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Facilitated PCI is Beneficial for the Patients with AMI

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Acute Coronary Syndrome

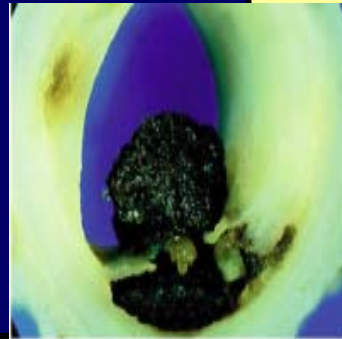
Presentation

Ischemic discomfort

Working Dx

Acute coronary syndrome

ECG



Biochemical marker

No ST elevation

ST elevation

Final Dx

Unstable angina

NSTEMI

Myocardial infarction

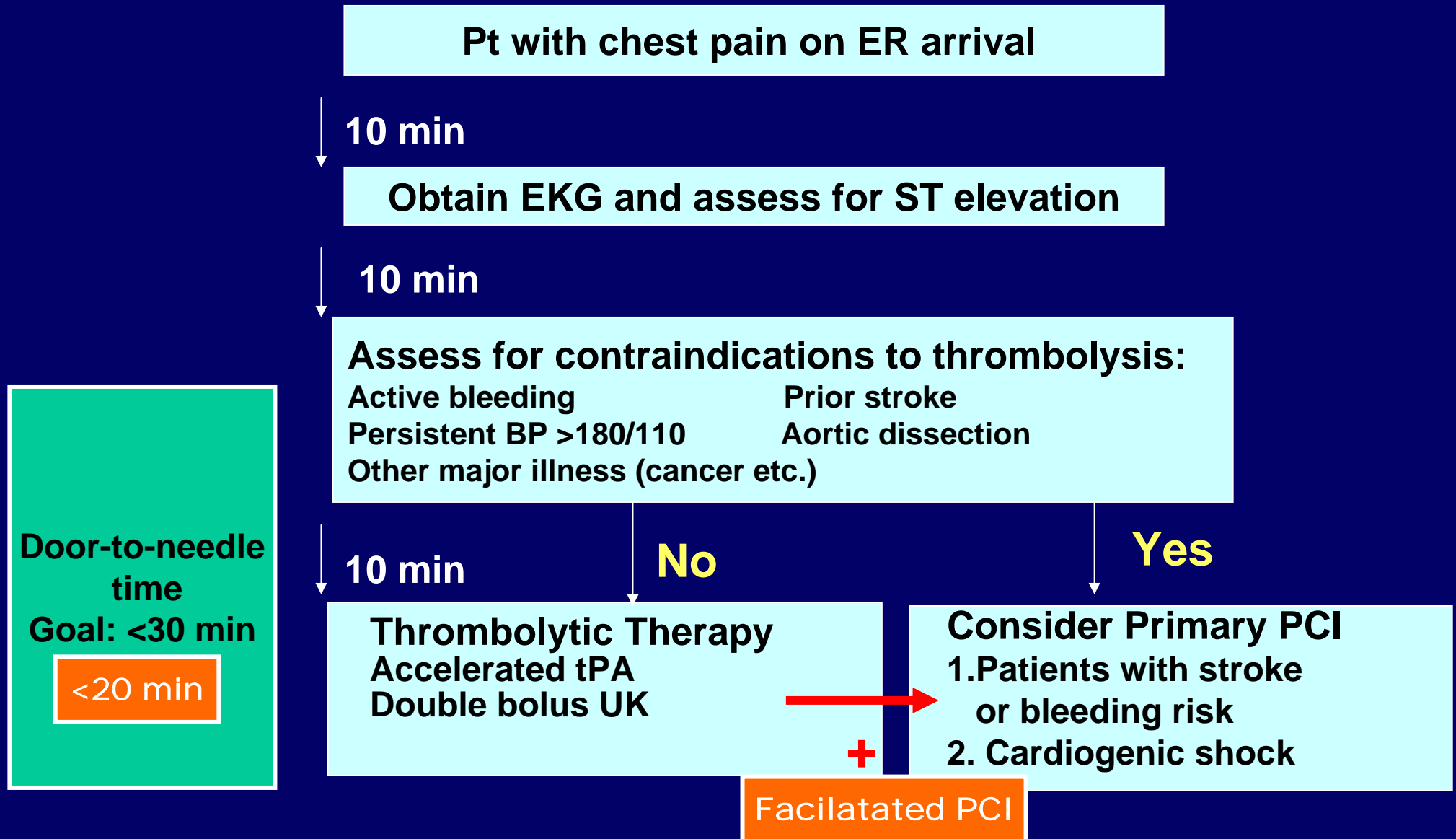
STEMI

Acute Care at Emergency Room for Acute Myocardial Infarction

- Pain control : morphine
- Oxygen
- Aspirin : powder or chewing tablet
- Heparin : standard or LMWH
- Beta-blocker
- Nitrate : sublingual or intravenous
- ACE inhibitor
- Platelet GP IIb/IIIa receptor blocker
- Statin

- Reperfusion therapy
: Thrombolytic therapy or Primary PCI

Speeding Time to Treatment



Thrombolysis vs. Primary PCI

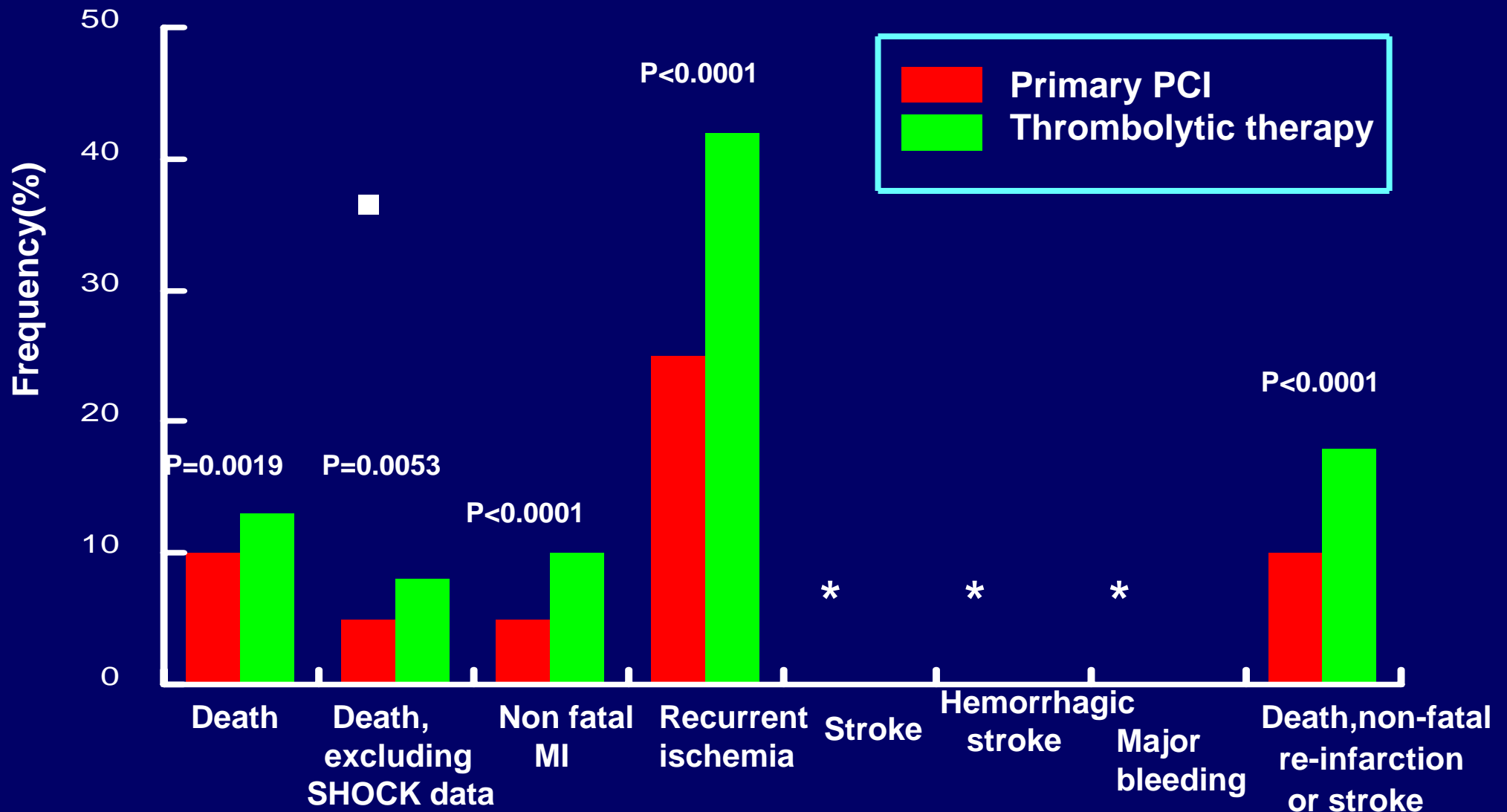
Thrombolysis

- Easy to administer
- Short time ■
- Reduce infarct size and improve LV function after early thrombolysis
- Able to administer within ambulance during transfer
- Not affected by doctor's skill
- Low cost

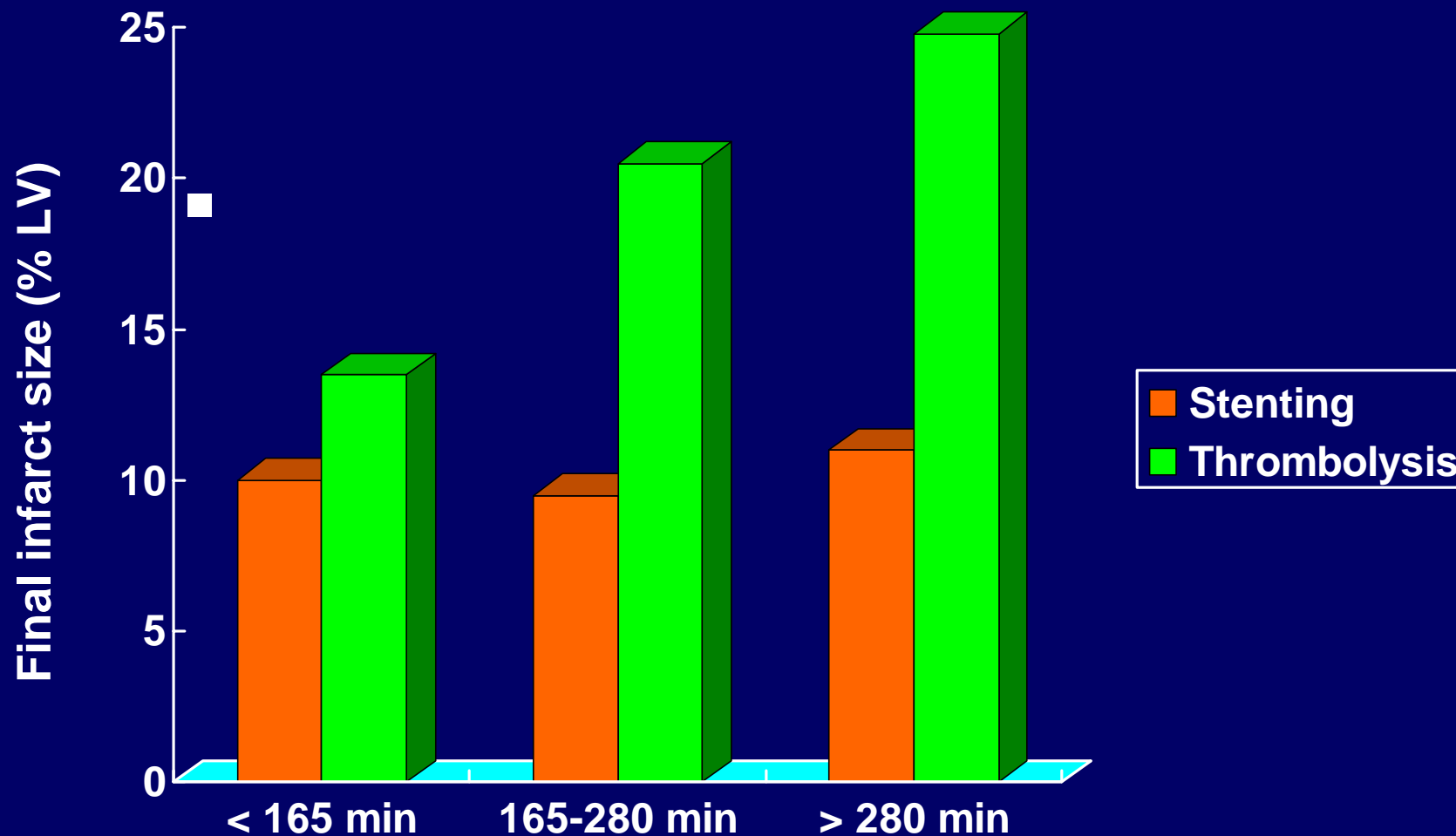
Primary PCI

- Effective revascularization
- Low recurrence
- Less residual lesion
- Less cerebral hemorrhage
- Detail coronary artery morphology and LV function
- Contraindicated to thrombolysis
- **Skilled Lab and interventional cardiologist**

23 Randomized Trials of PCI vs Lysis - Long-Term Outcomes after Primary PCI -



Median of Final Infarct Size According to the Tertiles of Time-to-Treatment Interval



Why is Primary PCI Less Time Dependent Than Thrombolysis?

- Thrombolysis is less effective at restoring infarct artery patency as the clot ages
 - : Not so for primary PCI
- Myocardial salvage and infarction size after thrombolytic therapy is very sensitive to time to reperfusion
 - : No so far primary PCI
- Cardiac rupture is more likely to occur as time to thrombolysis increases
 - : Cardiac rupture is rare after primary PCI

Primary PCI is Better !!

CASE 1. 53/M

2

4

14



135/95 mmHg, 80/min

3

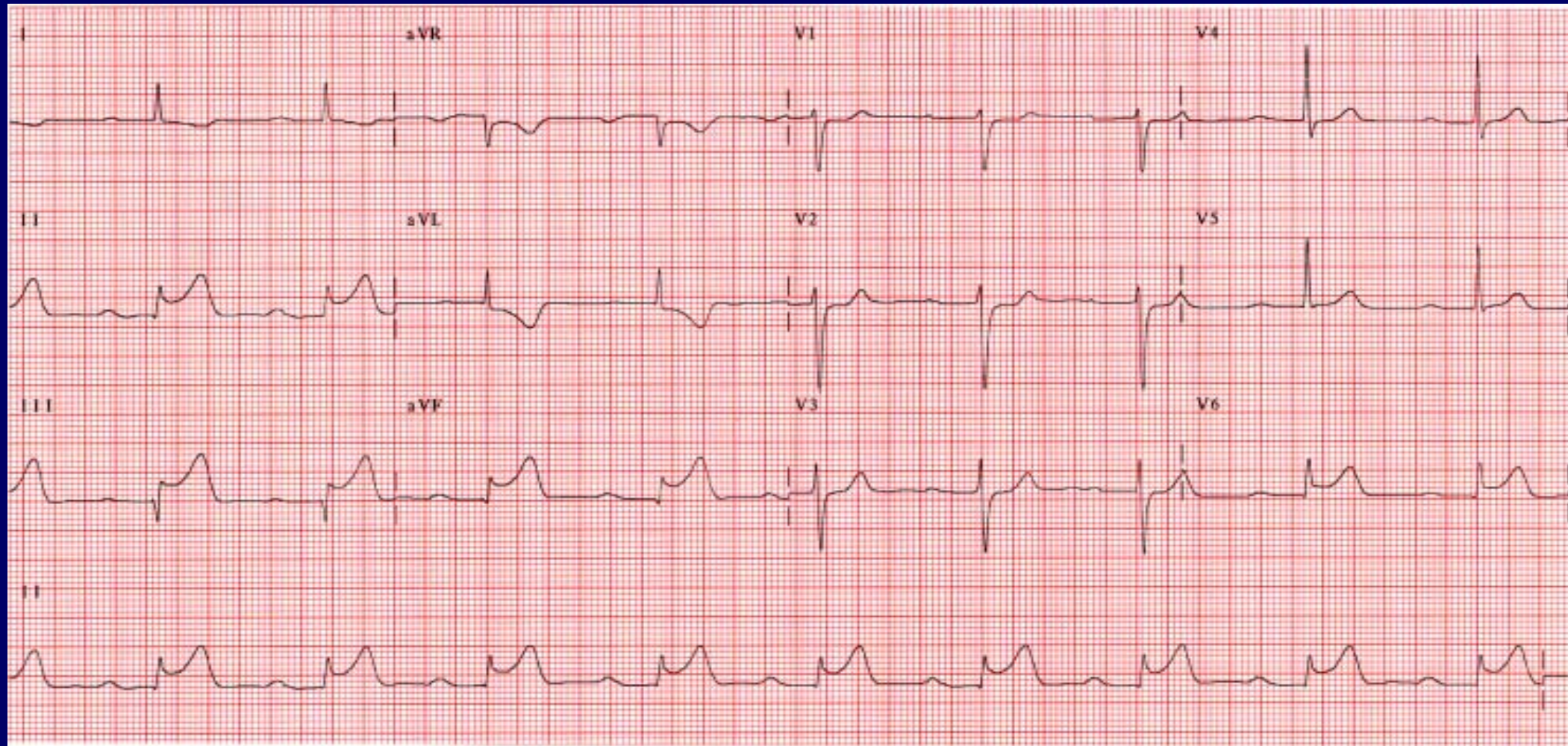
(-),

(-)

CK/CK-MB 822(138) U/L, Myoglobin 9.74 ng/ml, Tnl 5.04 ng/dL

LDL-Cholesterol 123 mg/dL

ECG on Hospitalization



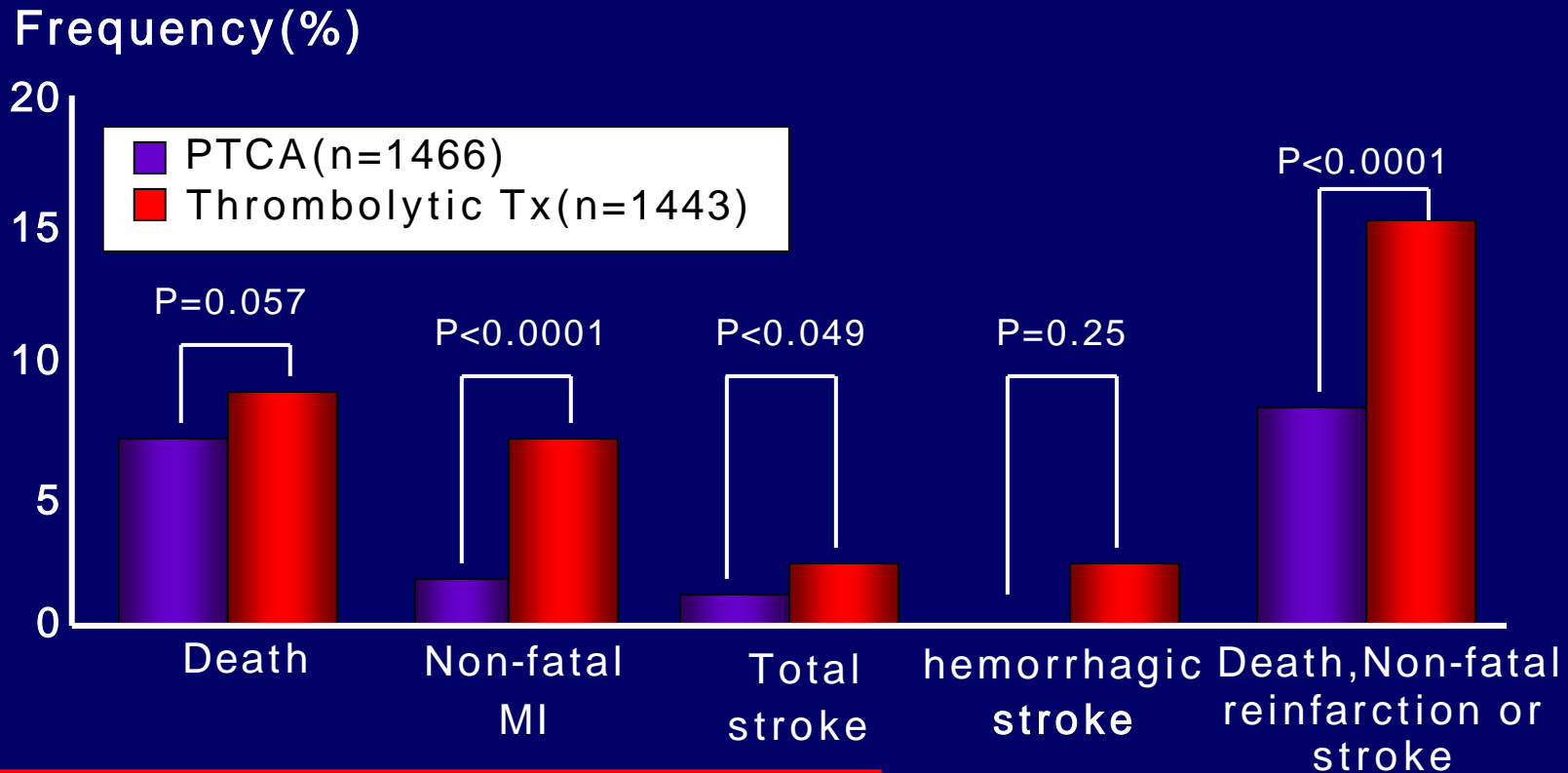
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1

, PCI 가
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1. Conservative Treatment and CCU Care
2. Thrombolysis
3. Transport to PCI center
4. Transport to PCI center after thrombolysis

AMI: Onsite Lysis vs Transfer and PCI



AIR PAMI, CAPTIM, DANAMI-2, PRAGUE-2

Hospitals w/o Qualified 1° PCI Facilities

ST Elevation AMI
(Pre-hospital Delay ⇔ 12 hrs.)

■ Aspirin / BB / ACEI / Statin / LMWH

Reperfusion therapy (-)
-contralx
-concomitant disease

Thrombolysis

Transfer for 1°PCI
+ IIb/IIIa inhibitor
-CI for thrombolysis
-Refusal of TL
-age >75 years

Transfer for PCI
± thrombolysis
± IIb/IIIa inhibitor prior to transfer
- cardiogenic shock

Transfer for rescue-PCI
-persistent angina >90 min after start of thrombolysis
-persistent ST elevation > 90 min after thrombolysis
-evolving cardiogenic shock

Hospitals with Qualified 1° PCI Facilities

ST Elevation AMI
(Pre-hospital Delay ⇔ 12 hrs)

Aspirin / BB / ACEI / Statin / LMWH

Reperfusion Tx(-)

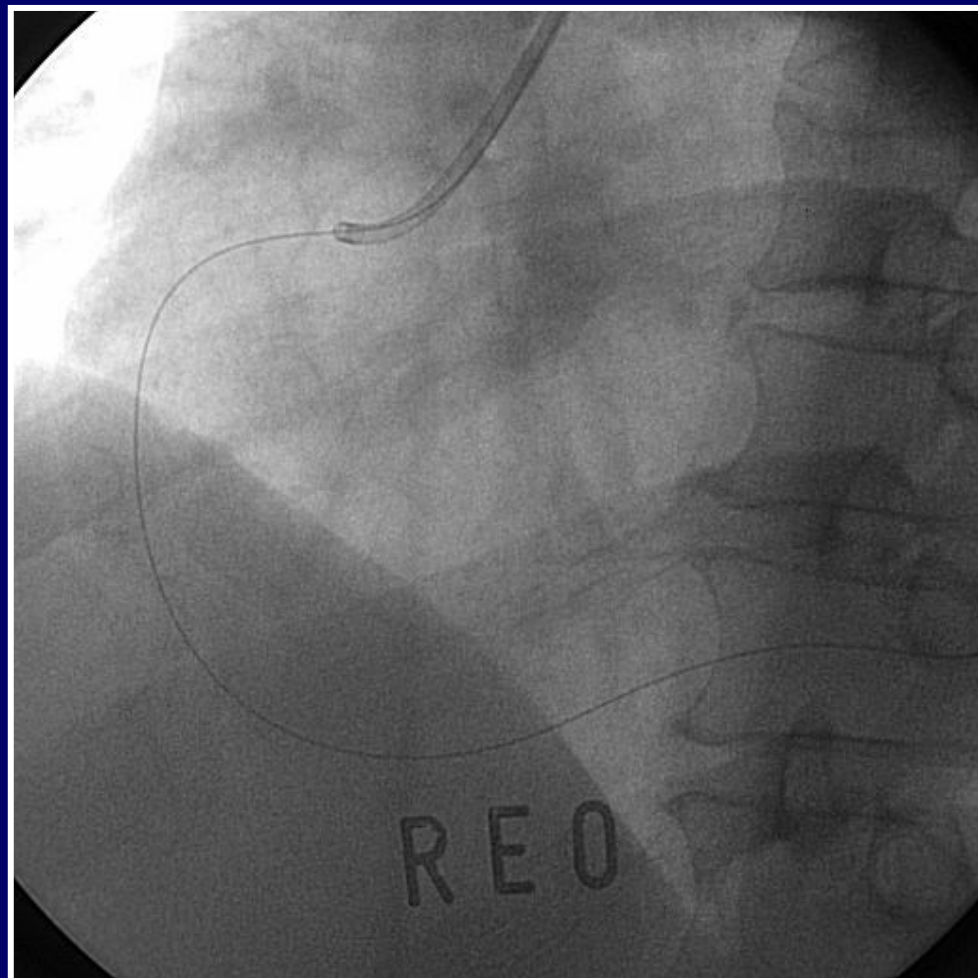
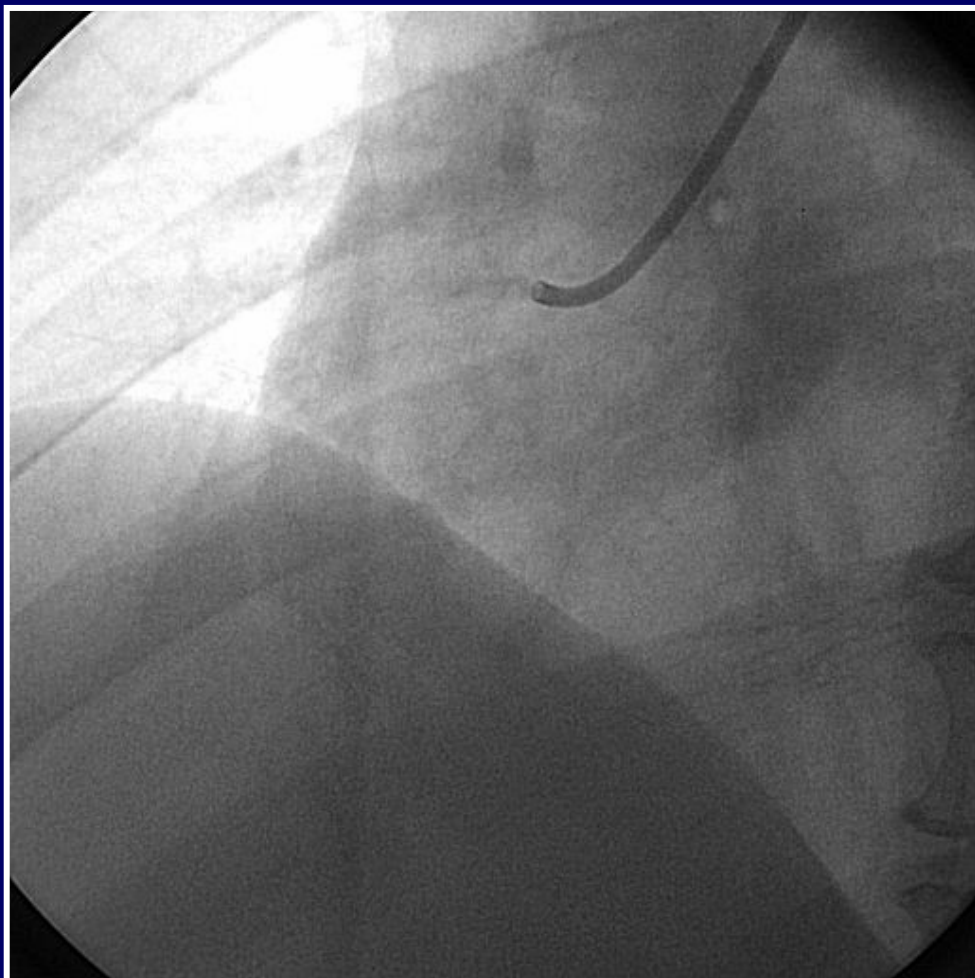
- Contra-Ix
- Concomitant disease (+)

Primary PCI

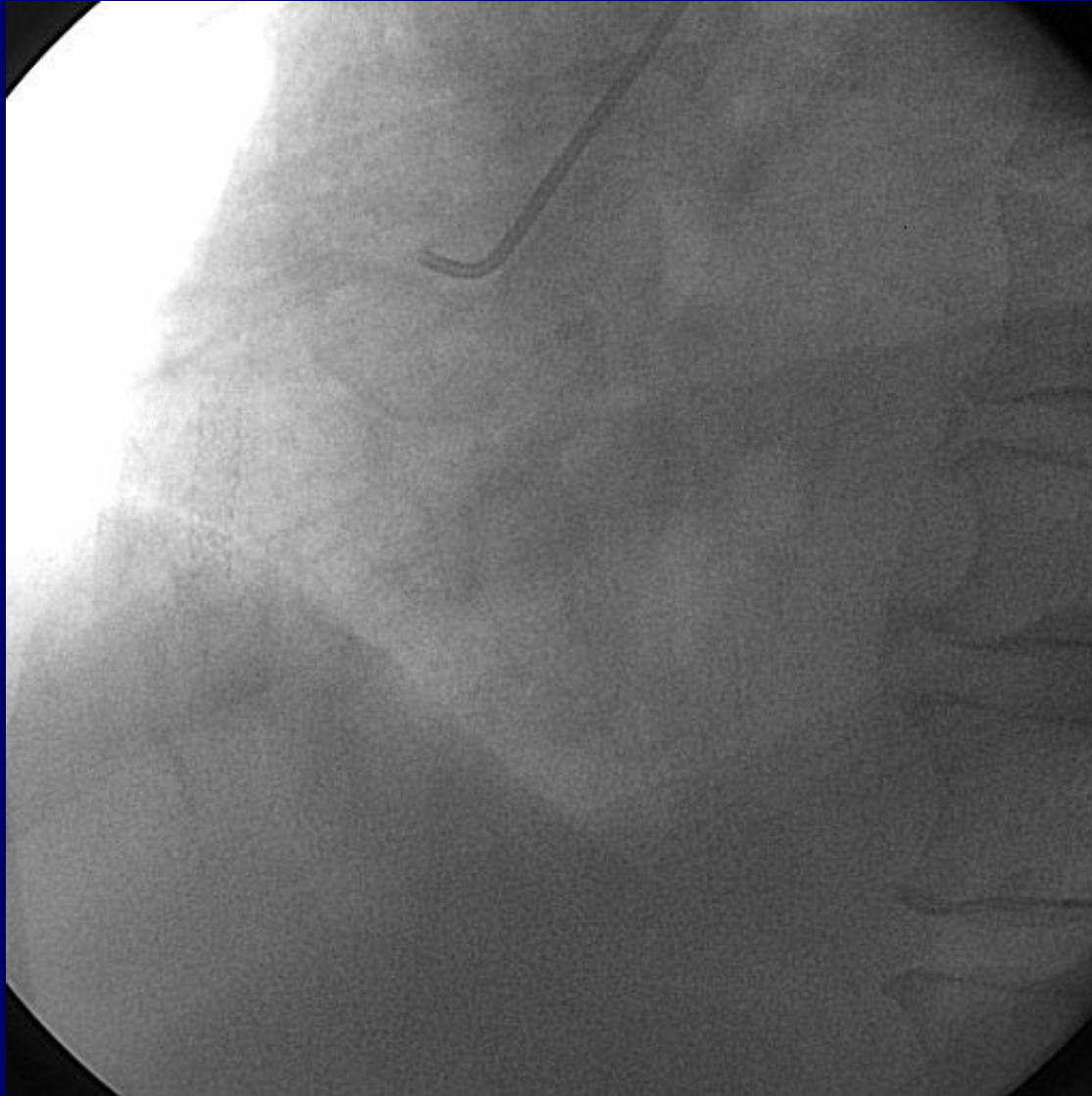
(First Choice therapy)
+ IIb/IIIa Inhibitors
(esp. if door-to-balloon
< 90 minutes)

Thrombolysis
- Refusal of Cath
- Cath Not Ready
within 90 mins

CAG and Facilitated PCI



F/U CAG at 3 days After PCI



CASE 2. 49/M

1

25 PYS

2002

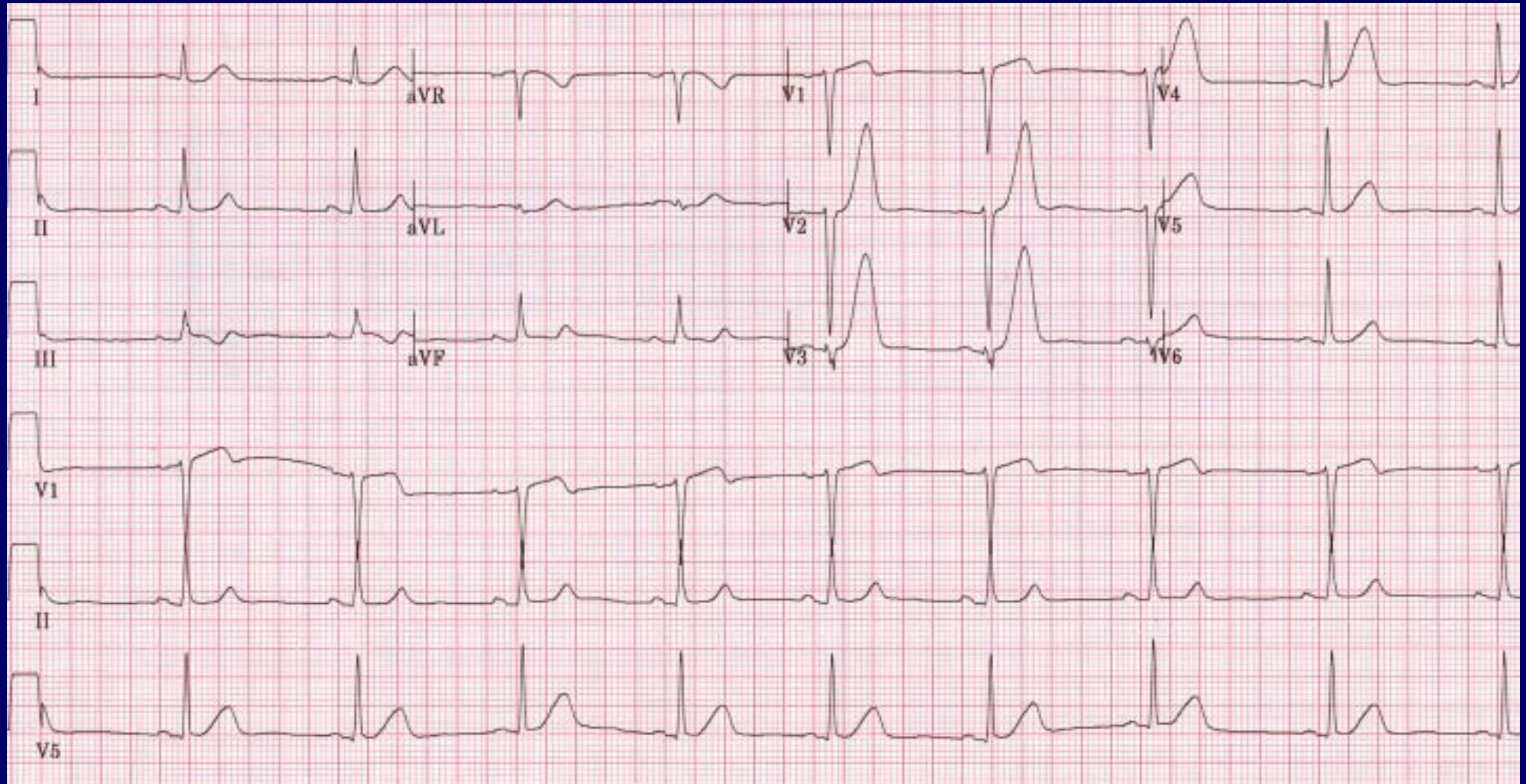
■ PCI in LAD

110/70 mmHg, 65/min

CK/CK-MB 45(1.8) U/L, Myoglobin 27 ng/ml, TnI 0.01 ng/dL,

TnT <0.01 ng/dL, LDL-Cholesterol 203 mg/dL

ECG on Hospitalization



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1.

2.



3. CCU

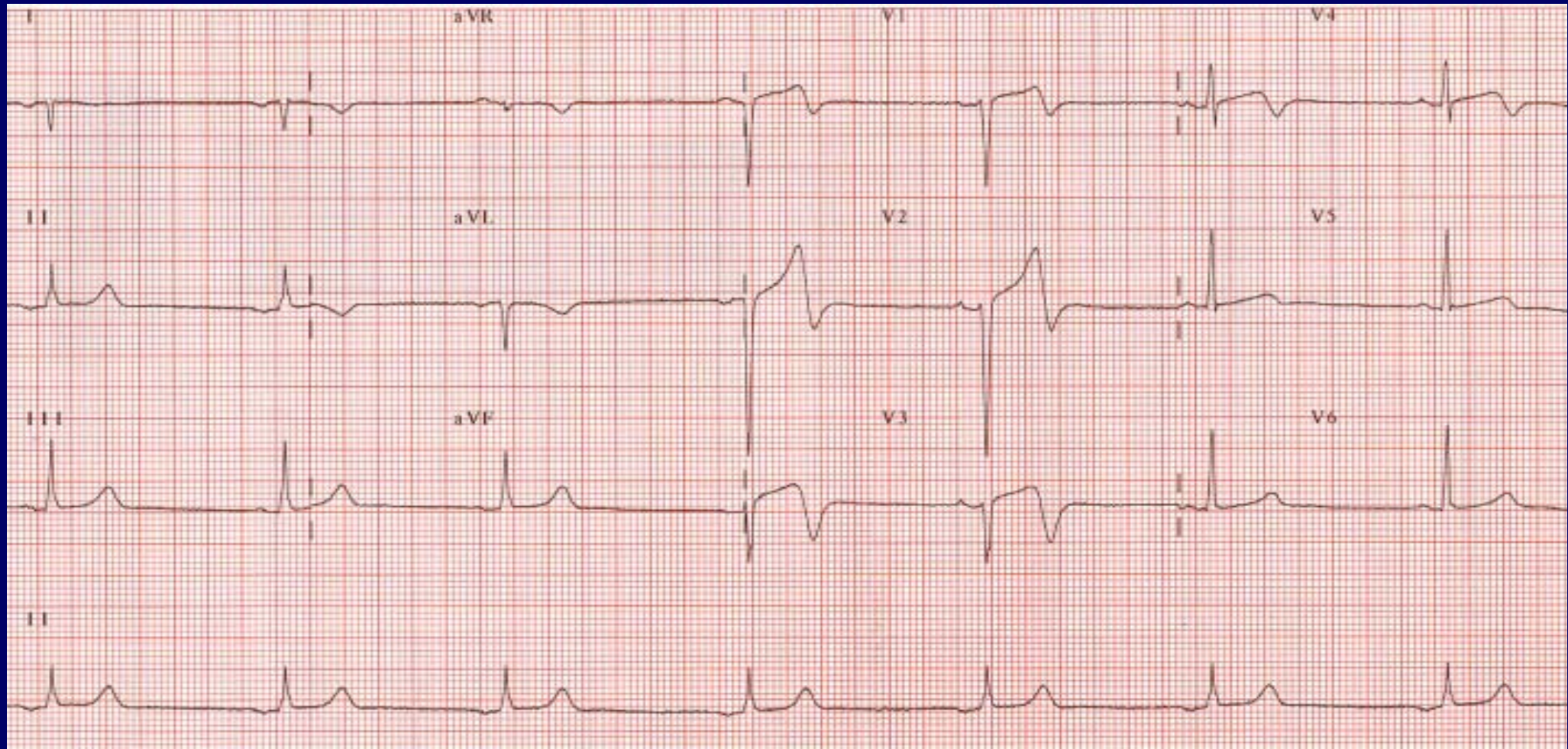
4.

CAG

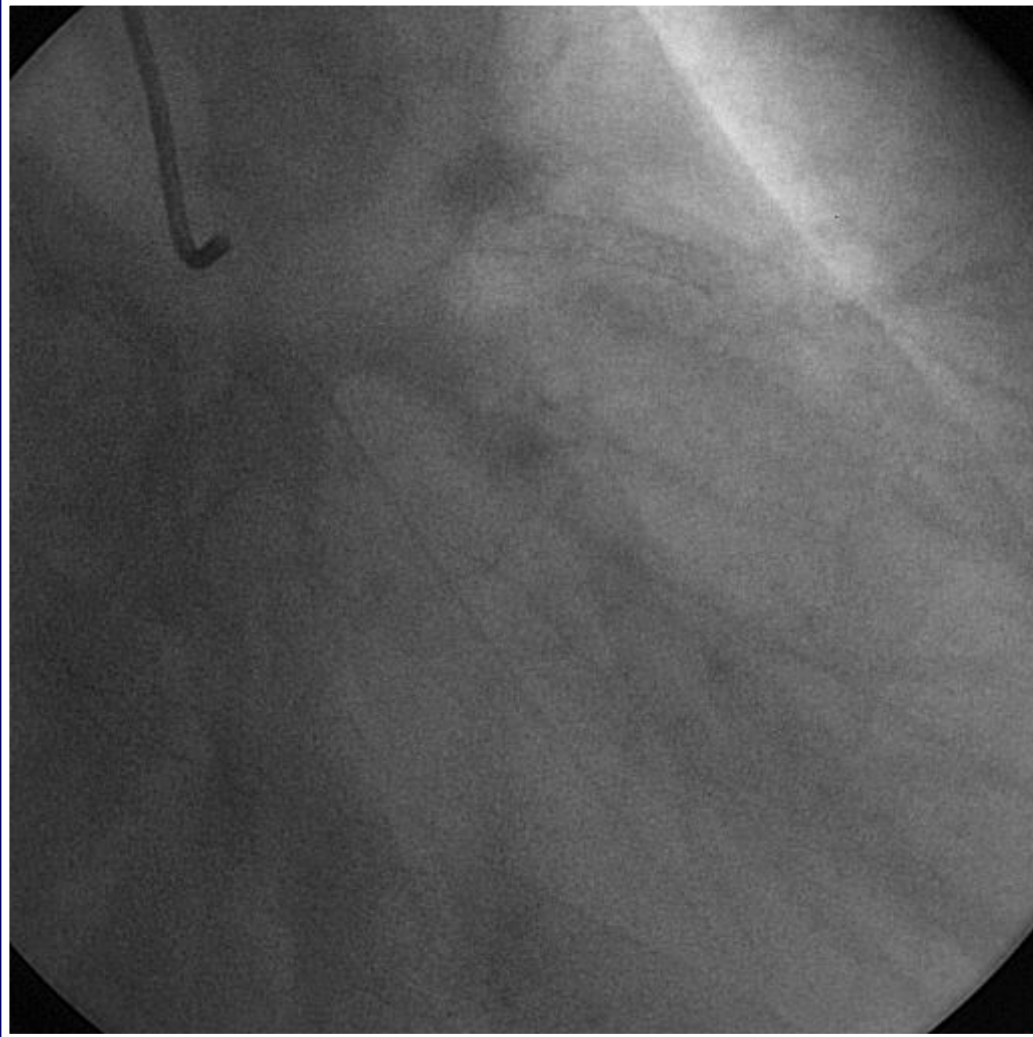
PCI

CABG

ECG At Cardiac Cath Lab



Diagnostic CAG



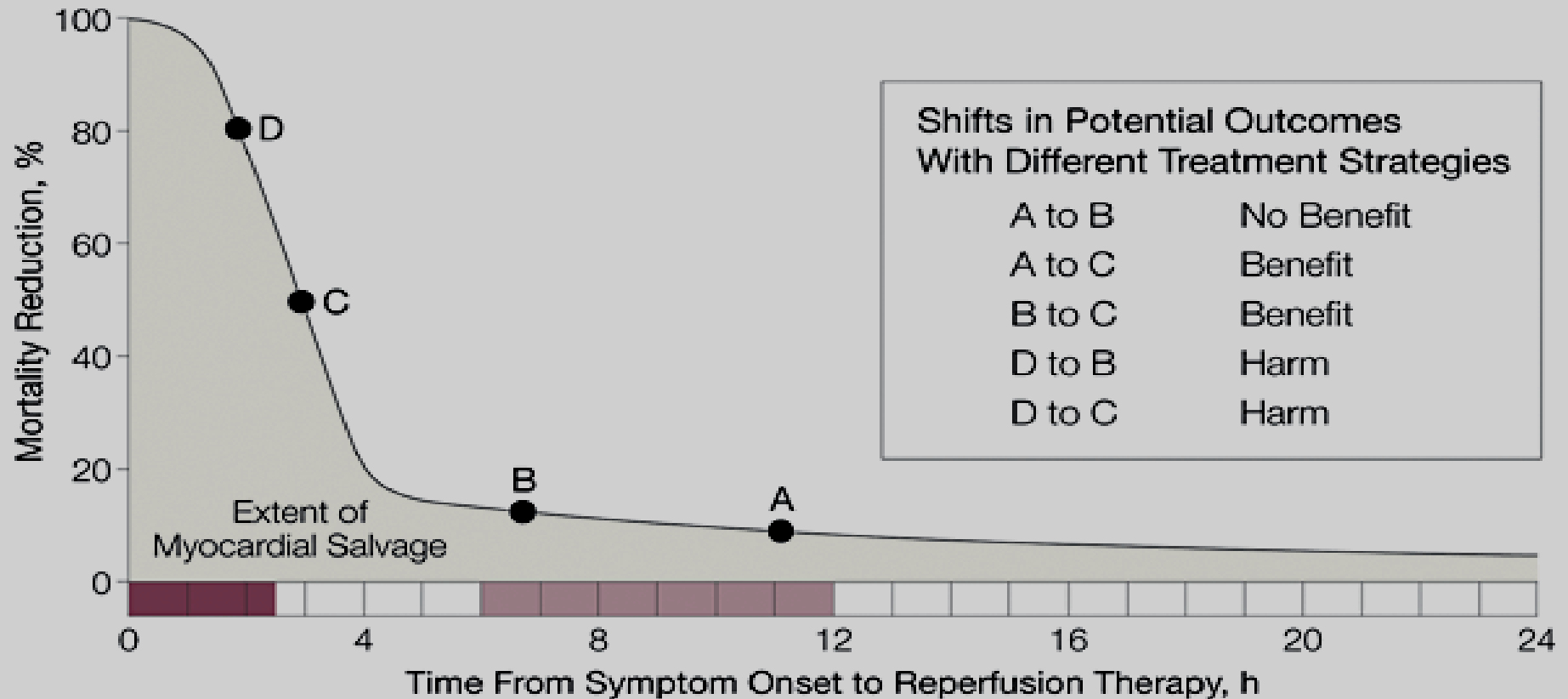
Time is Gold !

ESC Guidelines on ASTEMI

- Primary PCI is the preferred reperfusion therapy of AMI whenever can be **started within 90 minutes** of first medical contact

Primary PCI
preferred treatment
.. **If performed by.....:**
Experience team
<90 min after first medical contact

Relationship Among the Duration of Symptoms of Acute MI Before Reperfusion Therapy, Mortality Reduction, and Extent of Myocardial Salvage



 Critical Time-Dependent Period Goal: Myocardial Salvage	 Time-Independent Period Goal: Open Infarct-Related Artery
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2004 ACC/AHA ASTEMI Guidelines

Primary PCI

Class IA

ASTEMI within 12 hours of symptom onset:

- Door to balloon < 90 min
- Skilled operator (>75 PCIs/ year)
- Skilled team
(>200 PCIs and >36 primary PCIs/ year)
- Surgical facilities available

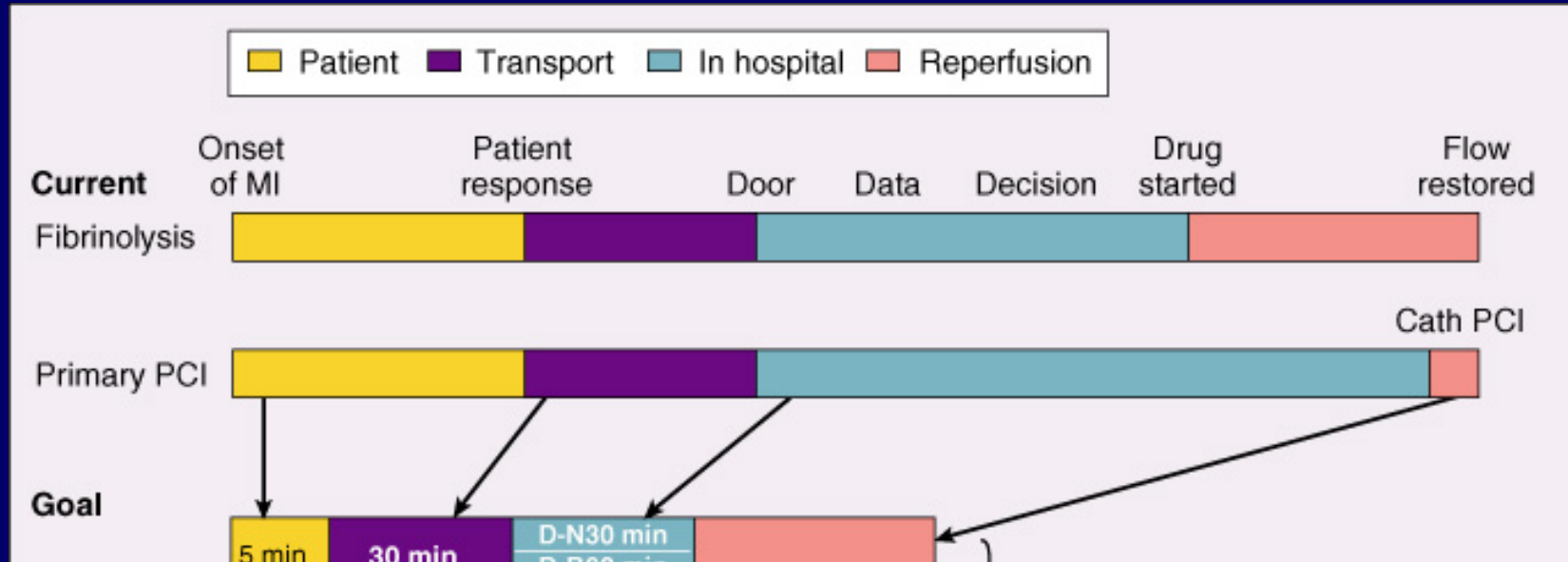
2004 ACC/AHA ASTEMI Guidelines

Primary PCI: specific consideration

Class IB

- Door to balloon goal < 90 min
- If presentation < 3hrs, and
 - (Door to balloon) – (Door to needle) < 1 hour
 - Primary PCI generally preferred
 - (Door to balloon) – (Door to needle) > 1 hour
 - Thrombolysis generally preferred
- If presentation > 3 hrs, then primary PCI is generally preferred

Major Components of Time Delay between Onset and Reperfusion

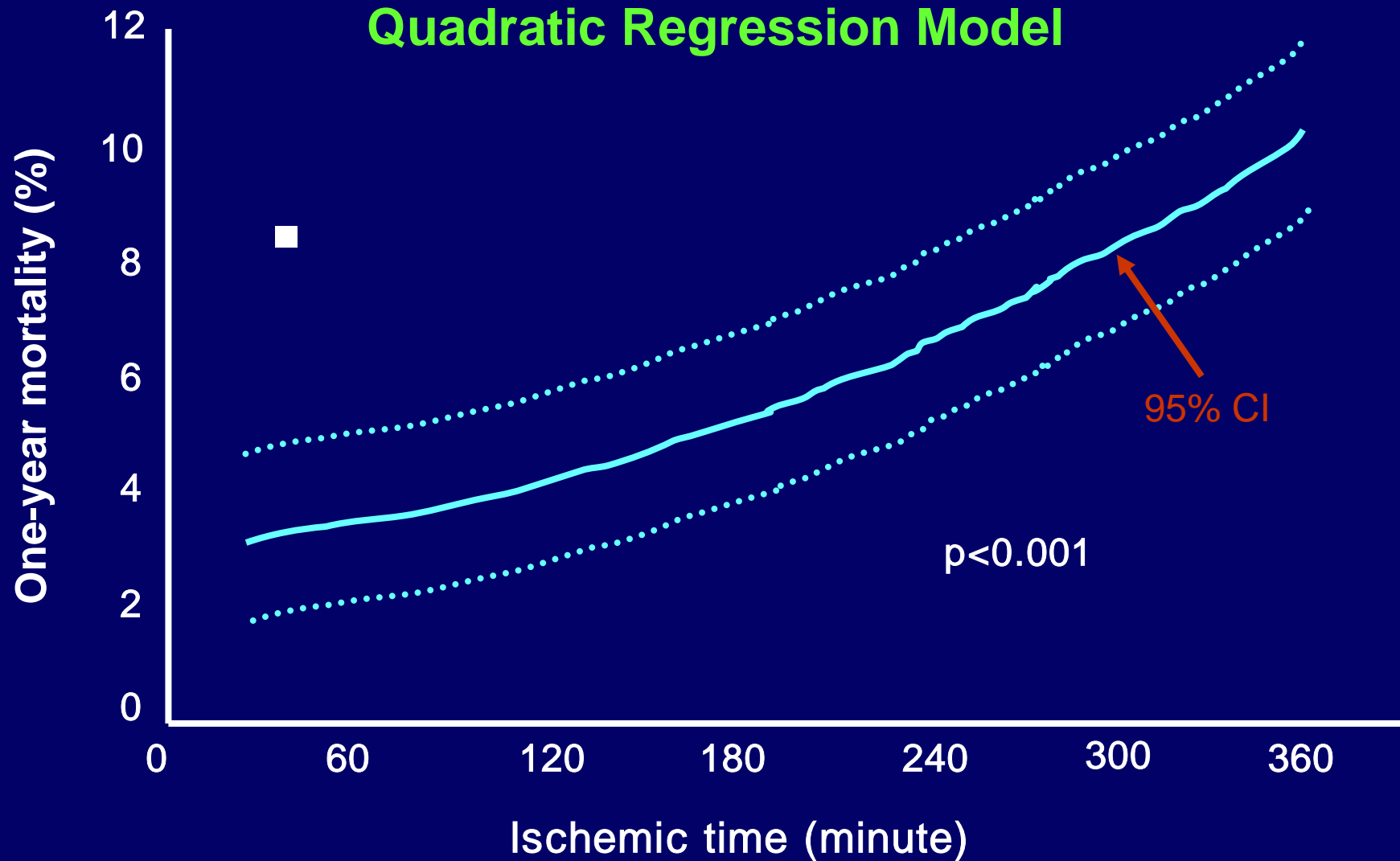


Korea Acute Myocardial Infarction (KAMI) Registry

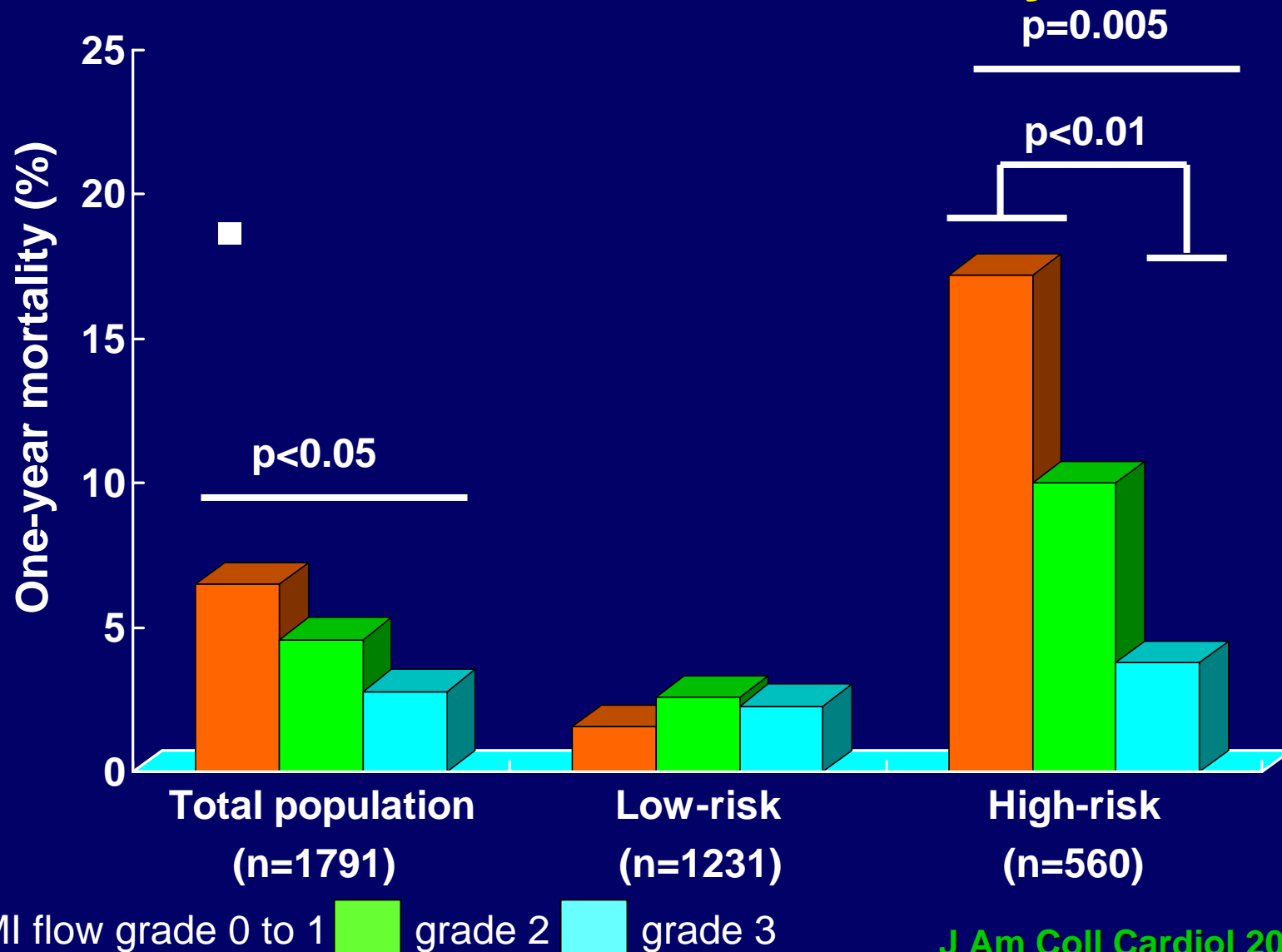
Concepts of Facilitated PCI

- **Builds superiority of primary PCI for ASTEMI**
- **Extends the benefits of early pharmacological reperfusion therapy for ASTEMI**
- **Established patency prior to PCI will further improve the mechanical approach**

Relationship Between Time to Treatment and One-year mortality in Primary PCI for AMI

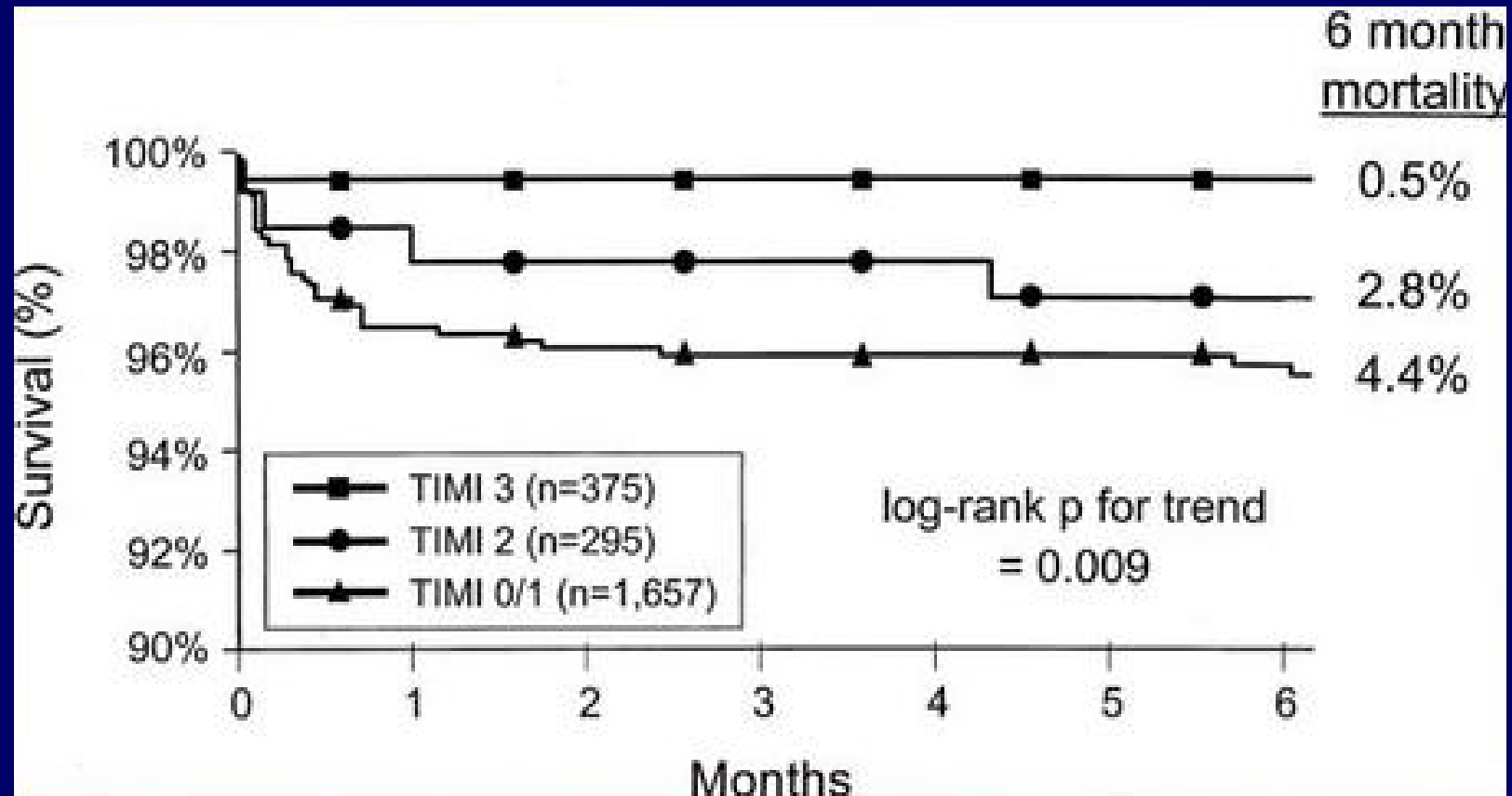


The Relationship Between Preprocedural TIMI Flow and One-Year Mortality



TIMI-3 flow before mechanical Reperfusion Therapy for ASTEMI

– PAMI Trial–



Facilitated PCI

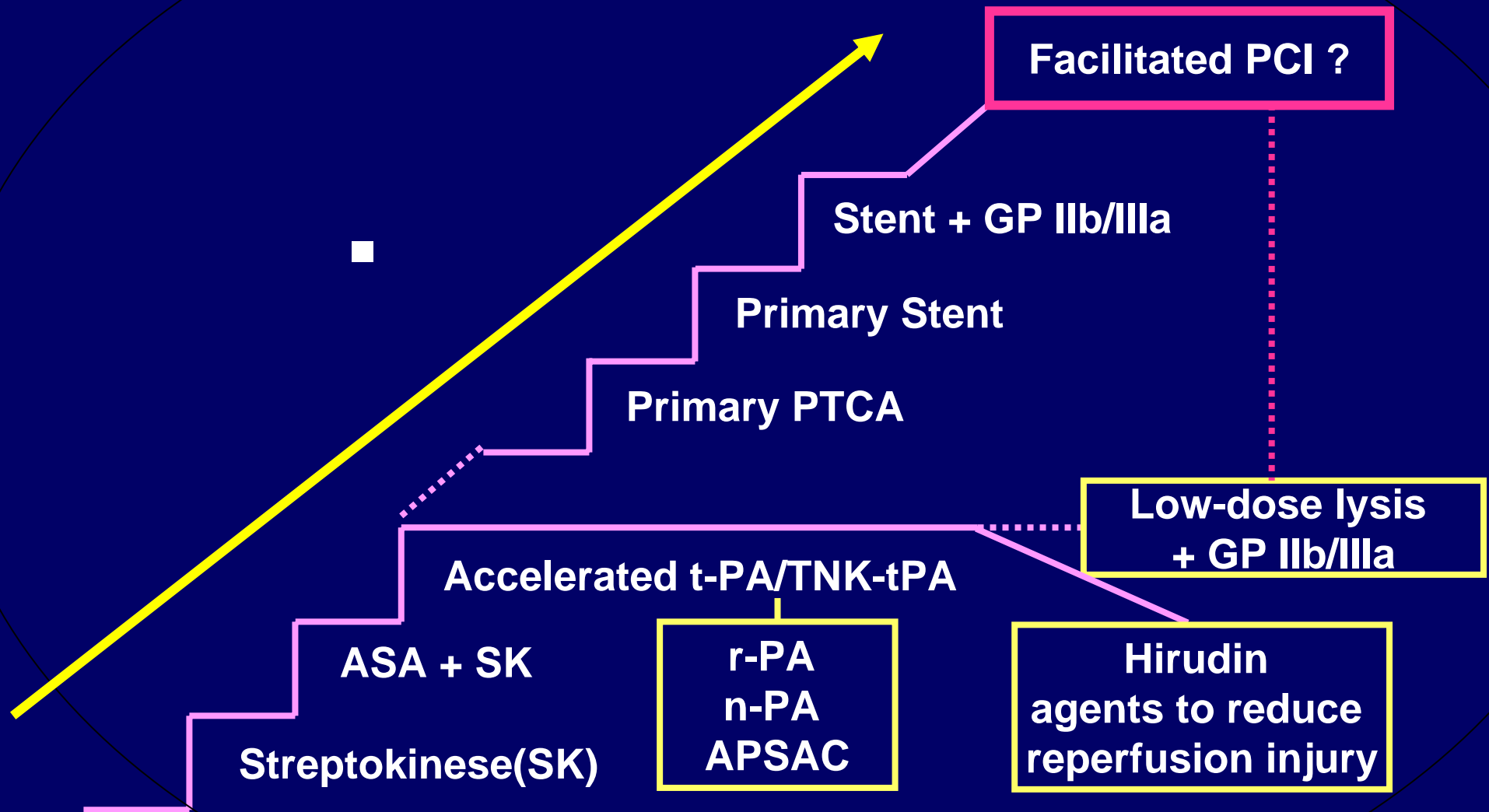
– Fibrinolysis Followed by PCI

- Beneficial if it increases very early infarct-related artery patency (prior to catheterization lab arrival)
- The early administration of lytic dose not diminish the success of primary PCI
- Lytic + PCI – no excessive laboratory complications
- The bleeding risk – but small

Benefits increased, if long pain-to-balloon time

**Reperfusion therapy started very early before PCI
(ambulance or helicopter)**

Steps in Reperfusion

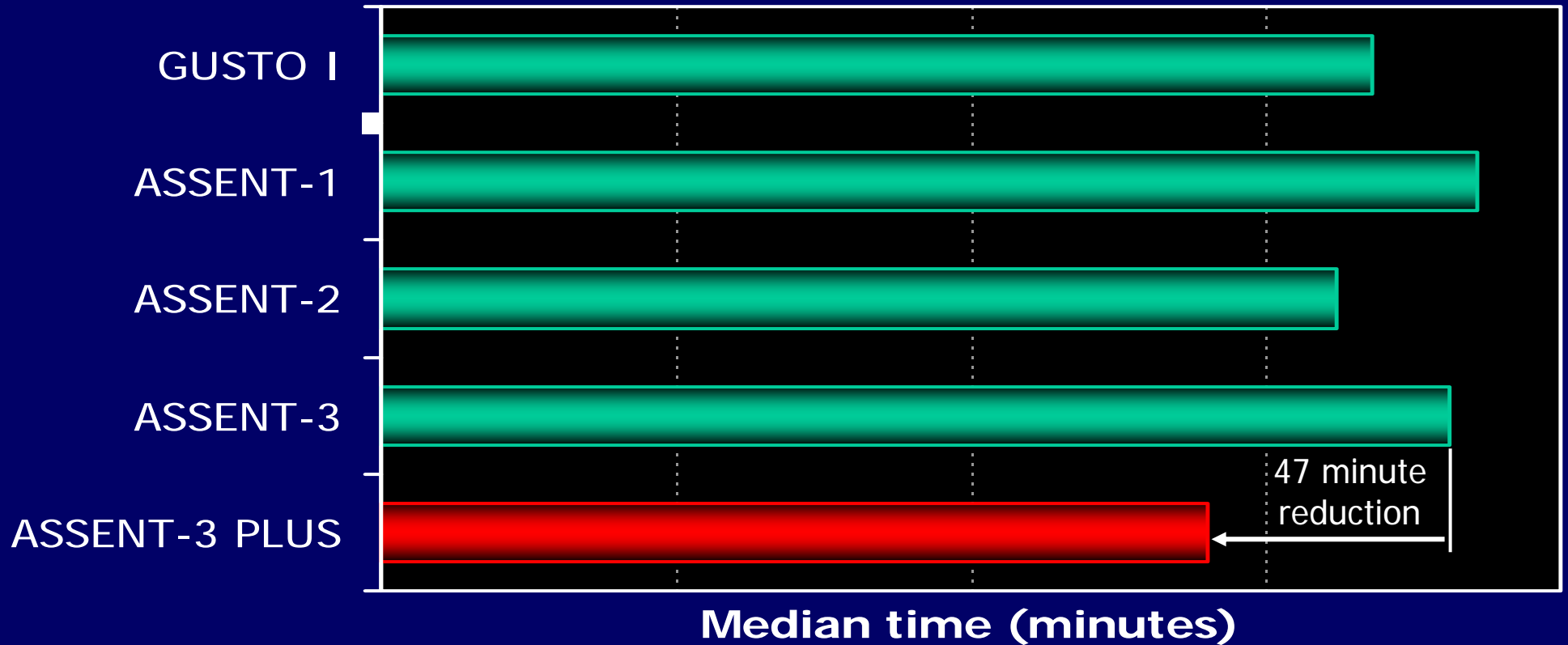


Current Issues of Facilitated PCI in AMI

Pre-Hospital Thrombolysis



Pre-hospital Thrombolysis Shortens Time from Symptom Onset to Treatment



Pre-hospital vs. In-hospital Fibrinolysis: Significant Reduction in All-cause Mortality

Study	Patient No	Odds ratio (95% CI)	Favors pre-hospital thrombolysis	Favors in-hospital thrombolysis
MITI 1993	360	0.69 (0.30-1.57)	○	○
EMIP 1993	5469	0.86 (0.72-1.03)	○	○
GREAT 1991	311	0.56 (0.25-1.23)	○	○
Roth et al 1990	116	0.80 (0.17-3.77)	○	○
Schofer et al 1990	78	0.46 (0.04-5.31)	○	○
Castaigne et al 1989	100	0.74 (0.14-3.86)	○	○
Overall	6434	0.83 (0.70-0.98)	○	○

Current Issues of Facilitated PCI in AMI

Pre-Hospital Thrombolysis

Successful Thrombolysis followed by PCI

GRACIA-1 Trial

Designed to reassess the benefits of an early post-thrombolysis interventional approach in the era of stents and new anti-platelet agents



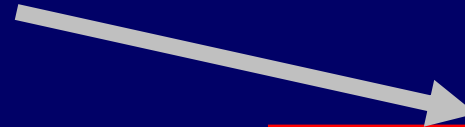
500 Pts ST Elevation AMI
< 12 hrs)



500 Thrombolysis (rt-PA)



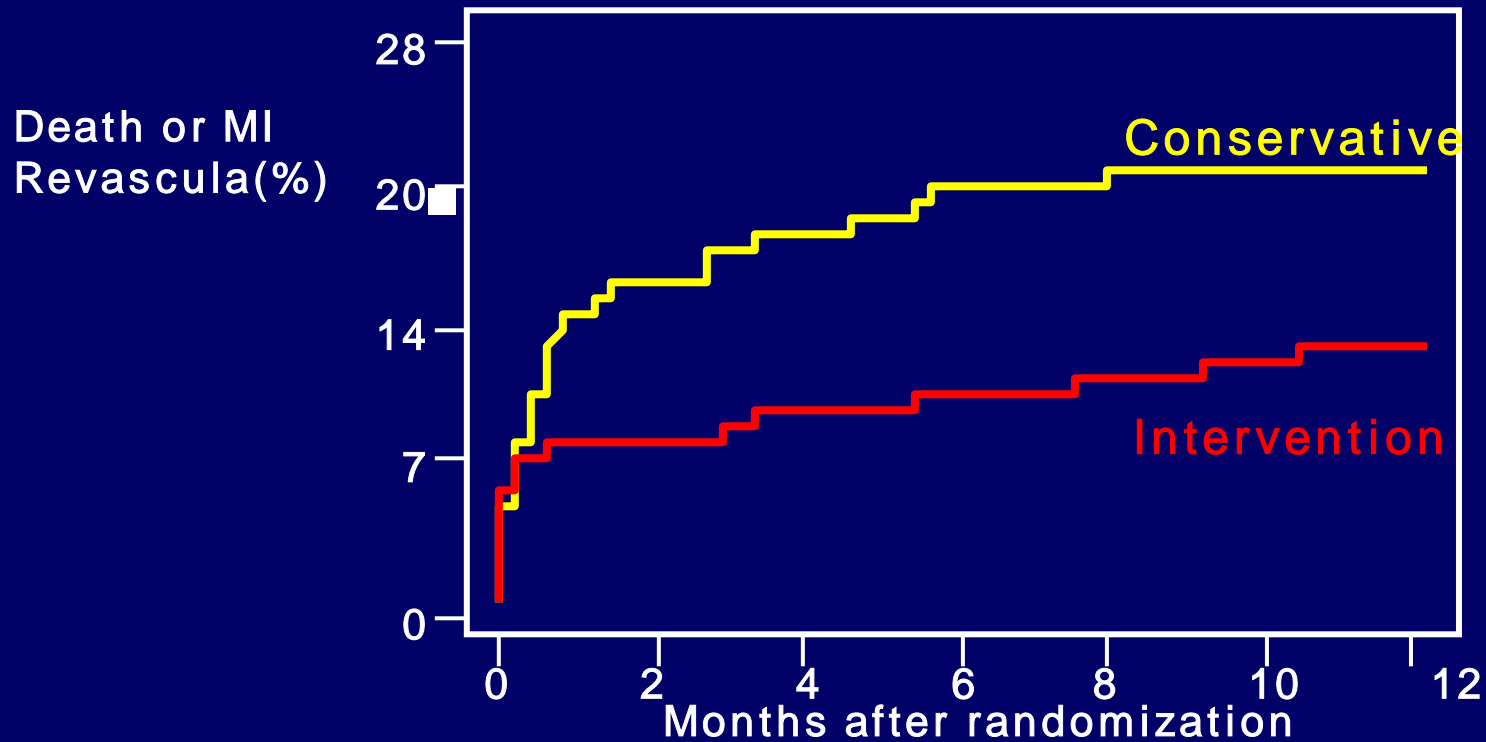
248 Invasive strategy
(Angiography <24)



252 Ischemia-guided strategy

GRACIA-1

Composite End-point 1 Year



Early post-thrombolysis PCI is safe and reduces the need for unplanned in-hospital revascularisation, and improves 1-year clinical outcome.

SIAM III The Southwest German Interventional Study in Acute Myocardial Infarction

Investigated potentially beneficial effects of immediate stenting after thrombolysis as opposed to a more conservative treatment regimen.

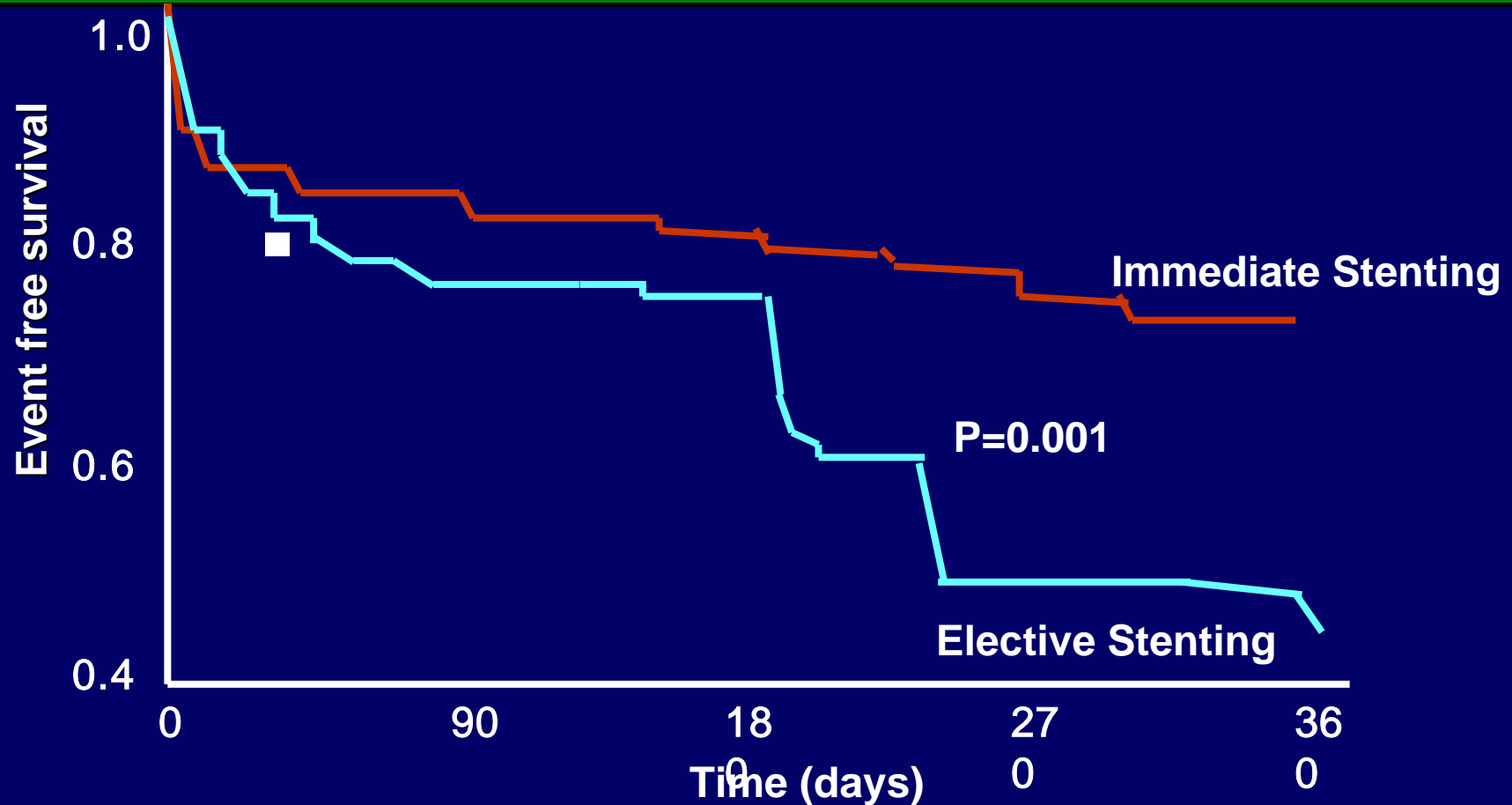
197 Pts ST Elevation AMI
< 12 hrs)

Thrombolysis (rt-PA)

Immediate stenting
Transfer <6hrs to
intervention center

Elective stenting

SIAM III The Southwest German Interventional Study in Acute Myocardial Infarction



Immediate stenting after thrombolysis leads to a significant reduction of cardiac events compared with a more conservative approach including delayed stenting after two weeks.

Current Issues of Facilitated PCI in AMI

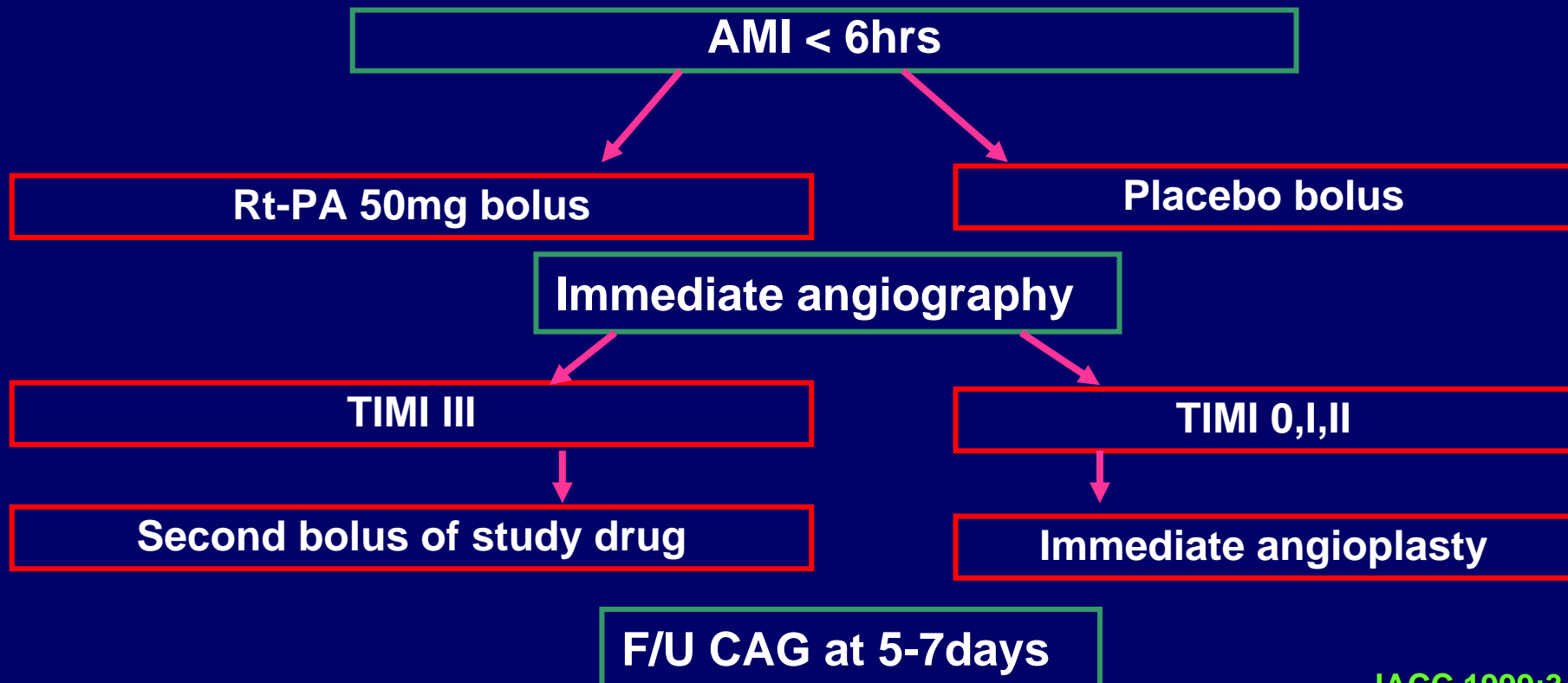
Pre-Hospital Thrombolysis

Successful Thrombolysis followed by PCI

Combined Thrombolysis and PCI

PACT Trial

Evaluated the efficacy and safety of a short-acting reduced-dose fibrinolytic regimen to promote early infarct-related artery (IRA) patency during the inherent delay experienced by infarct patients referred for angioplasty as the principal recanalization modality



PACT Trial

- IRA Patency on cath lab arrival : **61% with rt-PA** (28% TIMI-2, 33% TIMI-3), and **34% with placebo** (19% TIMI-2, 15% TIMI-3) ($p = 0.001$)
- Rescue and primary PTCA restored TIMI-3 equally (77%, 79%)
- No differences were observed in stroke or major bleeding
- Left ventricular function was similar in both treatment groups
 - **EF was highest with a patent IRA (TIMI-3) on cath lab arrival (62.4%)**
However, in 88% of angioplasties, the delay exceeded 1 h:
convalescent EF= 57.3%

Conclusions: Tailored thrombolytic regimens compatible with subsequent interventions lead to **more frequent early recanalization (before cath arrival)**, which facilitates **greater LV function preservation** with no augmentation of adverse events

Current Issues of Facilitated PCI in AMI

Pre-Hospital Thrombolysis

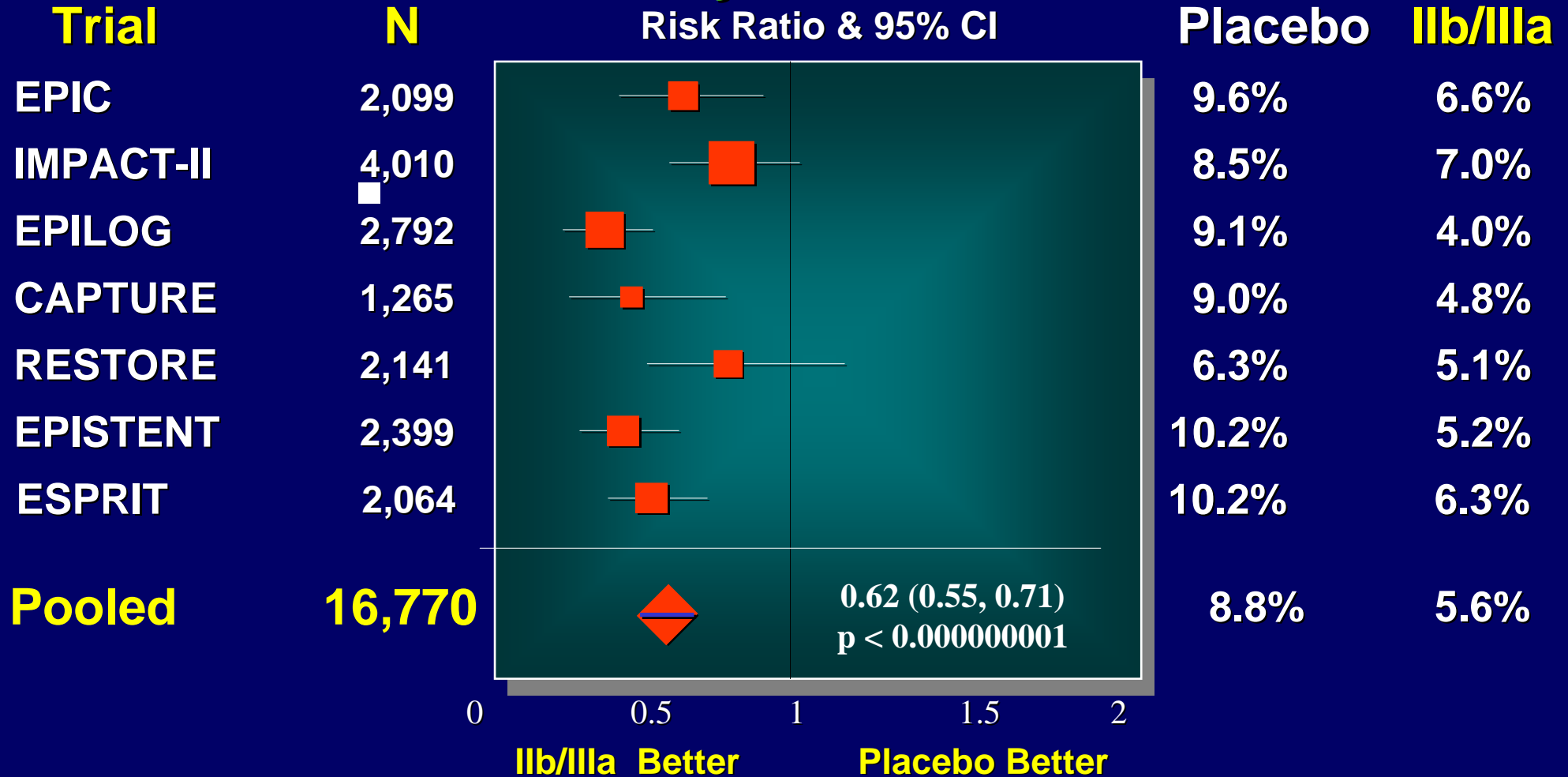
Successful Thrombolysis followed by PCI

Combined Thrombolysis and PCI

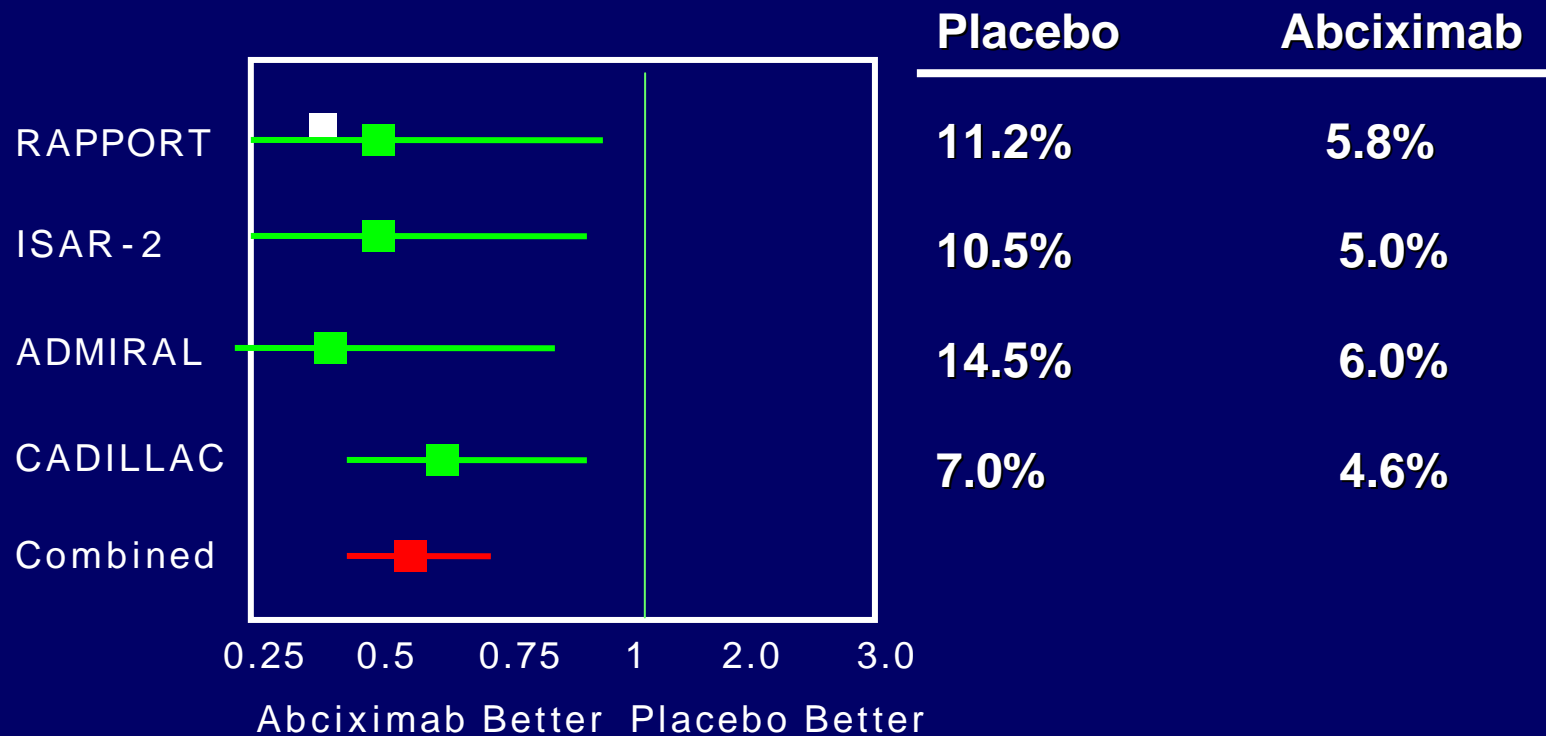
Combined GP IIb/IIIa Inhibitor and PCI

7 Trials of GPIIb/IIIa Antagonists in PCI

30 Day Death/MI

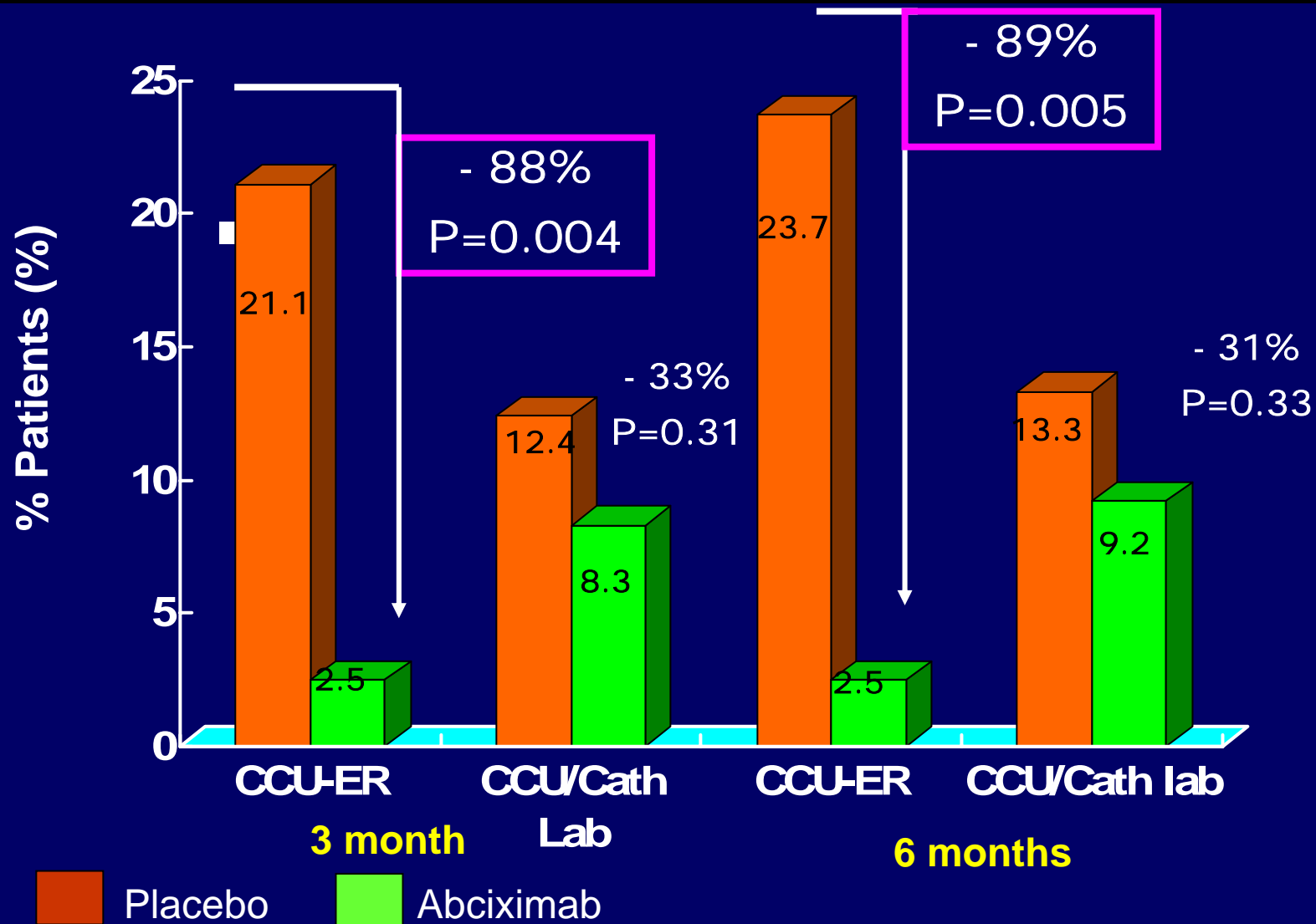


GP IIb/IIIa Inhibitor in Primary PCI : 30 Day Death/MI/TVR

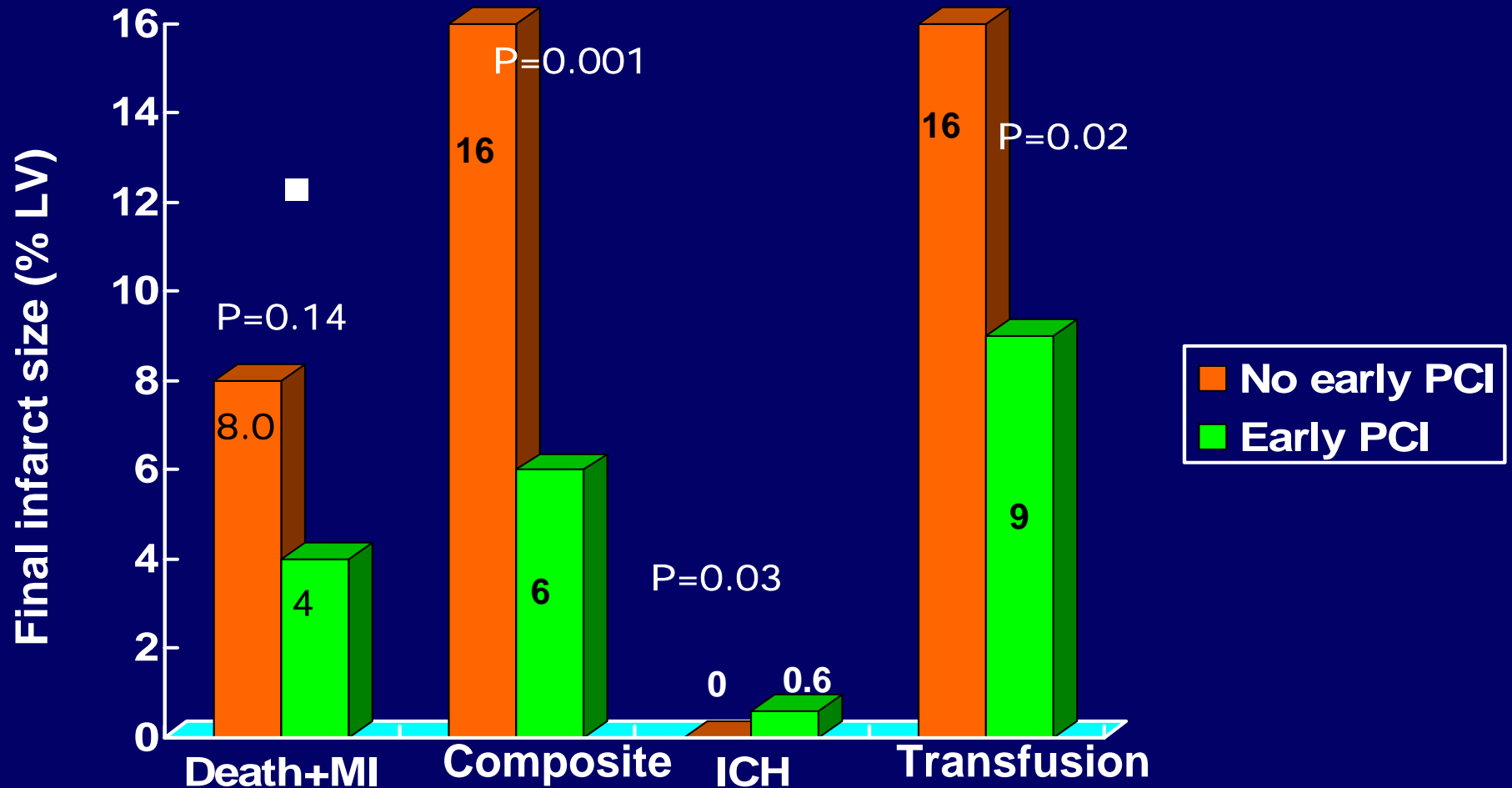


ADMIRAL Trial : Primary endpoint

The effect of early Tx of Abciximab



Facilitated PCI in SPEED Trial



Composite: Death, MI, Urgent revasc

GUSTO-V : AMI

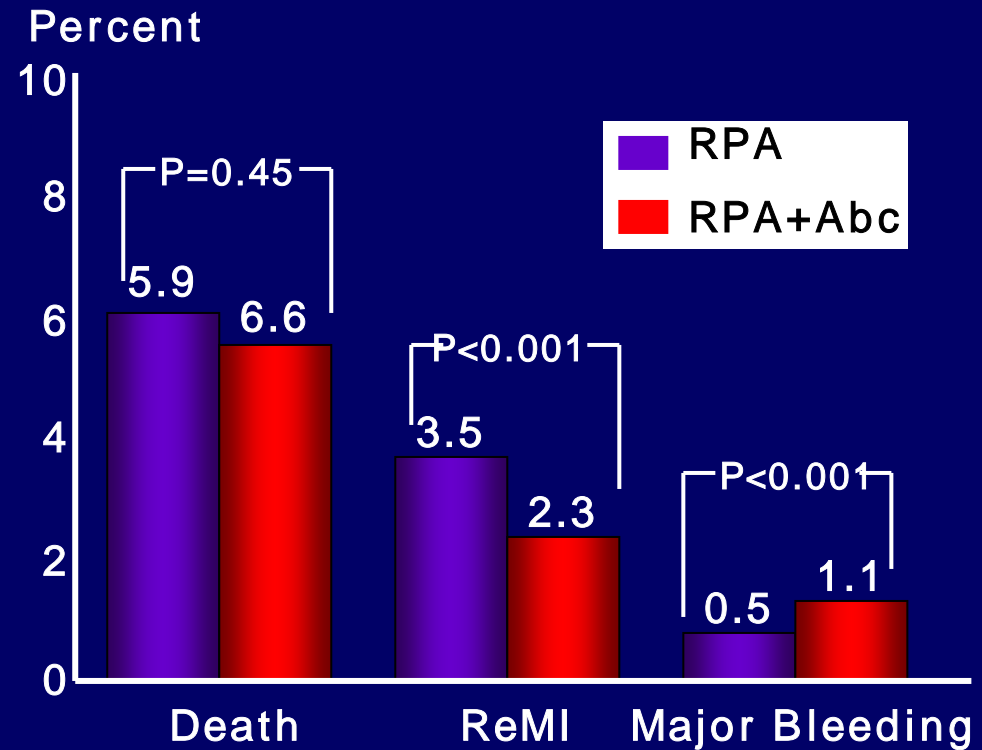
16,588 AMI patients

RPA vs.

half-dose RPA + Abciximab

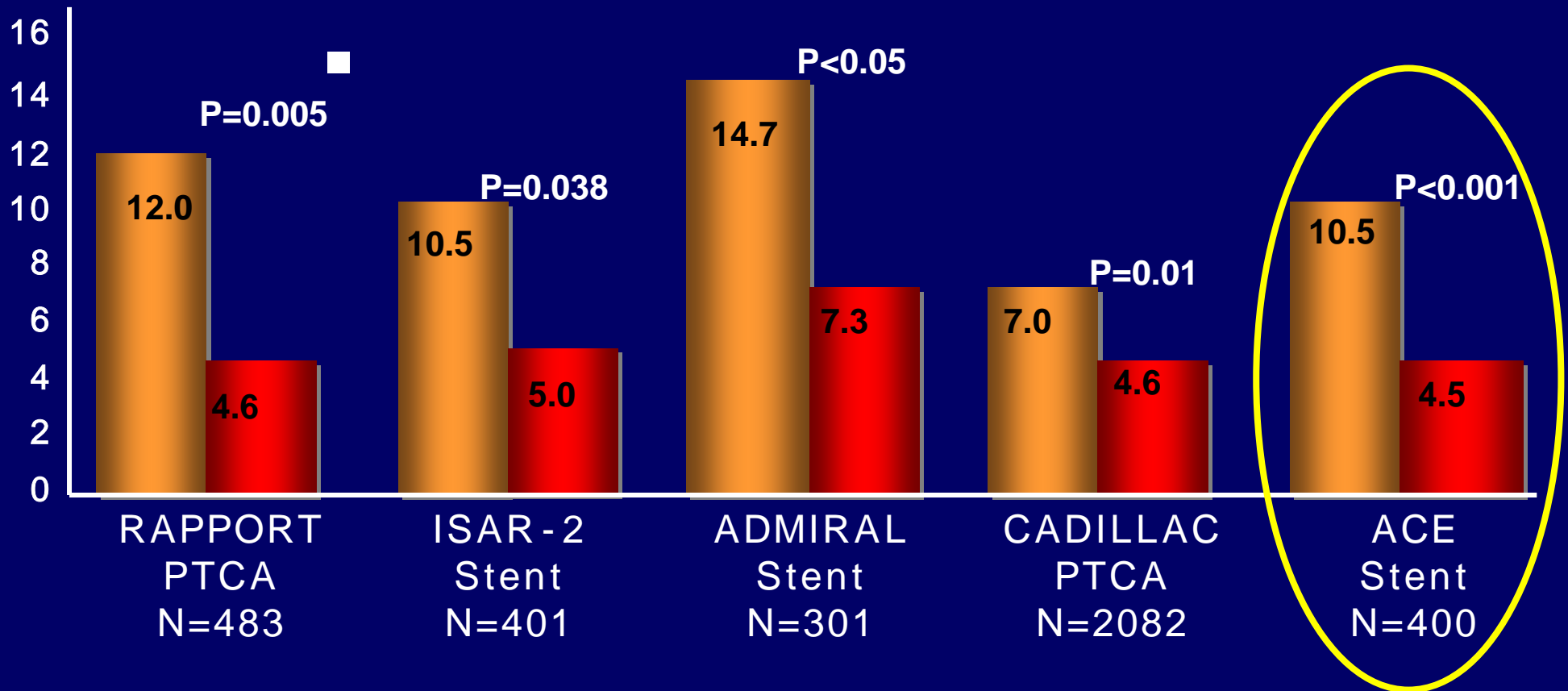
Heparin to aPTT 50-70 sec

30 day outcomes



GP IIb/IIIa Inhibitor in AMI

Abciximab and PCI – 30 day End-point

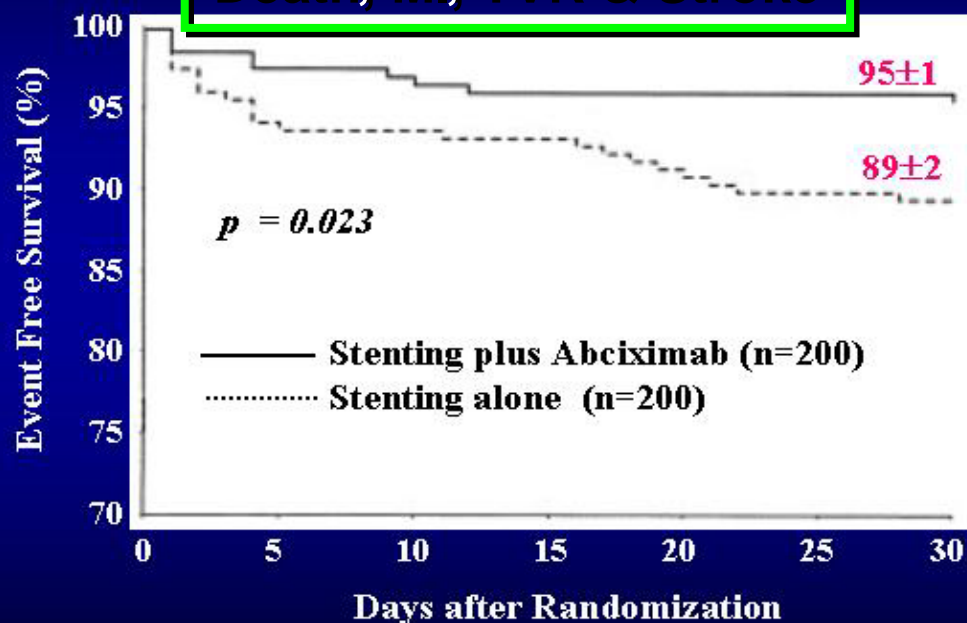


ACE Trial : Abciximab in AMI Stenting

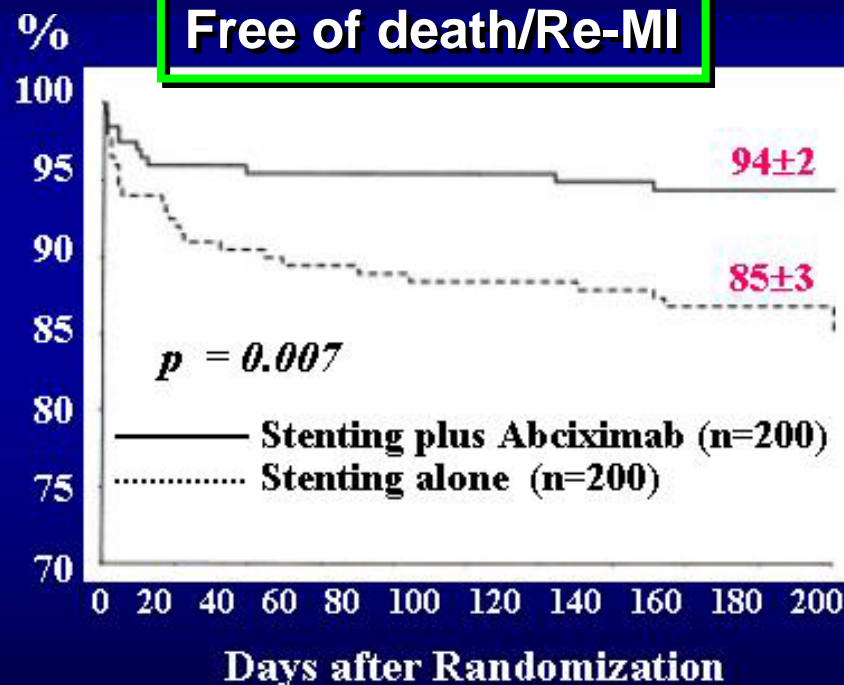
Background: Lack of evidence of benefit of Abciximab in patients with IRA stenting in AMI (11.5% vs. 10.2% of MACE in CADILLAC)

Subjects: High-risk patients who were poorly represented or excluded in previous trial

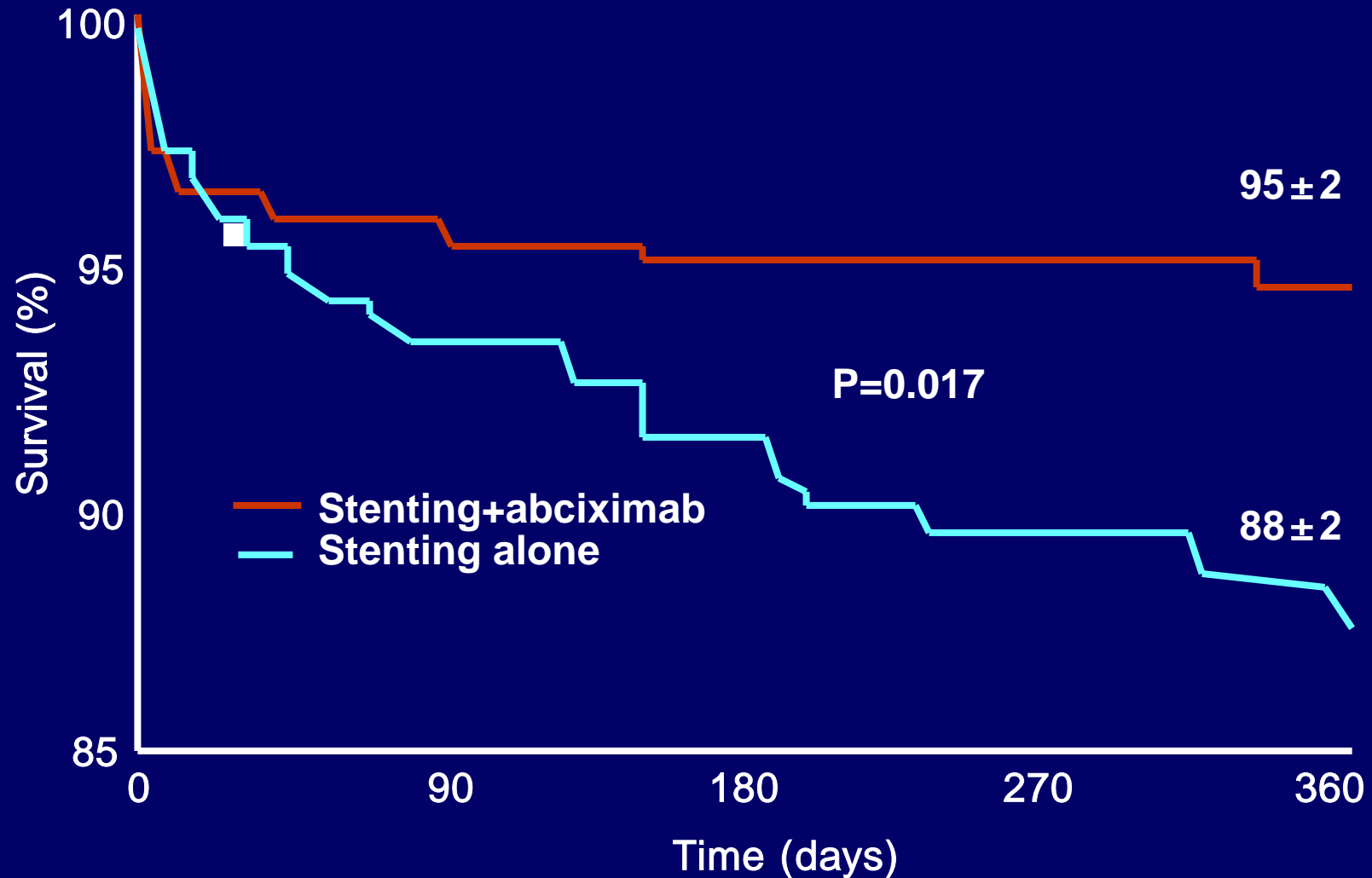
Death, MI, TVR & Stroke



Free of death/Re-MI



ACE Trial : 1 year Results



On-TIME Trial: On-going Tirofiban in Myocardial Infarction Evaluation

Acute myocardial infarction
Identified in ambulance or referral center

Early arm

Tirofiban 10ug/kg & 0.15ug/kg/min
Heparin 5000U

Late arm

Placebo
Heparin 5000U



Transportation



Angiogram in PCI center

Angiogram in PCI center

Placebo in second bolus

Tirofiban

Open label Tirofiban infusion

To compare Pre-hospital vs. Cath lab initiation of Tirofiban on the infarction-related artery patency in patients with AMI who are candidate primary PCI

Summary of ONTIME

**Early initiation of Tirofiban during transport for PCI
Improvement in IRA patency (TIMI 2/3) and myocardial
perfusion. ■
Significant reduction in intracoronary thrombus**

Particularly in high-risk pts enrolled in the ambulance

**Facilitation of primary PCI by tirofiban results in a very low rate
of mortality (2%) and re-MI (1%) at 30 days**

**Safe for early facilitation of PCI in pts with AMI, who are
transferred to a PCI center**

Facilitated PCI – BRAVE Trial

N=253 pts with STEMI <12hrs

Randomized to **Abciximab** for 12 hrs

■ or **Retepase + Abciximab**

Primary endpoint : infarction size

Outcomes	Combination	Abciximab only	P value
TIMI III flow in pre-PCI(%)	40	18	<0.001
Final infarction size(%)	13	11.5	0.81
Death at 30 days(%)	1.6	1.6	NS
Death/MI at 30 days(%)	2.4	1.6	NS
Death/MI/Stroke at 30 D(%)	3.2	1.6	0.66
Major bleeding(%)	5.6	1.6	0.16

Facilitated PCI in ASTEMI

– Conclusions –

- Reperfusion prior to Primary PCI improves procedural success and clinical outcomes
- Non-randomized trial data suggest clinical benefit with facilitated PCI
 - **Early abciximab therapy in the emergency room offers the best facilitation strategy**
- Facilitated PCI strategy offers unique ability to achieve synergism between pharmacological and mechanical strategies

Waiting On-going Large Trial

FINESSE: Design - Ongoing

N=3000 chest pain <6hrs patients
ASA + Heparin or Enoxaparin

■

Combo facilitated PCI

Abciximab
Retepase(5U/5U)
PCI

Abciximab facilitated PCI

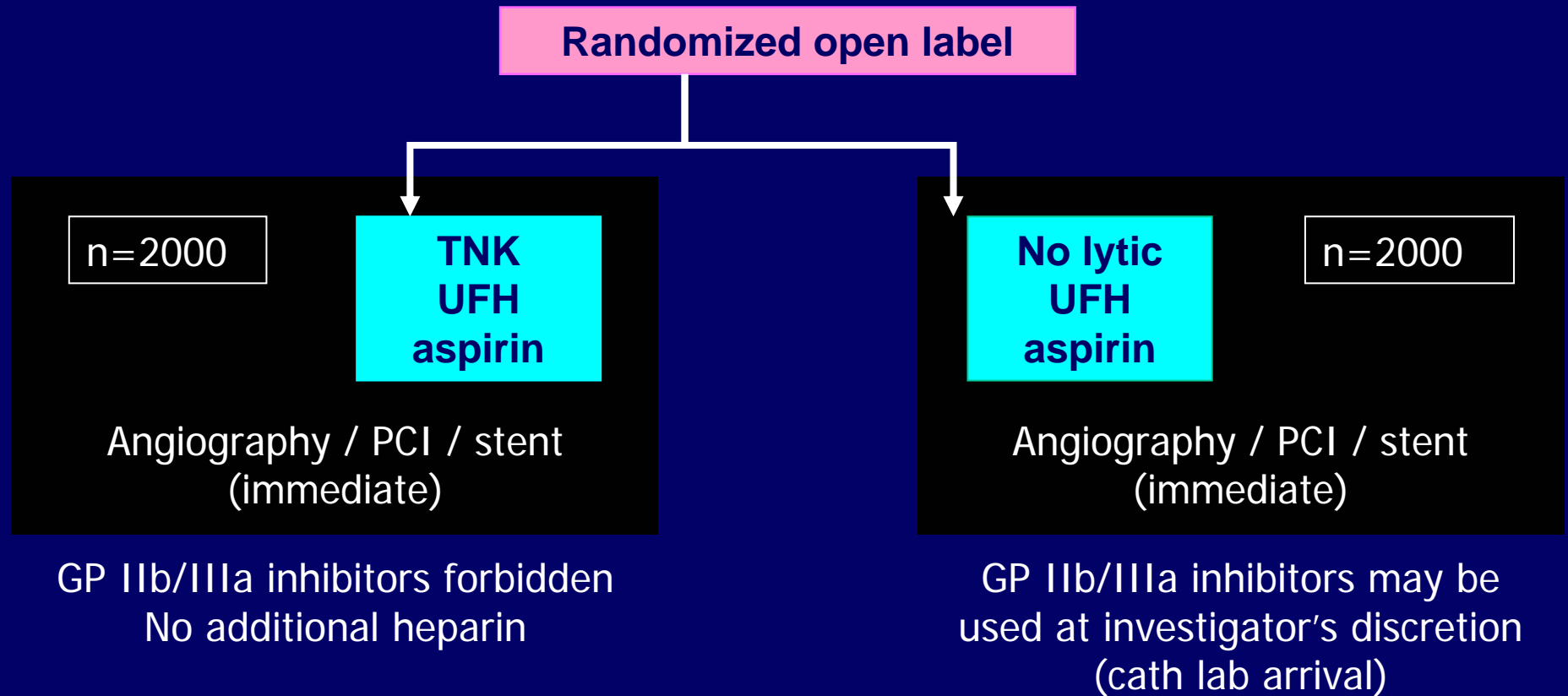
Abciximab in ER
PCI

Primary PCI

Abciximab in cath lab
PCI

Composite mortality, re-MI, CHF, VF, shock at 30 days

ASSENT-4 : Fibrinolysis as a Bridge to PCI



CASE 3. 55/F (ASSENT-4, #12)

4



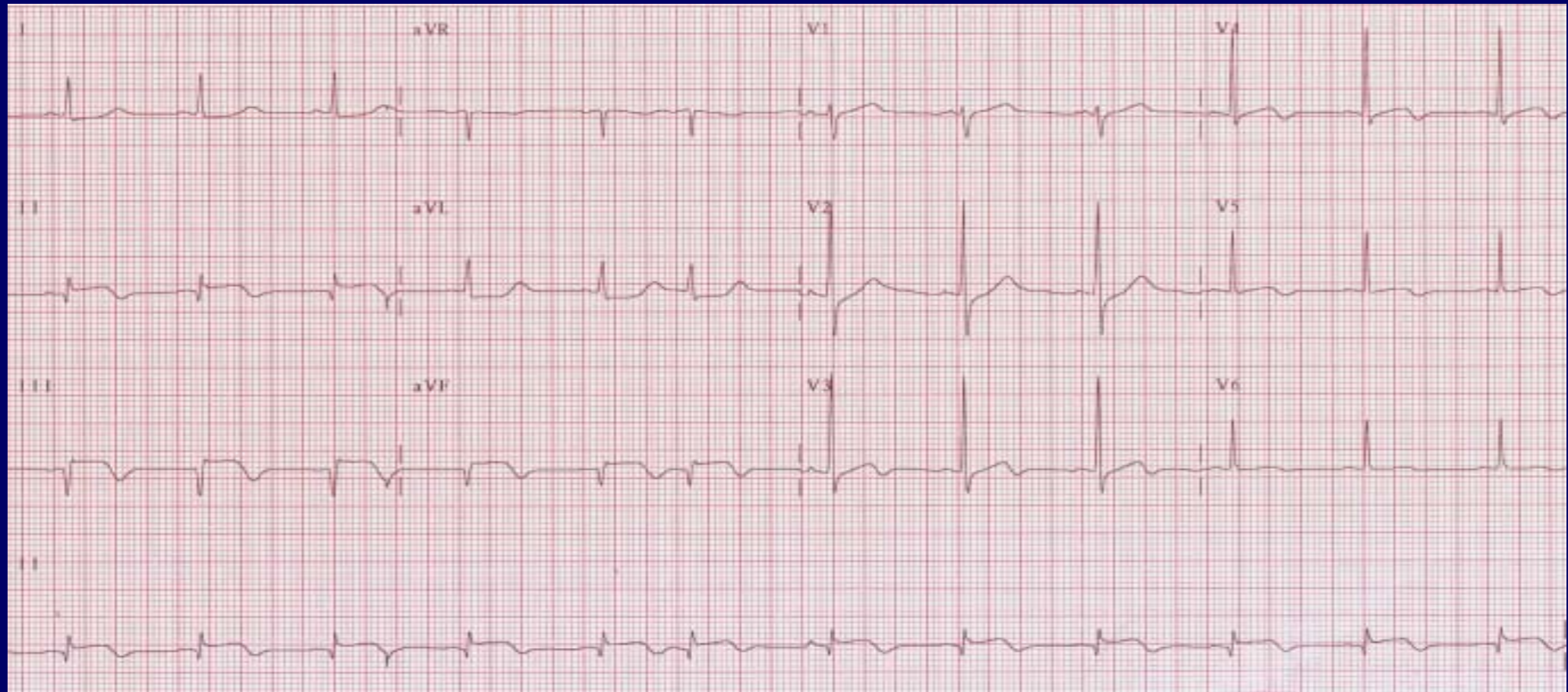
110/80 mmHg, 60/min

3 ,

CK/CK-MB 231(10.7) U/L, TnT 0.094 ng/ml, TnI 1.02 ng/dL

LDL-Cholesterol 145 mg/dL

ECG on Hospitalization



Hospital Course for ASSENT-4

: (=pm 4:45, pain onset to door time=4)

: ST elevation : II,III, AVF 11mm

exclusion criteria

: pm 4:50

, , , : pm 4:55

: pm 4:56

: pm 4:58

Aspirin 300 mg : pm 5:00

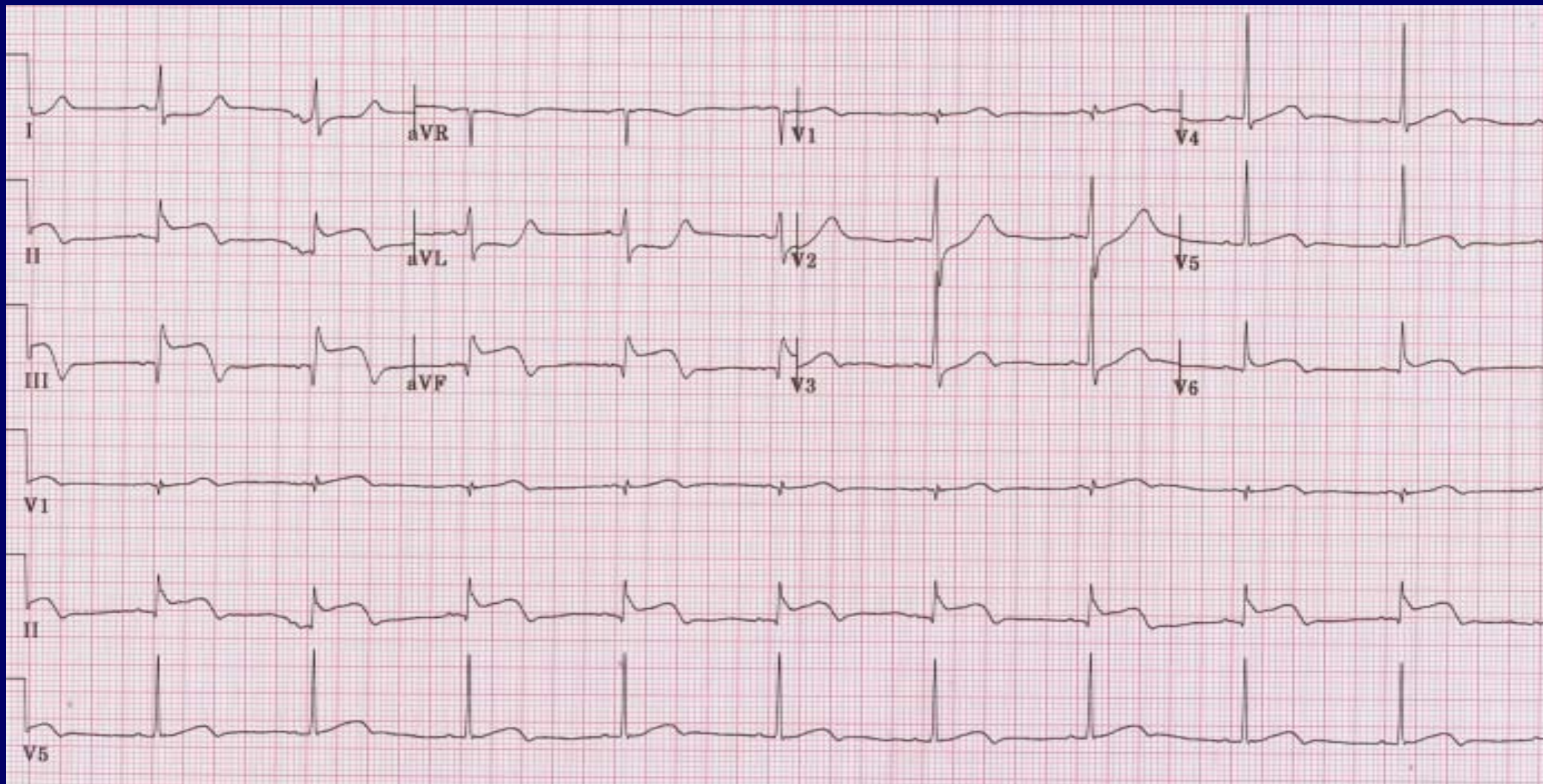
Randomized time : pm 5:03 → group A (TNK group)

iv Heparin : pm 5:09

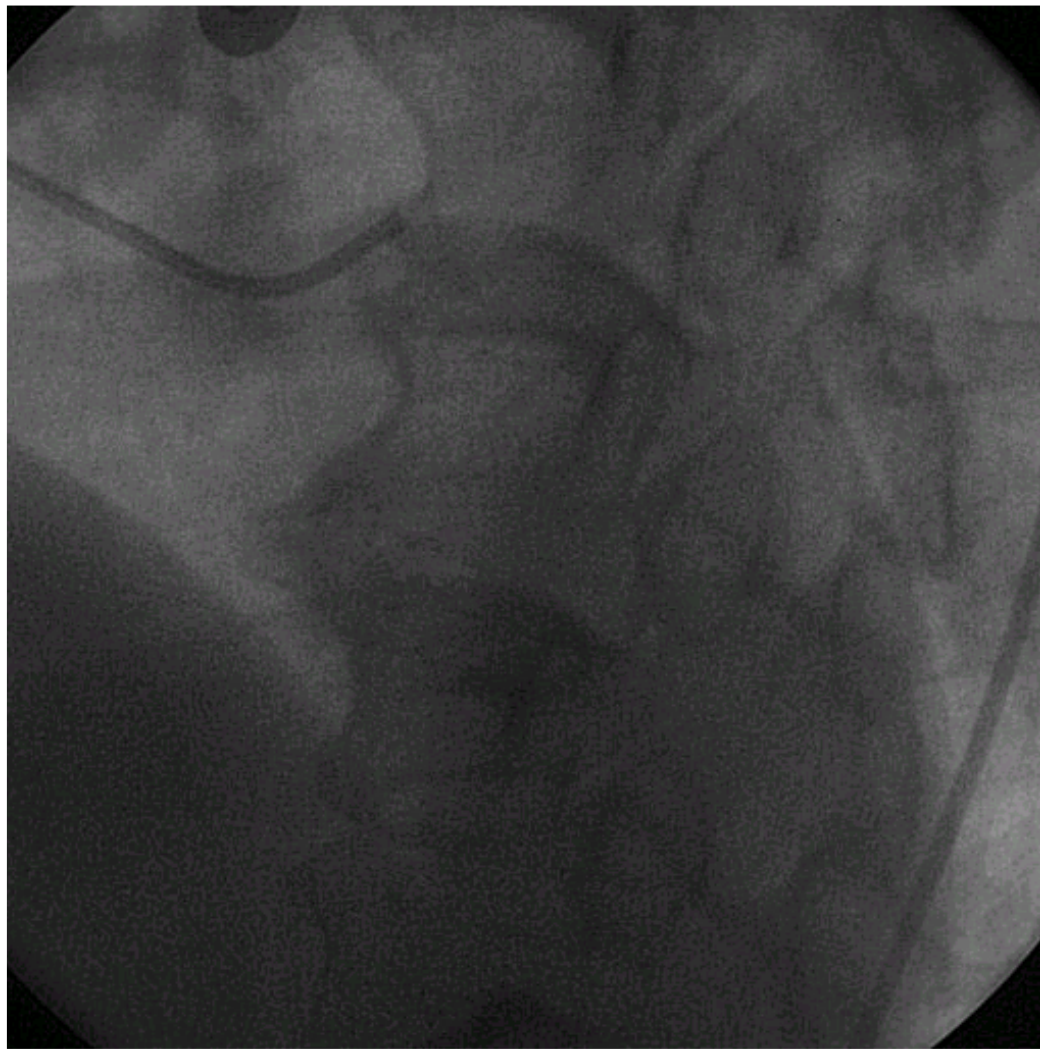
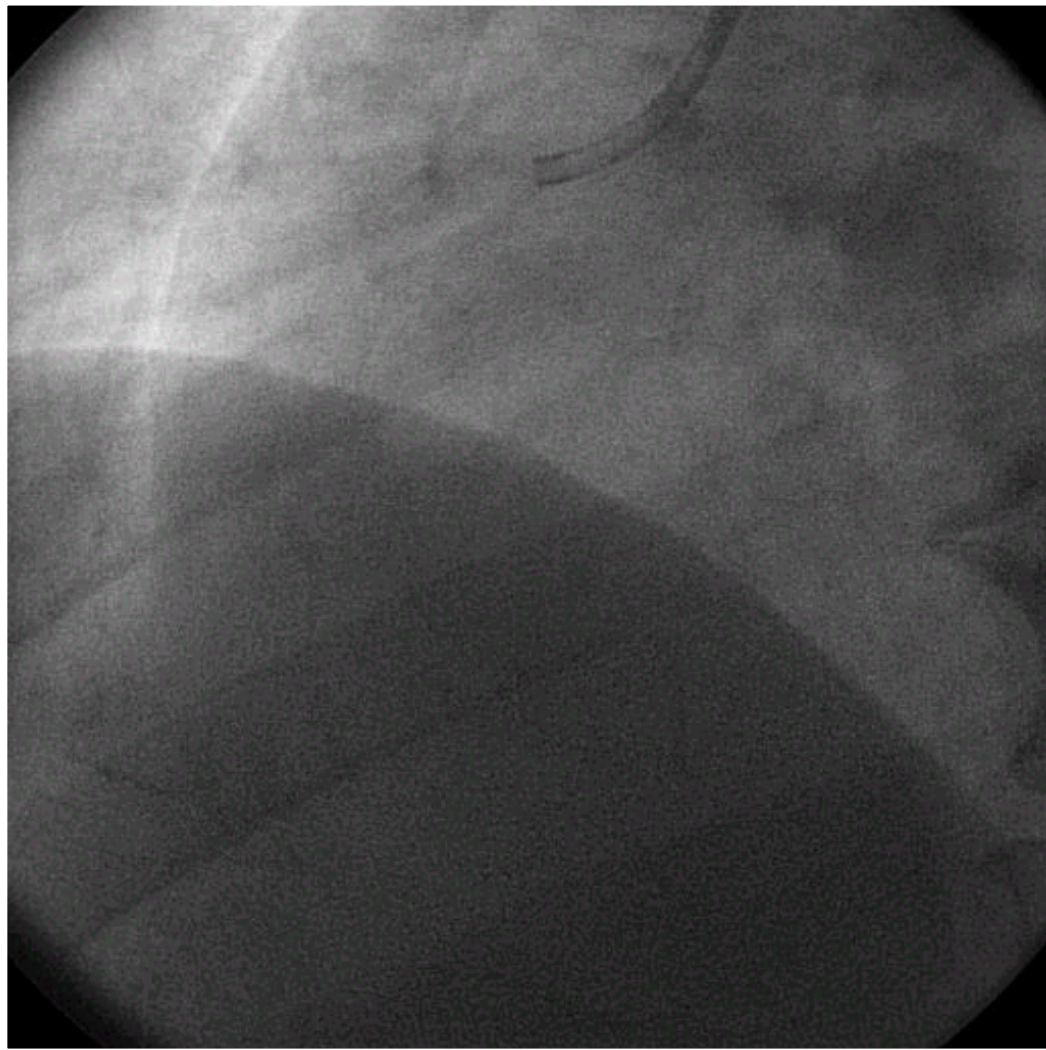
Iv TNK : pm 5:10

CAD and PCI : pm 6:10 (thrombolysis 1)

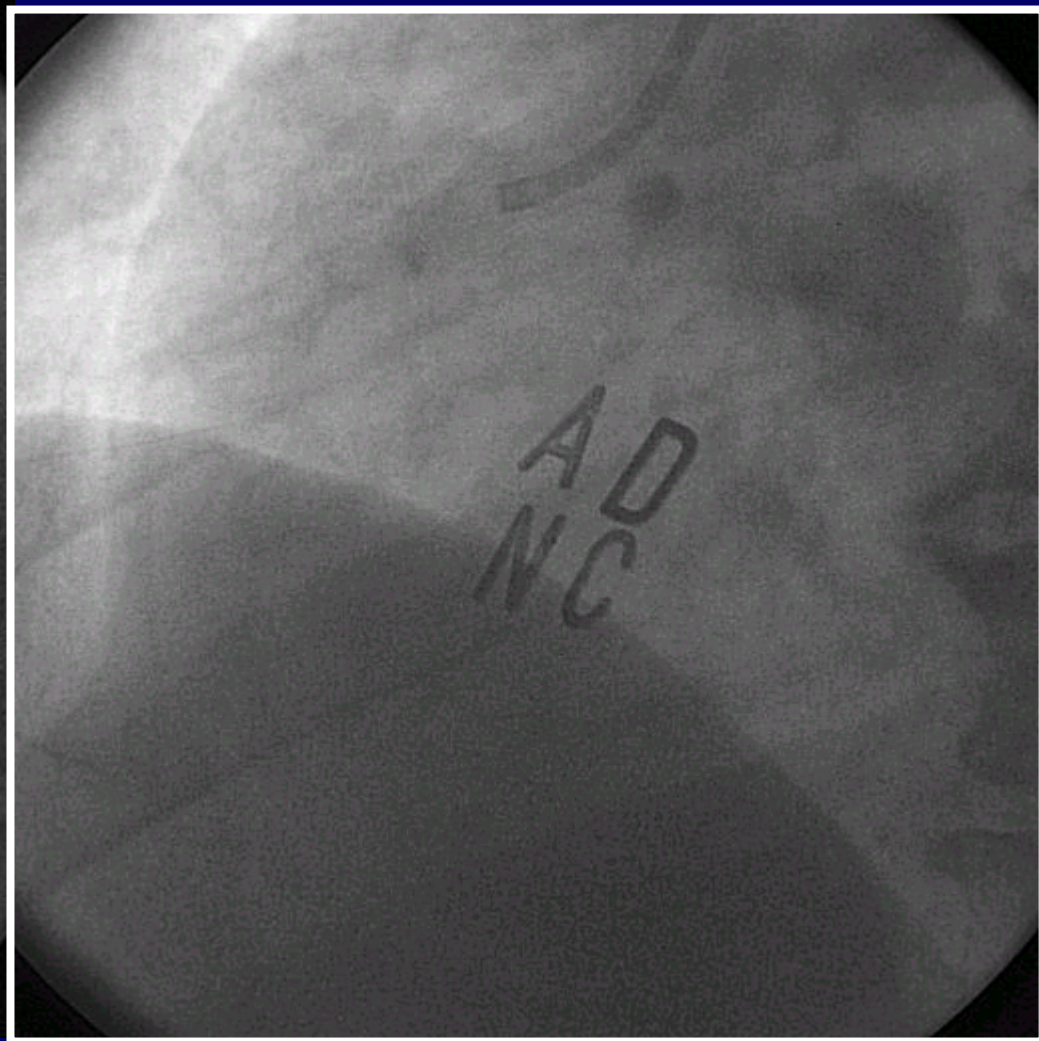
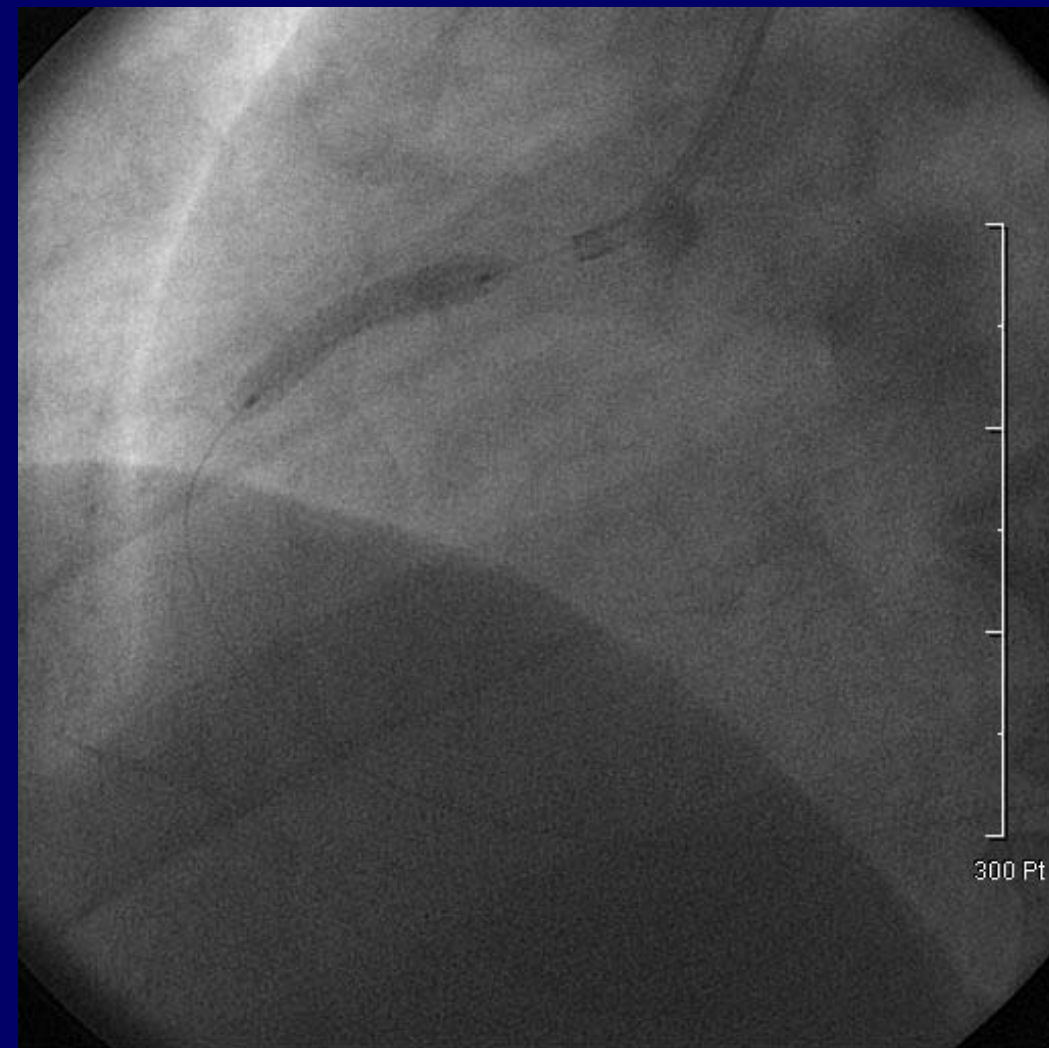
EKG at Cardiac Cath Lab



Diagnostic CAG



PCI for Target Lesion in RCA



Conclusion of Facilitated PCI



“공격축구로 8강”

1.

Rapid thrombolysis
or Platelet GP IIb/IIIa inhibitor



2.

Percutaneous Coronary Intervention



PCI

Facilitated

!

2002

4

!

