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KHK
Akutes Koronarsyndrom





Akutes Koronarsyndrom

Definition: akut lebensbedrohliche Phasen der koronaren Herzerkrankung

- Instabile Angina pectoris
- Nicht ST-Streckenhebungsinfarkt
- ST-Streckenhebungsinfarkt
- Plötzlicher Herztod

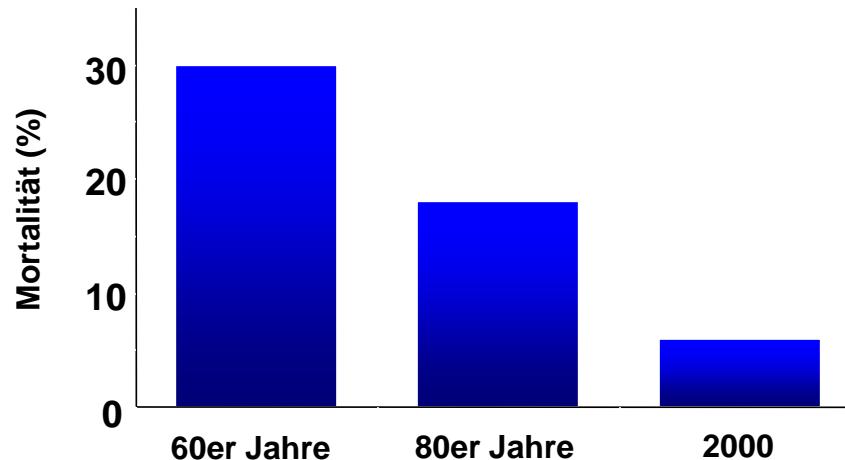


Akuter Myokardinfarkt

Inzidenz: **280.000 Pat./Jahr in Deutschland**

Mortalität: **25% im ersten Jahr**
- 50% in den ersten 2h

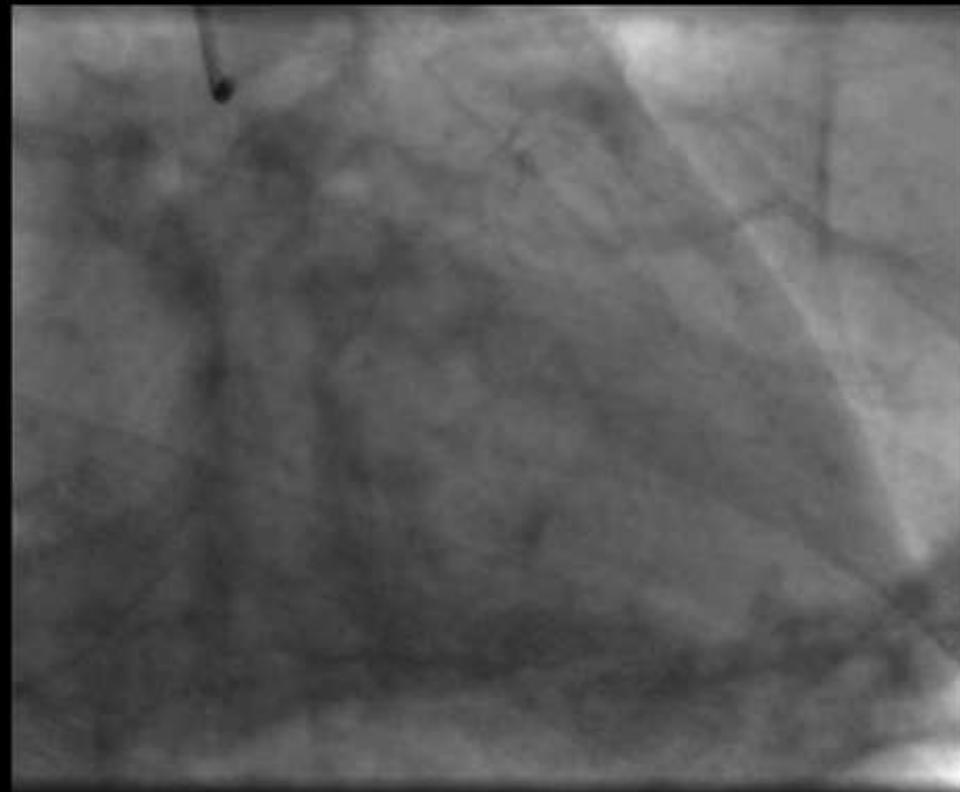
KH-Mortalität:





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I., A. 48a
Koronarangiographie -1-



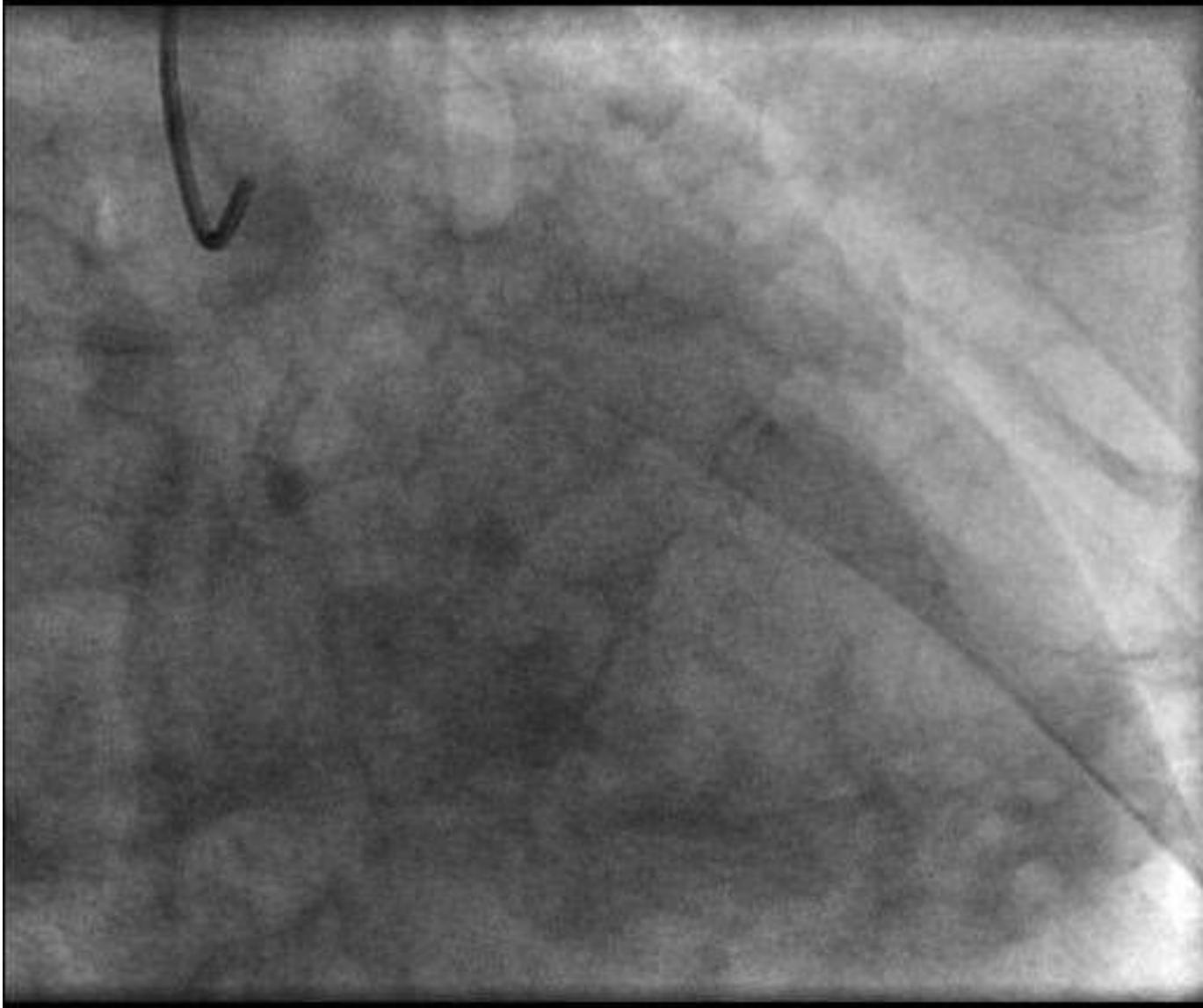


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I., A.

Koronarangiographie

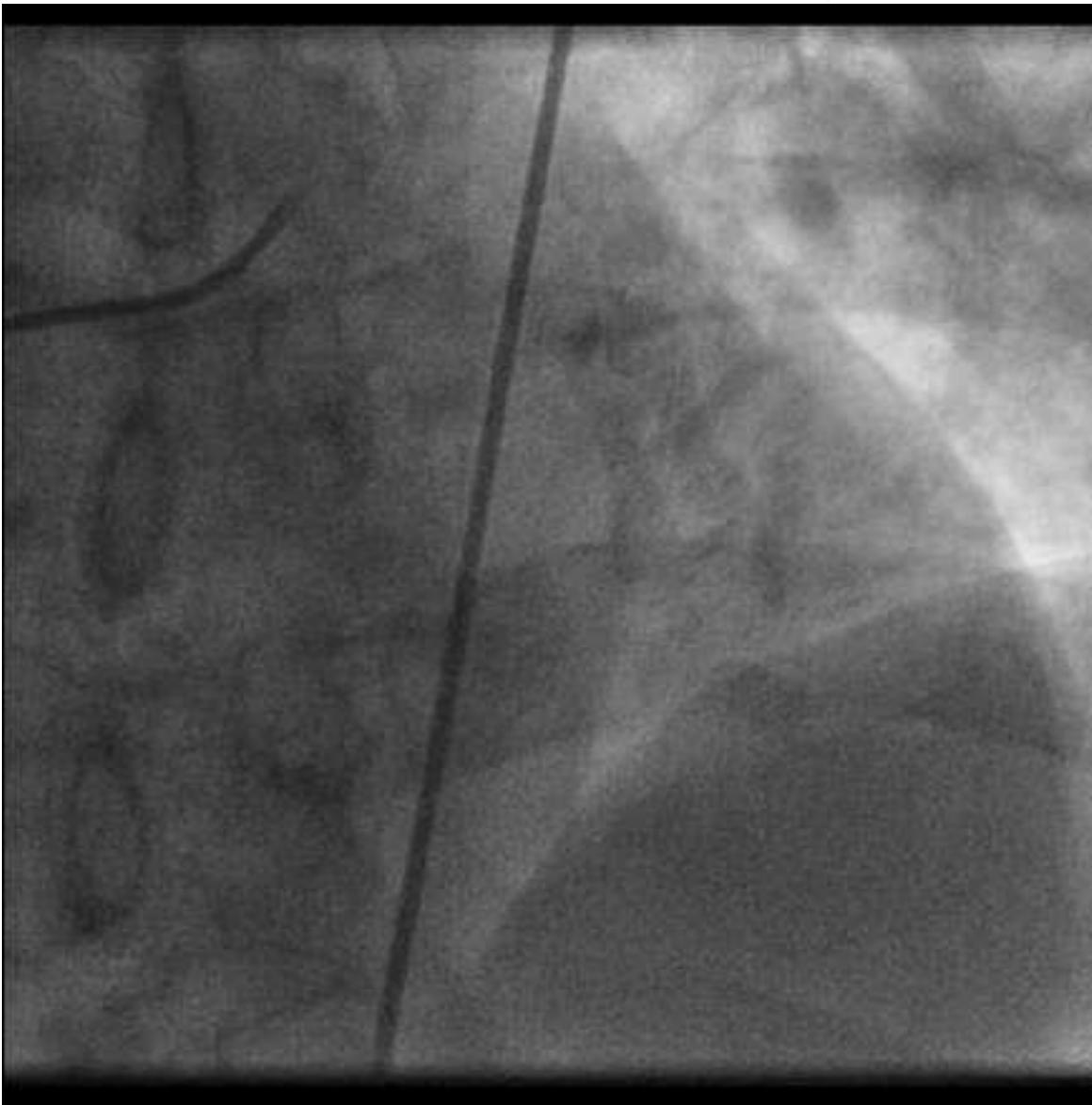
-2-





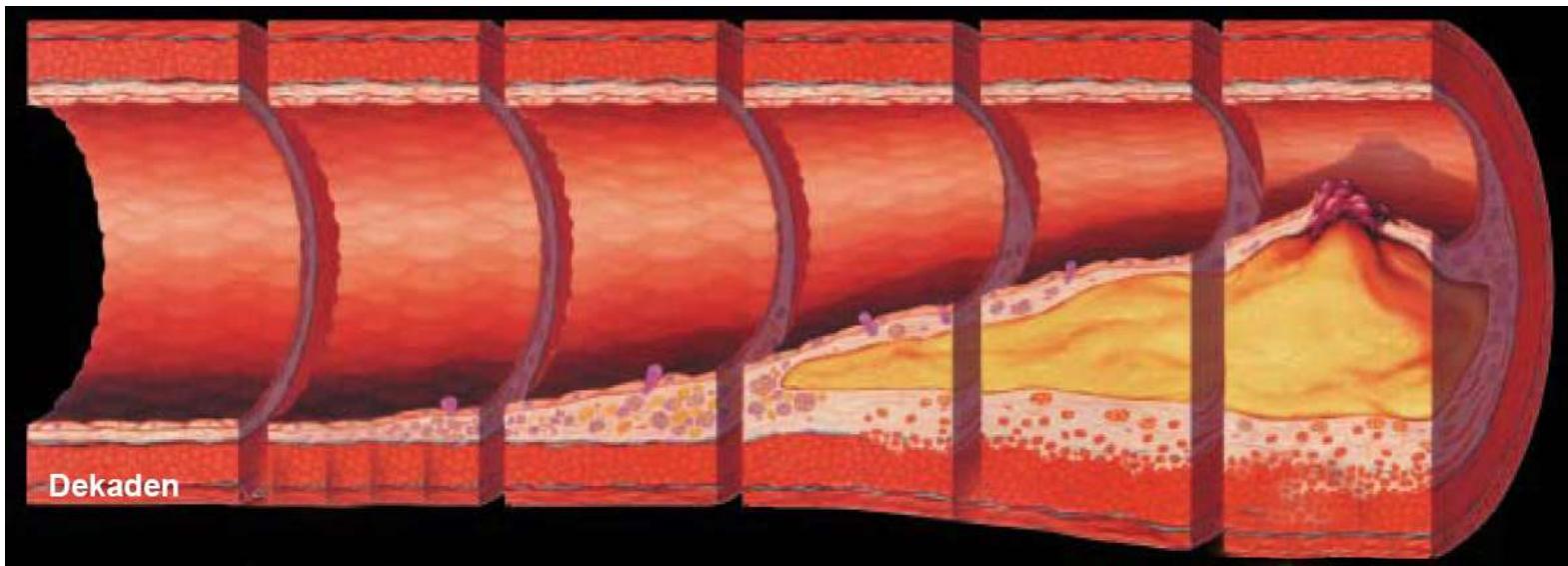
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H., D. 54a





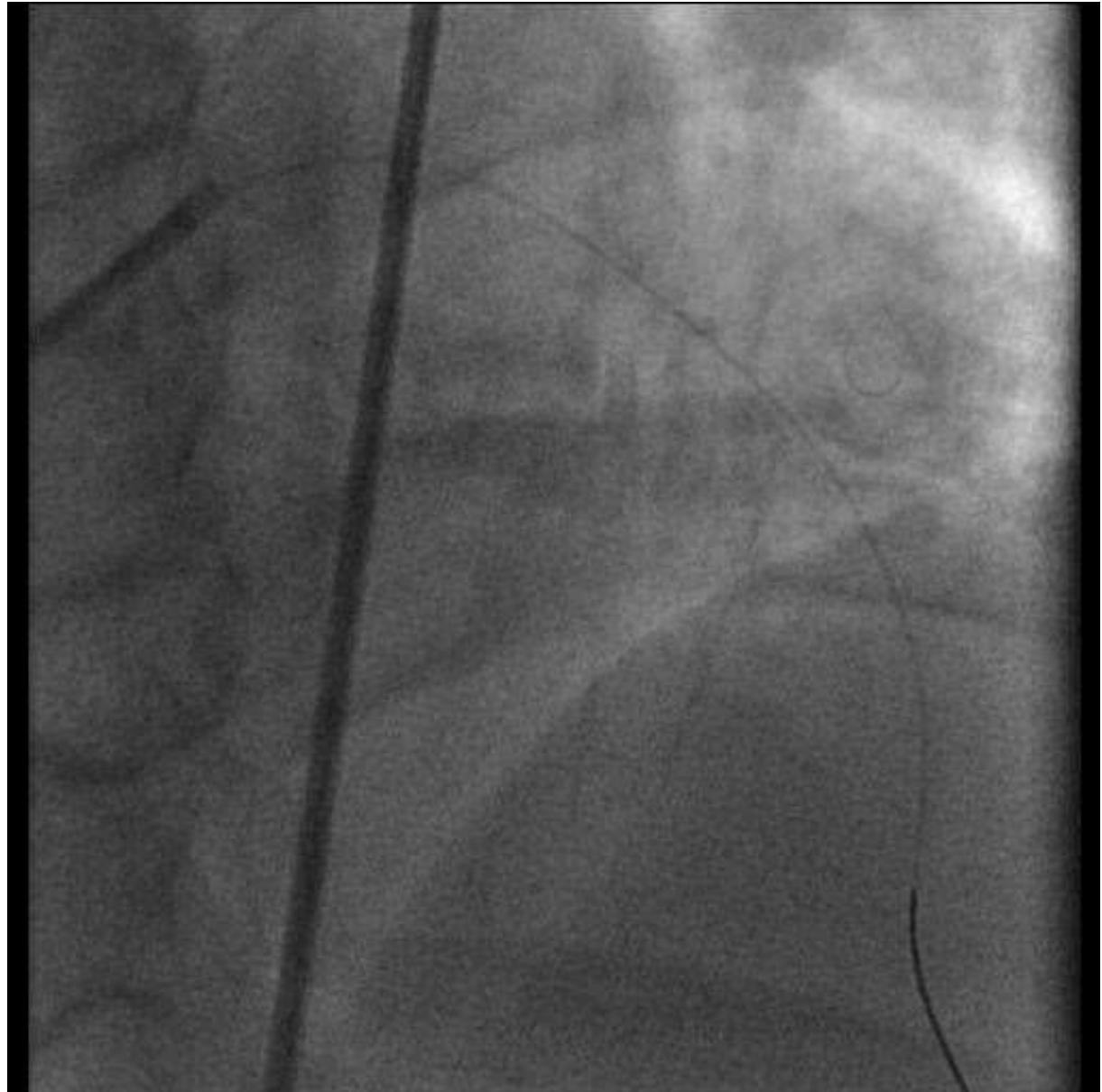
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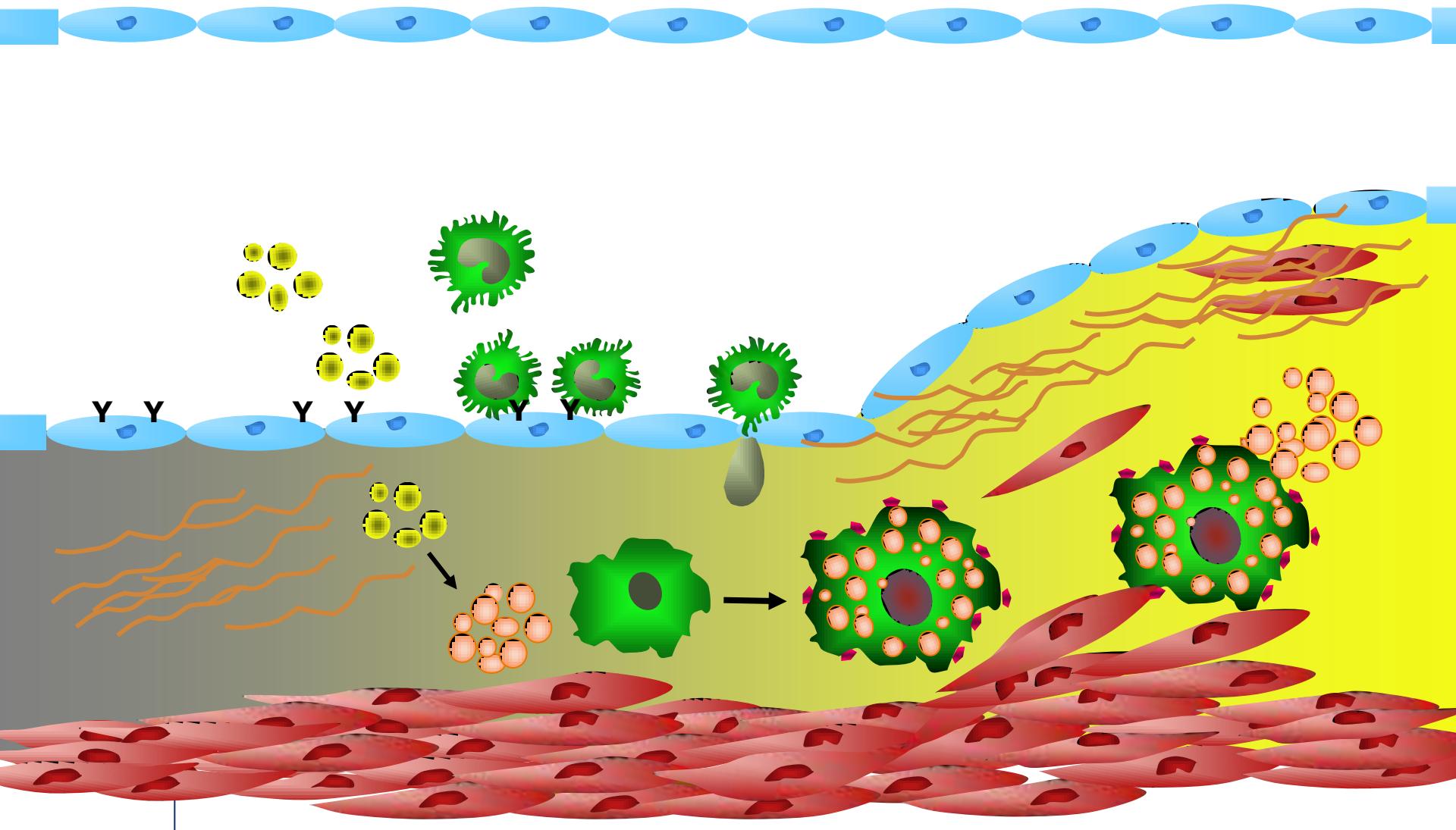
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H., D. 54a





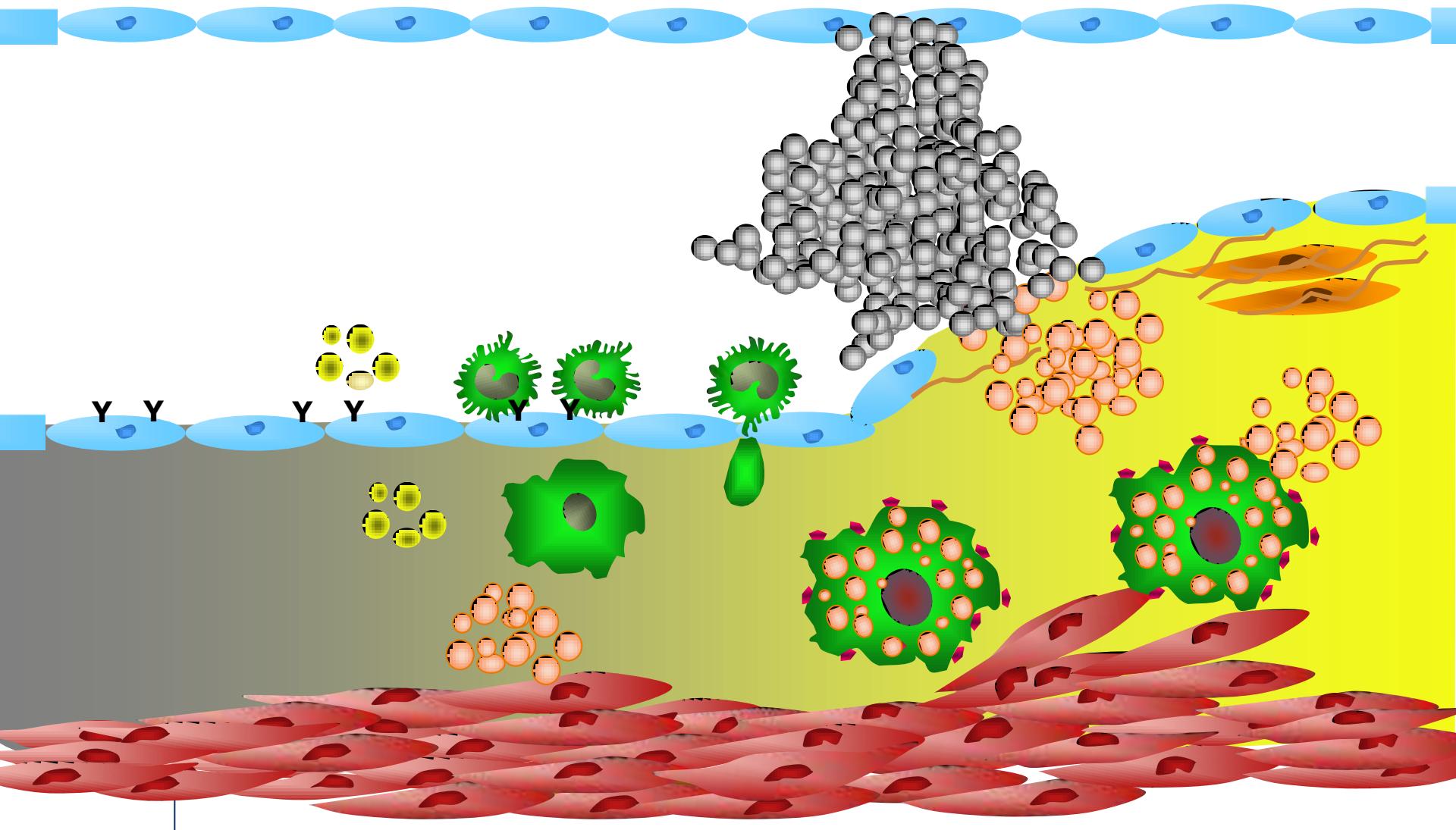
Plaqueformation





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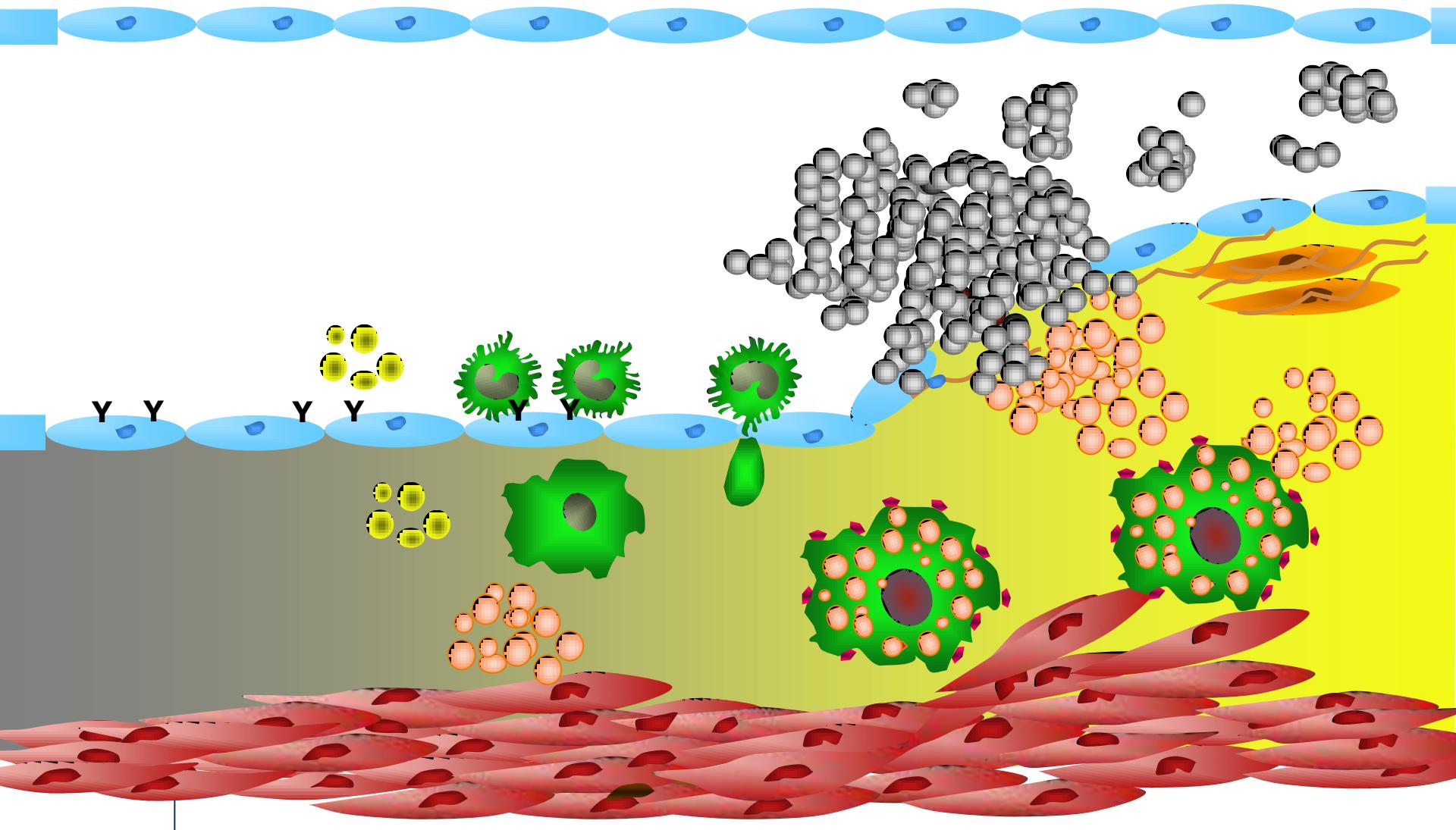
Plaqueruptur - epikardialer Gefäßverschluss -





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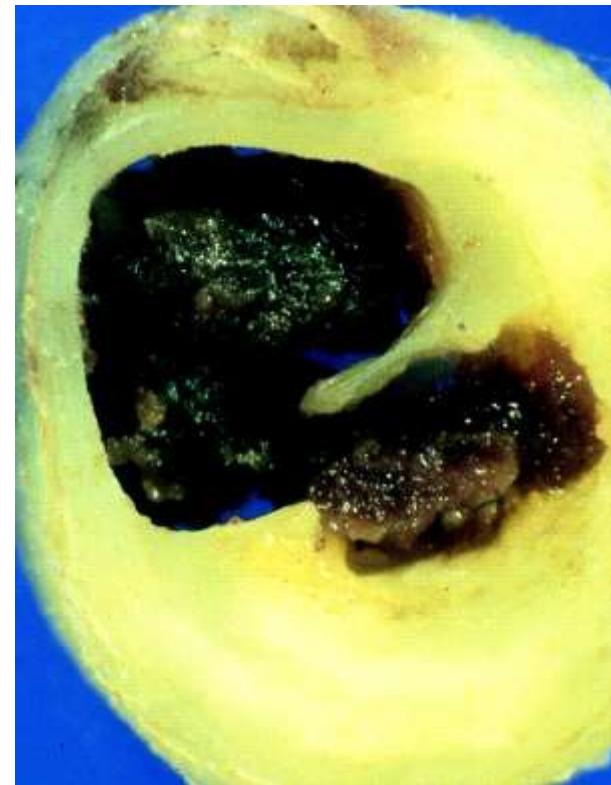
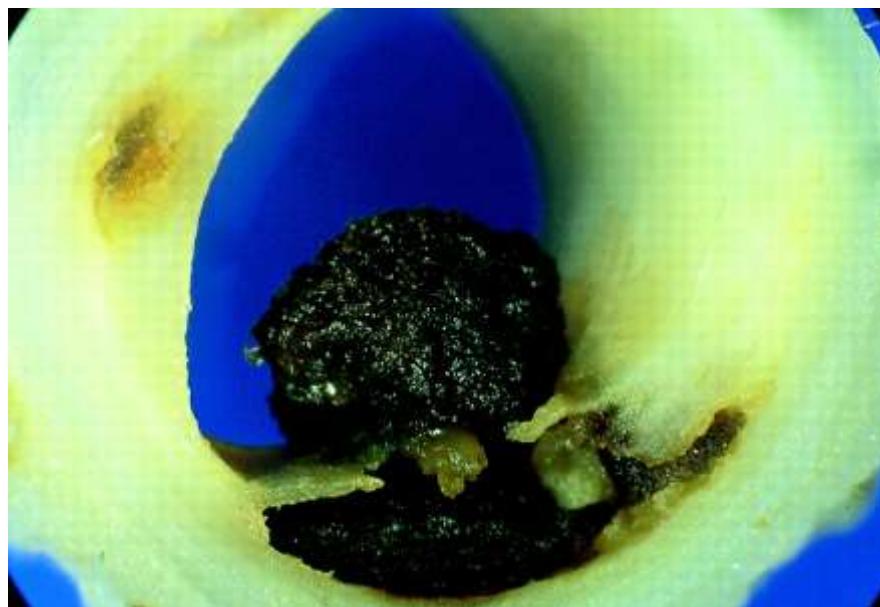
Plaqueruptur - distale Embolisation -





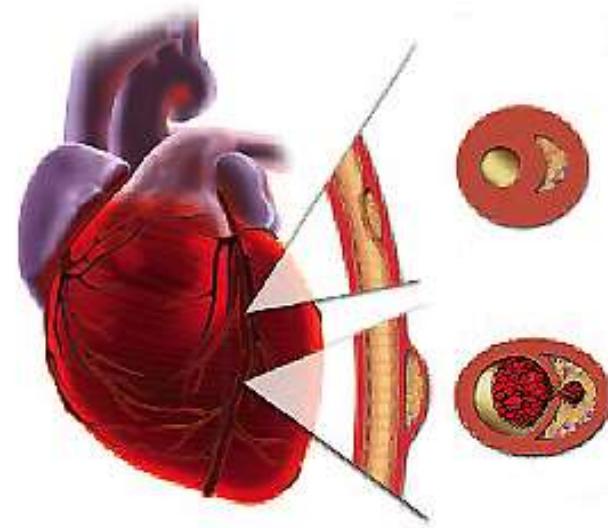
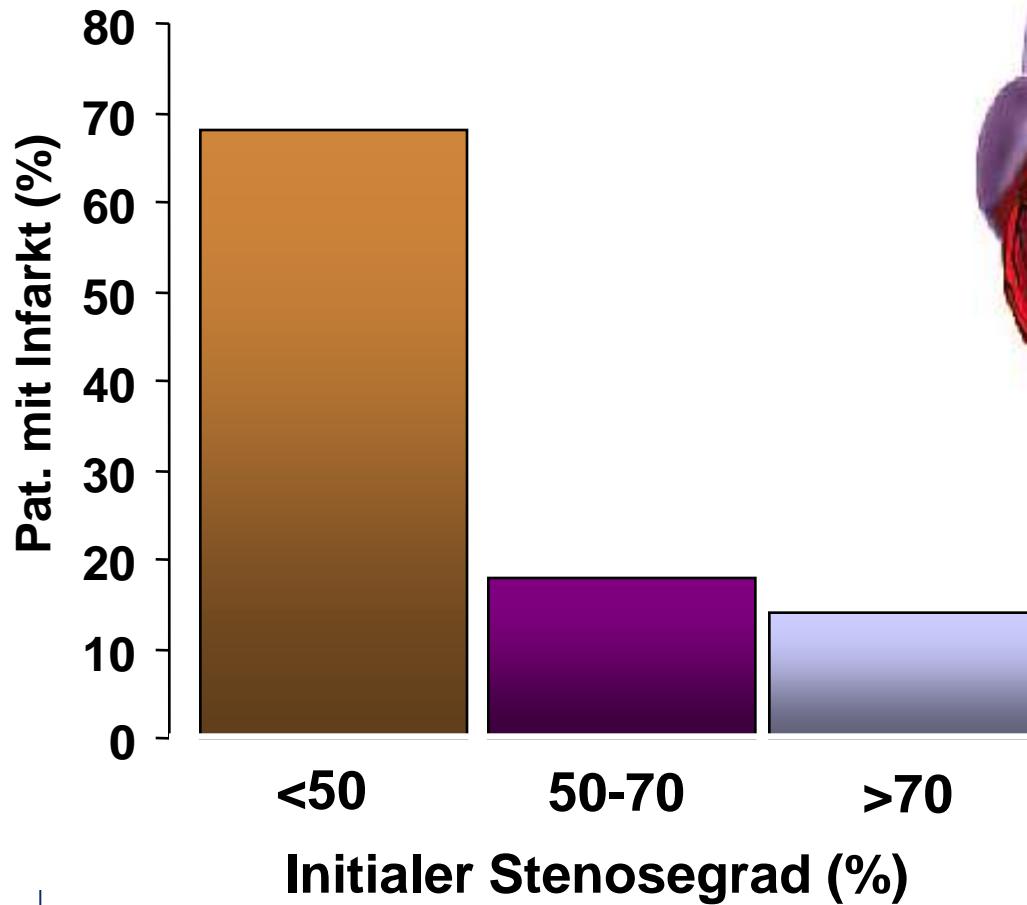
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Inkompletter vs. kompletter Koronargefäßverschluss



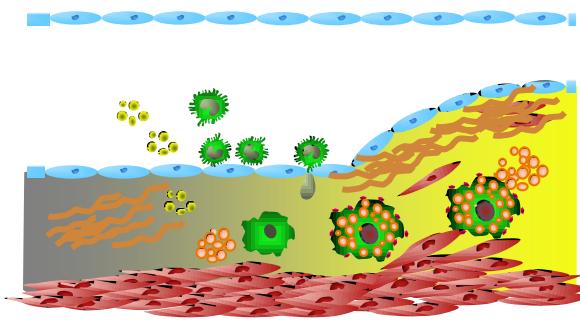


Prädiktiver Wert der Angiographie

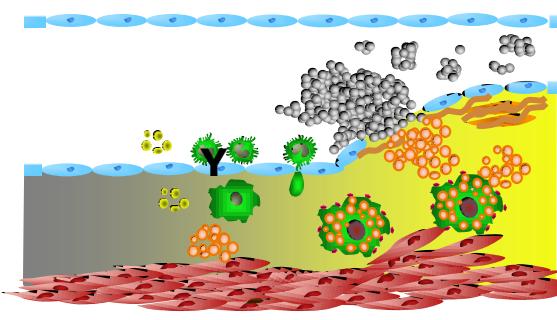


Libby Circulation 2005

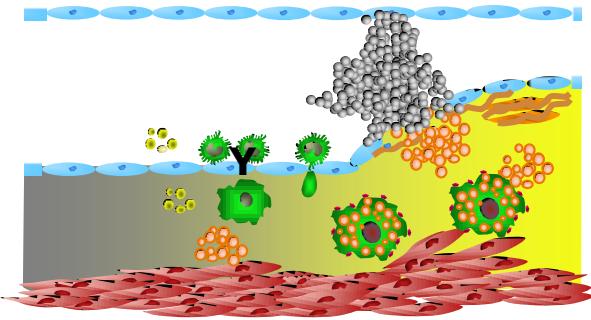
Giroud et al. Am J Cardiol 1992



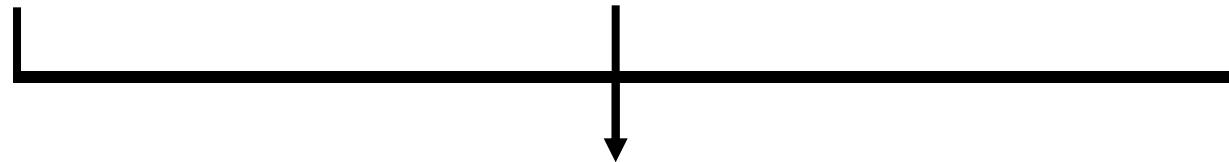
**Instabile
Angina pectoris**



Myokardinfarkt



Myokardinfarkt



Akutes Koronarsyndrom



1. Symptomatik

2. EKG

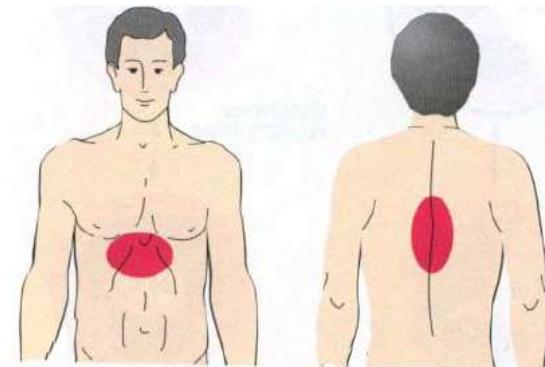
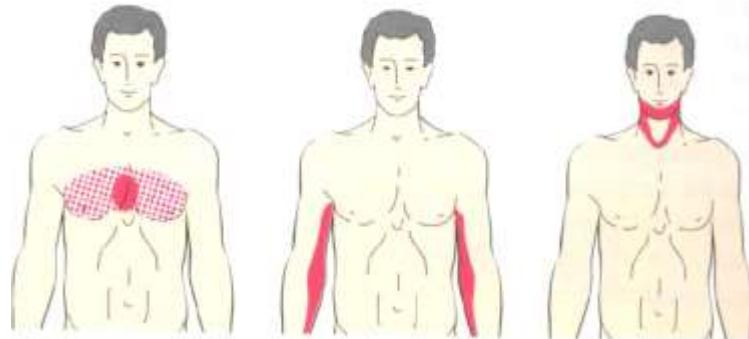
3. Biomarker für Myokardnekrose

4. Koronarangiographie

3. Zirkulierende Marker für Myokardnekrose



- **Blässe, Kaltschweissigkeit**
- **Thoraxschmerz**





Klinik: Thoraxschmerz

EKG

(10 Min nach Aufnahme, nach 6h, 12h)

- **epikardialer vs. peripherer Gefäßverschluss**
- **Infarktstadium**
- **Infarktlokalisation**

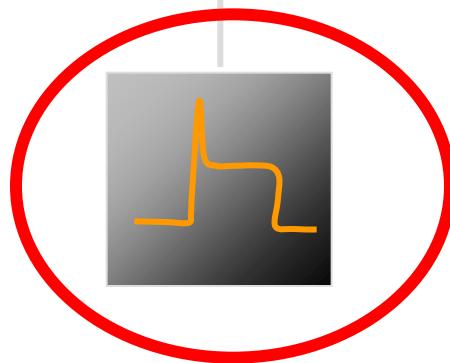


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Klinik: Thoraxschmerz

EKG

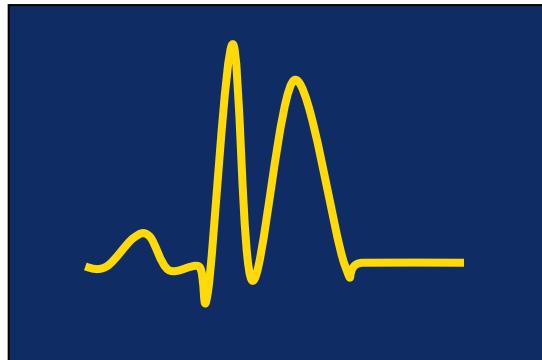
(10 Min nach Aufnahme, nach 6h, 12)





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ST-Hebungsinfarkt



Stadium 0



Stadium I



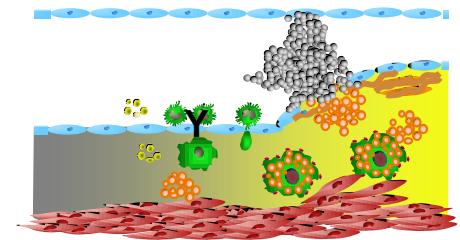
Stadium II



Stadium III

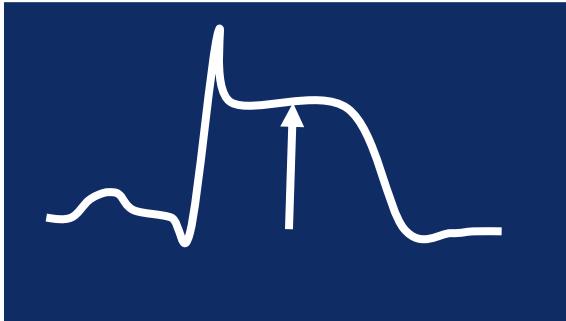


Stadium IV

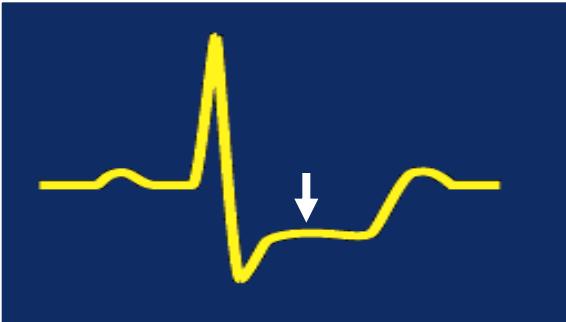




EKG



ST Streckenhebung:
 $\geq 0,1\text{mV}$ in 2 Extremitäten-Abl. bzw.
 $\geq 0,2\text{mV}$ in 2 Brustwand-Abl.



Gegensinnige Ableitungen:
ST Streckensenkung



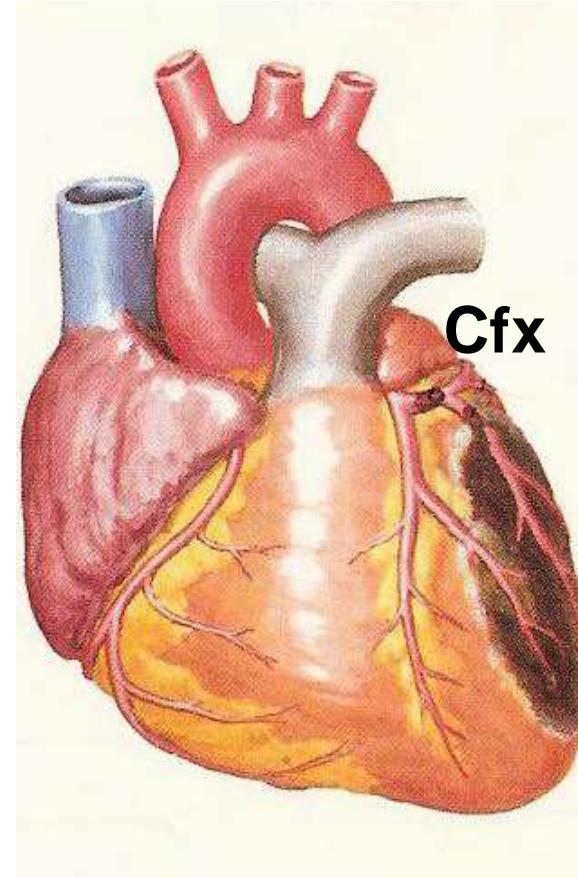
Pathologisches Q:
 $> 1/4$ von R tief
 $> 0.04 \text{ s}$ breit



Infarktlokalisation im EKG

Seitenwandinfarkt:

- I, aVL
- V 5/6



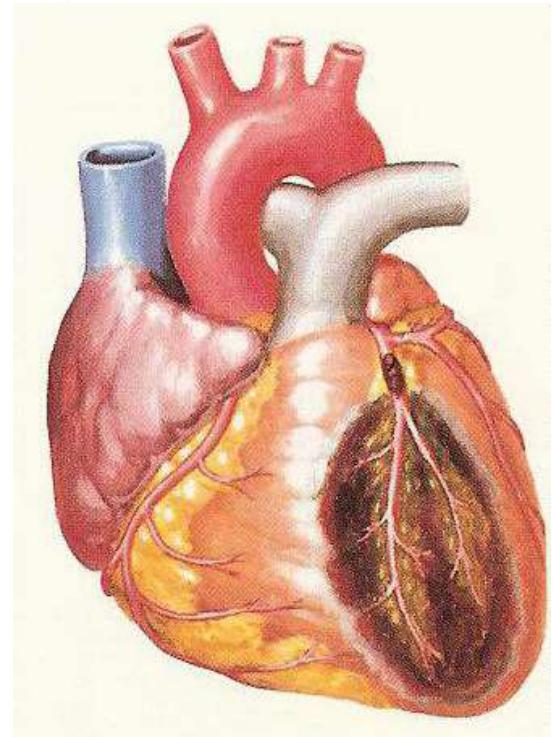
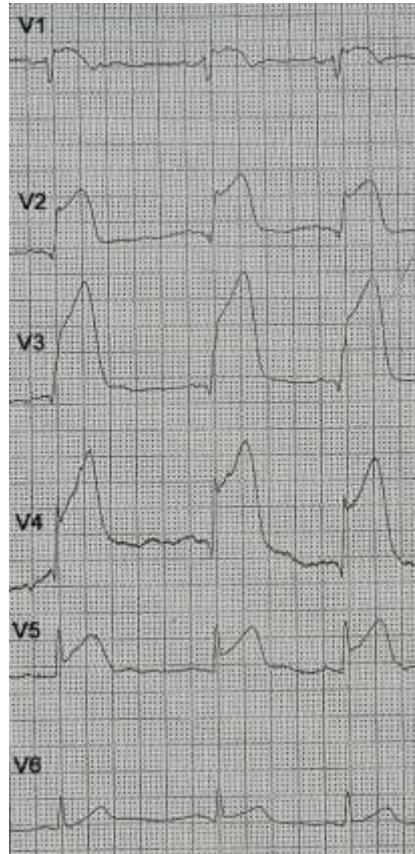
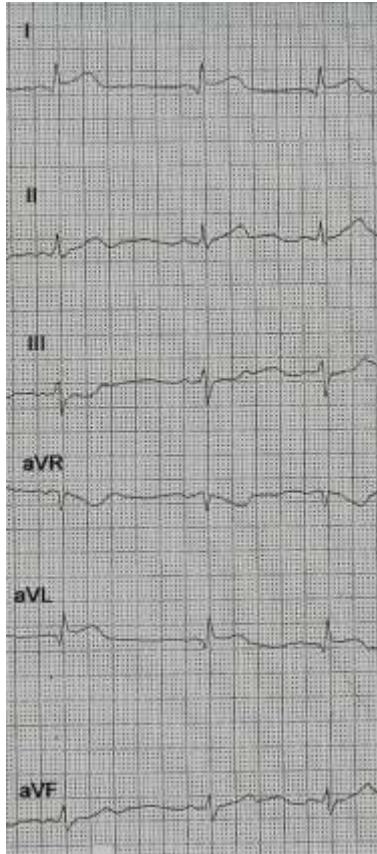
In 50% ist das EKG nicht wegweisend!



Infarktlokalisation im EKG

**Vorderwandinfarkt:
-anteroseptal**

**V3,4 (V5/6)
V1,2**



RIVA

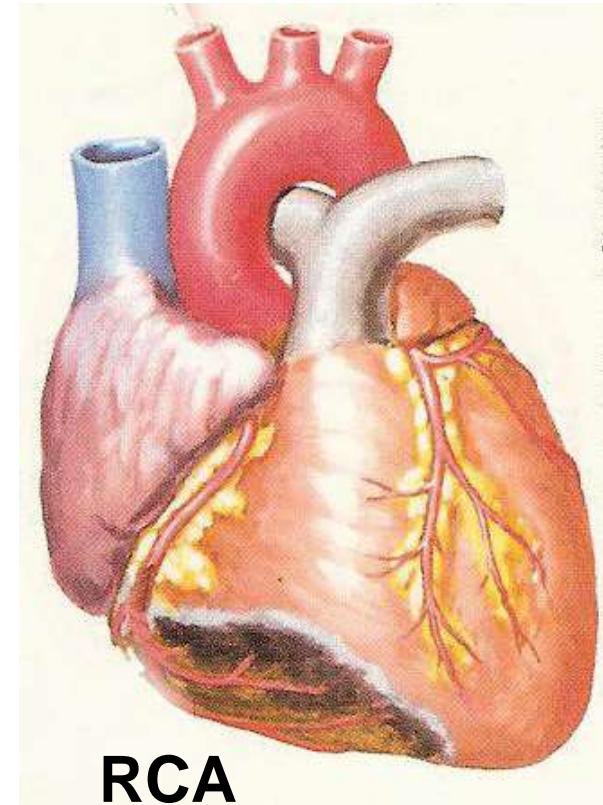
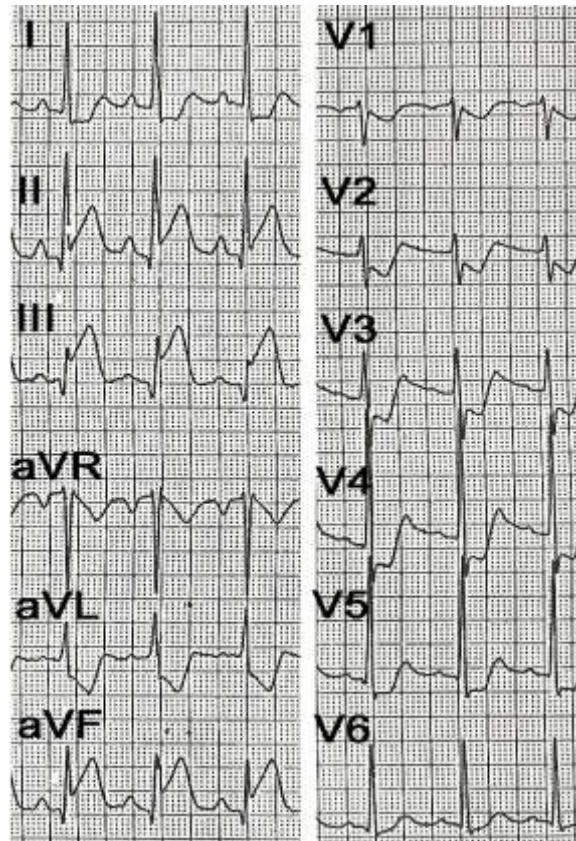


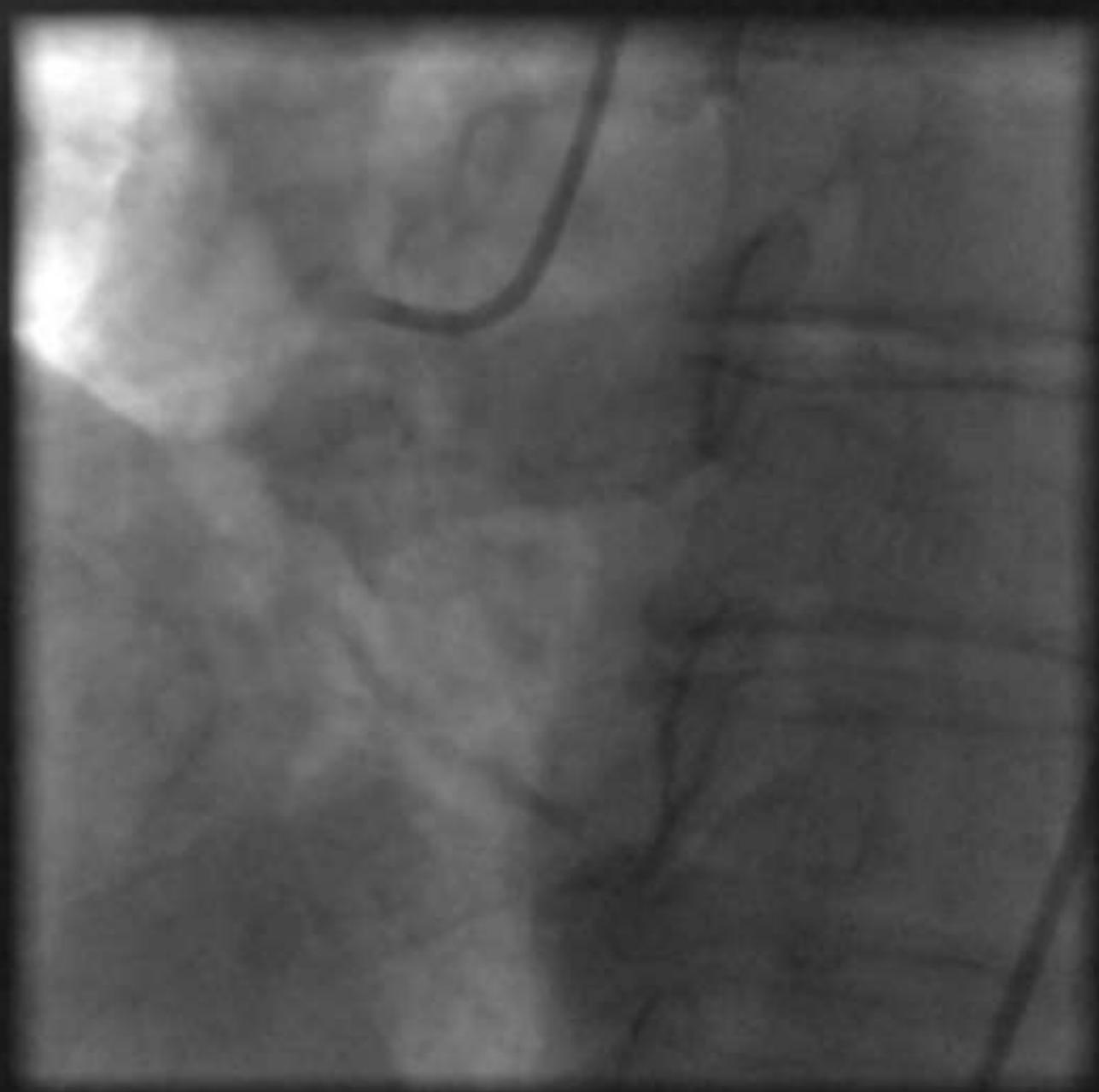
Infarktlokalisation im EKG

inferiorer Infarkt:

- posterior:
- rechtsventrikulär

II, III, aVF
V5/6
V4r

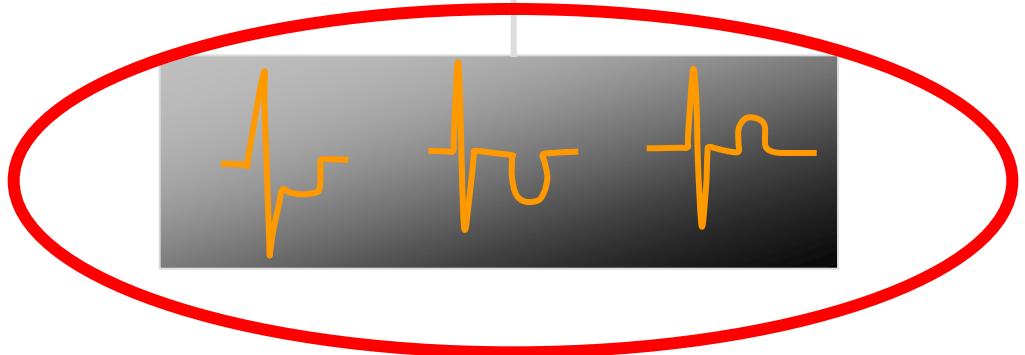






Klinik: Thoraxschmerz

EKG





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Nicht ST Streckenhebungsinfarkt

Image size: 512 x 512
View size: 1311 x 752
X: 0 px Y: 0 px Value: 0.00
WL: 128 WW: 256

A

unnamed
966-2006
12
Kardio1 2D



R

128 L

Im: 1/82
Zoom: 147% Angle: 0
Thickness: 0.00 mm Location: 0.00 mm

P

19:05:43

24.04.06

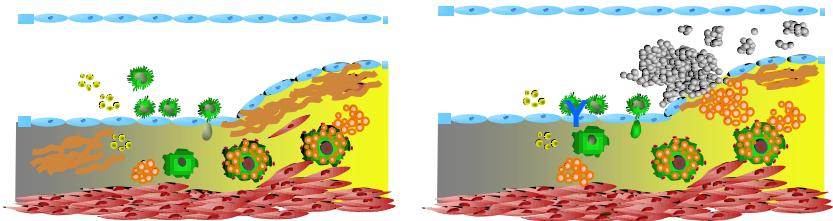
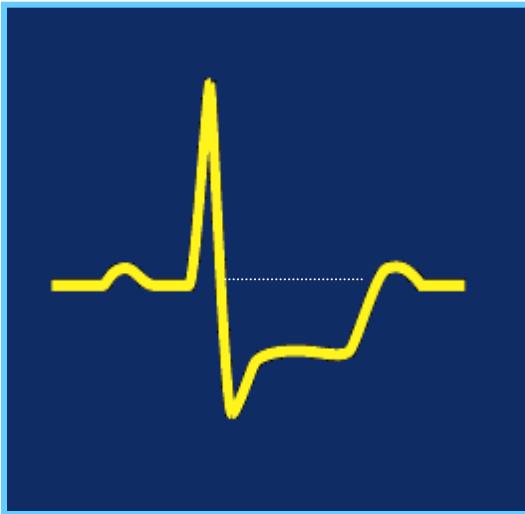
Erstellt mit Osirix





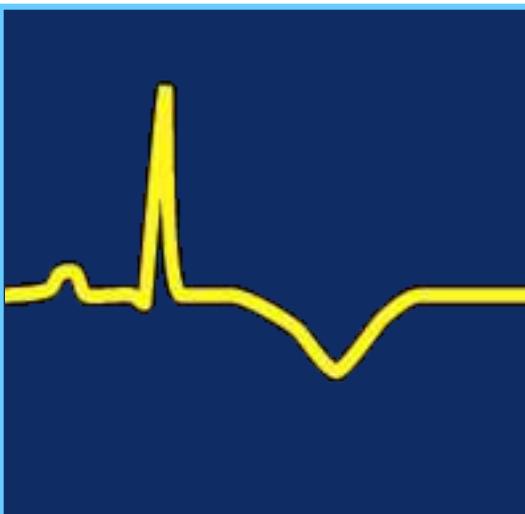


EKG instabile Angina/NSTEMI



ST-Streckensenkung

- > 0,05mV in mind. 2 Ableitungen
- > 0,2mV: Mortalität 6fach erhöht



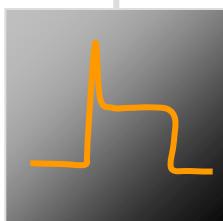
T-Wellen Inversion

- > 0,1mV in mind. 2 Ableitungen



Klinik: Thoraxschmerz

EKG



Labor

STEMI

+



NSTEMI

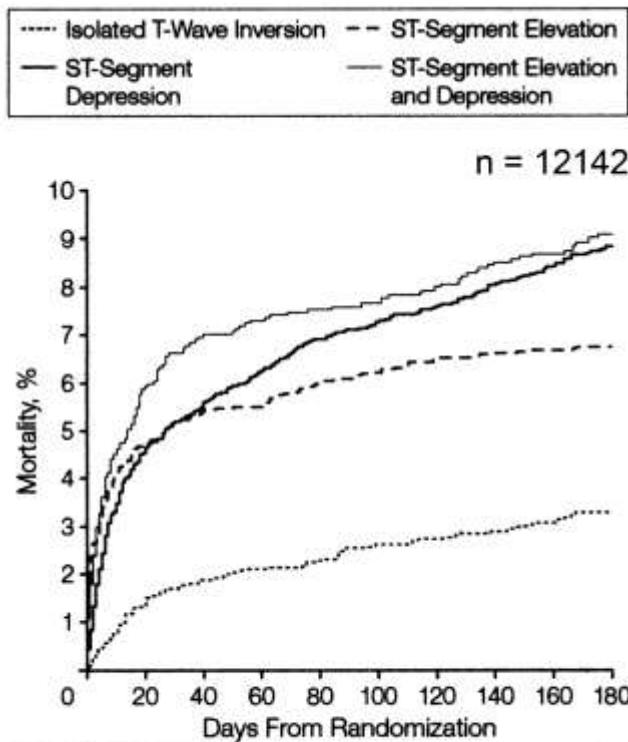
-



Instabile AP

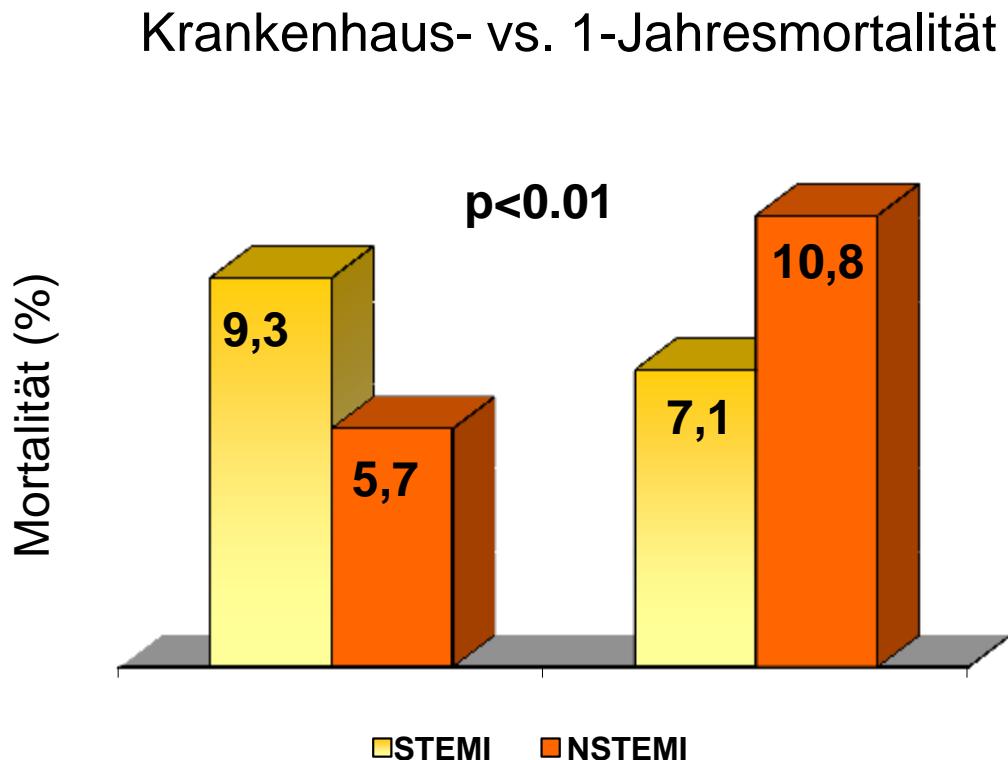


Prognose Akutes Koronarsyndrom

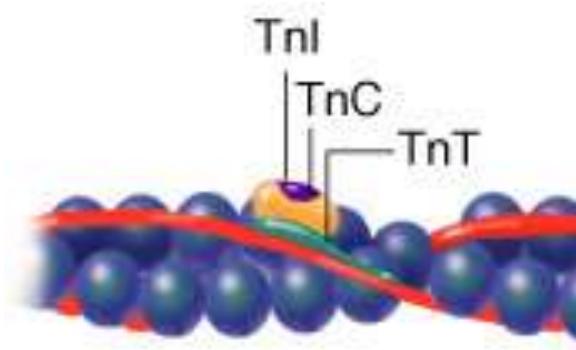
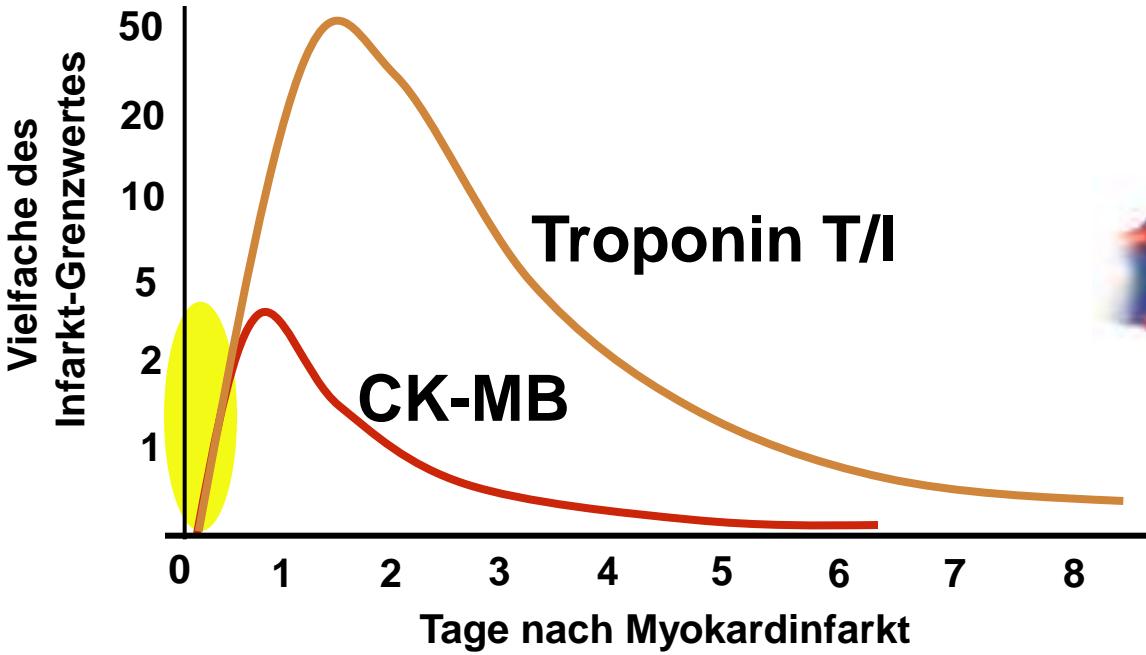


Top, mortality rate up to 30 days. Bottom, mortality rate to 6 months.

Savonitto et al, JAMA 1999



Eur Heart J 2005



Troponine

100% spezifisch

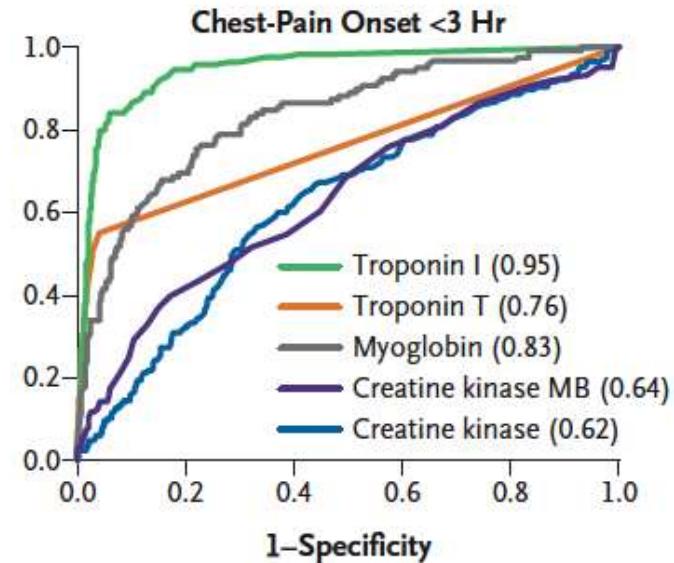
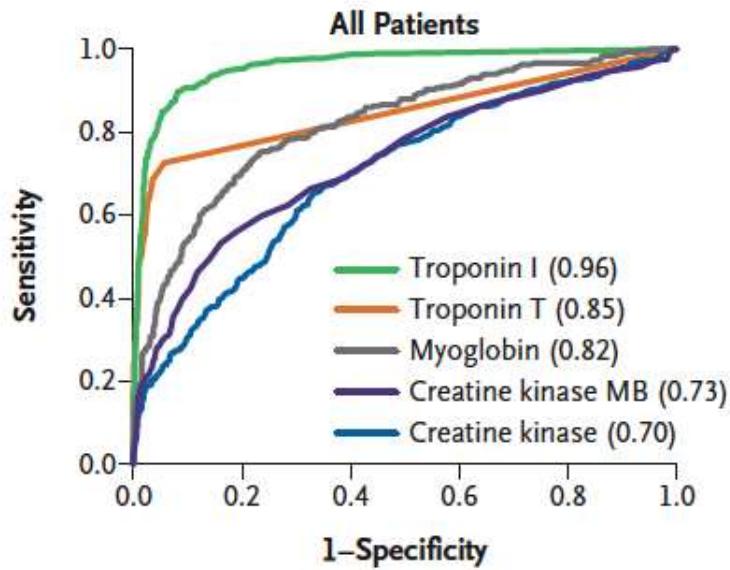
Nachweis: 3h post MI

erhöht bis zu 3 Wochen nach Infarkt

Biomarker neue Entwicklungen

Sensitive Troponine

n=1818



neg. prädiktiver Wert: 87%

Neg. prädiktiver Wert nach 2. Messung nach 3 Stunden: 99%



Infarktdiagnose mit hochsensitiven Troponinen

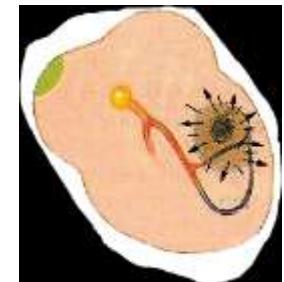
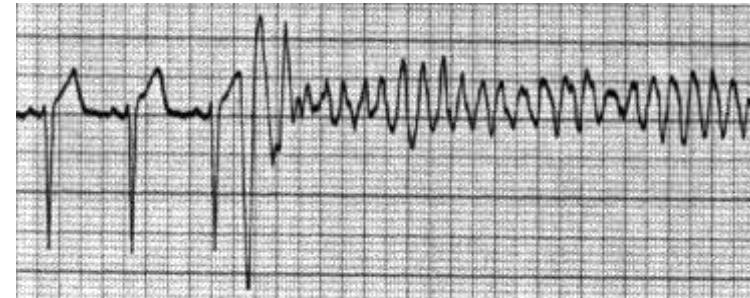
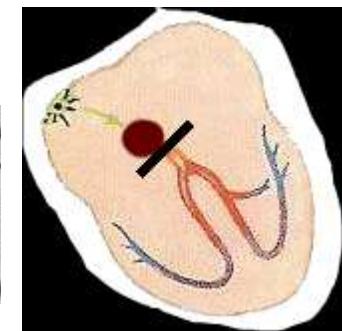
Delta Change	Sensitivity (CI)	Specificity (CI)	PPV (CI)	NPV (CI)
High Sensitive Troponin I 99th percentile at 29 pg/mL				
On admission > 99th percentile	82.6 (77.7-86.9)	91.8 (89.9-93.5)	74.4 (69.2,79.2)	94.8 (93.2,96.1)
After 3 hours > 99th percentile	98.6 (96.4-99.6)	90.0 (87.9-91.8)	73.9 (69.2,78.3)	99.5 (98.8-99.9)
On admission or after 3 hours > 99th percentile AND				
Change ≥20%	60.6 (54.7-66.4)	96.7 (95.4-97.8)	84.2 (78.5-89.0)	89.5 (87.5-91.3)
Change ≥30%	56.0 (50.0-61.9)	97.9 (96.7-98.7)	88.3 (82.6-92.6)	88.5 (86.5-90.4)
Change ≥50%	50.4 (44.4-56.3)	99.0 (98.1-99.5)	93.4 (88.2-96.8)	87.4 (85.3-89.3)
Change ≥75%	44.7 (38.8-50.7)	99.1 (98.3-99.6)	93.3 (87.7-96.9)	86.1 (84.0-88.1)
Change ≥100%	41.8 (36.0-47.8)	99.3 (98.5-99.7)	94.4 (88.8-97.7)	85.6 (83.4-87.5)
Change ≥150%	37.2 (31.6-43.2)	99.3 (98.5-99.7)	93.8 (87.5-97.5)	84.6 (82.4-86.6)
Change ≥200%	34.8 (29.2-40.6)	99.5 (98.8-99.8)	95.1 (89.0-98.4)	84.1 (81.9-86.2)
Change ≥250%	33.0 (27.5-38.8)	99.6 (99.0-99.9)	95.9 (89.8-98.9)	83.7 (81.5-85.8)
Change ≥266%*	33.0 (27.5-38.8)	99.6 (99.0-99.9)	95.9 (89.8-98.9)	83.7 (81.5-85.8)



Folgen von Myokardischämie/-nekrose

1. Pumpversagen

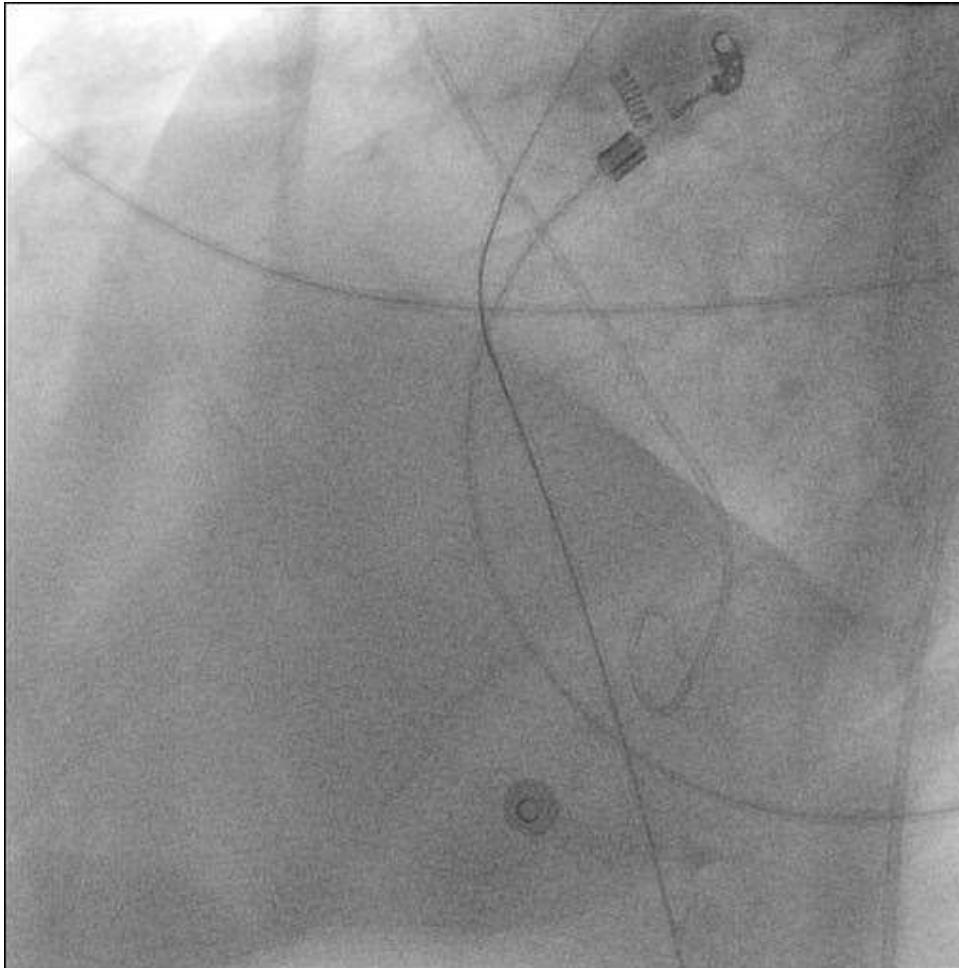
2. Rhythmusstörungen





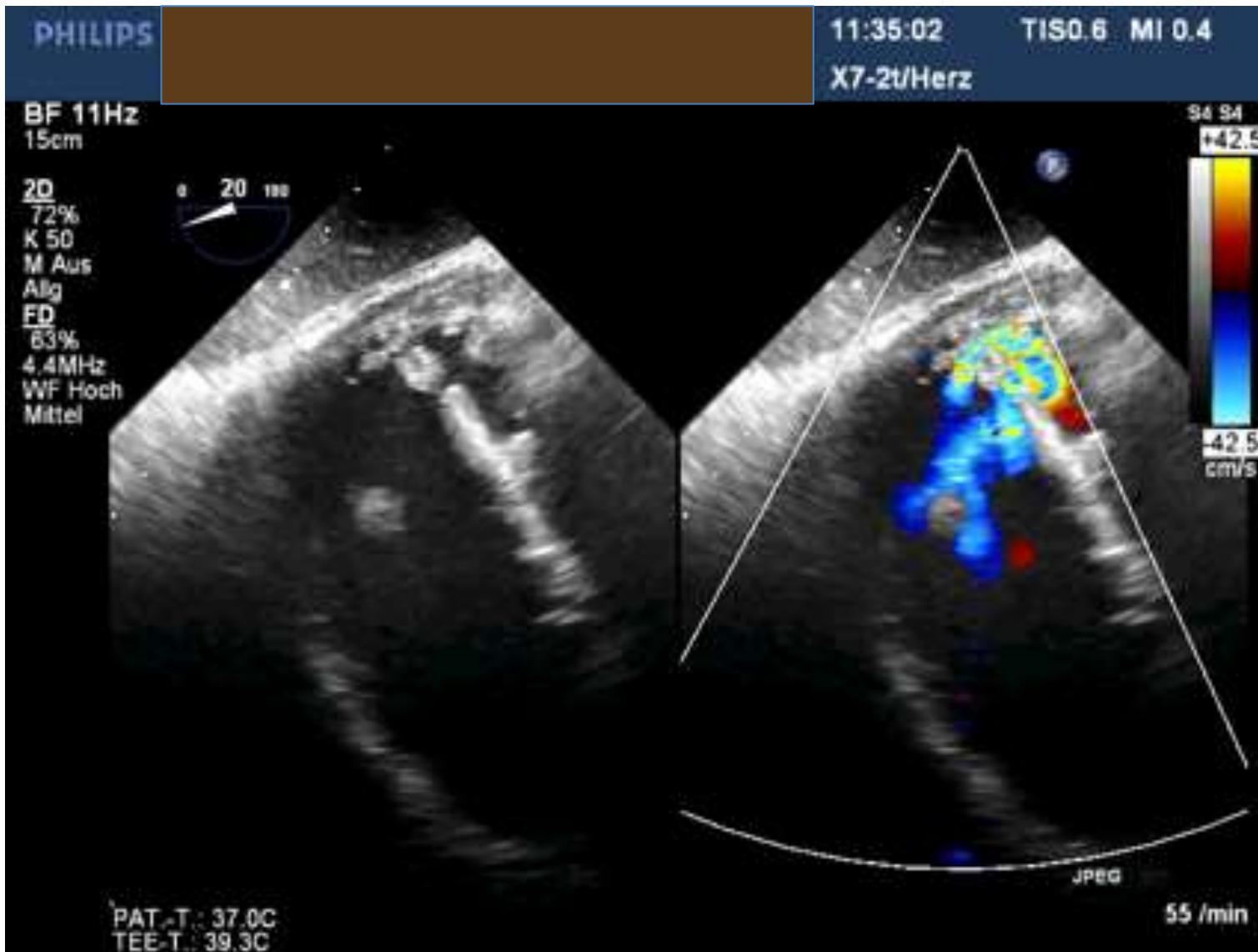
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Komplikationen von Myokardischämie/-nekrose



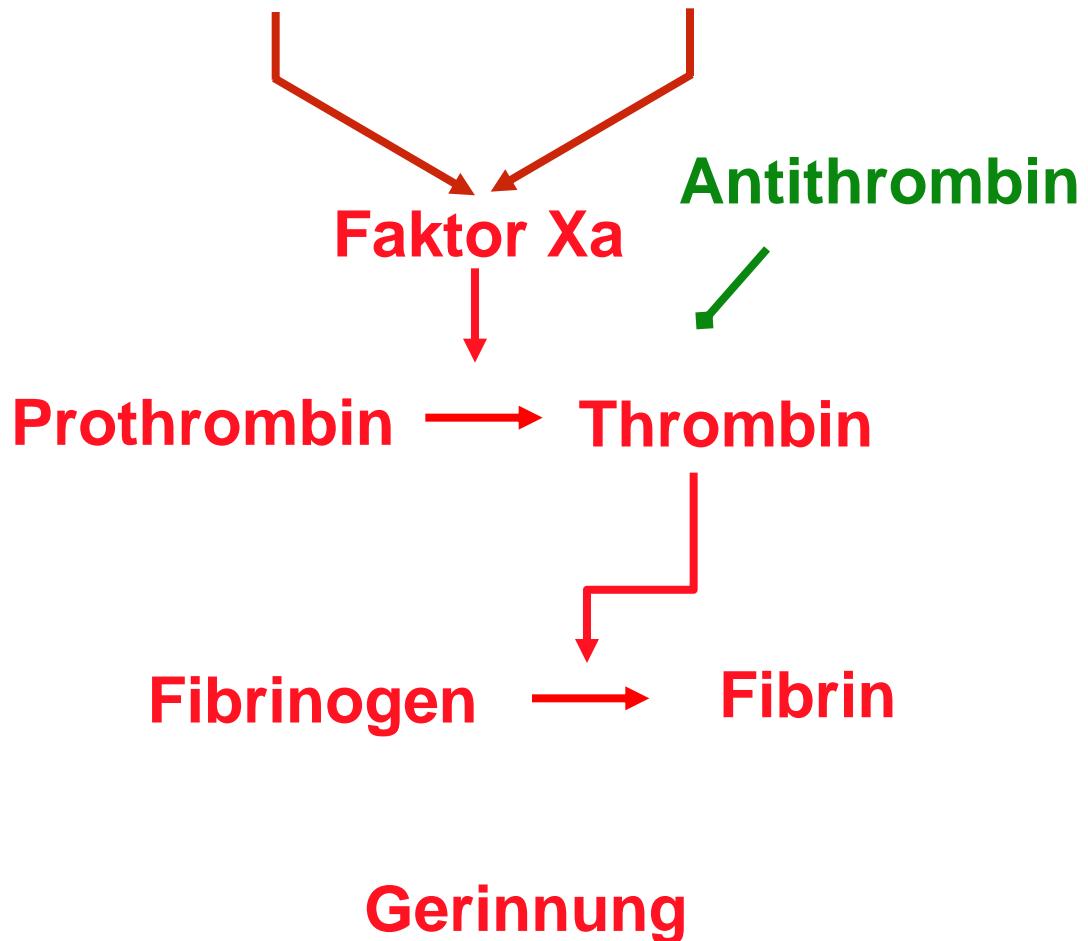


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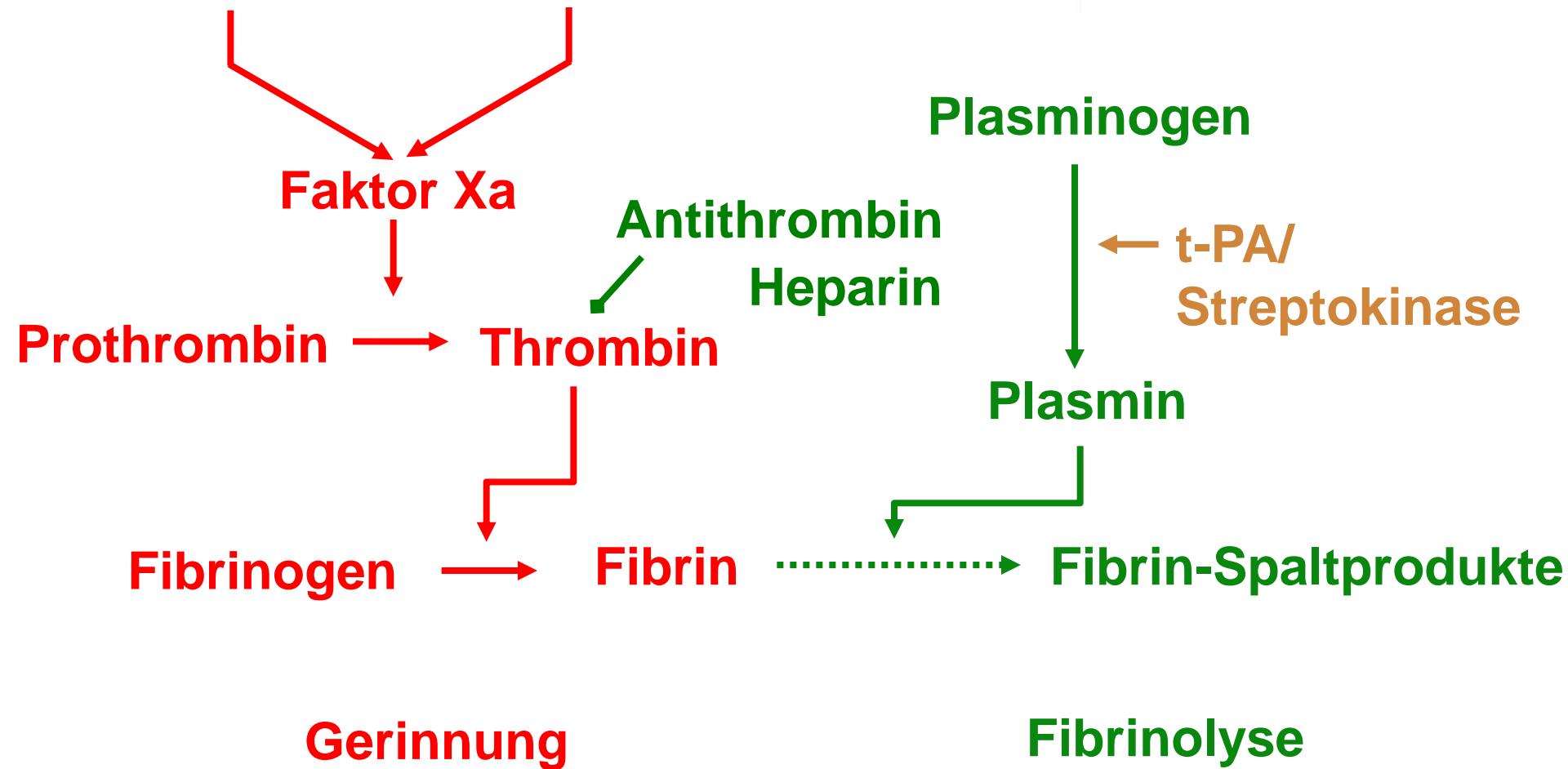


- Kausale Therapie
 - Korpuskuläre Gerinnungshemmung (Thrombozyten)
 - ASS
 - ADP Antagonisten
 - GP IIb/IIIa Rezeptorantagonisten
 - Plasmatische Gerinnungshemmung
 - Heparin 70U/kg KG, max 5000U
 - Enoxaparin 30mg iv, 1mg/kg sc
 - Fibrinolyse





Fibrinolyse





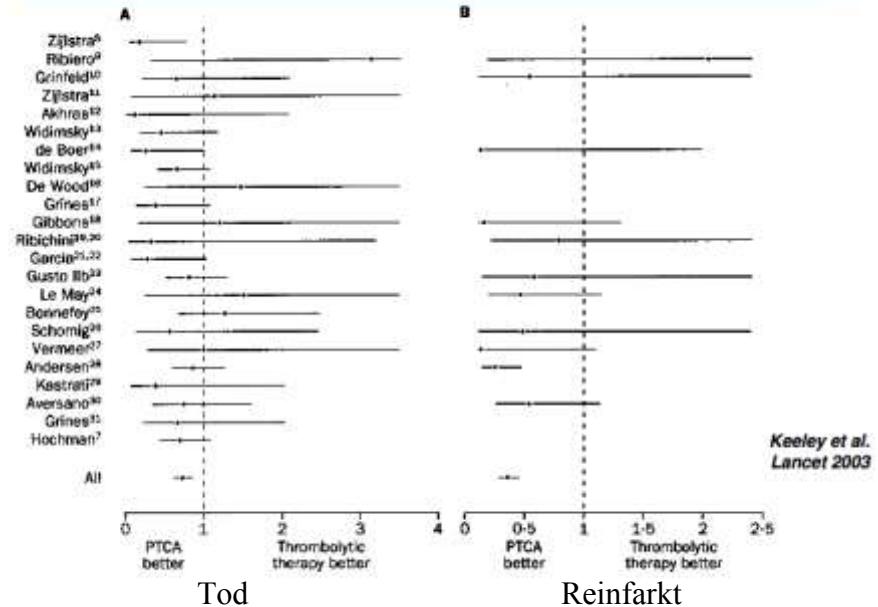
Fibrinolyse vs. Koronarintervention

Vollständige Wiederherstellung des koronaren Blutflusses

- nach Lyse: 60%
- nach Koronarintervention: 85%

- Reduktion der Infarktsterblichkeit nach Koronarintervention: 7% vs 9% -> -25%
- Reduktion der Reinfarktrate: 3% vs 7%
- Reduktion der Schlaganfallrate: 1% vs 2%

STEMI: Lyse vs. PCI?



Keeley et al, Lancet 2003

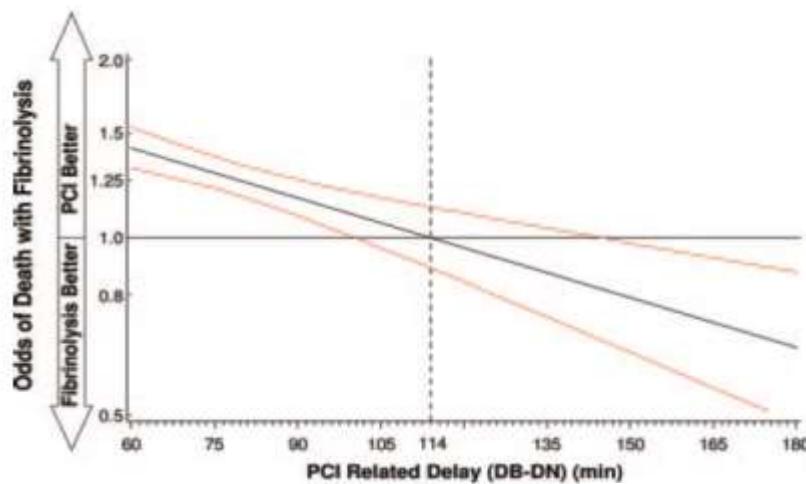


STEMI Therapie

STEMI



Primäre PCI
in
 <120 min

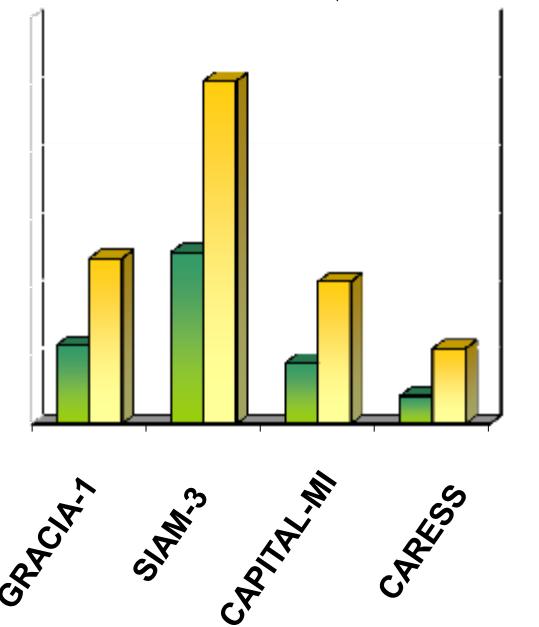


Pinto et al, Circ 2006

Lyse



Endpunkte (%)



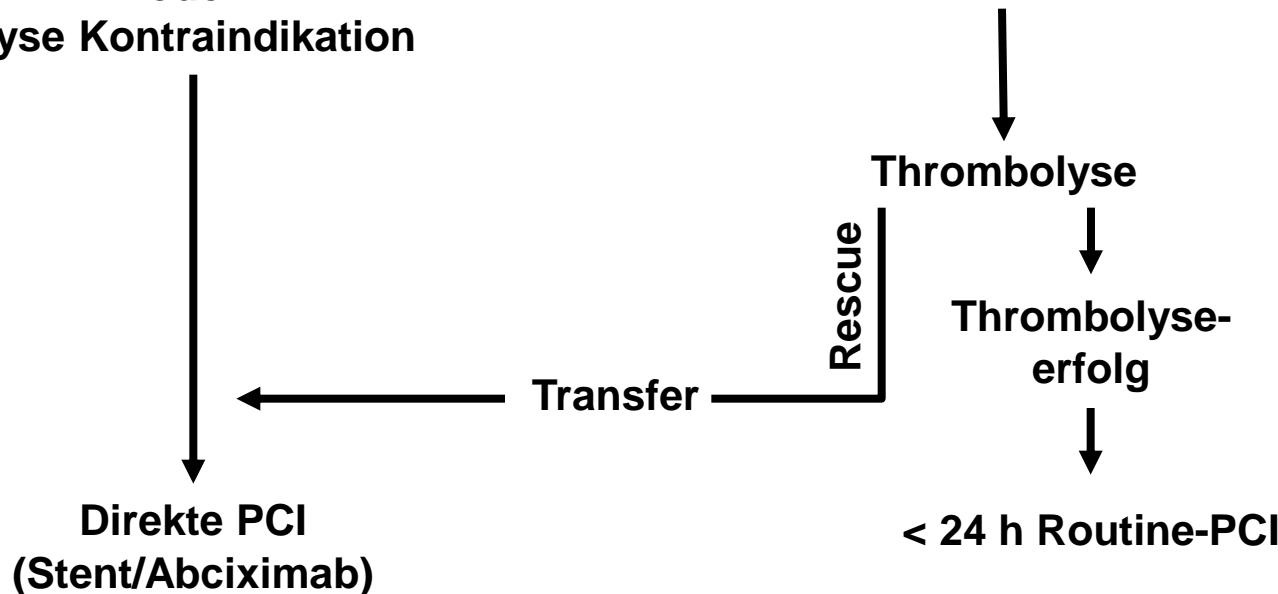
→ PCI zwischen 2 und 17h nach Lyse



STEMI-Strategie



oder
Lyse Kontraindikation





GRACE Risk Score

Countries 30
Hospitals 247
Patients 102.341

GRACE
Global Registry of Acute Coronary Events

ACS Risk Model

At Admission (in-hospital/to 6 months) At Discharge (to 6 months)

Age	Years	<input type="checkbox"/> Cardiac arrest at admission
HR	bpm	<input type="checkbox"/> ST-segment deviation
SBP	mmHg	<input type="checkbox"/> Elevated cardiac enzymes/markers
Creat.	mg/dL	Probability of Death Death or MI
CHF	Killip Class	In-hospital -- -- To 6 months -- --

SI Units Reset

[Calculator](#) | [Instructions](#) | [GRACE Info](#) | [References](#) | [Disclaimer](#)



Non STE-ACS: In-hospital Mortality

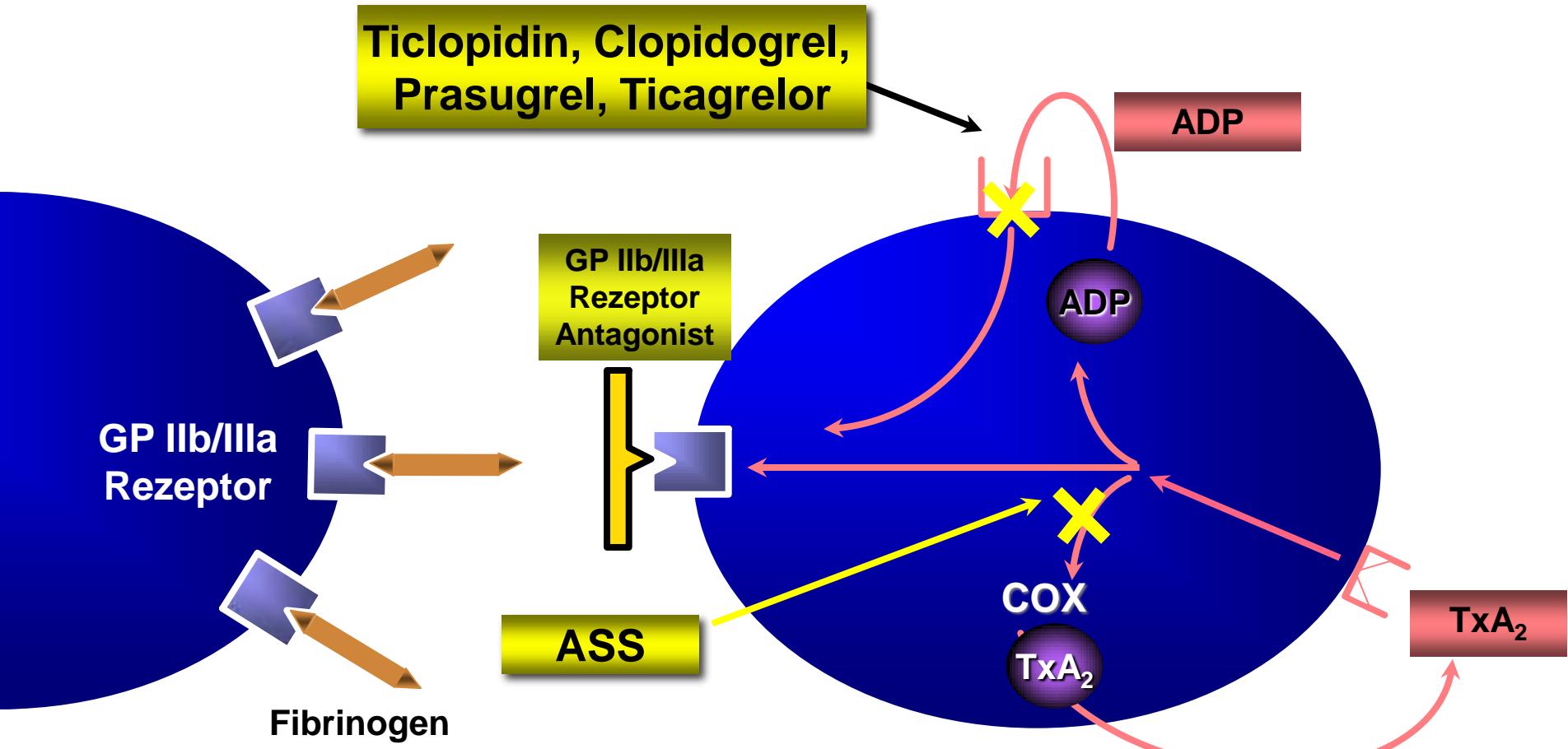
Risk Category (tertiles)	GRACE Risk Score	Probability of Death In-hospital (%)
Low	1-108	<1
Intermediate	109-140	1-3
High	141-372	>3

Non STE-ACS: 6 Month Post-discharge Mortality

Risk Category (tertiles)	GRACE Risk Score	Probability of Death Post-discharge to 6 Months (%)
Low	1-88	<3
Intermediate	89-118	3-8
High	119-263	>8

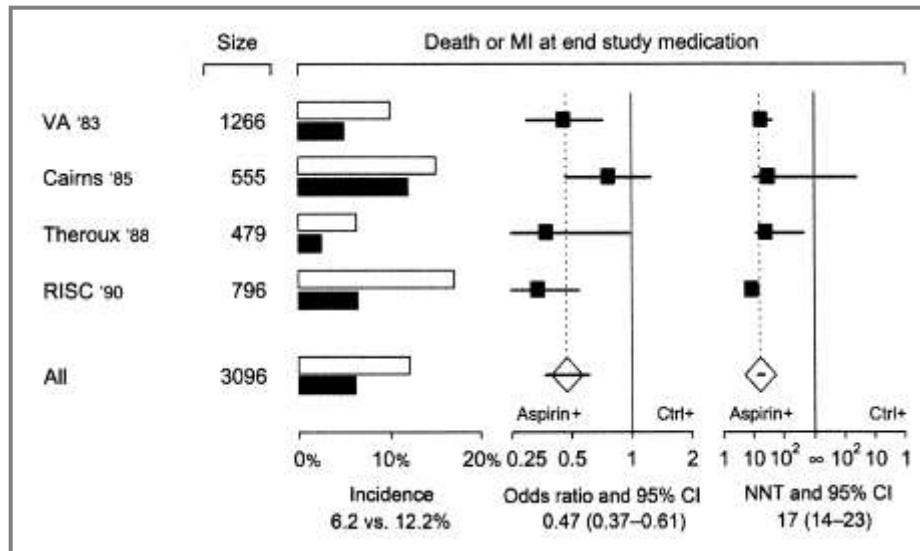


Thrombozytenaggregation

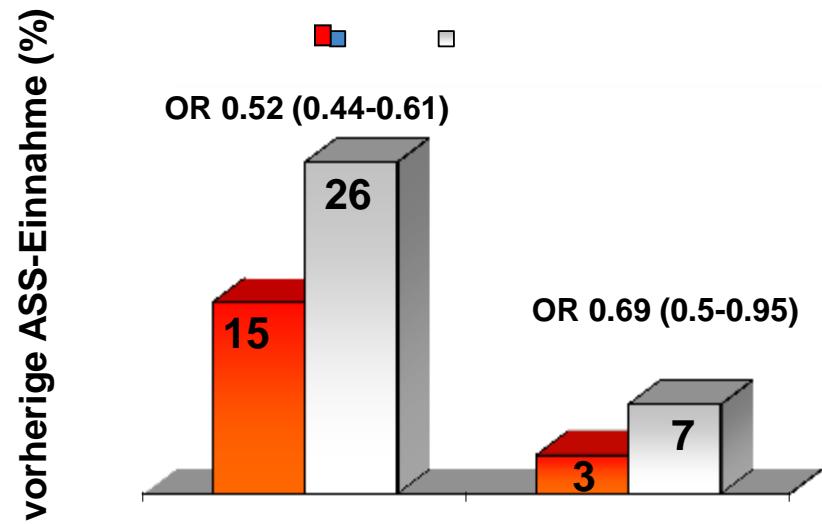




STEMI/NSTEMI medikamentöse Therapie



NNT: 17; 46%ige Reduktion von vaskulären Ereignissen



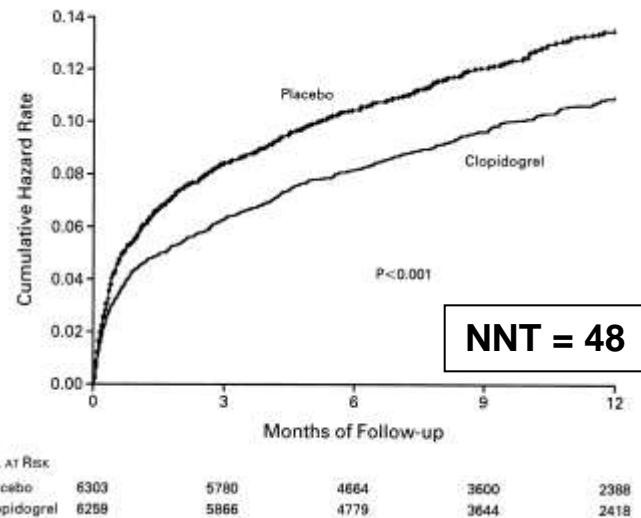
Am J Cardiol 2002

Leitlinien: ASS 160-325mg p.o.; 100mg/d p.o. lebenslang



Clopidogrel-Langzeittherapie nach ACS

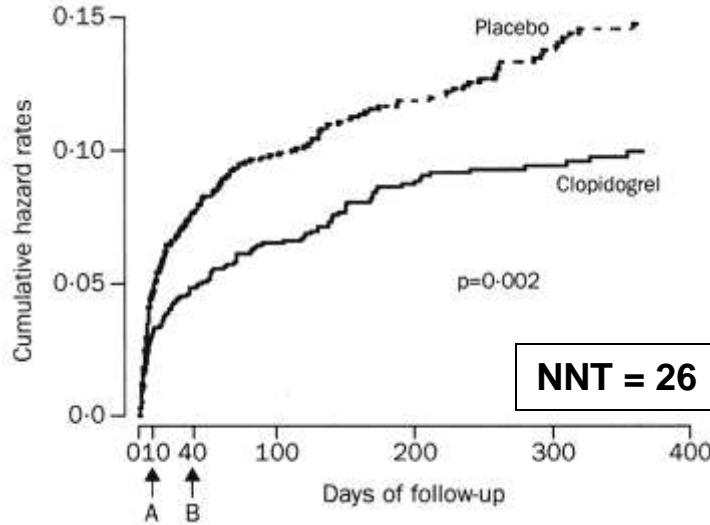
Cure



n = 12 562

NEJM 2001

PCI-Cure

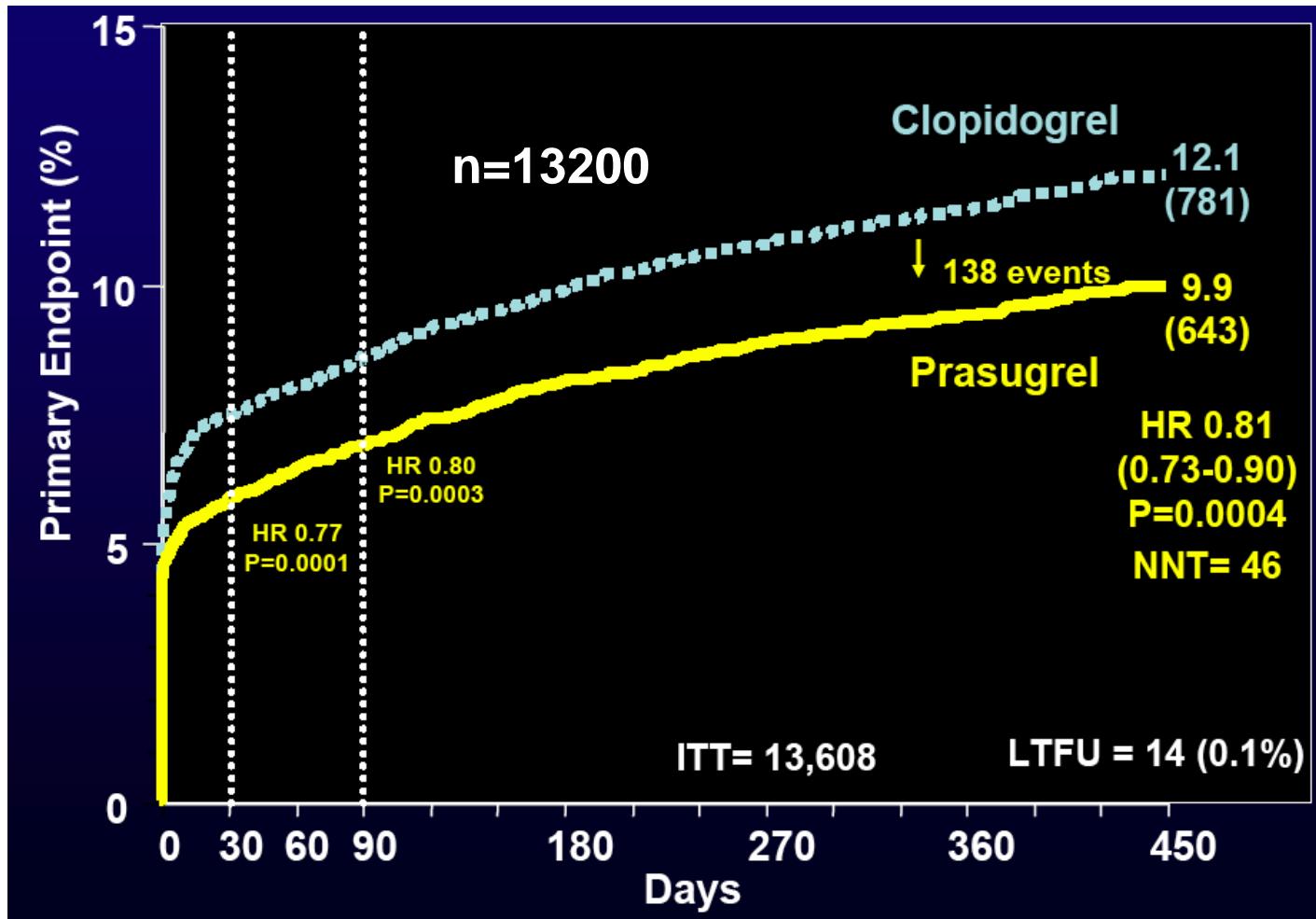


Lancet 2001

Leitlinien: 300-600mg Bolus (vor Herzkatheter)
Therapiedauer: 9-12 Monate



Prasugrel bei ACS Patienten



Erhöhte Blutungsneigung: Z.n. Schlaganfall, Alter > 75J, Gewicht <60kg
 $n = 15\ 603$

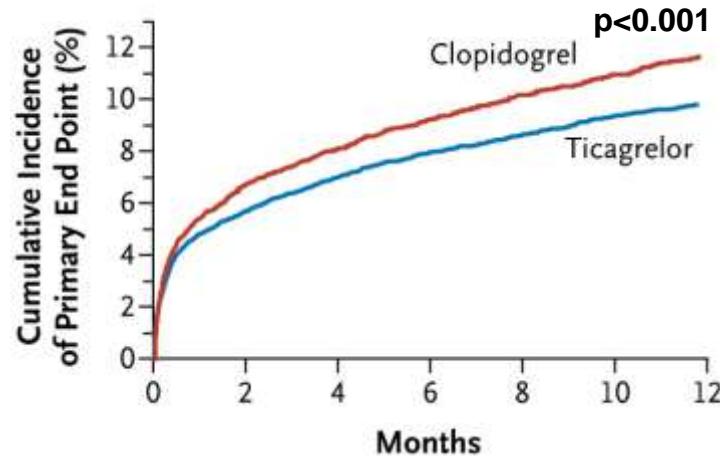
NEJM 2007



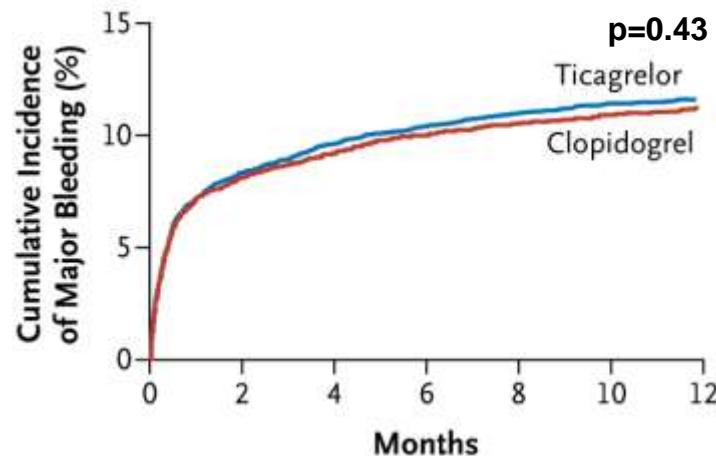
Clopidogrel vs Ticagrelor in ACS-Patienten

NNT: 53

Primärer Endpunkt



Blutung



Tod insgesamt: 4.5% vs 5.9%, p<0.001, HR 0.78

End Point	Ticagrelor Group	Clopidogrel Group	Hazard or Odds Ratio for Ticagrelor Group (95% CI)†	P Value
Primary safety end points — no./total no. (%)				
Major bleeding, study criteria	961/9235 (11.6)	929/9186 (11.2)	1.04 (0.95–1.13)	0.43
Major bleeding, TIMI criteria‡	657/9235 (7.9)	638/9186 (7.7)	1.03 (0.93–1.15)	0.57
Bleeding requiring red-cell transfusion	818/9235 (8.9)	809/9186 (8.9)	1.00 (0.91–1.11)	0.96



Antiplatelet therapy		Class ^a	Level ^b
NSTE-ACS			
Antiplatelet therapy			
	ASA	I	C
	Clopidogrel (with 600 mg loading dose as soon as possible)	I	C
	Clopidogrel (for 9–12 months after PCI)	I	B
	Prasugrel ^d	IIa	B
	Ticagrelor ^d	I	B
STEMI			
Antiplatelet therapy			
	ASA	I	B
	Clopidogrel ^f (with 600 mg loading dose as soon as possible)	I	C
	Prasugrel ^d	I	B
	Ticagrelor ^d	I	B



I. Clinical Evaluation

2. Diagnosis/Risk Assessment

3. Coronary angiography

