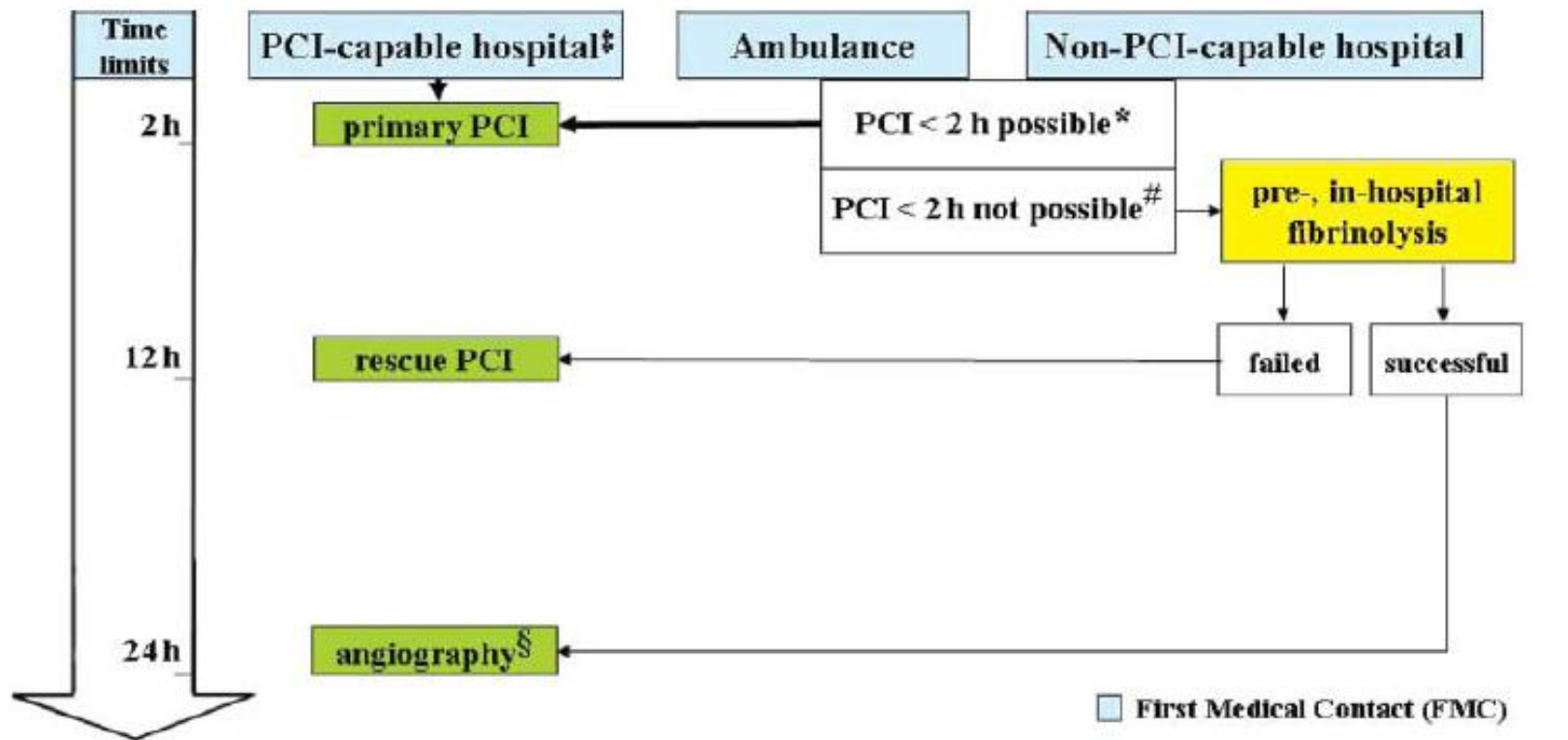
Hospitalized STEMI treatment in Europe (data from national registries or surveys)



STEMI data in Piemonte

Figures from SDO

	2007	2008	2009	2010
STEMI TOTALI	5507	5.495	5212	4896
Accesso diretto	2736 49%	2.806 51%	2694 52%	2496 (51%)
Accesso 118	1544 28%	1.533 28%	1466 28%	1501(31%)
RIPERFUSI TOTALI	2602 47%	2.747 50%	2760 53%	2714 (55%)
DA 118	697 27%	707 26%		
MORTALITA' TOTALE	728 13,2 %	696 12,6%		13% (M 10% F18%)
MORTALITA' RIPERFUSI	153 5,8%	129 4,6%	142: 5.1% M 53 4.4% F 89 7.1%	5%



* Time FMC to first balloon inflation must be shorter than 90 min in patients presenting early (<2 h after symptom onset), with large amount of viable myocardium and low risk of bleeding.

If PCI is not possible <2 h of FMC, start fibrinolytic therapy as soon as possible.

§ Not earlier than 3 h after start fibrinolysis

‡ 24/7 service



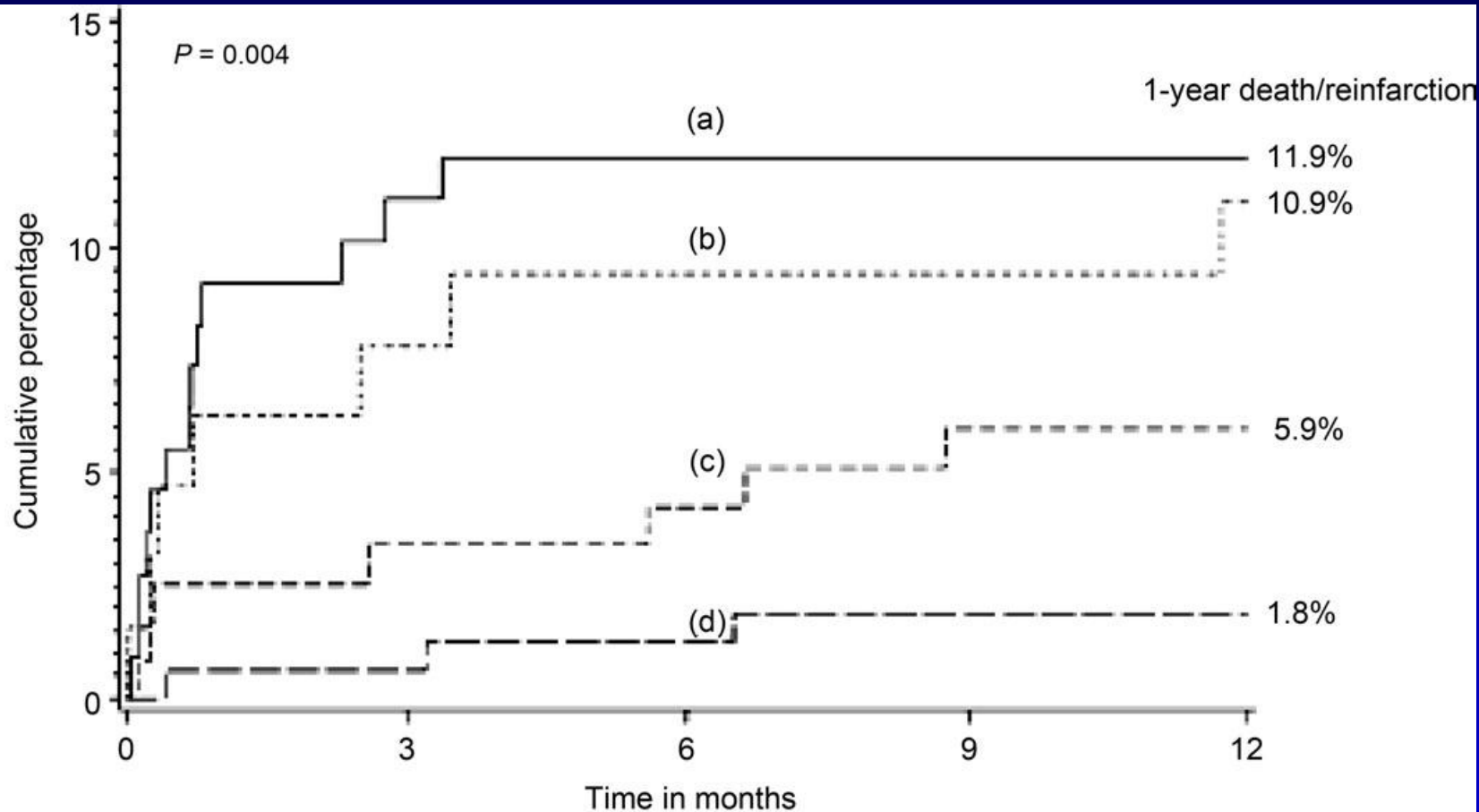
Reperfusion strategy in 2011

- PCI centers should do PCI (time < 90min)
- Short distance transfer patients should have PCI (time < 120 min)
- Long distance transfer or patients with expected delay remains an area of controversy (facilitated PCI, pre-hospital thrombolysis, in hospital thrombolysis)



Protect microcirculation

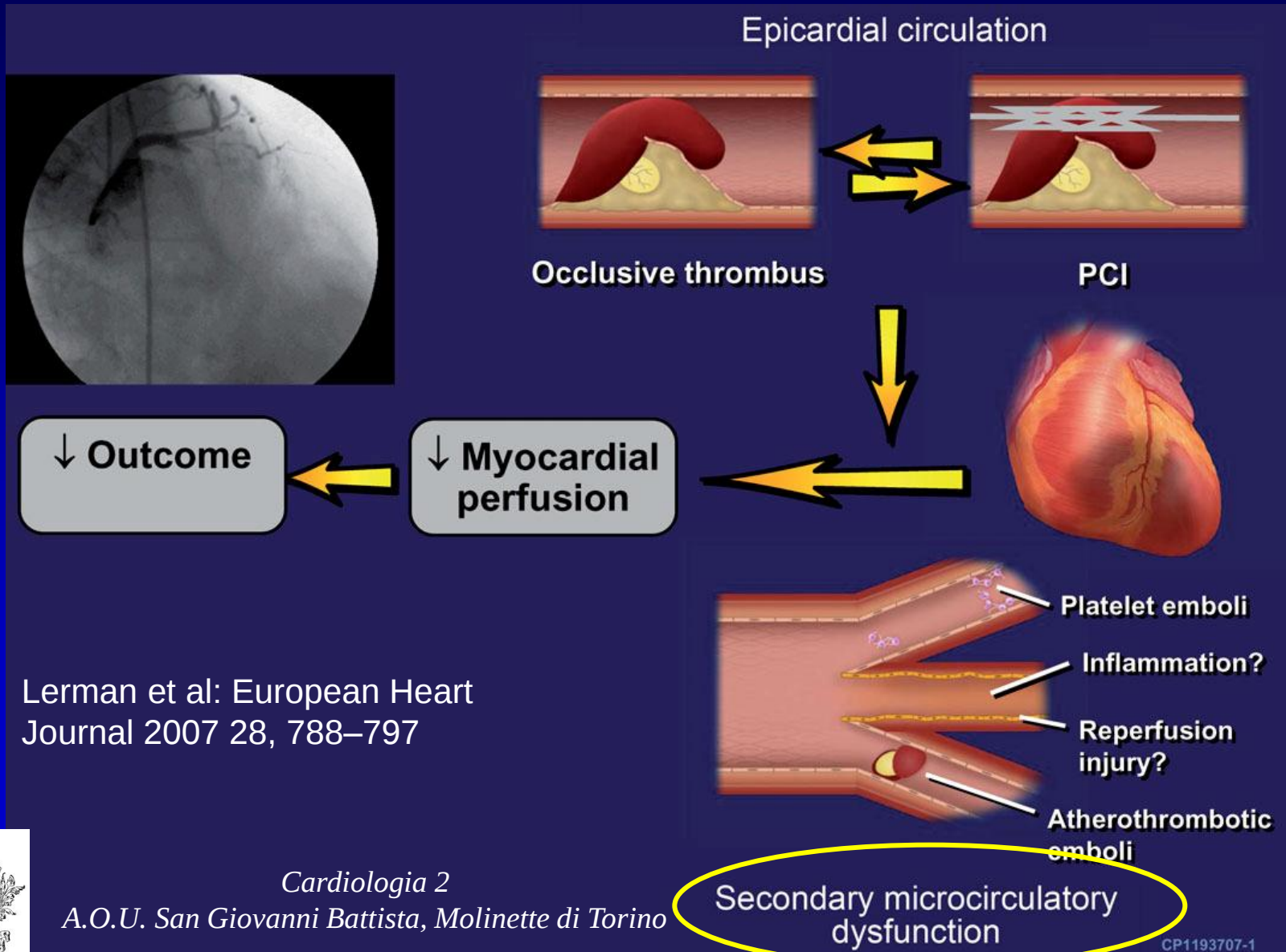
Prognostic merit of 2 surrogates of myocardial perfusion
(data from the CADILLAC trial)



Number at risk

$\Sigma < 70\%$, Blush 0/1 (a)	109	96	95	95	95
$\Sigma < 70\%$, Blush 2/3 (b)	54	59	58	58	57
$\Sigma \geq 70\%$, Blush 0/1 (c)	118	114	113	111	111
$\Sigma \geq 70\%$, Blush 2/3 (d)	165	161	158	156	156

Microcirculatory dysfunction in ST-elevation myocardial infarction: cause, consequence, or both?



no-reflow”

microvascular obstruction and reduced myocardial flow after opening an occluded artery



- 1) early postinfarction complications (arrhythmias, pericardial effusion, cardiac tamponade, early congestive heart failure)
- 2) left adverse ventricular remodeling
- 3) late repeat hospital stays for heart failure
- 4) mortality



No-reflow: prevention and treatment

Table 1 Predictors of Pathogenetic Components of No-Reflow and Therapeutic Implications

Pathogenetic Mechanism of No-Reflow	Predictor	Therapeutic Implications
Distal embolization	Thrombus burden (40)	Thrombus aspiration
Ischemia	Ischemia duration (42,43)	Reduction of coronary time
	Ischemia extent (44,45)	Reduction of oxygen consumption
Reperfusion	Neutrophil count (46)	Specific antineutrophil drugs
	ET-1 levels (51)	ET-1r antagonists
	TXA2 levels (49)	TXA2r antagonists
	Mean platelet volume or reactivity (47,48)	Antiplatelet drugs
Individual susceptibility	Diabetes (37)	Correction of hyperglycemia
	Acute hyperglycemia (57)	Correction of hyperglycemia
	Hypercholesterolemia (38)	Statin therapy
	Lack of pre-conditioning (58)	Nicorandil

ET = endothelin; TXA2 = thromboxane A2.

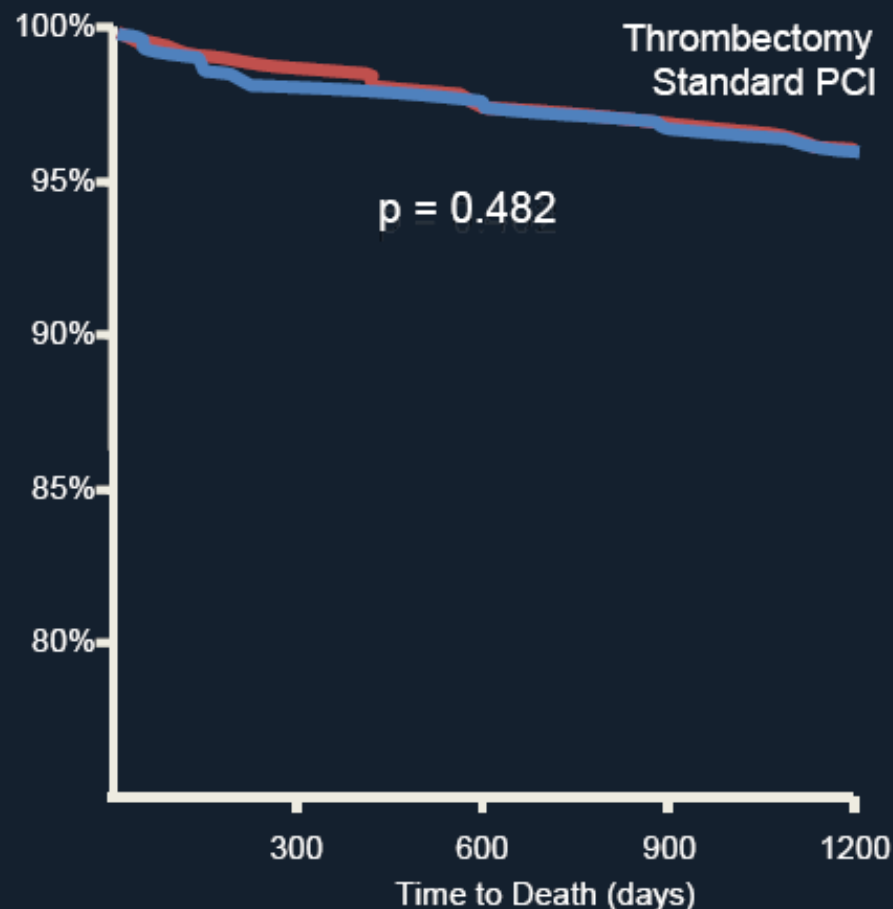


ATTEMPT: Impact of Type of Thrombectomy Device on Mortality

Eur Heart J 2009 30(18):2193

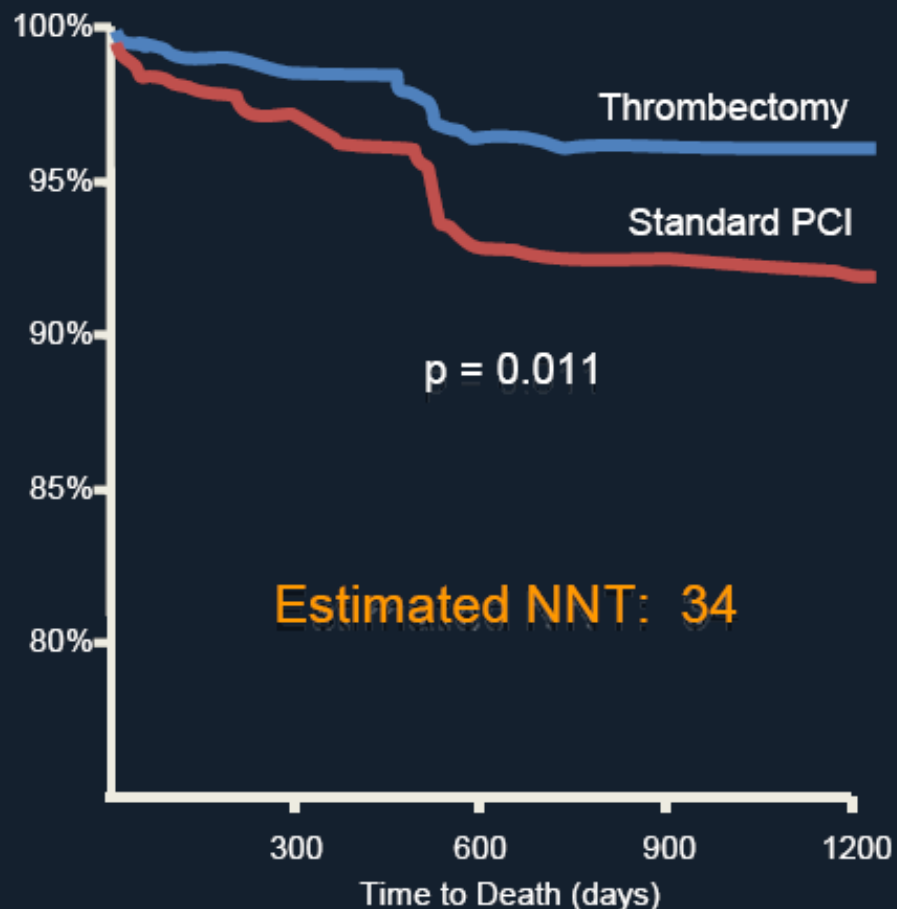
NON-MANUAL THROMBECTOMY TRIALS

Cumulative Survival

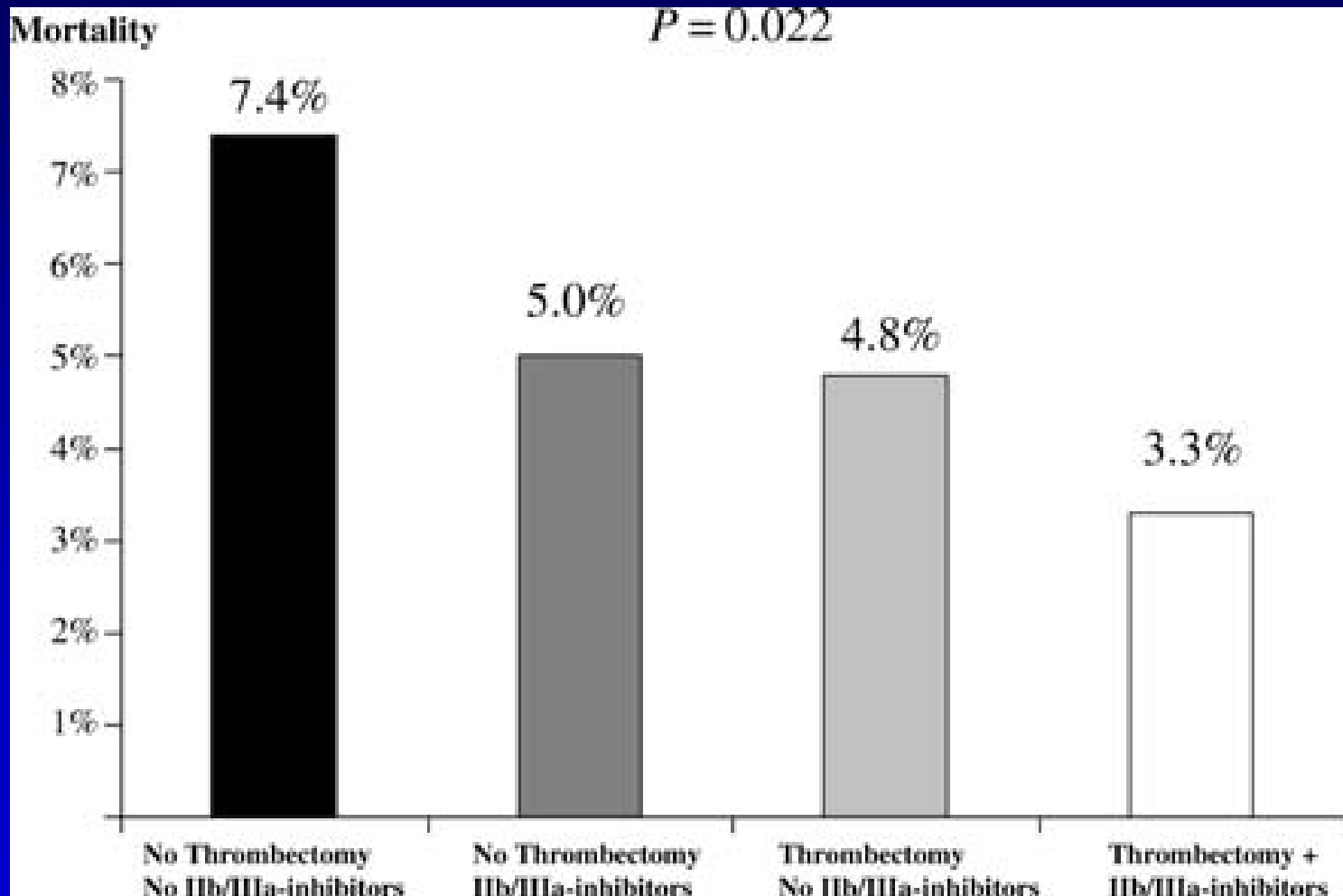


MANUAL ASPIRATION TRIALS

Cumulative Survival



Mortality rates observed in the ATTEMPT database according to thrombectomy and to administration of IIb/IIIa-inhibitors.

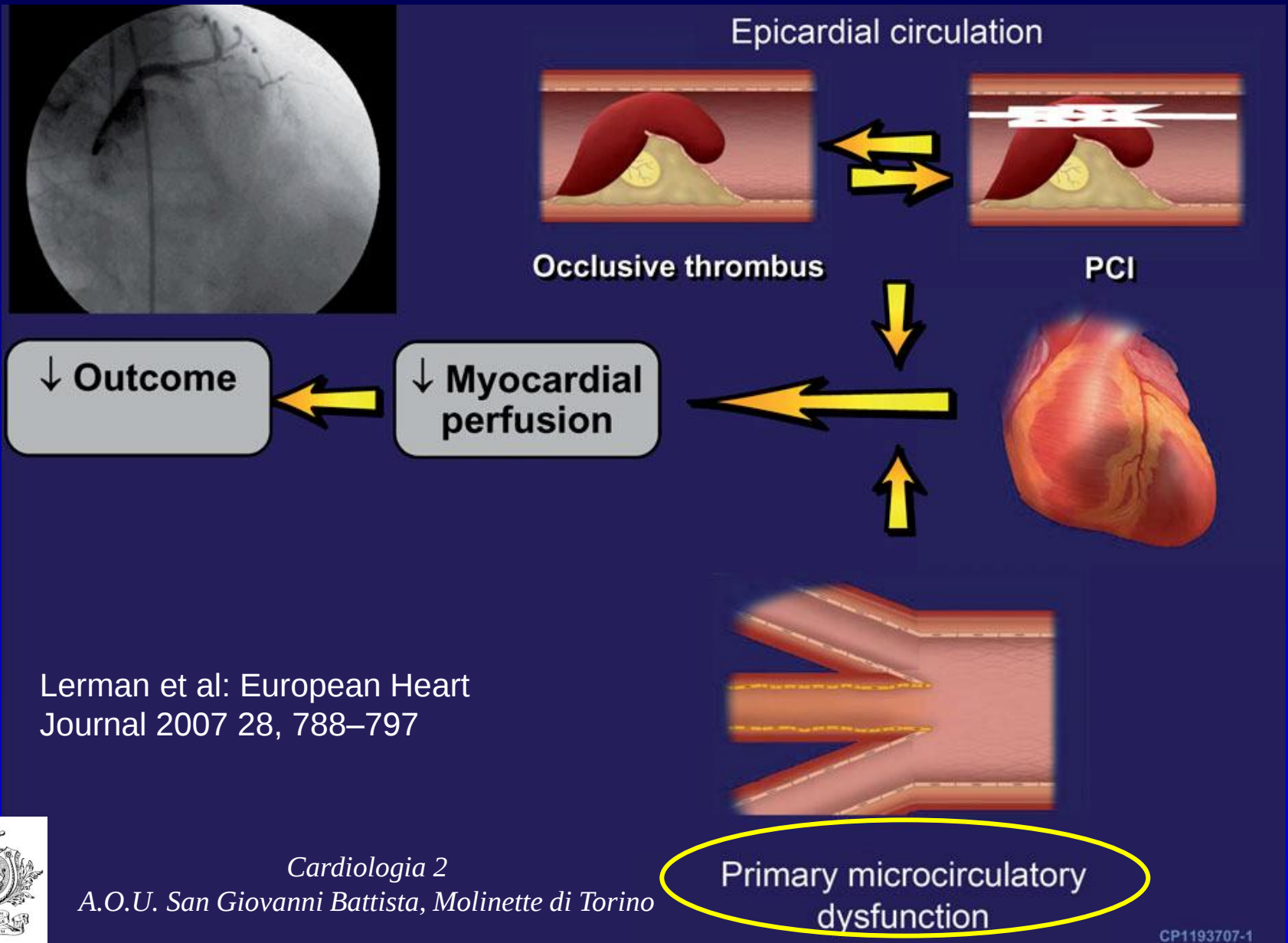


Cardiologia 2

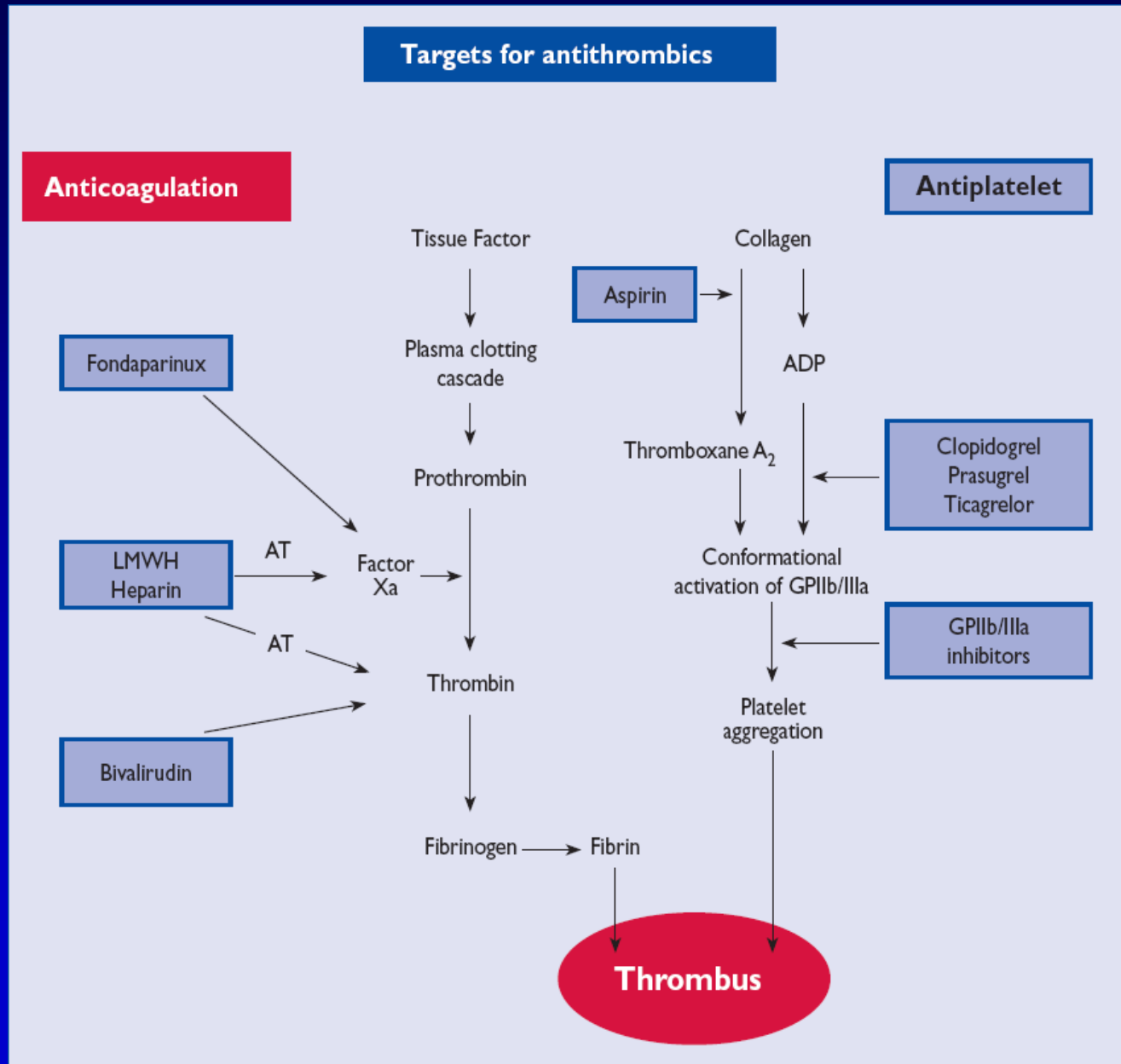
A.O.U. San Giovanni Battista, Molinette di Torino



Microcirculatory dysfunction in ST-elevation myocardial infarction: cause, consequence, or both?



Tailored Therapy



Tailored Therapy



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HORIZONSAMI

Harmonizing Outcomes with Revascularization and Stents in AMI

3602 pts with STEMI with symptom onset ≤ 12 hours

Attributable
Deaths

Risk Factor

HR [95% CI]

P-value

Reinfarction

Incidence 69 (2.2%)
10 deaths with event



9.75
[2.72, 34.91]

<0.001

9.0*
[6.3, 9.7]

Major bleeding
(Non CABG)

Incidence 238 (6.8%)
26 deaths with event



4.66
[2.84, 7.63]

<0.001

20.4**
[16.8, 22.6]

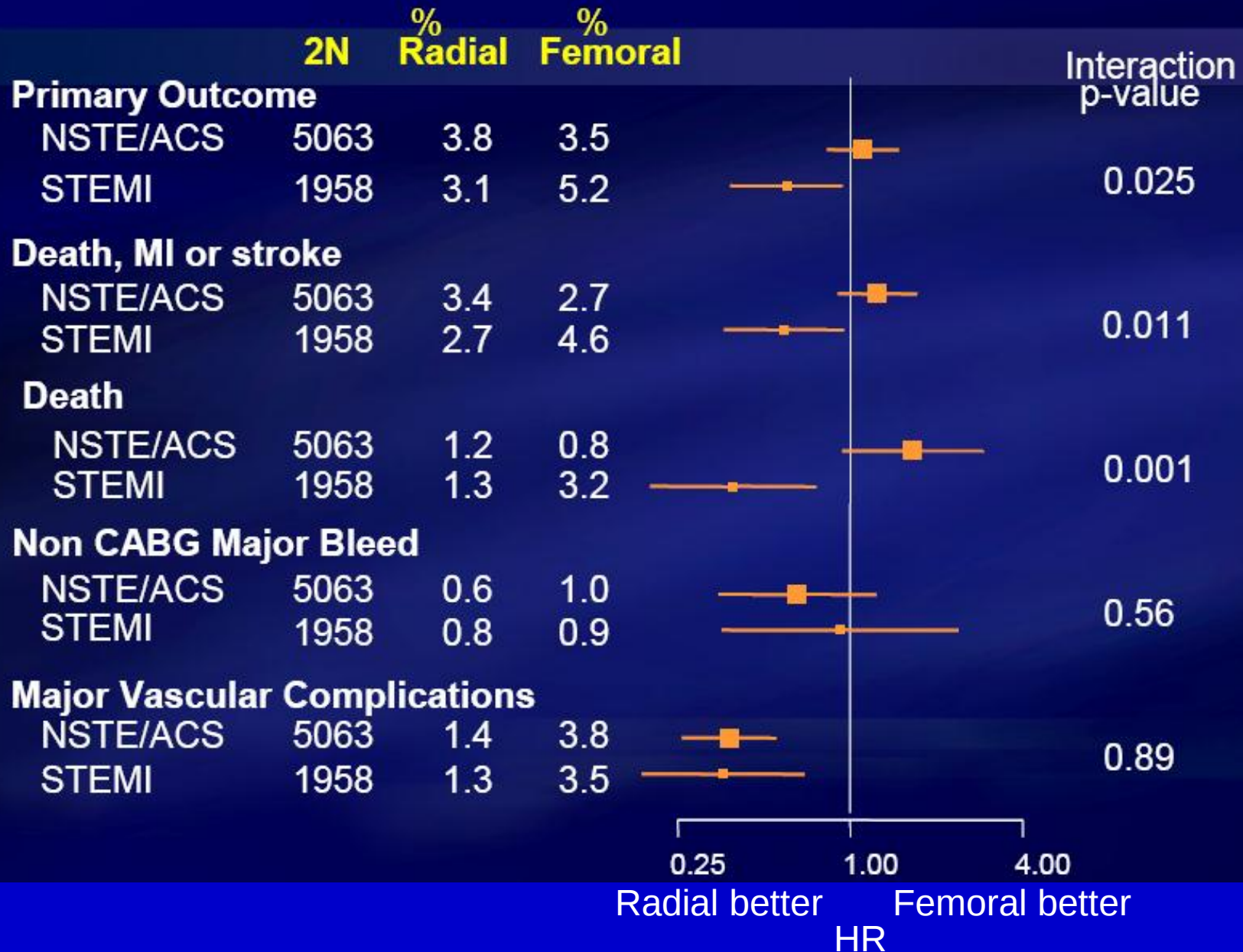
0.01 0.1 1 10 100

Hazard Ratio [95% CI]

*9.7% of 93 total deaths
**21.9% of 93 total deaths

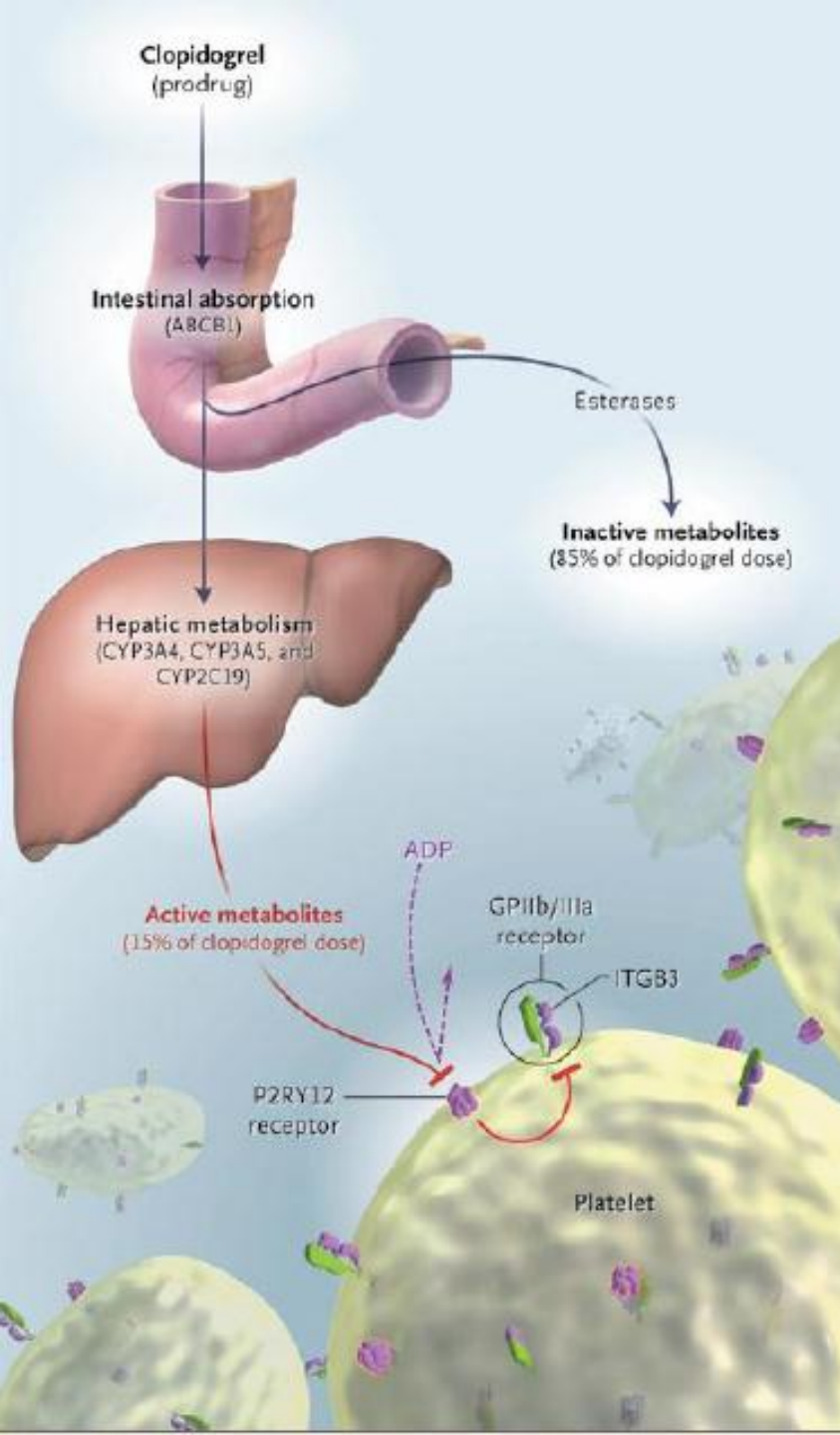


A randomized comparison of Radial Vs. femorAL access for coronary intervention in ACS (RIVAL)



New concepts in tailored therapy:

The genetic polymorphisms



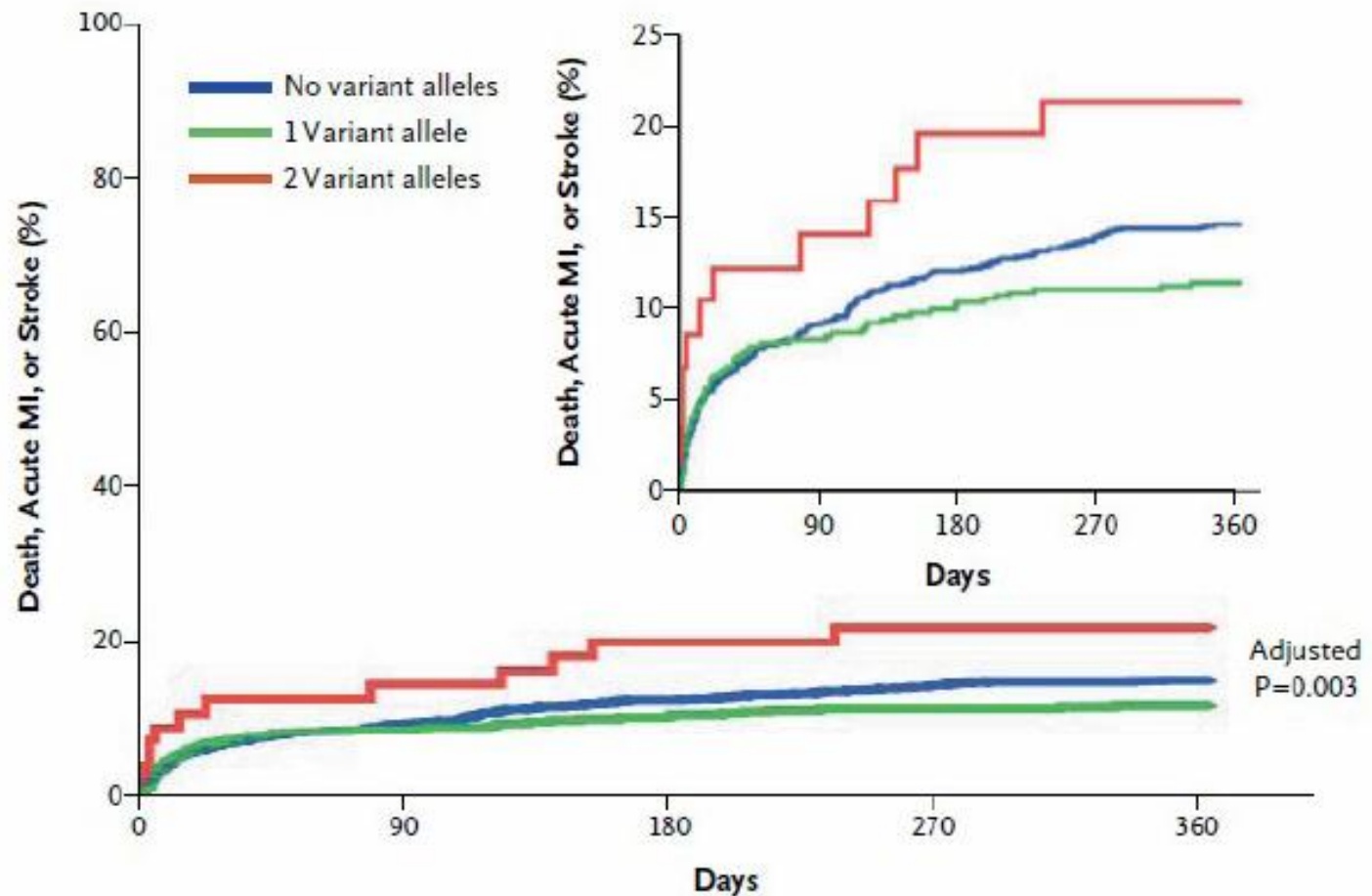
ORIGINAL ARTICLE

Genetic Determinants of Response to Clopidogrel and Cardiovascular Events

Tabassome Simon, M.D., Ph.D., Céline Verstuyft, Pharm.D., Ph.D., Murielle Mary-Krause, Ph.D., Lina Quteineh, M.D., Elodie Drouet, M.Sc., Nicolas Méneveau, M.D., P. Gabriel Steg, M.D., Ph.D., Jean Ferrières, M.D., Nicolas Danchin, M.D., Ph.D., and Laurent Becquemont, M.D., Ph.D., for the French Registry of Acute ST-Elevation and Non-ST-Elevation Myocardial Infarction (FAST-MI) Investigators

Variant alleles are associated with CV events

B



No. at Risk

No variant alleles	1572	1334	1288	1211	1208
1 Variant allele	576	502	491	468	446
2 Variant alleles	58	47	44	42	40

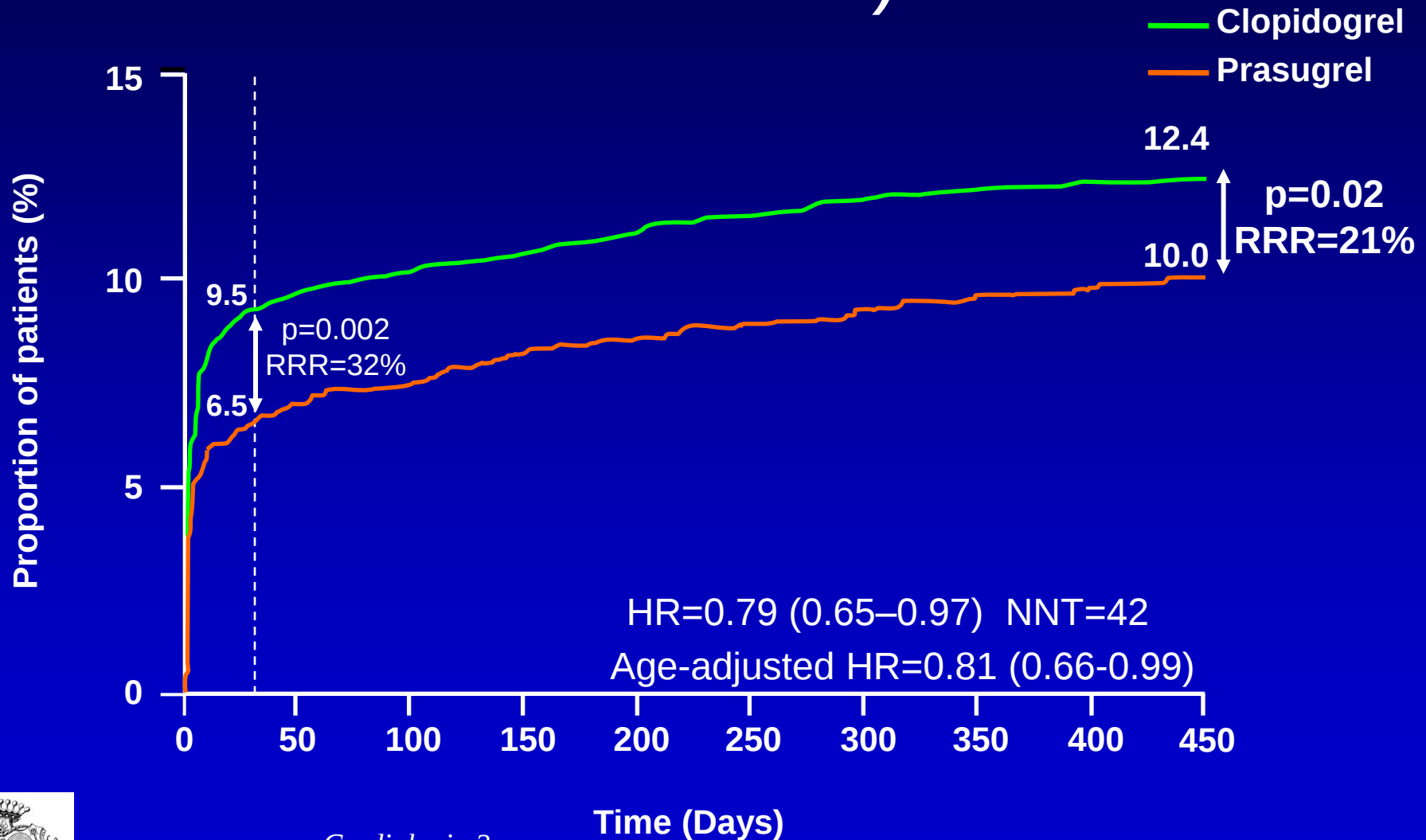
Clopidogrel Under Fire

Is Prasugrel in Primary PCI or Recent MI Superior? Insights From TRITON-TIMI-38



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Primary EP (CV death, MI and stroke at 15 months)



Anticoagulant therapy

Potential options

- ① Unfractionated heparin
- ② Low molecular weight heparin (enoxaparin)
- ③ Bivalirudin



Bivalirudin



The Good:

- Lower mortality
- Lower bleeding

The Bad:

- Very short $t_{1/2}$ requiring continuous IV infusion

The Ugly:

- Acute (?subacute) thrombosis

Potential Solution(s)

1. Pre-procedural IV UFH bolus
2. More rapidly acting thienopyridine
3. Prolonged infusion of bivalirudin
4. IIb/IIIa antagonist with radial approach



CONCLUSIONS

STEMI mortality is secondary to a number of patient's intrinsic and extrinsic factors

The interventional cardiologist is concerned about artery patency and coronary disease extension

The clinical cardiologist is concerned about the integrity of microcirculation and muscle

Reduce mortality of STEMI patients means increase, improve and adapt reperfusion therapy for the individual patient

Nowadays the variety and complexity of therapy for STEMI patients allows to build a tailor-made therapy



THANKS FOR YOUR ATTENTION



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