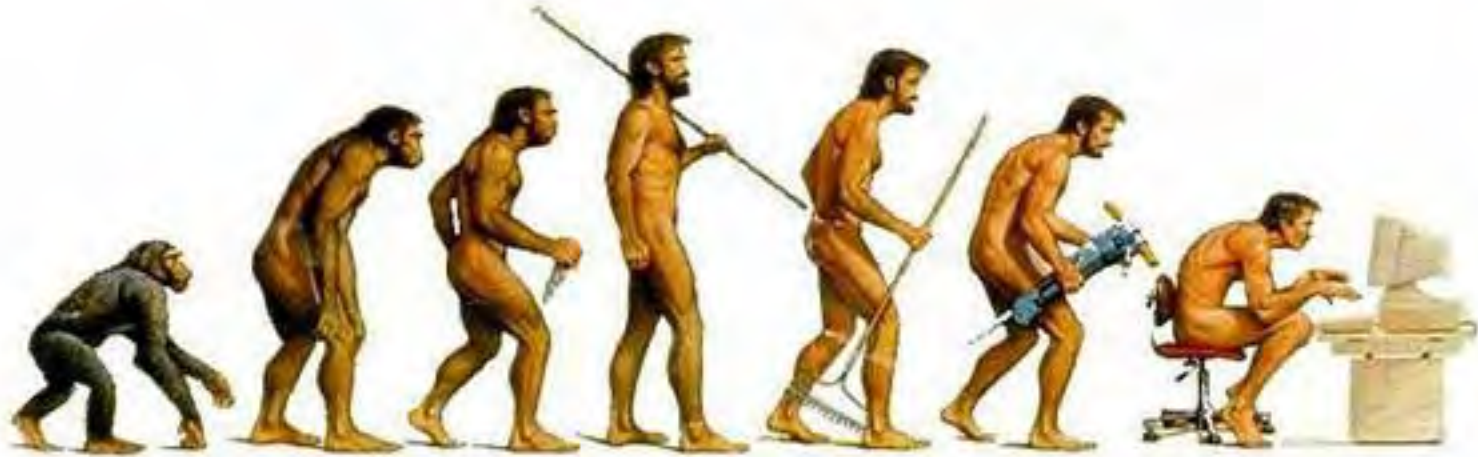


# **Prehospital diagnostikk ved STEMI – er vi gode nok?**

**Bjørn Bendz  
Hjerteredisinsk avdeling  
OUS, Rikshospitalet**



- **1950-tallet: Pasientene funnet døde i sengen**
- **1960-tallet: Overvåkning + defibrillering**
- **1970-tallet: Sviktbehandling**
- **1980-tallet: Trombolyse**
- **1990-tallet: Akutt PCI**
- **2000-tallet: Logistikk, nye medik./utstyr**

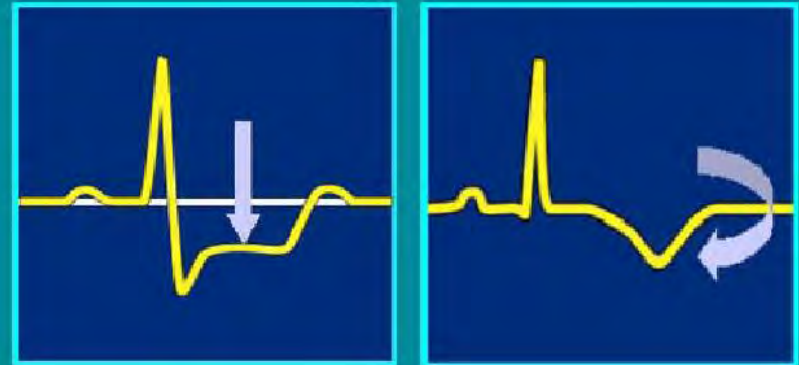
**Hva er STEMI ?**

# Akutt Koronar Syndrom (AKS)

ACS with persistent ST-segment elevation



ACS without persistent ST-segment elevation



Troponin ↑ or CK-MB

**STEMI**

Troponin elevated or not

**NSTEMI**

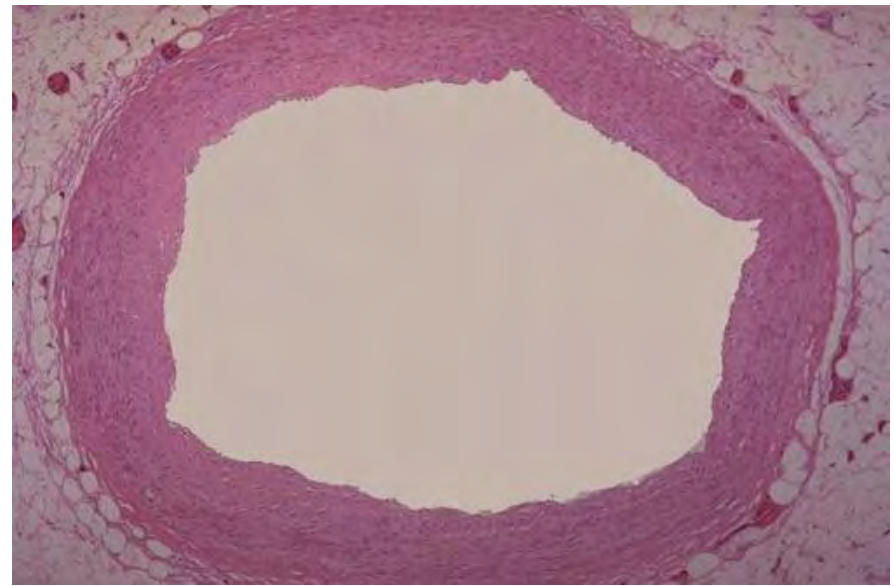
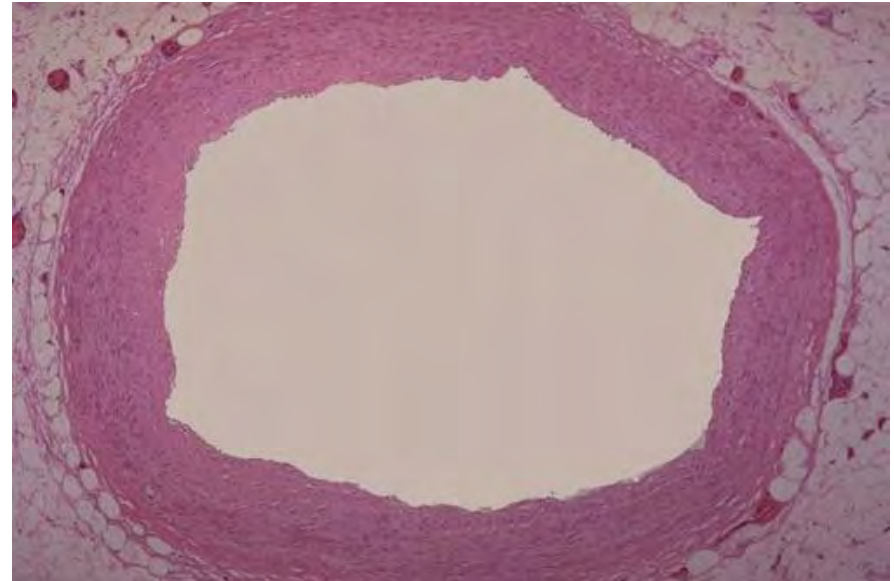
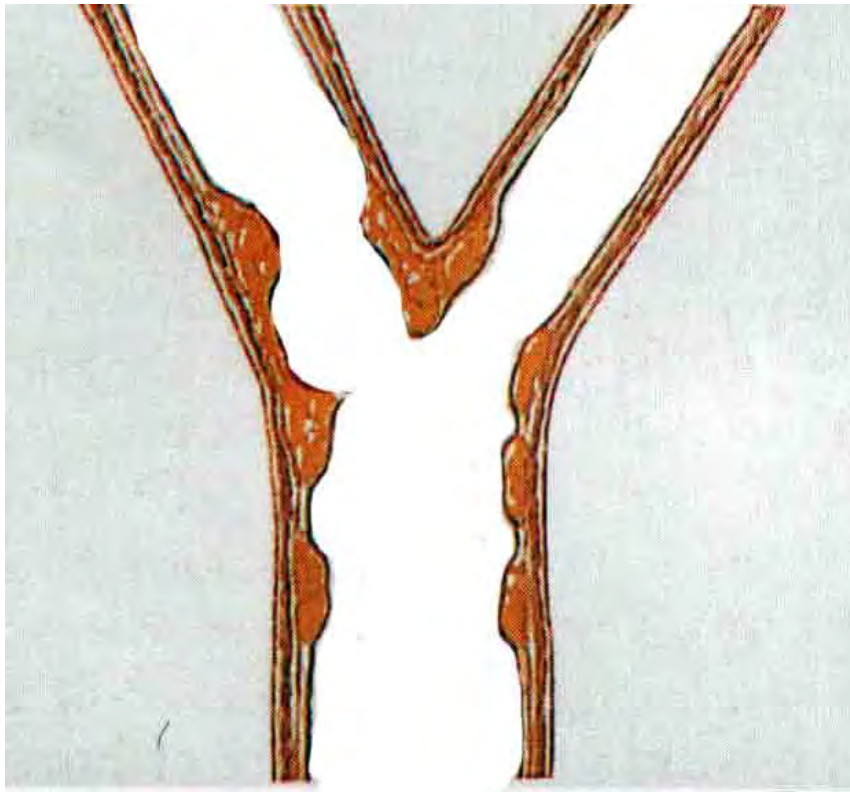
**UAP**

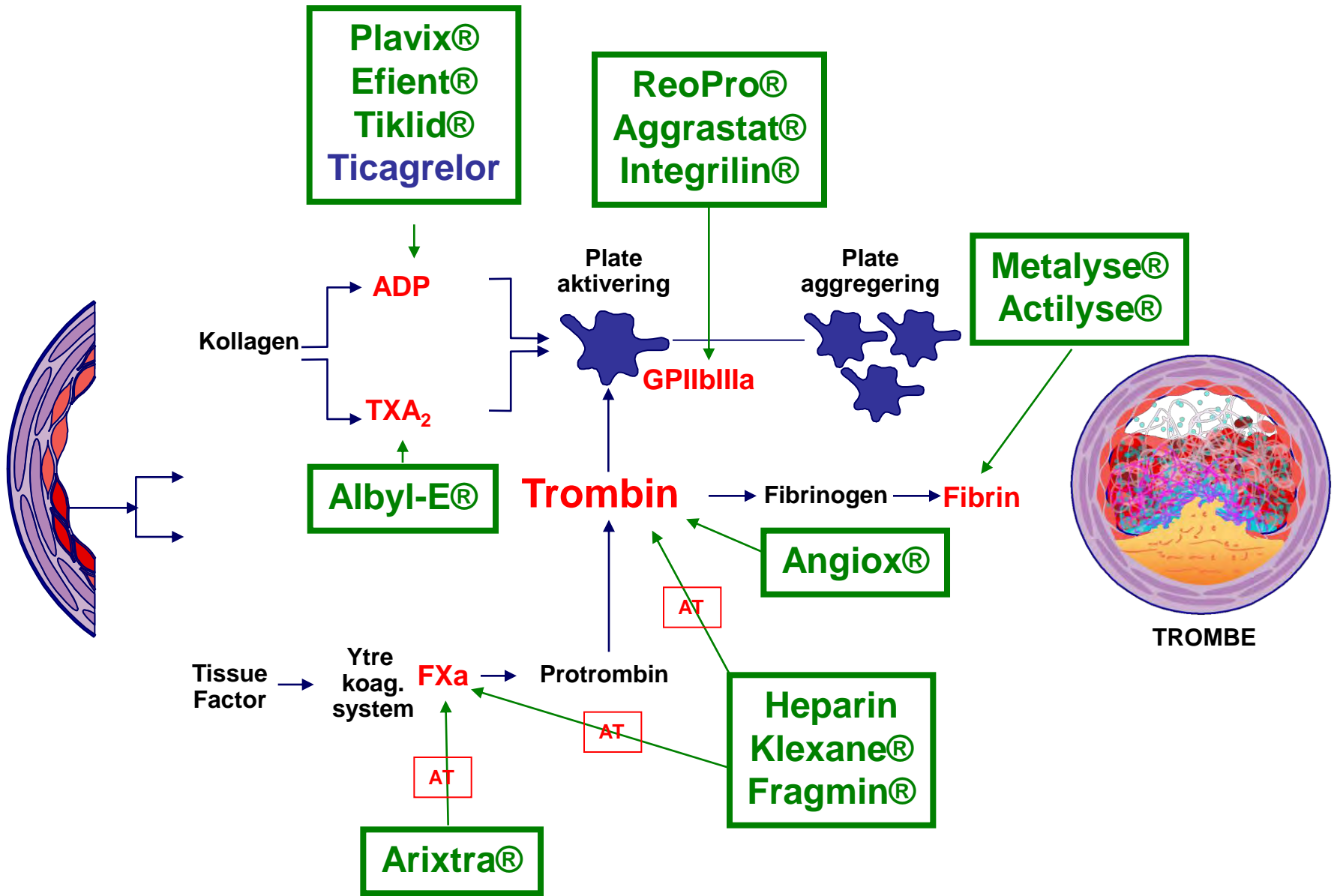
Myocardial infarction

Unstable angina

# Patofysiologi ved AKS

- **Forskjellig klinisk uttrykk**
- **Samme mekanisme**
  - **Plakkruptur**
  - **Trombose**
  - **Embolisering**



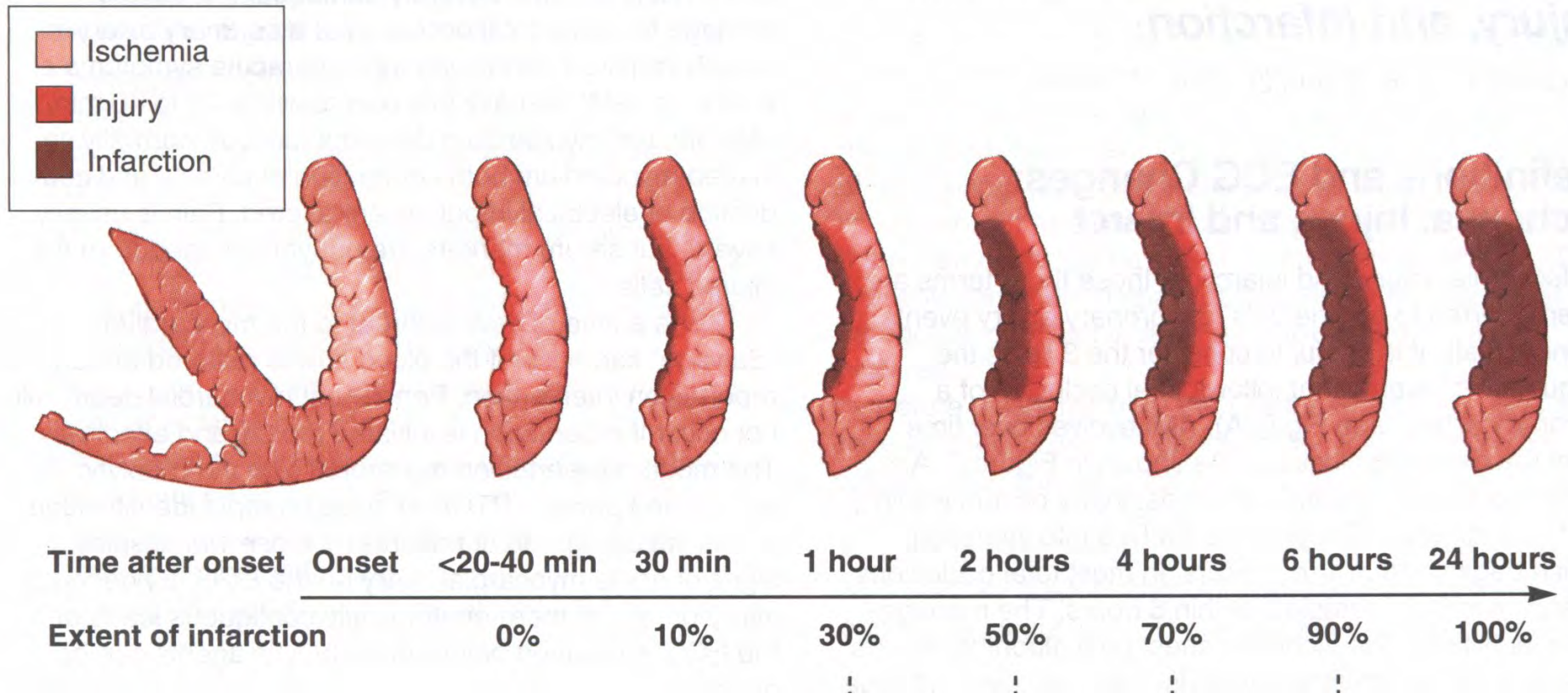




# Behandling av hjerteinfarkt; et kappløp mot døden...

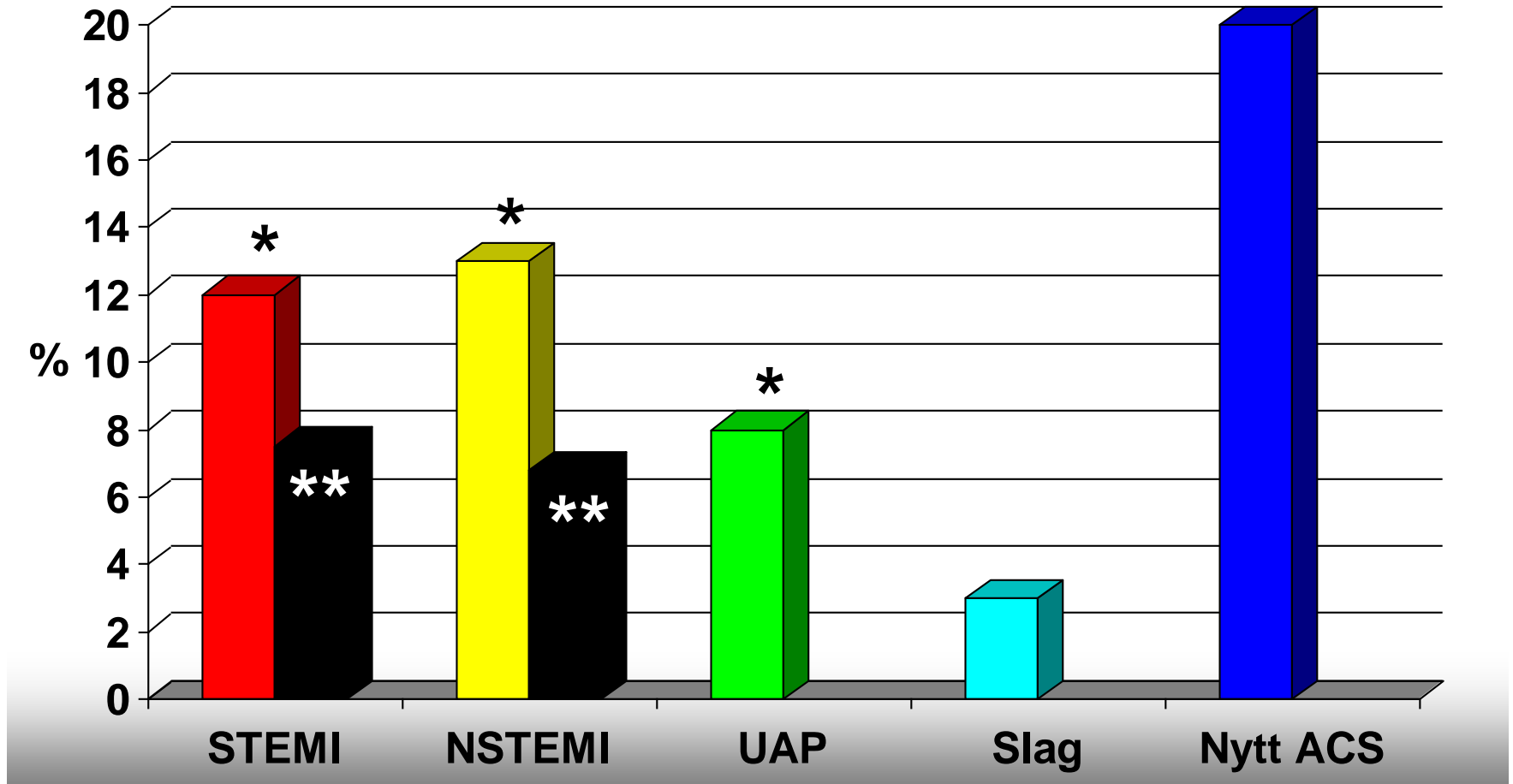


# Myokardnekrose





# Prognose ved AKS, 6 mnd

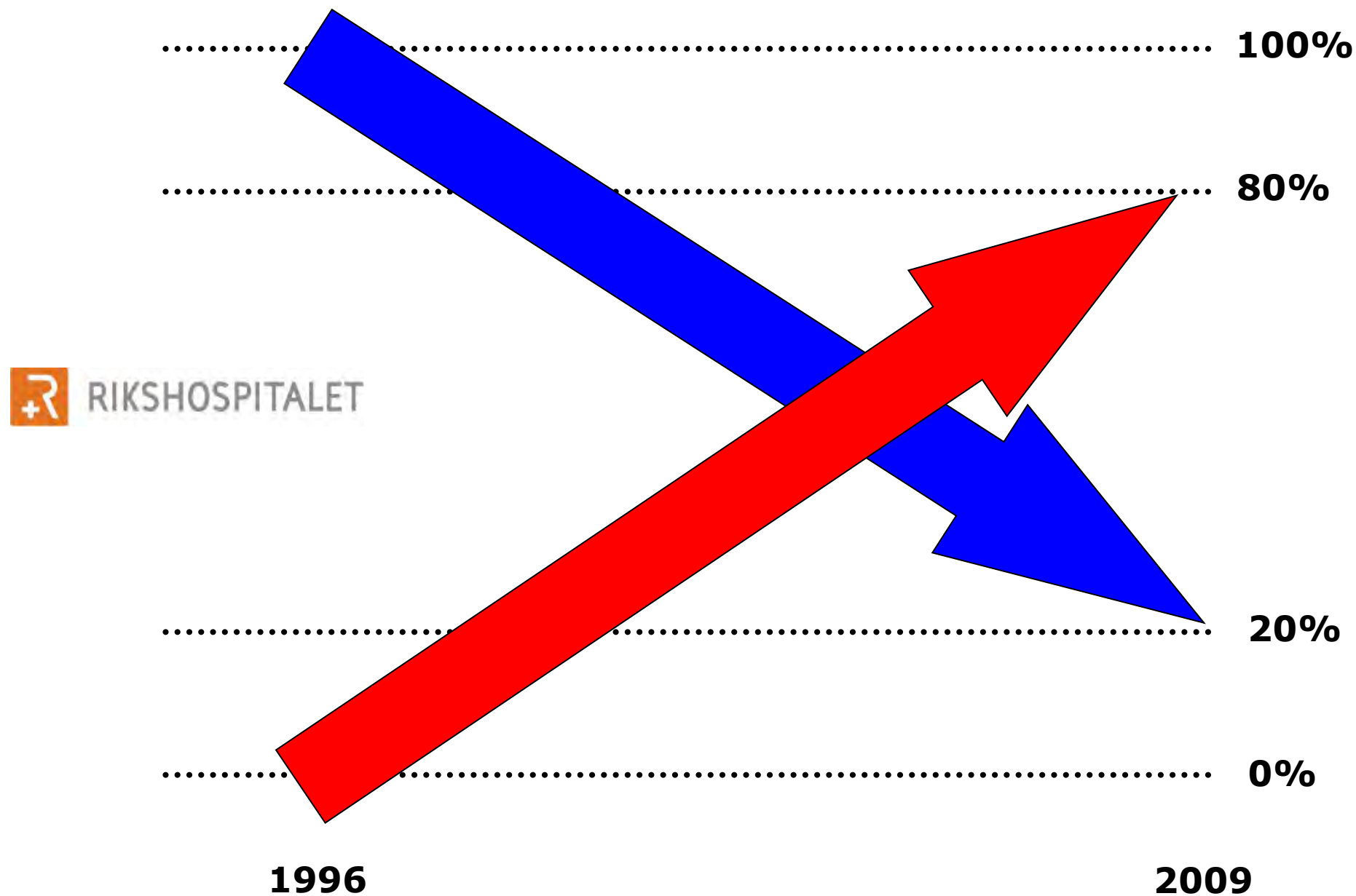


\* **Mortalitet**

GRACE registry, Fox KAA, Heart 2004, 90:698-706

\*\* **Rikshospitalet 2008 (Mort. 1 år) inkl. Stans + Kardiogent sjokk**

# PCI ved stabil AP vs STEMI/NSTEMI/UAP



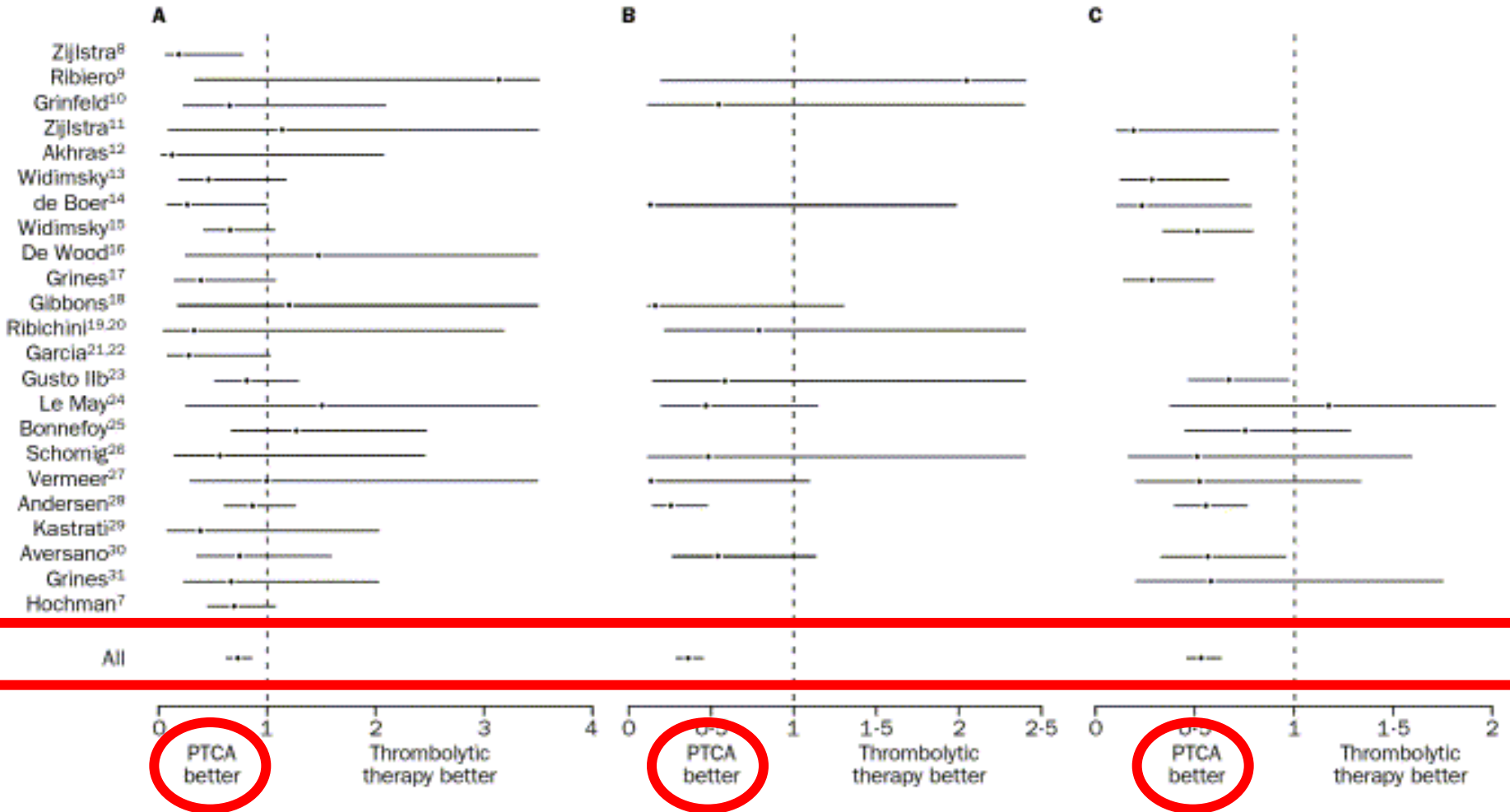
**STEMI**

**Trombolyse**  
**eller**  
**PCI?**

# Death 30d

# Reinfarction

# Death, reinf, stroke



Odds ratios (95% CI)

Keeley, Boura & Grines. Lancet. 2003;361:13-20




# STEMI – behandling 2010

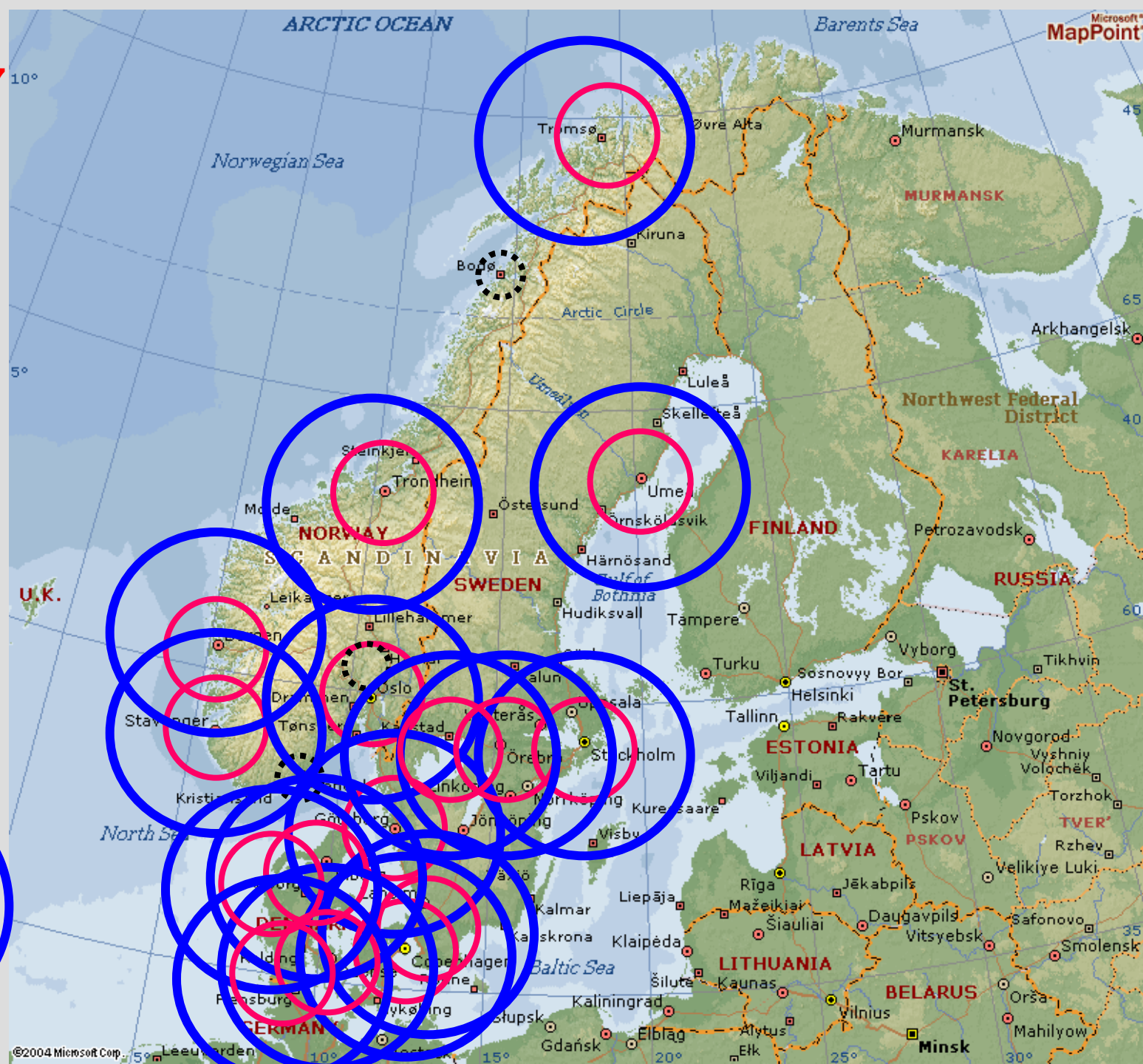
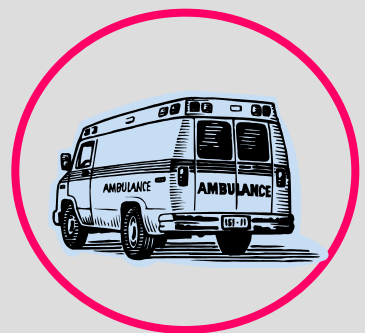
Primær PCI	(Prehospital) trombololyse	Rescue PCI
Sykehistorie <12t og <120min til PCI	Trombololyse ved sykehistorie <2t og >90min til PCI	Ikke effekt av trombololyse etter 45-60min:
Kontraindikasjon mot trombololyse	Kjør direkte til PCI senter om mulig – prognostisk angio innen 24t	<50% ST-tilbakegang, smerter, arytmier, svikt
Pasienter <75år som utvikler kardiogent sjokk tidlig		<75 år og sjokk
Lengre sykehistorie med "on and off"-preg (EKG)		



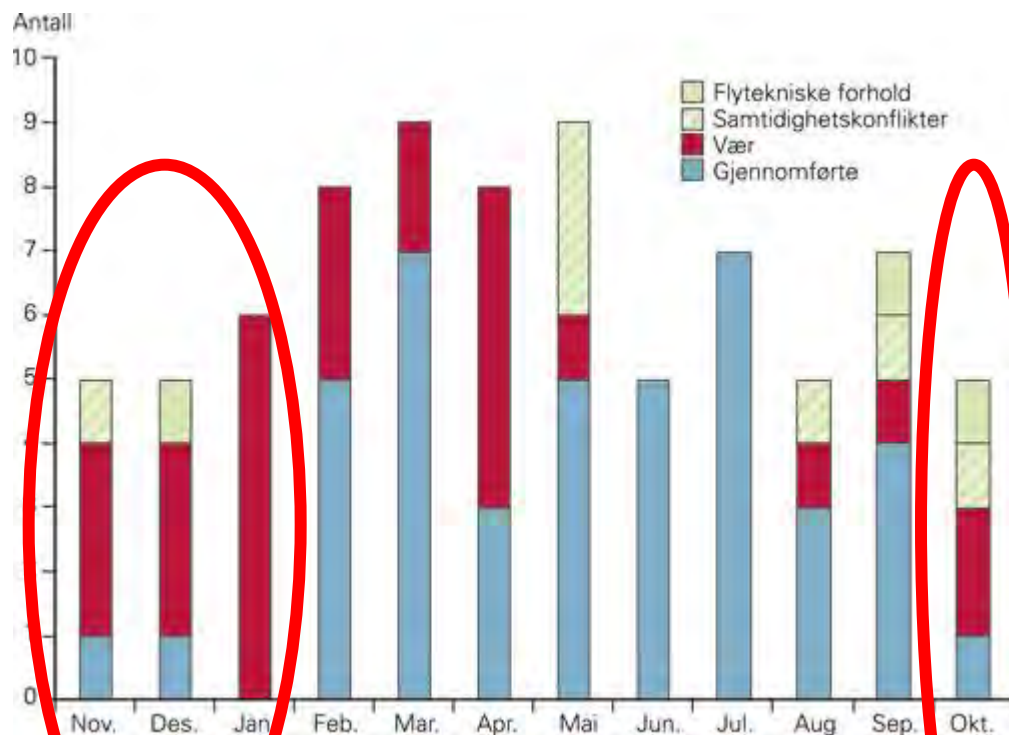


 = PCI 24/7

**DEN: 5**  
**NOR: 6**  
**SWE: 13**

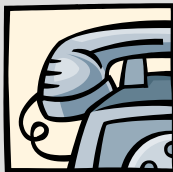


# Får man helikopter når man trenger det?





# Prehospitalt EKG



# Trombolyse



# PCI





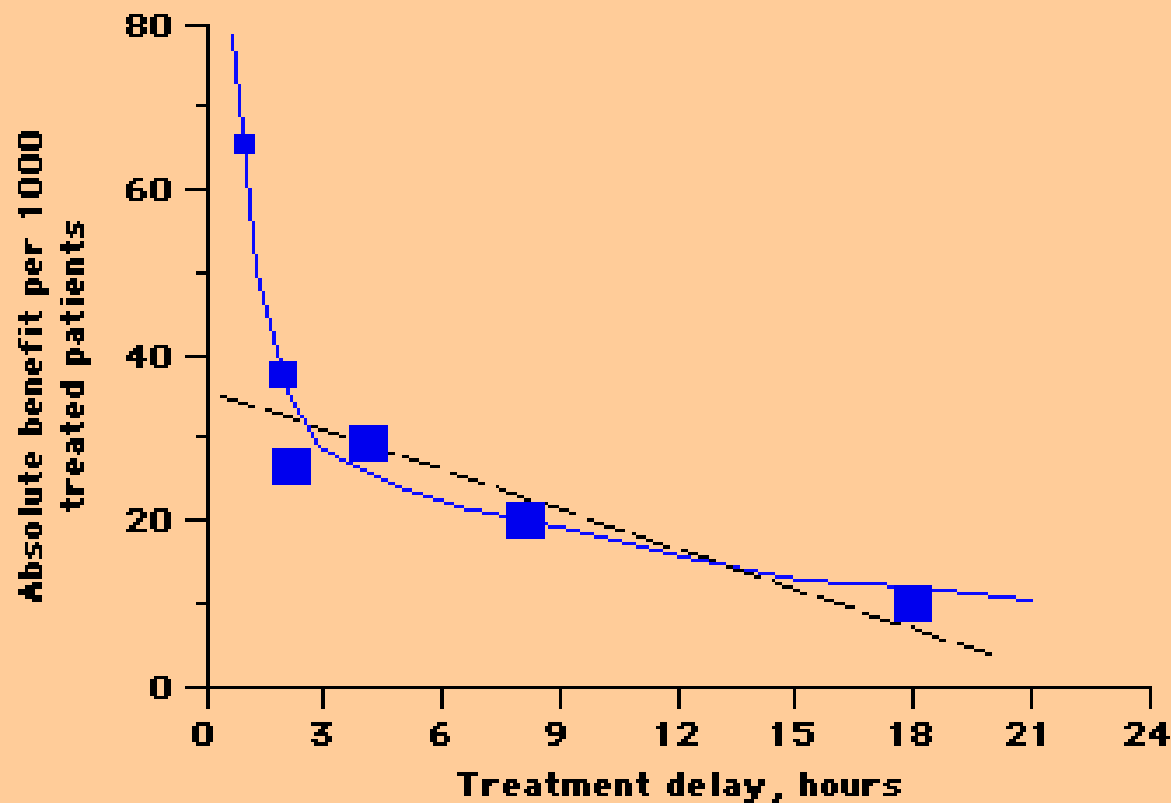
# Prehospitalt EKG forkorter tiden til **trombolyse** og **PCI**

- **Trombolyse**

- Ca 25 min raskere hvis gitt i sykehus
- 30-120 min raskere hvis gitt prehospitalt

- **Akutt PCI**

- 30 min raskere door-to-balloon tid
- 120 min raskere behandlingstid fra symptom debut



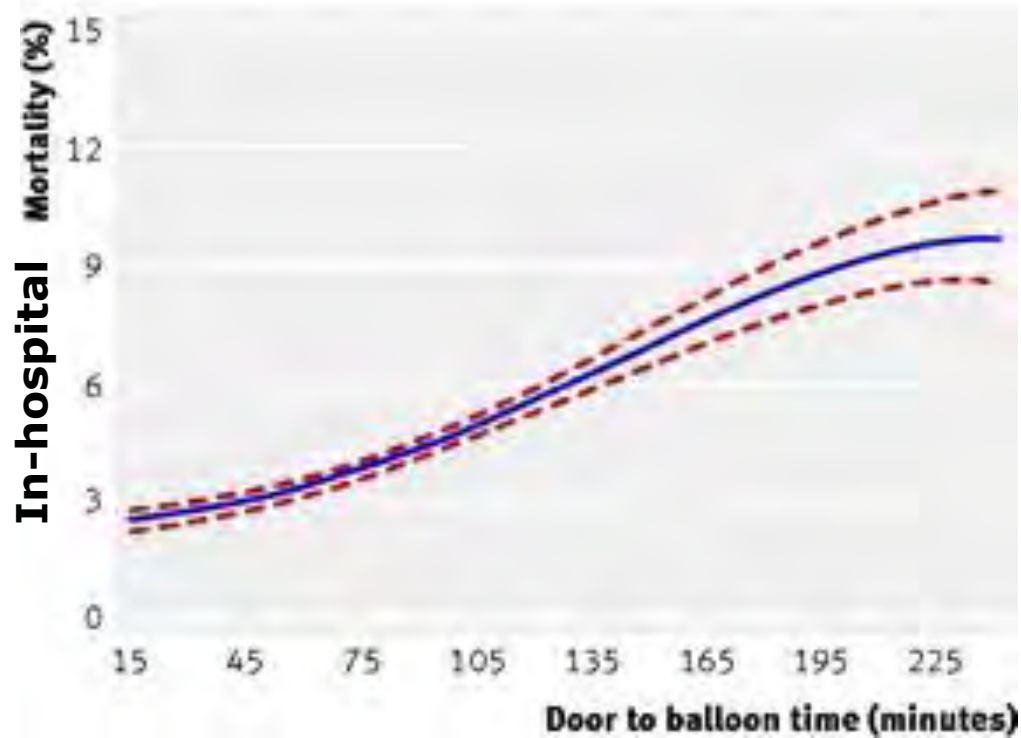
**Time to thrombolysis and 35-day mortality** The importance of time to thrombolysis in acute myocardial infarction and the absolute reduction in 35 day mortality in a meta-analysis of over 50,000 patients. The benefit from thrombolytic therapy is greatest when it is administered within two hours of symptom onset. The survival benefit is progressively reduced as the delay in therapy increases; after two hours, the benefit from thrombolytic therapy fits a linear function (black line) in which the benefit falls by approximately 1.6 lives per 1000 patients per hour of treatment delay. (Data from Boersma, E, Maas, ACP, Simoon, ML, Lancet 1996; 348:771.)

# Spart tid = sparte liv

- Time 0-1, **Golden hour!**
  - 65 liv spart  $\forall/1000$  behandl.
- Time 1-2
  - 37 liv spart  $\forall/1000$  behandl.
- Time 2-3
  - 26 liv spart  $\forall/1000$  behandl.
- Time 3-6;
  - 29 liv spart  $\forall/1000$  behandl.



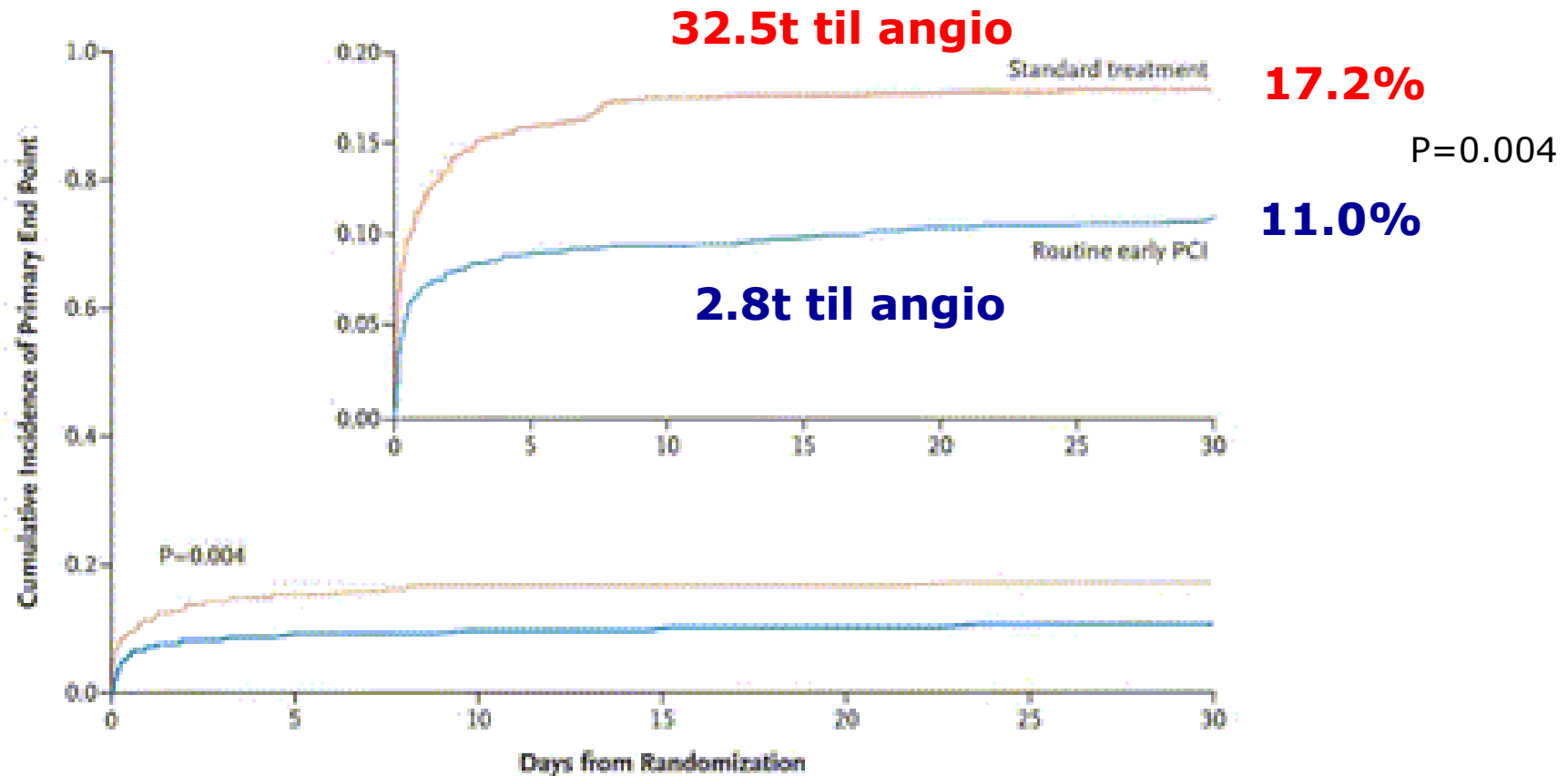
# Door-to-balloon time



**N=43 801**

# Når angio etter trombololyse?

Død, infarkt, svikt



**N=1059**



# Angio etter trombolyse forts.

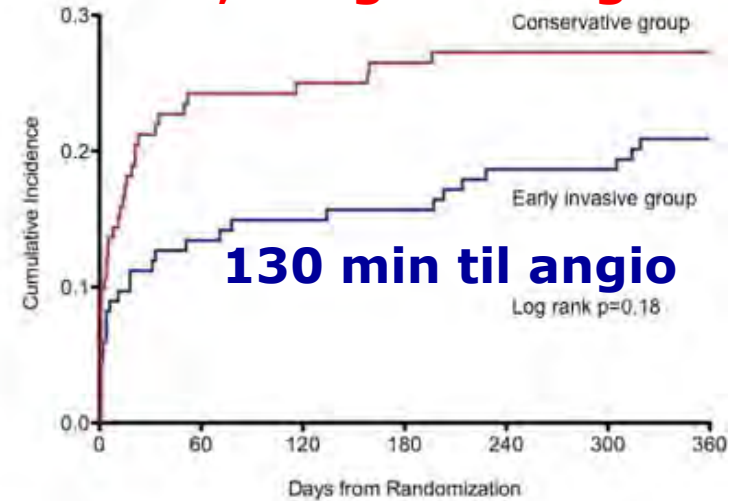
**N=266**

**NORDISTEMI**, Bøhmer et al, JACC 2009;  
[doi:10.1016/j.jacc.2009.08.007](https://doi.org/10.1016/j.jacc.2009.08.007)

**A Primary endpoint**

**Død, infarkt, slag, ischemi**

**5,5 dager til angio**

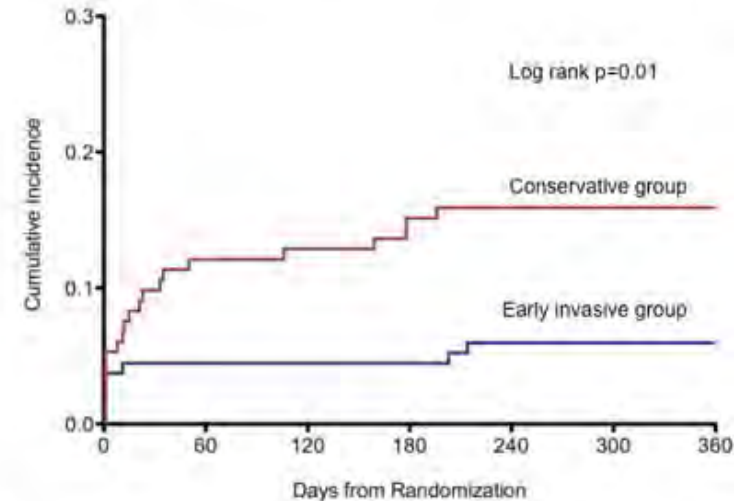


No. At Risk

Conservative group	132	100	99	97	96	96	96
Early invasive group	134	116	114	113	109	109	106

**B Death, reinfarction or stroke**

**Død, infarkt, slag**

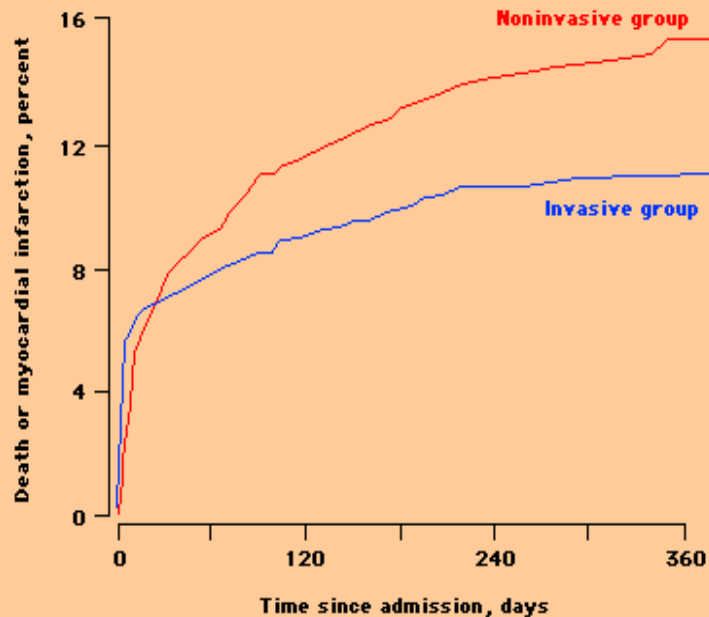


No. At Risk

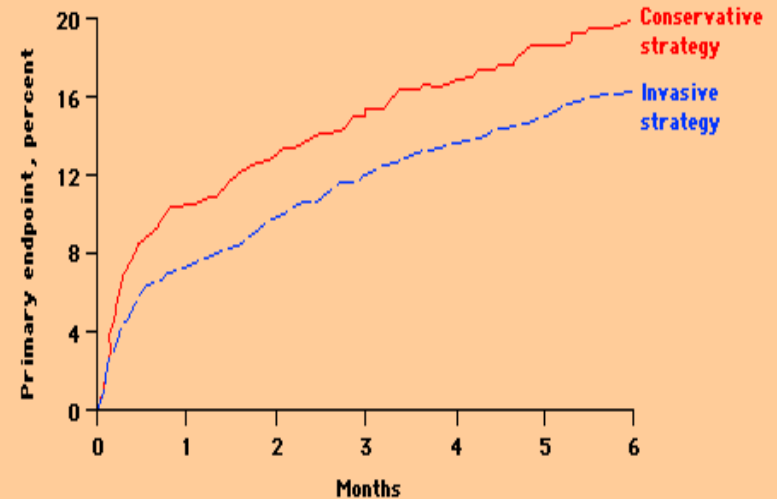
Conservative group	132	116	115	114	111	111	111
Early invasive group	134	128	128	128	126	126	126

**NSTEMI / UAP**

# Revaskularisering ved NSTEMI/UAP



**Early revascularization beneficial in unstable coronary disease in FRISC II** A one year follow-up of 2457 patients with unstable coronary disease in the FRISC II trial showed that the incidence of myocardial infarction (MI) or death was significantly lower in those who were randomly assigned to an invasive strategy (early catheterization and revascularization) compared to a noninvasive strategy (10.4 versus 14 percent). (Data from Wallentin, L, Lagerqvist, V, Husted, S, et al, for the FRISC II Investigators, Lancet 2000; 356:9.)



**Improved outcome with early invasive strategy in TACTICS-TIMI 18** In the TACTICS-TIMI 18 trial of 2220 patients with unstable angina or a non-ST elevation myocardial infarction, the cumulative incidence of the primary end point (death, nonfatal myocardial infarction, or rehospitalization for an acute coronary syndrome) during the six-month follow-up period was lower in the invasive-strategy group (catheterization within 4 to 48 hours and revascularization with angioplasty or bypass surgery, if feasible) than in the conservative treatment group (15.9 versus 19.4 percent). (Data from Cannon, CP, Weintraub, WS, Demopoulos, LA, et al, for the TACTICS Thrombolysis in Myocardial Infarction 18 Investigators, N Engl J Med 2001; 344:1879.)

**20-35% ACB-opr i invasiv arm**

# NSTEMI/UAP - behandling

## Høy ("urgent")

- Klinisk ustabile ± troponin ved maksimal medisinsk behandling: Invasiv utredning **samme dag**

## Intermediær ("early")

- ↑ trop, EKG-dynamikk, DM, nyresvikt, svikt, nylig infarkt/PCI/ACB: Invasiv utredning **innen 72t**

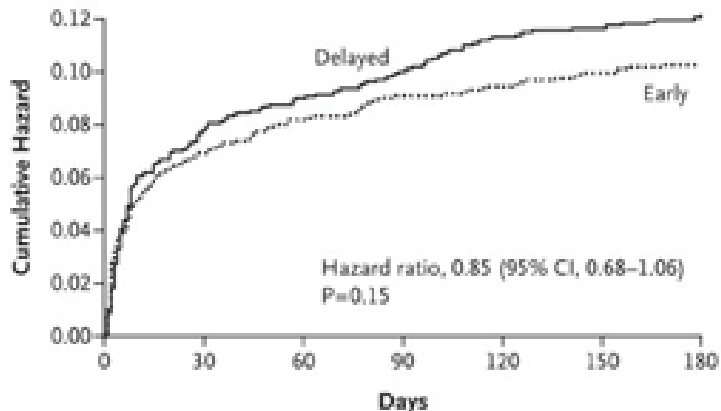
## Lav ("conservative")

- Normal trop, normalt EKG, klinisk stabil: **Elektiv henvisning** etter ischemitest

# Revaskularisering ved NSTEMI/UAP

A Primary Outcome

Død, infarkt, slag

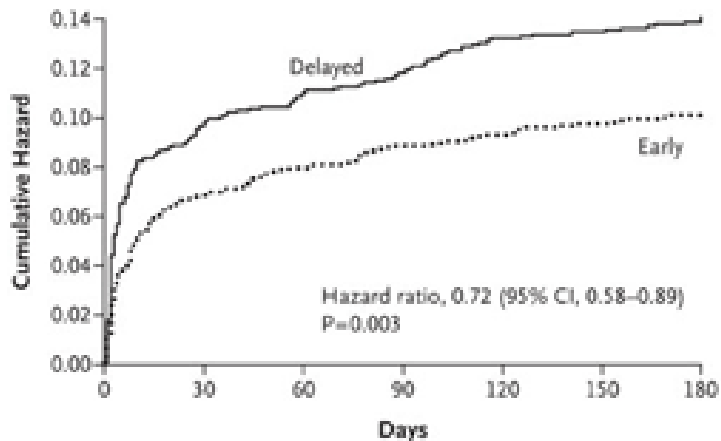


No. at Risk

Delayed	1438	1328	1269	1254	1234	1229	1211
Early	1593	1484	1413	1398	1391	1382	1363

B Secondary Outcome

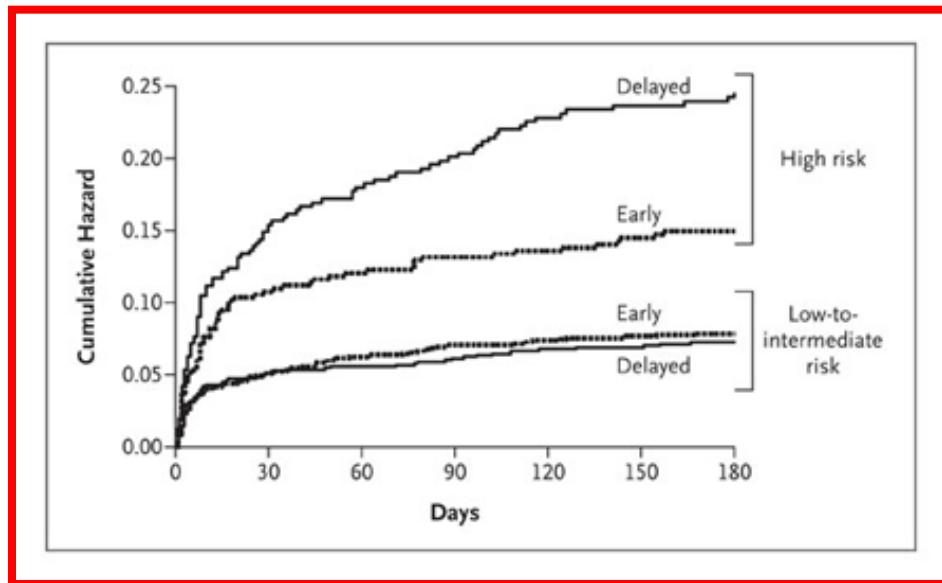
Død, infarkt, ischemi



No. at Risk

Delayed	1438	1303	1243	1230	1209	1205	1187
Early	1593	1485	1417	1402	1394	1386	1366

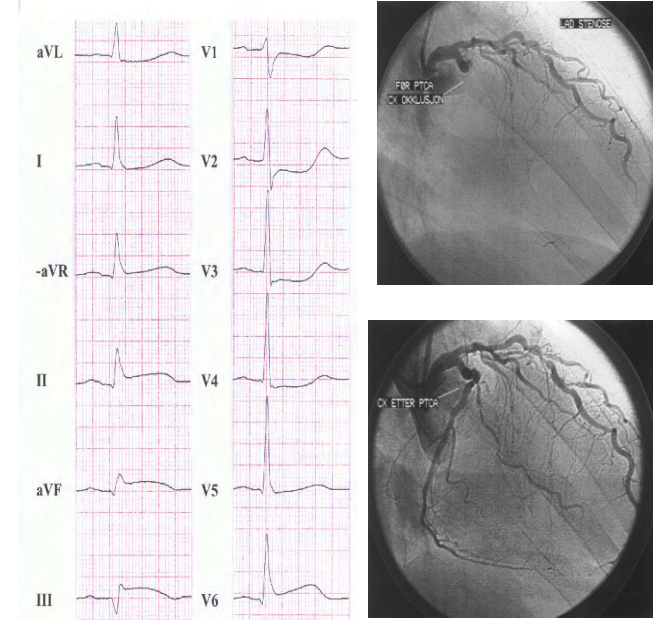
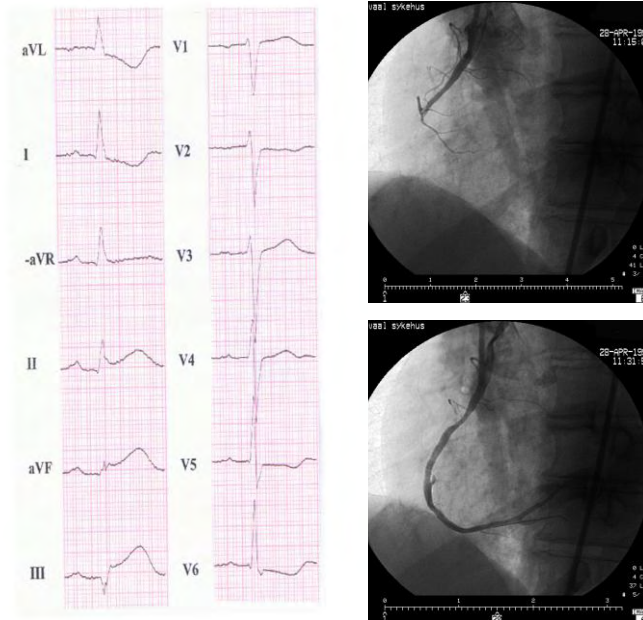
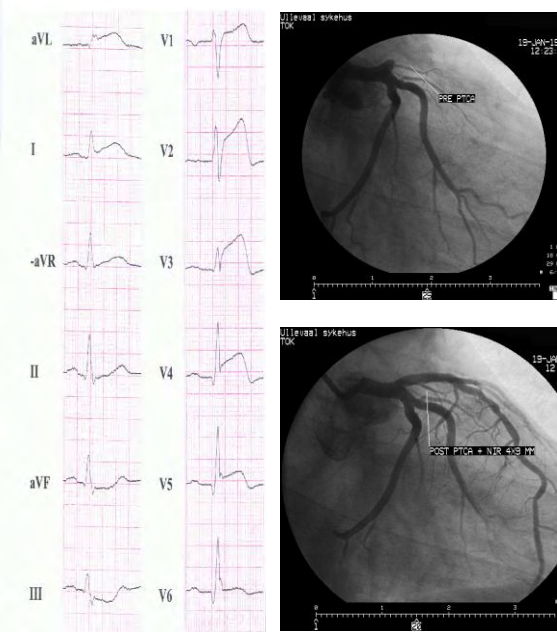
Early  $\leq$  24t til angio  
Delayed  $\geq$  36t til angio



Høy-risiko pasienter profiterer mest på tidlig angio



# Typisk EKG + angiografi ved STEMI



# Differensialdiagnoser

- **Akutt koronar syndrom (STEMI/NSTEMI/UAP)**  
**Husk bakreveggsinfarkt !**
- **Kardiomyopati (OBS! Takotsubo, men flere...)**
- **Peri/Myokarditt**
- **Lungeembolisme**
- **Aortaaneurysme eller disseksjon**
- **Pneumoni**
- **Pleuritt**
- **Pneumothorax**
- **Hyperventilasjon**
- **Øvre GI, lever, galle eller pancreas lidelse**
- **Traumer (f.eks costafraktur)**
- **Myalgi**
- **+++**

# Konklusjon

- **Er vi gode nok?**
  - **Vi har aldri vært bedre !**
- **Hva kan gjøres bedre?**
  - **Klinikken er viktigst – vær derfor ydmyk ved typisk klinikk, men manglende EKG funn**
  - **Prehospitaltjenester, lokalsykehus og PCI sentere må fortsette å fokusere på dette**

# Team Work

