



***RISK STRATIFICATION IN  
PATIENTS WITH NSTEMI -ACS.***

**BY:**

**DR. AYMAN ABDEL SAMAD.  
M.D CARDIOLOGY.**

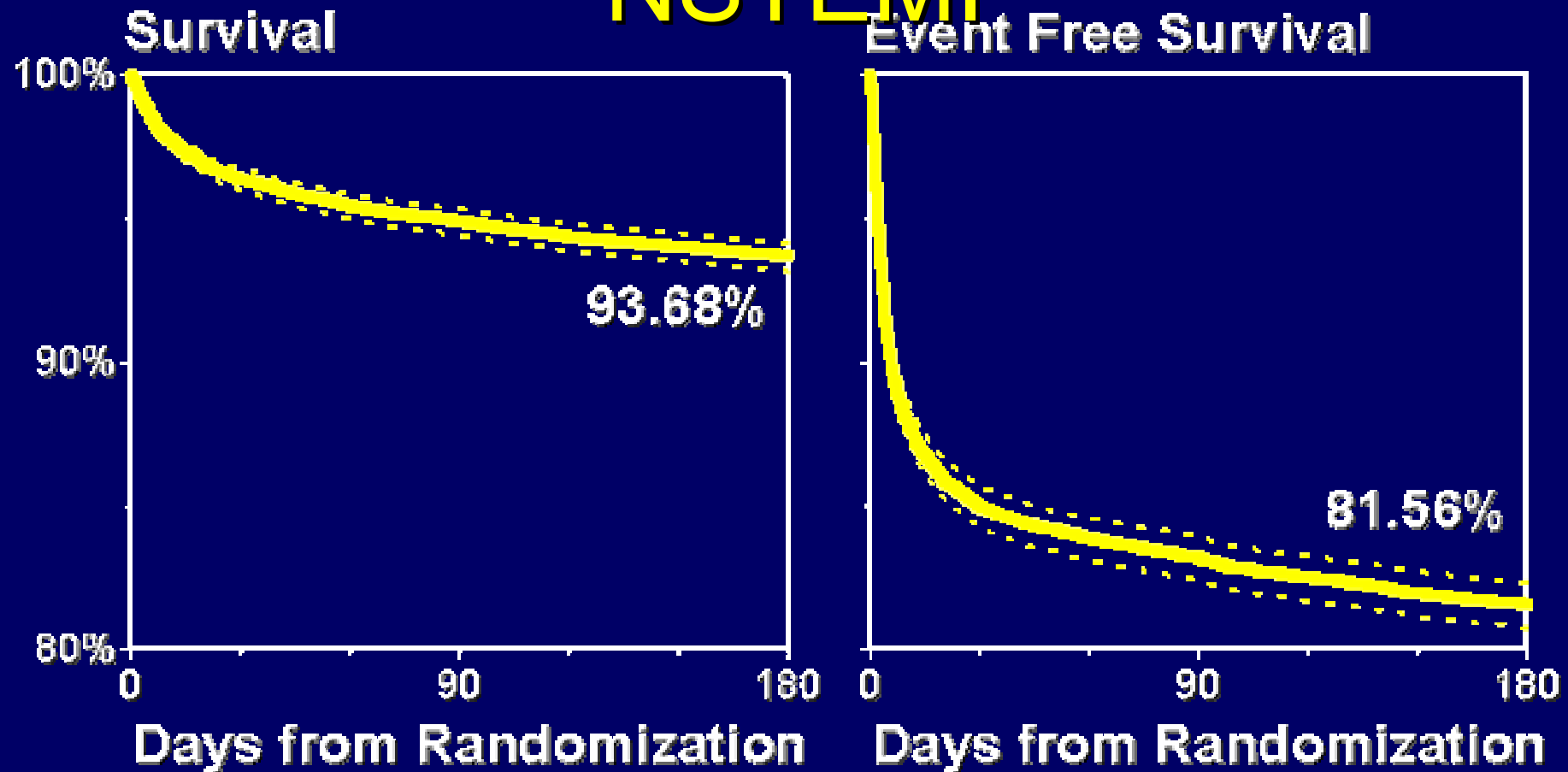
## **1. NATURAL HISTORY:**

**-The short-term mortality of patients** with unstable angina has been shown to be lower(1.7% at 30 days) than that of patients with NSTEMI or STEMI.

**-long term outcomes-for** both mortality & nonfatal events- are actually worse for patients with either unstable angina or NSTEMI compared with STEMI.

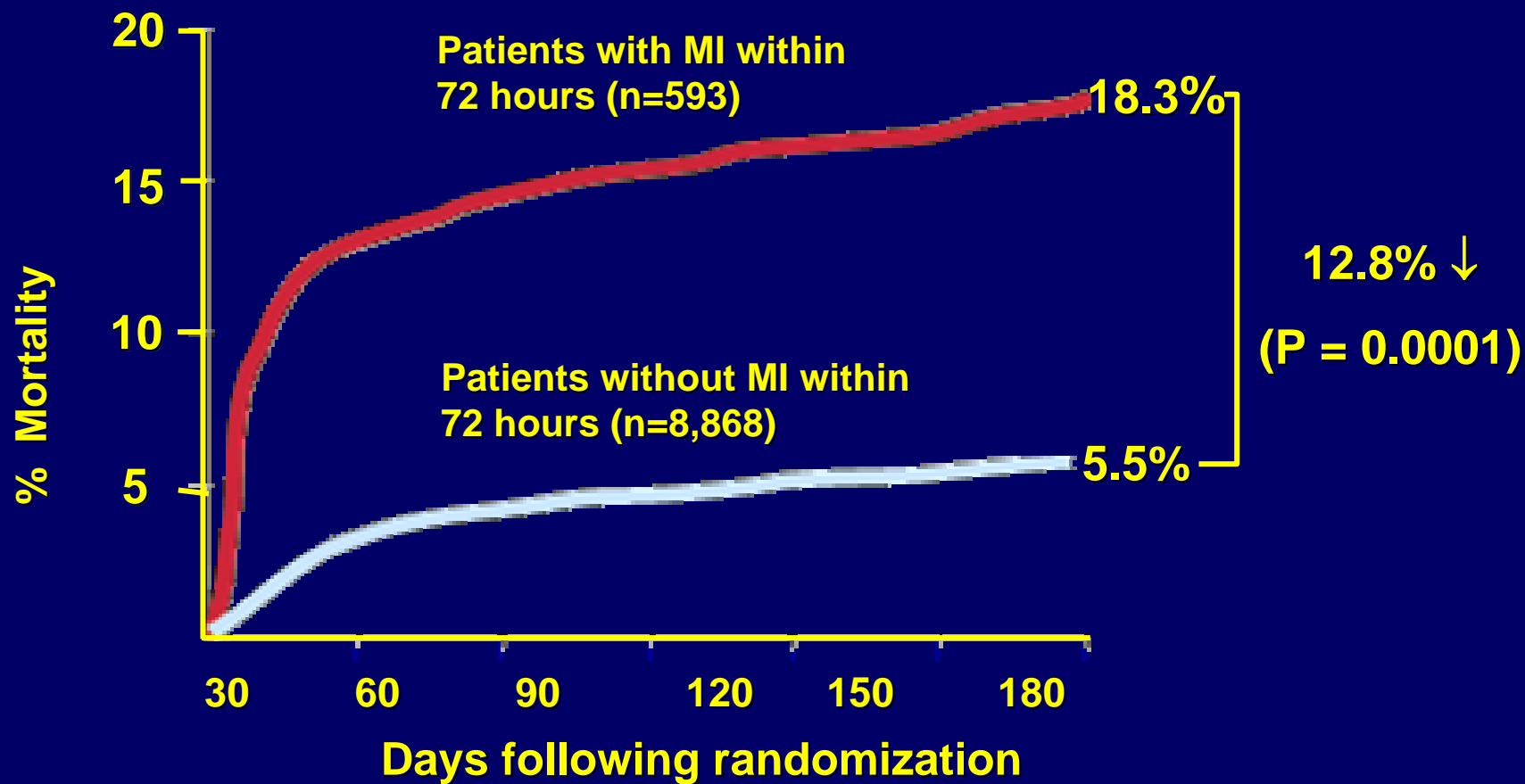
- **SHORT TERM OUTCOME** is dependent on the hemodynamic state
- **MEDIUM TERM OUTCOME** ; transient ST segment shift
- **LONG TERM OUTCOME** Tn T&I longer term above and beyond conventional risk factors

# Prognosis in Unstable Angina / NSTEMI



*PURSUIT trial data*

# Mortality in Non-ST $\uparrow$ ACS Patients With Myocardial Infarction During Hospitalization



## 2-METHODS OF RISK STATIFICATIN.

patients with UA/NSTEMI are a heterogeneous group, with a prognosis that ranges from

- An excellent outcome with modest adjustments in therapeutic regimen,
- high risk of death or MI : in which intensive treatment is needed.

- High risk subgroups of patients, identified by:
  - clinical features.
  - electrocardiographic findings, or
  - cardiac(or vascular) markers.
- This group appear to derive greater benefit from more aggressive -antithrombotic or
  - interventional therapy or
  - both.



### 3-CLINICAL VARIABLES:

-classification of unstable angina has been shown in several studies to be useful clinically in identifying high risk patients.

-**High risk** groups of patients with unstable angina are those with :

-Acute **rest** pain.

-Post-MI unstable angina.

-Secondary unstable angina.

## **4-RISK ASSESSMENT BY ECG :**

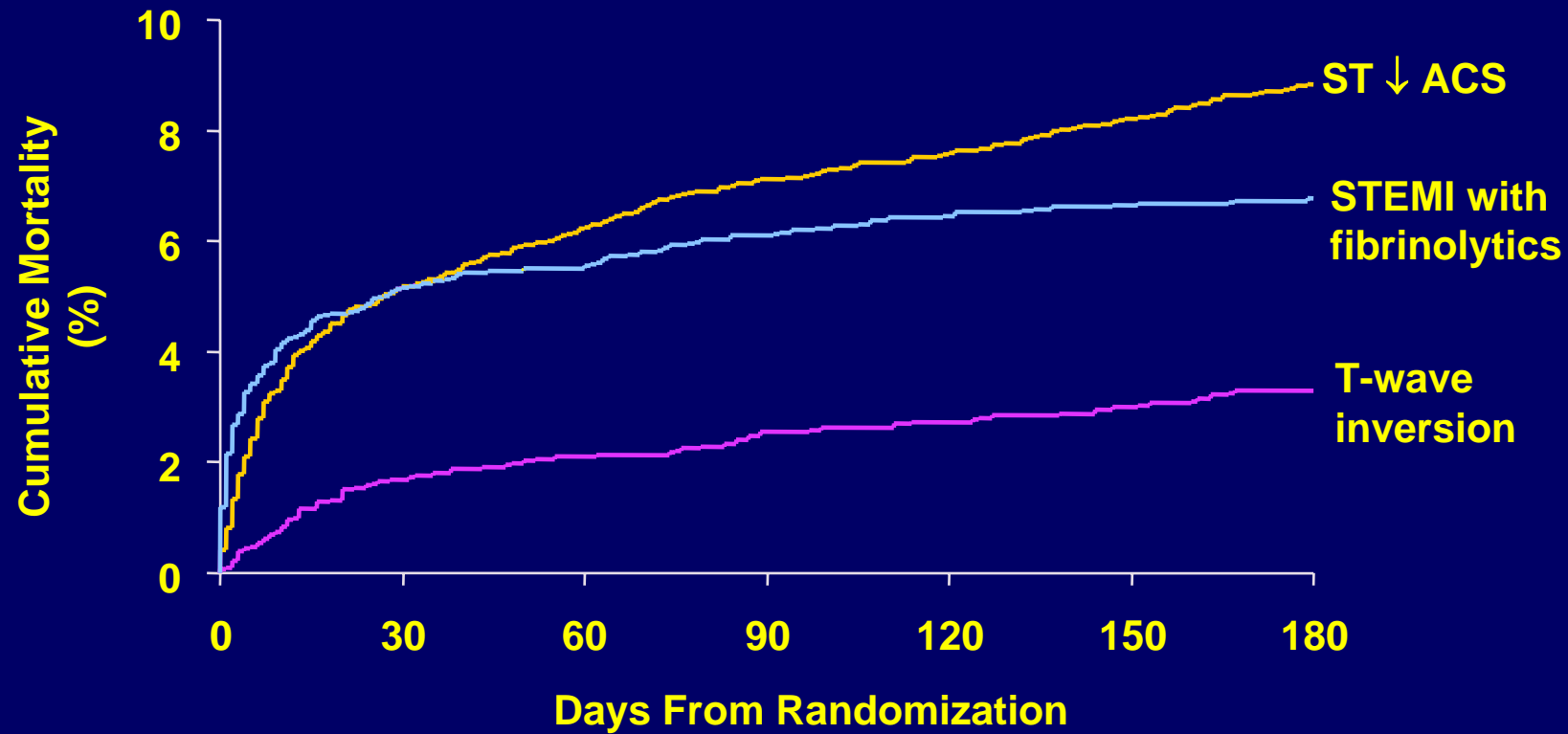
**-The admission ECG** is very useful in predicting long-term adverse outcomes.

**-Independent predictors of 1-year death or MI** included:

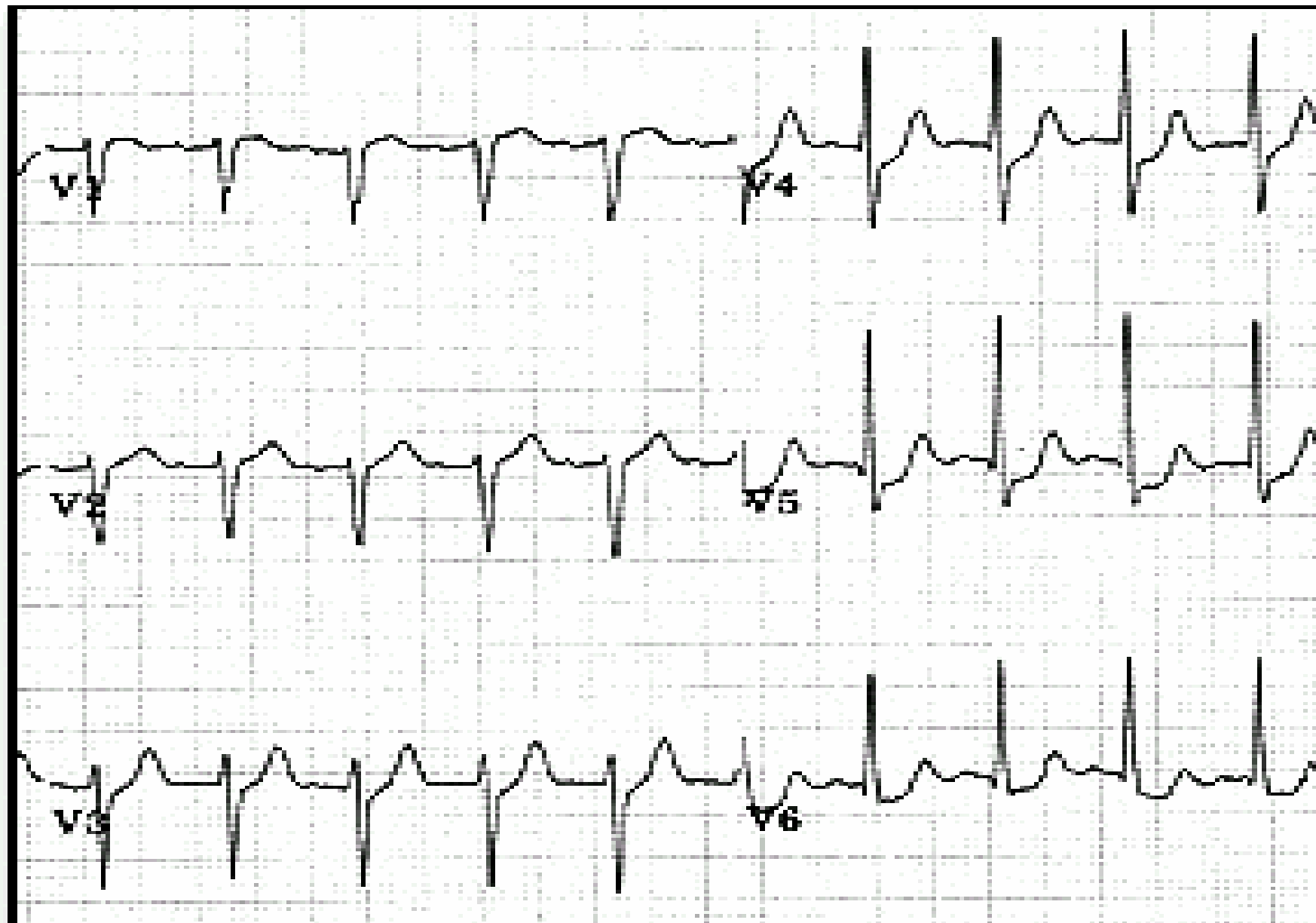
- LBBB
- ST segment deviation  $> 0.05\text{mv}$ .

**-The presence of T wave changes  $> 0.1\text{mV}$ ,**  
was associated with a modest or no increase in subsequent death or MI.

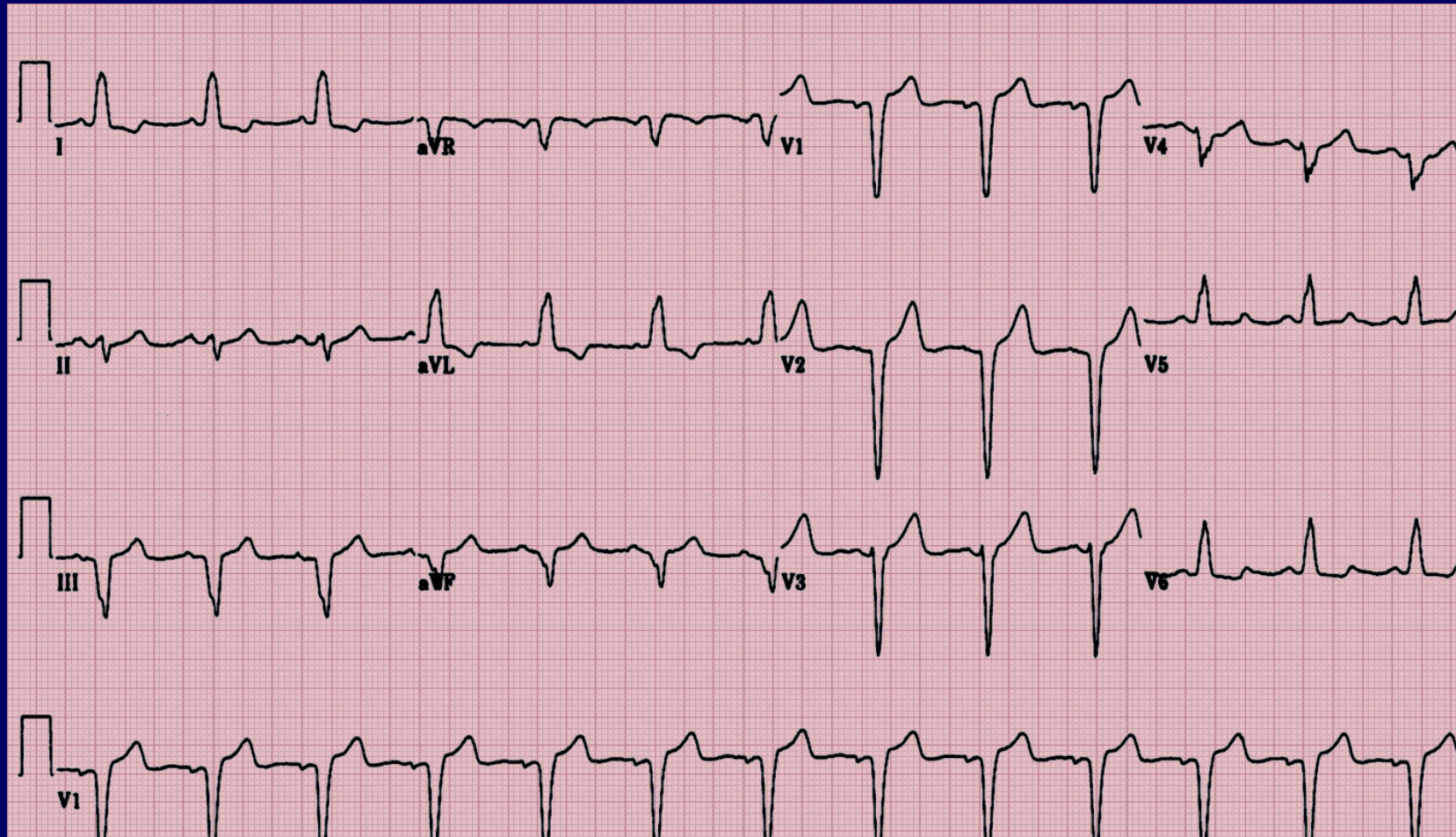
# GUSTO IIb: Correlation of 6-Month Mortality With Baseline ECG Findings in Patients With ACS



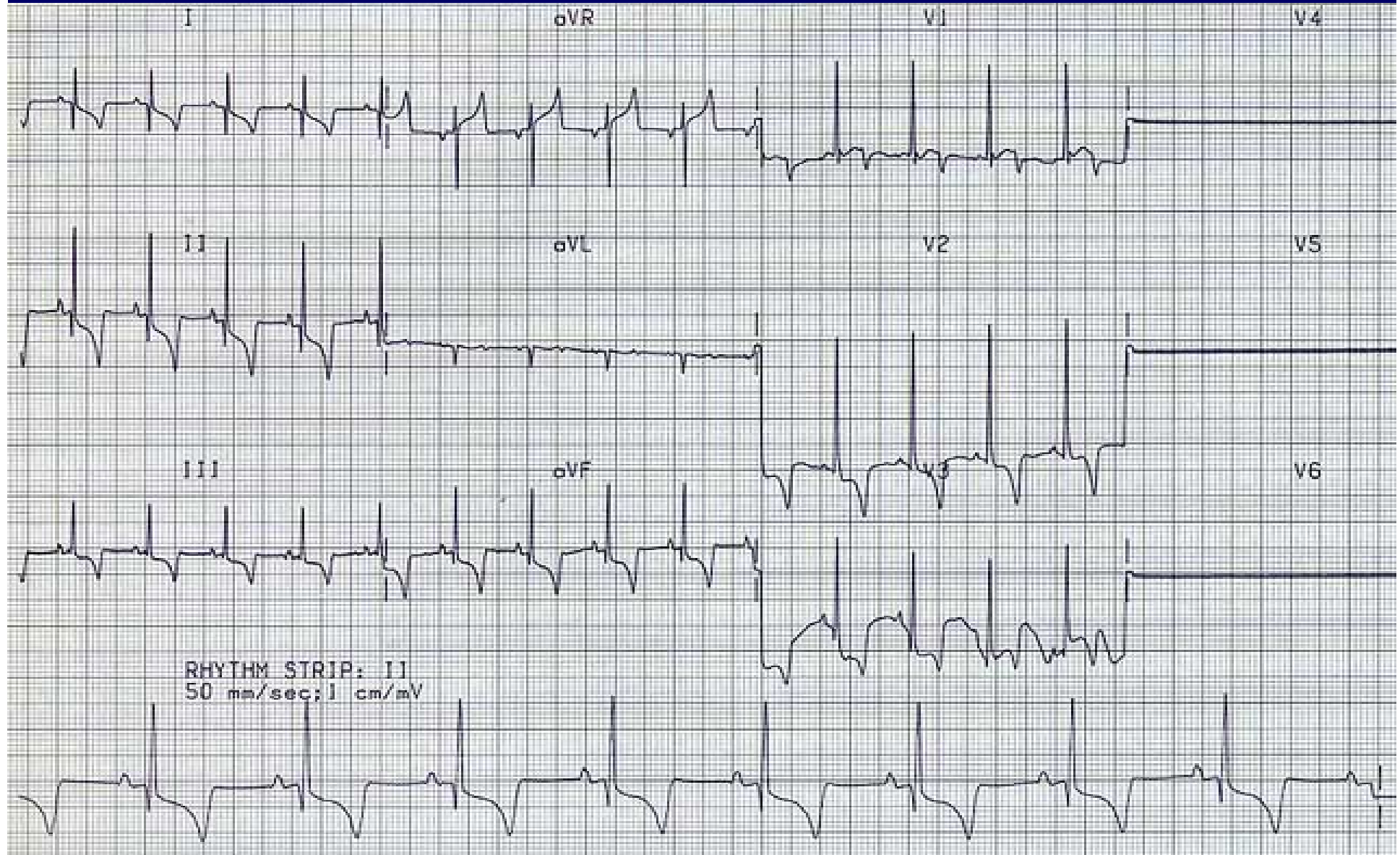
# Typical ST Depression



# New LBBB



# Non-ST-Segment Elevation MI



# 5-RISK ASSESSMENT BY CARDIAC MARKERS.

## 1-Creatine kinase-MB

NSTMI= elevated biomarkers of myocardial necrosis

-NSTMI with elevated CK-MB or troponins,  
have a worse long-term prognosis than those with unstable angina.

- .

## CK/MB

- Rises 4-6 hours after injury and peaks at 24 hours
- Remains elevated 36-48 hours
- Positive if CK/MB  $> 5\%$  of total CK and 2 times normal
- Elevation can be predictive of mortality
- False positives with exercise, trauma, muscle dz, DM, PE



## 2-Myoglobin

- Rises 2-4 hours after injury and peaks at 6-12 hours
- Remains elevated 24-36 hours
- Not cardiac specific
- Rise of 25-40% over 2 hours strongly predictive of MI

## ROPONINS :

Very specific and more sensitive than CK

Rises 4-8 hours after injury

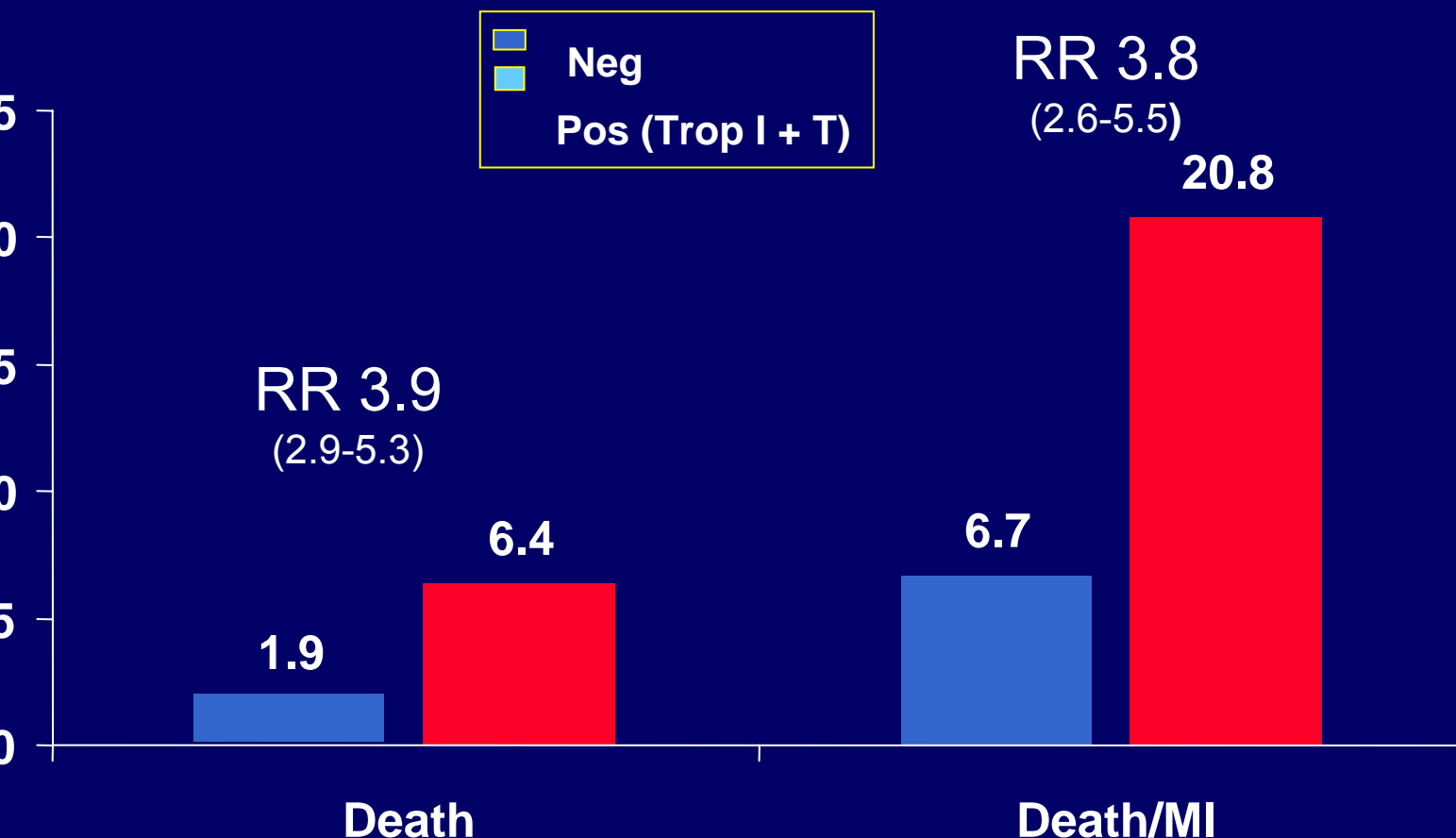
Remains elevated for 7-10 days

Provide very useful prognostic information

Linear relationship between the level  
of troponin T or I & subsequent risk  
of death

The higher the troponin, the higher  
the mortality risk

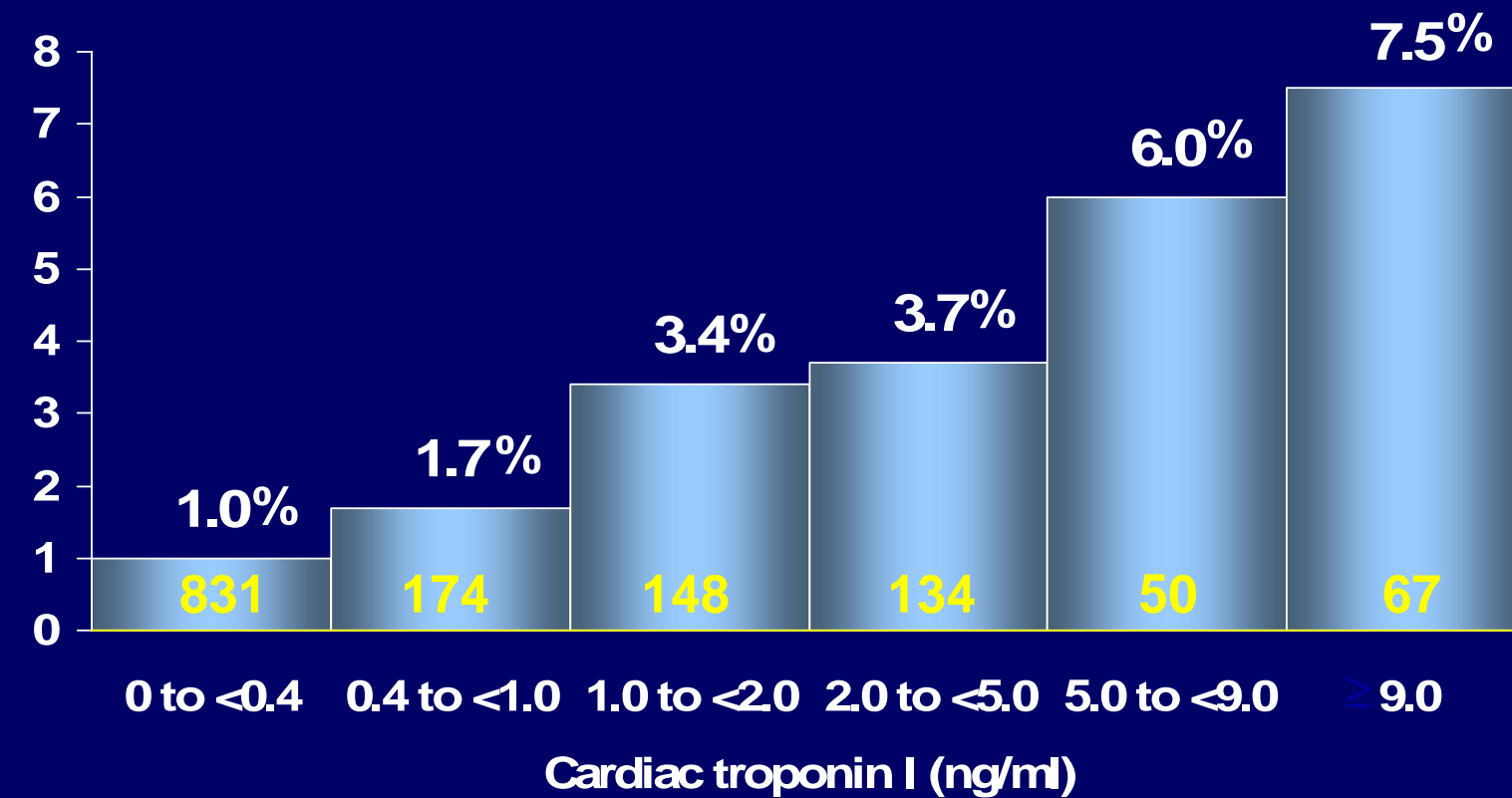
# Prognostic Value of Troponin T or I in ACS: A Meta-Analysis



-A higher risk of MI was observed with lower levels of troponin in several studies, & thus the overall rate of death or MI is equally high among patients with low or higher troponin values.

-Troponin T & I are useful not only in diagnosing MI but also in risk assessment & in targeting therapies to high risk patients.

## Troponin I Levels and Mortality in Patients with NSTEMI-ACS



## REACTIVE PROTEIN:

-CRP is very promising. Elevated CRP has related to

- increased risk of death

- MI

- need for urgent revascularization.

-levels of CRP in patients with ACS are approximately five times higher than those of stable patients.

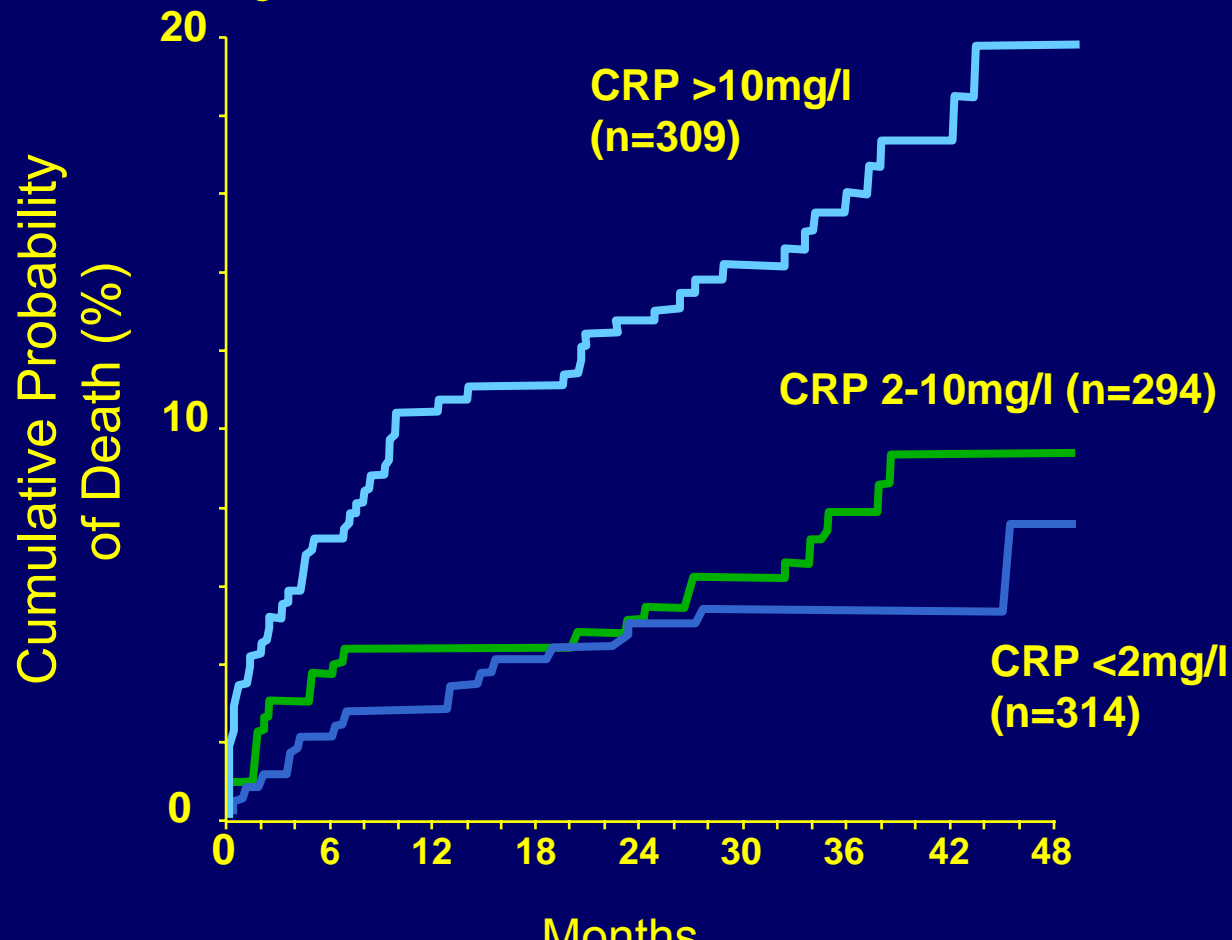
**-CRP was able to discriminate** a high- & a low-risk group: mortality for patients with an elevated CRP was 5.8% versus 0.4% for patients without elevated CRP.

**-Mortality can be stratified** from  
0.4% for patients with both markers negative  
1.7% if either CRP or troponin was positive  
9.1% if both were positive.



# Predictive Value of hs-CRP

## Mortality from ACS in FRISC Substudy



**-CRP measured at the time of hospital**  
**charge** has been found to be a strong predictor  
of outcome over 3 to 12 month.

## Other inflammatory markers

have offered consistent evidence of an association between systemic inflammation & recurrent adverse events , including

serum amyloid A

monocyte chemoattractant protein-1 (MCP-1).

## WHITE BLOOD CELL COUNT:

Simple marker of inflammation

Elevated WBC counts were ass. with  
higher risk of mortality & recurrent acute

II

This association was independent of CRP.

## CD40 LIGAND :

CD40L is a member of tumor necrosis factor- $\alpha$  family of proteins.

Expressed on the platelet surface when platelets are activated

Subsequently cleaved, generating a soluble proteolytic fragment termed sCD40L.

**-it has been found to be both prothrombotic  
proinflammatory & to have a role in  
atherosclerotic process.**

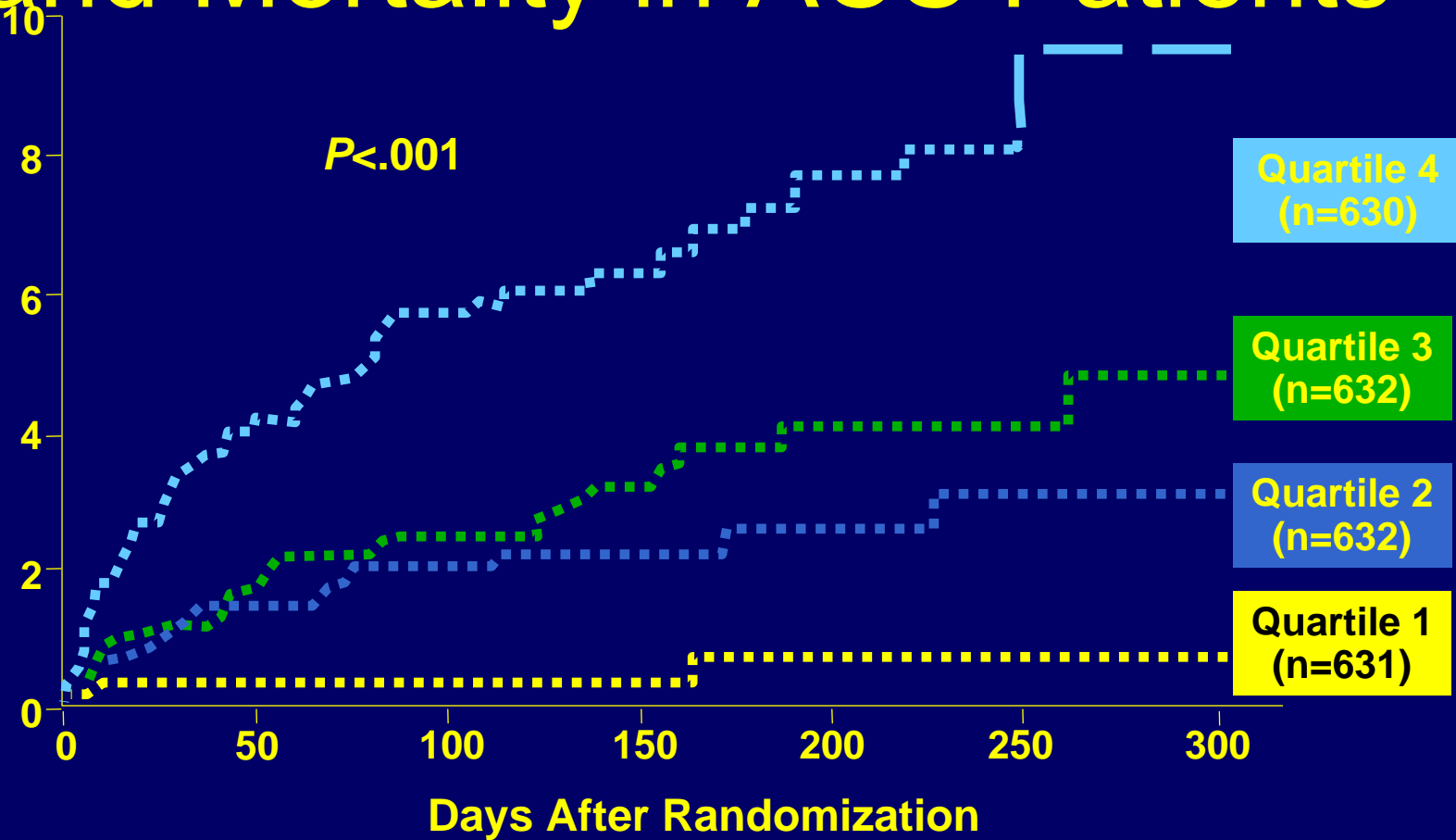
**-CD40L has been correlated with the  
degree of platelet activation, as measured by  
platelet monocyte aggregates, & thus is a novel  
marker of platelet activation.**

## ***B-TYPE NATRIURETIC PEPTIDE:***

**-BNP is a neurohormone** that is synthesized in ventricular myocardium & released in response to increased wall stress.

**-its actions include** :natriuresis, vasodilation, inhibition of sympathetic nerve activity, & inhibition of the renin-angiotensin-aldosterone system.

# B-type Natriuretic Peptide (BNP) and Mortality in ACS Patients





**-BNP has prognostic value** across the full spectrum of patients with ACS, including those with UA/NSTEMI.

**-Measurement of BNP** in patients with UA/NSTEMI is very important to our current tools for risk stratification.

## MYELOPEROXIDASE (MPO):

MPO is a hemoprotein expressed by neutrophils that possesses potent inflammatory properties & that promotes oxidation of lipoproteins in vascular atheroma.

Marker of inflammation

role of neutrophil in vascular inflammation and ACS

- MPO serum levels in patients with STEMI-ACS were associated with increased risk

r

sequent death

. independent of other risk factors & other

diac markers.

-Elevations of MPO have been seen

throughout the coronary vasculature in patients

h UA/NSTEMI.

## -Serum Creatinine :

levated creatinine was found to be associated with an adverse prognosis, independent of other standard risk factors.

## GLUCOSE :

-Adverse outcomes have been seen among diabetic patients with acute MI with elevated admission glucose values compared with patients without hyperglycemia.

-This association was found even among patients without a prior diagnosis of diabetes.

-Adverse outcome also with poor glycemic control, as measured by hemoglobin A<sub>1c</sub> has been seen in other studies.

# Braunwald Classification of Risk for Patients with NSTEMI-ACS

## CLINICAL INDICATORS OF INCREASED RISK IN PATIENTS WITH NSTE-ACS;

### History ;

Age more than 70 y

DM

post MI angina

PVD

Cerebrovascular disease

**CLINICAL PRESENTATION;**

Braunwald class II or III (acute ,subacute  
rest pain)

Braunwald class B (secondary UA)

HF

Hypotension

Ventricular arrhythmias



ECG ;

ST deviation 0.05 Mv

LBBB

T wave inversion 0.03 Mv

## *Cardiac markers*

Tn T or Tn I

BNP

CK-MB

CD40 LIGAND

GLUCOSE

CREATININE

HBA1c

**ANGIOGRAM ;**

**Thrombus**

**3 VD**

**REDUCED EF**

# COMBINED RISK ASSESSMENT SCORES.

- Comprehensive risk scores that use clinical variables, findings from ECG, & findings from serum cardiac markers.
- the most important baseline determinants of higher mortality were:
  - increasing age.
  - increasing heart rate.
  - lower systolic BP.
  - ST segment depression.
  - signs of heart failure.

# TIMI Risk Score

predicts risk of death, new/recurrent MI, need for urgent revascularization within 14 days

$\geq 65$  years

CAD Risk Factors

Coronary Stenosis  $>50\%$

ST-segment deviation

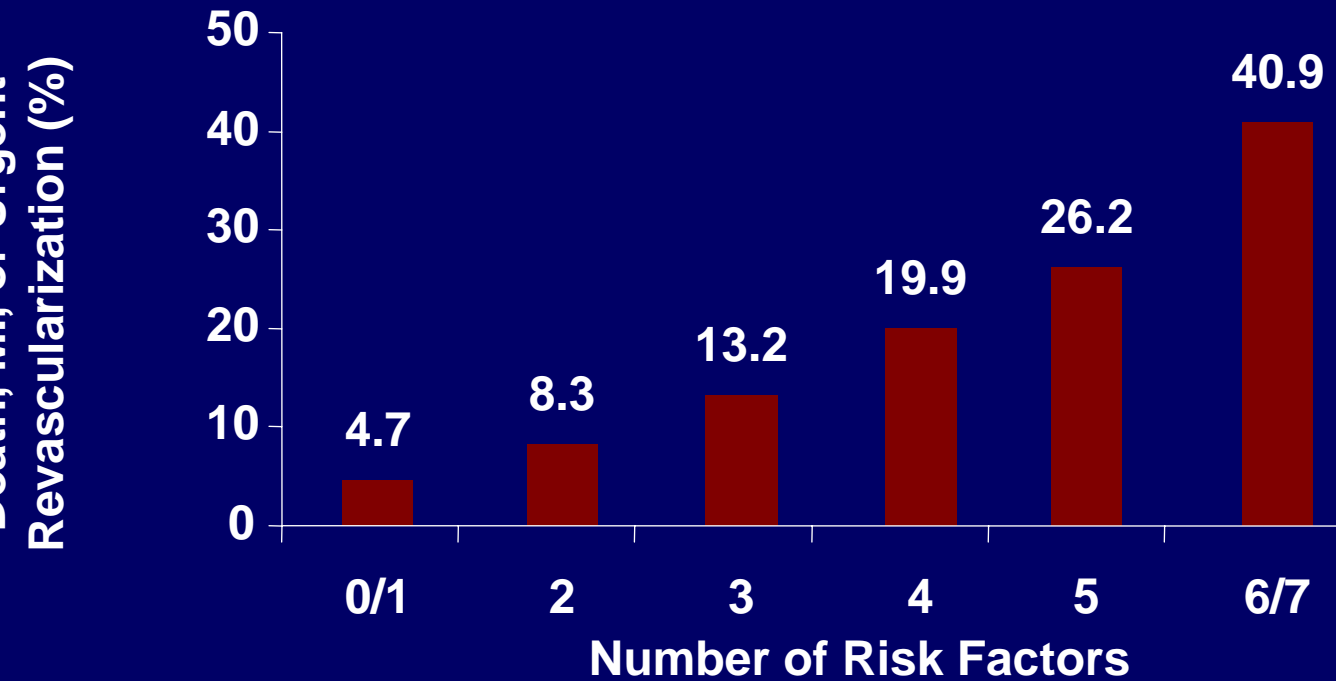
Anginal events  $\leq 24$  hours

MI in last 7 days

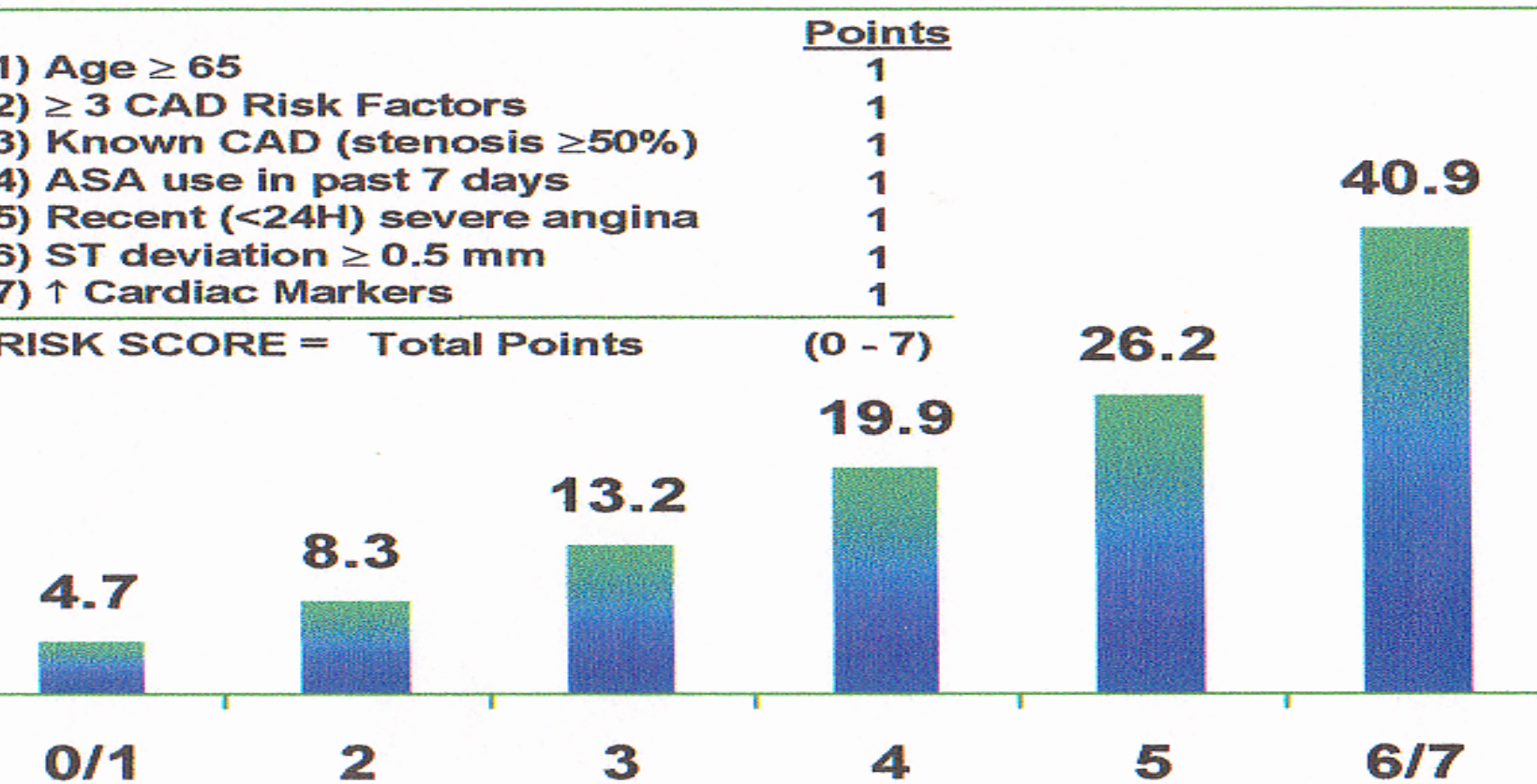
Positive Cardiac Markers (CK-MB or troponin)

**is scoring system was used to  
atify the risk for patients across a 10  
ds gradient of risk  
om 4.7 % to 40.9 % (p<0.001)**

# The TIMI Risk Score and Incidence of Adverse Ischemic Events in Patients with NSTEMI-ACS



# Risk Stratification





***the strongest prognostic markers***

**CRP**; marker of inflammation initiator of atherosclerosis

**BNP**; reflect impaired LV function

**Tn**; the most sensitive and specific marker of myocyte necrosis

*patients with higher TIMI risk scores* ;

and significant reductions in events when  
treated with ;

Enoxaparine compared with ufh (heparin)

with a GPII B/III A inhibitor compared with

placebo .

with an invasive vs conservative strategy.

*Thank you*