



Conflits d'Intérêts mineurs avec:  
Abbott, Biosensor, Cordis, Medtronic, Saint-Jude,  
Terumo, Minvasys

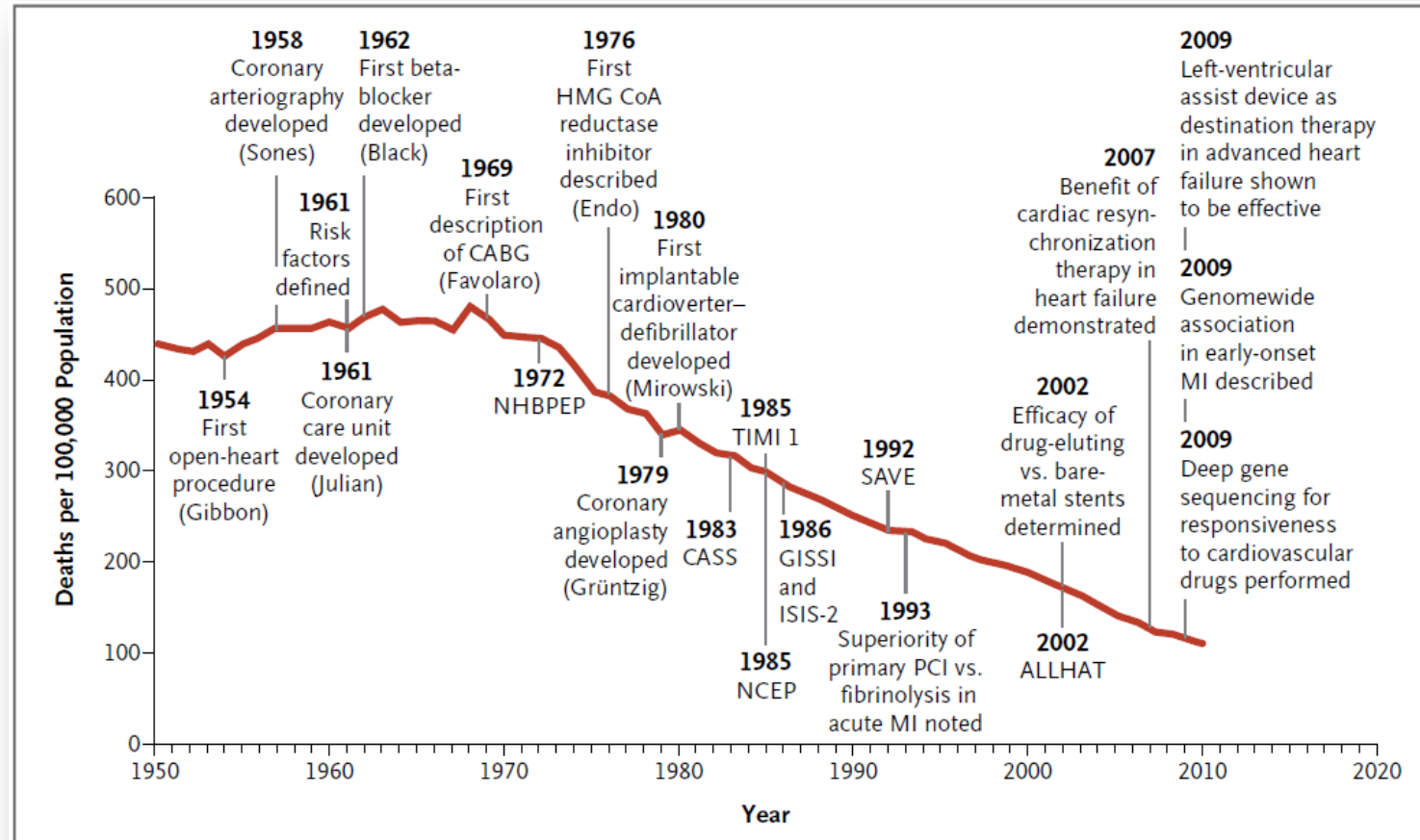


INSTITUT  
CARDIOVASCULAIRE  
PARIS  
SUD

# FUTUR de l' ANGIOPLASTIE

Hakim BENAMER





**Figure 1. Decline in Deaths from Cardiovascular Disease in Relation to Scientific Advances.**

The timeline shows the steady decline in cardiovascular deaths over the late 20th and early 21st centuries, along with major advances in cardiovascular science and medicine. ALLHAT denotes Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial, CASS Coronary Artery Surgery Study, GISSI Italian Group for the Study of Streptokinase in Myocardial Infarction, HMG-CoA 1-hydroxy-3-methylglutaryl coenzyme A, ISIS-2 Second International Study of Infarct Survival, MI myocardial infarction, NCEP National Cholesterol Education Program, NHBPEP National High Blood Pressure Education Program, PCI percutaneous coronary intervention, SAVE Survival and Ventricular Enlargement, and TIMI 1 Thrombolysis in Myocardial Infarction 1.

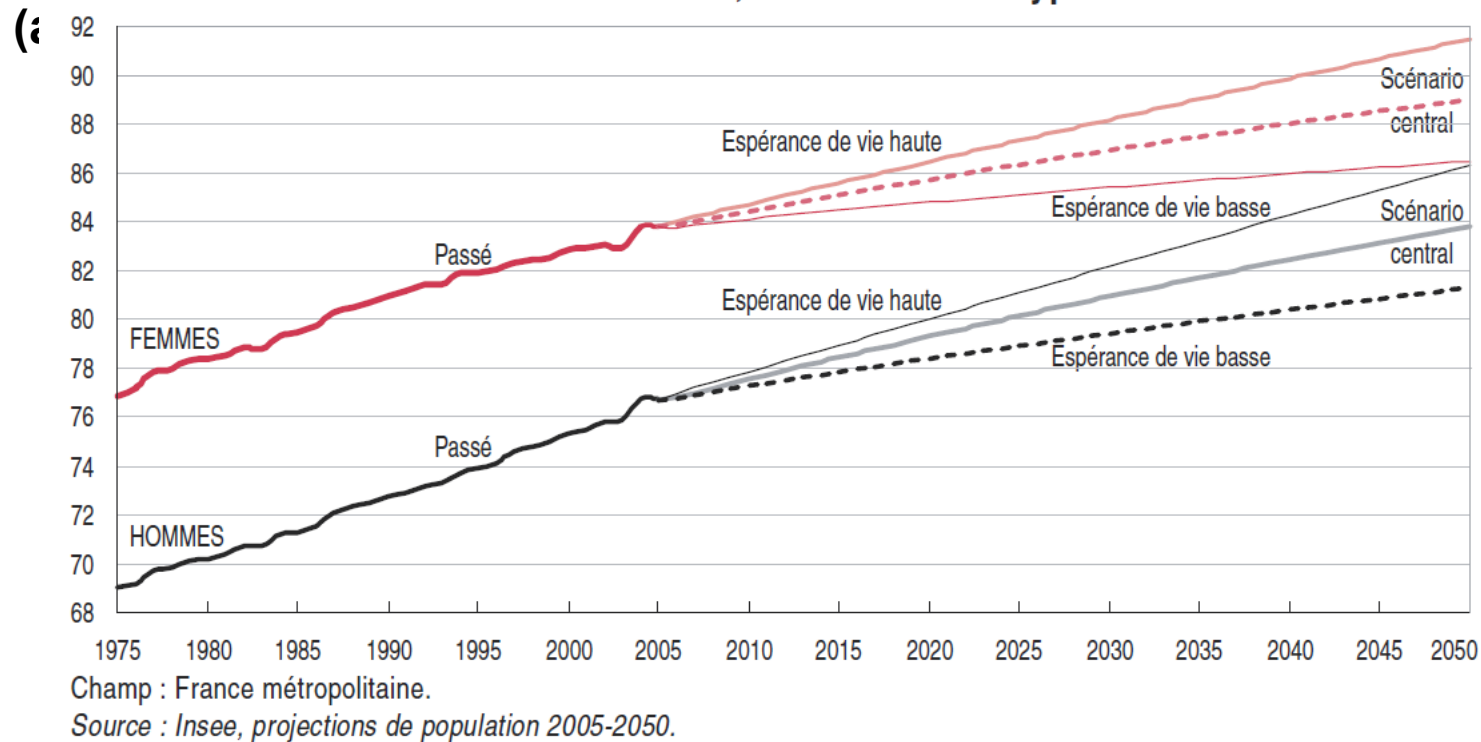
# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Nos patients vont changer*



# Population plus âgée

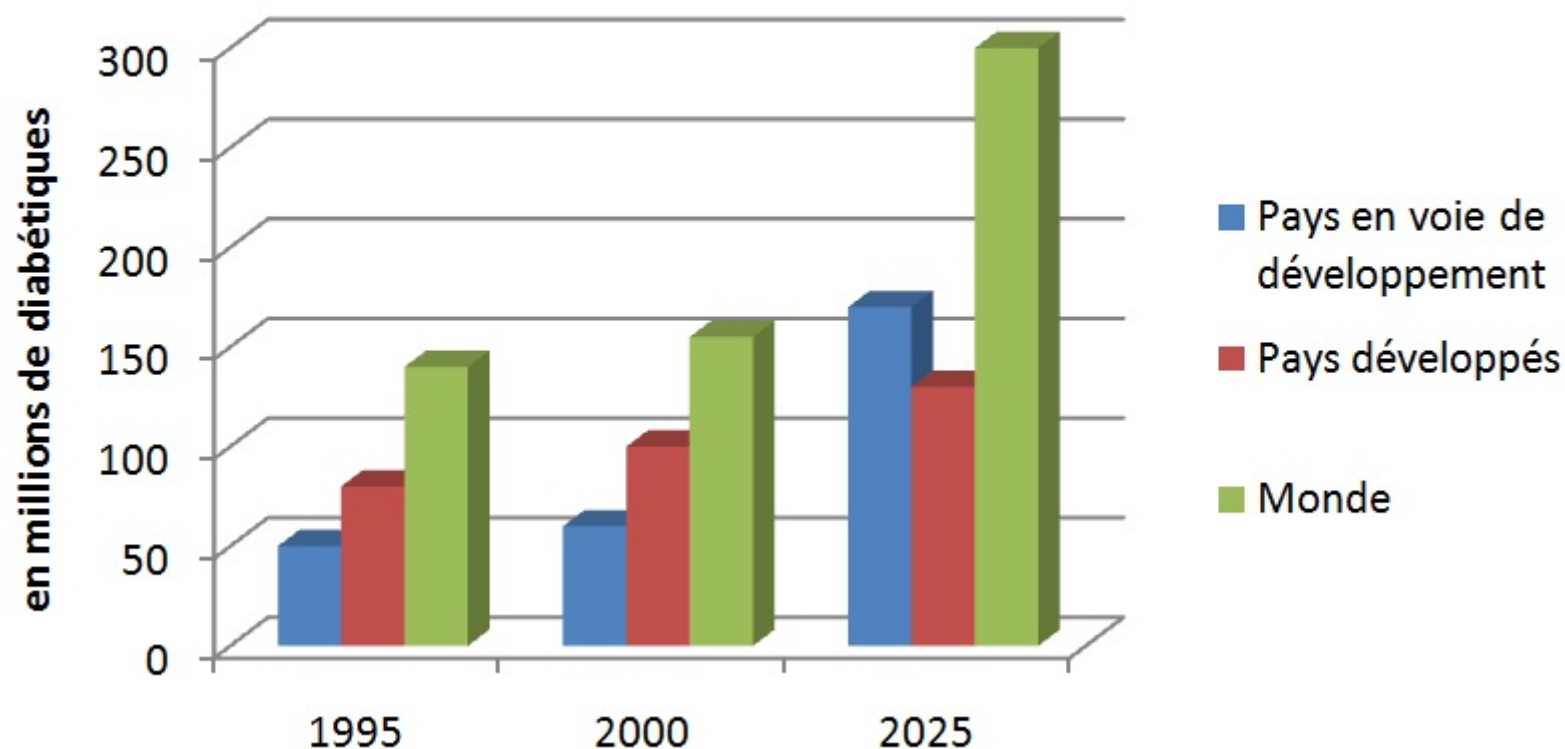
③ Évolutions passée et future de l'espérance de vie à la naissance des femmes et des hommes entre 2005 et 2050, selon les trois hypothèses retenues



**During the last century, life expectancy increased by 30 years**

# Population Diabétique

## Le diabète dans le monde



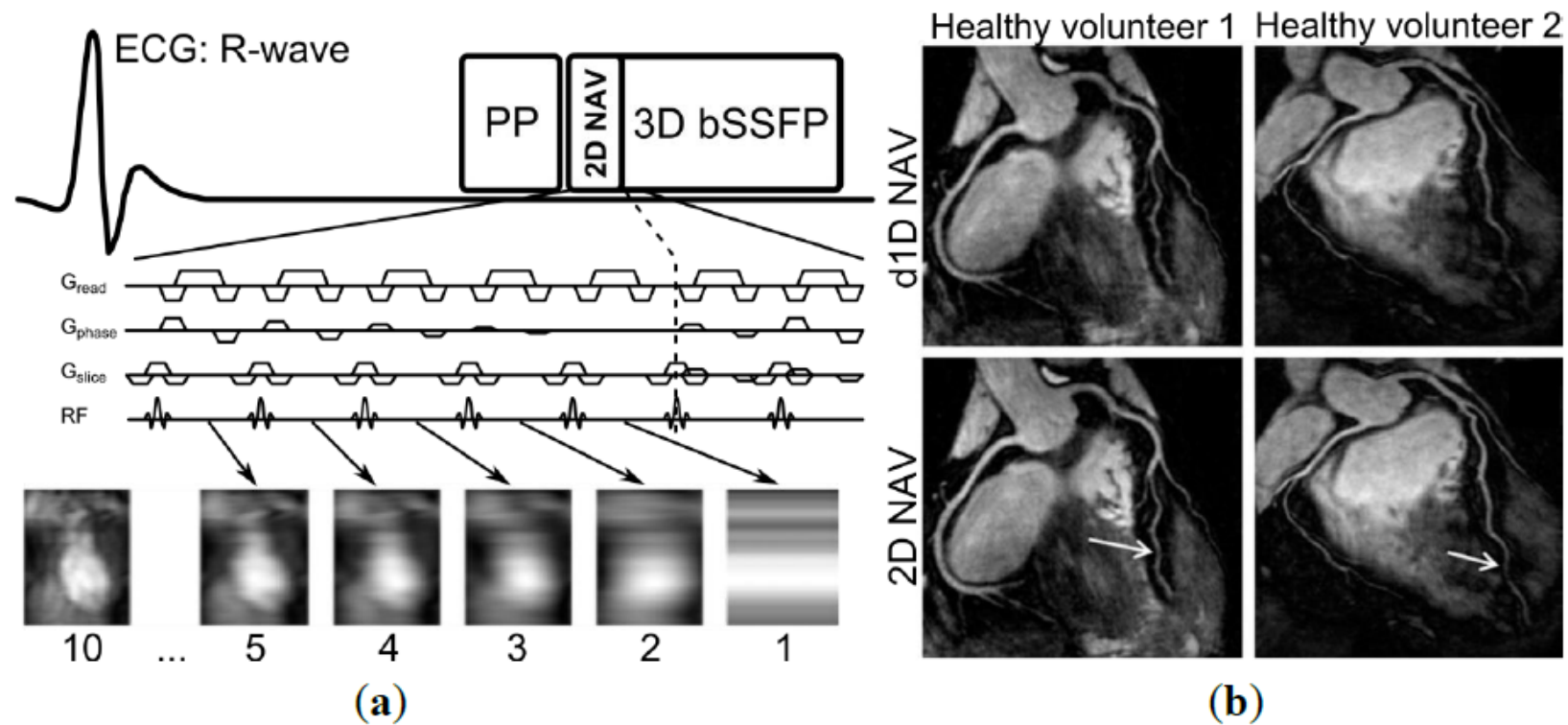
# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Nous ne ferons plus de  
coronarographie diagnostique*

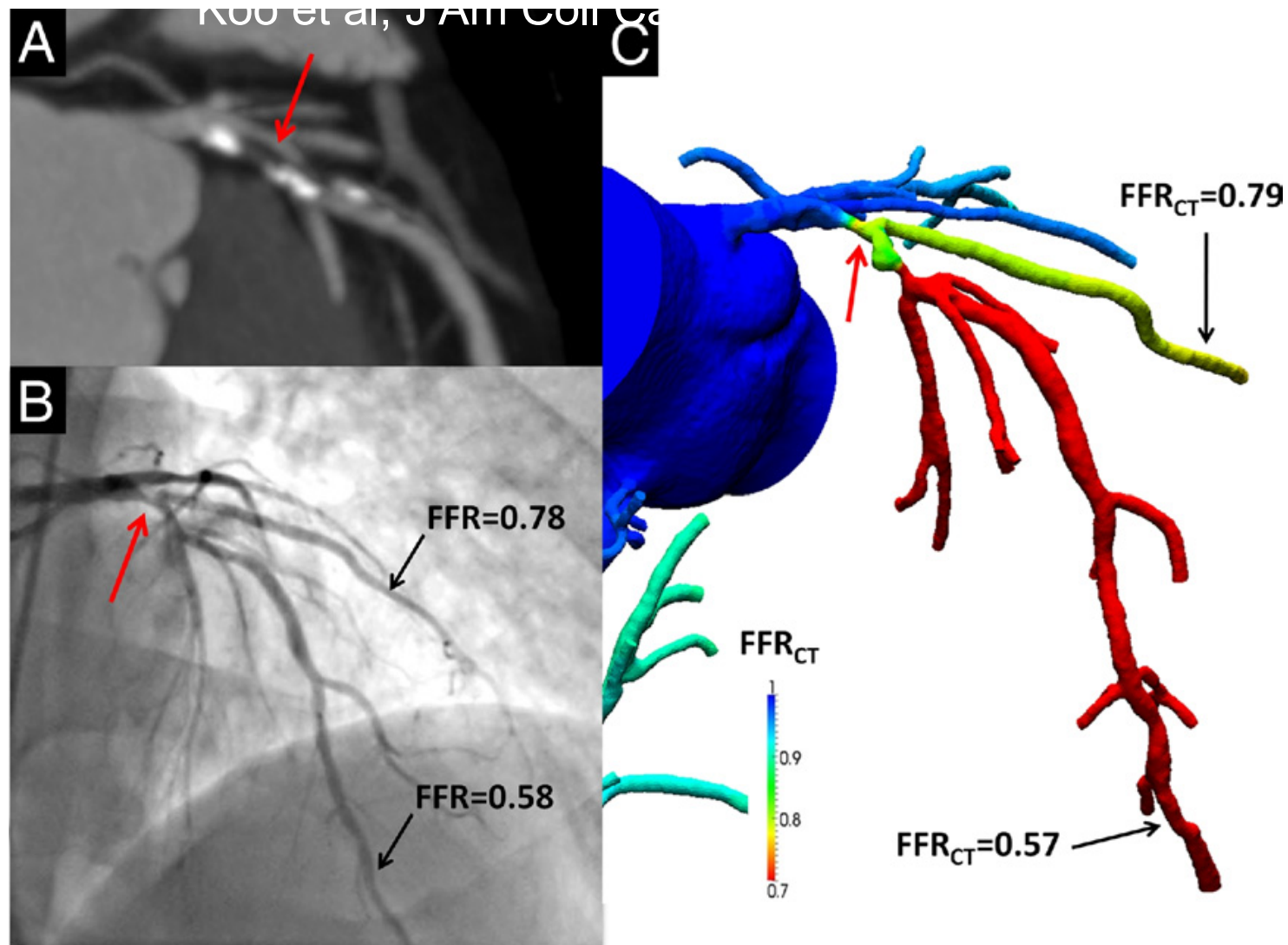
Review

# Advanced Respiratory Motion Compensation for Coronary MR Angiography

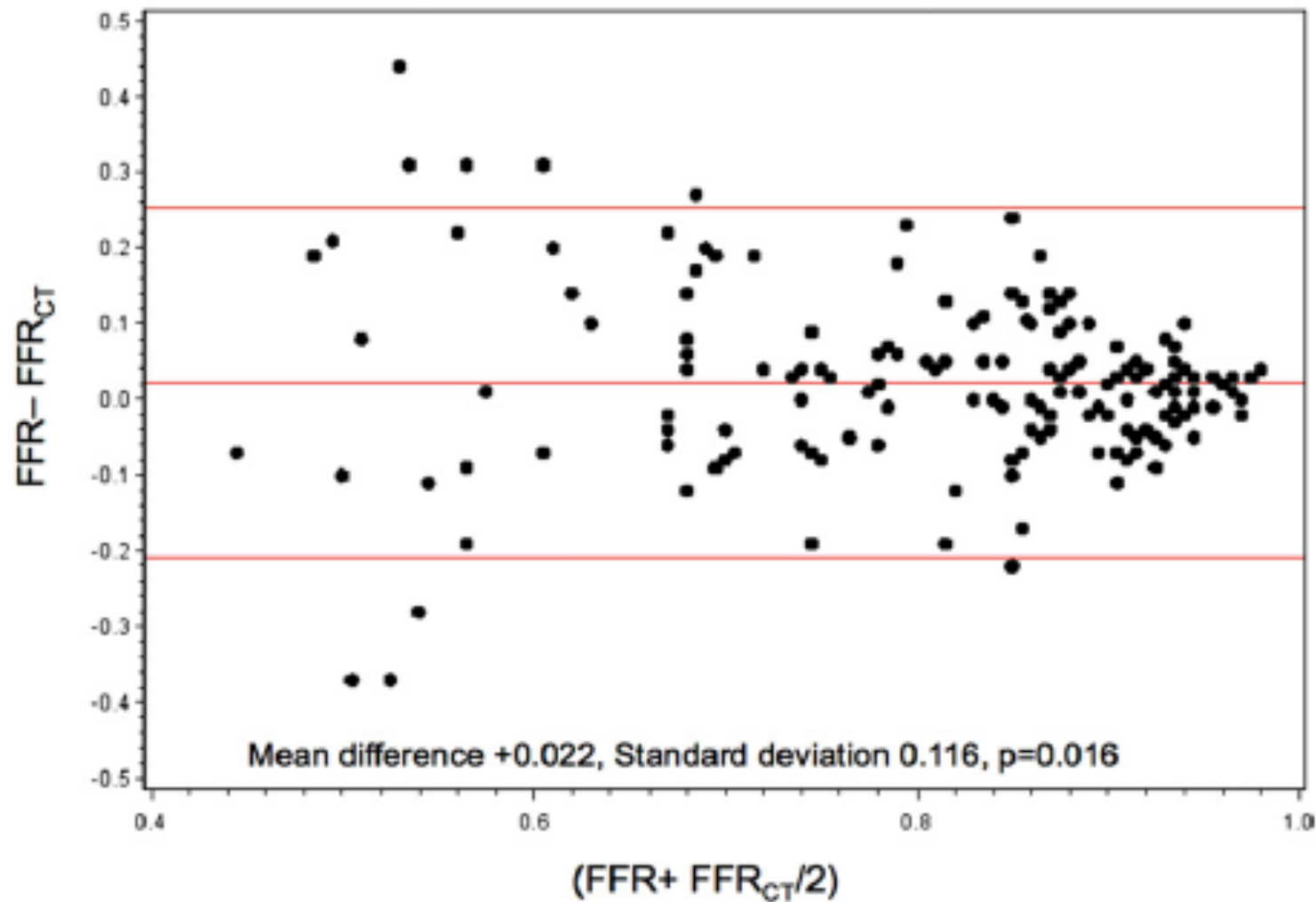
Markus Henningsson <sup>1,\*</sup> and Rene M. Botnar <sup>1,2,3,4</sup>



# FFR-CT scan integration

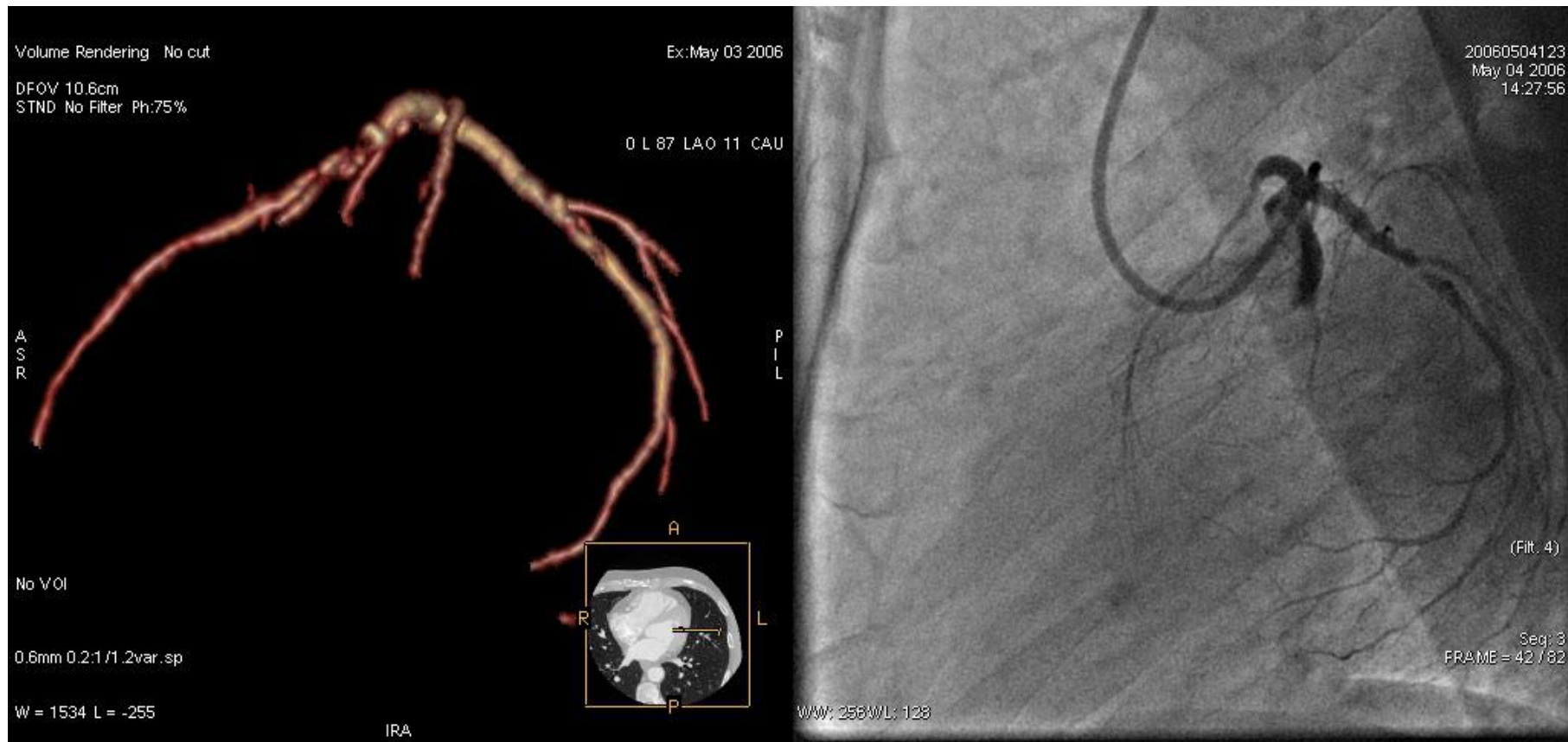


# FFR-CT scan integration



# Aide à la thérapeutique

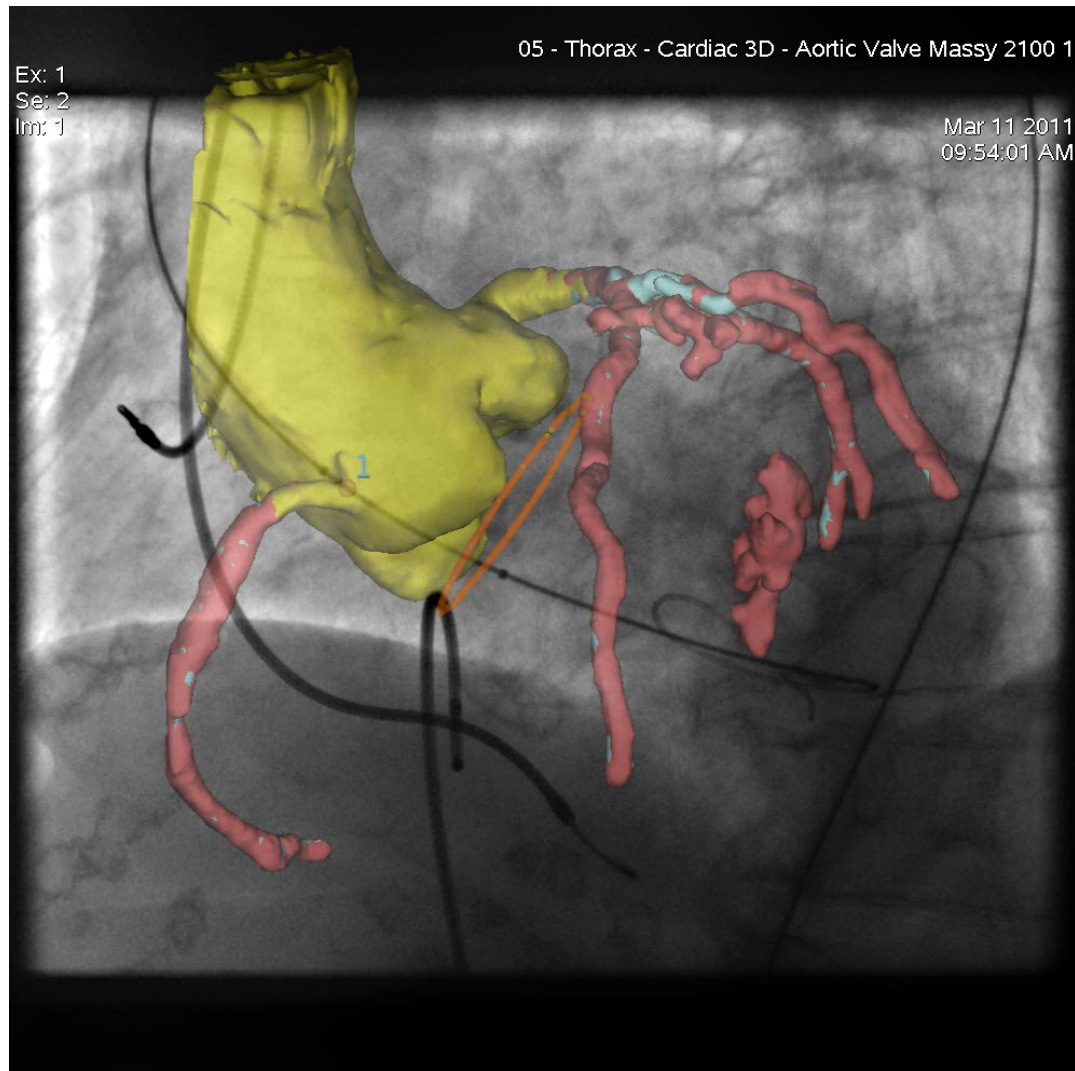
## CT scan integration imaging





# Aide à la thérapeutique

## CT scan integration imaging

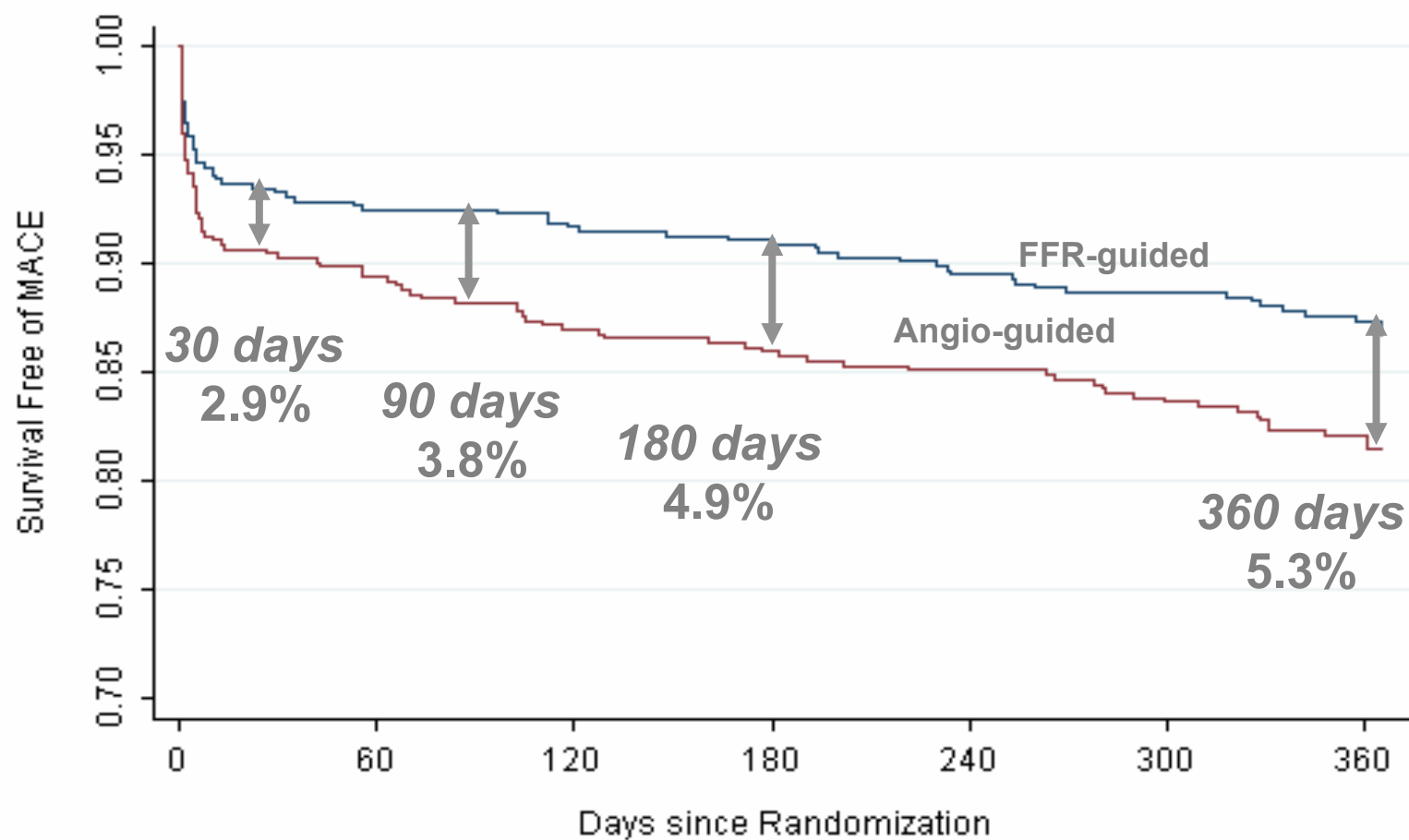


# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Nous ferons plus de tests  
fonctionnels en salle de cathétérisme  
ce qui réduira le nombre de  
revascularisations inutiles en  
améliorant le pronostic des patients*



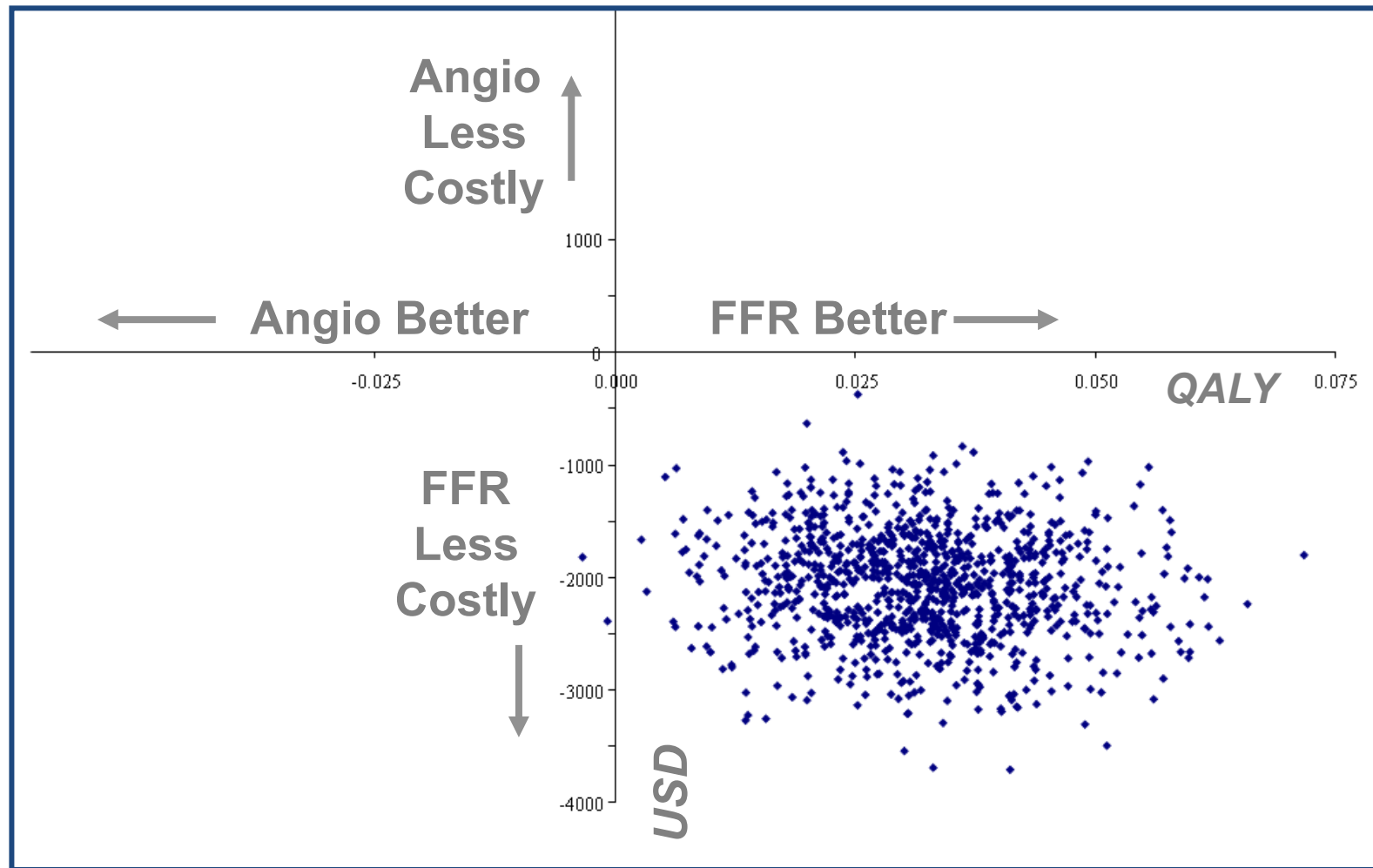
## ***FAME study: Event Free Survival***





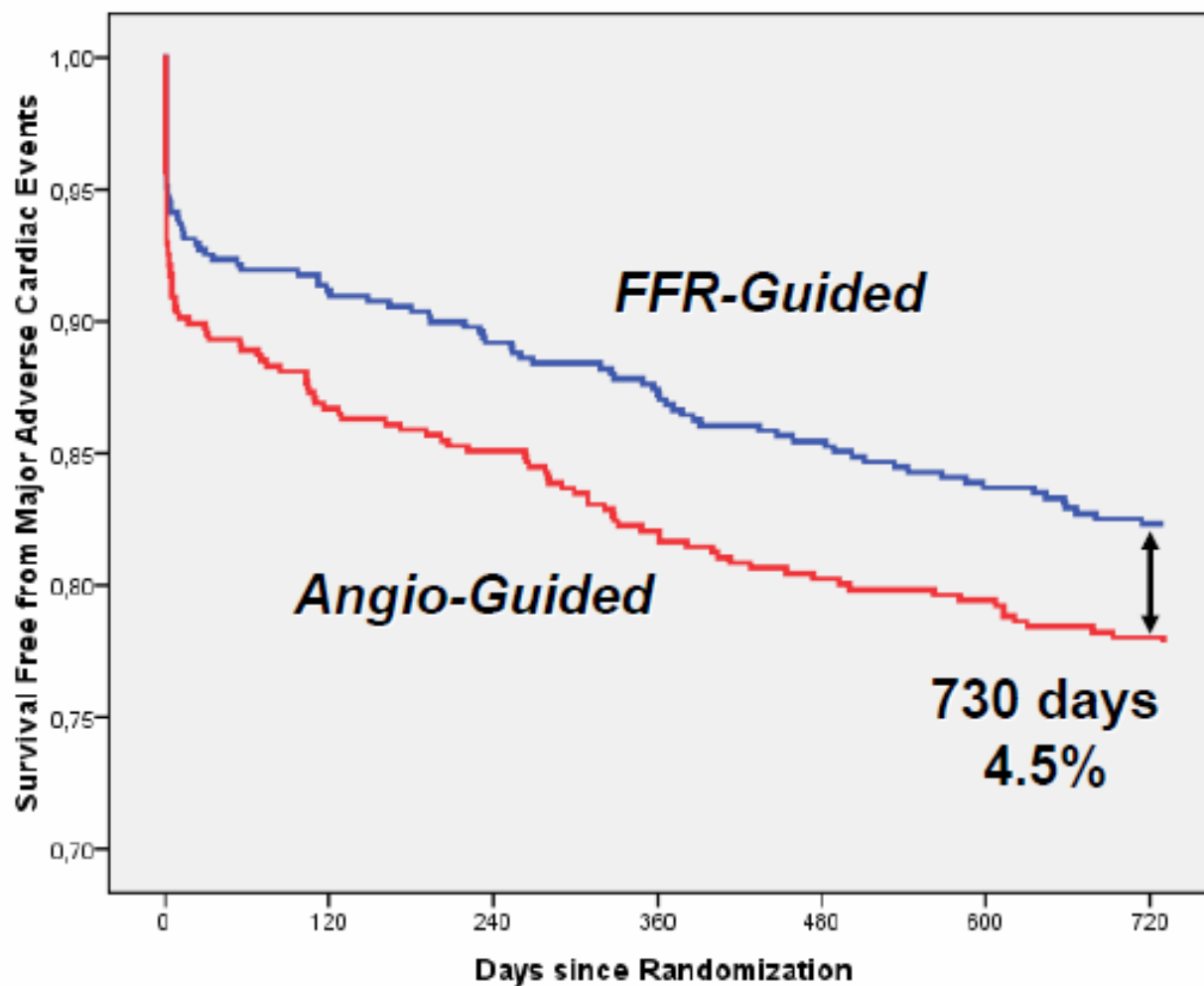
# 1 Year Economic Evaluation

## Bootstrap Simulation



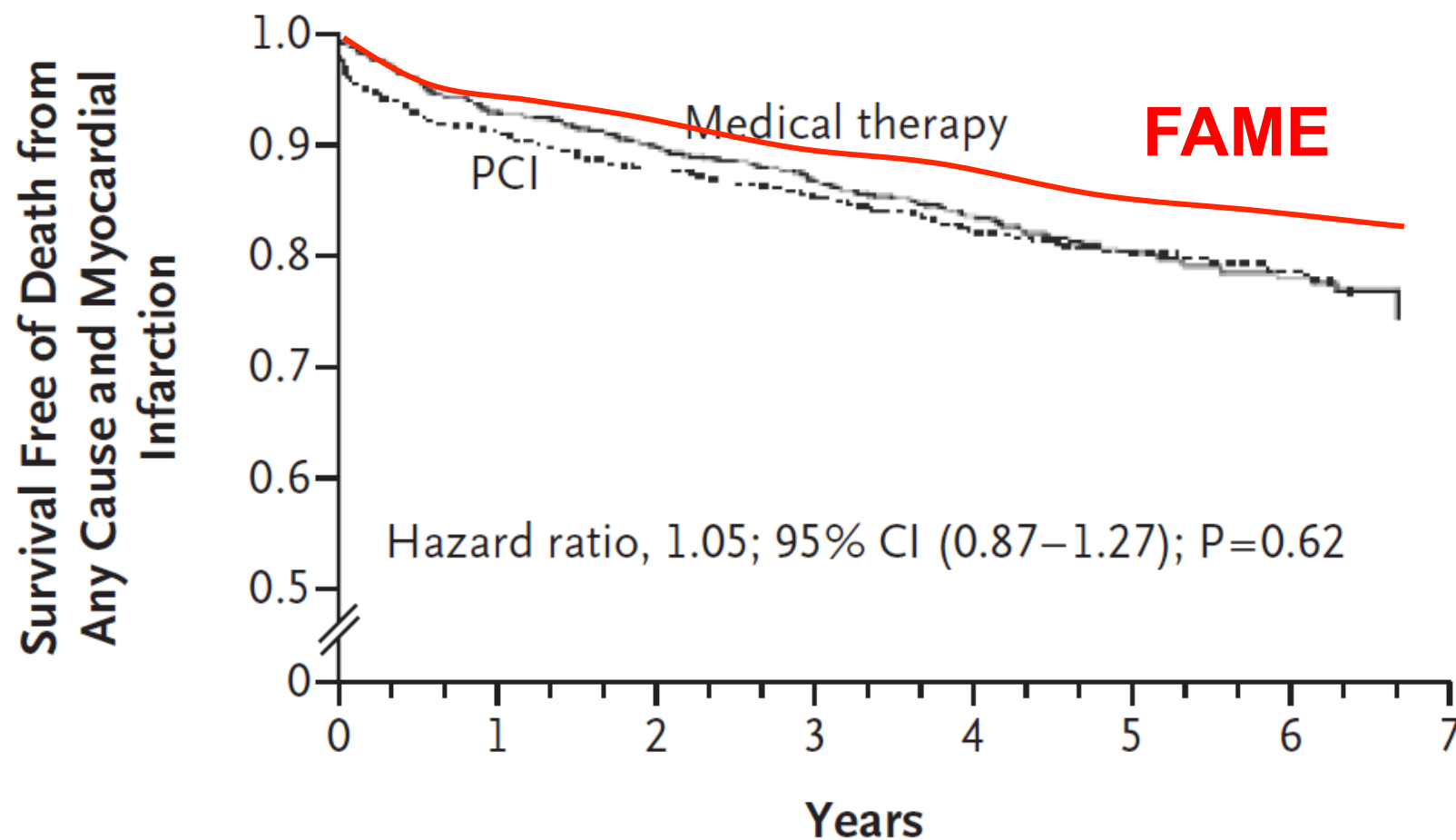


## *Two-Year Survival Free of MACE*



# Implications of FAME

## *Death and MI in the COURAGE study*



# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Nous utiliserons des stents encore  
meilleurs*

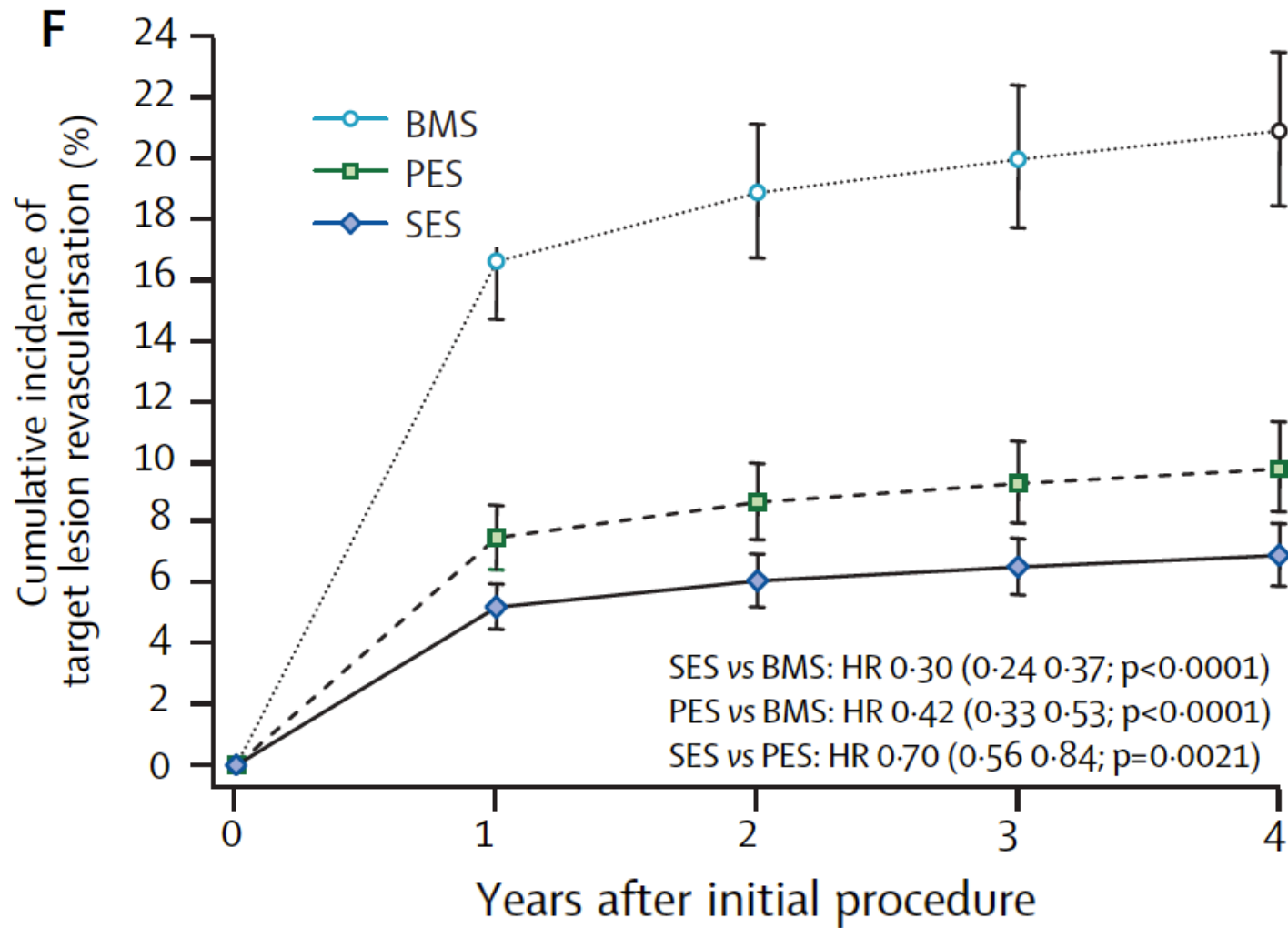
- Actifs*
- Durée de TTT plus courte*
- Bioabsorbable*



## A short Story of Angioplasty

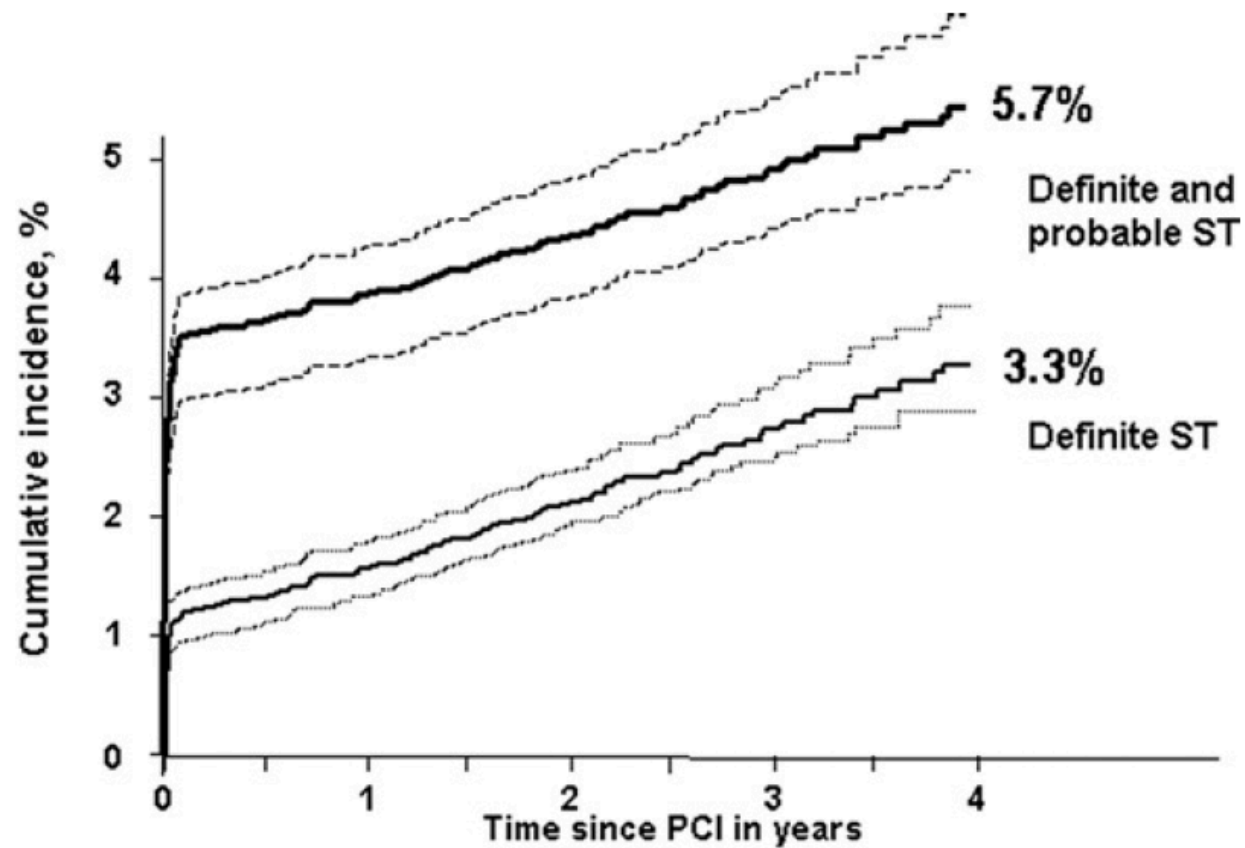
|                              | Balloon Angioplasty | BMS    | DES   | DES 2nd |
|------------------------------|---------------------|--------|-------|---------|
| Decade                       | 1980s               | 1990s  | 2000s | 2010s   |
| Acute Success rate           | 70–85%              | >95%   | >95%  | >95%    |
| Restenosis                   | 40–45%              | 20–30% | <10%  | <10%    |
| Early Thrombosis<br><30 days | 3–5%                | 1–2%   | 1–2%  | <1%     |
| Late Thrombosis<br>>30 days  | NA                  | <0.5%  | 1–2%  | <1%     |
| Very Late Thrombosis (>1y)   | NA                  | <0.5%  | 1–2%  | <1%     |

## Outcomes associated with DES and BMS: a collaborative network meta-analysis



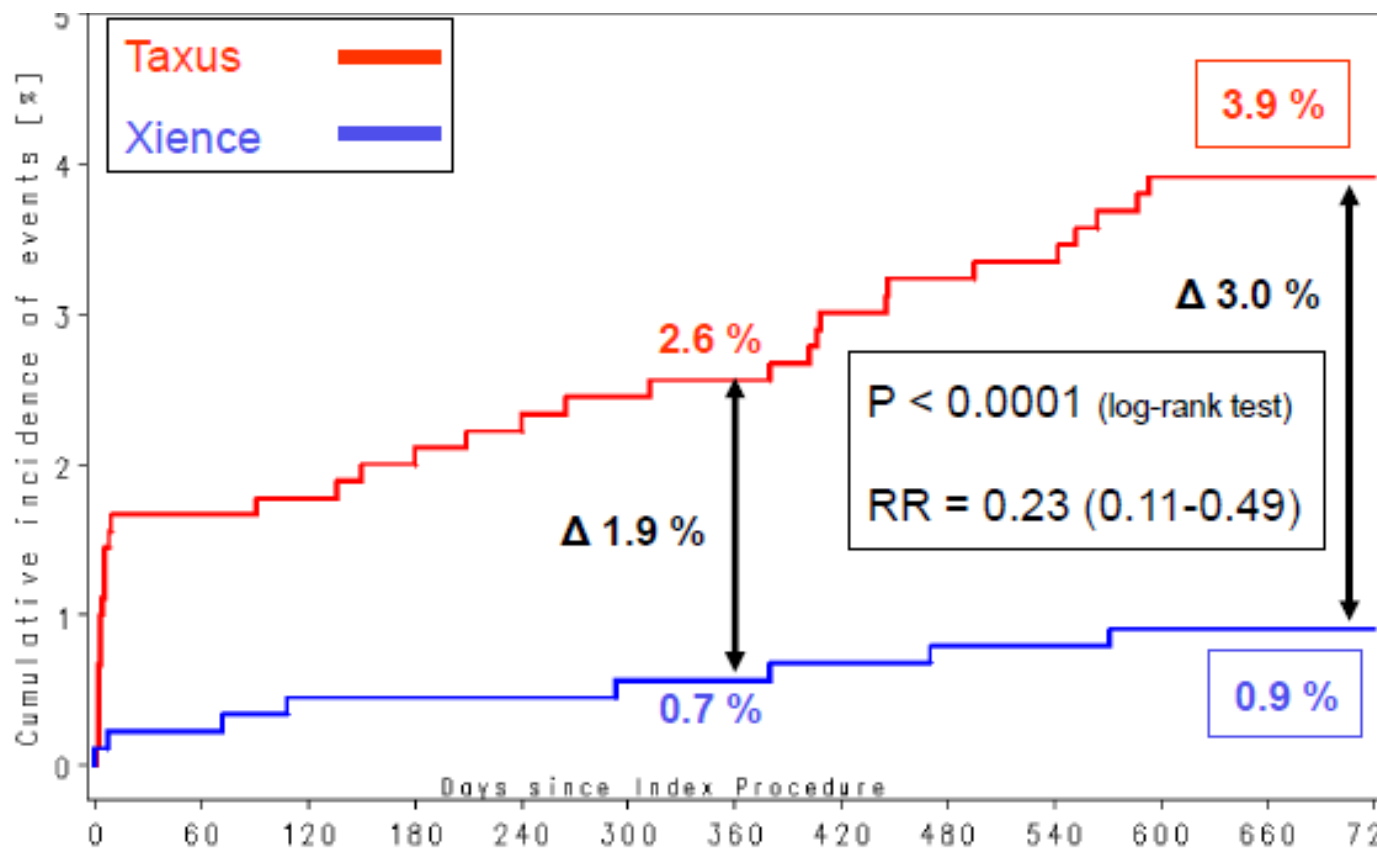
## BERN Rotterdam Cohort Study

**0.6% Definite stent thrombosis/year**



# Everolimus vs Paclitaxel-Eluting Stents

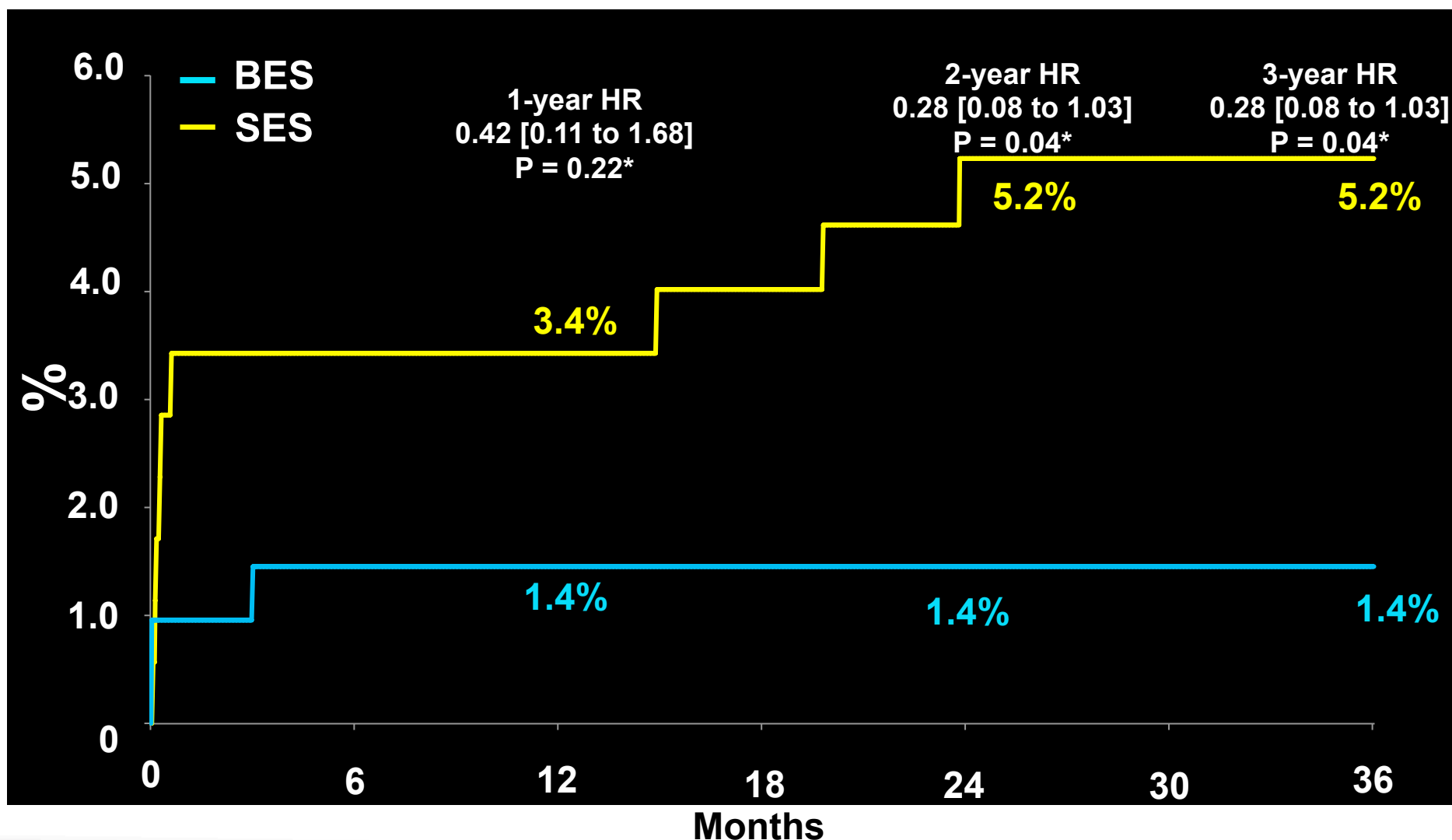
## Compare Study (All comers)



Smits et al. TCT 2010

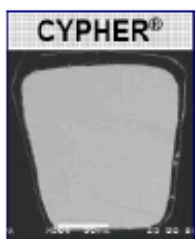
# Biolimus vs Sirolimus-Eluting Stents

## LEADERS – Definite ST, Multivessel Subsest

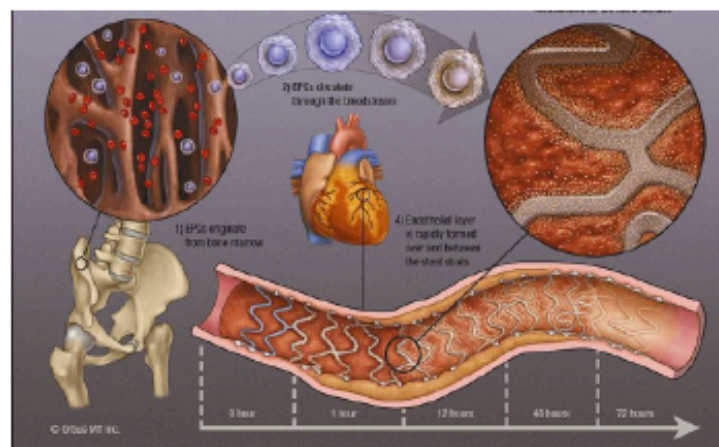


# Prevention of Very Late ST – New Stent Technology

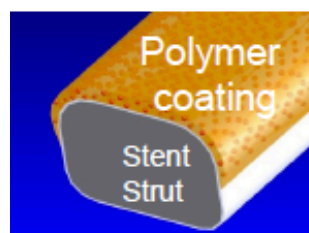
## New Generation DES

| CYPHER®                                                                           | TAXUS®                                                                            | ENDEAVOR                                                                          | XIENCE V                                                                           |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |  |
| Strut Thickness:<br>157 µm                                                        | Strut Thickness:<br>132 µm                                                        | Strut Thickness:<br>91 µm                                                         | Strut Thickness:<br>81 µm                                                          |
| Polymer Thickness:<br>12.6 µm                                                     | Polymer Thickness:<br>16 µm                                                       | Polymer Thickness:<br>5.3 µm                                                      | Polymer Thickness:<br>7.6 µm                                                       |
| Total:<br>169.6 µm                                                                | Total:<br>148 µm                                                                  | Total:<br>96.3 µm                                                                 | Total:<br>88.6 µm                                                                  |

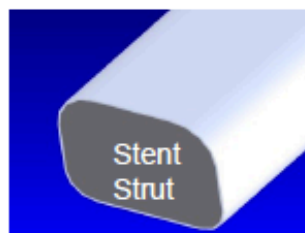
## Endothelial Progenitor Cell Capture



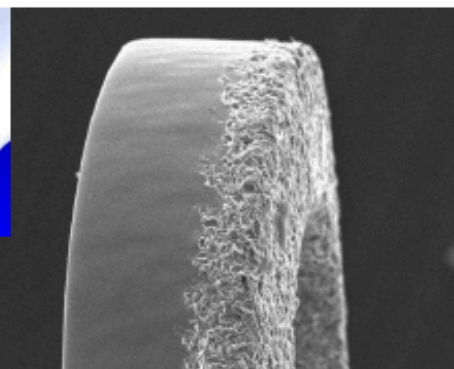
## Biodegradable Polymers



Biodegradable  
Polymer  
abluminal only

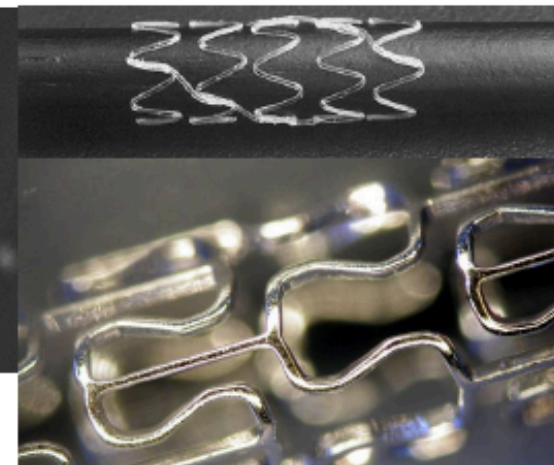


After release  
of polymer



## Polymer Free Surface

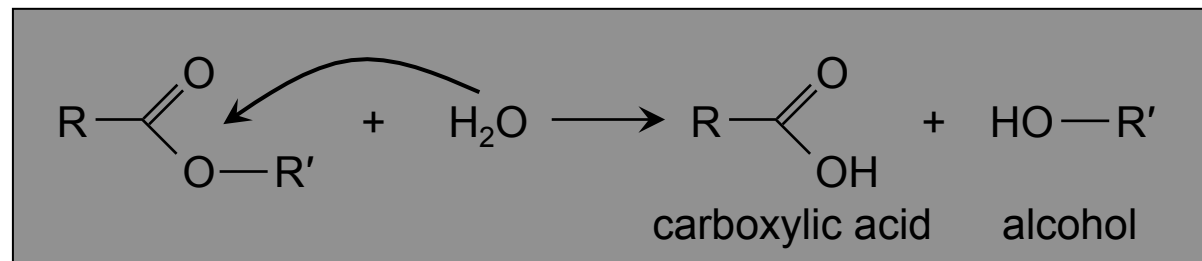
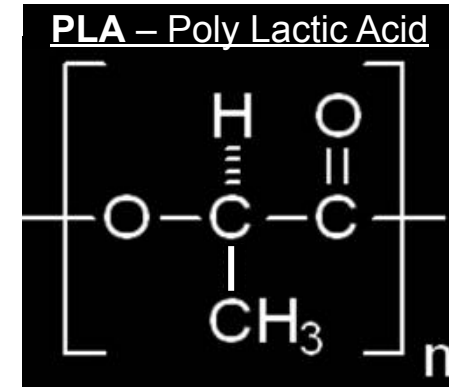
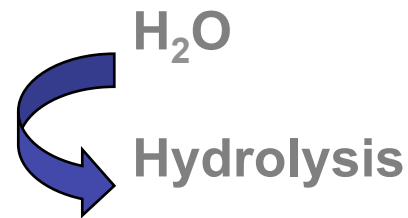
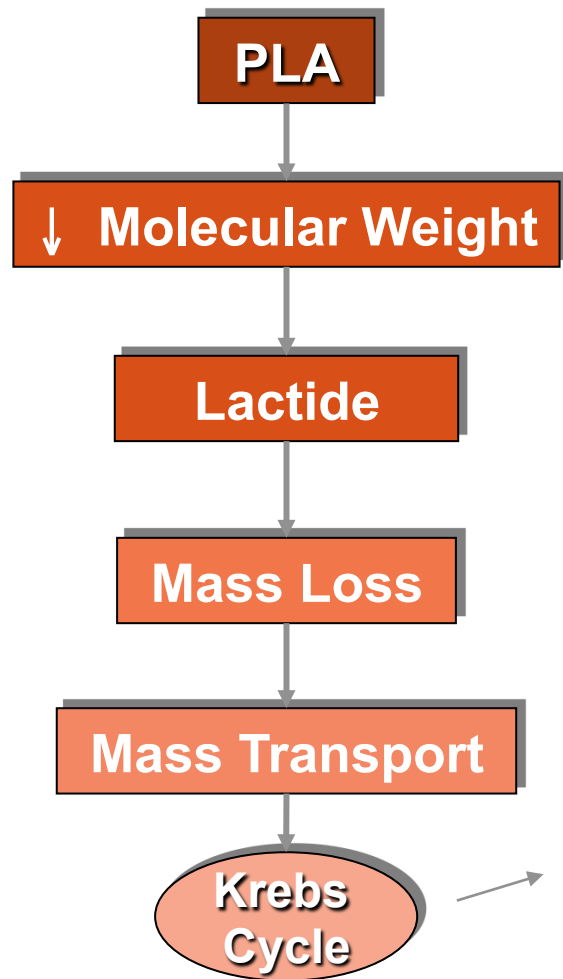
## Bioabsorbable Stents



# Potential Long Term Advantages of “Removing” a Rigid Coronary Stent

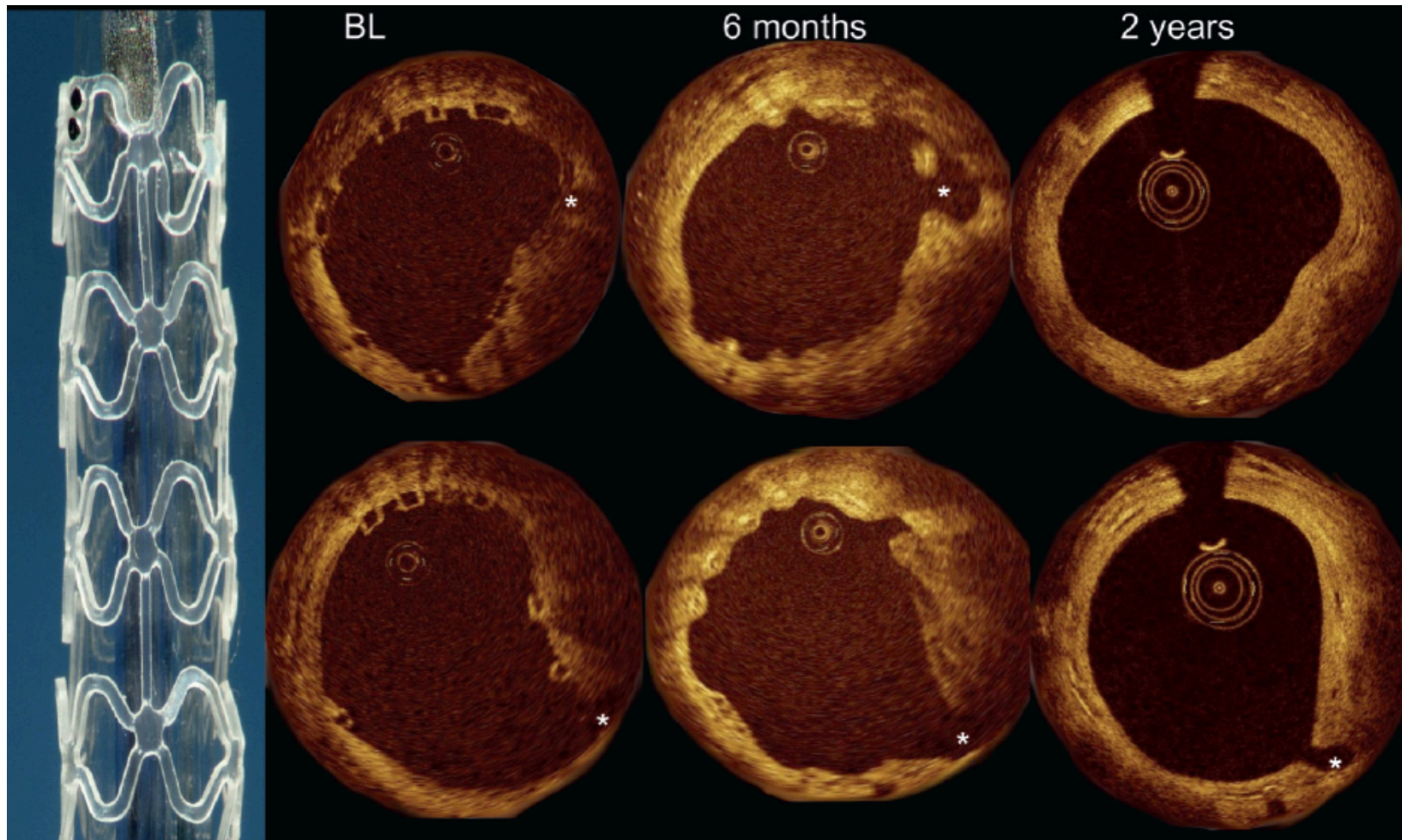
- ✓ Restoration of epicardial coronary capacitance to coronary flow regulation
- ✓ Restoration of shear stress modulation and flow mediated dilation vital for the direct coupling of coronary flow to metabolic demand
- ✓ Minimize chronic flow separations (turbulence) and low endothelial shear stress (ESS) due to protruding struts and / or vessel distortion
- ✓ Abolition of stress “shielding” and negative influences of endothelial and SM cell function
- ✓ Reduce risk of late events or atheroprogession (all other factors controlled)

# Poly Lactide - Hydrolysis

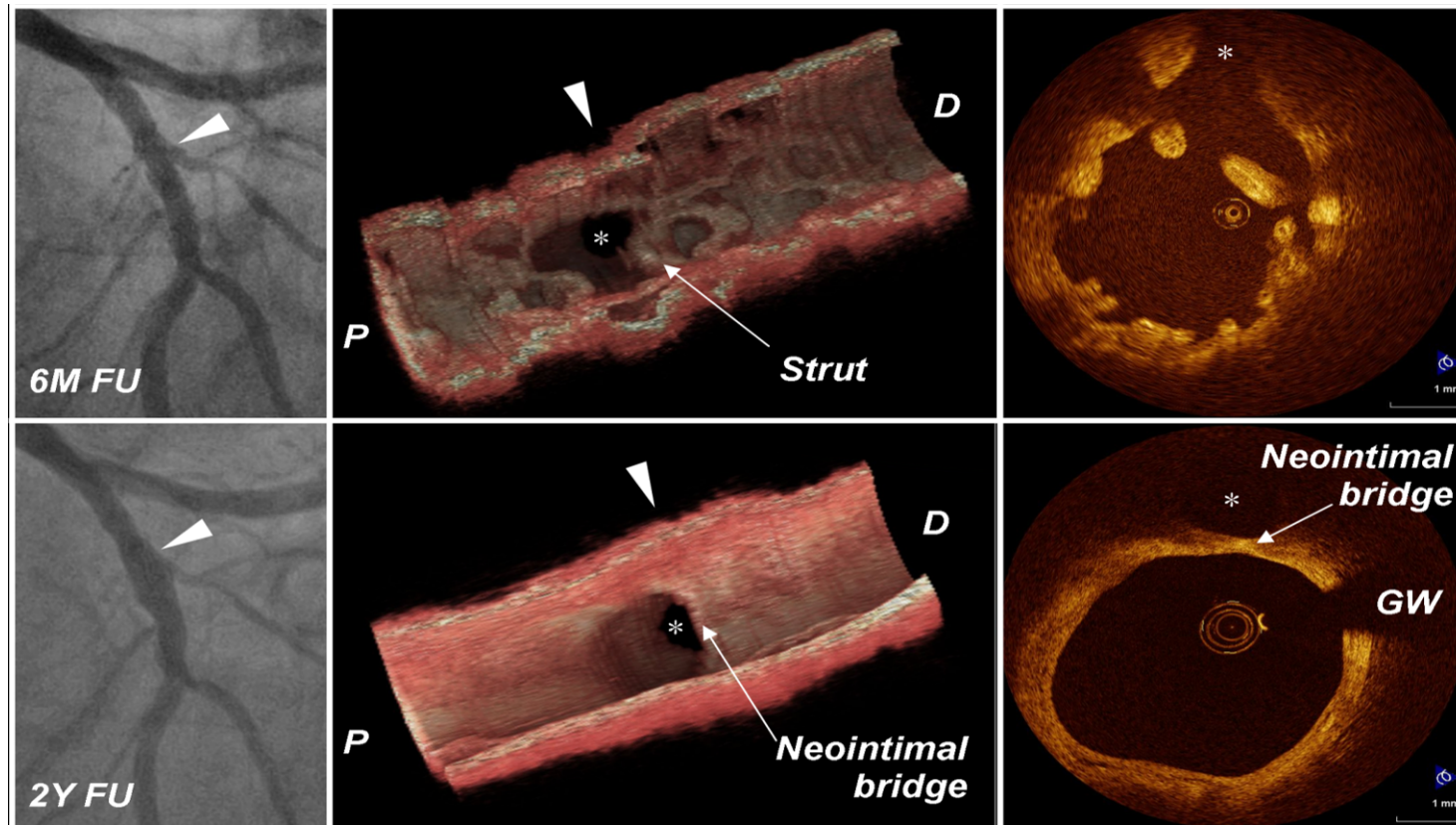




# Bioresorbable Scaffolds



## Bioresorption at jailed side branch is a real phenomenon



# ABSORB Trial

**Table 2. Hierarchical major adverse cardiac events up to three years.**

| Hierarchical              | 6 months<br>30 patients | 12 months<br>29 patients* | 2 years<br>29 patients* | 3 years<br>29 patients* |
|---------------------------|-------------------------|---------------------------|-------------------------|-------------------------|
| Ischaemia driven MACE (%) | 3.3% (1)*               | 3.4% (1)*                 | 3.4% (1)*               | 3.4% (1)*               |
| Cardiac death (%)         | 0.00%                   | 0.00%                     | 0.00%                   | 0.00%                   |
| MI (%)                    |                         |                           |                         |                         |
| Q-Wave MI                 | 0.00%                   | 0.00%                     | 0.00%                   | 0.00%                   |
| Non-Q-Wave MI             | 3.3% (1)**              | 3.4% (1)**                | 3.4% (1)**              | 3.4% (1)**              |
| Ischaemia driven TLR (%)  |                         |                           |                         |                         |
| by PCI                    | 0.00%                   | 0.00%                     | 0.00%                   | 0.00%                   |
| by CABG                   | 0.00%                   | 0.00%                     | 0.00%                   | 0.00%                   |

# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

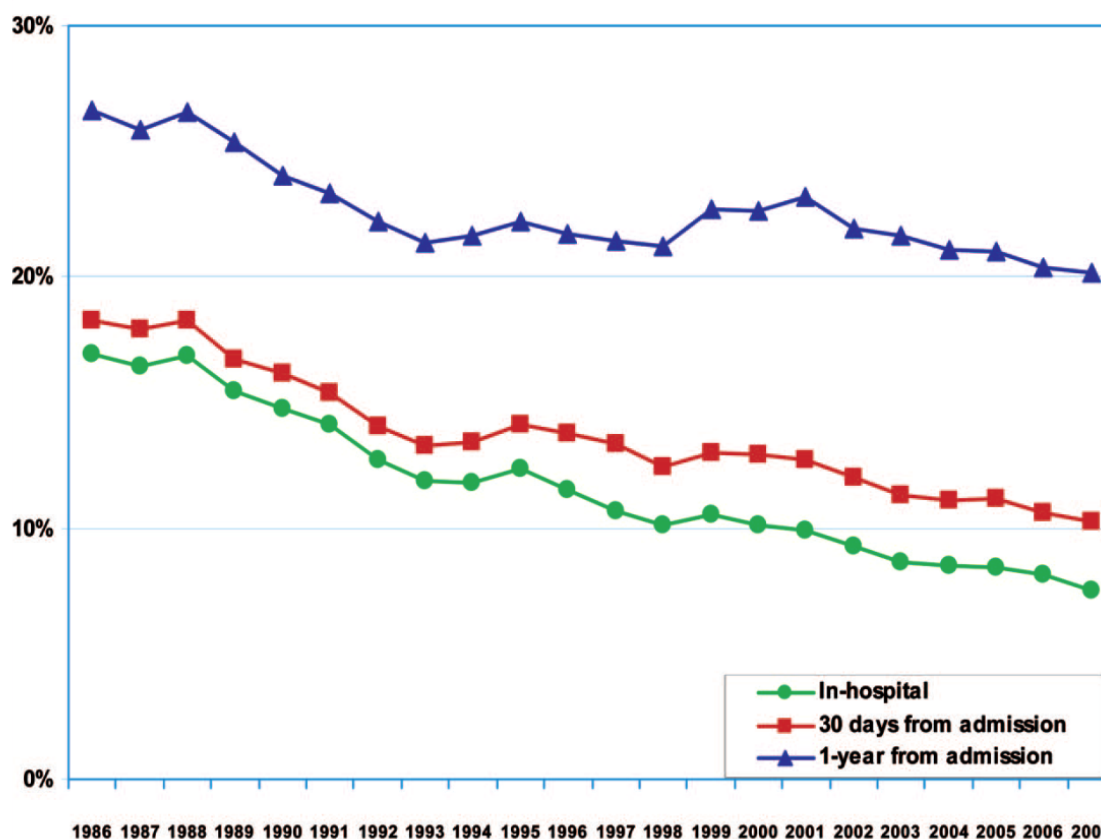
*Nous continuerons à améliorer le pronostic  
des patients traités pour SCA ST*

- Augmentant le nb d'angioplastie*
- Réduisant les délais de prise en charge*
- Améliorant prise en charge médicale (TTT)*



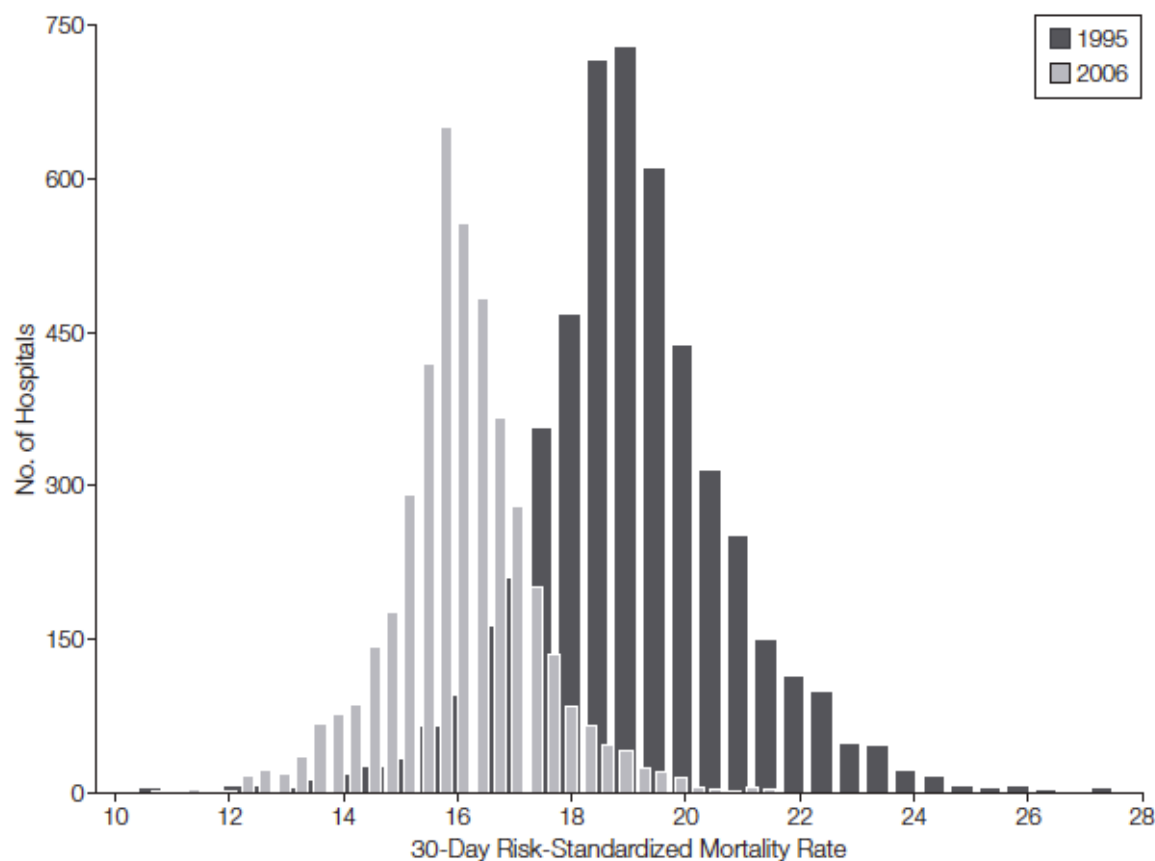
# Trends in Mortality of Acute Myocardial Infarction After Discharge From the Hospital

285 397 Pts hospitalized for a first acute MI in New Jersey (1986-2007)



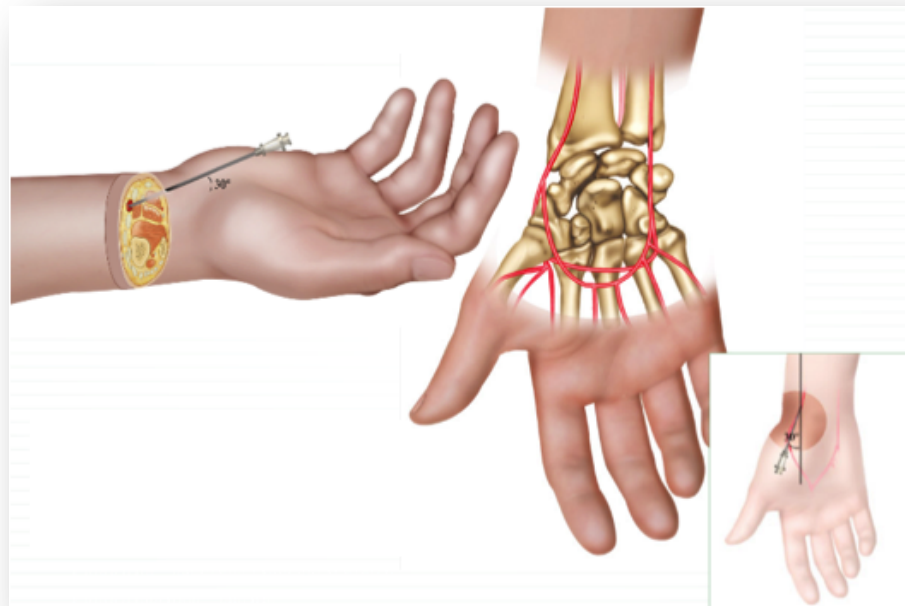
# Reduction in Acute Myocardial Infarction Mortality in the United States

Change in AMI 30-Day Mortality in 2 755 370 patients from 1995 to 2006



# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Abord radial sera un Gold Standard*



## M.O.R.T.A.L study

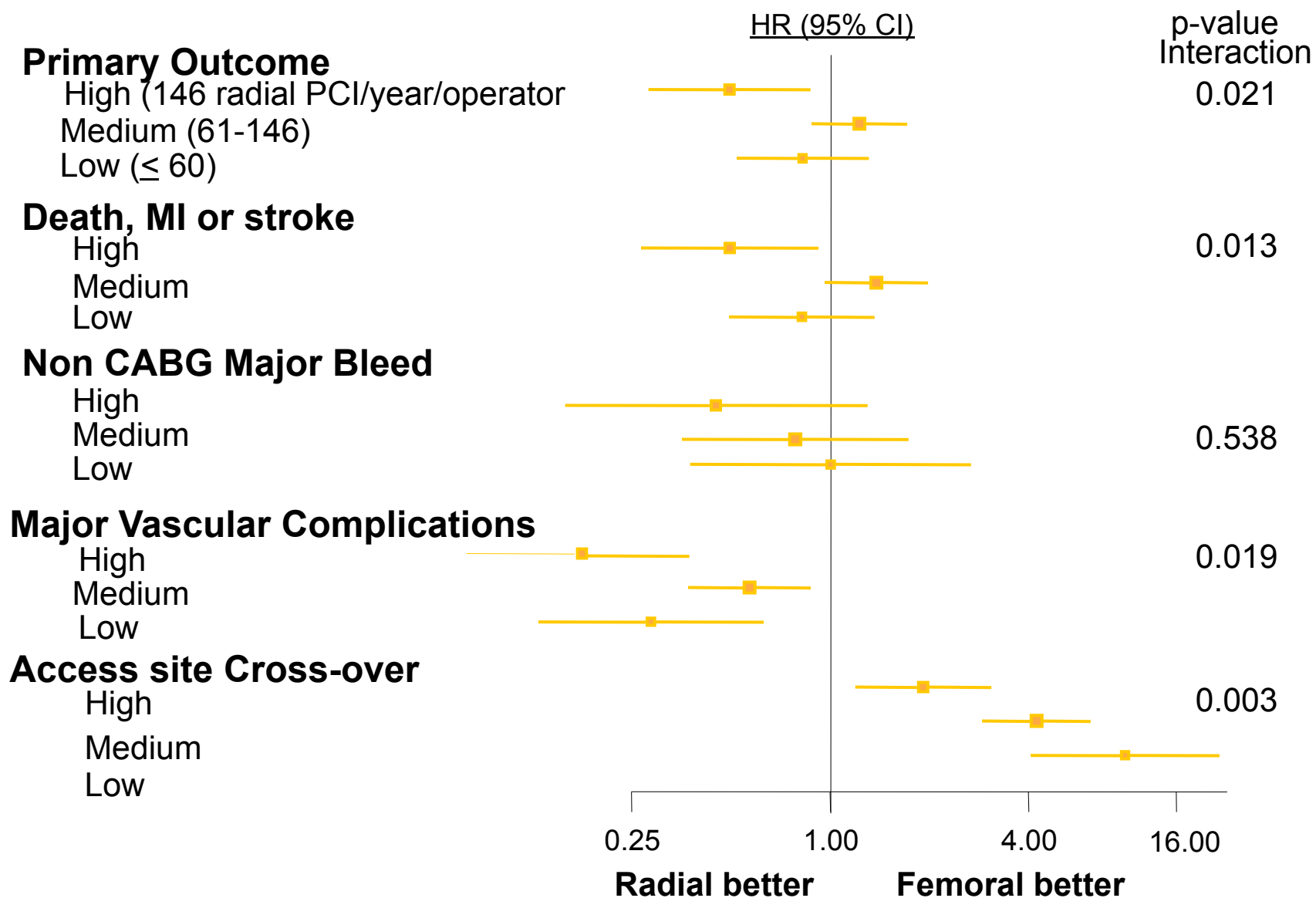
(Mortality benefit Of Reduced Transfusion after percutaneous coronary intervention via the Arm or Leg)

| Raw outcomes whole cohort | Whole sample (n = 38 872) | Radial cases (n = 7972) | Femoral cases (n = 30 900) | p Value |
|---------------------------|---------------------------|-------------------------|----------------------------|---------|
| Received transfusion      | 967 (2.5)                 | 108 (1.4)               | 859 (2.8)                  | <0.01   |
| 30-Day mortality          | 598 (1.5)                 | 78 (1.0)                | 520 (1.7)                  | <0.01   |
| 1-Year mortality          | 1437 (3.7)                | 224 (2.8)               | 1213 (3.9)                 | <0.01   |

**NNT~100**



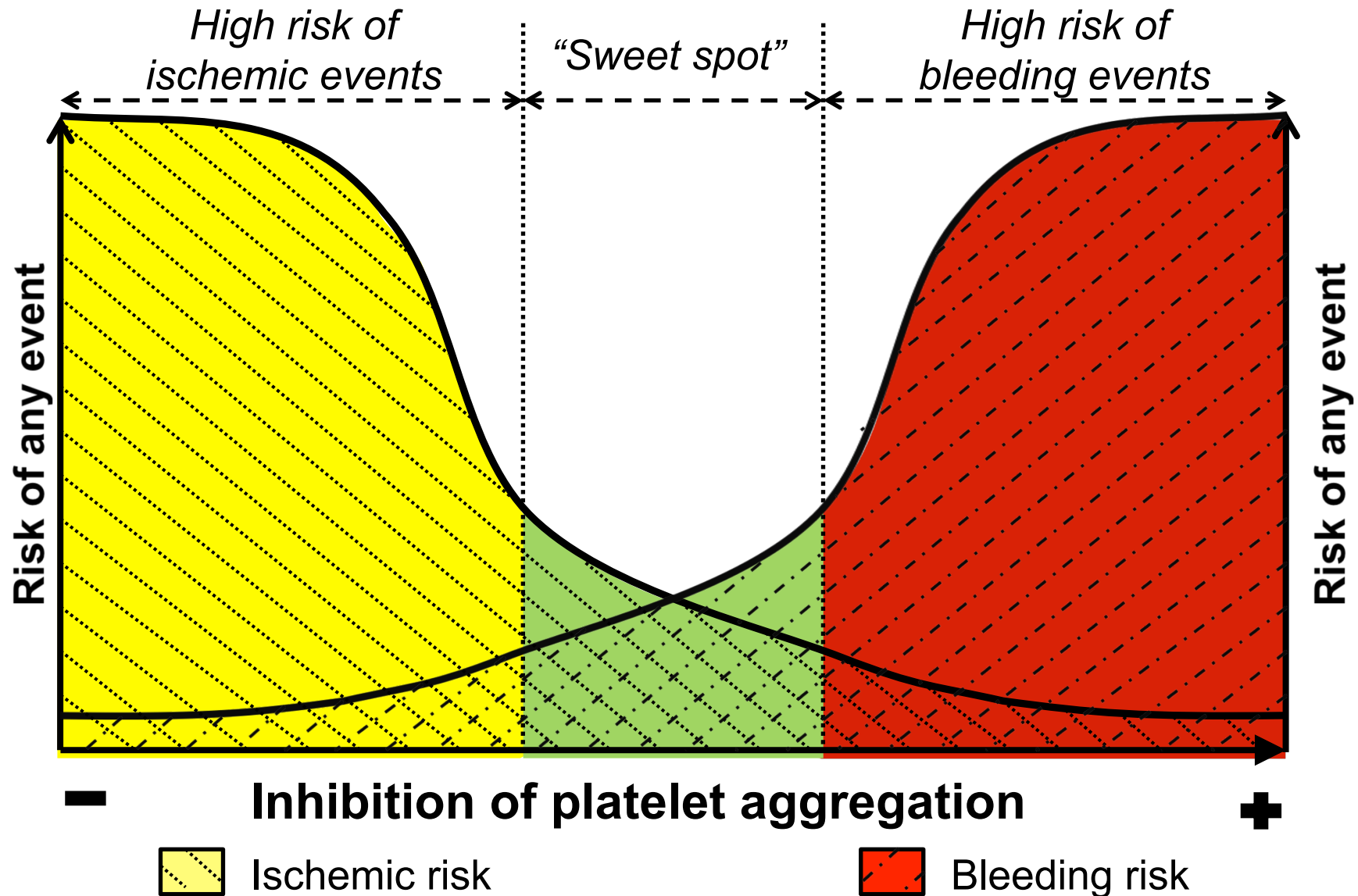
## RIVAL: High, Medium and Low Volume Radial Centres

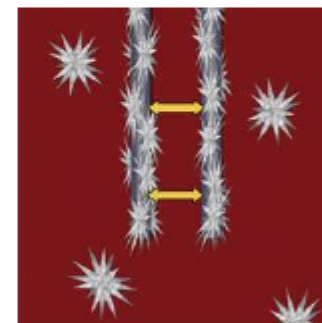
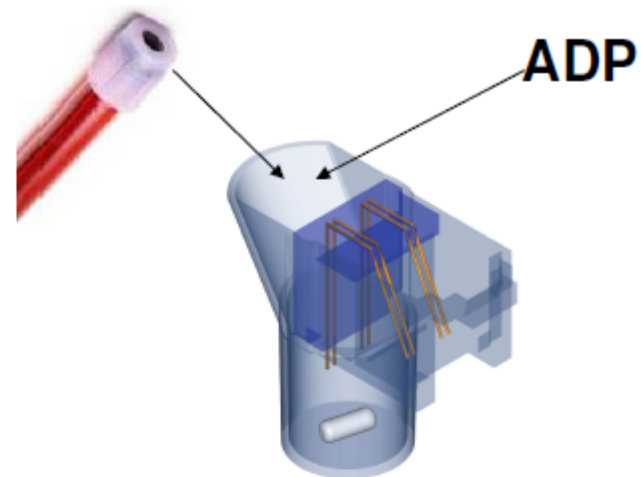


# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Une approche plus personnalisée  
du traitement antiagrégant  
plaquettaire*

# Balancing Safety and Efficacy





## Multiple Electrode Aggregometry MEA



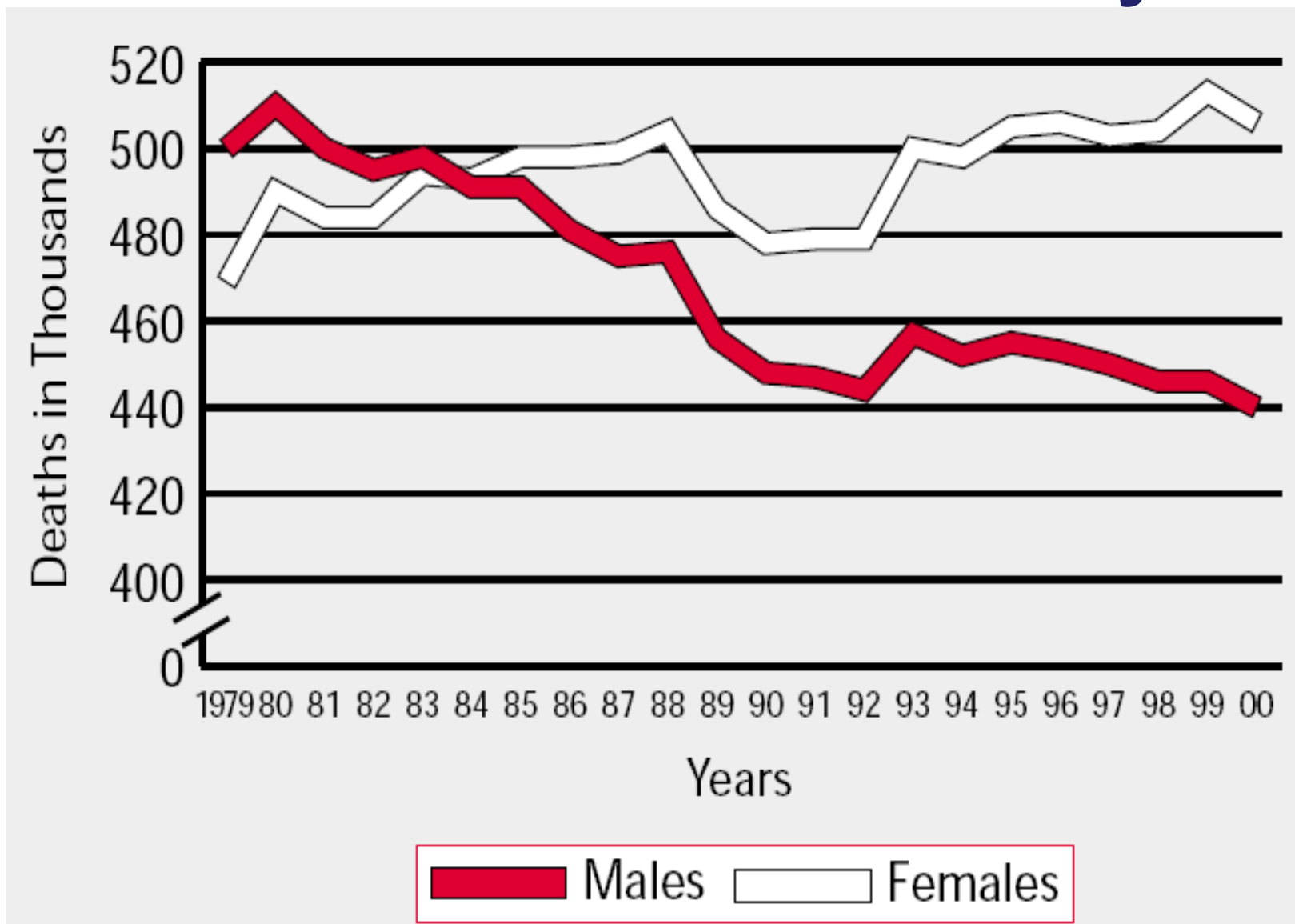
#esc2012

[www.escardio.org](http://www.escardio.org)

# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*Moins d'analyse en sous groupe  
dans les études  
Plus d'études dédiées*

# Cardiovascular Mortality



# RCTrials and Gender

| Trial   | Enr. pts | Females % | Reference               |
|---------|----------|-----------|-------------------------|
| GISSI-1 | 11 711   | 25        | Lancet 1986;1:397-402   |
| ISIS-2  | 17 187   | 23        | Lancet 1988;2:349-360   |
| GISSI-2 | 12 490   | 20        | Lancet 1990;336:65-71   |
| GISSI-3 | 18 023   | 22        | Lancet 1994;343:1115-22 |
| 4S      | 4 444    | 19        | Lancet 1994;334:1383-89 |
| ISIS-4  | 58 050   | 26        | Lancet 1995;345:669-685 |
| SMILE   | 1 556    | 27        | NEJM 1995;332:80-85     |
| EMIAT   | 1 486    | 16        | Lancet 1997;349:667-674 |
| GISSI-P | 11 324   | 15        | Lancet 1999;354:447-52  |
| CIBIS-2 | 2 647    | 19        | Lancet 1999;353:9-13    |

*Courtesy: S. Priori*



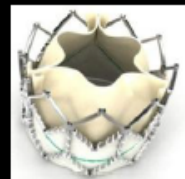
# CARDIOLOGIE INTERVENTIONNELLE de DEMAIN

*L'angioplastie coronaire ne  
représentera plus la majorité de nos  
actes interventionnels*

## Today



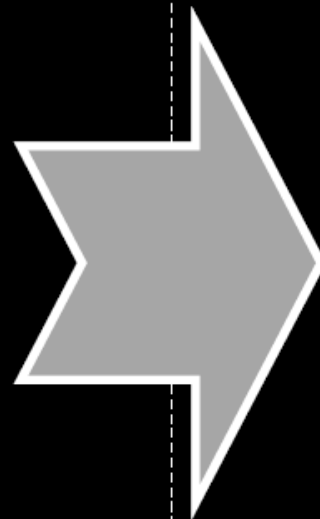
**Medtronic  
CoreValve**



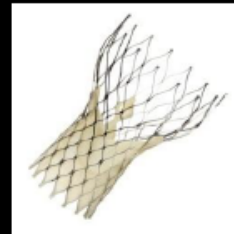
**Edwards  
Sapien XT**



**Edwards  
Sapien**



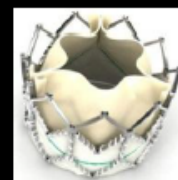
## Tomorrow



**Next Gen.  
Medtronic  
CoreValve**



**Medtronic  
Engager**



**Edwards  
Sapien XT**



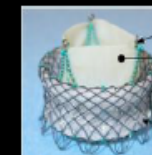
**Boston Sci.  
Lotus™**



**Saint Jude  
Portico™**



**JenaValve**



**HLT**



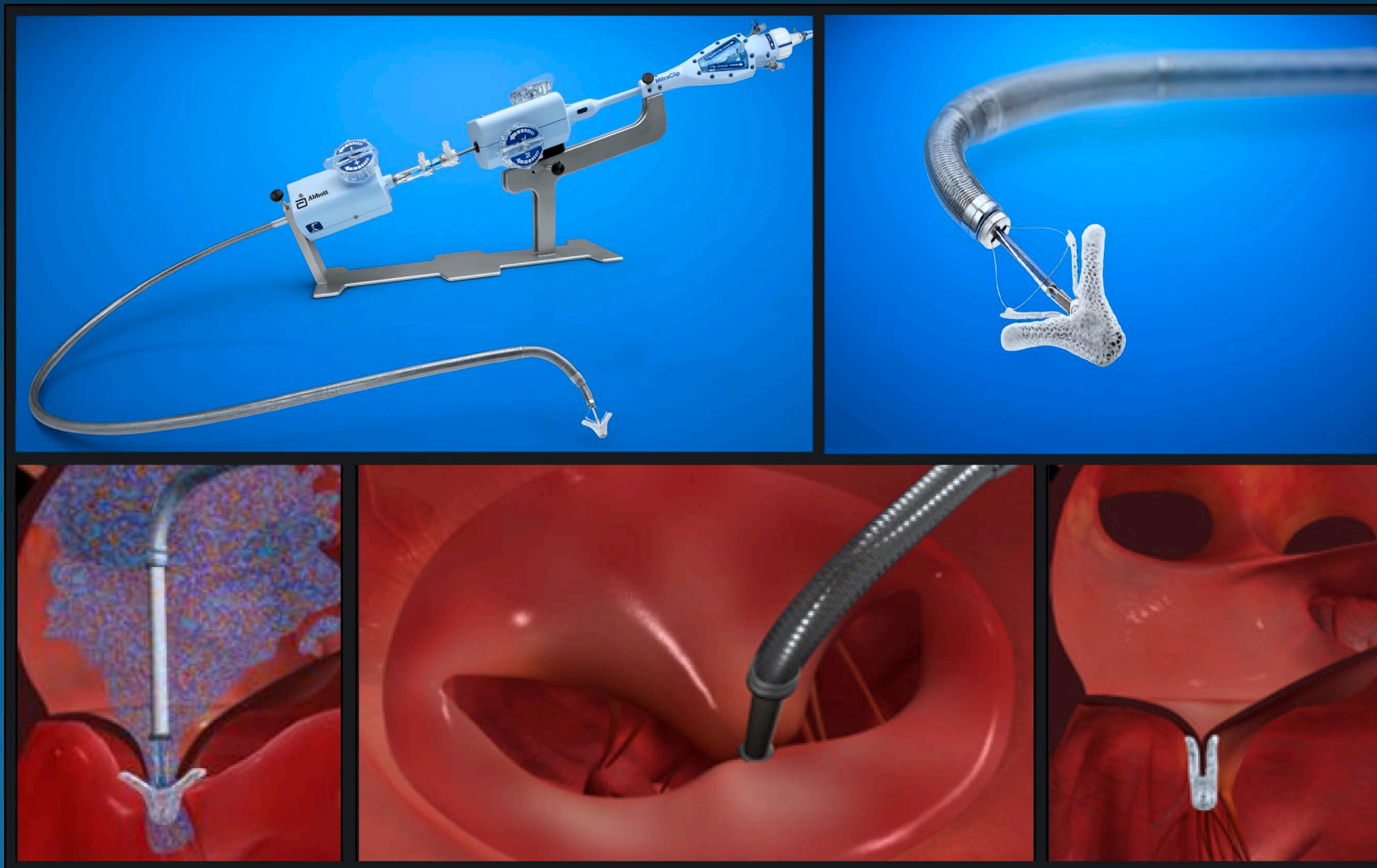
**Direct Flow**



**Symetis  
ACCURATE**

# Percutaneous Mitral Valve Repair

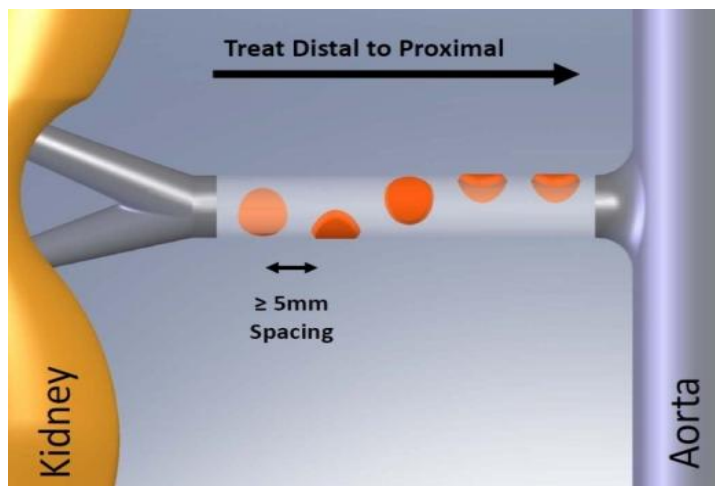
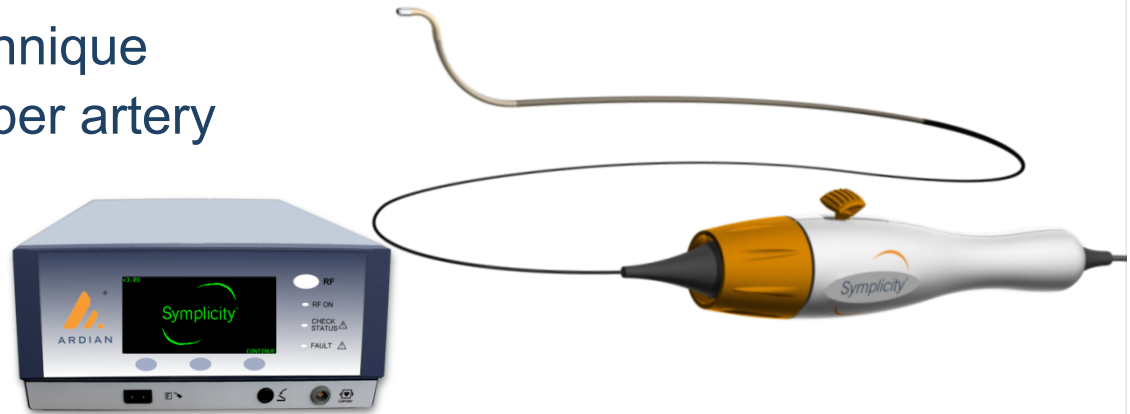
## MitraClip® System



# Dénervation Rénale HTA résistante

Standard interventional technique  
4-6 two-minute treatments per artery  
Proprietary RF Generator

Automated  
Low-power  
Built-in safety algorithms



Multiple focal ablations allows good coverage without circumferential medial damage

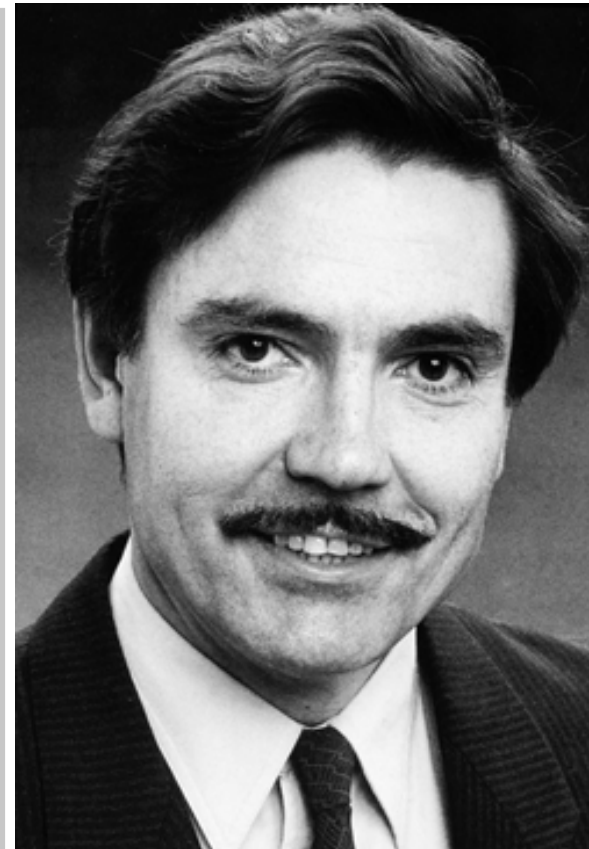
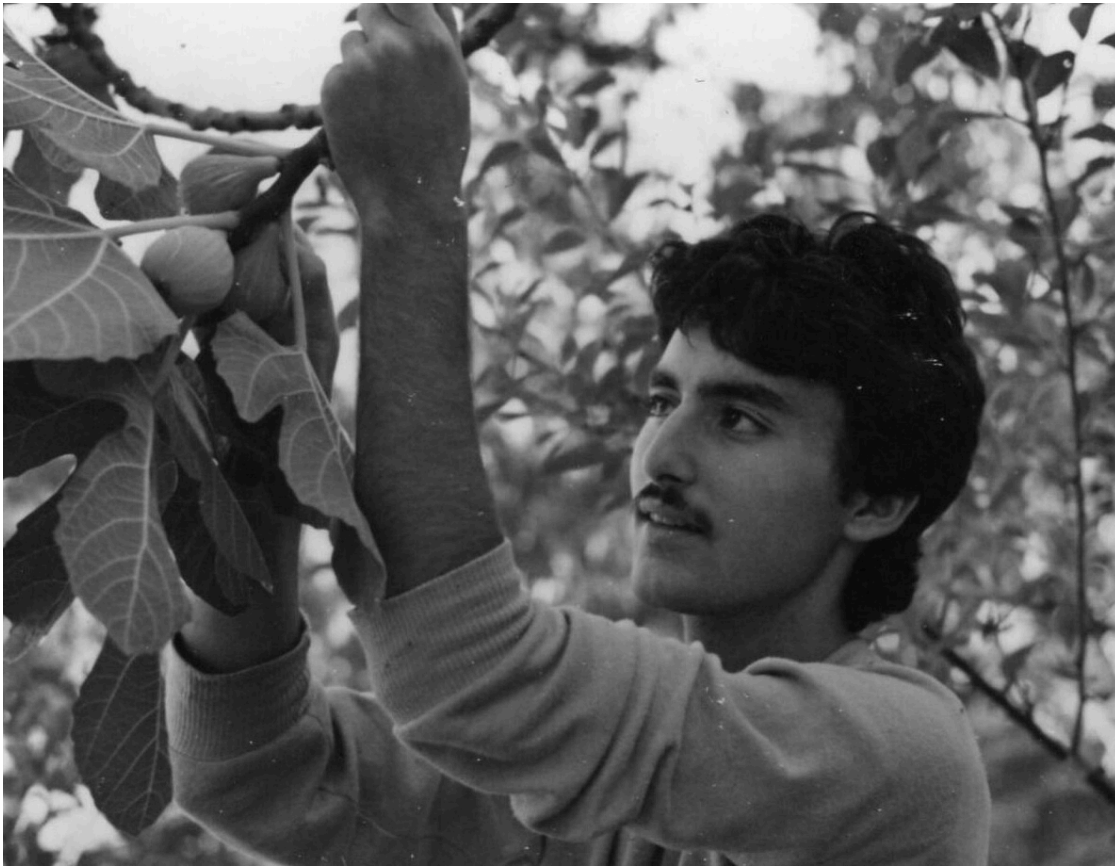
*The NEW ENGLAND JOURNAL of MEDICINE*

ORIGINAL ARTICLE

# Atherosclerosis is related to Campylobacter Atherosclerosis.

Omega, A: N Engl J Med, 2025;364:1718-27.

# CLIN d'ŒIL du DESTIN



Andreas Grüntzig, 1939-1985