Universitätsspital Basel

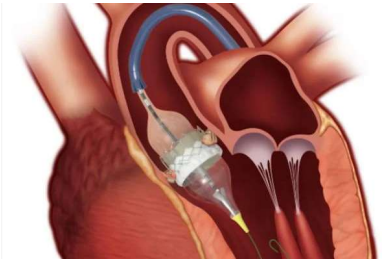
Kardiologie

# Thérapies invasives de la maladie coronarienne:
## Qu'est-ce qui est possible ?
## Qu'est-ce qui est raisonnable ?

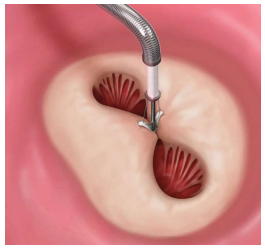
C. Kaiser, Hôpital universitaire de Bàle

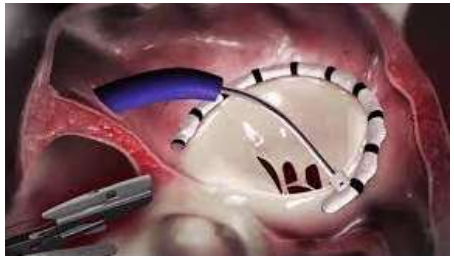
**Congrès de Medecine Interne, Delémont 10 mars 2022**

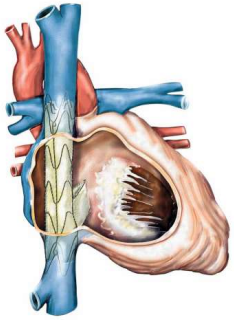
# Advances in interventional cardiology during the last 20 years

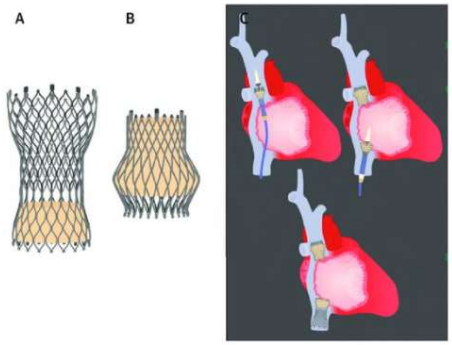






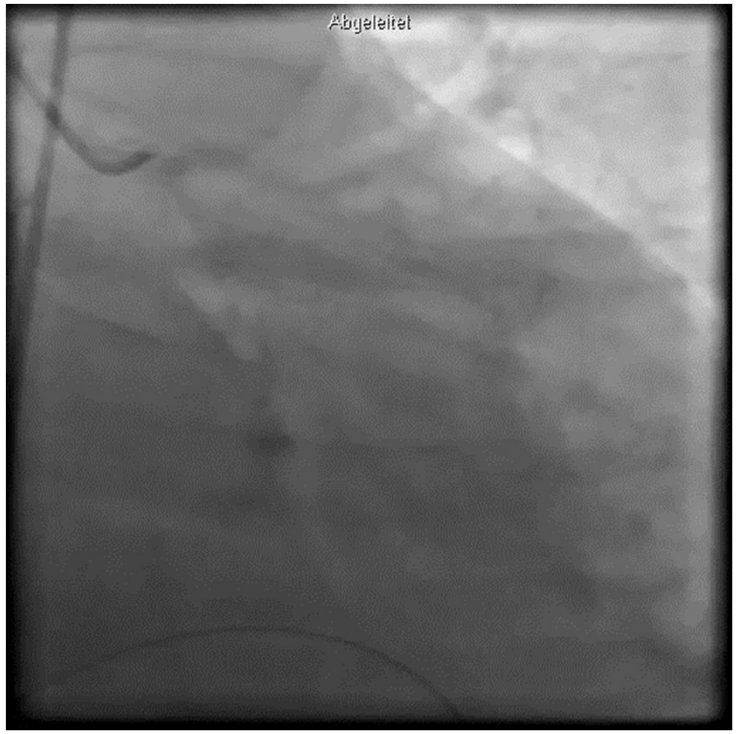


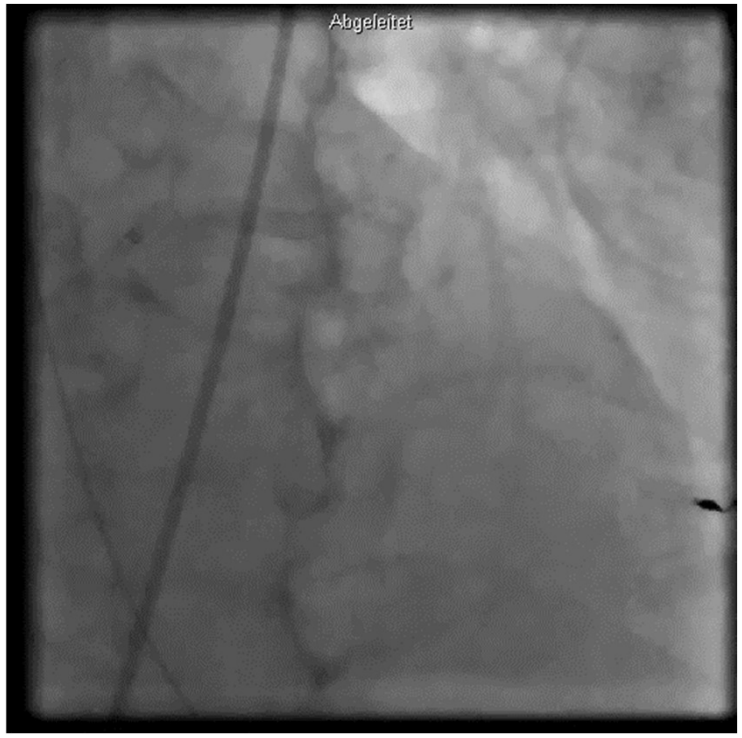




# Advances in interventional treatment of CAD

**Male, 50, In-hospital reanimation with asystole, lateral hypokinesiea**

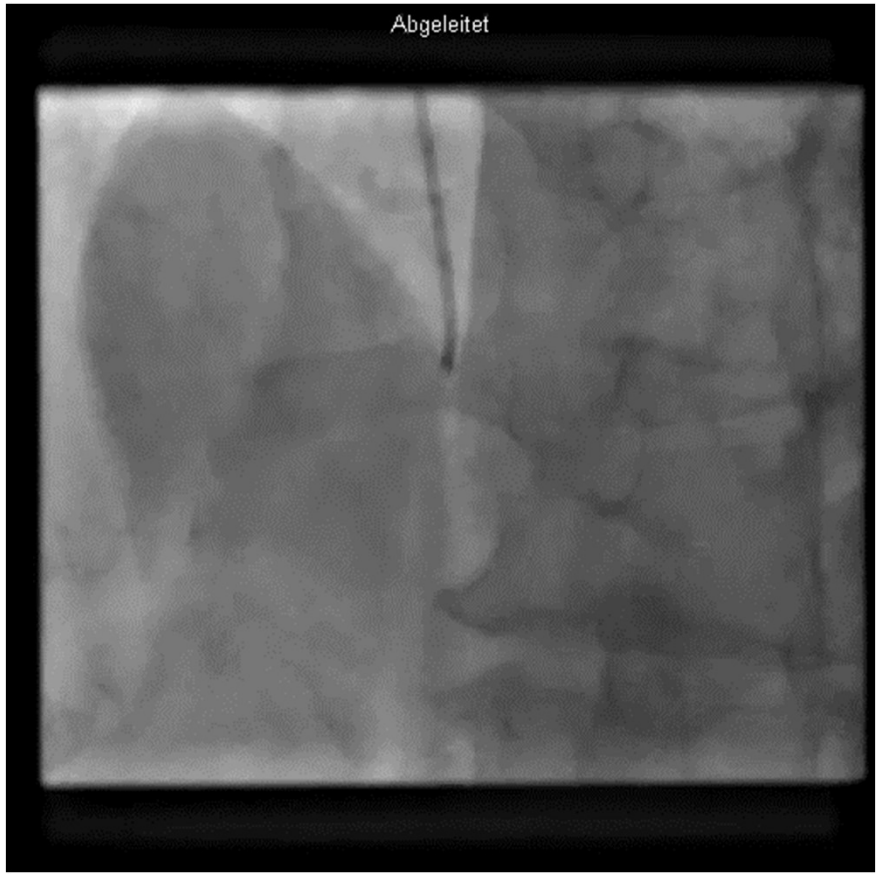


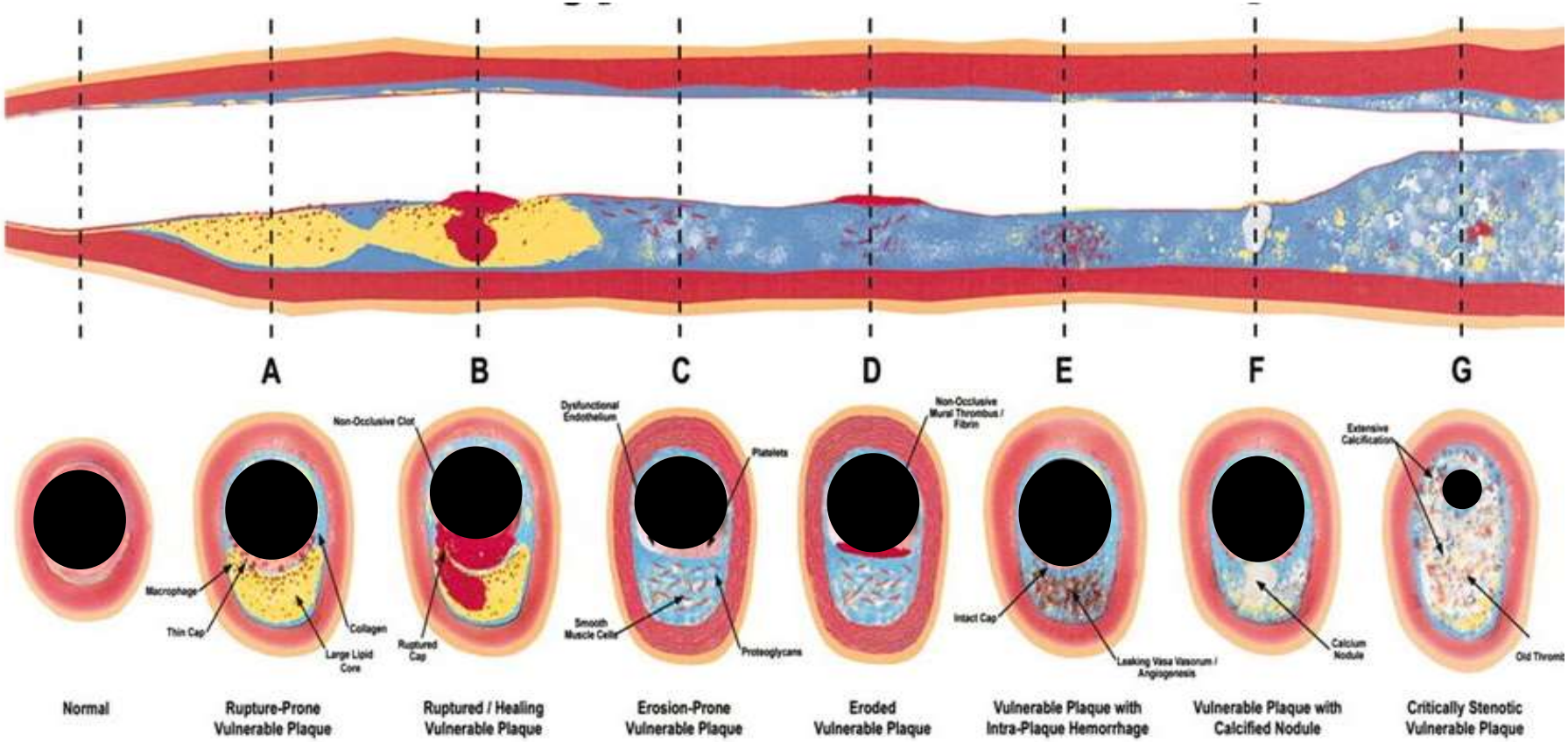

- Advances in coronary stents
- New techniques & devices
- New drugs (Clopidogrel, Ticagrelor, Prasugrel)

# CAD ?

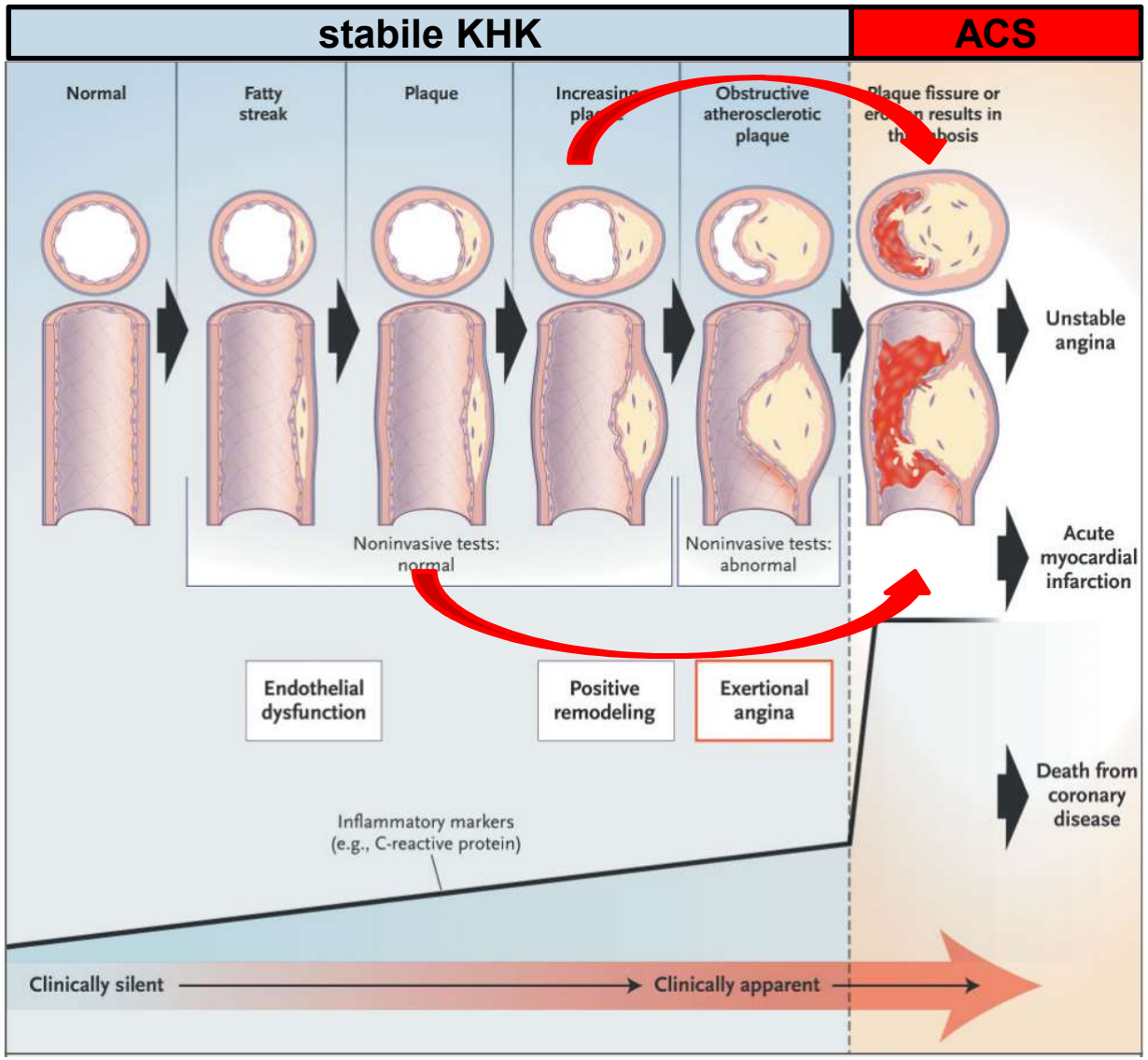
## Female, 70 years, severe MI, preoperative angiography




# Progression of CAD & Angiography



# Progression of stable CAD to ACS




Rupture of plaque is difficult to predict

*Abrams J, NEJM, 2005*

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# A Short History of Coronary Stents

**Balloon Angioplasty**

**Bare-Metal Stent**

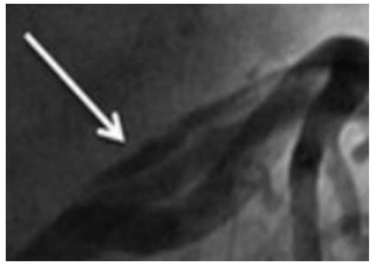
**Brachytherapy**

**Drug-Eluting Stent**

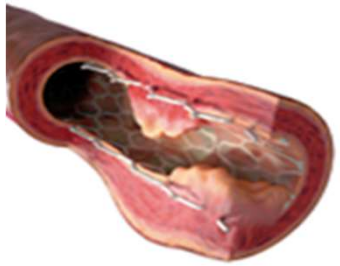
**DAPT for 12 mts**

1977 — 1986 — 2002 — 2006

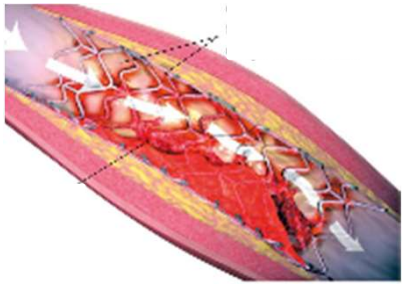
Akute Vessel Closure



In-Stent-Restenoses
after 6-12 mts



↓ Re-stenoses, however
↑ late Stent-thromboses

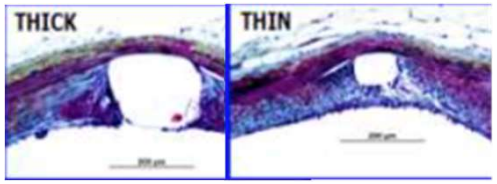


# A Short History of Coronary stents

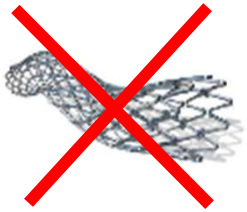
**DAPT for 12 mts**

**BMS in ↑ bleeding risk**

**New generation DES**

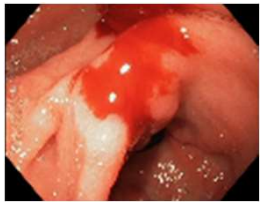



**End of BMS**

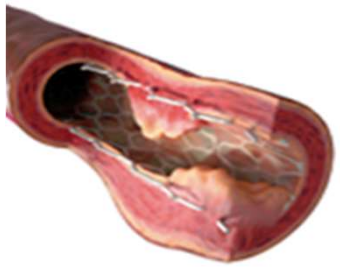


2006 — 2007 — 2014 — 2018

↑ bleeding



In-Stent-Restenoses
after 6-12 mts



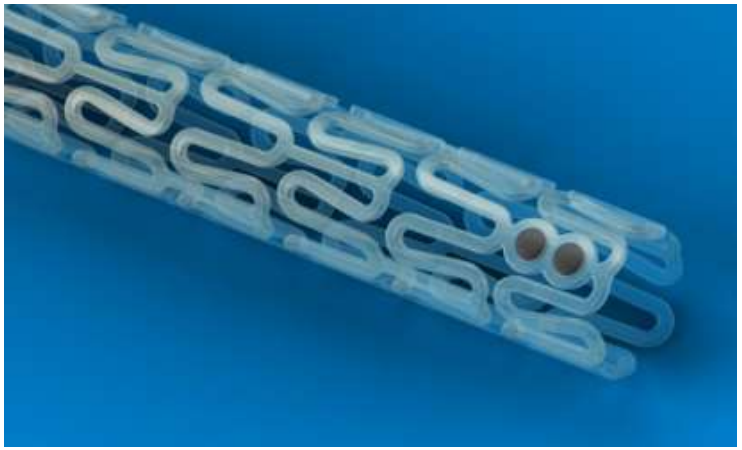
↓ Restenoses
↓ Stentthromboses
Despite short DAPT

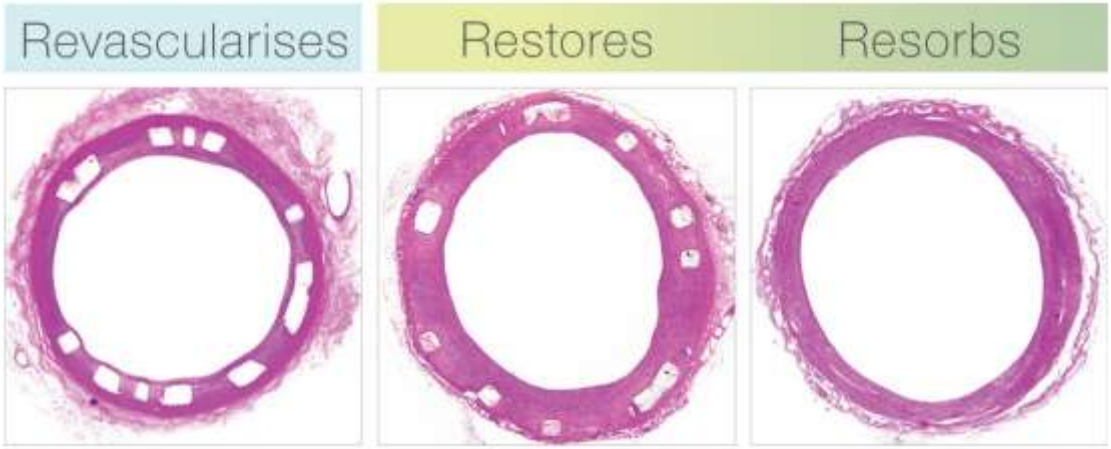
Today only DES

# Coronary stents: Failures

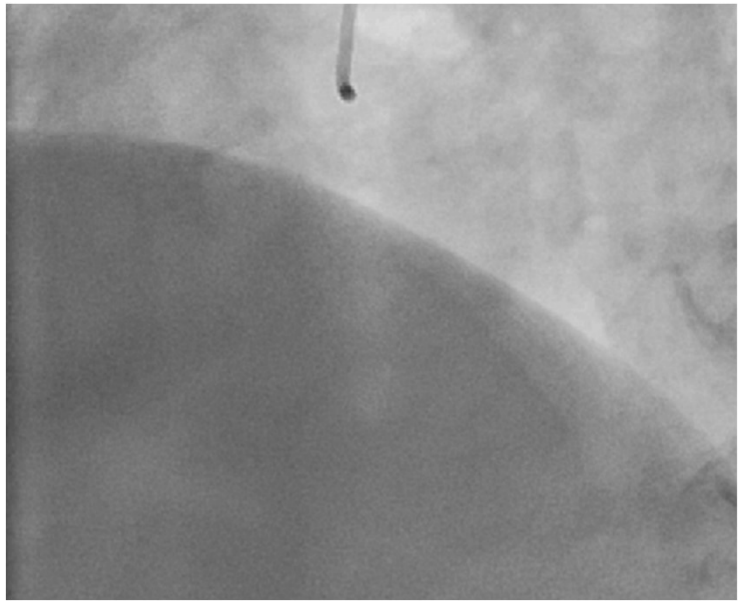
**Bioabsorbable Scaffolds (BVS)**

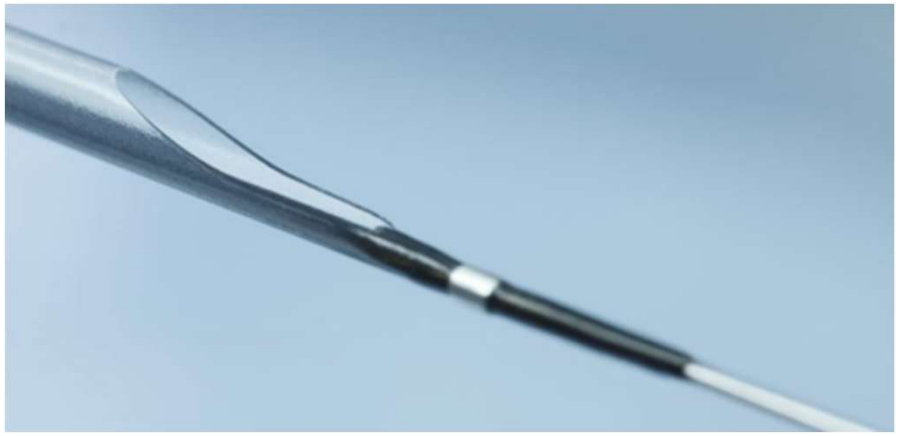
- **Absorb, Abbot**
  **a lactic acic scaffold**
  **coated with Everolimus**

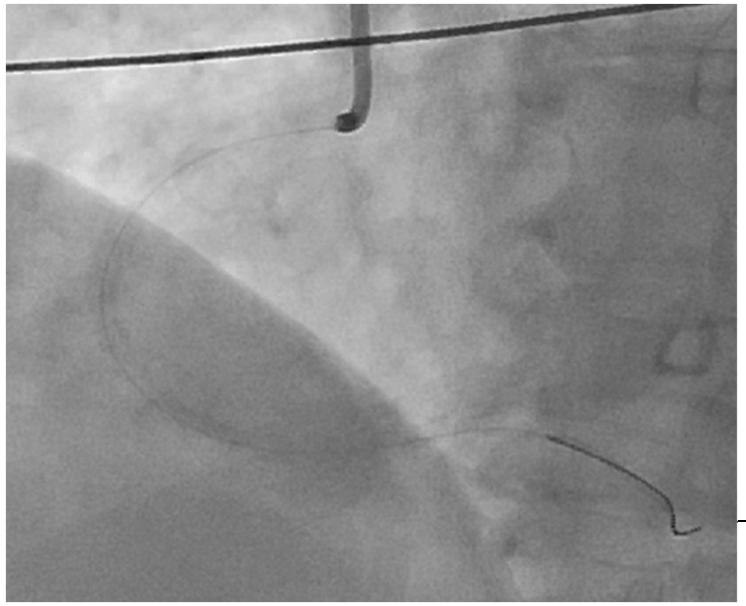


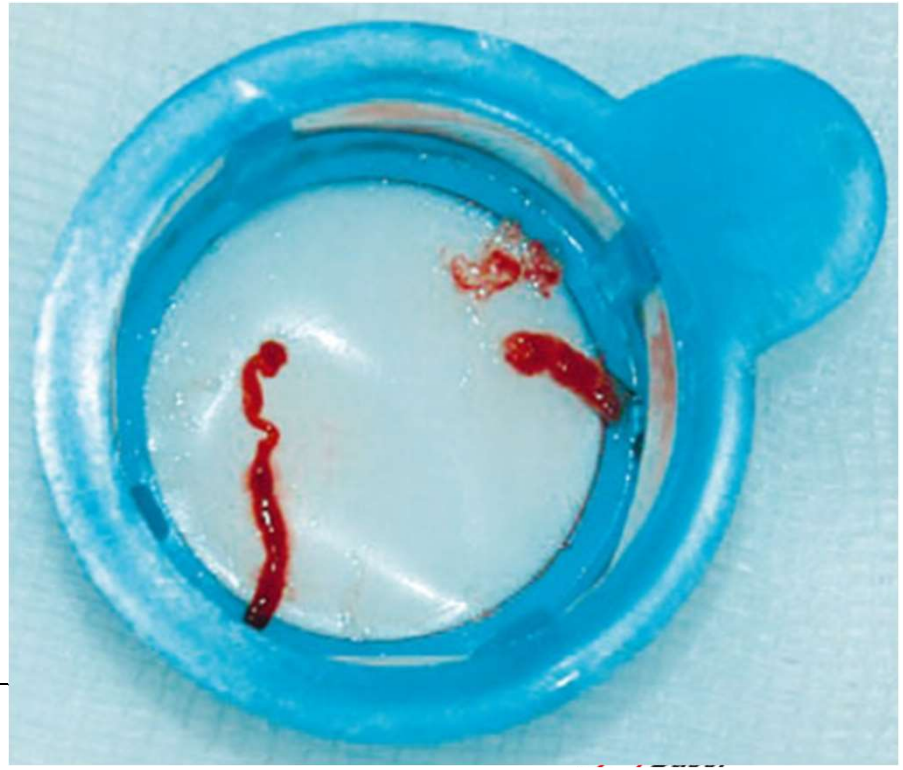


# New devices: Thrombusaspiration

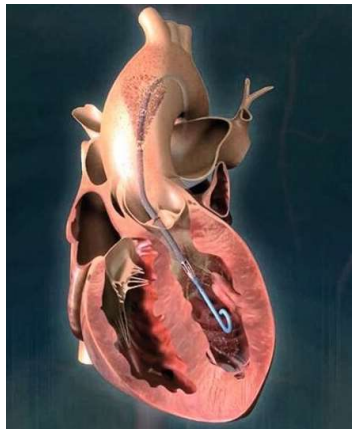




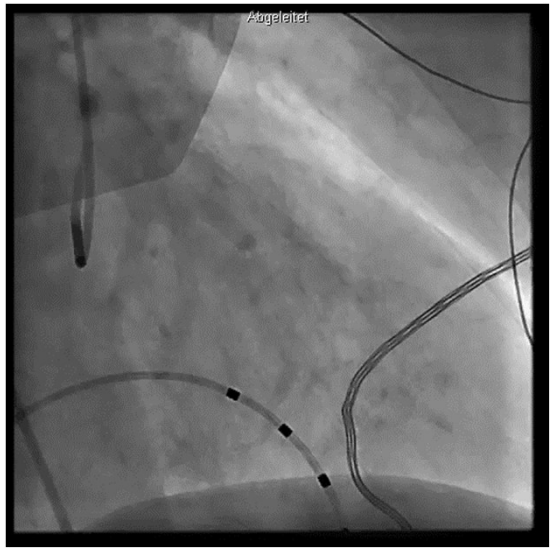


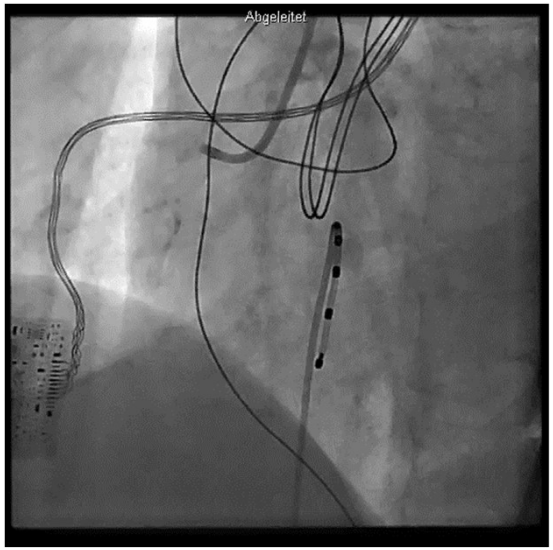


# New Devices: Impella



**Male, 64 years, inferior STEMI, cardiogenic shock**



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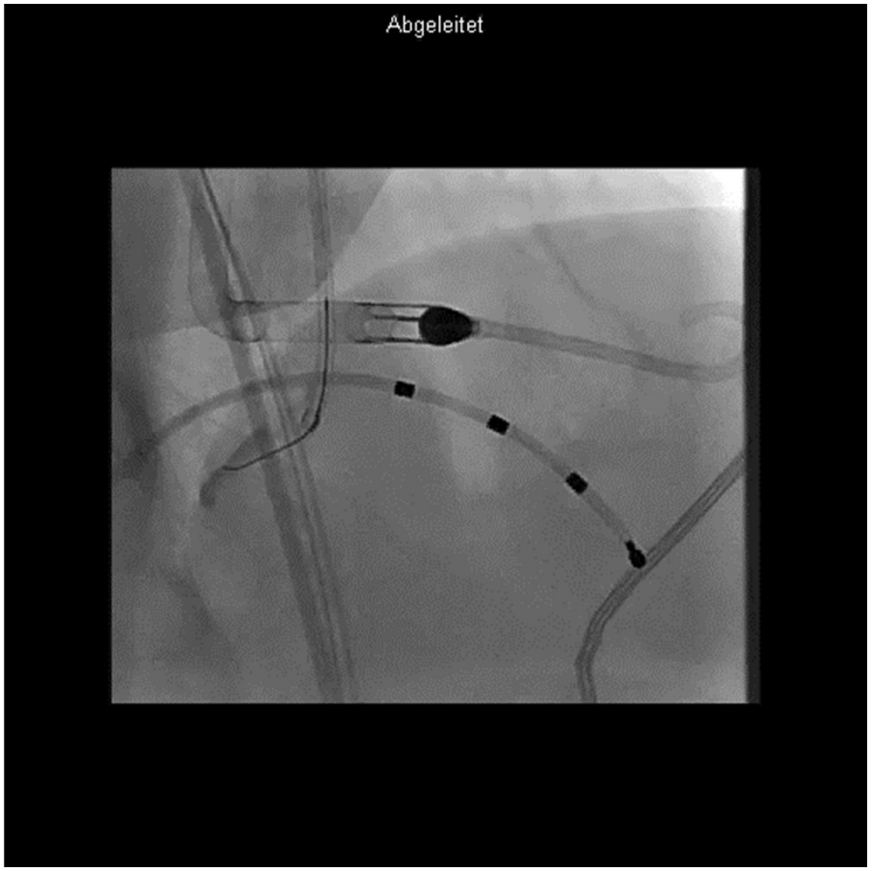
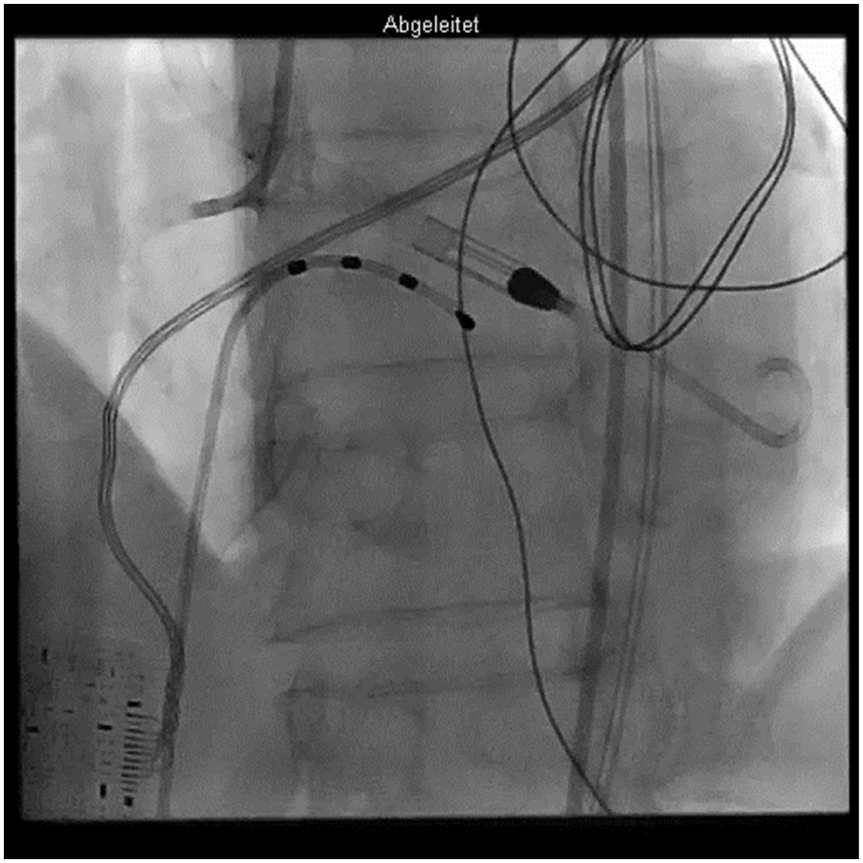
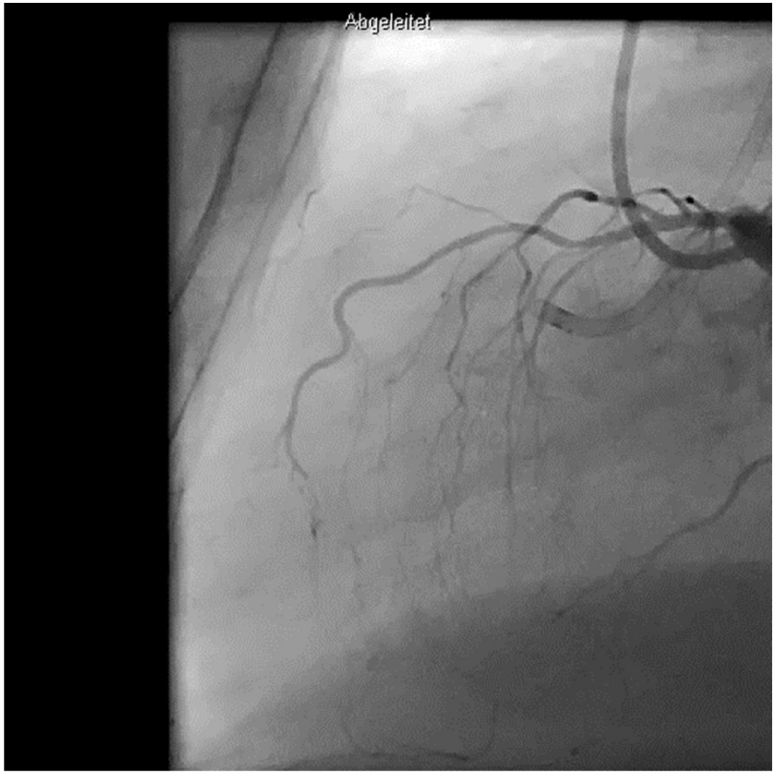
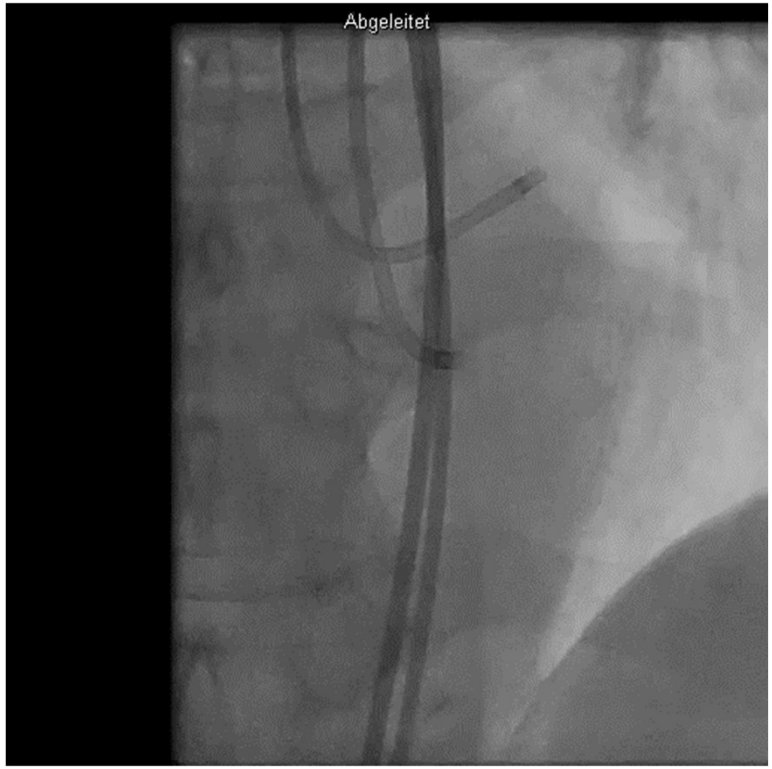


# New Devices: CTO

**Male, 56 years, Angina CCS III, inferior ischemia**



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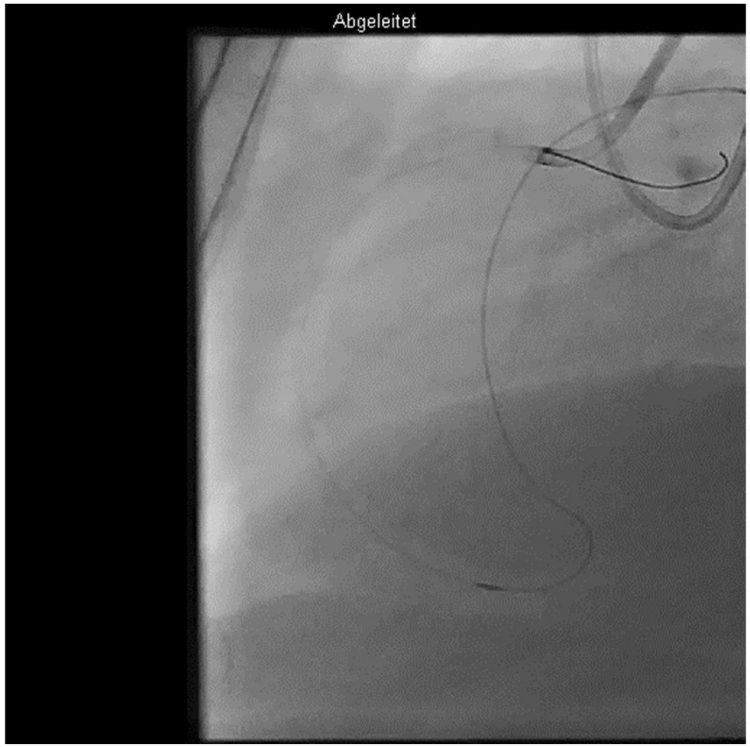
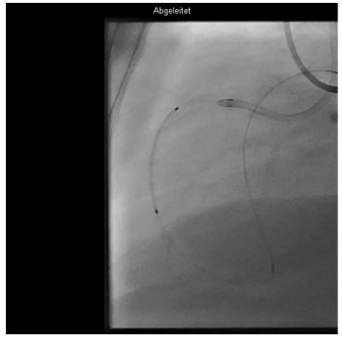
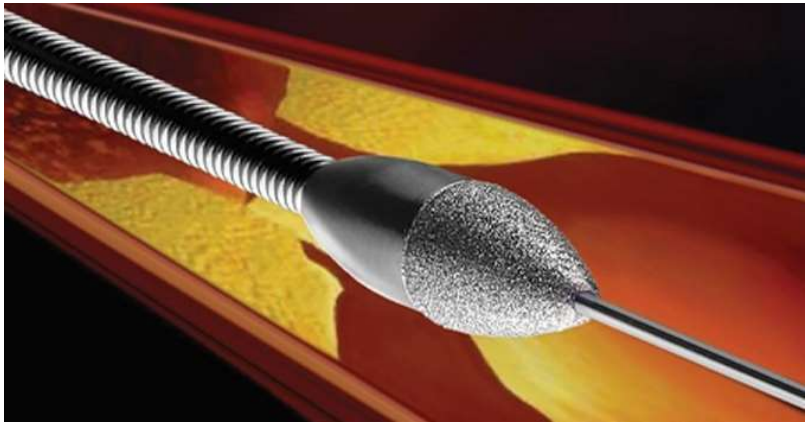
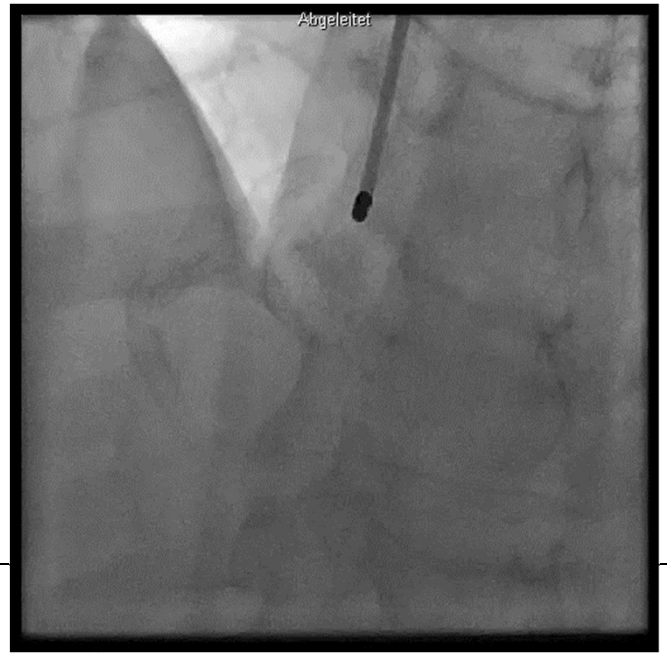



# New Devices: Rotablation



**Male, 54 years, typical Angina , inferior ischemia**



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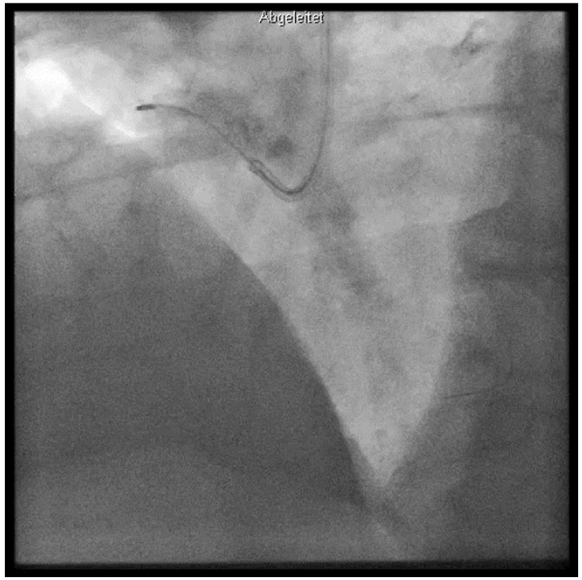
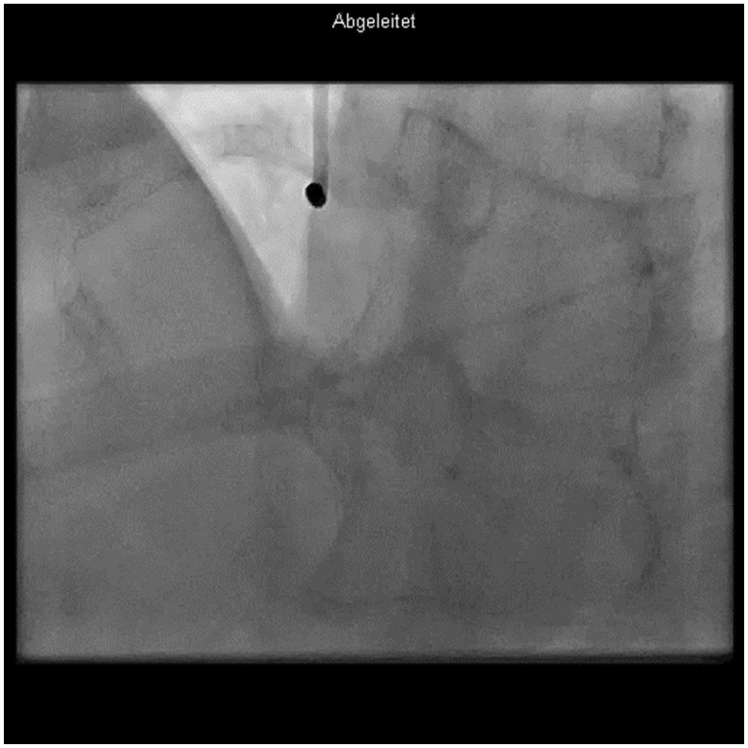
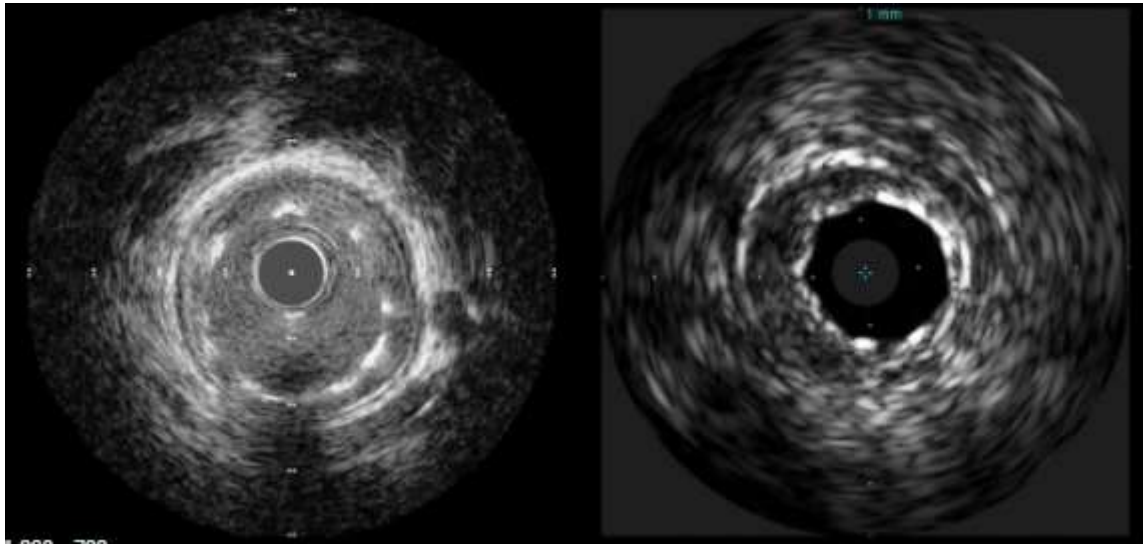






# New Devices: IVUS & OCT



# New Devices & Techniques:

# Does CABG still exist ?

Cardiovascular News

Europe's newspaper for cardiovascular and thoracic specialists

Issue 5 October – December 2003

## Surgeons under threat

**According to Marko Turina of the University Hospital Zurich, cardiac surgeons are facing a future of more difficult ethical decisions, fund shortages and intense public scrutiny.**

At the European Association for Cardio-Thoracic Surgery (EACTS) and European Society of Thoracic Surgeons (ESTS) joint meeting, Professor Marko Turina spoke on the role of the cardiac surgeon in the future environment. His stated aim was to outline the magnitude of the problems faced by cardiac surgeons.

Cardiovascular diseases remain the leading cause of death in developed countries, in spite of tremendous medical progress. In the European Union, cardiovascular diseases still comprise a large proportion of deaths, somewhere between 36-40% and they are also the leading cause of hospitalisation. However, cardiology has taken away a very large proportion of coronary artery bypass graft (CABG) patients from surgery. "CABG is going to reduce, it has been reduced already

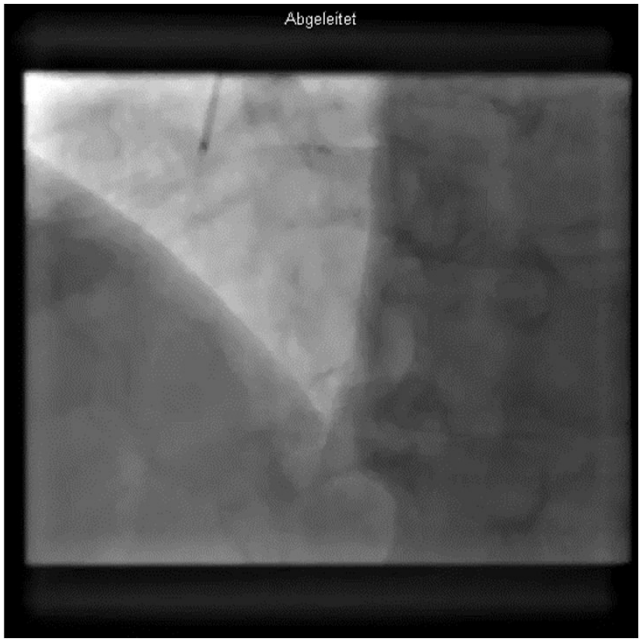
"If you look at the UK cardiac surgery registry, in recent years there has been a considerable reduction in the number of coronary artery bypass grafting procedures, while congenital surgery and advanced surgery have remained reasonably constant. There is no doubt that we will be faced with less coronary patients – not only will there be less cases but they will be more complex," said Turina.

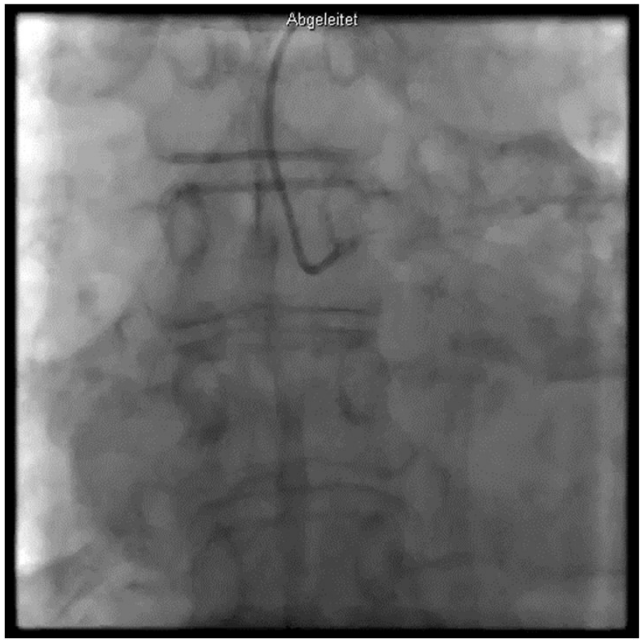
"In my country, Switzerland, we have seen a tremendous increase in the number of percutaneous procedures," continued Turina. This interesting change is also observed in Bruce Keogh's *First European Adult Cardiac Surgical Database Report*, which was launched at the EACTS/ESTS joint meeting.

Previously, coronary artery bypass grafting made up a substantial

has been a tremendous increase in life expectancy over the last 40 years. This is driving cardiac surgeons' attention to older and more comorbid patients.

# CABG lives !

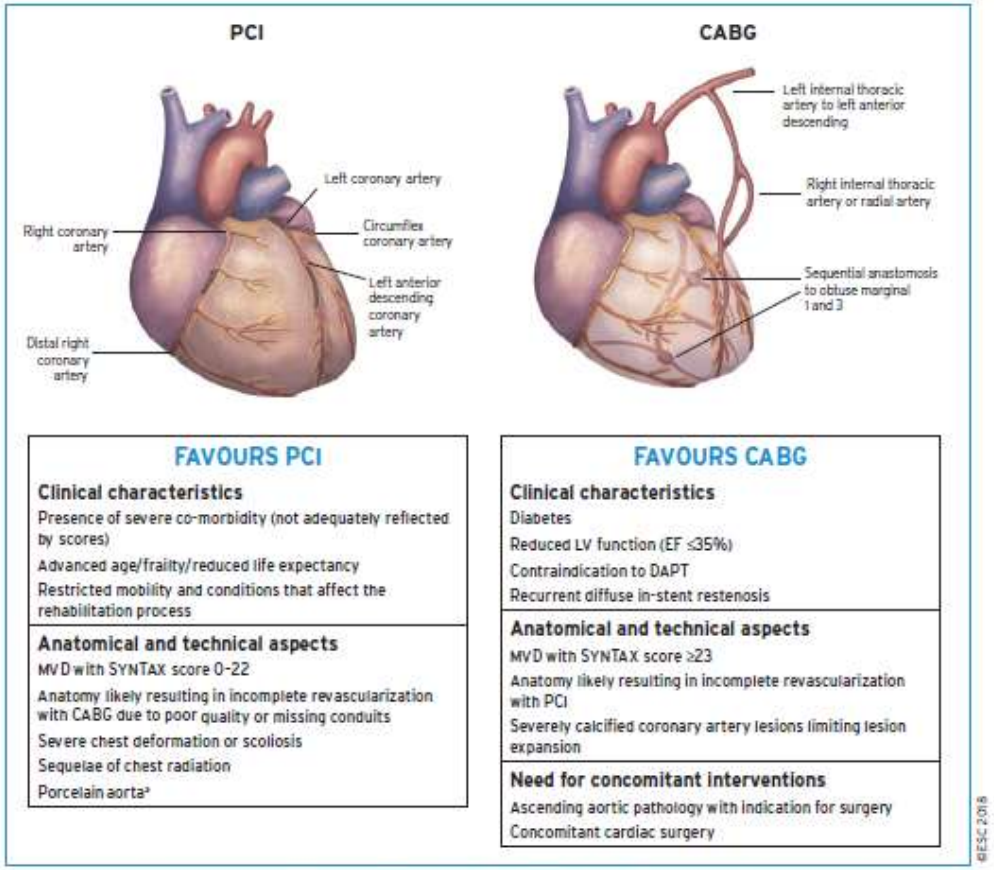




**Male, 64 years, typical Angina CCS II, diabetes**

# Heart Team in MVD



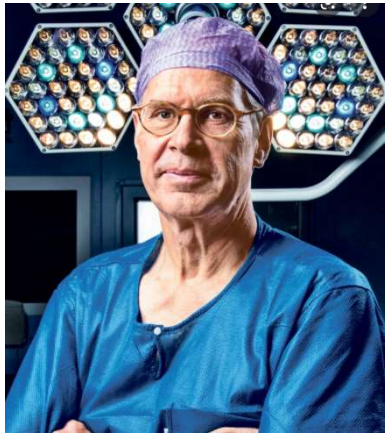

CABG = coronary artery bypass grafting; Cx = circumflex; DAPT = dual antiplatelet therapy; EF = ejection fraction; LAD = left anterior descending coronary artery; LIMA = left internal mammary artery; LV= left ventricular; MVD = multivessel coronary artery disease; PCI = percutaneous coronary intervention; PDA = posterior descending artery; RA = radial artery; RIMA = right internal mammary artery; SYNTAX = Synergy between Percutaneous Coronary intervention with TAXUS and Cardiac Surgery.
[a]Consider no-touch off-pump CABG in case of porcelain aorta.

**Figure 3** Aspects to be considered by the Heart Team for decision-making between percutaneous coronary intervention and coronary artery bypass grafting among patients with stable multivessel and/or left main coronary artery disease.

pro specie rara





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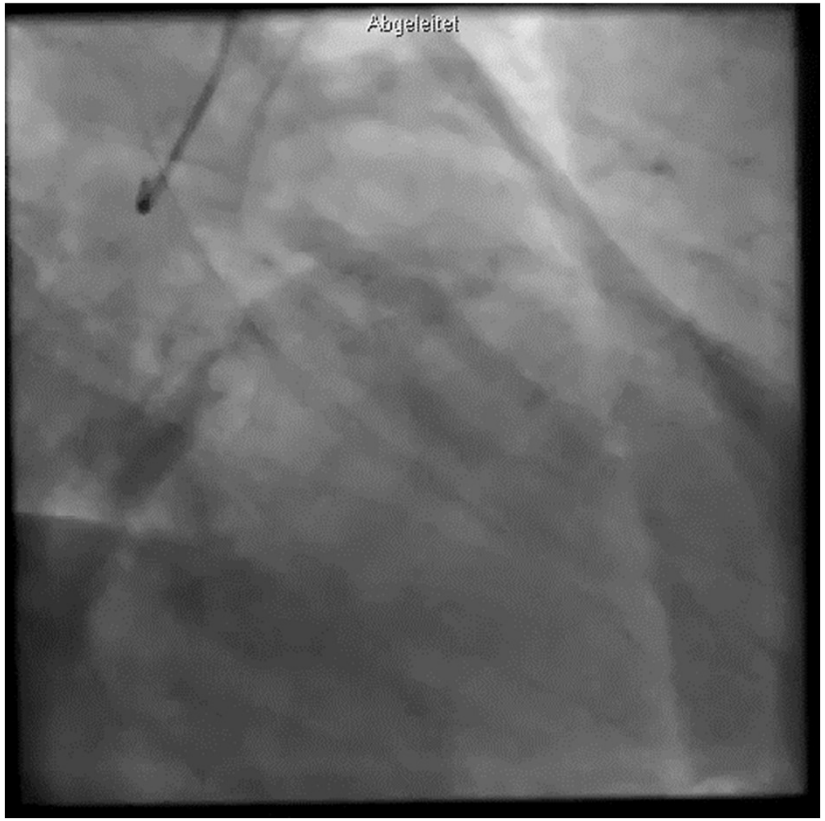
# End stage CAD

**Male, 75 years, NSTEMI from Delémont**
**Comorbidities: chronic Alcohol abuse, laryngeal carcinoma**

# Does Coronary Intervention Improve Prognosis ?

## Prognosis after acute myocardial Infarction

| | In-Hospital Mortality |
|---|---|
| Until 1960 | 25 - 30% |
| ICU | 18% |
| Thrombolysis | 6 - 7% |
| Acute-PCI (since 1992) | 4 - 6% |

**Mortality before hospital admission: 35-40%**

*ESC-Textbook of Cardiovascular Medicine, 2006*
*Braunwald's Heart Disease, 2007*

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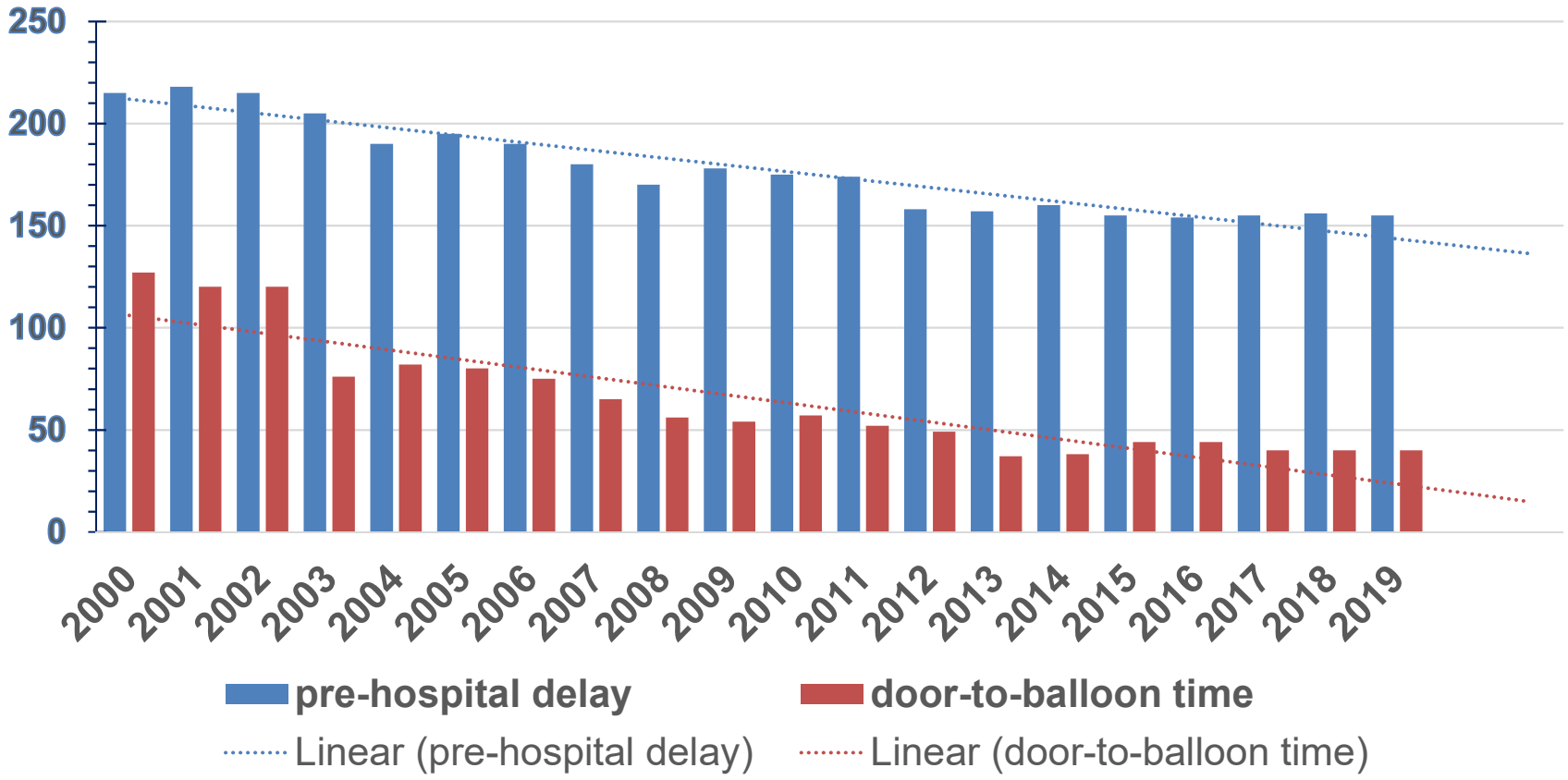
# ACS Delays in Switzerland

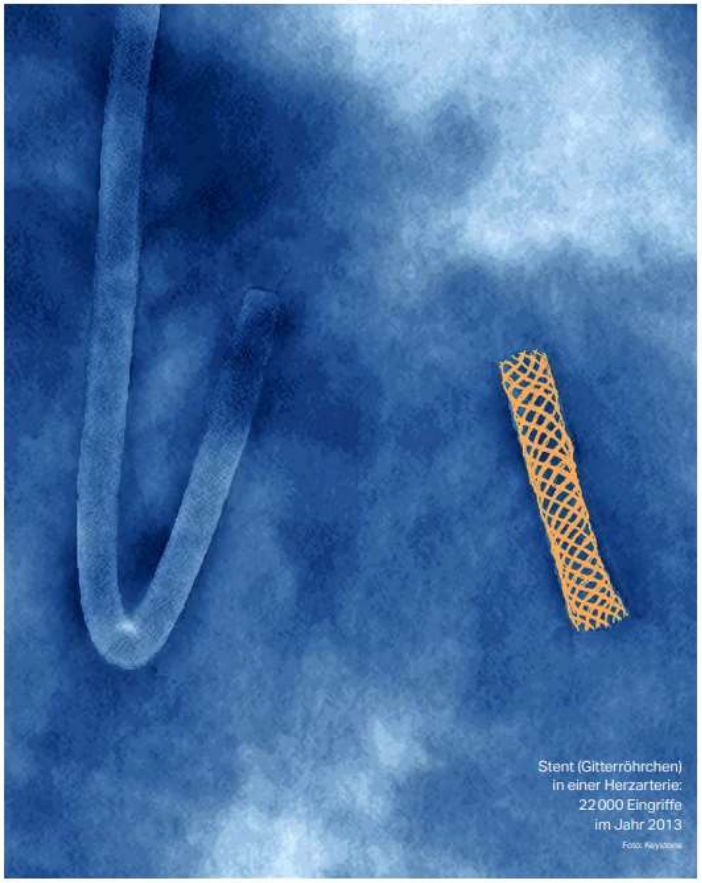
**Delay in STEMI-Patients (minutes, n=31’520)**



# Prognostic Impact of Coronary Intervention in chronic CAD

## Zu viele Eingriffe am Herz

Die Zahl der Herzgefäss-Behandlungen mit Katheter und Stents hat sich seit 2002 verdoppelt. Dahinter stehen wirtschaftliche Interessen der Spitäler. Das sagt selbst der oberste Kardiologe. Mit Stents verdienen Kliniken mittlerweile 300 Millionen Franken pro Jahr

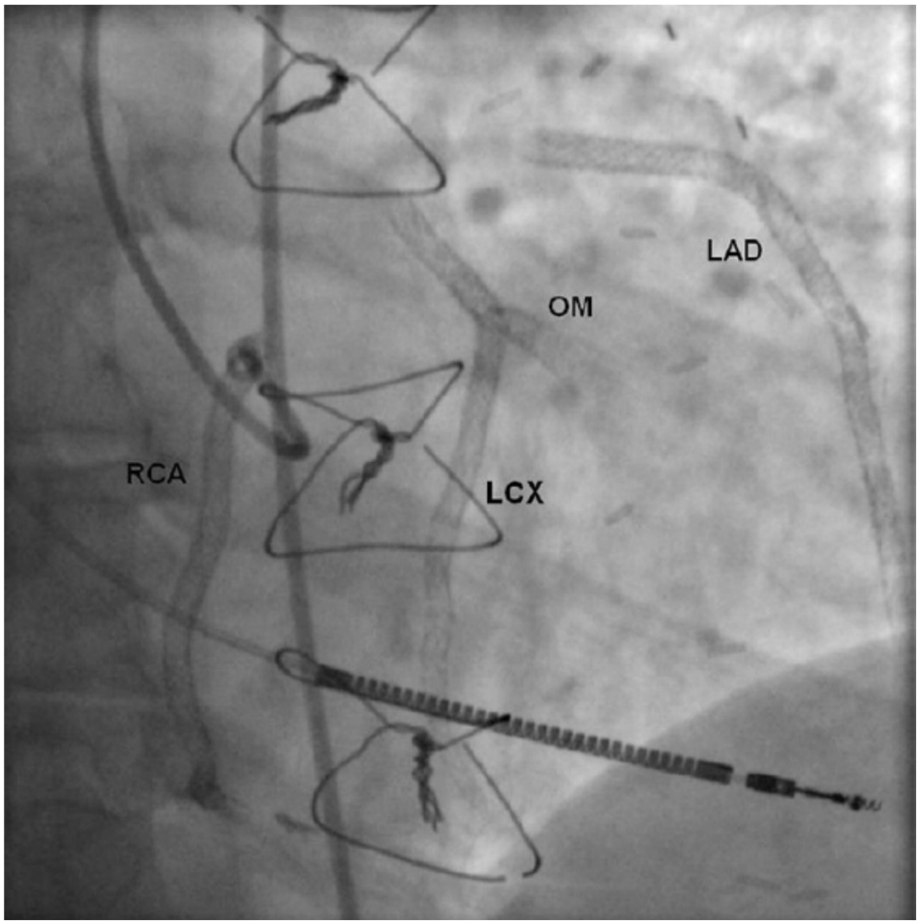


Stent (Gitterröhrchen) in einer Herzarterie: 22 000 Eingriffe im Jahr 2013

Foto: Keystone

*Sonntagszeitung , April 2015*

# Prognostic Impact of Coronary Intervention in chronic CAD




**A Heart with 67 Stents…….**

*Khouzam RN et al. J. Am. Coll. Cardiol. 2010;56;1605*

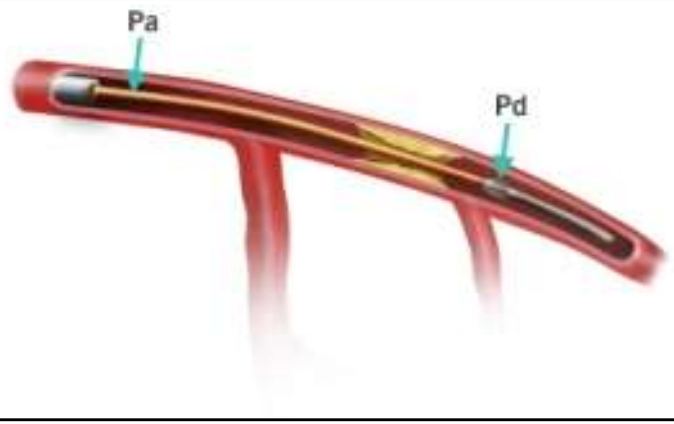
# Oculostenotic Reflex: See it, stent it !

# Impact of FFR

Fractional flow reserve is a new coronary hemo-dynamic para meter used to assess physiological impact of border line lesions in coronary artery disease. The calculation is simple

$$FFR = \frac{\text{Distal Coronary Pressure (Pd)}}{\text{Proximal Coronary Pressure (Pa)}}$$

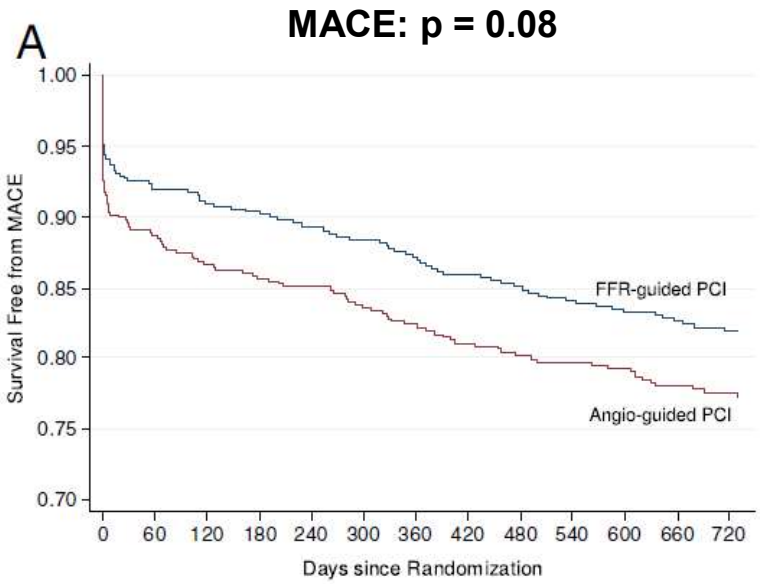
(During Maximum Hyperemia)

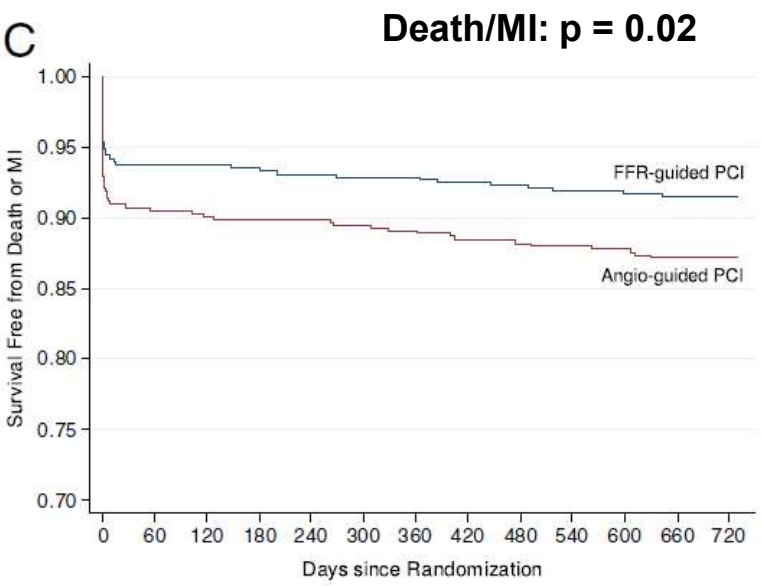



**FFR < 0.80: hemodynamically relevant stenosis**
**FFR > 0.80: hemodynamically not relevant stenosis**

# Impact of FFR: FAME-Trial

- **n= 1005 patients with MVD: Angiography - guided PCI versus FFR-guided PCI**
- **Primary combined EP after 2 years: mortality, MI, revascularization**




*Pijls NH et al. J Am Coll Cardiol 2010;56:177-183*

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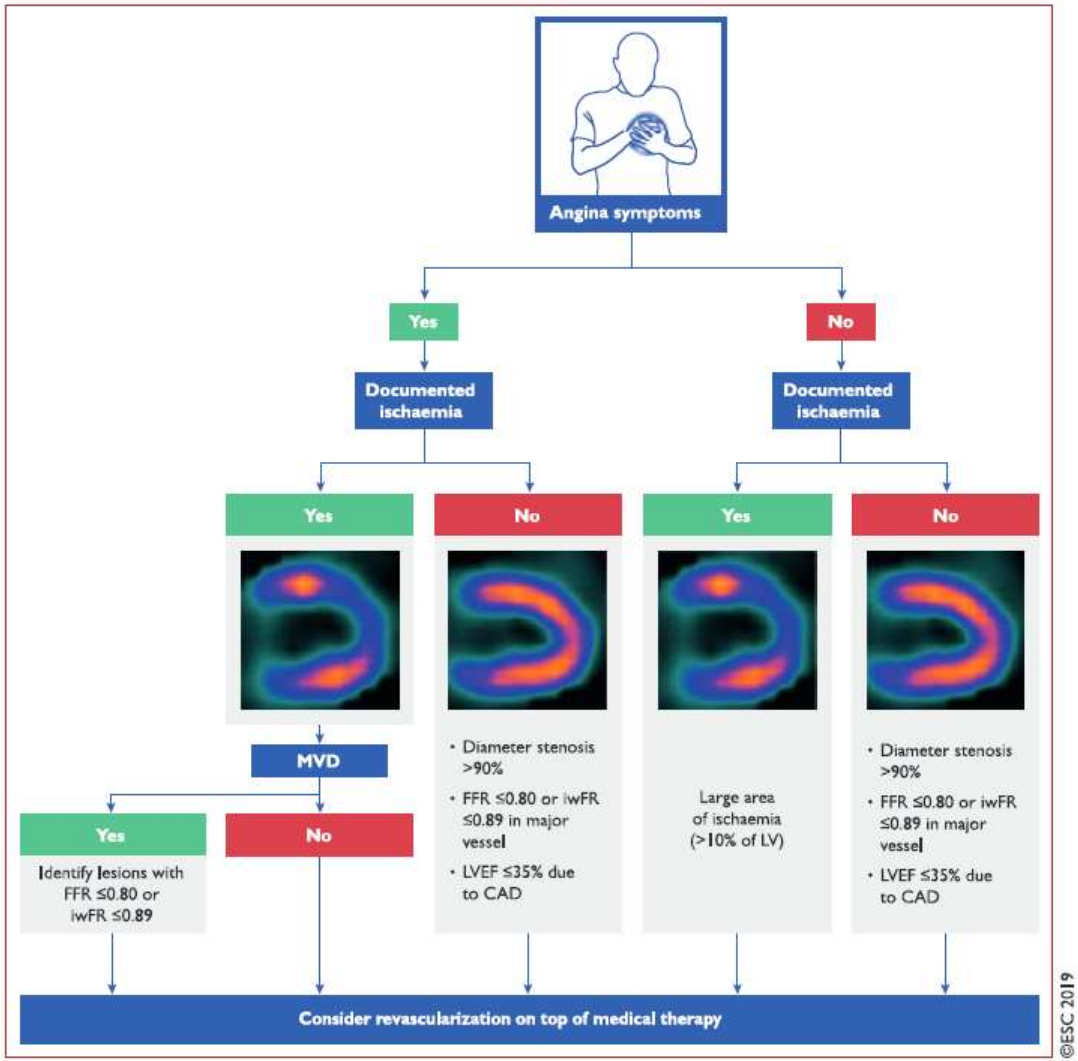
# Current guidelines

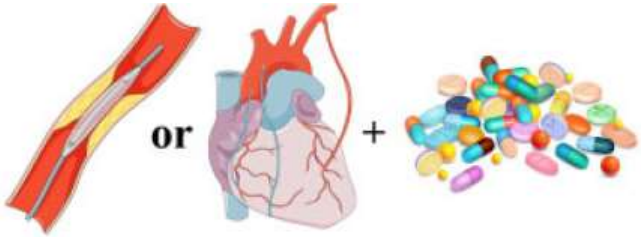



**Consider Revascularization in patients with:**

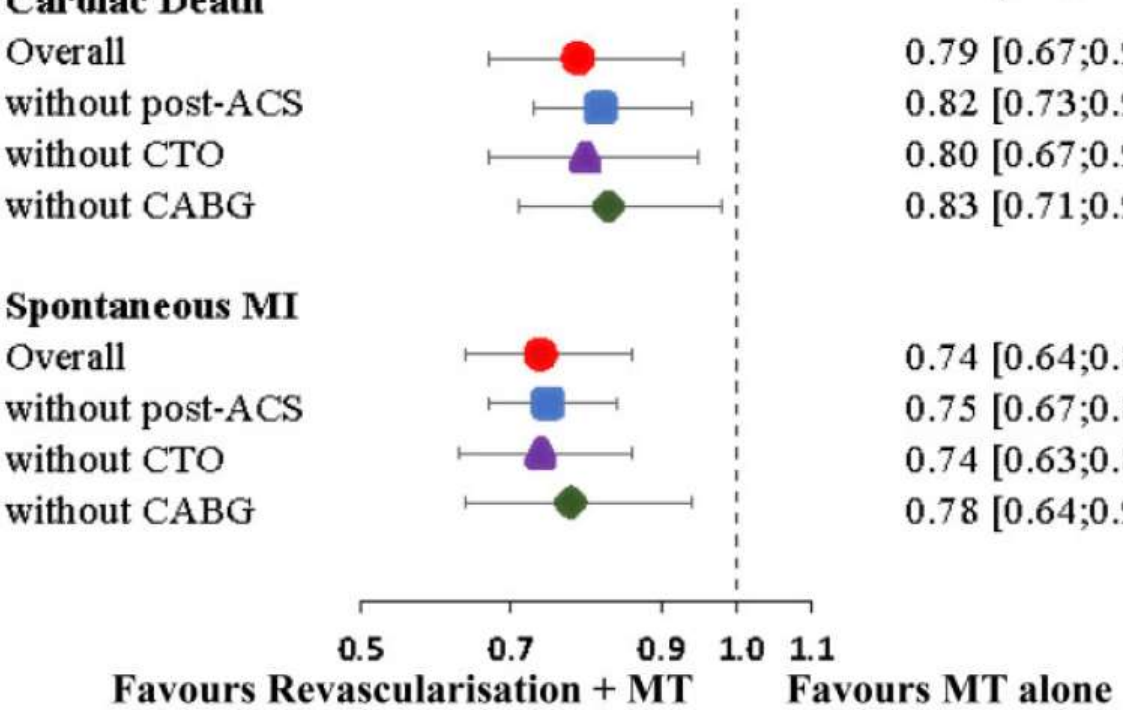
- **Hemodynamically relevant stenoses**
- **Large ischemic burden**

*ESC 2019 Guideliines for chronic cornary syndromes*

# Retrospective Data



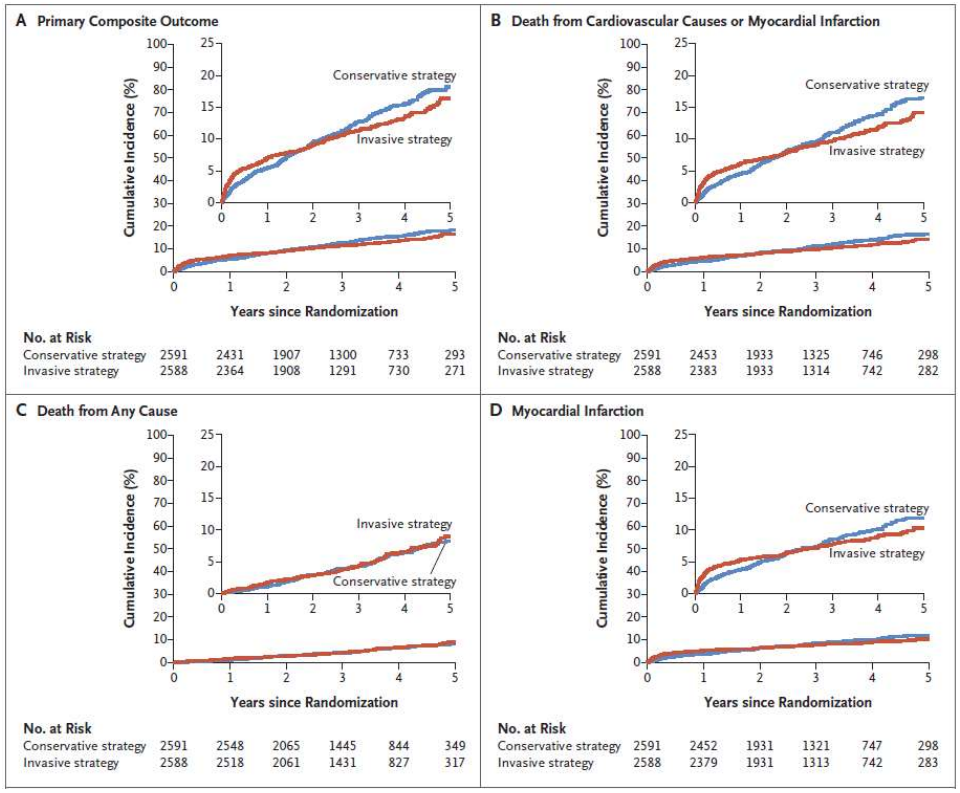

**25 randomised trials**
**N = 19,806**




*Navarese EP, et al. Eur Heart J 2021; 00:1-14*

# 2020: Proof of concept: ISCHEMIA Trial

- **n= 5’179 patients with moderate to severe ischemia:**
- **Invasive strategy with revascularization & OMT versus OMT alone**
- **Primary combined EP after 3 years: CV death, MI, or hospitalization for ACS, heart failure or cardiac arrest**




*Maron DJ et al, N Engl. J Med 2020;382:1395-407*

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# 2020: Proof of cencept: ISCHEMIA Trial

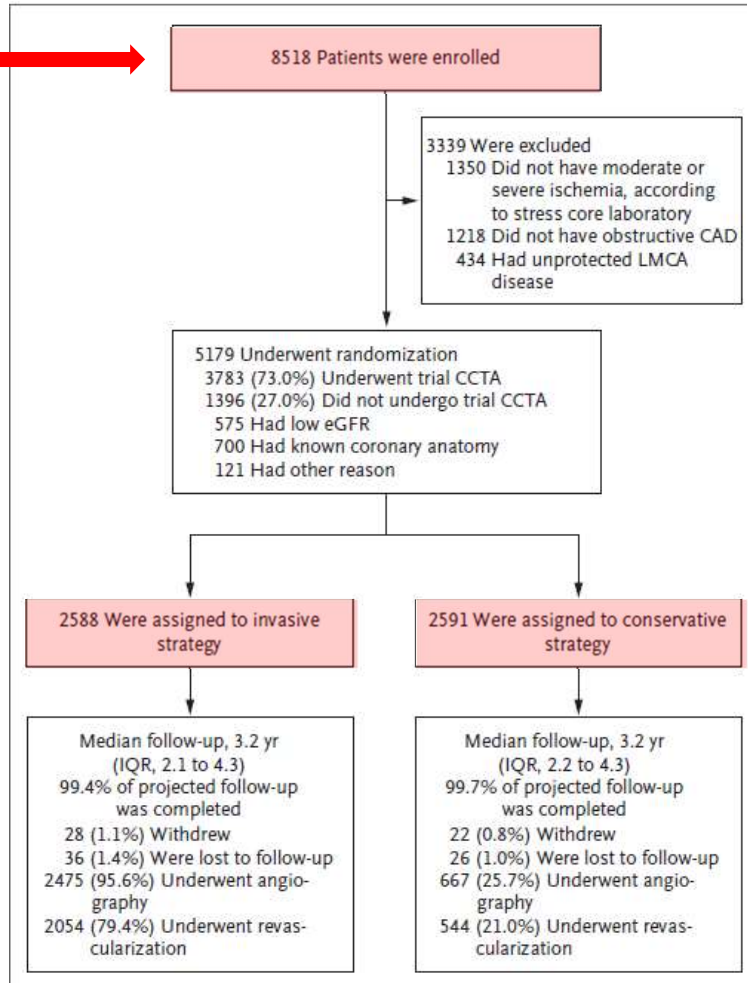
**Exclusion Criteria**

1. LVEF <35%
2. History of unprotected left main stenosis ≥50% on prior CCTA or prior cardiac catheterization (if available)
3. Finding of "no obstructive coronary artery disease" (<50% stenosis in all major epicardial vessels) on prior CCTA or prior catheterization, performed within 12 months
4. Coronary anatomy unsuitable for either PCI or CABG
5. Unacceptable level of angina despite maximal medical therapy
6. Very dissatisfied with medical management of angina
7. History of noncompliance with medical therapy
8. Acute coronary syndrome within the previous 2 months
9. PCI within the previous 12 months
10. Stroke within the previous 6 months or spontaneous intracranial hemorrhage at any time
11. History of ventricular tachycardia requiring therapy for termination, or symptomatic sustained ventricular tachycardia not due to a transient reversible cause
12. NYHA class III-IV heart failure at entry or hospitalization for exacerbation of chronic heart failure within the previous 6 months
13. Non-ischemic dilated cardiomyopathy or hypertrophic cardiomyopathy
14. End stage renal disease on dialysis or estimated glomerular filtration rate <30 ml/min (not an exclusion criterion for CKD ancillary trial, see CKD ancillary trial)
15. Severe valvular disease or valvular disease likely to require surgery or percutaneous valve replacement during the trial
16. Allergy to radiographic contrast that cannot be adequately pre-medicated, or any prior anaphylaxis to radiographic contrast
17. Planned major surgery necessitating interruption of dual antiplatelet therapy (note that patients may be eligible after planned surgery)
18. Life expectancy less than the duration of the trial due to non-cardiovascular comorbidity
19. Pregnancy (known to be pregnant; to be confirmed pre-CCTA and/or randomization, if applicable)
20. Patient who, in the judgment of the patient's physician, is likely to have significant unprotected left main stenosis (those who are able to undergo CCTA will have visual assessment of the left main coronary artery by the CCTA core laboratory)

*Maron DJ et al, N Engl. J Med 2020;382:1395-407*

# ISCHEMIA Trial: representative population ?

~26,000 patients preliminary screening of stress test reports for potential eligibility based on level of ischemia (moderate-severe)




- **Only 20% of screened patients included !**
- **Around 10% of enrolled patients had none or only mild ischemia**

*Maron DJ et al, N Engl. J Med 2020;382:1395-407*
*Hochman JS et al. JAMA Cardiol 2019;4:273-86*

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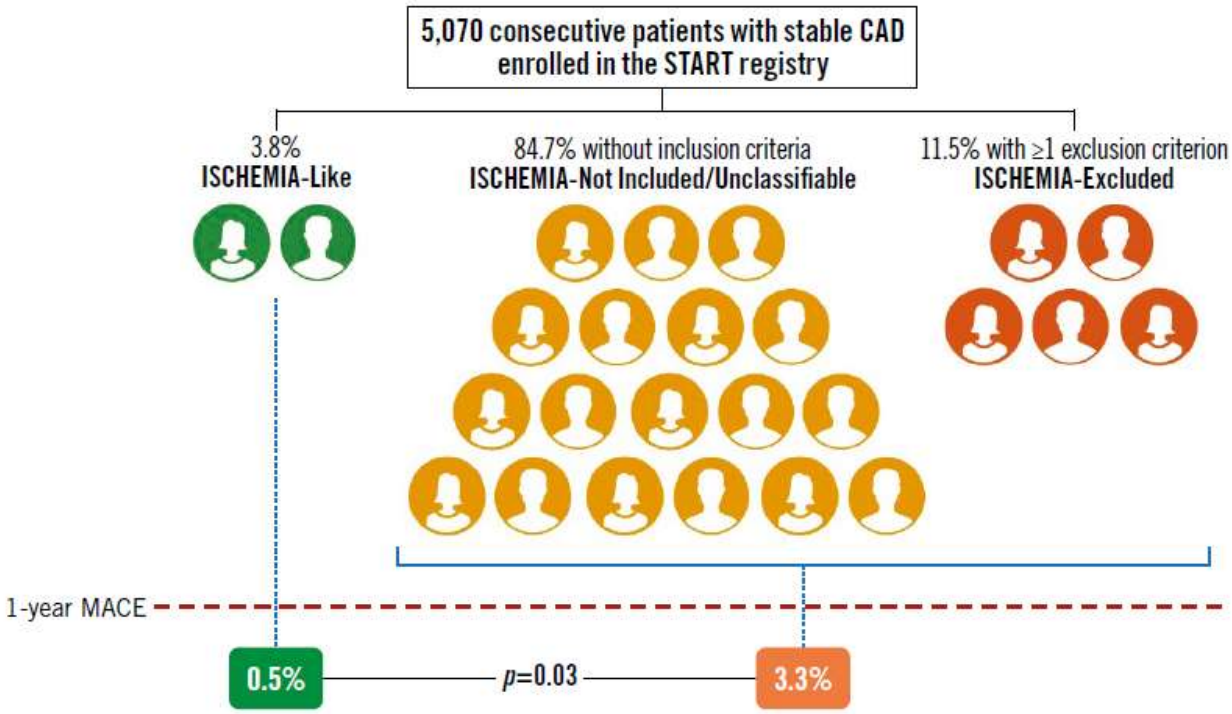
# ISCHEMIA Trial: representative population ?

5,070 consecutive patients with stable CAD enrolled in the START registry

**Visual summary.** *Proportion of patients with stable CAD enrolled in the START registry with or without ISCHEMIA criteria and their rate of MACE at 1 year.*

*De Luca, et al. Eurointervention 2020;16*

# ISCHEMIA Trial: representative population ?




**Visual summary.** *Proportion of patients with stable CAD enrolled in the START registry with or without ISCHEMIA criteria and their rate of MACE at 1 year.*

*De Luca, et al. Eurointervention 2020;16*

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# ISCHEMIA Trial: representative population ?

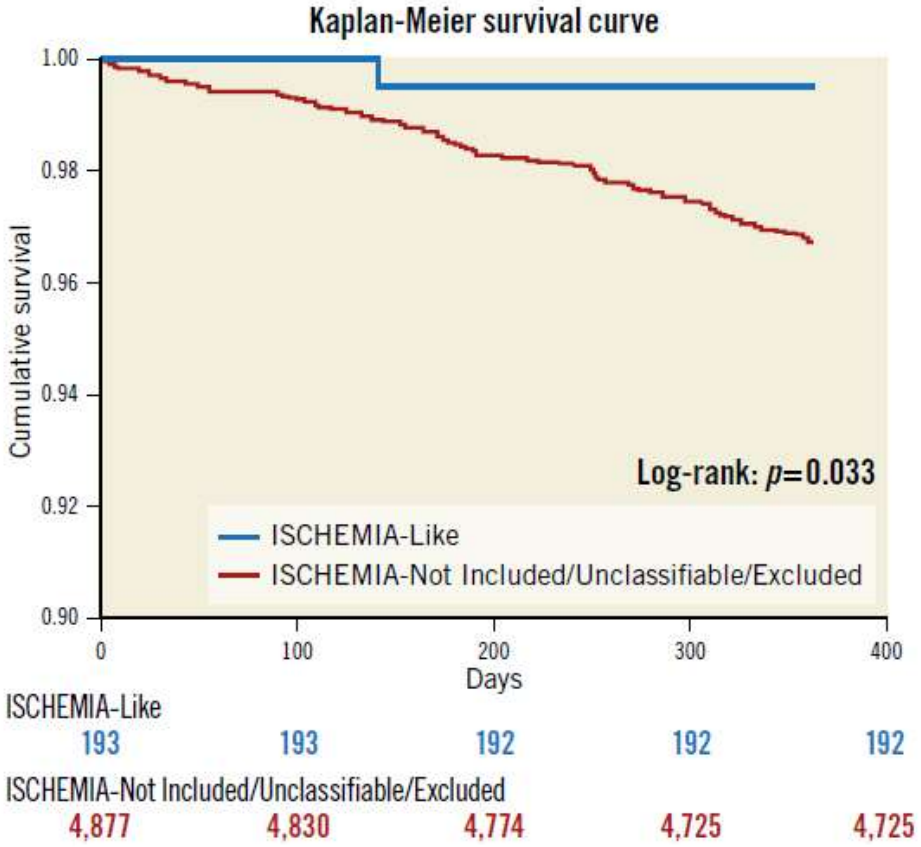


**Figure 3.** *Kaplan-Meier survival curves for the primary composite outcome in the two groups.*

*De Luca, et al. Eurointervention 2020;16*

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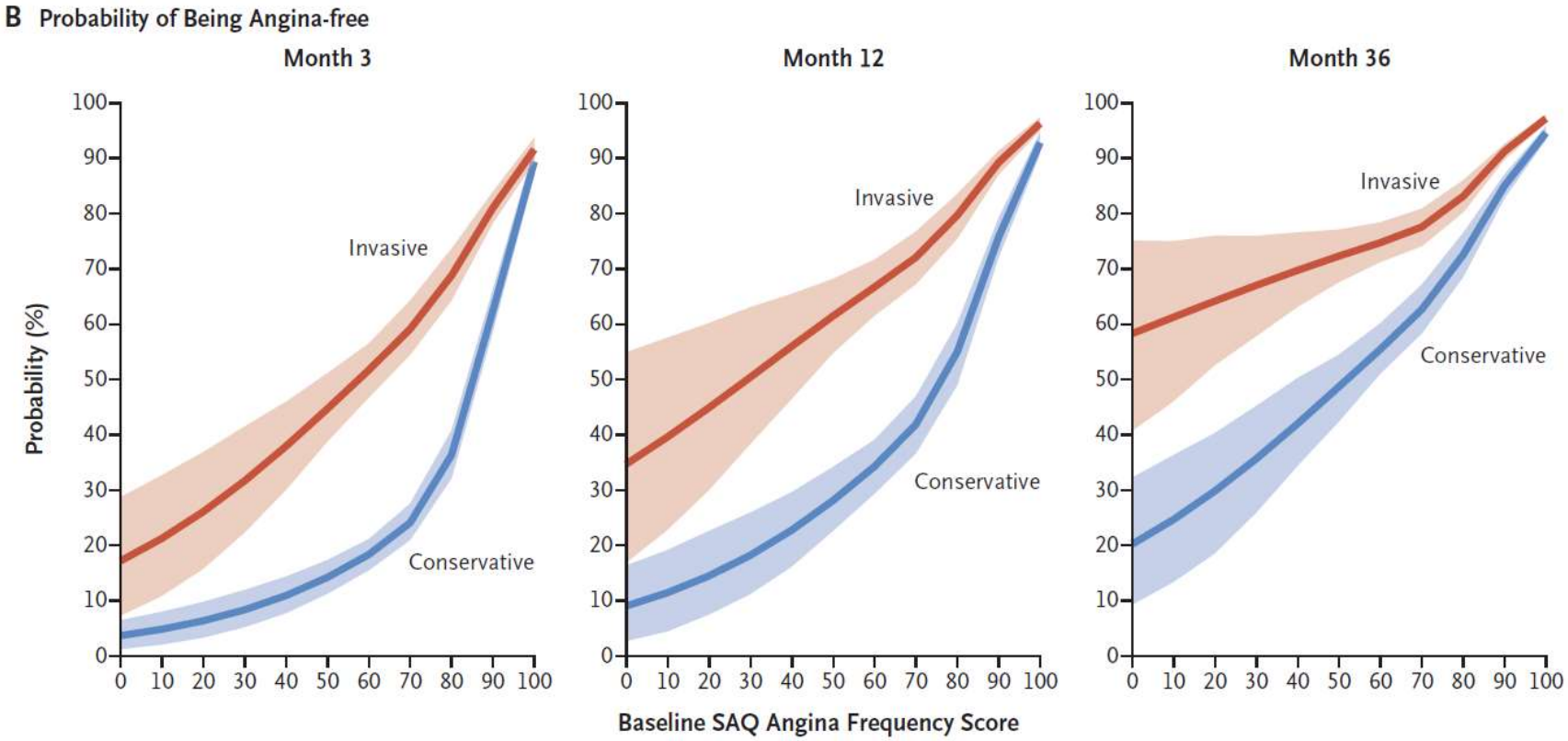
# ISCHEMIA Trial: What about the symptoms ?




*Spertus JA, et al. N Engl J Med 2020:382:1408-19*

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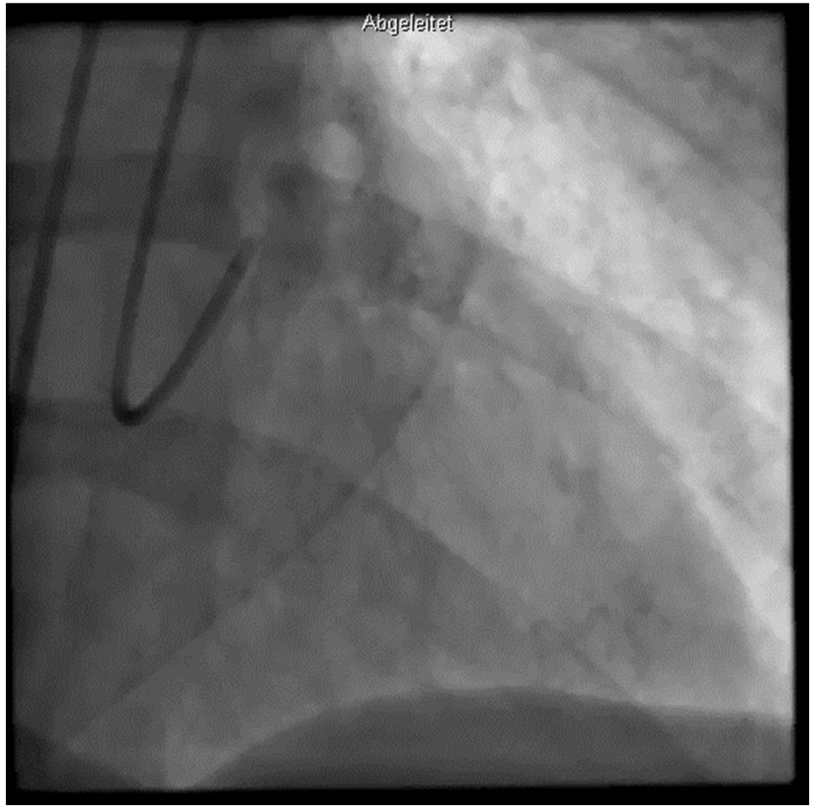
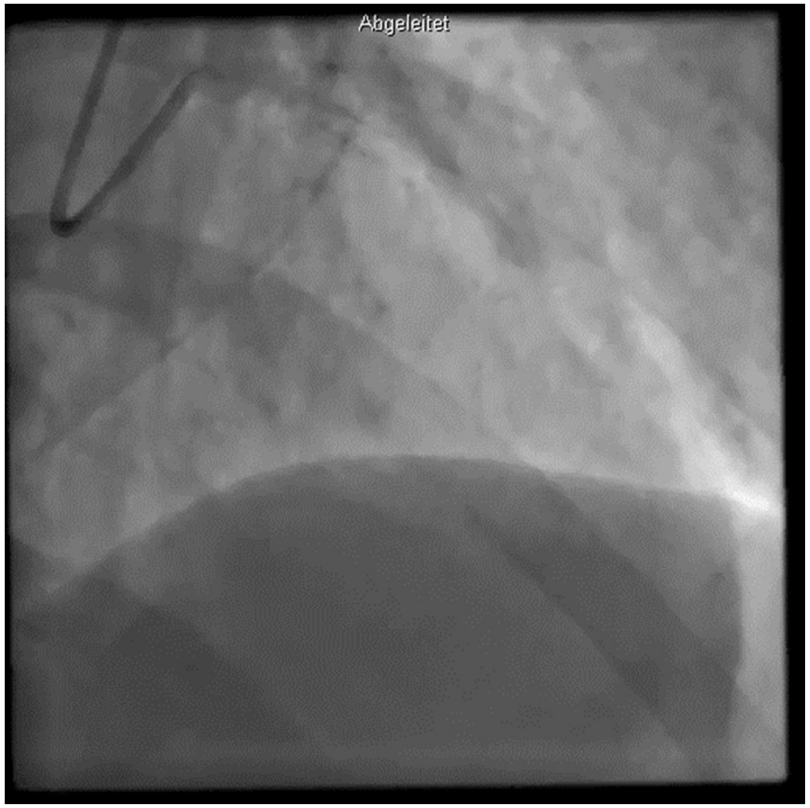
# What would YOU want ?

## YOU, Angina CCS III despite therapy with betablockers




# Merci pour votre attention