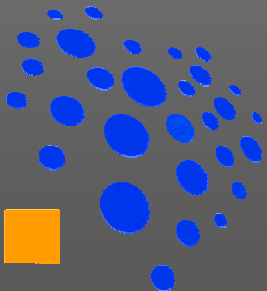


Myocardial Infarction Criteria Following PCI or Surgery: Time for Reassessment?



Christian W. Hamm, Kerckhoff Heart Center,
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Definition of AMI

ESC/ ACC CONSENSUS Document 2000



- Typical rise or fall of troponin (or CK-MB) with at least one of the following:
 - Ischaemic symptoms
 - New Q waves on the ECG
 - ECG changes indicative of ischaemia (ST elevation/ depression)
 - **Coronary artery intervention (e.g. PCI)**

or:

- Pathologic findings of an acute AMI

Definition of AMI

ESC/ ACC CONSENSUS Document 2000



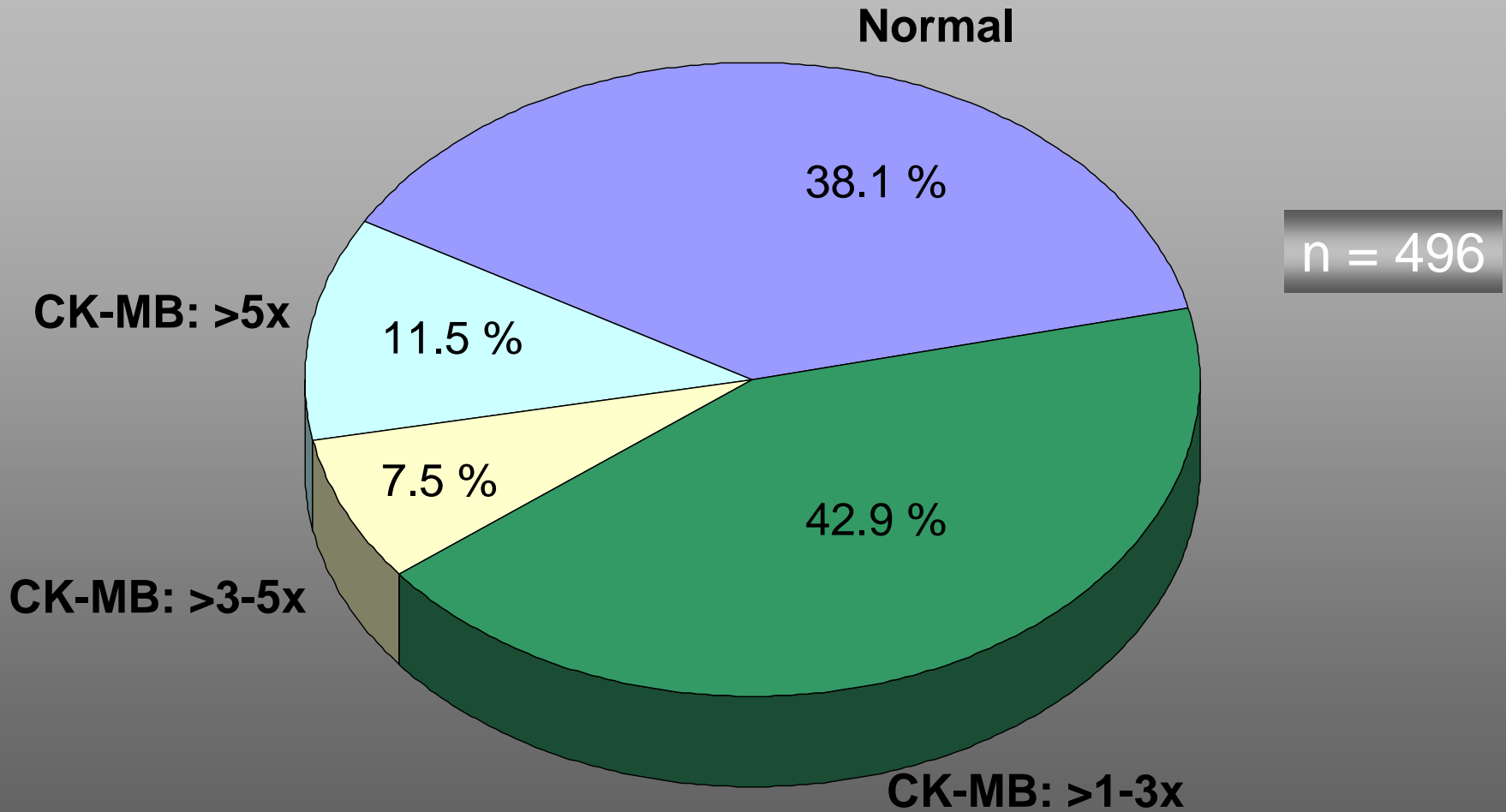
different databases. However, the Joint ESC/ACC Expert Committee reached the consensus opinion that, irrespective of the clinical circumstances (except for coronary artery surgery or intended myocardial lesions such as radiofrequency ablation of arrhythmias or septal ablation for hypertrophic cardiomyopathy), the same discriminative value for each biochemical marker should be applied, as they reflect the same amount of myocardial necrosis.



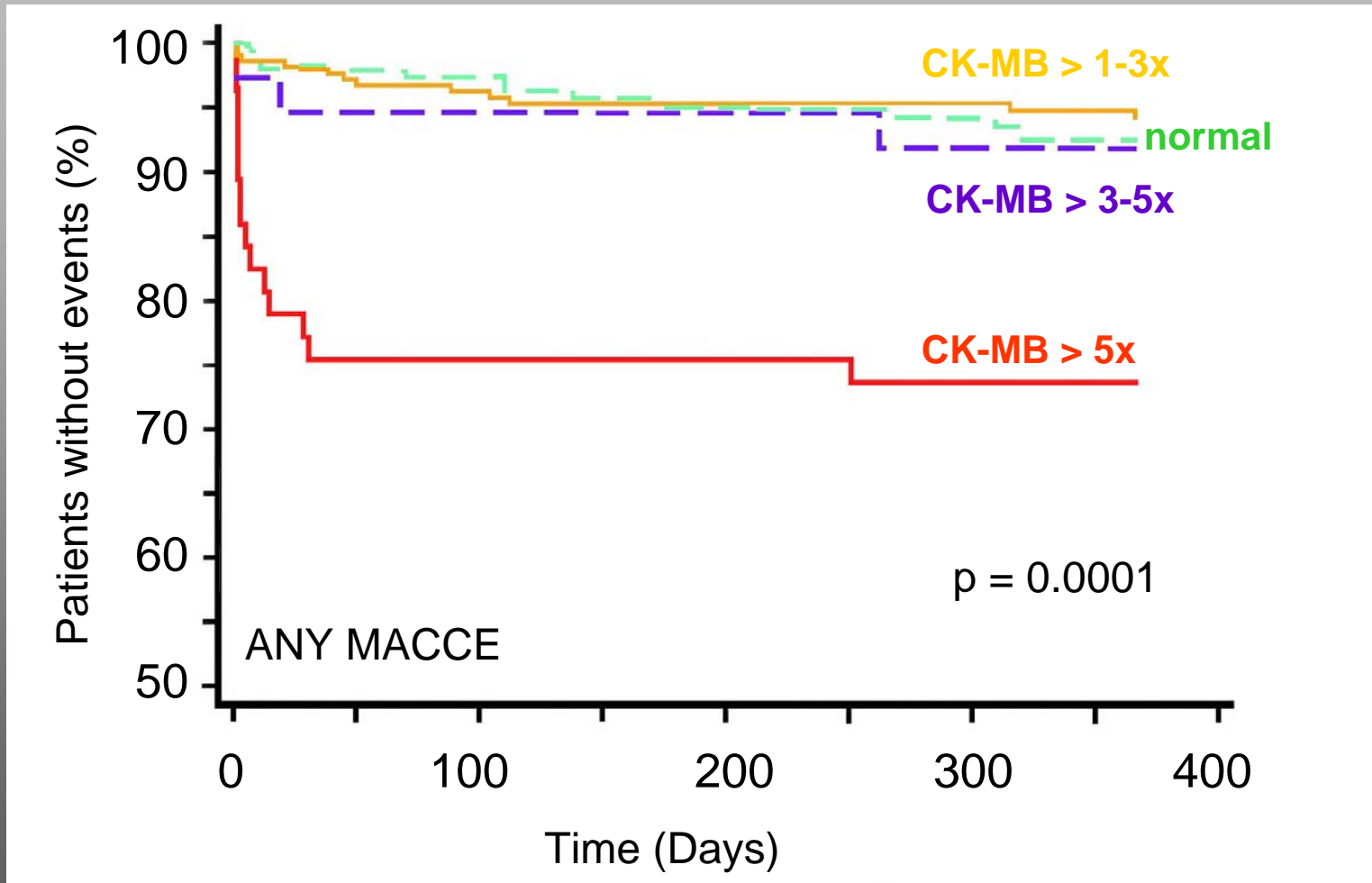
Controversy

- cell death : prognostic value
- biomarker leak: by-stander

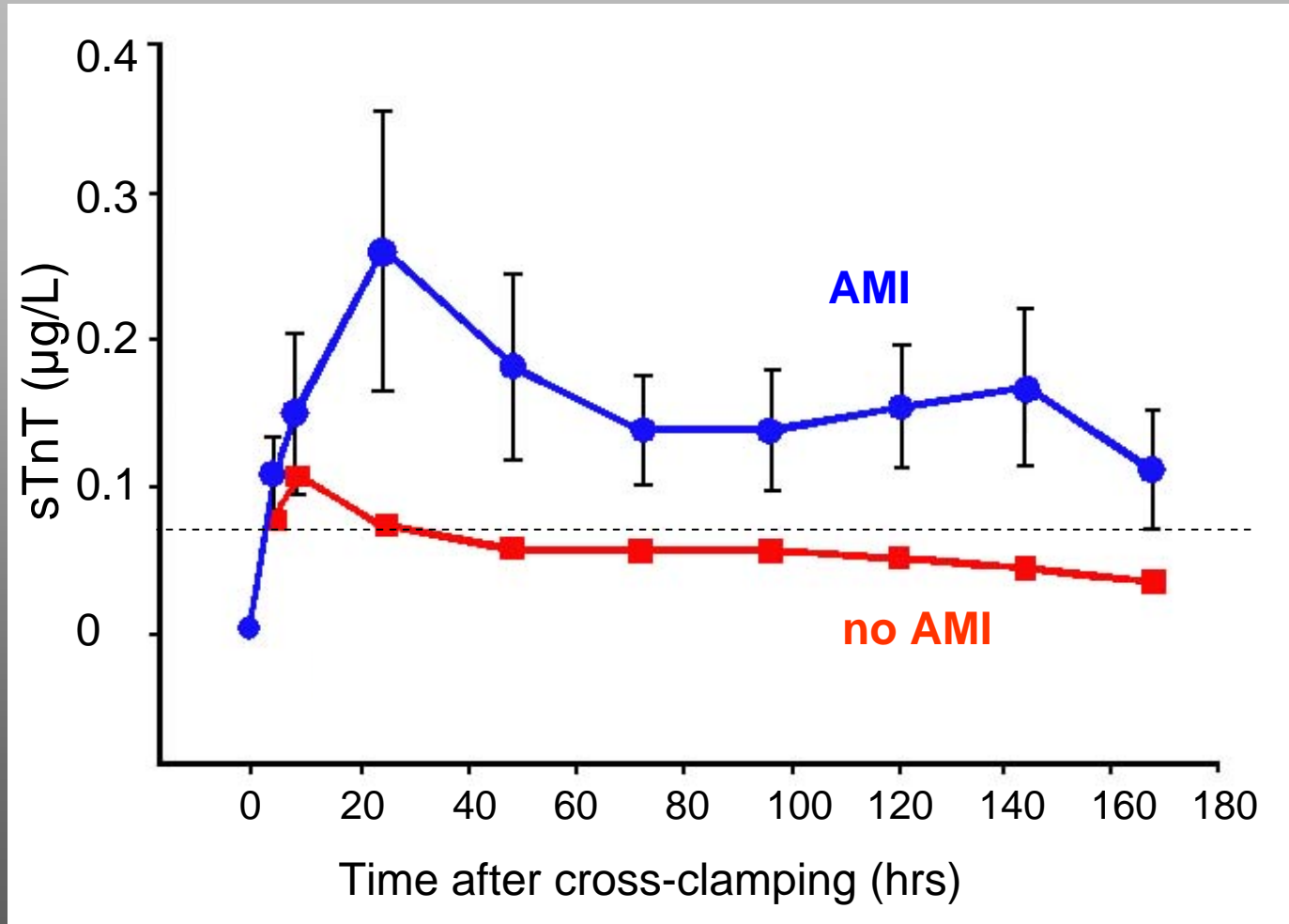
CK-MB after CABG: ARTS Study



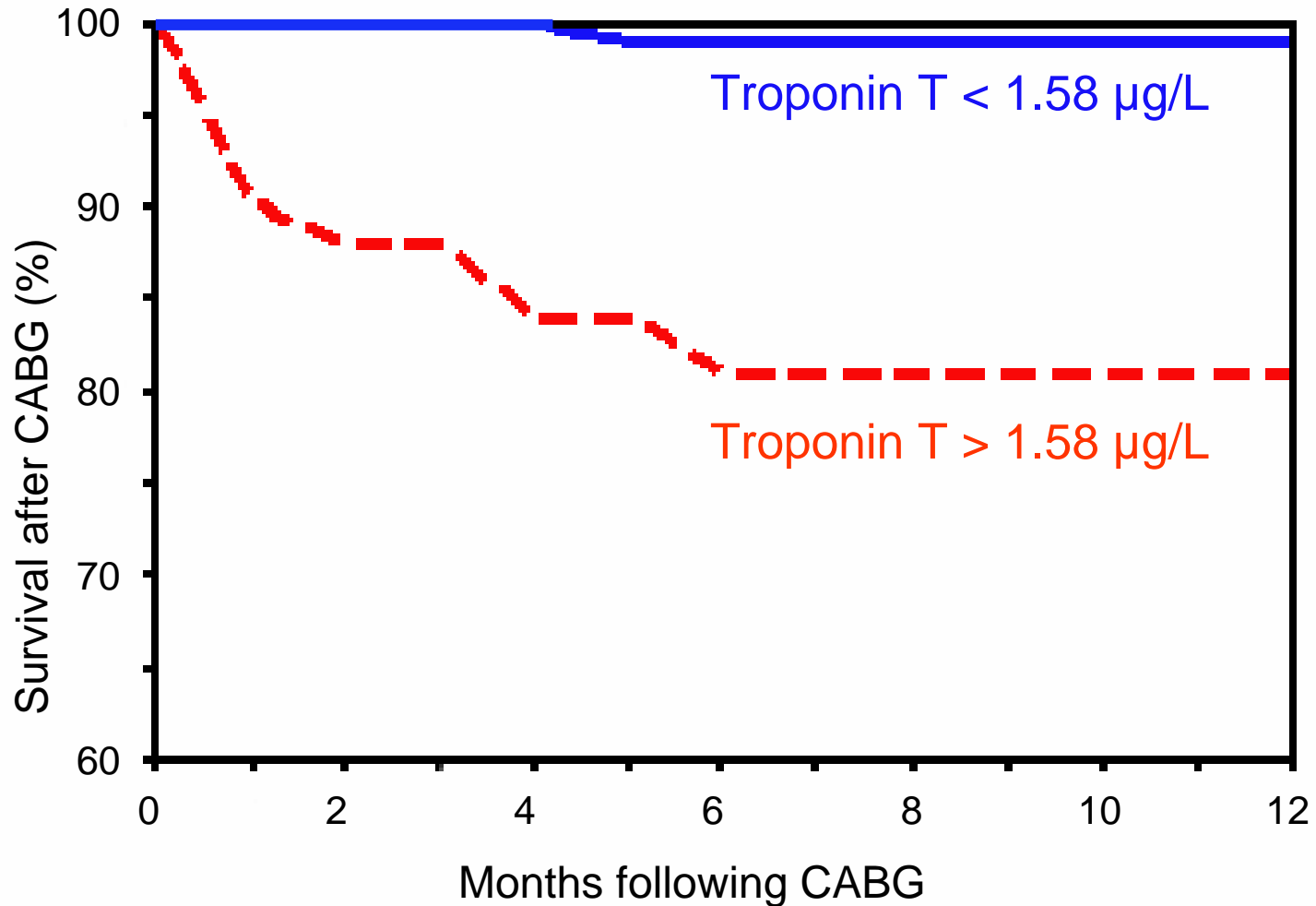
MACCE after CABG: ARTS Study



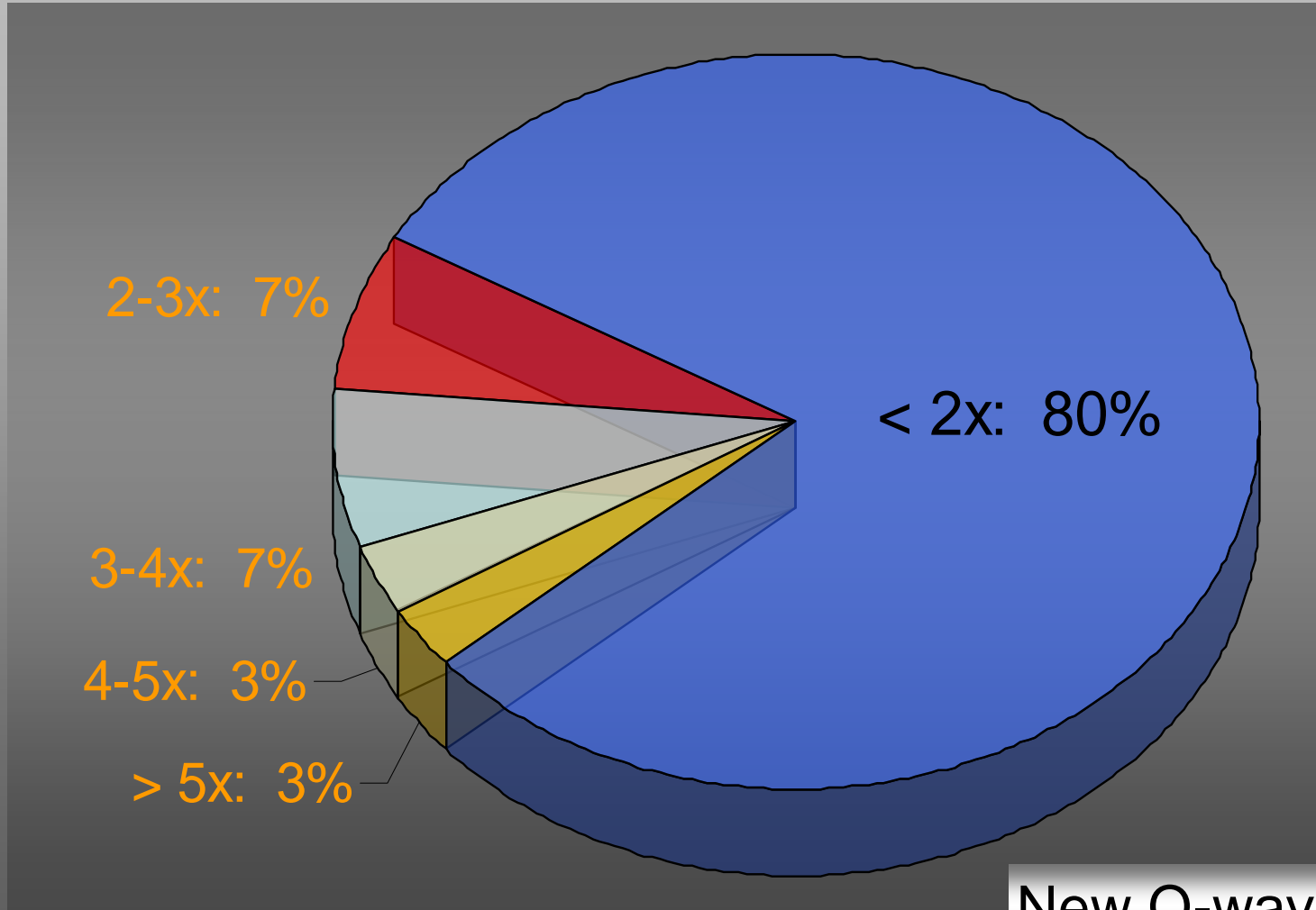
Troponin I after CABG



Survival after CABG

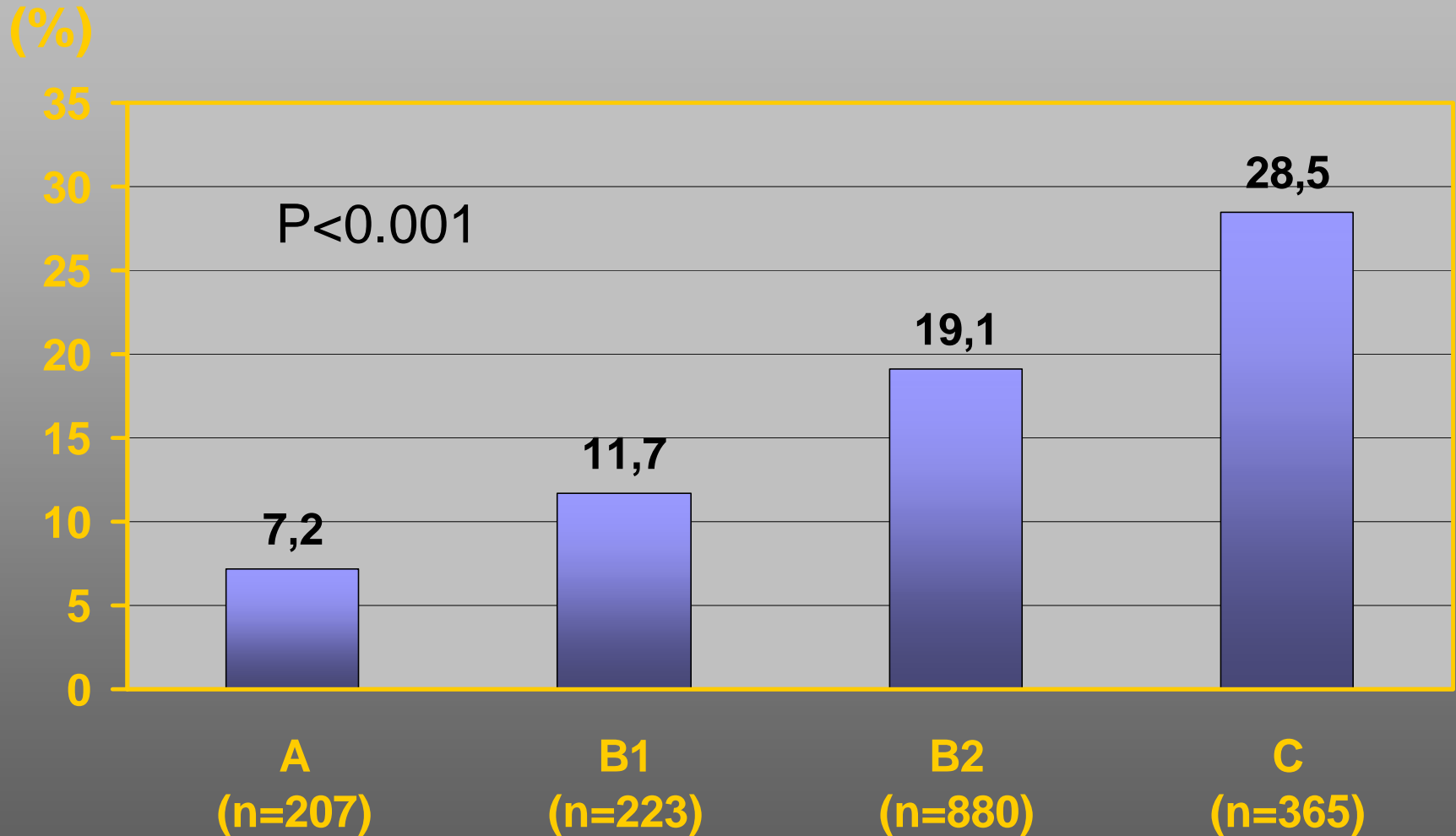


CK-MB post PCI

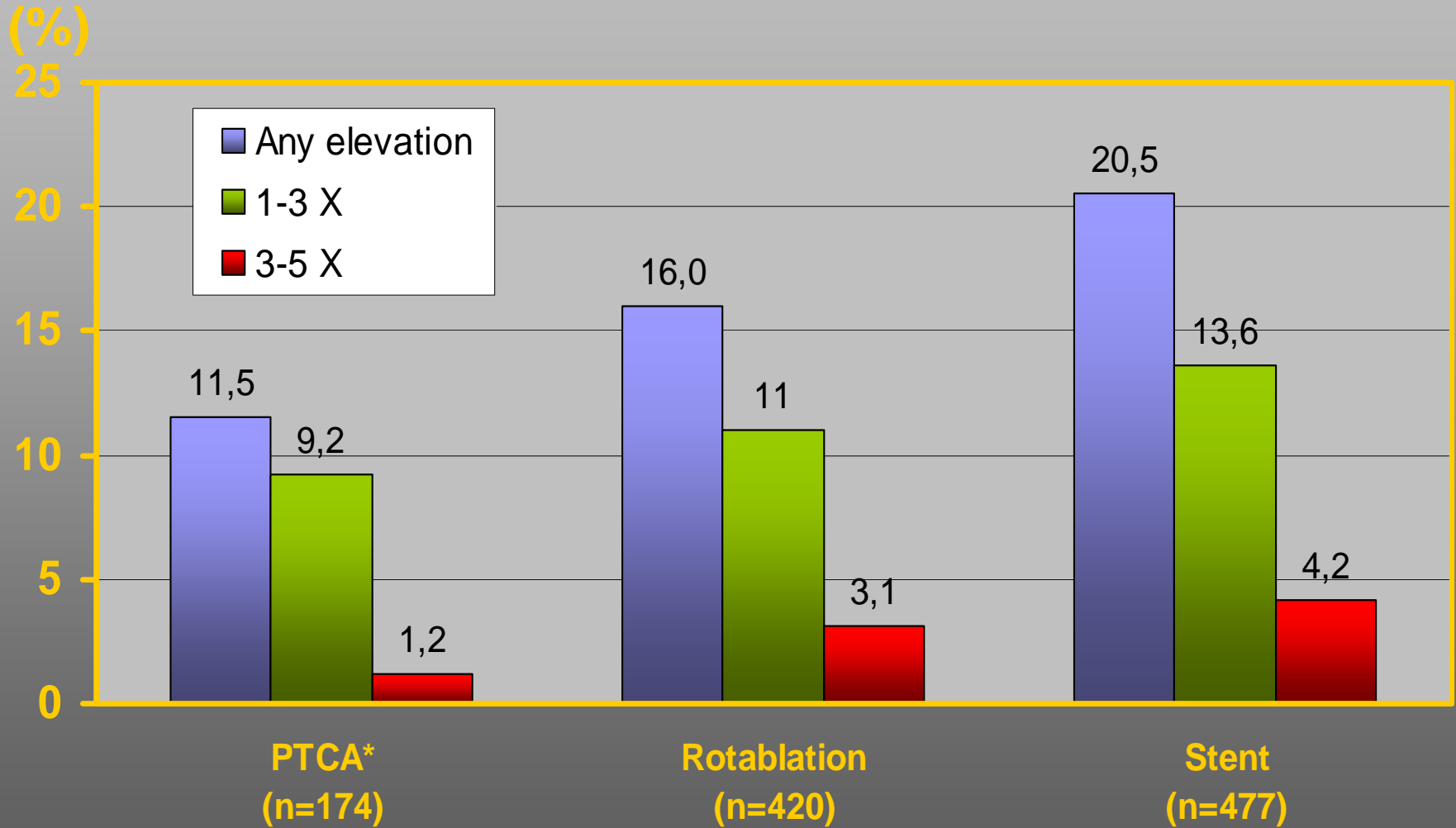


New Q-waves: 1.9%

CK-MB post PCI: ACC/AHA Lesion Type

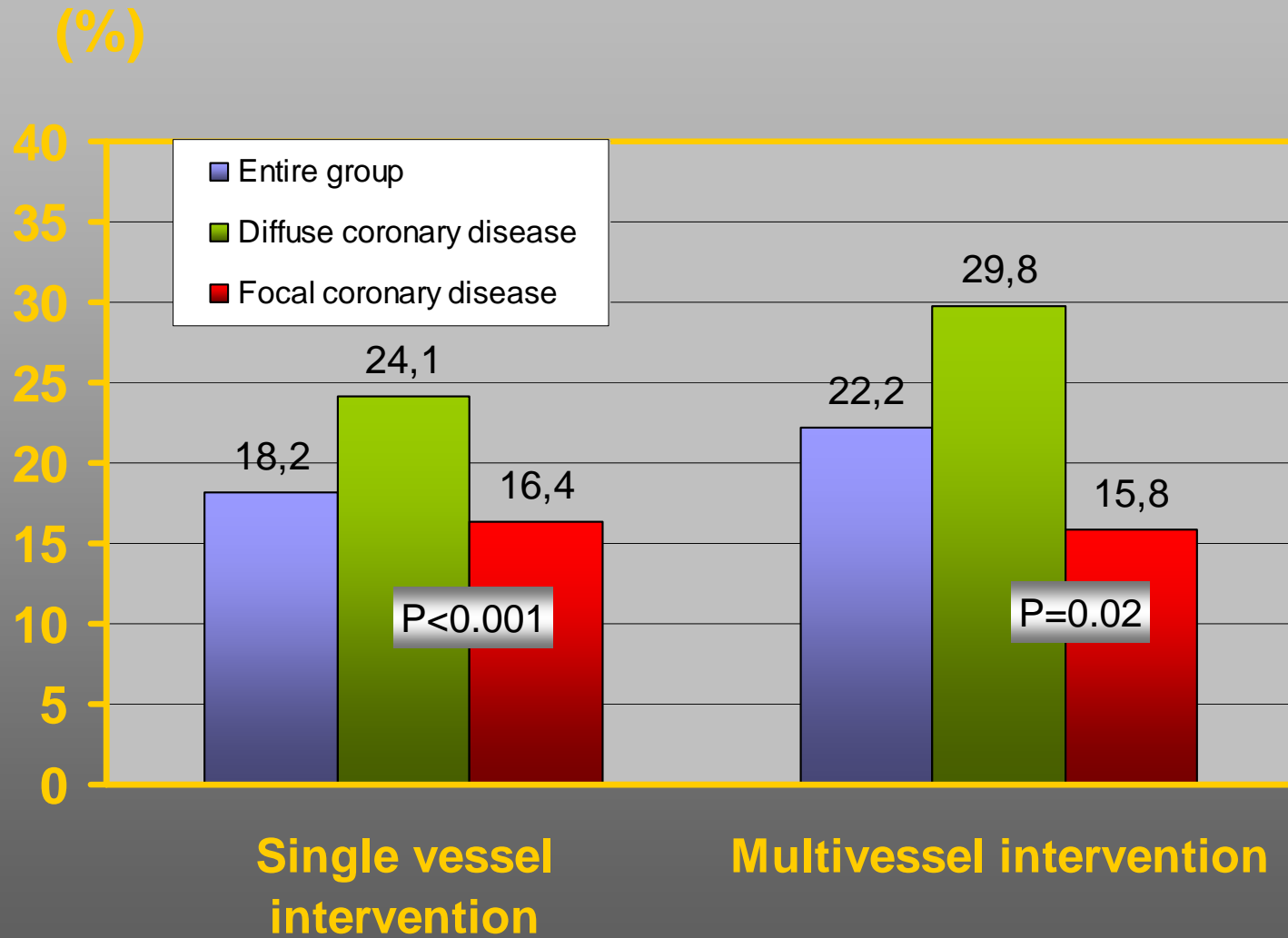


CK-MB post PCI: Interventional Device

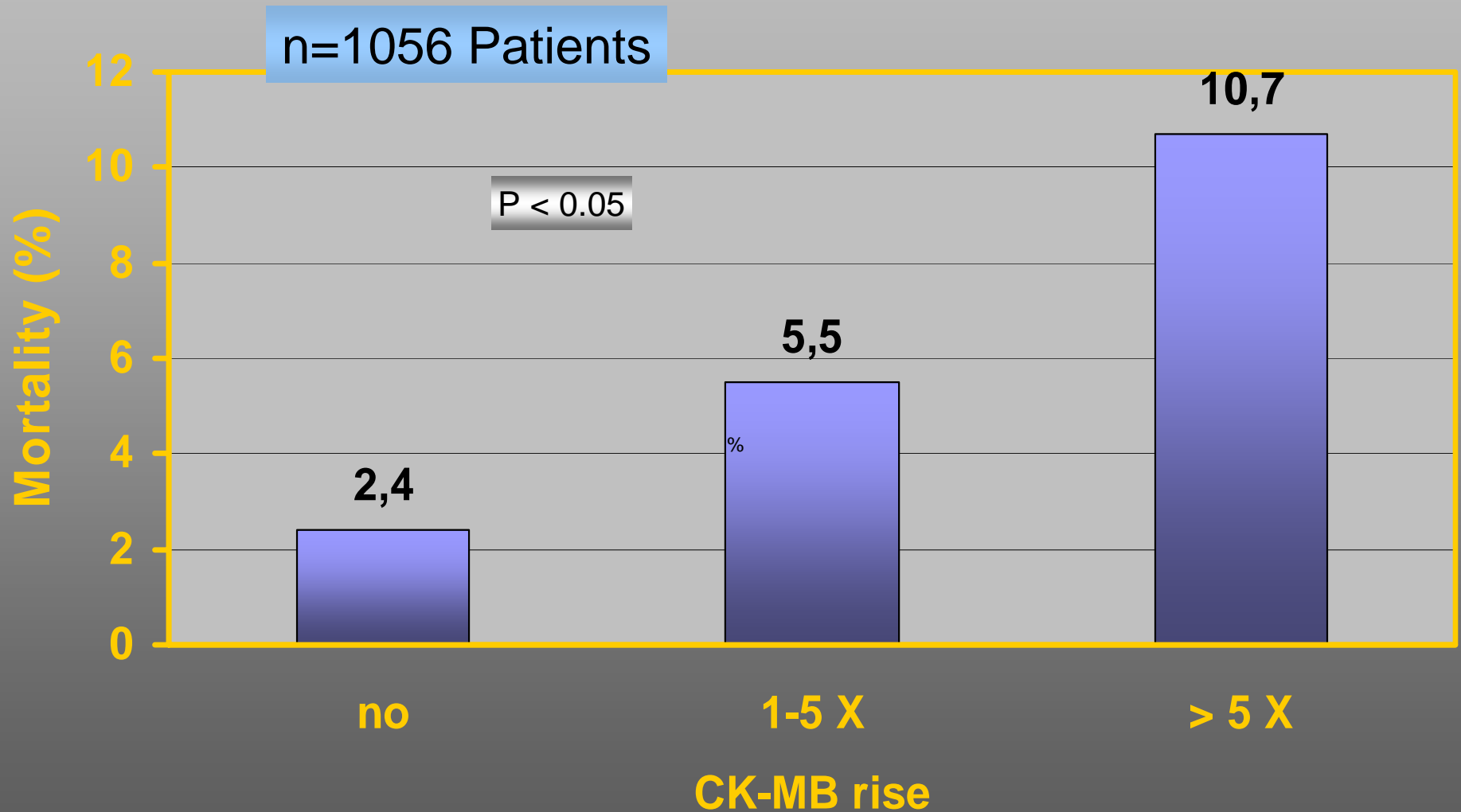




CK-MB post PCI: Extent of CAD



Saphenous Vein Grafts PCI



Biomarker after PCI

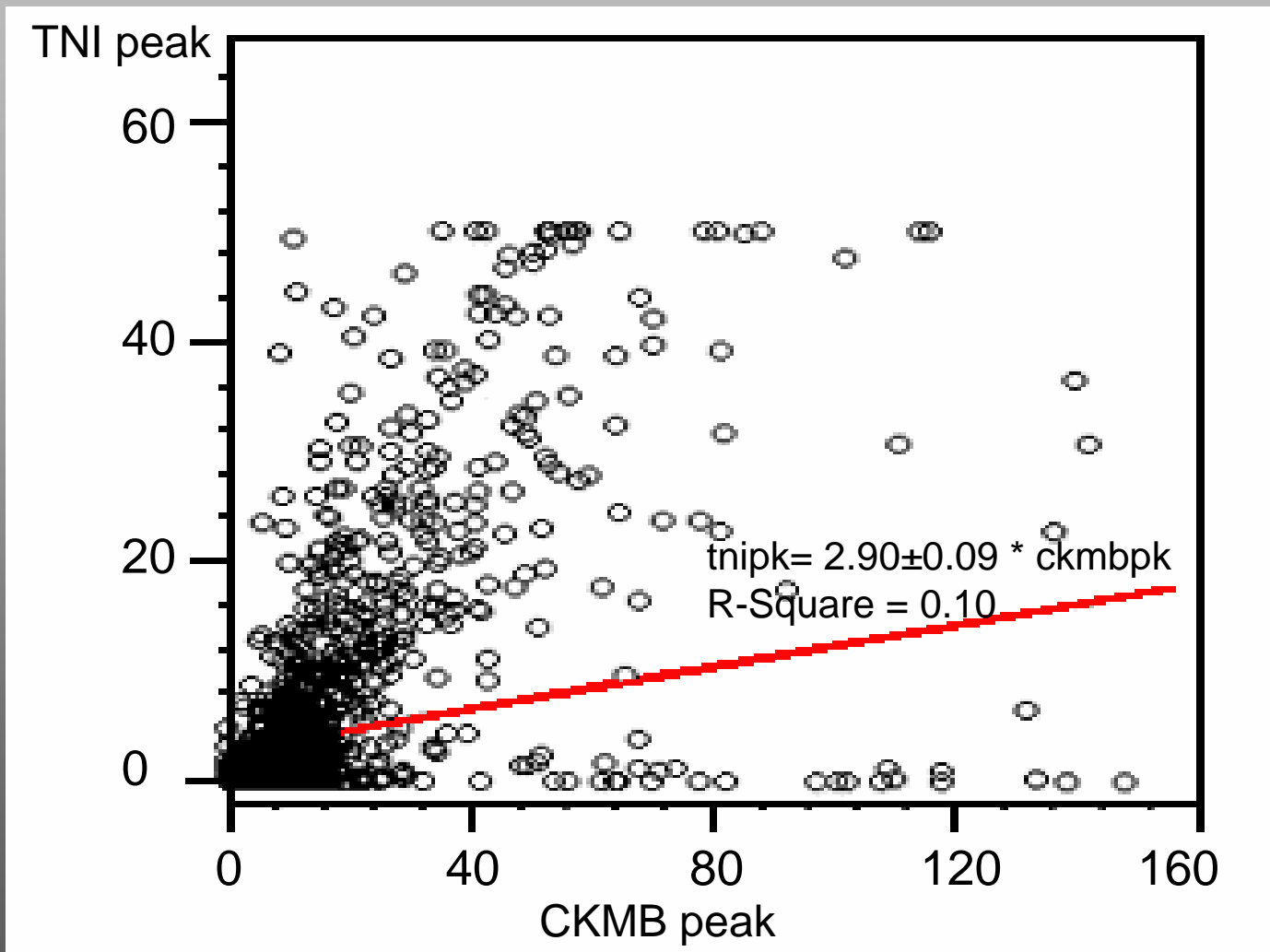


Contemporary Studies

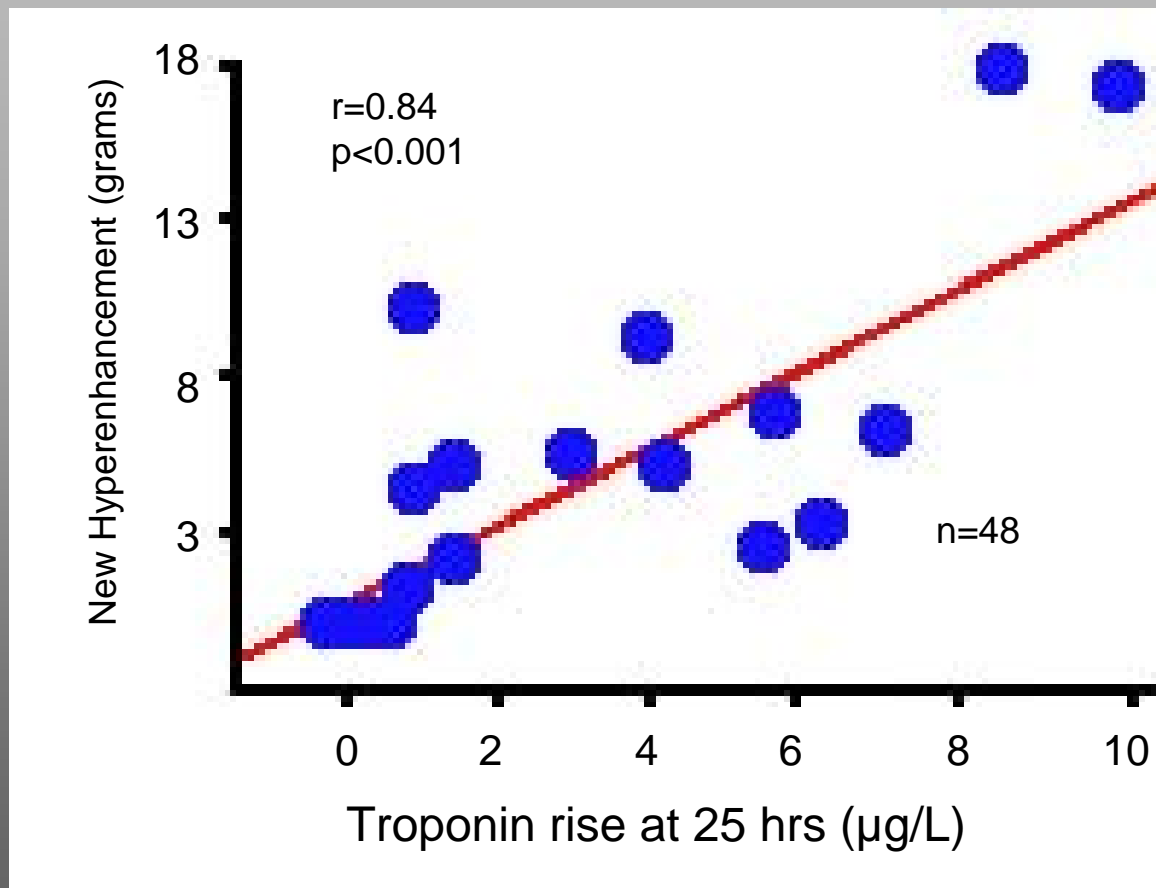
Frequency of Marker Elevation

	Patients	CK-MB ↑	Troponin I ↑	No. of samples
Cavallini et al. Eur. H. J. 2005	n = 3494	16.0 %	44.2 %	3
Kini et al. Am. J. Cardiol. 2004	n = 2873	16.1 %	38.9 %	3

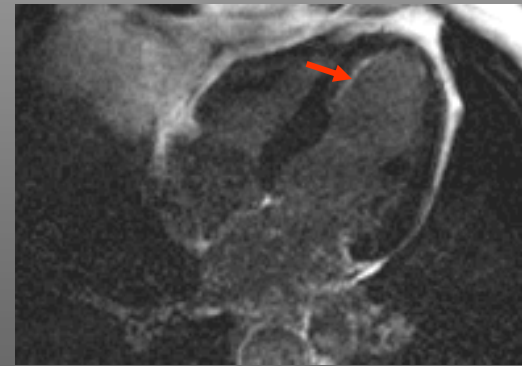
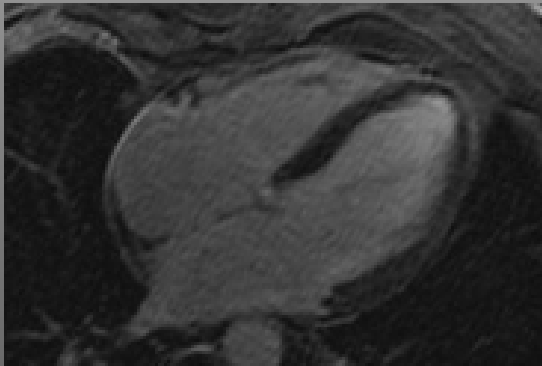
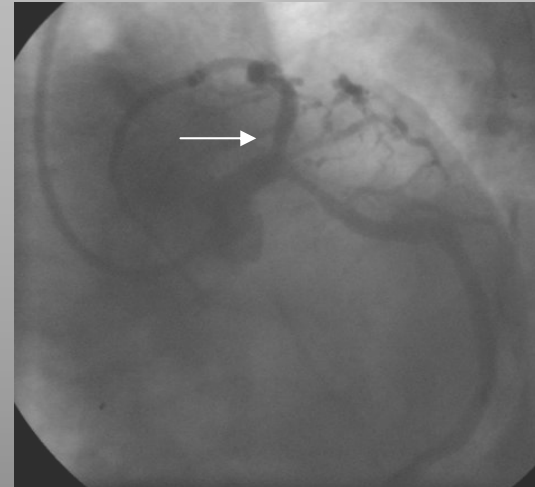
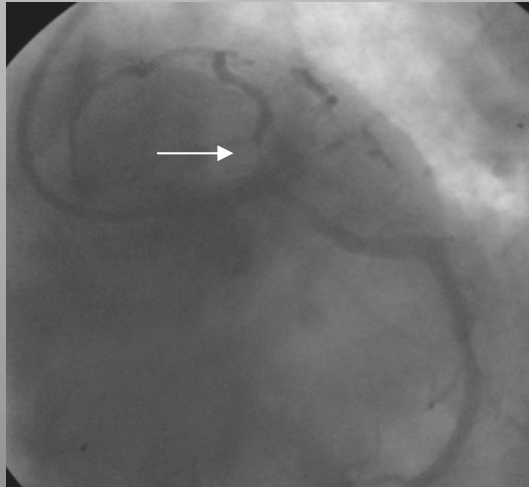
Correlation of CK-MB and Troponin I



Hyper-enhancement by MRI post PCI



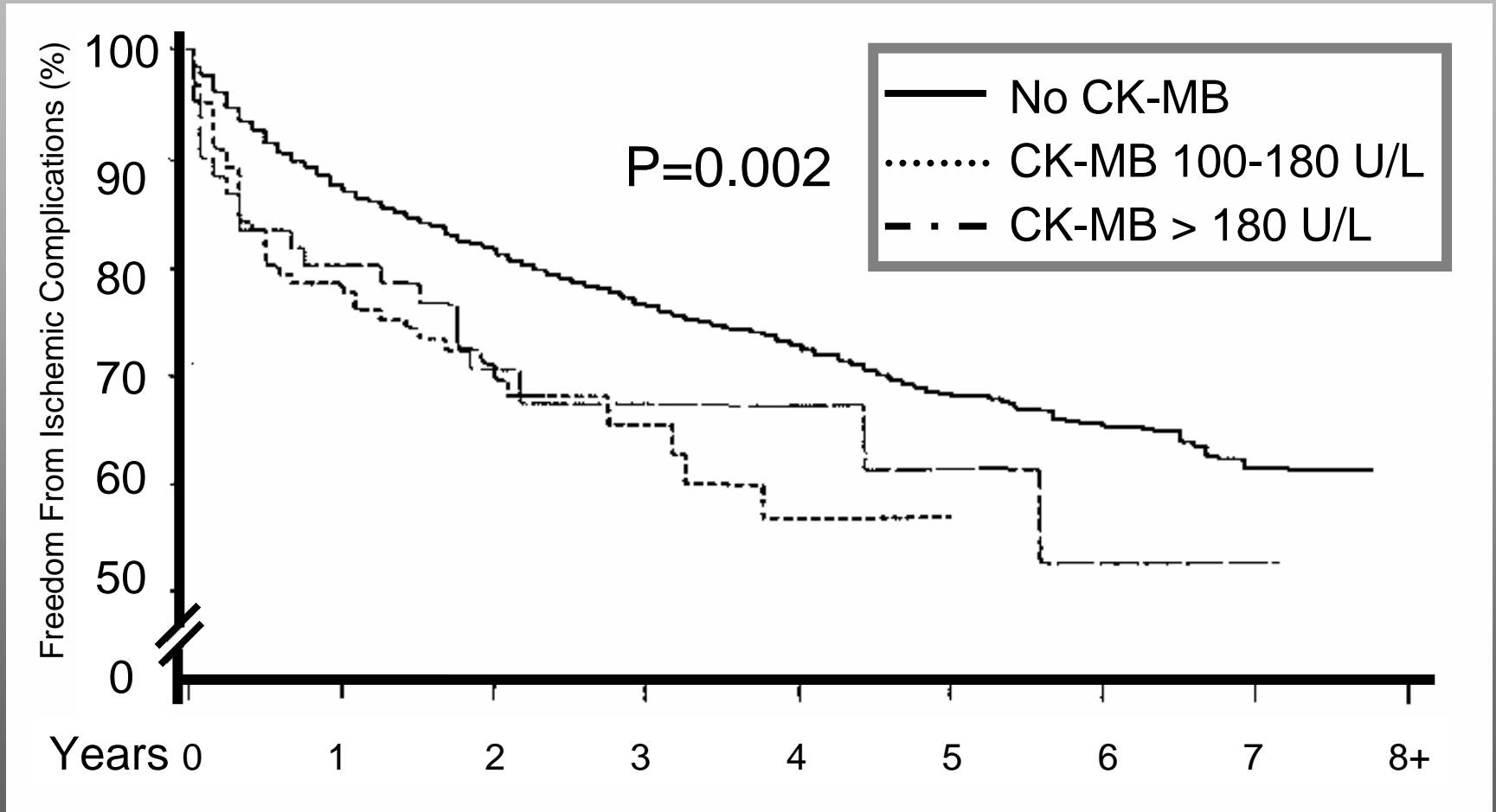
Hyper-enhancement by MRI post PCI



Contrast enhanced MRI
before PCI

Contrast enhanced MRI
after PCI
(arrow: subendocardial infarct)

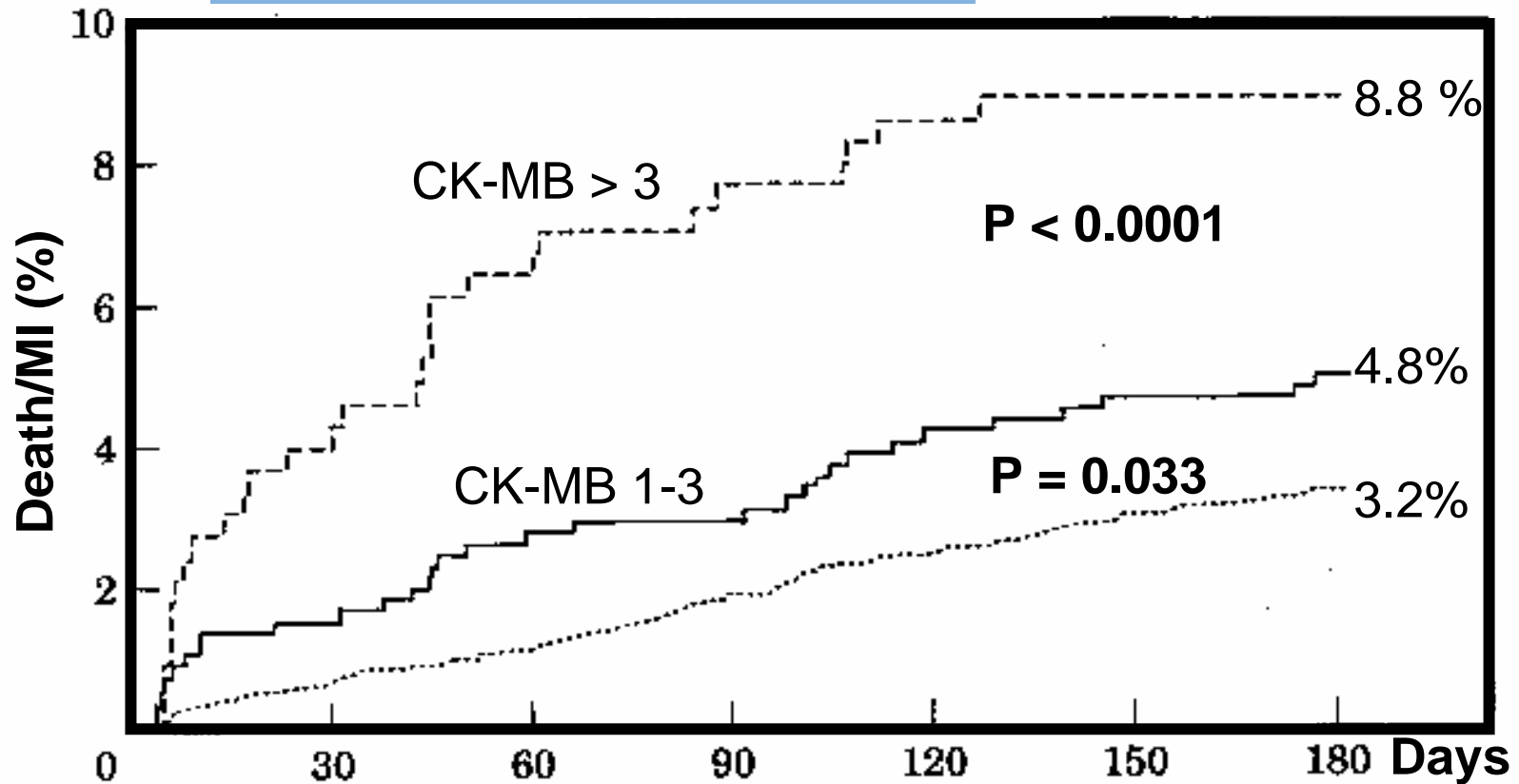
CK-MB post PCI: Marker of Risk



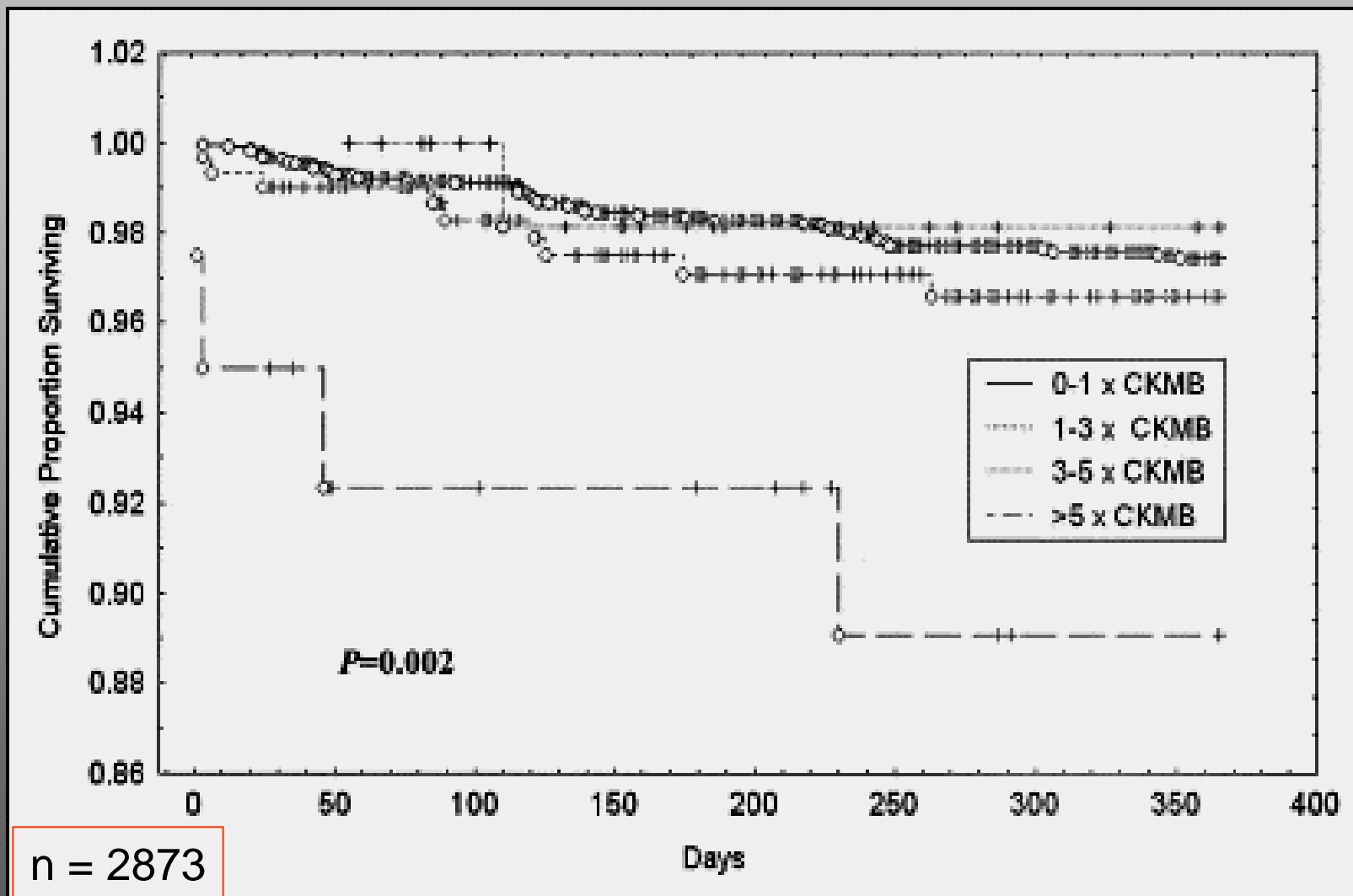
CK-MB post PCI in High Risk Patients



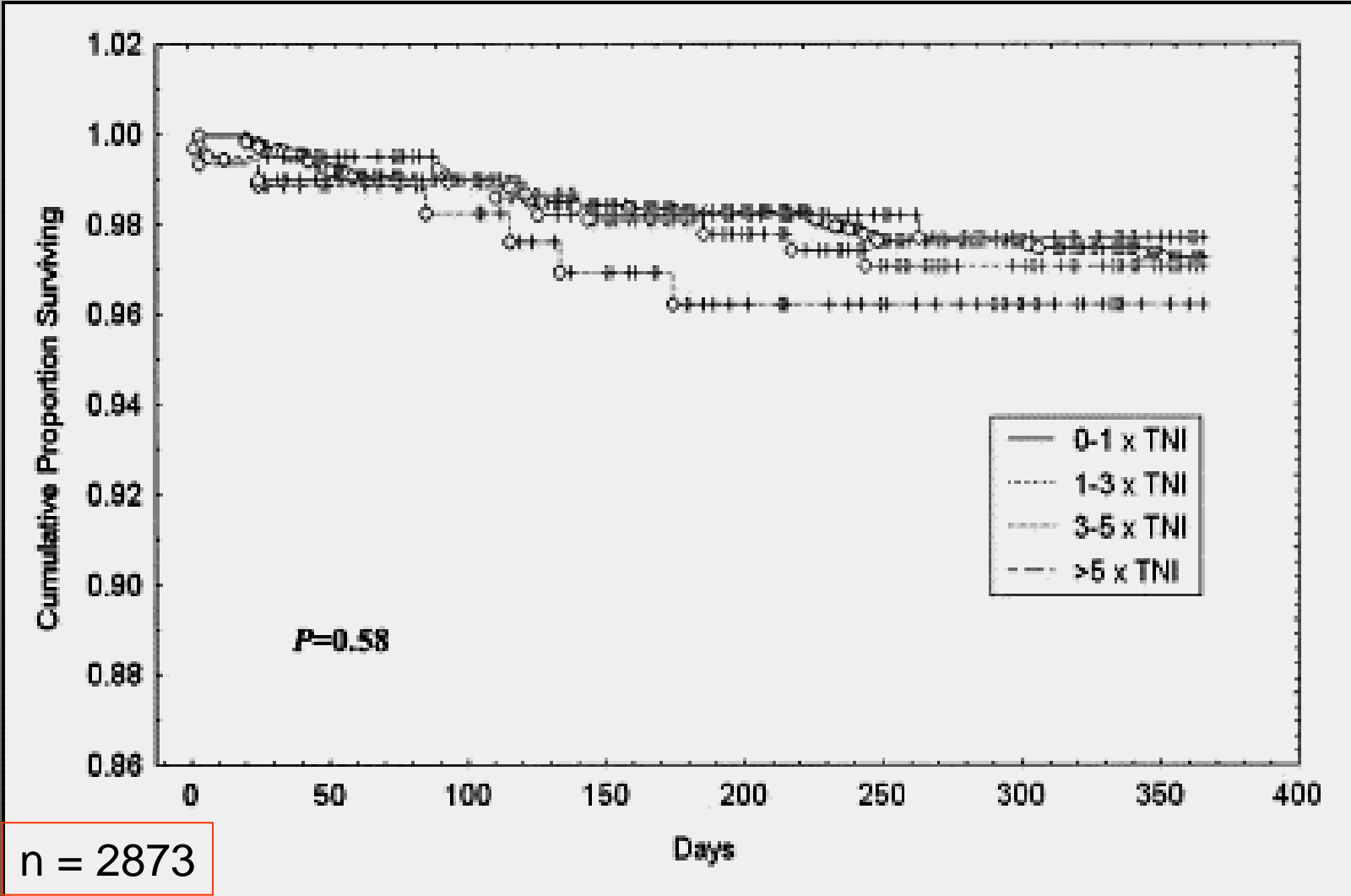
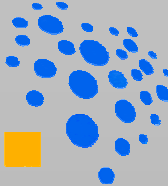
CAPTURE, EPIC, EPILOG



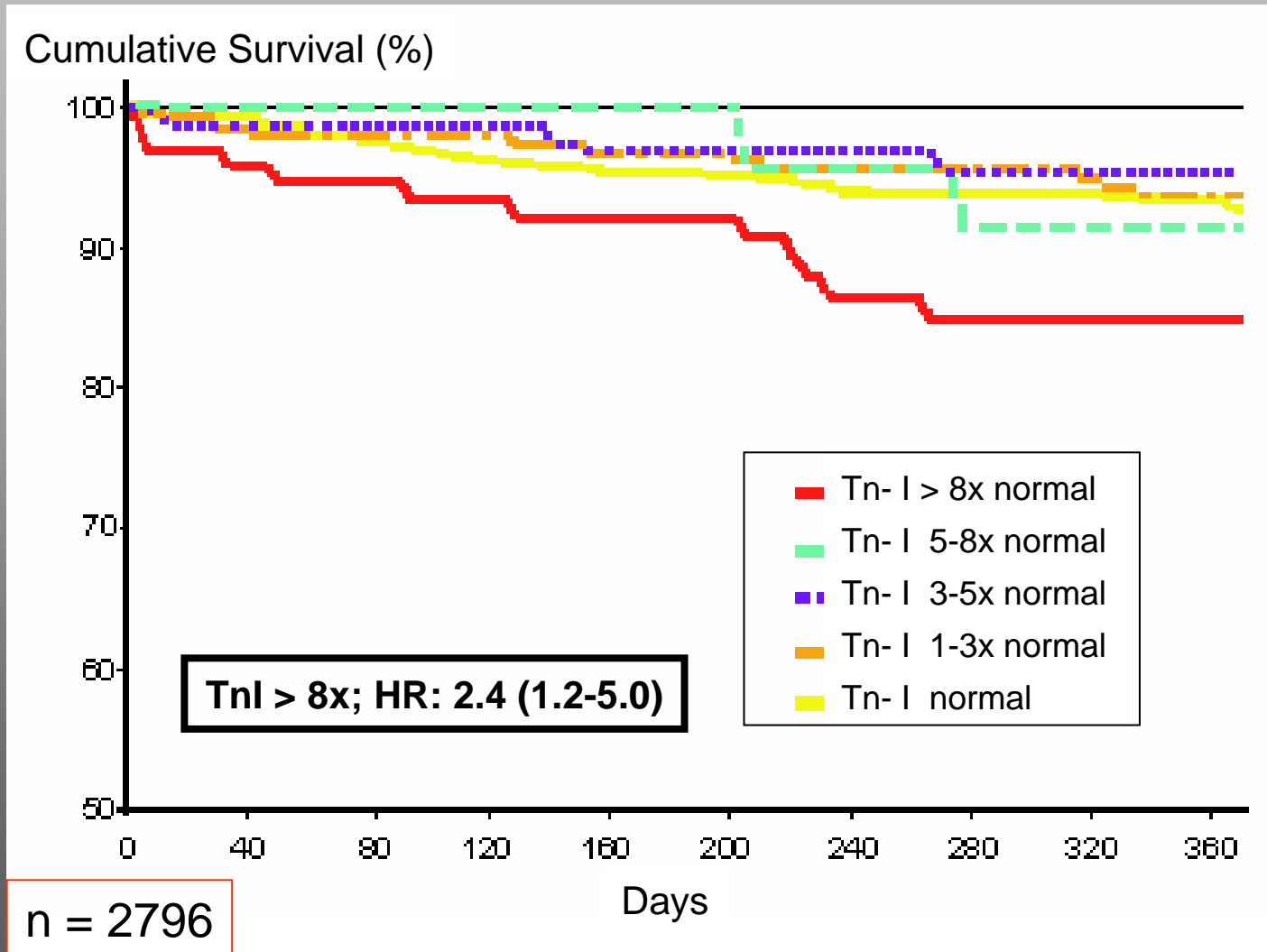
Survival after PCI related to CK-MB



Survival after PCI Related to Troponin I



Cumulative Survival after PCI

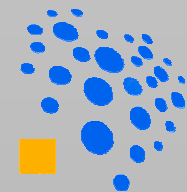


Cardiac Markers Elevation



Causes of PCI induced CK-MB elevations

- Side branch closure (23%)
- Slow flow/ no reflow (7%)
- Transient vessel closure (4%)
- Embolization of thrombus (2%)
- Prolonged balloon inflation (4%)
- Severe dissection (3%)
- Other: DC, drug-induced, haematoma



Predictors of Large Troponin I Elevations after PCI

Clinical Predictor	HR	95% CI	p Value
Thrombus present	3.0	1.3-6.5	0.007
Abrupt closure	8.0	2.3-27.9	0.001
No-reflow	4.5	1.3-15.5	0.016
Perforation	6.4	1.1-37.0	0.040
Sidebranch occlusion	7.9	2.6-23.9	<0.001

HR = hazard ratio CI = confidence interval



Summary

- ✓ Biomarkers frequently elevated after PCI / CABG
- ✓ Similar prognostic value:
 - Minor injury not predictive
 - Extensive injury ↓ survival
- ✓ cut – offs:
 - CK-MB > 5 x normal
 - Troponin > ~8 x normal



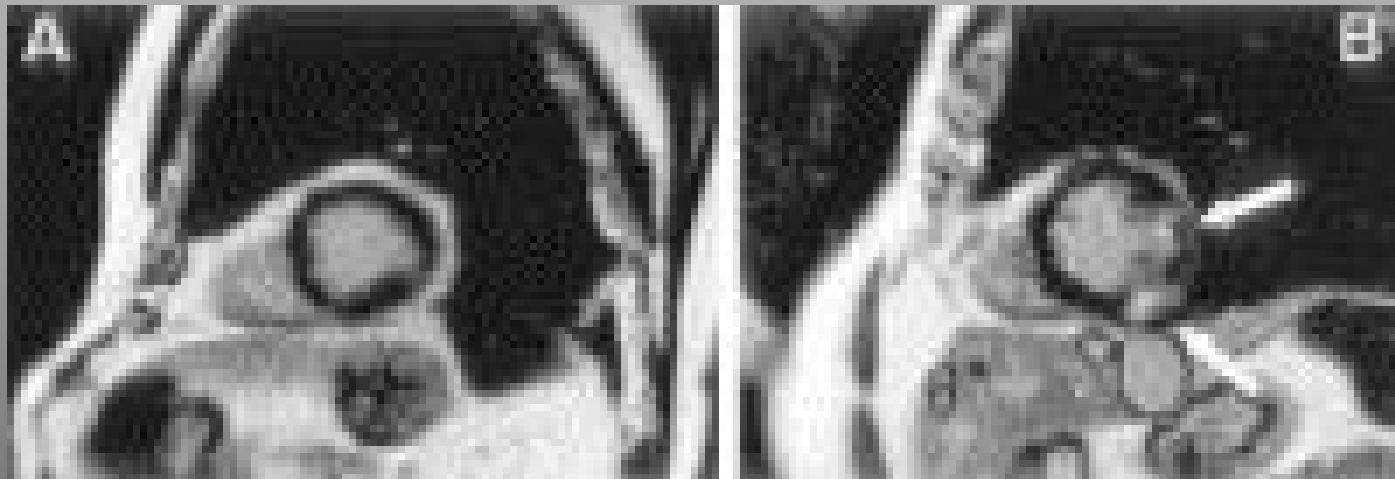
Conclusions

Definition of AMI after intervention (PCI /CABG)
needs to be adapted/specified:
 minor myonecrosis or
 major myocardial injury?



Thank you !

Hyperenhancement by MRI post PCI



Cardiac Markers Elevation



Sampling protocol

- Baseline
- 8 hours post procedure
- 16 hours post procedure



Definition

CK-MB > 3 x upper limit of normal

(CK > 3 x, MB > 5%)

Biochemical Markers of Cell Injury



	Sensitivity	Specificity
CK	+	+
CK-MB	++	++
Troponin T / I	+++	+++
Myoglobin	++	+