

# Trombolisi prehospitalària

**Curs de formació continuada: 'Reperfusió en l'IAMEST 2010'**  
**Societat Catalana de Cardiologia**  
**Tarragona, 26.11.2010**

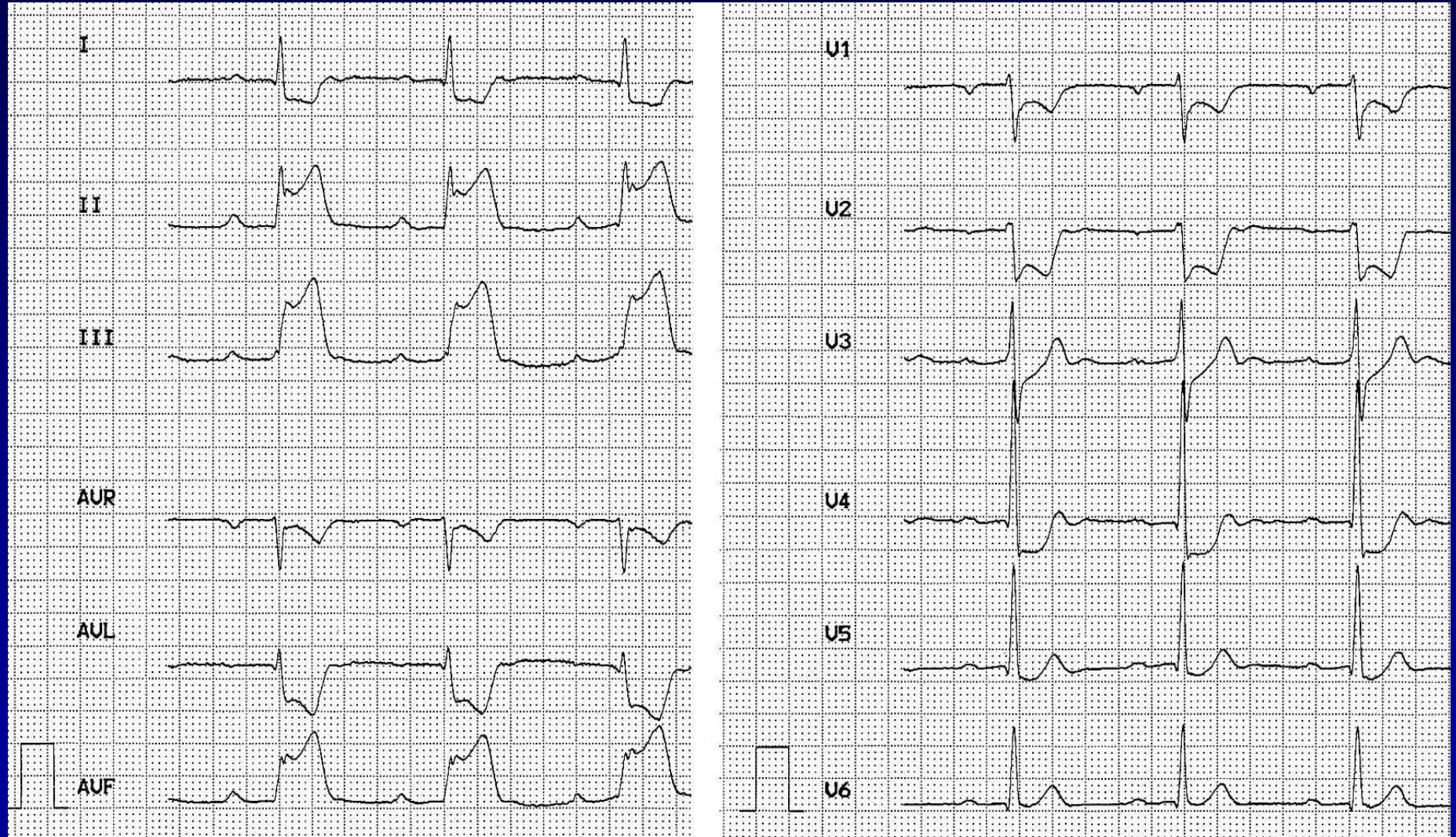
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Unitat Coronària, Servei de Cardiologia, Àrea del Cor  
Hosp. Univ. Vall d'Hebron, Barcelona

# Caso clínico

- Varón de 48 años, fumador de 10 cig/día
- A las 11:00, viajando por trabajo, dolor torácico con sudoración y un vómito → CAP → cede con NTG sl. → ECG al parecer normal → alta y recomendación de prueba de esfuerzo
- A las 13:15 nuevo dolor + sudor + vómito → otro CAP → ECG (14:11)

# Caso clínico (2)

## ECG (56 min de dolor)



# Caso clínico (3)

- El dolor no cede con NTG
- ¿Qué hacer?
  - Traslado al hospital más cercano para trombolisis hospitalaria
  - Trombolisis inmediata in situ
  - Traslado a hospital terciario para ICP primaria

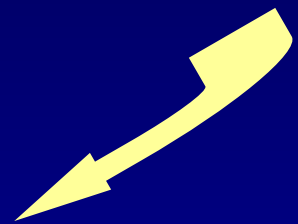
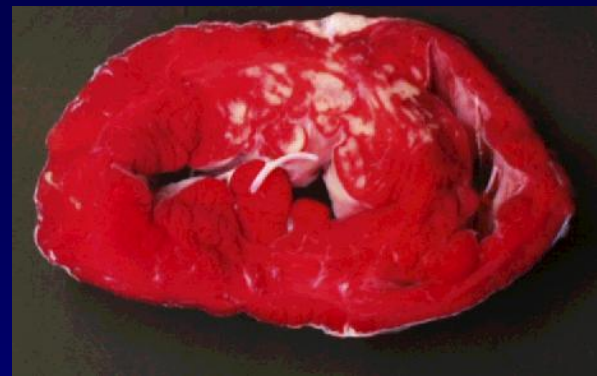
# The Wavefront Phenomenon of Ischemic Cell Death

## 1. Myocardial Infarct Size vs Duration of Coronary Occlusion in Dogs

KEITH A. REIMER, M.D., PH.D., JAMES E. LOWE, M.D.,  
MARGARET M. RASMUSSEN, M.D., PH.D., AND ROBERT B. JENNINGS, M.D.

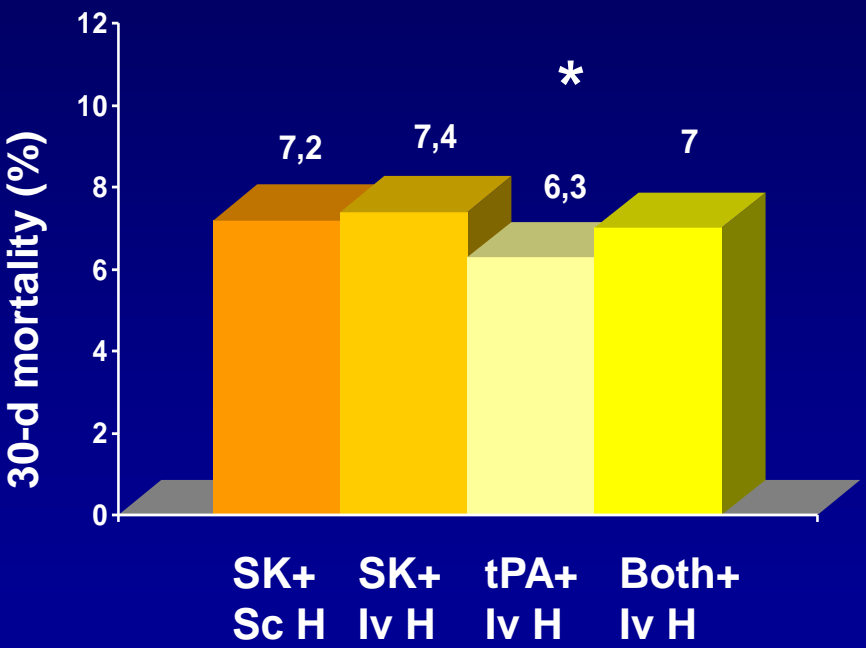
**SUMMARY** Irreversible ischemic myocardial cell injury develops in an increasing number of cells as the duration of coronary occlusion is prolonged. The present study quantitates myocardial necrosis produced by 40 minutes, 3 hours, or 6 hours of temporary circumflex coronary occlusion (CO) followed by 2 to 4 days of reperfusion, or by 24 or 96 hours of permanent circumflex ligation in pentobarbital anesthetized open chest dogs. After 40 minutes of ischemia, myocyte necrosis was subendocardial but with increasing duration of coronary

occlusion, irreversible injury progressed as a wavefront toward the subepicardium. Transmural necrosis was  $38 \pm 4\%$  after 40 min,  $57 \pm 7\%$  after 3 hours,  $71 \pm 7\%$  after 6 hours and  $85 \pm 2\%$  after 24 hours of ischemic injury. These results document the presence of a subepicardial zone of ischemic but viable myocardium which is available for pharmacologic or surgical salvage for at least three and perhaps six hours following circumflex occlusion in the dog.

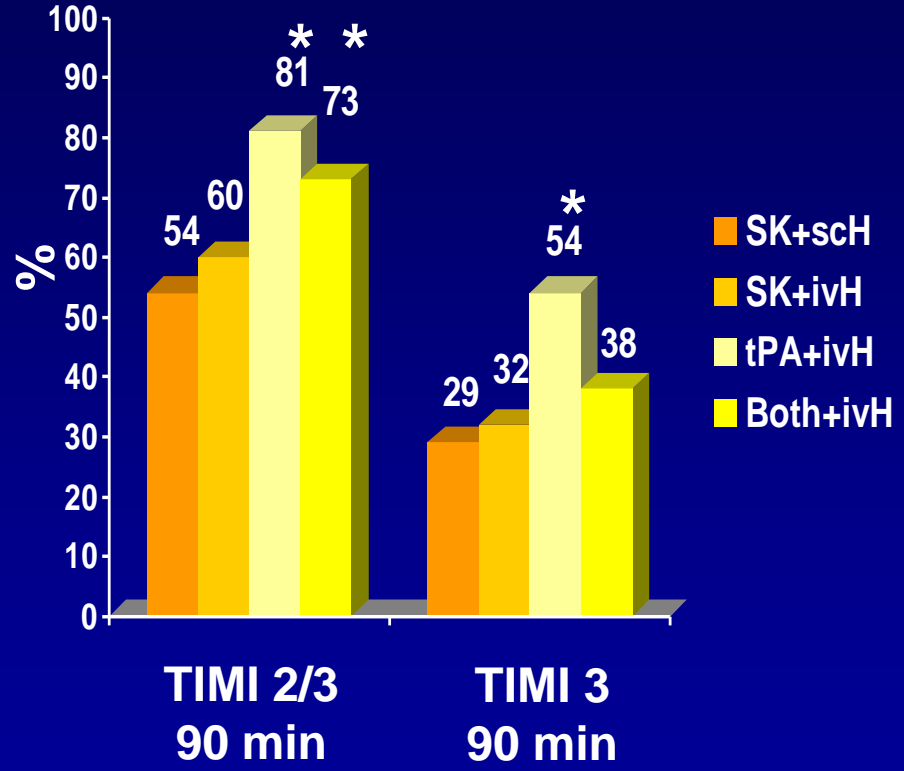


# Beneficio de la pauta acelerada de tPA

**GUSTO-I**  
(n = 41021)



**GUSTO-I**  
(n = 2431)

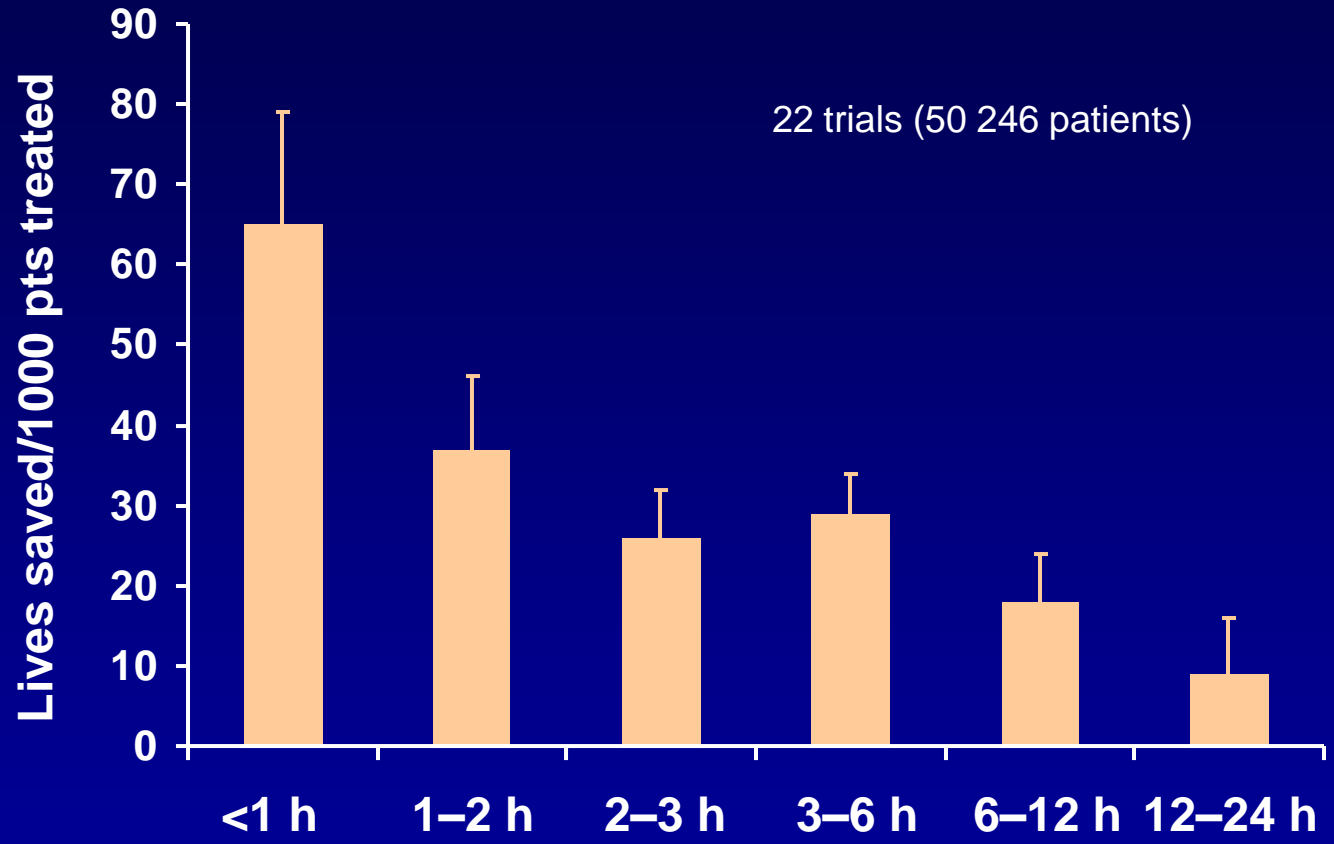


\* P = 0.001

The GUSTO Investigators, NEJM 1993  
The GUSTO Angiographic Investigators, NEJM 1993

- Eficacia limitada en apertura rápida de arterias
- Existencia de contraindicaciones
- Riesgo hemorrágico (ACV 1%)
- Riesgo de reoclusión (6% en GUSTO)
- Dudoso beneficio en shock y limitado en ancianos

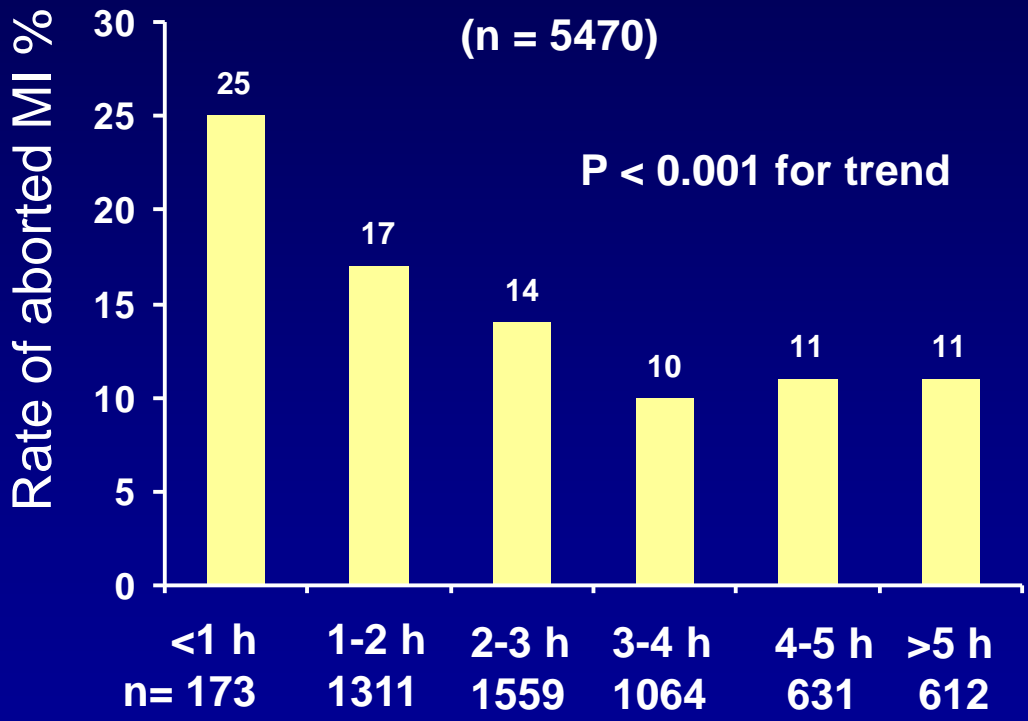
# The 'golden hour' in the benefit of thrombolysis in AMI



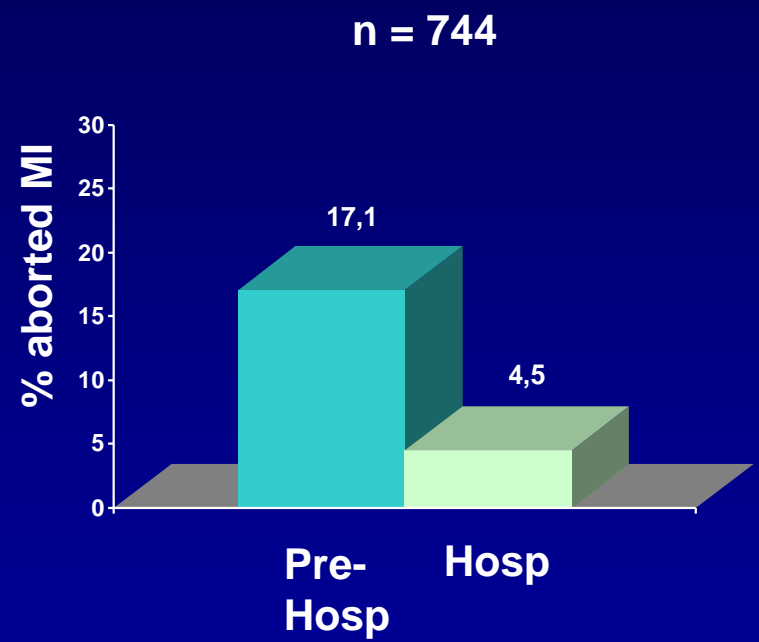


# Aborted myocardial infarction after thrombolytic therapy

## ASSENT-3

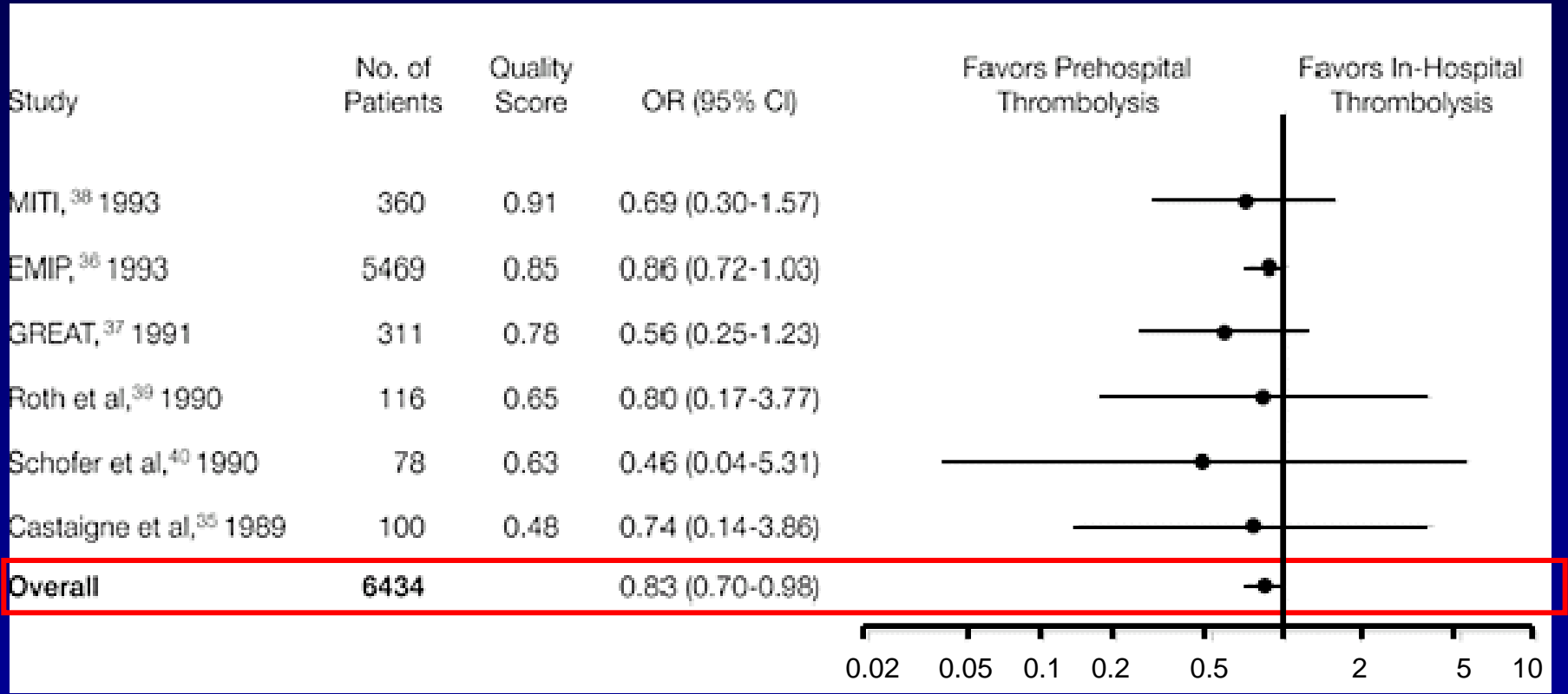


Taher et al, JACC 2004



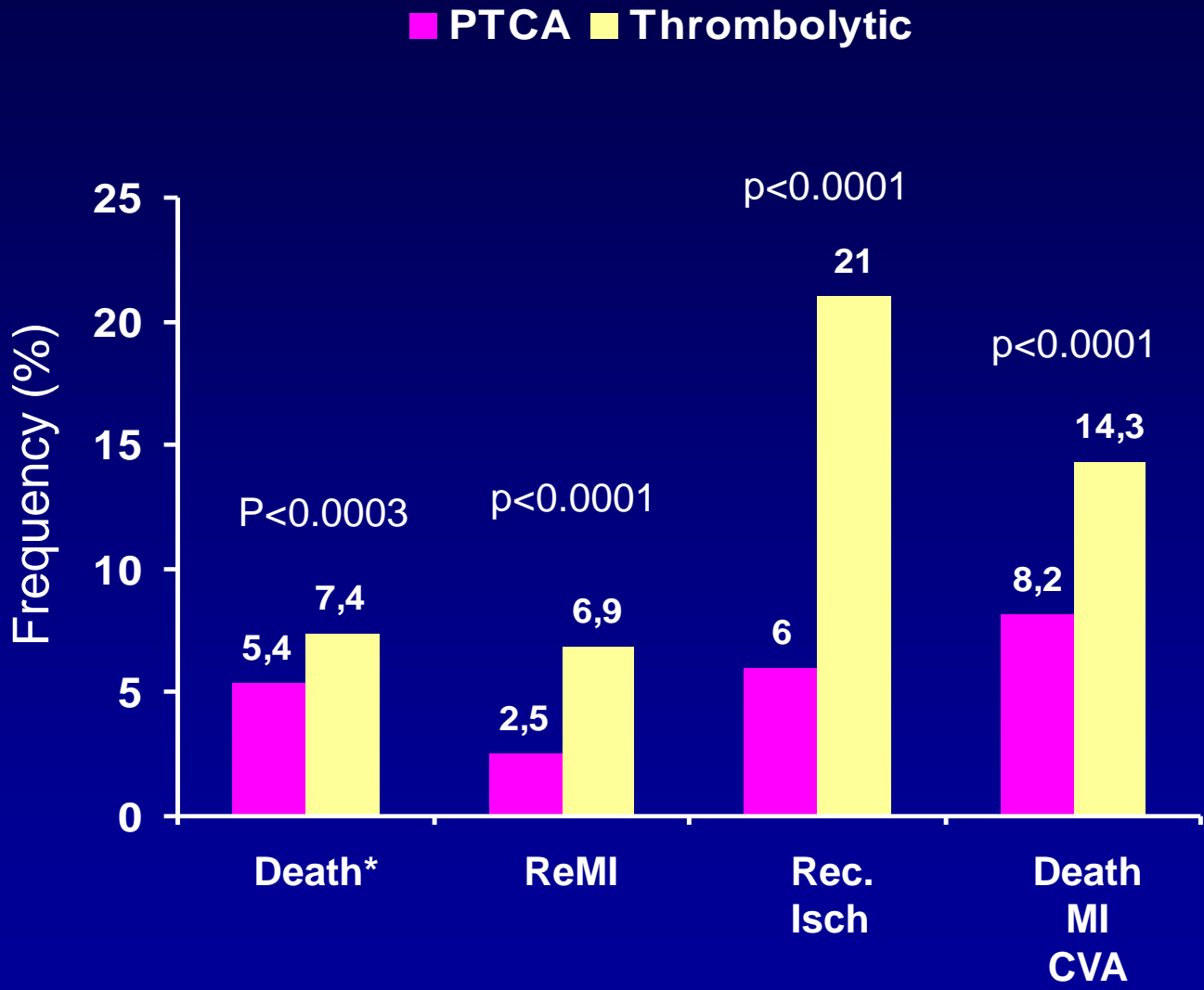
Lamfers et al, Heart 2003

# Trombolisis prehospitalaria vs. hospitalaria y mortalidad del IAM



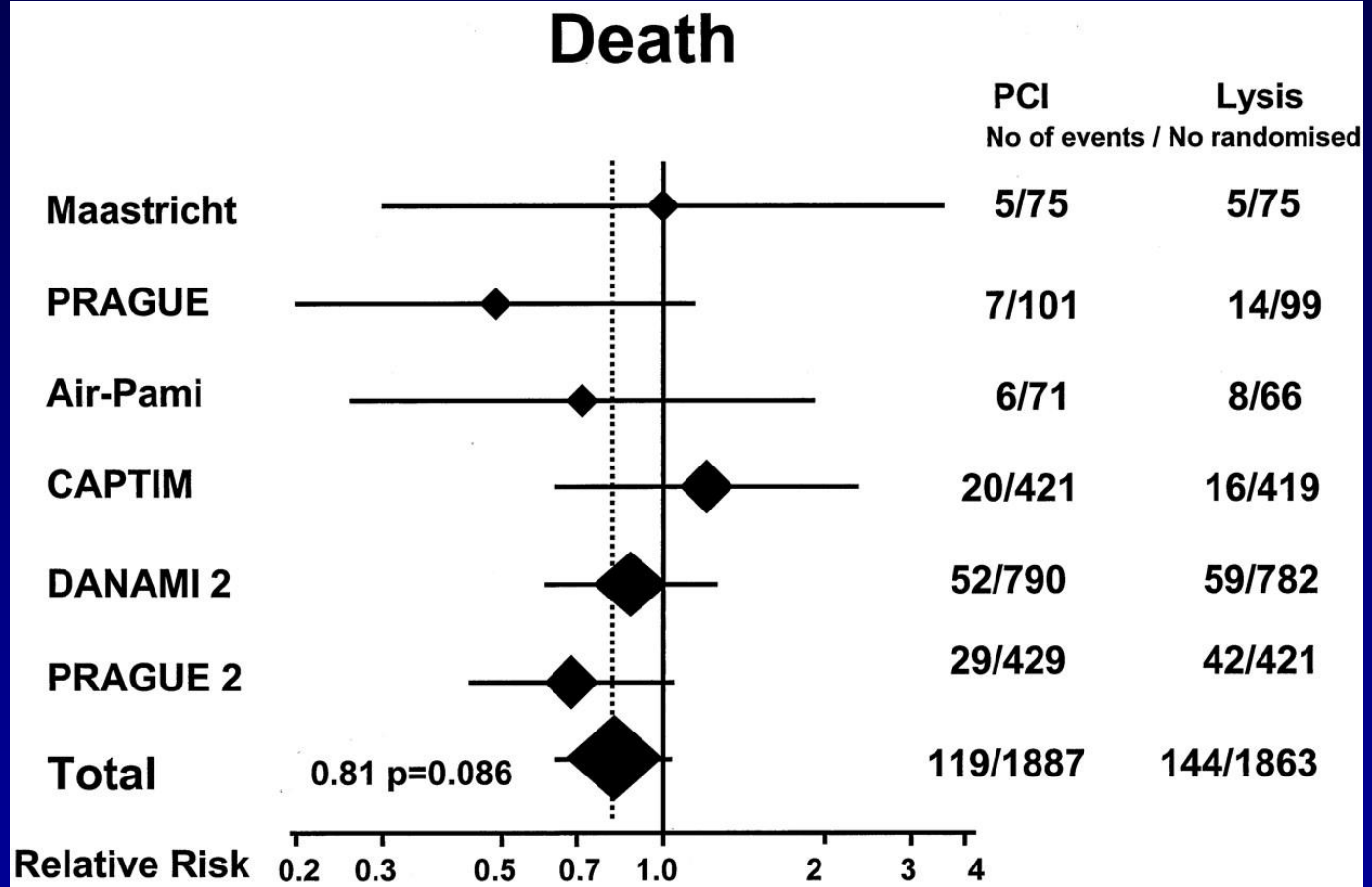
OR(95% CI)

# Primary PTCA vs. thrombolysis in AMI: short-term outcomes in a meta-analysis of 23 trials (n = 7739)



\*No SHOCK data

# On-site thrombolysis vs. transfer for primary PTCA



**MINI REVIEW:  
EXPERT OPINIONS**



**Fibrinolytic Therapy**

**Is It A Treatment of the Past?**

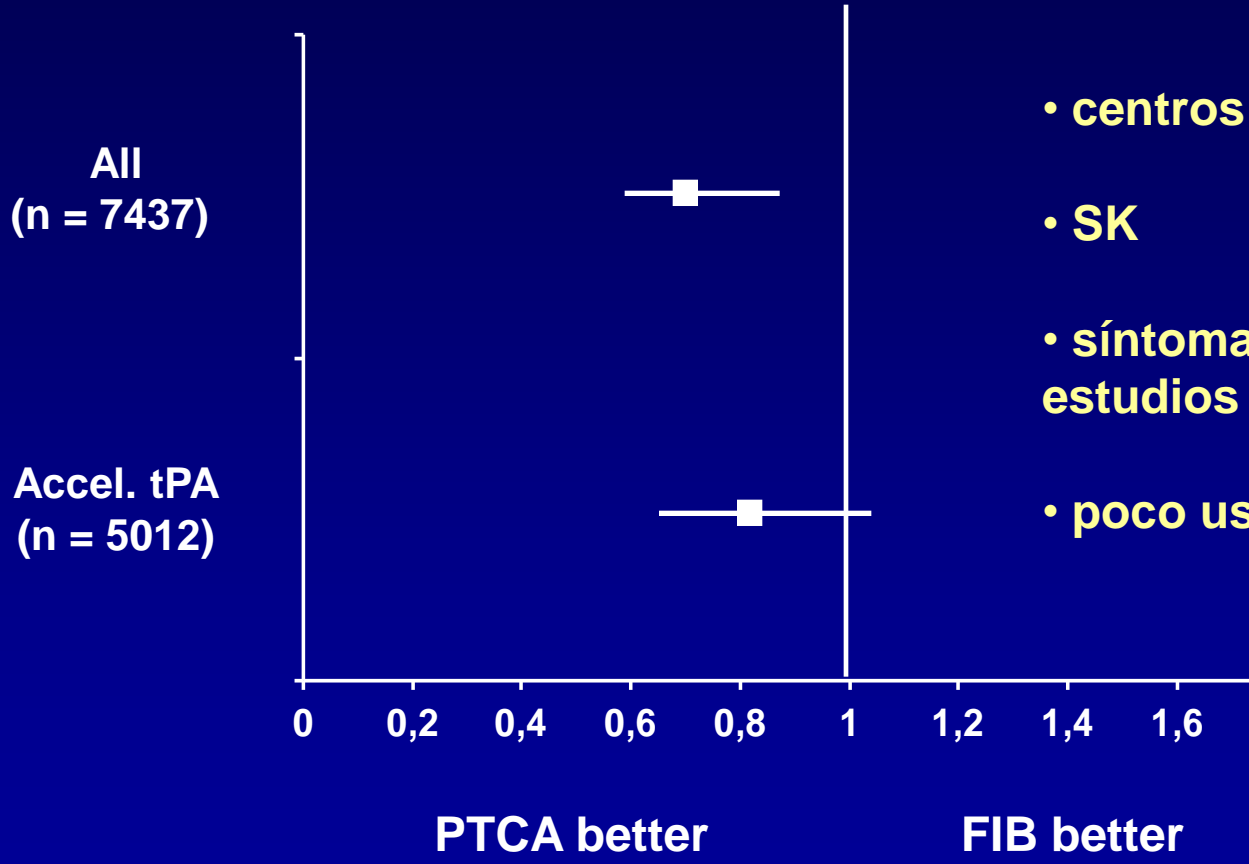
Cindy L. Grines, MD; Patrick Serruys, MD; William W. O'Neill, MD

Circulation 2003



# Primary PTCA vs. thrombolysis: short-term mortality in a meta-analysis of 23 trials

OR (95% CI) for short-term death



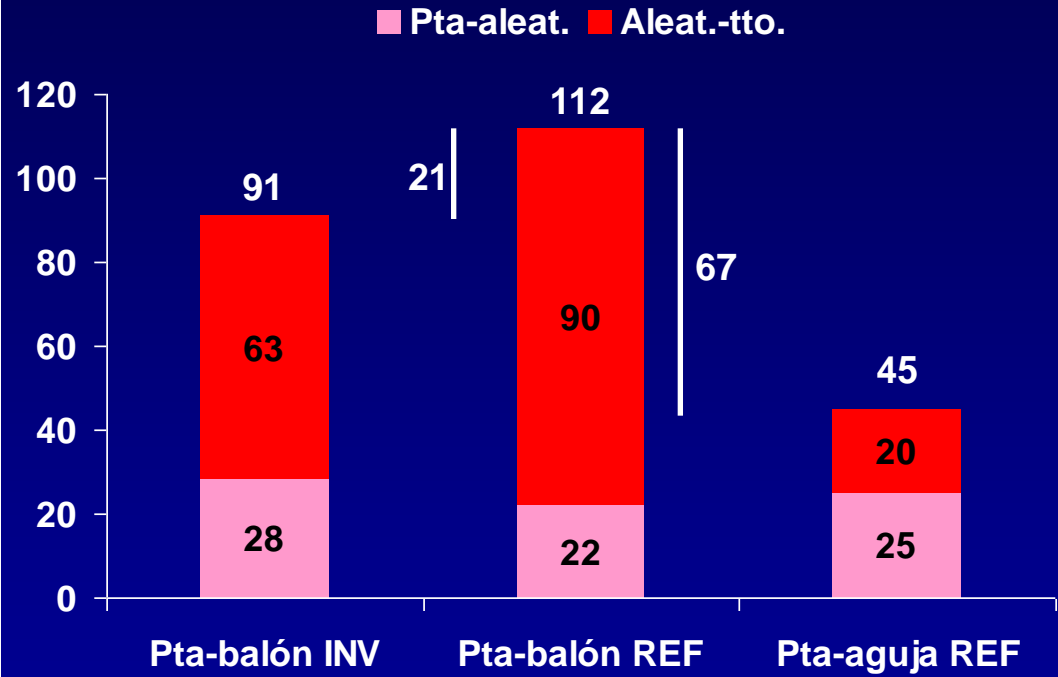
- centros de excelencia
- SK
- síntomas hasta 12 h en 7/11 estudios
- poco uso de ACTP de rescate

# Tiempos hasta la reperusión en el estudio DANAMI-2

**Table 2. Time from Onset of Symptoms to Start of Fibrinolytic or Angioplastic Treatment.\***

Variable	Fibrinolysis Group		Angioplasty Group	
	Referral Hospitals (N=562)	Invasive-Treatment Centers (N=220)	Referral Hospitals (N=567)	Invasive-Treatment Centers (N=223)
<i>minutes</i>				
Interval from onset of symptoms to admission				
Median	105	104	107	105
Interquartile range	60-202	54-189	60-205	61-185
Interval from admission to randomization				
Median	25	30	22	28
Interquartile range	18-40	20-45	15-35	20-43
Interval from randomization to start of treatment				
Median	20	20	90	63
Interquartile range	15-30	13-30	74-108	49-77
Interval from arrival to start of interhospital transportation by ambulance				
Median	—	—	50	—
Interquartile range	—	—	39-65	—
Duration of interhospital transportation by ambulance				
Median	—	—	32	—
Interquartile range	—	—	20-45	—
Interval from arrival at invasive-treatment center to first balloon inflation				
Median	—	—	26	93
Interquartile range	—	—	20-38	77-113
Total interval from onset of symptoms to start of treatment†				
Median	169	160	224	188
Interquartile range	110-270	110-255	171-317	145-273

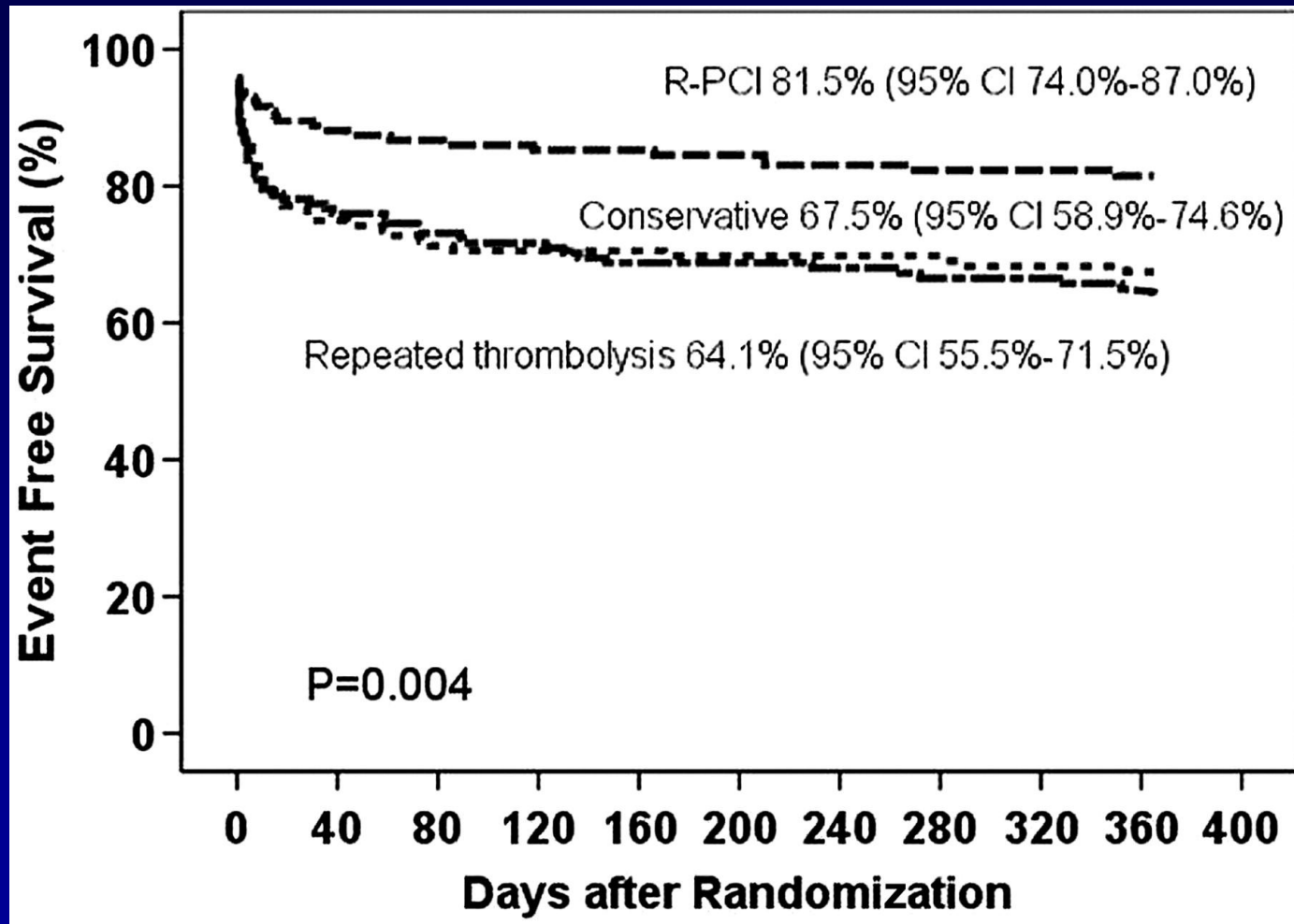
\* The start of treatment was defined as the start of fibrinolysis or the first balloon inflation.  
 † P<0.001 for the comparison between referral hospitals and invasive-treatment centers in terms of the interval from the onset of symptoms to the first balloon inflation in the angioplasty group; the difference between referral hospitals and invasive-treatment centers with respect to the start of fibrinolysis was nonsignificant.



- Angioplastia de rescate 2%
- Retrombolisis precoz 3%

N = 1472

# Benefit of rescue PCI: REACT trial (1-year results)



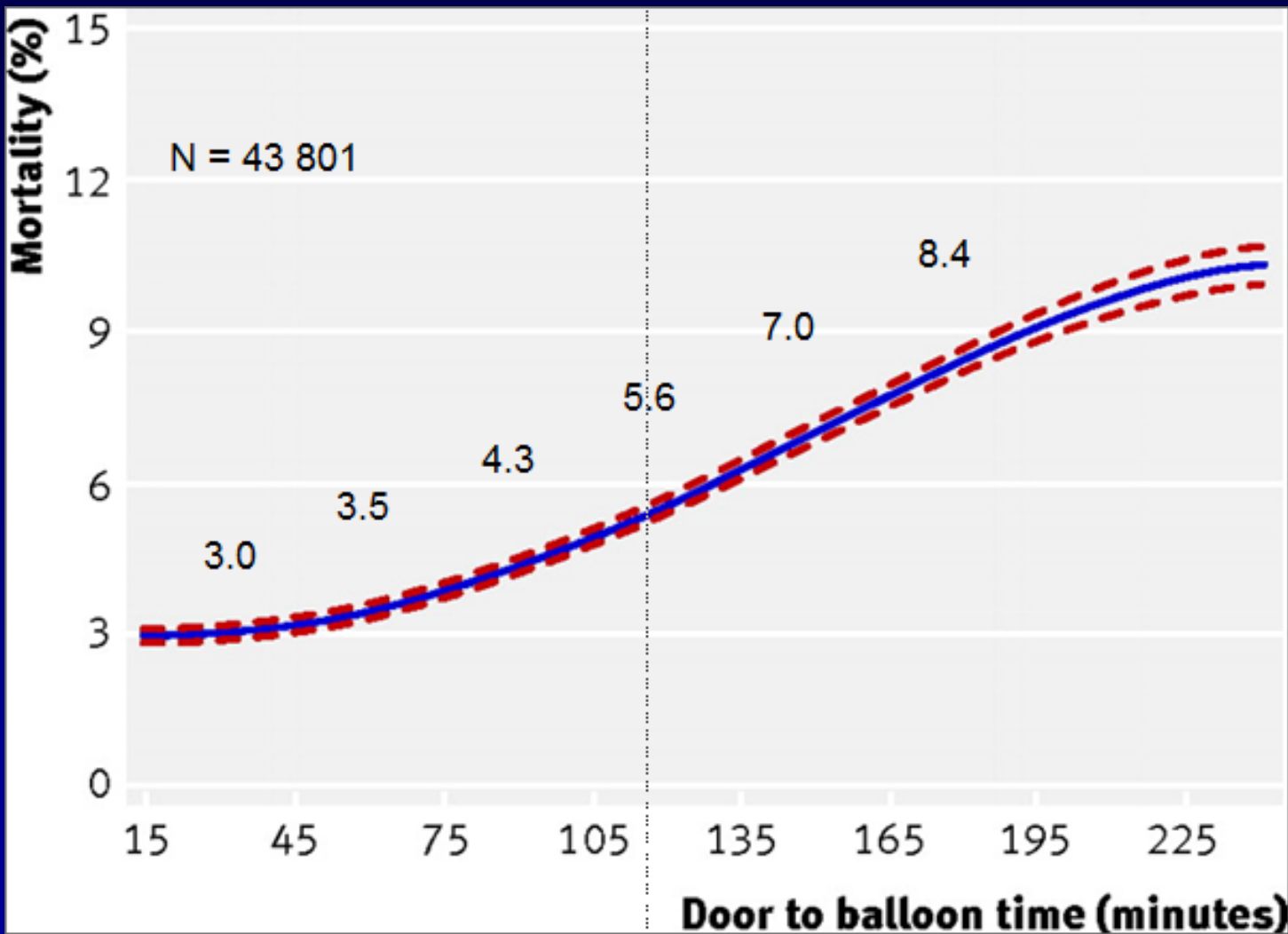
N = 427

Carver A et al. J Am Coll Cardiol 2009;54:118-26.



- El máximo beneficio de la trombolisis se obtiene:
  - con su administración extrahospitalaria
  - en infartos con poco tiempo de evolución
  - con un uso liberal de ACTP de rescate si fracasa
- La ACTP primaria es claramente superior a la trombolisis cuando ambos tratamientos se pueden aplicar en igualdad de condiciones

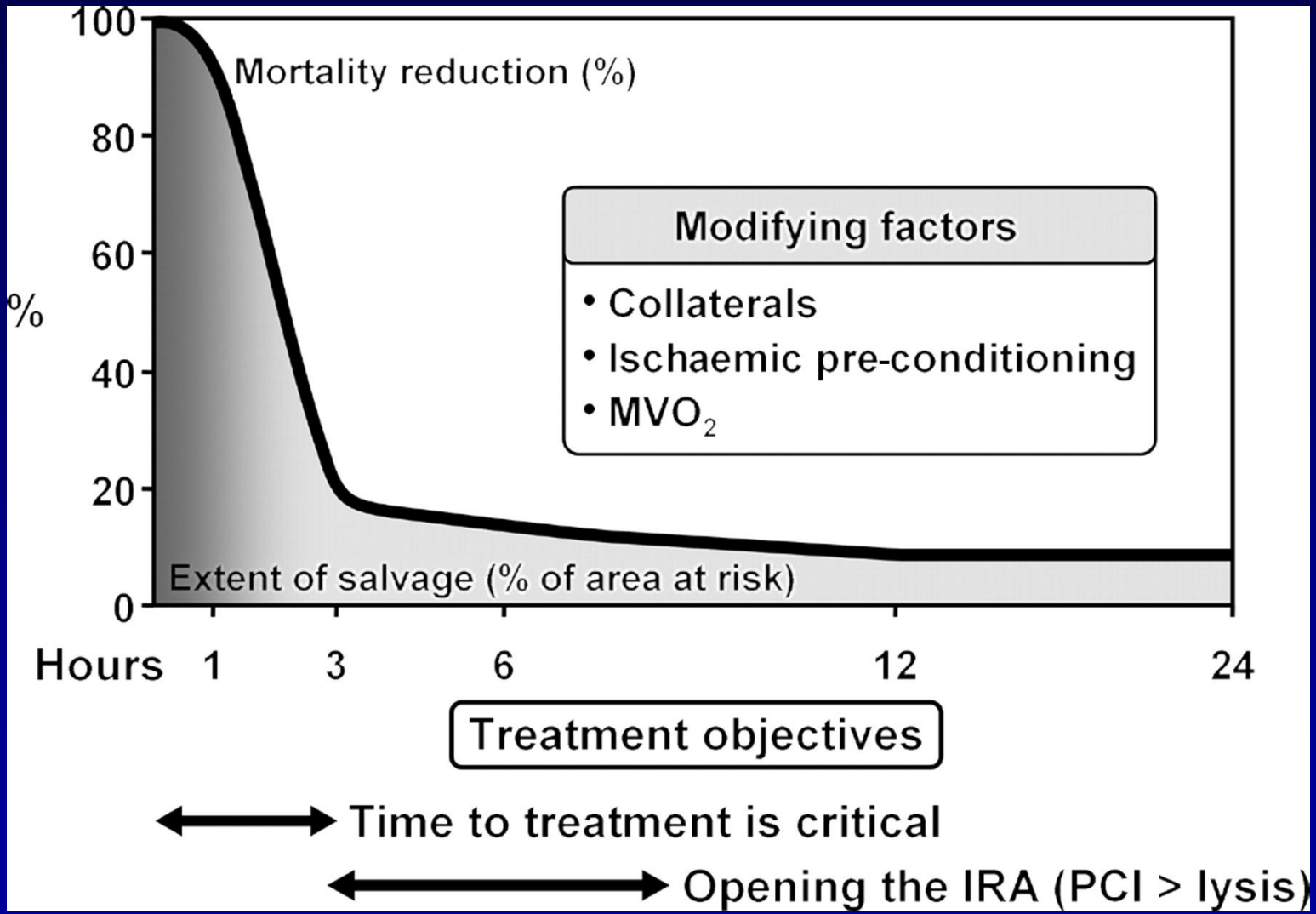
# Efecto del tiempo en el beneficio de la ACTP primaria



# ¿Con cuánto retraso (Door-to-balloon–Door-to-needle) se pierde el beneficio de la ICP?

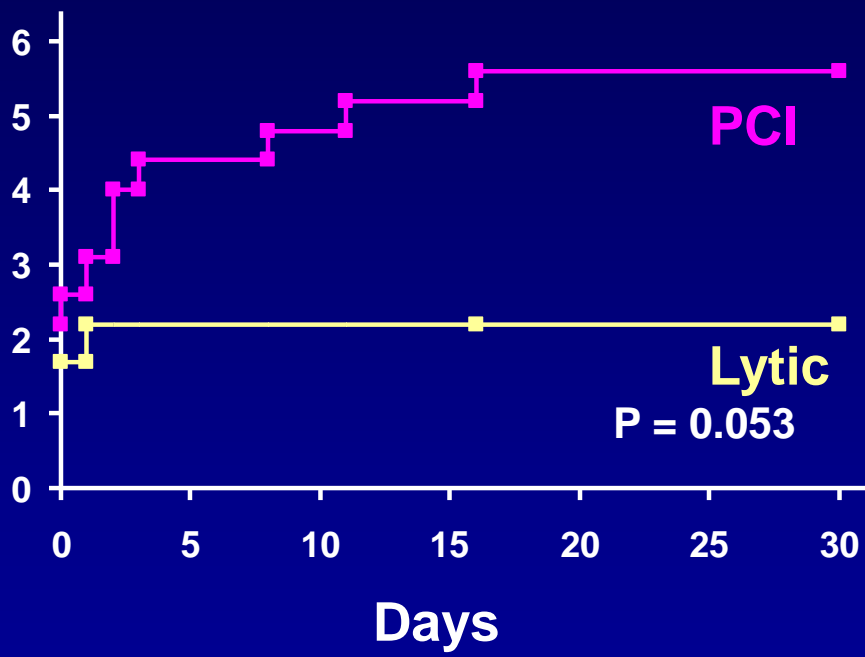
- Análisis de ensayos clínicos:
  - 60 min (Nallamothu & Bates, Am J Cardiol 2003)
  - 110 min (Betriu & Masotti, Am J Cardiol 2005)
  - 120 min (Boersma, Eur Heart J 2006)
- Análisis de registros:
  - 114 min (Pinto et al, Circulation 2006)
- Análisis de registros, pacientes transportados:
  - 107 min (Pinto et al, AHA 2010)

# Hypothetical relationship between time to treatment and the reduction in mortality and extent of salvage

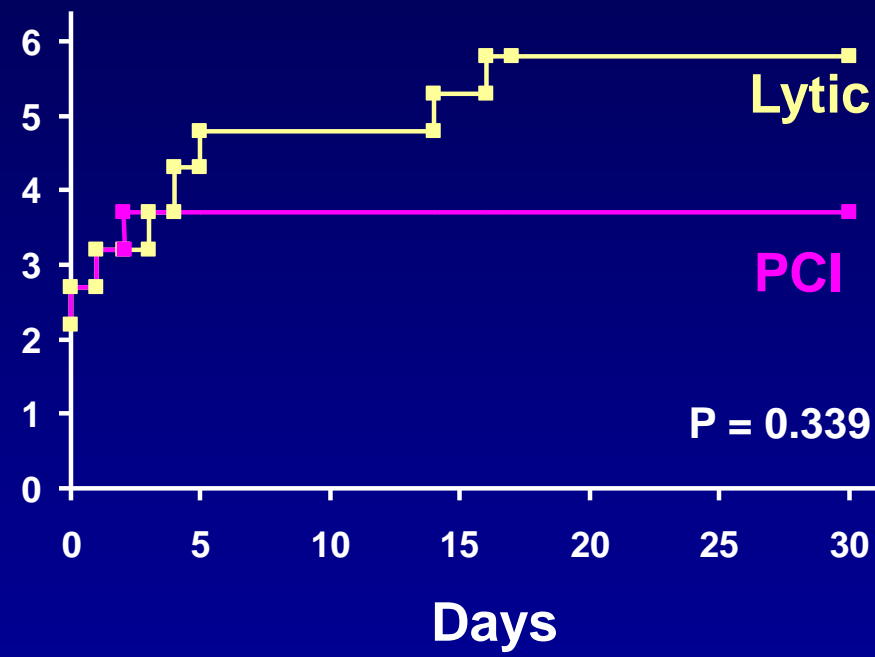


# Thrombolysis vs. primary PTCA: impact of time to treatment on mortality

## The CAPTIM Study (n = 840)

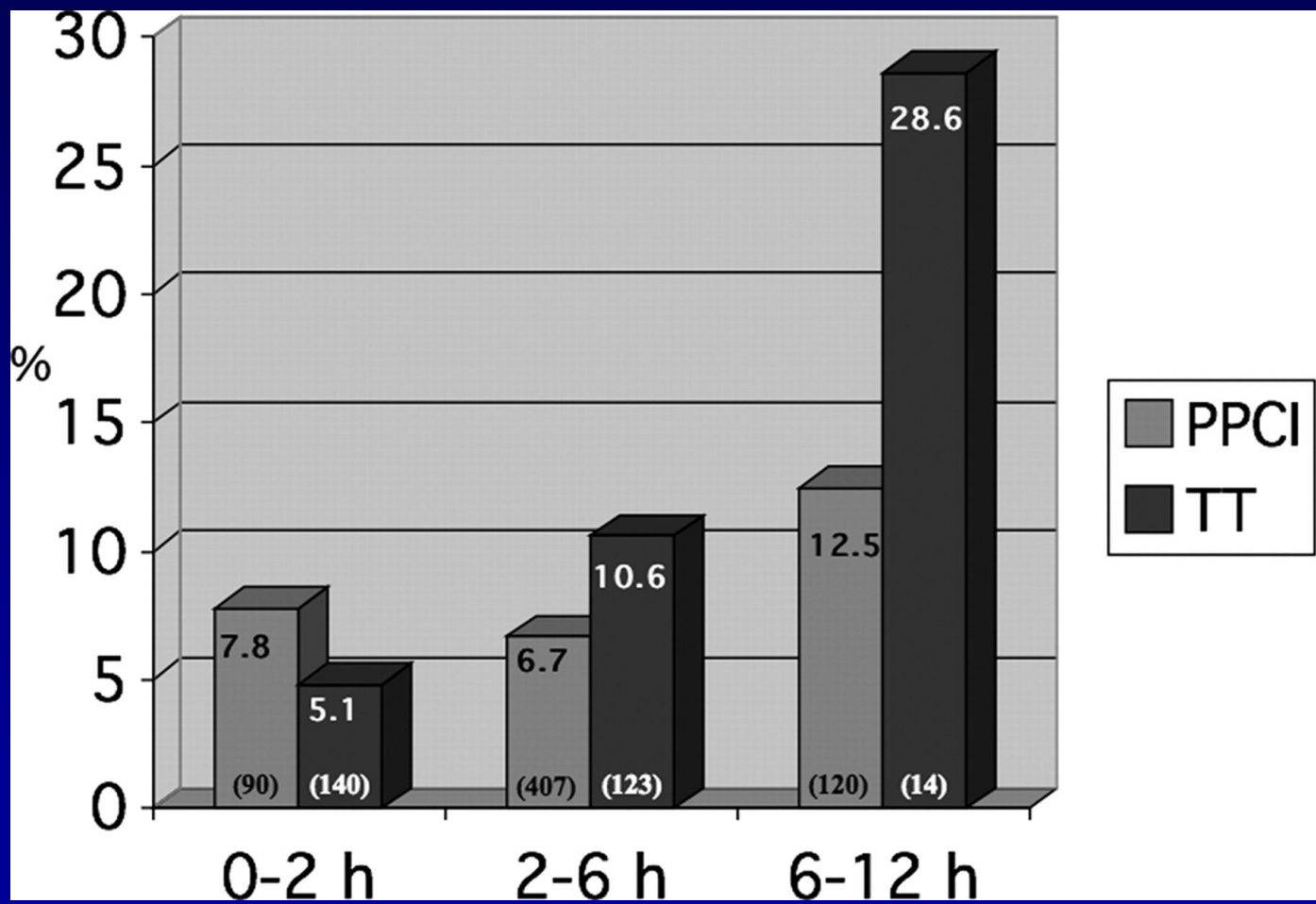


Delay < 2 hours

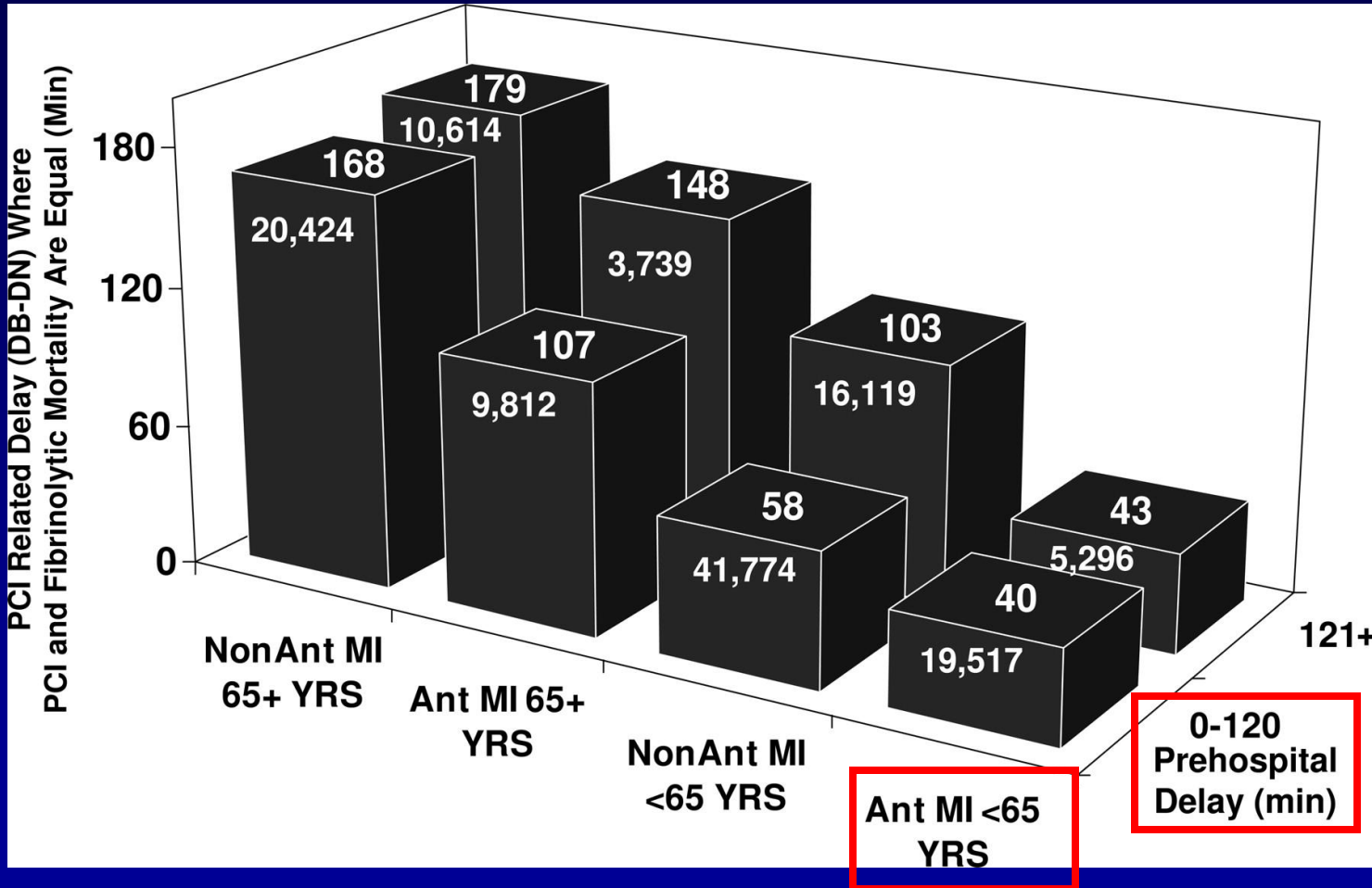


Delay ≥ 2 hours

## La red de atención al IAMEST de Viena

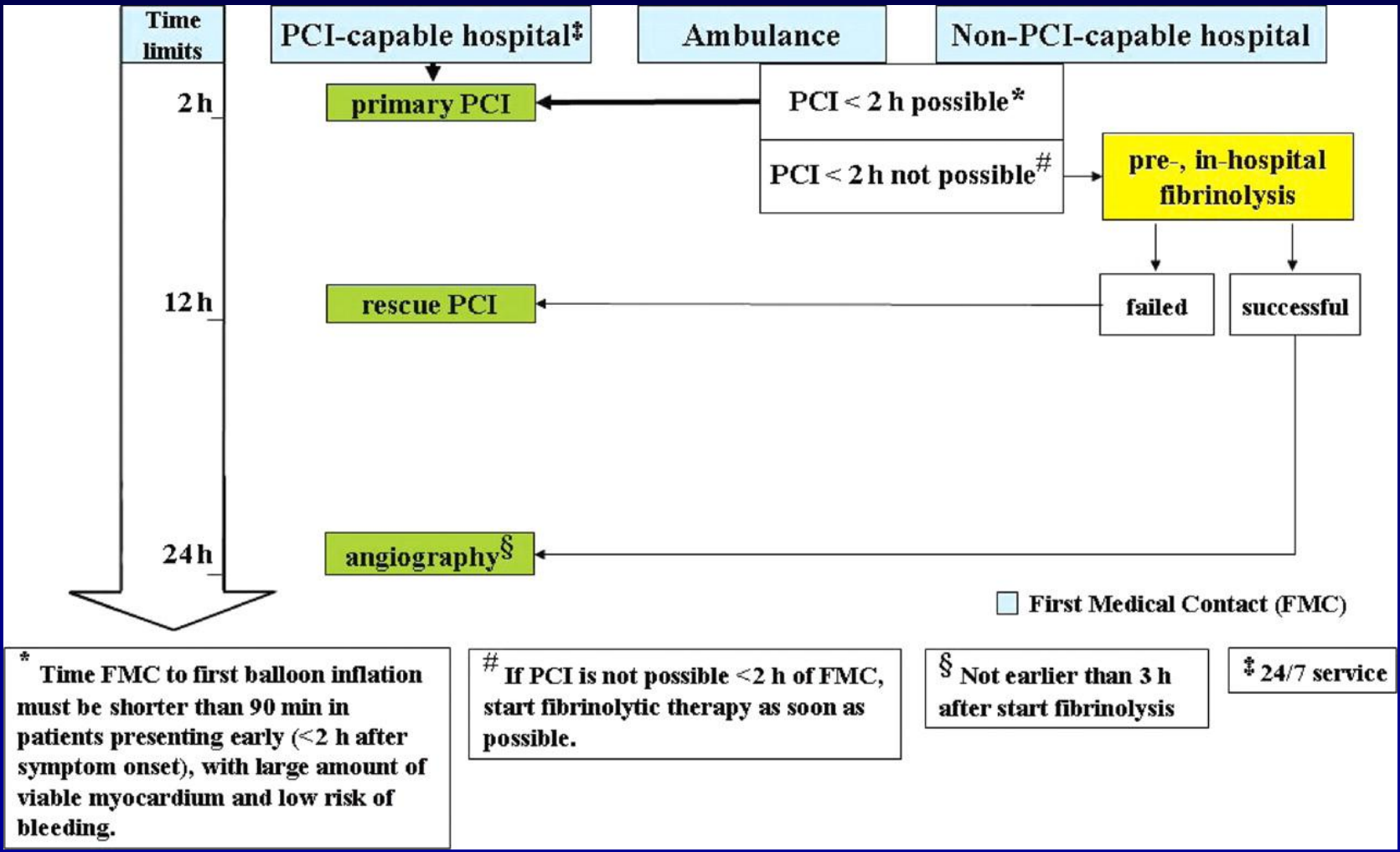


# ¿Con cuánto retraso (Door-to-balloon–Door-to-needle) se pierde el beneficio de la ICP primaria sobre la trombolisis?



N = 192 509

# Estrategia de reperfusión recomendada por la ESC





# ¿Se cumplen estas recomendaciones en la vida real?

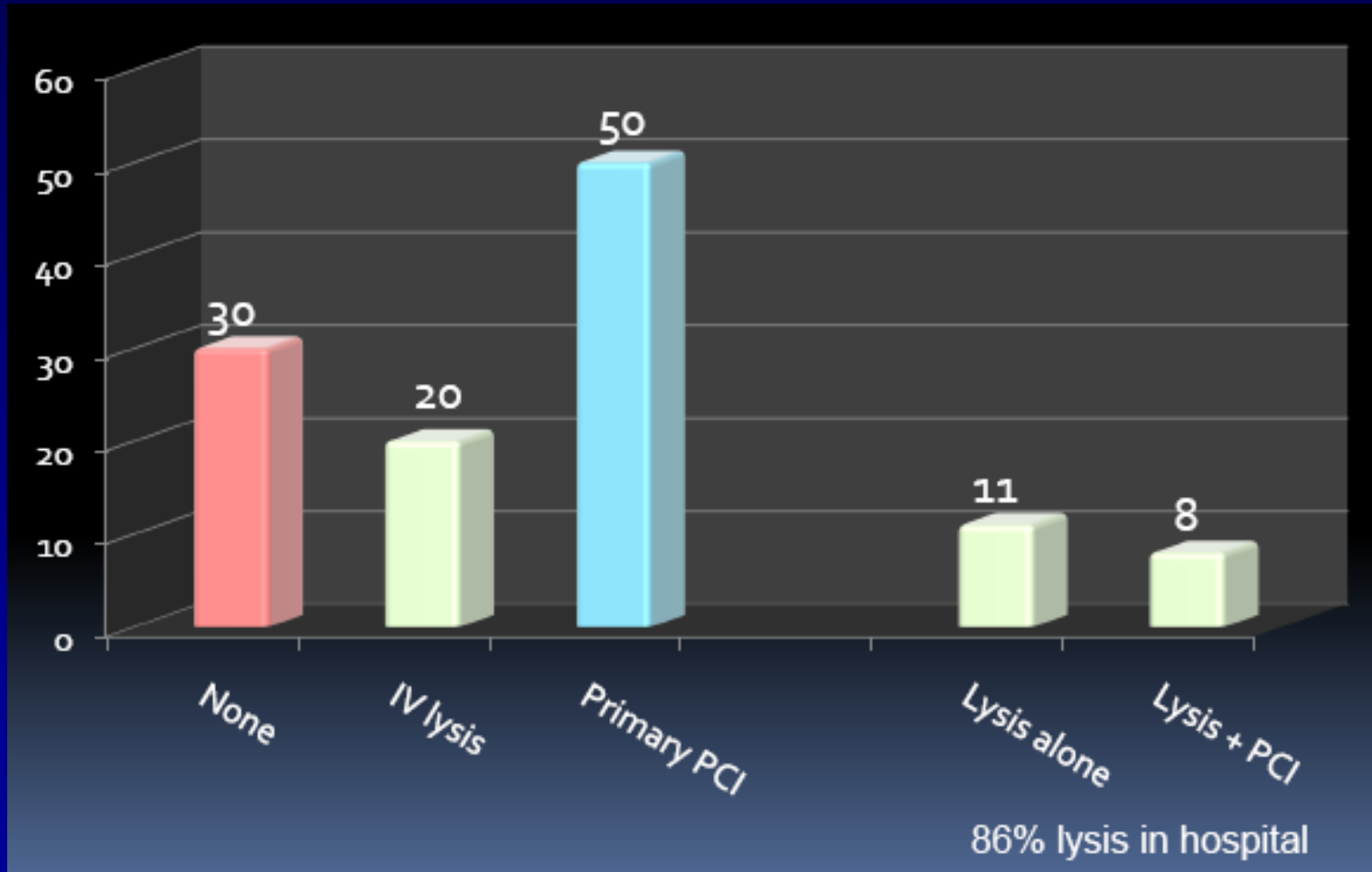
## Estado de Massachusetts

Year	Mean DTB time (no transfer)	Mean DTB time (inter-hospital transfer)	Mean Inter-hospital Transfer Time	DTB Time ≤90 minutes (no transfer)	DTB Time ≤90 minutes (inter-hospital transfer)
2005 (n=1952)	92.9 minutes	171.1 minutes	128.6 minutes	56.6%	4.1%
2006 (n=2052)	87.9 minutes	160.2 minutes	120.3 minutes	62.1%	6.8%
2007 (n=2152)	78.7 minutes	142.0 minutes	108.1 minutes	74.6%	10.6%
2008 (n=1592)	71.7 minutes	136.4 minutes	103.8 minutes	81.3%	15.4%

- Por cada 15 min adicionales de retraso, la mortalidad hospitalaria aumentó un 4.7%

# ¿Se cumplen estas recomendaciones en la vida real?

## European Heart Survey Snapshot 2009

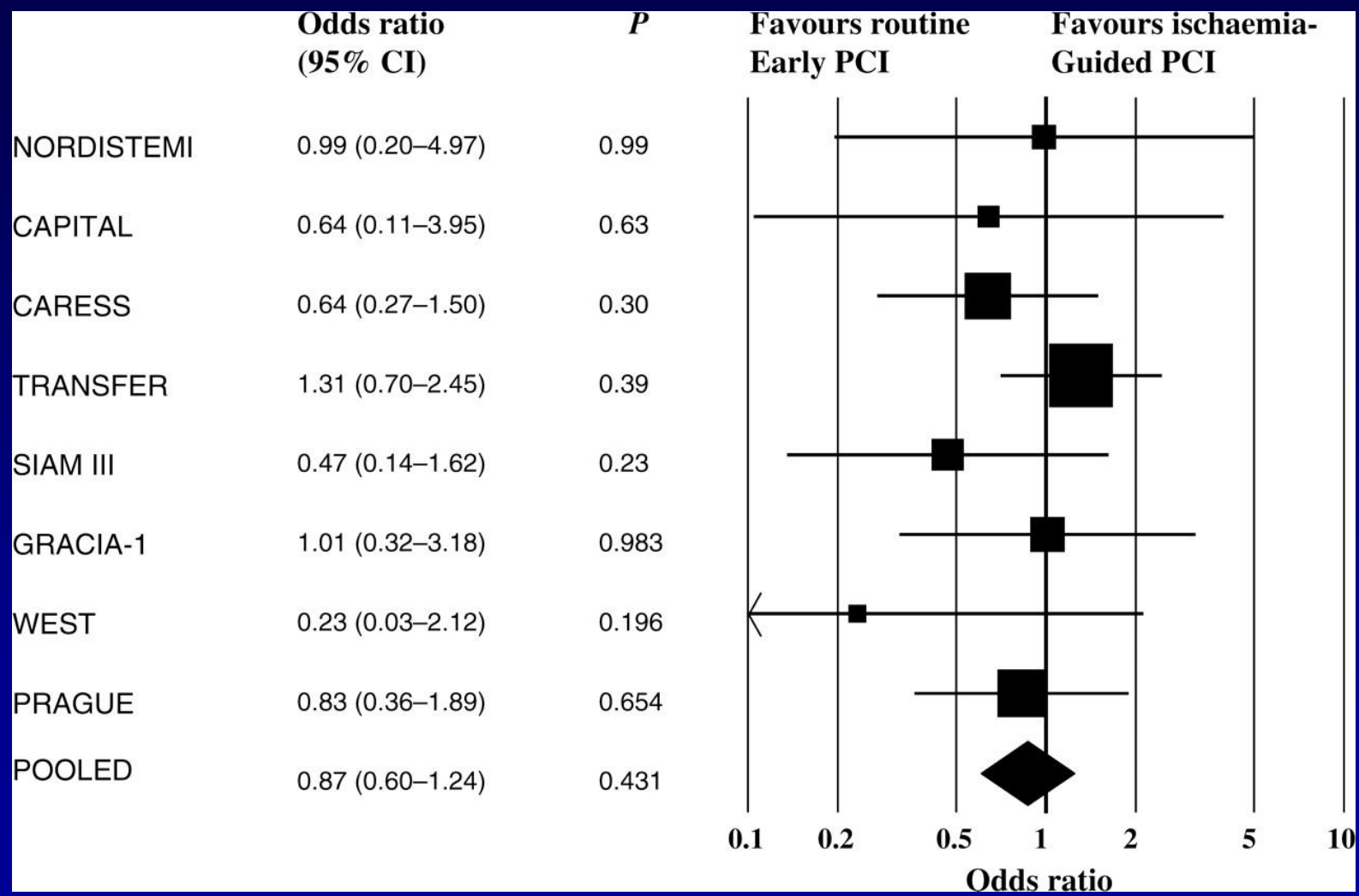


# ¿Se cumplen estas recomendaciones en la vida real?

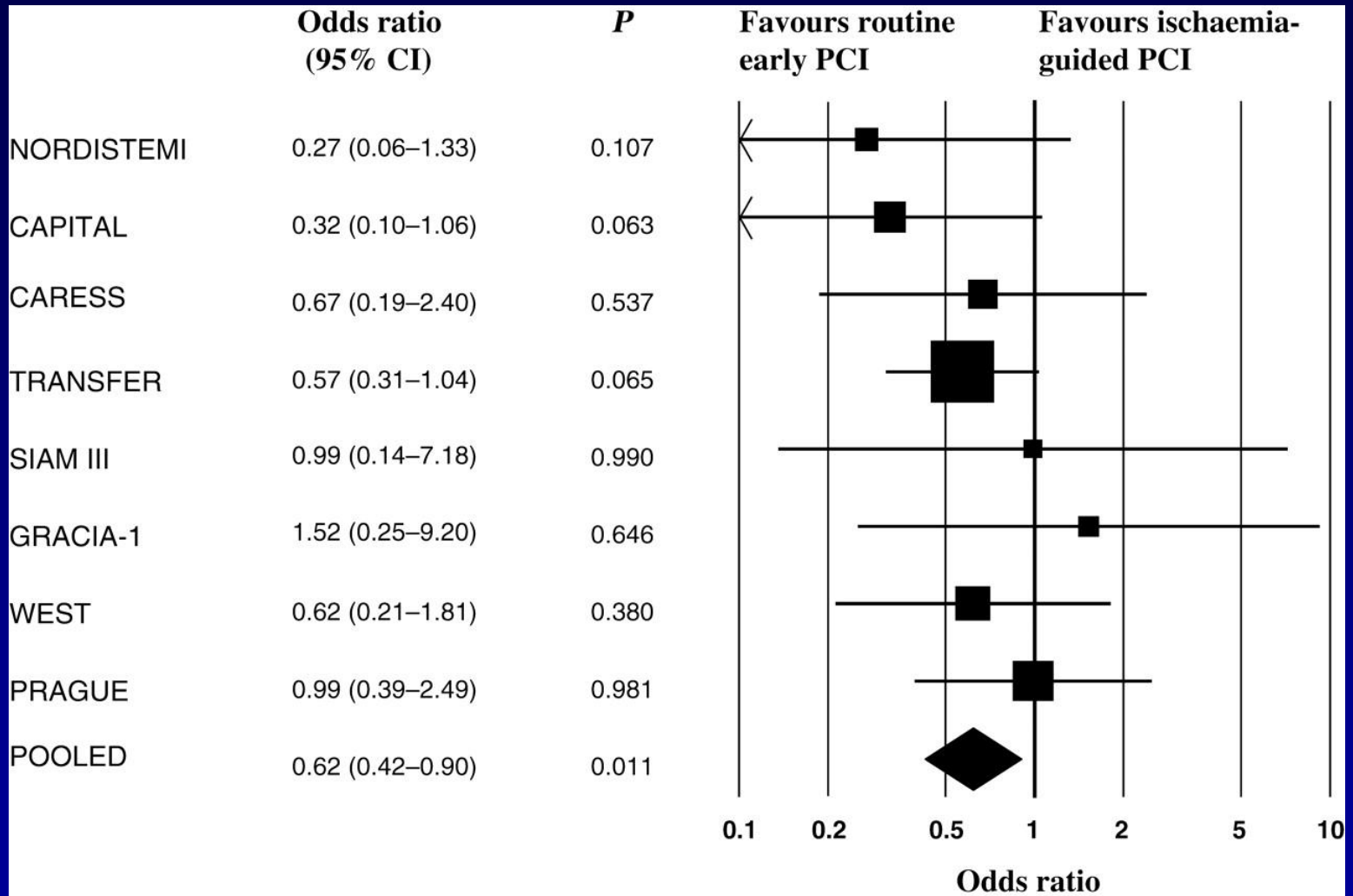
## European Heart Survey Snapshot 2009

	ACS-1	ACS-2	Snapshot 2009
Time from onset to ER (or first ECG)	176	145	132
Time to reperfusion:			
ER (or first ECG) to lysis	40	37	50
ER (or first ECG) to primary PCI	93	70	115

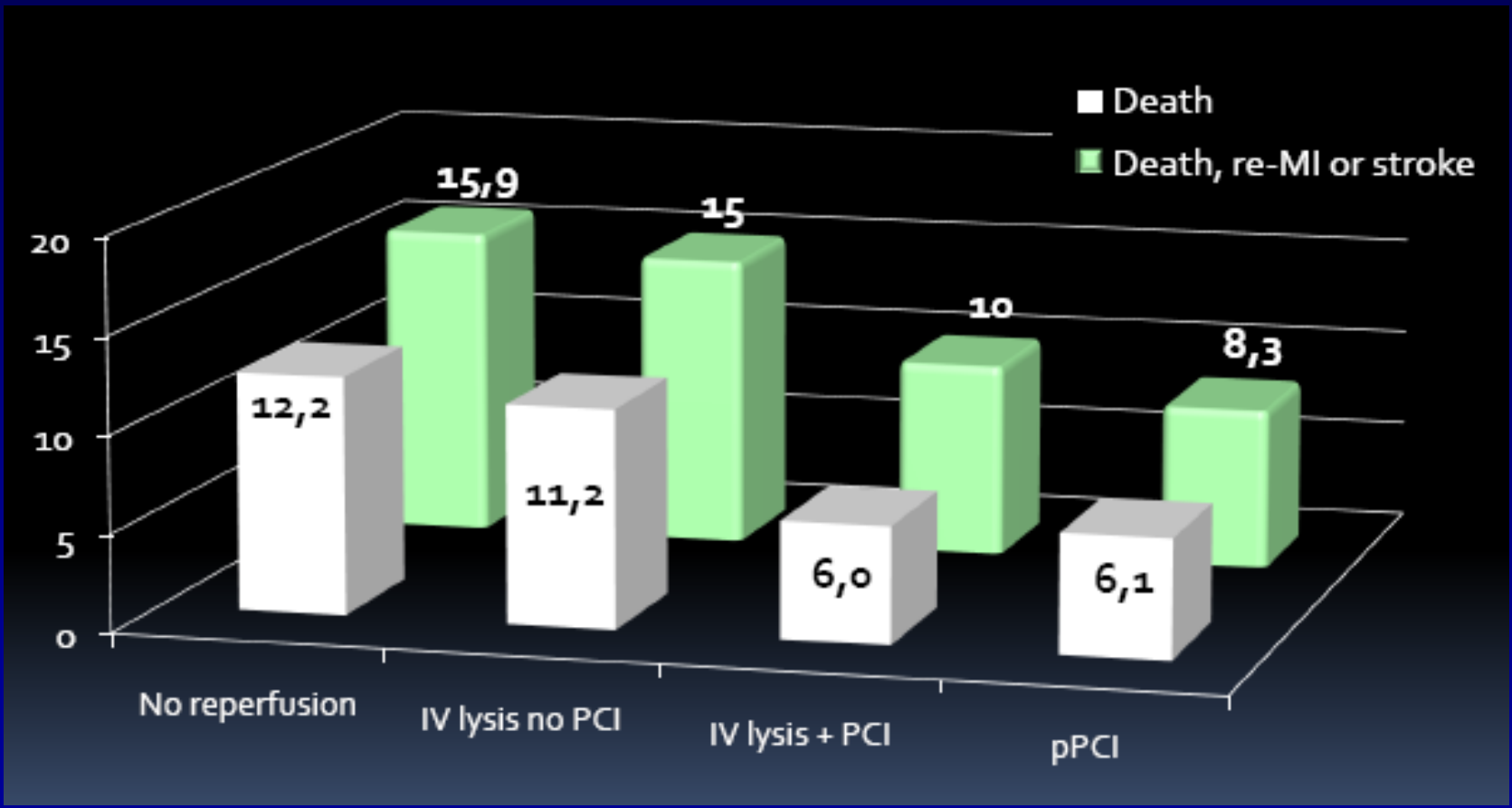
# La estrategia farmacoinvasiva: efecto sobre la mortalidad a 30 días en ensayos clínicos



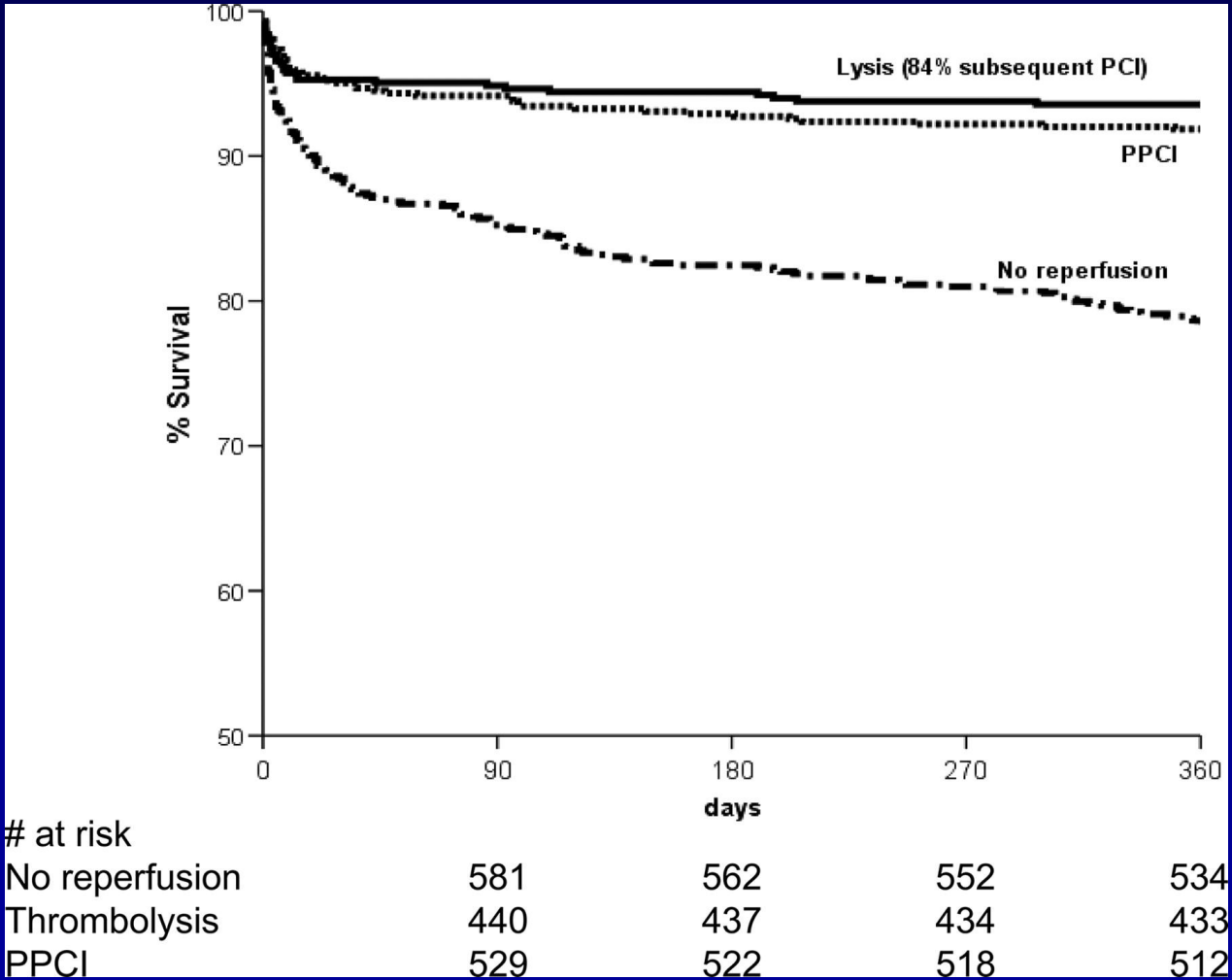
# La estrategia farmacoinvasiva: efecto sobre el reinfarto a 30 días en ensayos clínicos



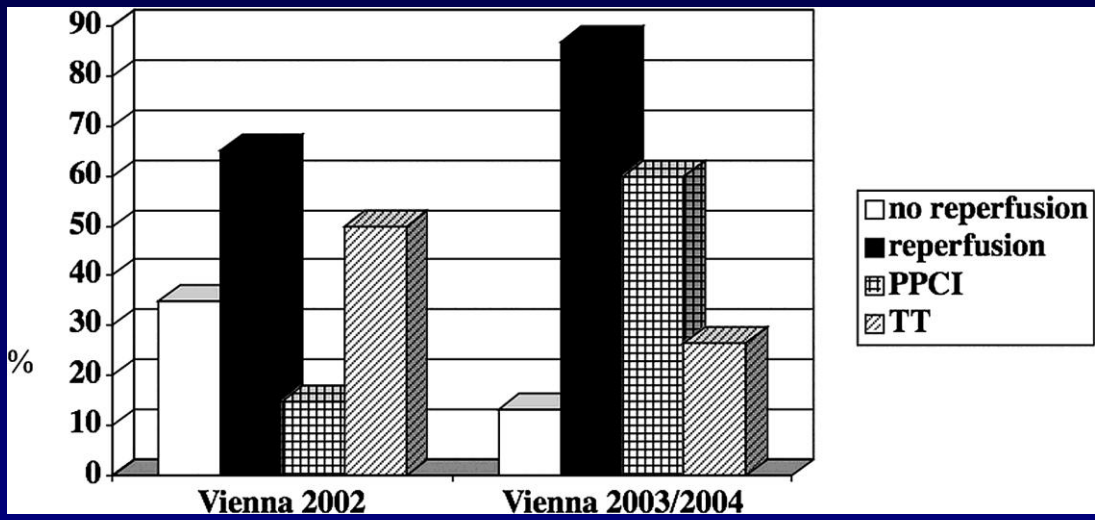
## European Heart Survey Snapshot 2009



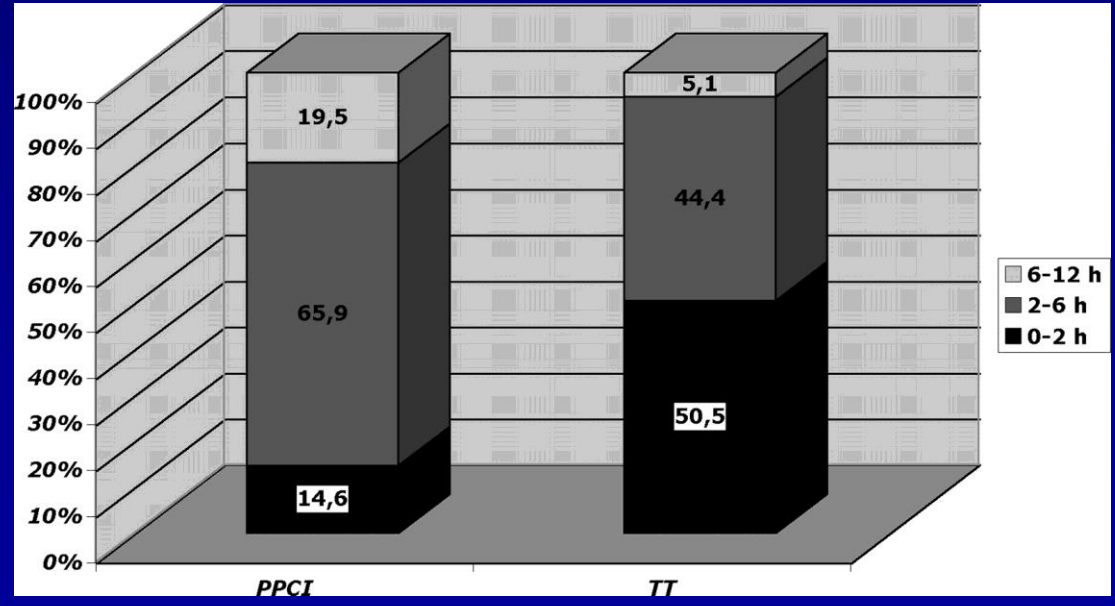
## FAST-AMI Registry



# La creación de redes regionales de atención al IAMEST, ¿implica abandonar la trombolisis?



## The Vienna network

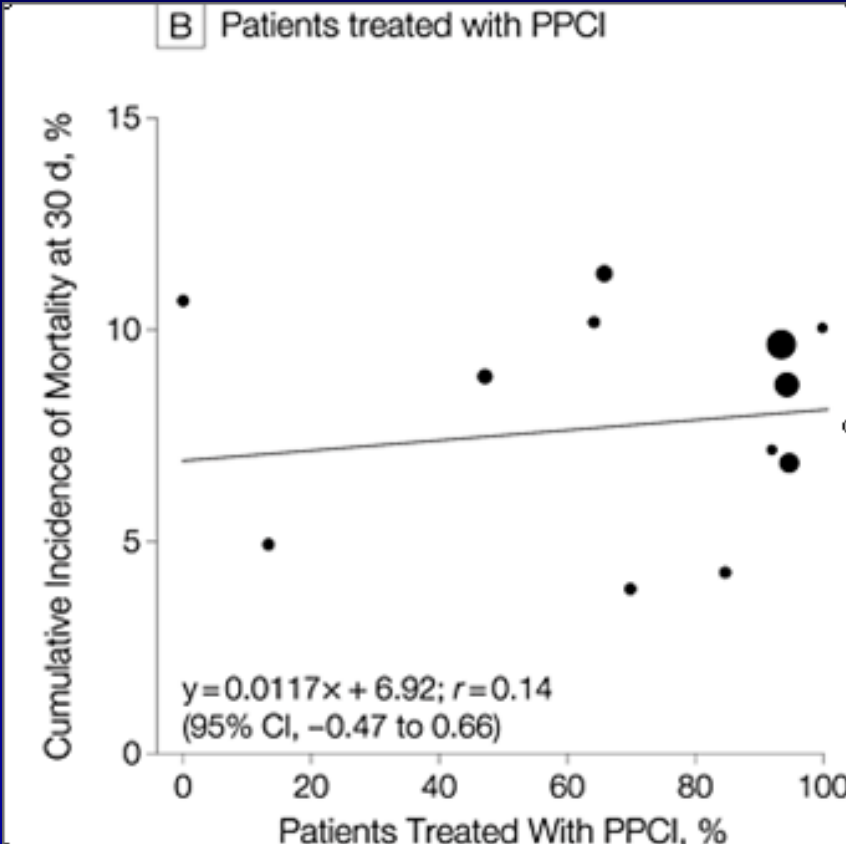




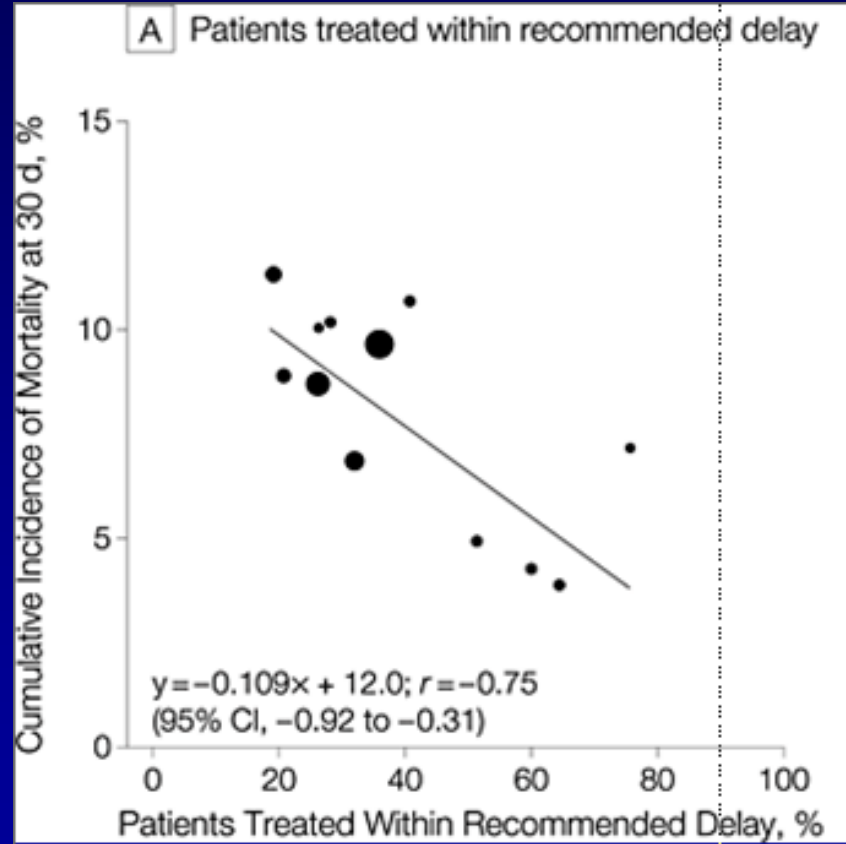
## The Mayo Clinic Protocol

- Paciente llega a centro ICP → ICP primario
- Paciente llega a centro sin ICP:
  - > 3 h de dolor → traslado para ICP primario
  - < 3 h de dolor → trombolisis y traslado para ICP de rescate o electivo

## Según el % de ICPP



## Según el % de pacientes tratados a tiempo (FIB+ICPP)



## Resumen (2)

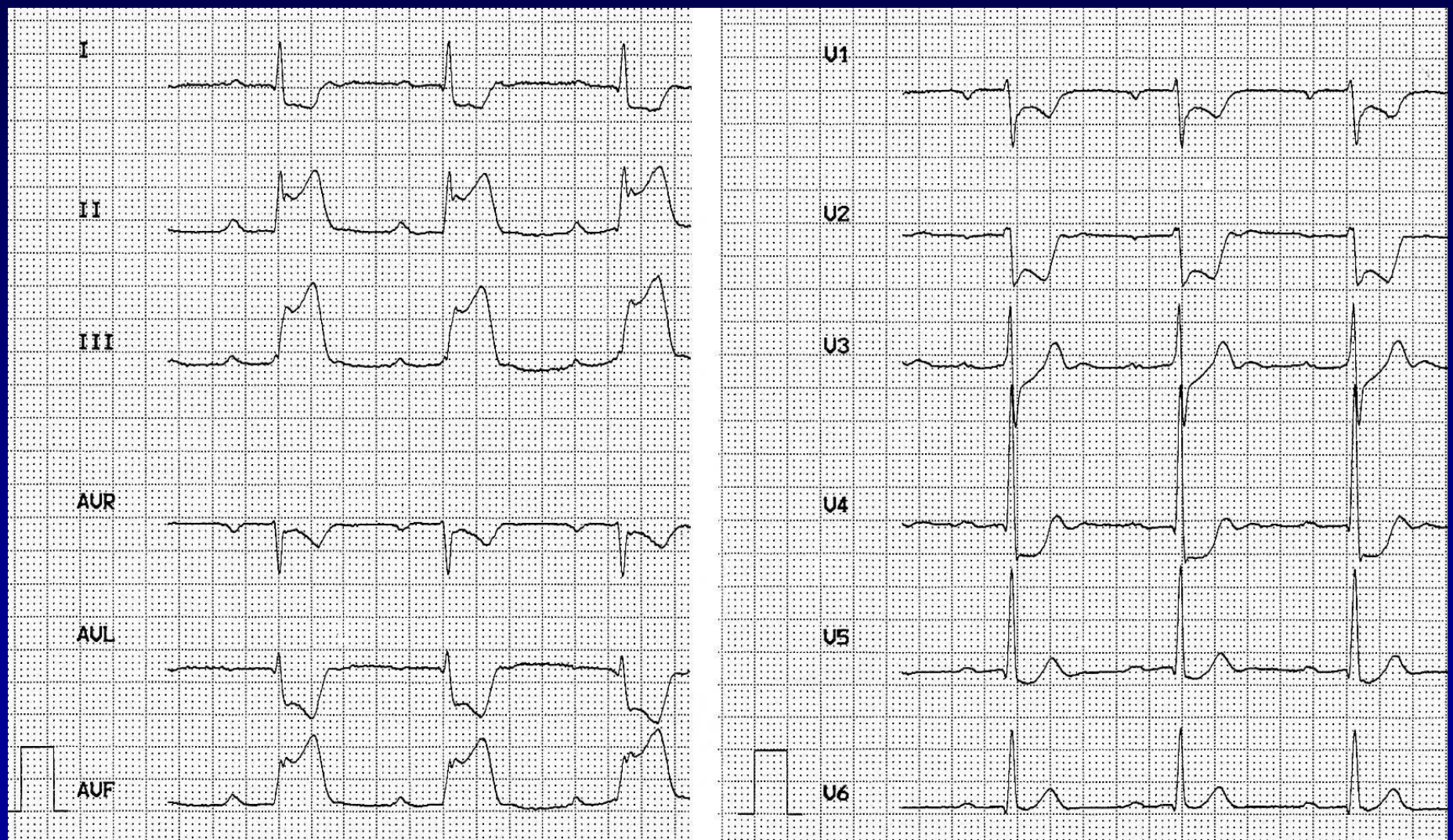
- Si el traslado para ICPP comporta un retraso significativo, su beneficio respecto a la trombolisis sobre la mortalidad se pierde. El retraso aceptable no es homogéneo, sino que depende del tamaño del infarto, de la posibilidad de salvar miocardio (tiempo de síntomas) y del riesgo hemorrágico (edad)
- La angioplastia electiva sistemática precoz mejora el resultado de la trombolisis
- Es fundamental trabajar para ofrecer el tratamiento de reperfusión (trombolisis o ICPP) dentro de los tiempos recomendados

# Tratamiento coadyuvante a la trombolisis

- Aspirina 150-325 mg vo ó 250-500 mg ev
- Clopidogrel 300 mg (75 mg si >75 años)
- Anticoagulación (TPA o derivados):
  - Enoxaparina
    - <75 años y creatinina <2.0-2.5: 30mg ev + 1 mg/kg/12 h sc (primeras 2 dosis sc no >100mg)
    - >75 años: no bolo ev y 0.75 mg/kg/12 h sc
    - disfunción renal severa: dosis sc/24 h
  - Heparina ev: bolo 60 U/kg (max 4000) + infusión 12 U/kg/h (max 1000 U/h) para TTPa 50-70s

# Caso clínico (4)

## ECG (56 min de dolor)

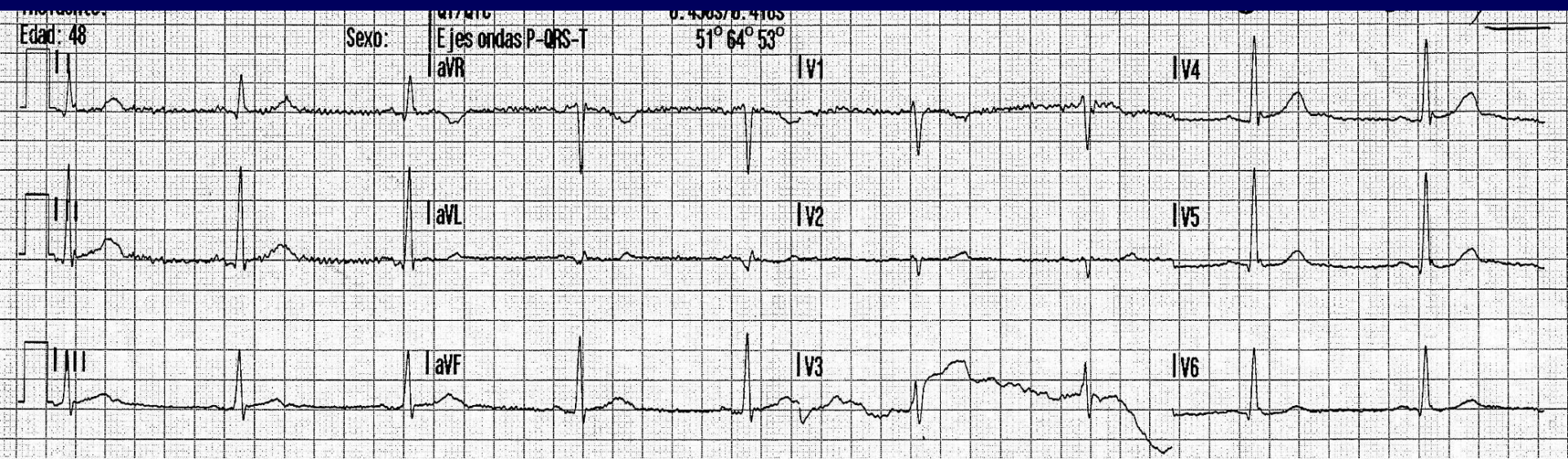


## Tratamiento in situ:

- 14:25 → NTG sl, sin respuesta
- 14:27 → Morfina
- 14:35 → AAS 250 mg + clopidogrel 300 mg + enoxaparina 30 mg ev + enoxaparina 70 mg sc + TNK 8000 U ev
- Traslado a hospital terciario
- A los 30 min queda asintomático → ECG

# Caso clínico (5)

## ECG 40 min post-TNK



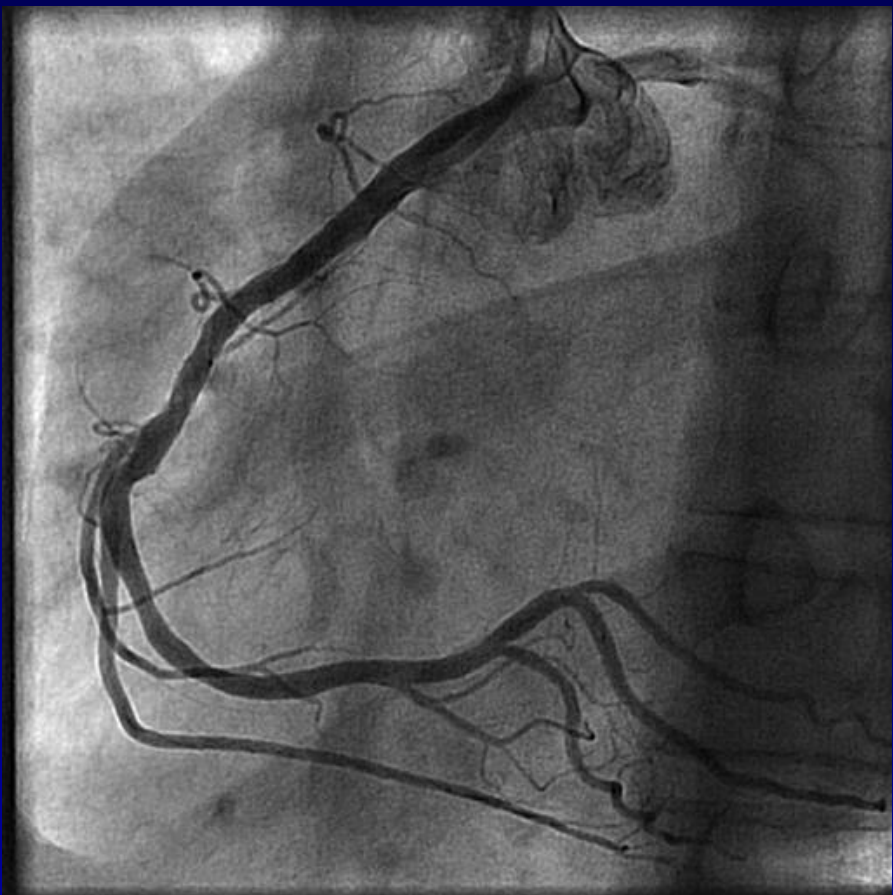
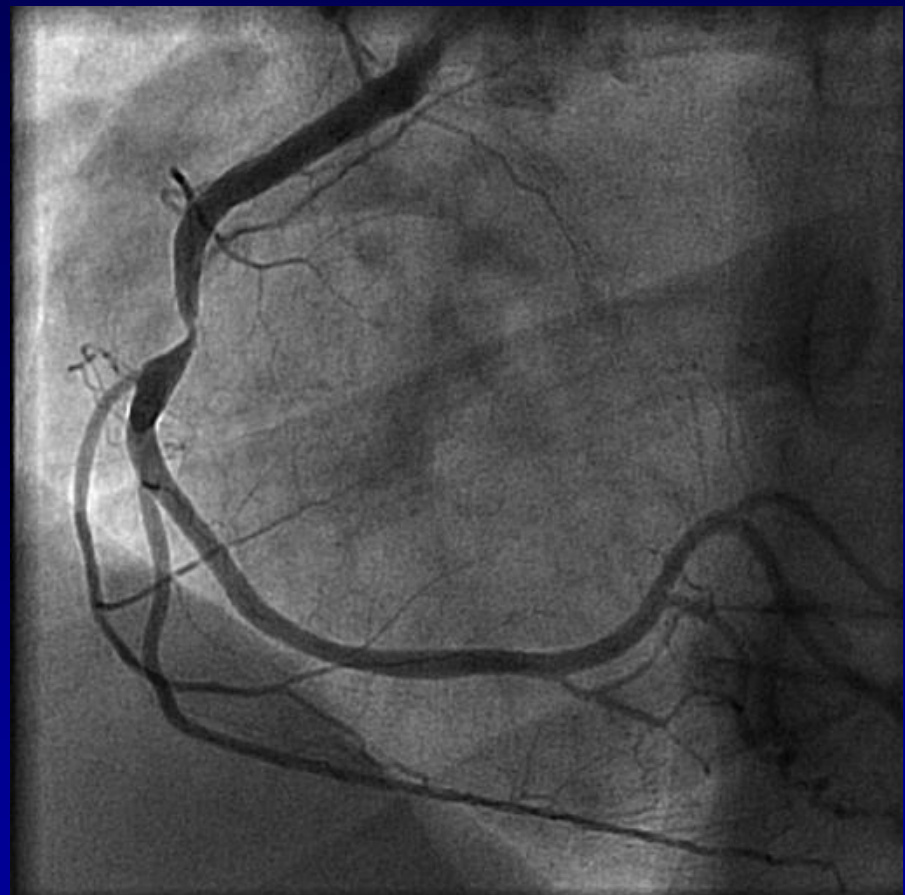
# Caso clínico (6)

## Ingreso HVH

- Asintomático y sin complicaciones
- Pico CKmb 8.55 ng/ml (n 6.5), TnT 0.29 ng/ml
- Ecocardiograma: hipocinesia inferior ligera, FE normal
- HCA al día siguiente

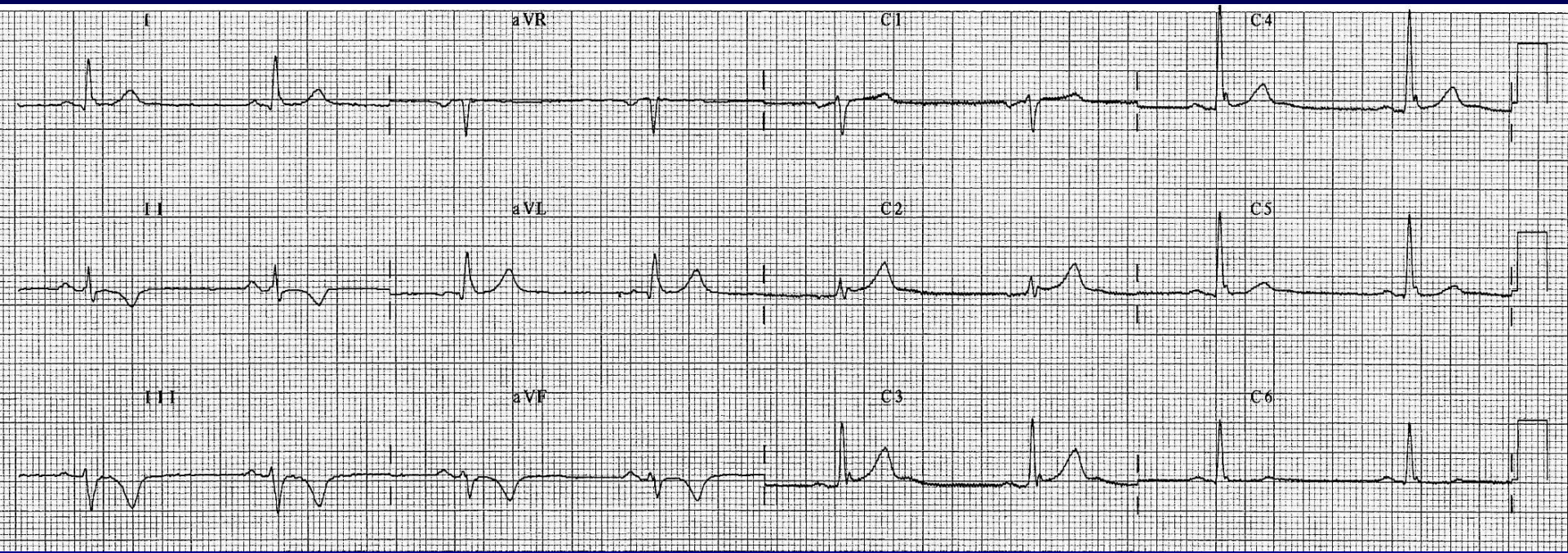


# Caso clínico (6)



# Caso clínico (7)

## ECG alta



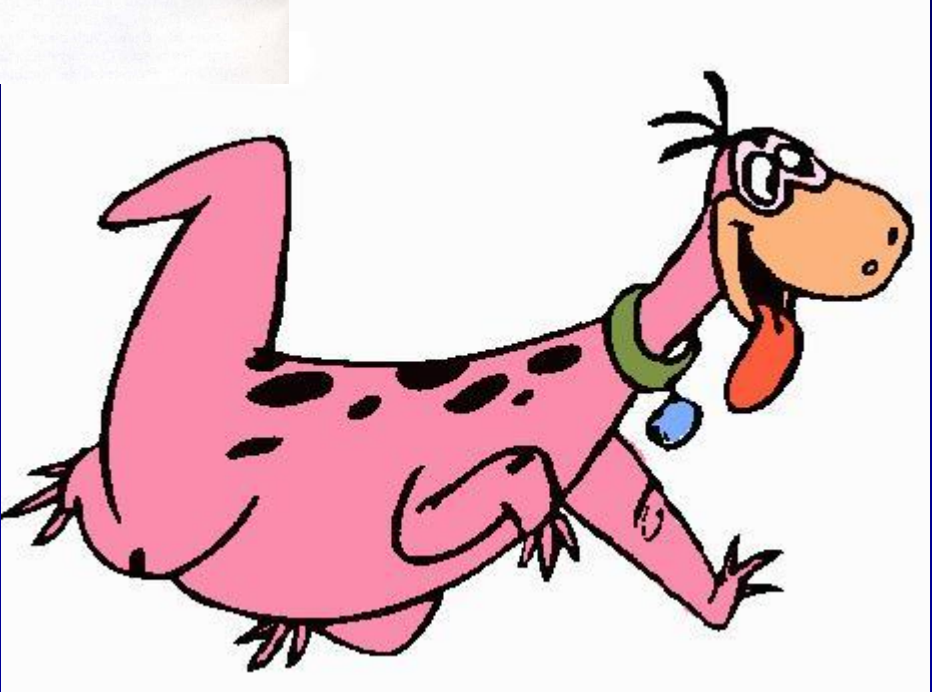
**MINI REVIEW:  
EXPERT OPINIONS**



**Fibrinolytic Therapy**

**Is It A Treatment of the Past?**

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**Moltes gràcies**