Which Stent in Complex Patients?

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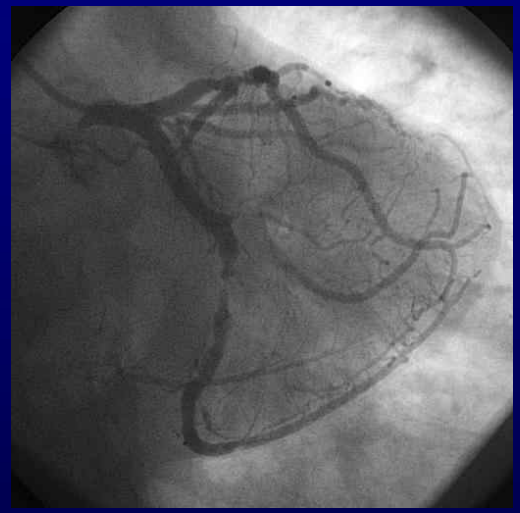
Paris France

Conflicts of interest

- Cordis: Speaker's bureau and advisory board
- Abbott: Speaker's bureau
- Lilly: Speaker's bureau and advisory boeard
- Pfizer: Speaker's bureau

Complex situations

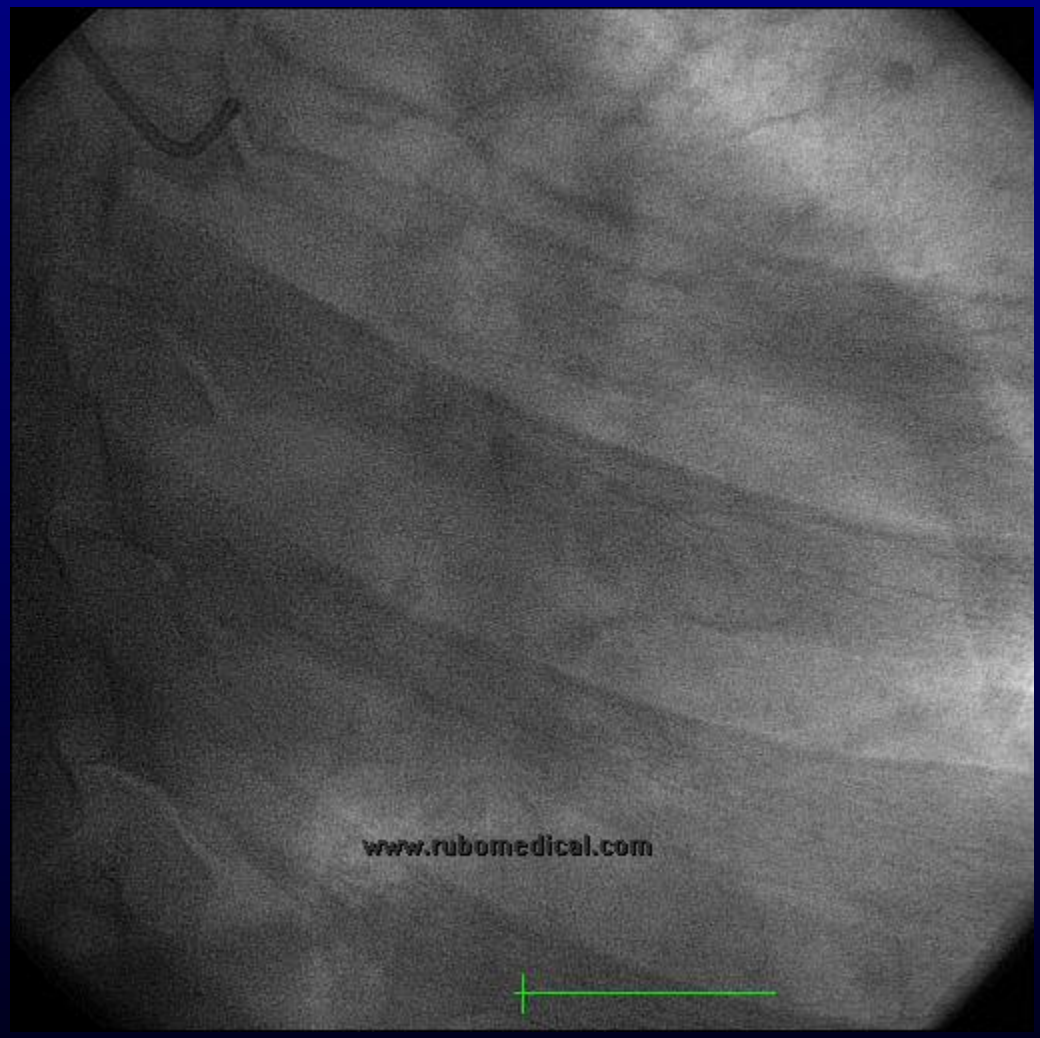
- Diabetes

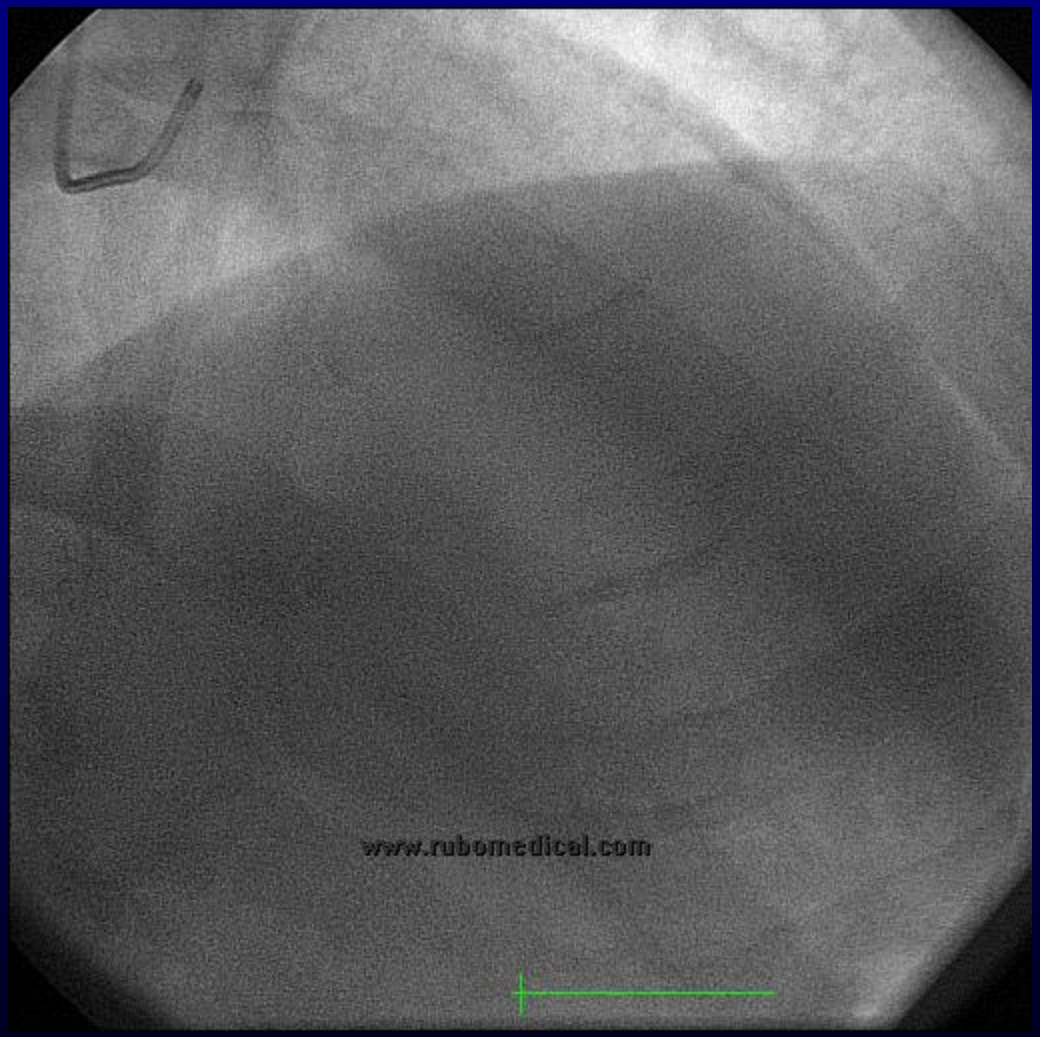


- Acute myocardial infarction

Clinical case

- Male patient, 56 years of age
- Risk factors: hypertension, diabetes treated by methformine
- Atypical chest pain
- Stress test (bicycle): ST segment depression in anterior leads at 60 watts
- Echocardiogram: akinesia of the inferior wall, LV ejection fraction: 50%

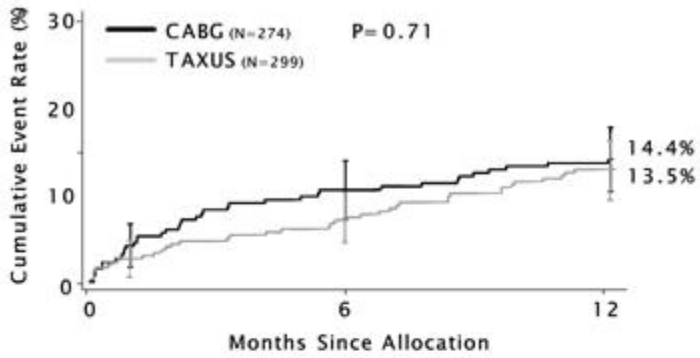

www.rubomedical.com


www.rubomedical.com

Questions

- Do you use the Syntax score in your practice to choose between CABG and PCI, especially in diabetic patients, and why?
- What is the Syntax score of this patient:
  - Low (<22)
  - Intermediate (22-33)
  - High (>33)

MACCE by SYNTAX Score 0-22



The cumulative MACCE rate is displayed for the SYNTAX Trial group this patient corresponds to.

Summary

Lesion 1	
segment number(s)	
(segment 1): 1x2=	2
(segment 6): 3.5x2=	7
(segment 13): 0.5x5=	2.5
(segment 14): 0.5x2=	1
Age T.O. is yes	1
+ Bridging	1
the first segment beyond the T.O. visualized by contrast: 14	0
+ sidebranch: Yes, all sidebranches >=1.5mm	1
Bifurcation Type: Medina 1,1,0:	1
Sub total lesion 1	*16.5*
Diffuse disease/Small vessels	
Segment 14b	1
Sub total diffuse disease/small vessels	*1*
TOTAL:	*17.5*

Questions

- Do you use other scores ?

- What other data are important when choosing between CABG and PCI?

Creatinine clearance estimated from the Cockroft-Gault formula:

$$Ccr\ (ml.min) = \frac{72 \times (140 - Age) \times Wt\ (kg)}{Cr\ (mg/dl)}$$

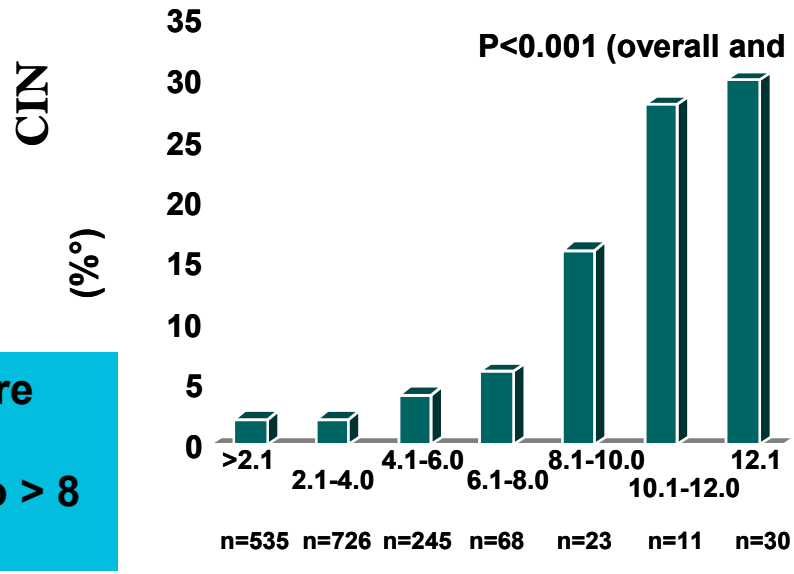
(X.85 for females)

Contrast volume / Ccr:

→ **normalises the contrast agent dose to the patient's renal function**

How Does Volume/Ccr Ratio Relate to Nephropathy ?

Association between CIN and Contrast-Cr Clearance Ratio



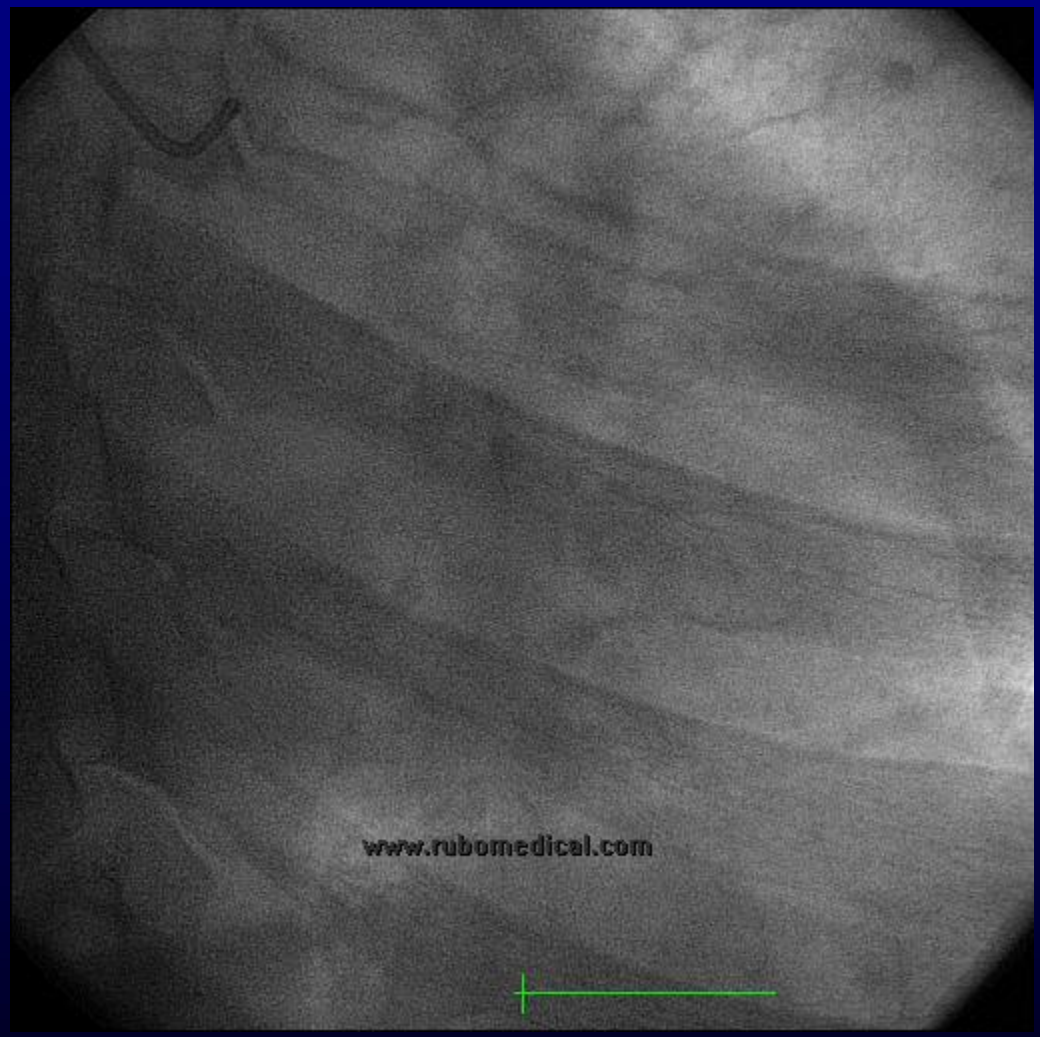
Nephropathy is rare at ratio <4
Very common at ratio > 8

LASKEY et al. (Abstr) ACC '06

Our patient: ratio= 3.2

And the winner is…

- After a staff meeting and discussion with the patient PCI was the preferred option:
  - Low Syntax score
  - Revascularization by PCI is feasible
  - Obtuse marginal branches are small and distal: grafting with mammary arteries seemed difficult
  - Akinesia of the inferior wall: a graft on the right coronary artery seemed useless
  - Patient was informed and preferred PCI despite the higher risk of re-intervention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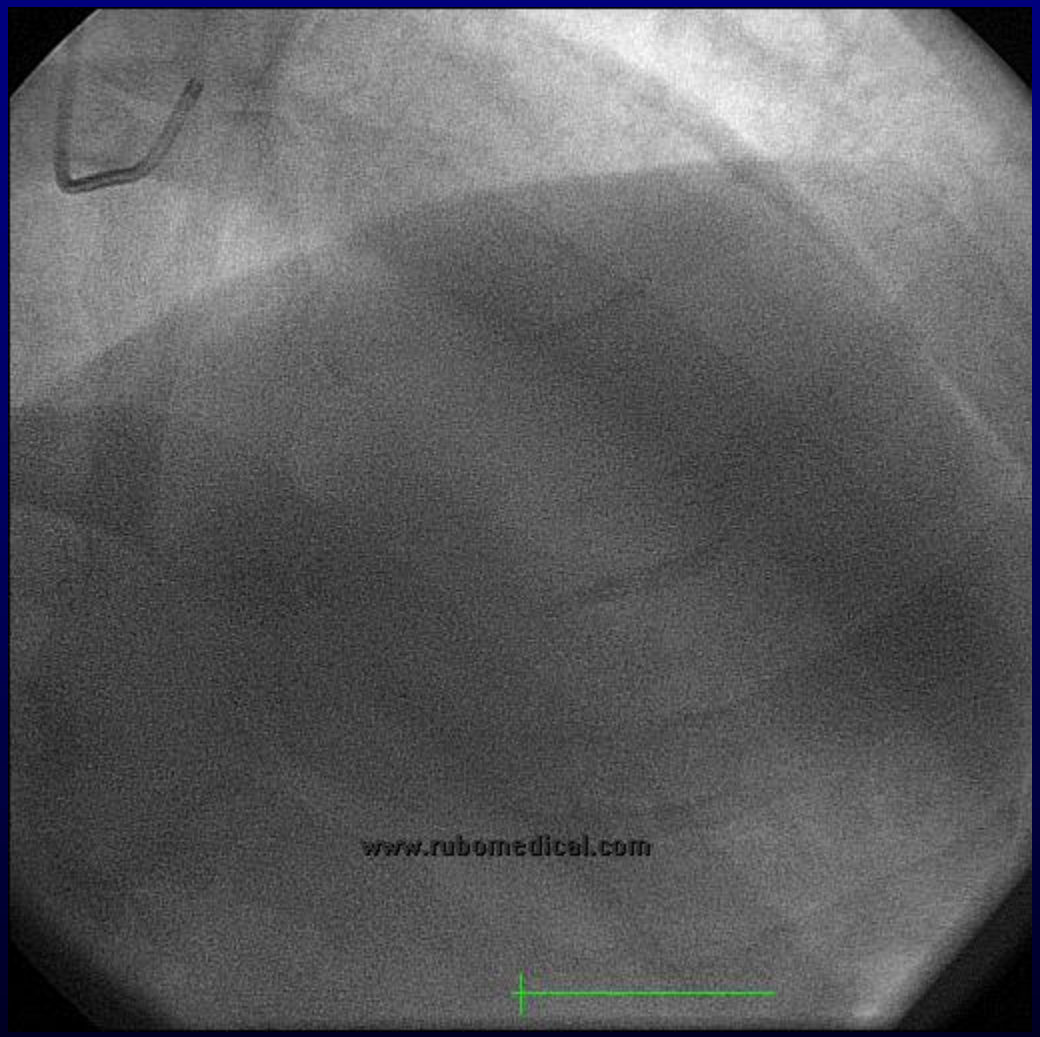
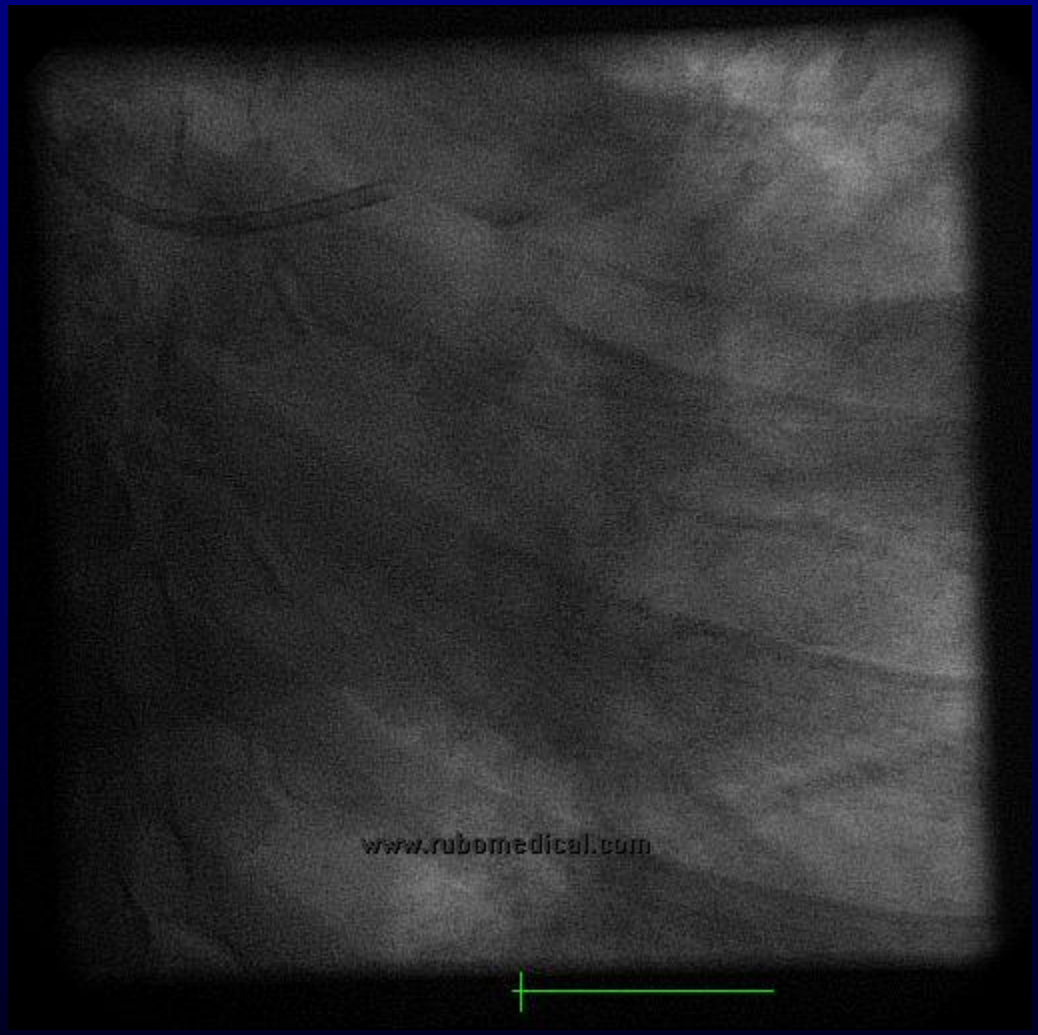
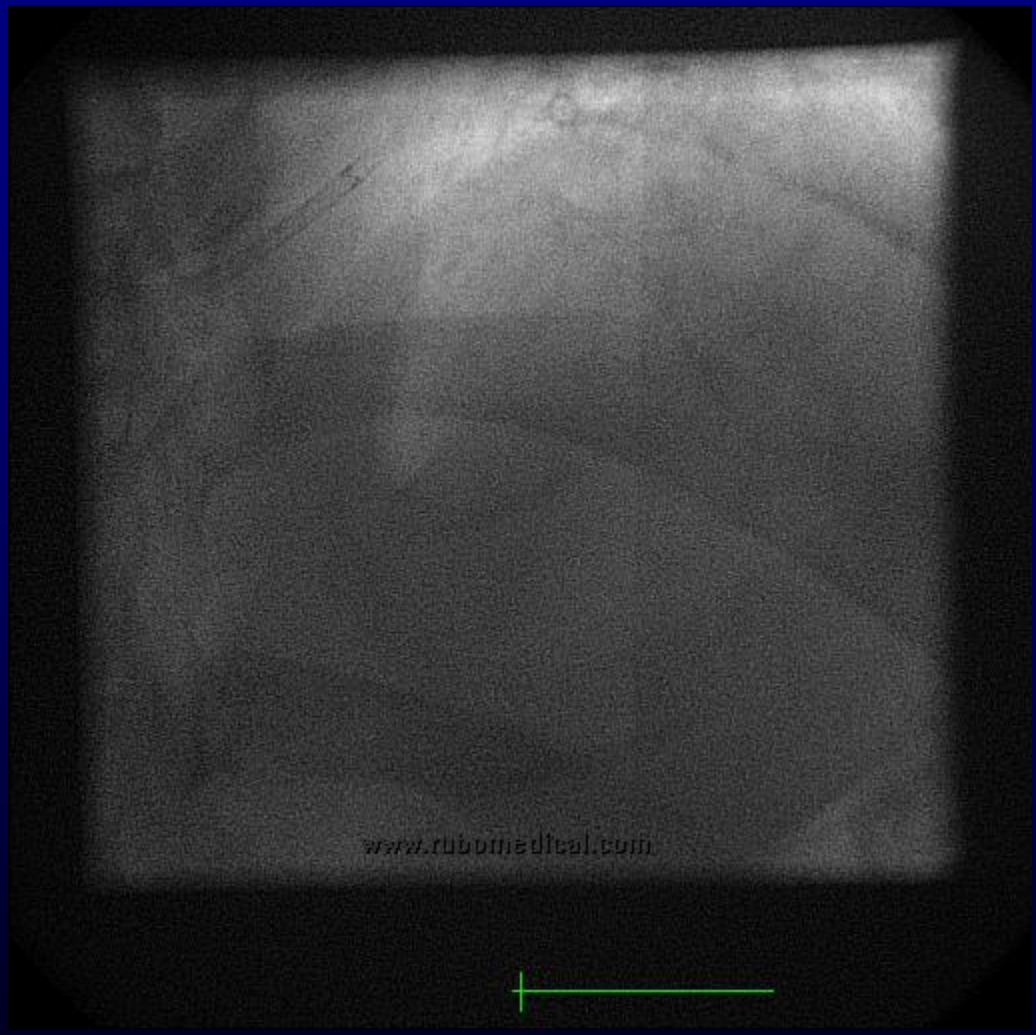

www.rubomedical.com

PCI strategy

- Loading dose of clopidogrel 600 mg the day before the procedure, aspirin 100 mg daily
- Left radial approach, EBU 3.75 6F catheter
- IVUS on the LAD to assess the lesion
- Open the distal circumflex, stent on the circumflex and kissing ballon on the obtuse marginal branch
- If possible (contrast medium), stent the LAD during the same procedure
- DES (Cypher*)



Cypher 2.75 X 23 and kissing balloon

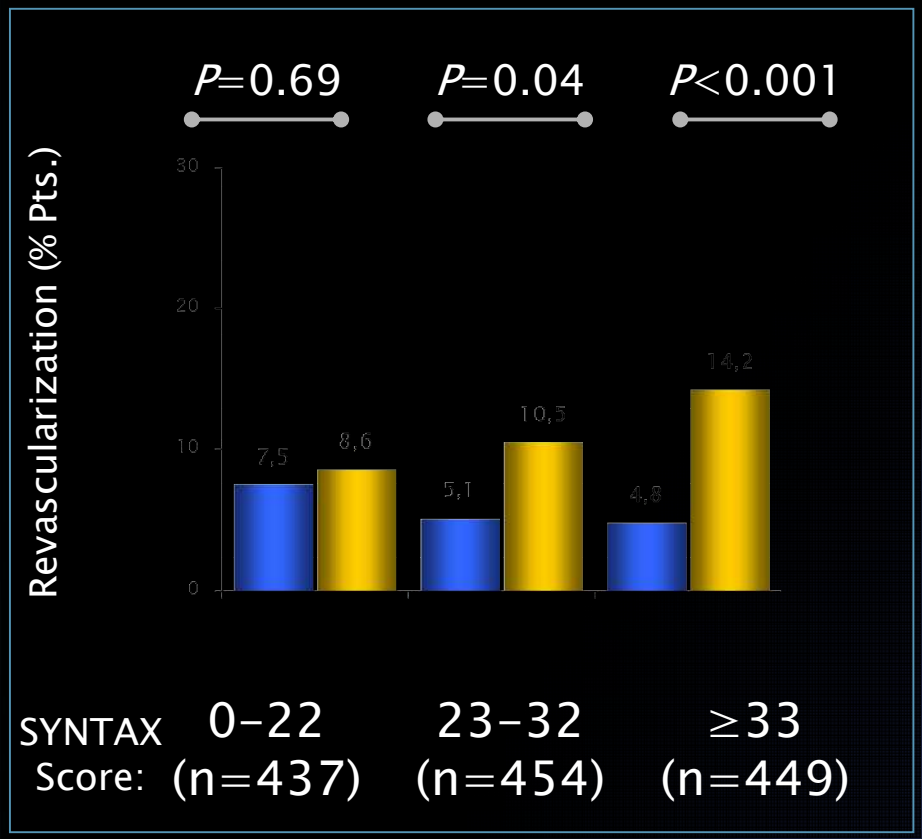


Cypher 3.0 X 23

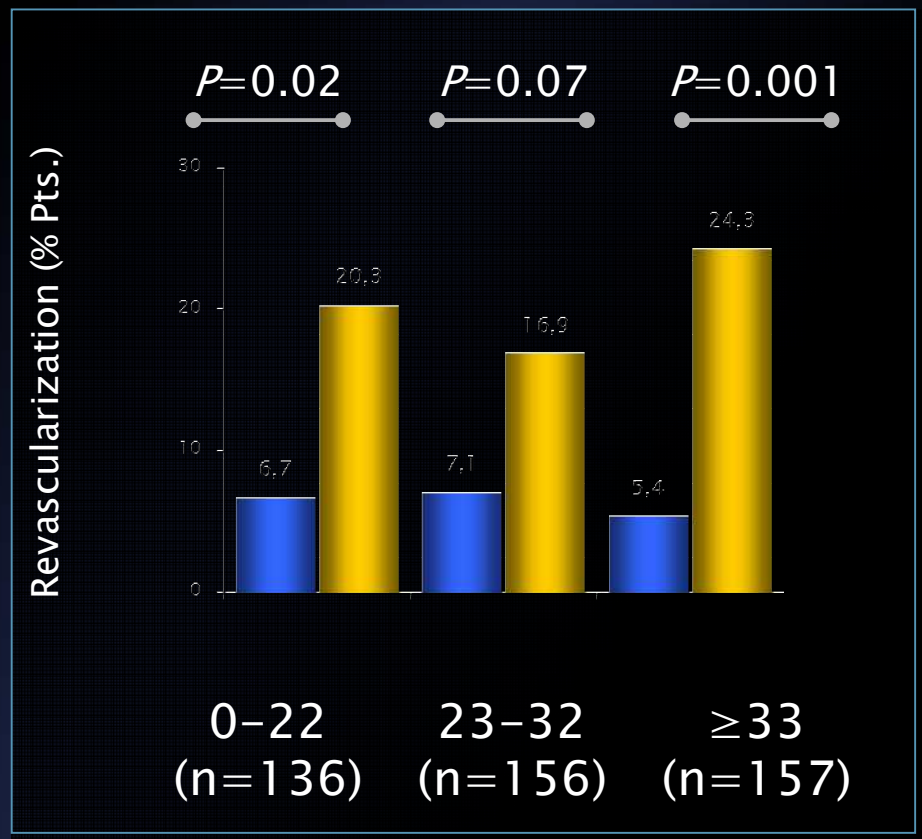
Revascularization by SYNTAX Score
3VD/LM Diabetic and Non-Diabetic Patients

CABG TAXUS

Non-Diabetic



Diabetic

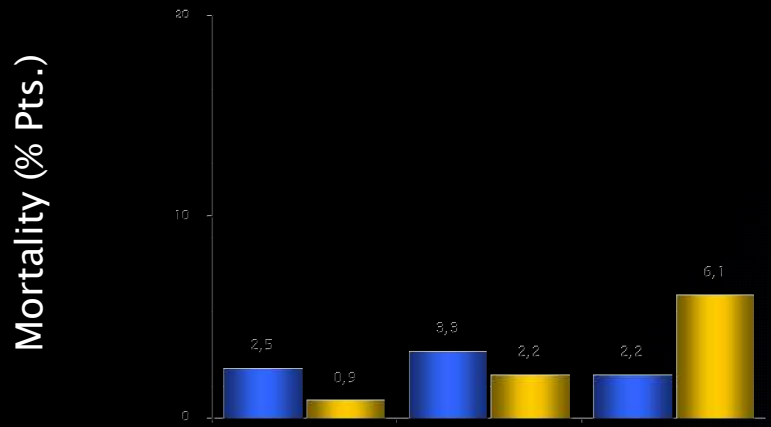


Mortality by SYNTAX Score
3VD/LM Diabetic and Non-Diabetic Patients

CABG TAXUS

Non-Diabetic

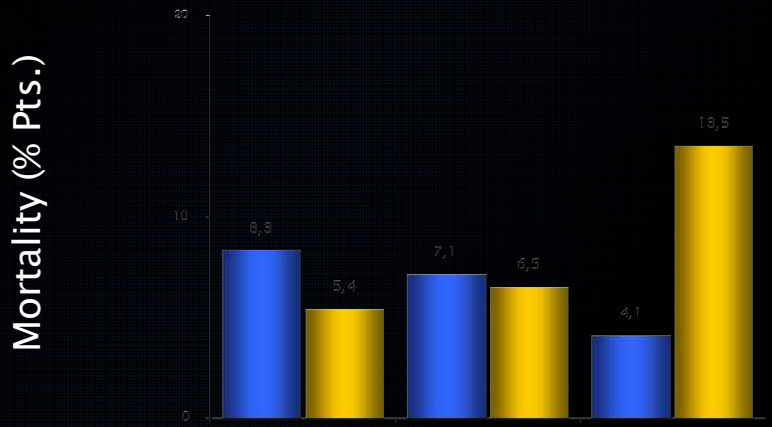
P=0.26 *P*=0.48 *P*=0.04



SYNTAX Score: 0-22 (n=437) 23-32 (n=454) ≥33 (n=449)

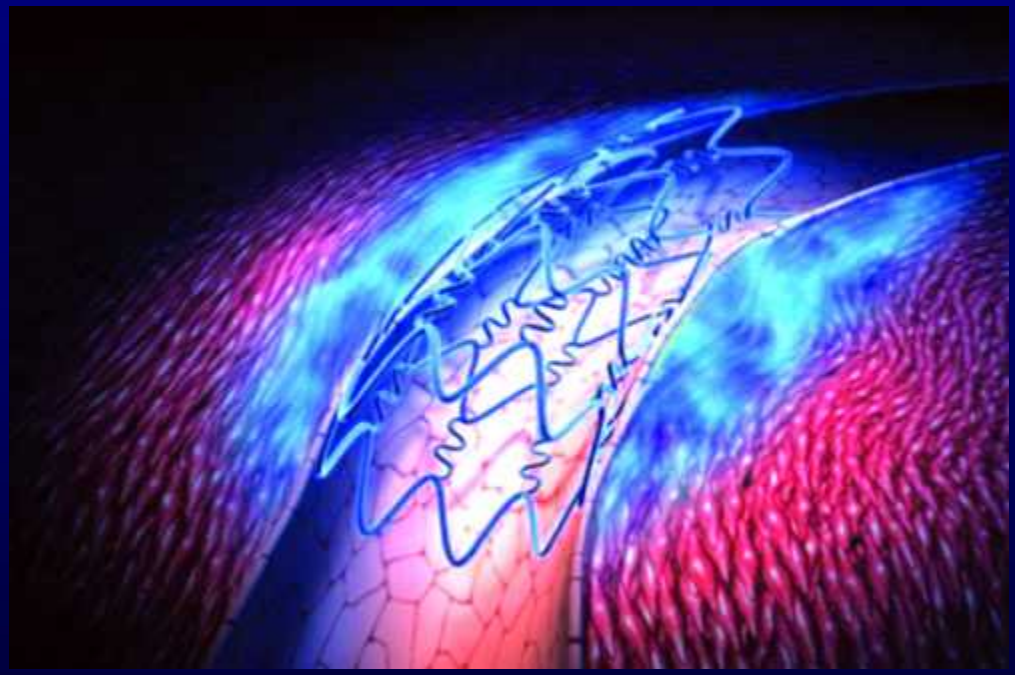
Diabetic

P=0.51 *P*>0.99 *P*=0.04



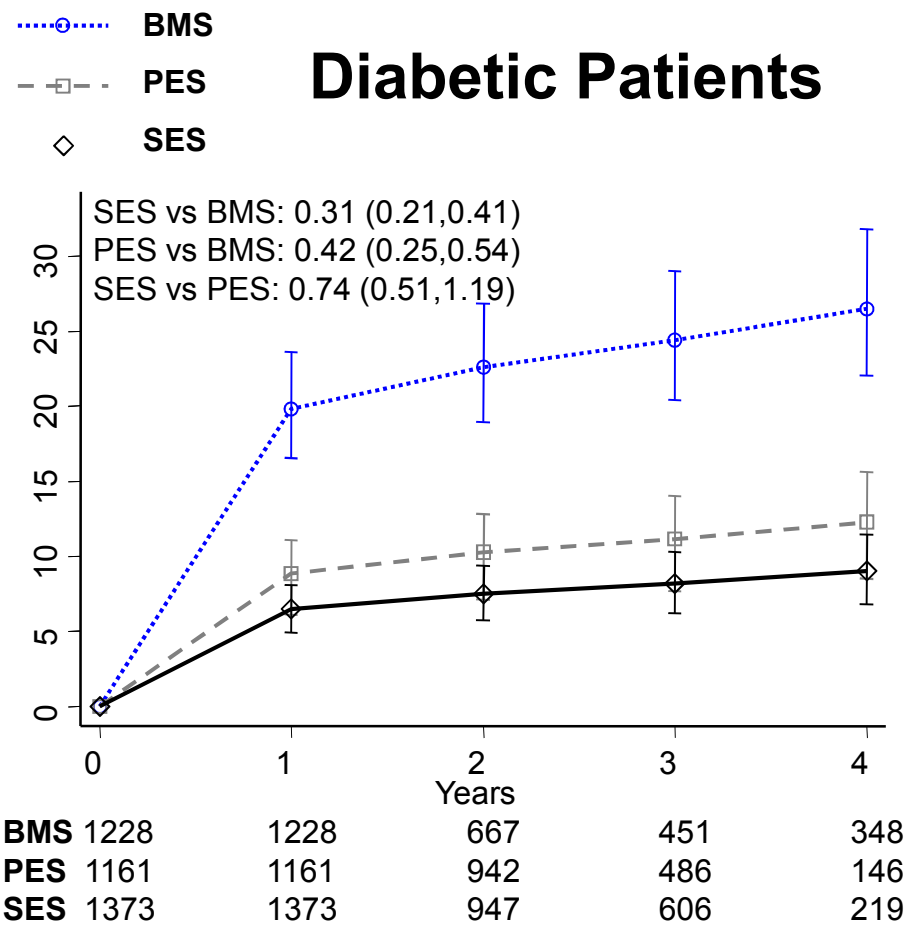
0-22 (n=136) 23-32 (n=156) ≥33 (n=157)

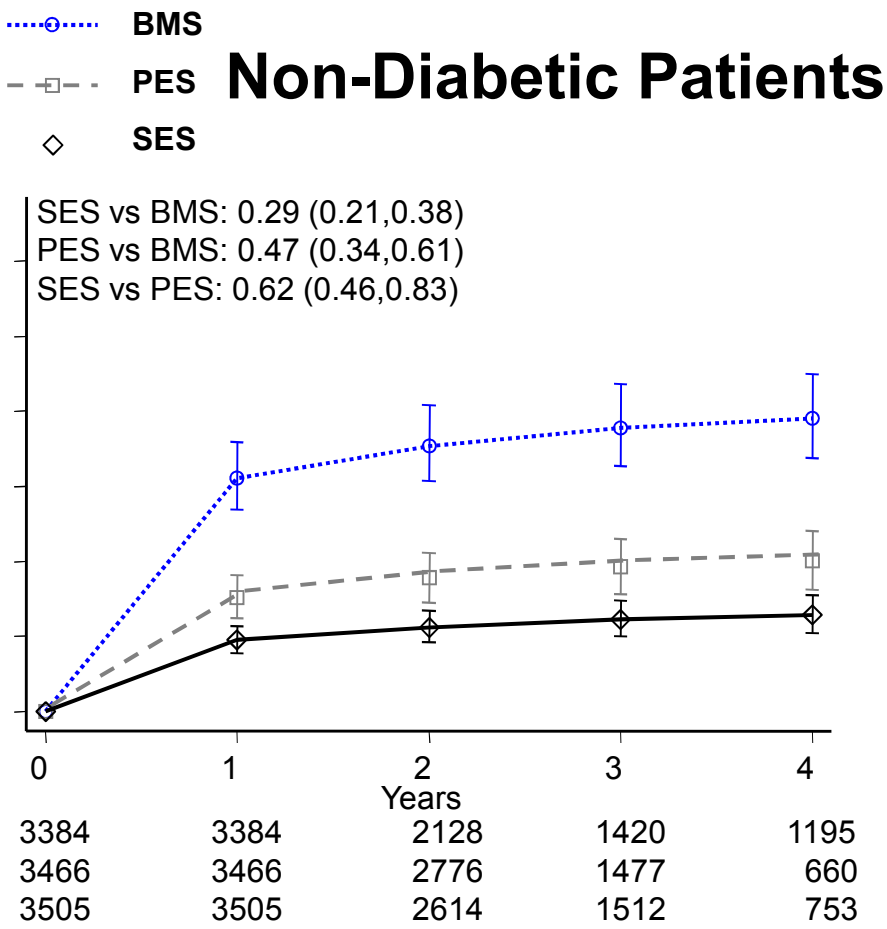
Which stent in diabetic patients?



Target Lesion Revascularization
Network Meta-Analysis: DES vs BMS

Stettler C et al. *Lancet 2007; 370: 937-48 and BMJ* 2008;337:a1331



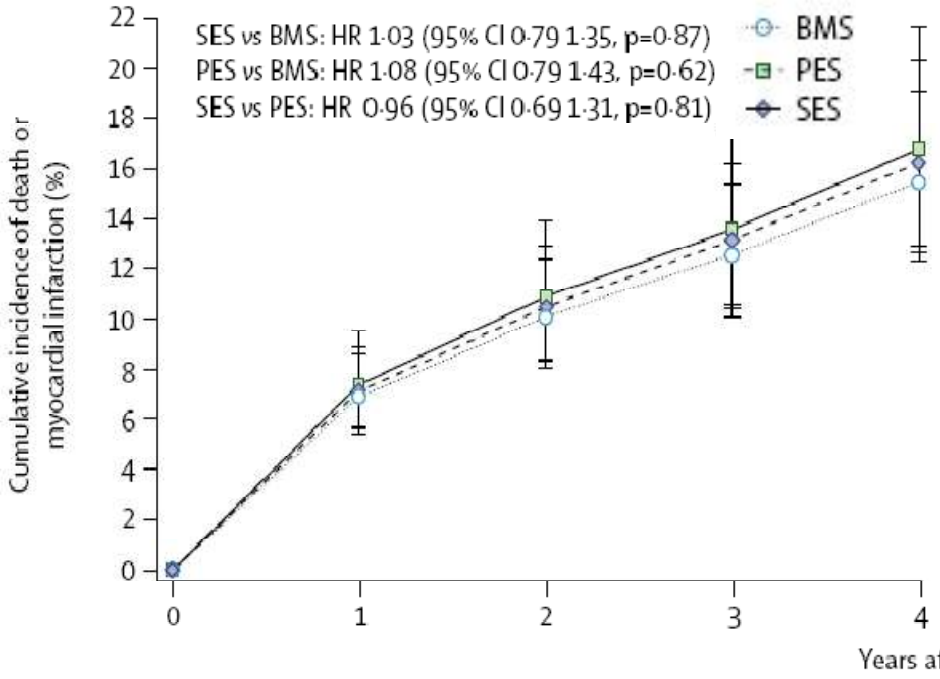


Courtesy of P Juni

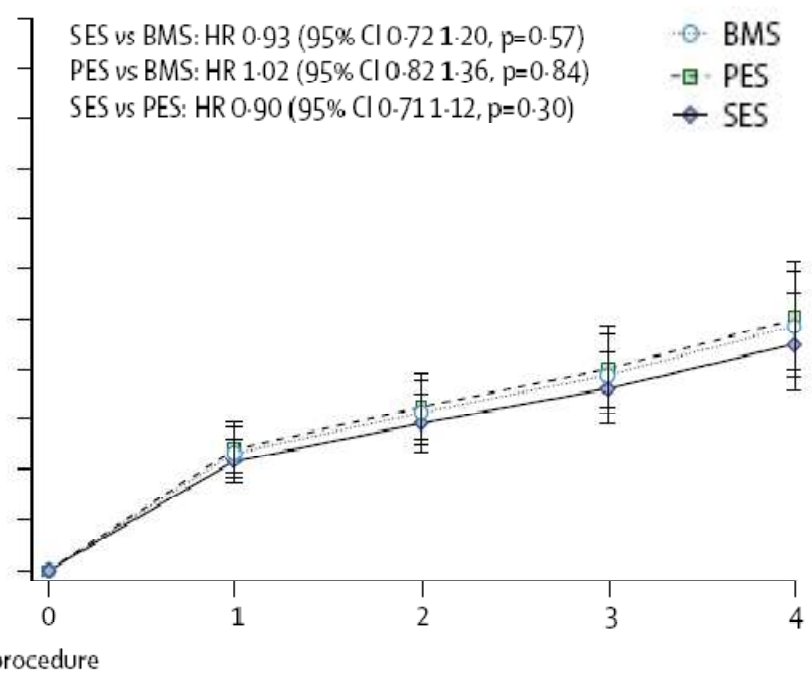
Death or Myocardial Infarction Network Meta-Analysis: DES vs BMS

Stettler C et al. *Lancet 2007; 370: 937-48*

Diabetic Patients



Non-Diabetic Patients

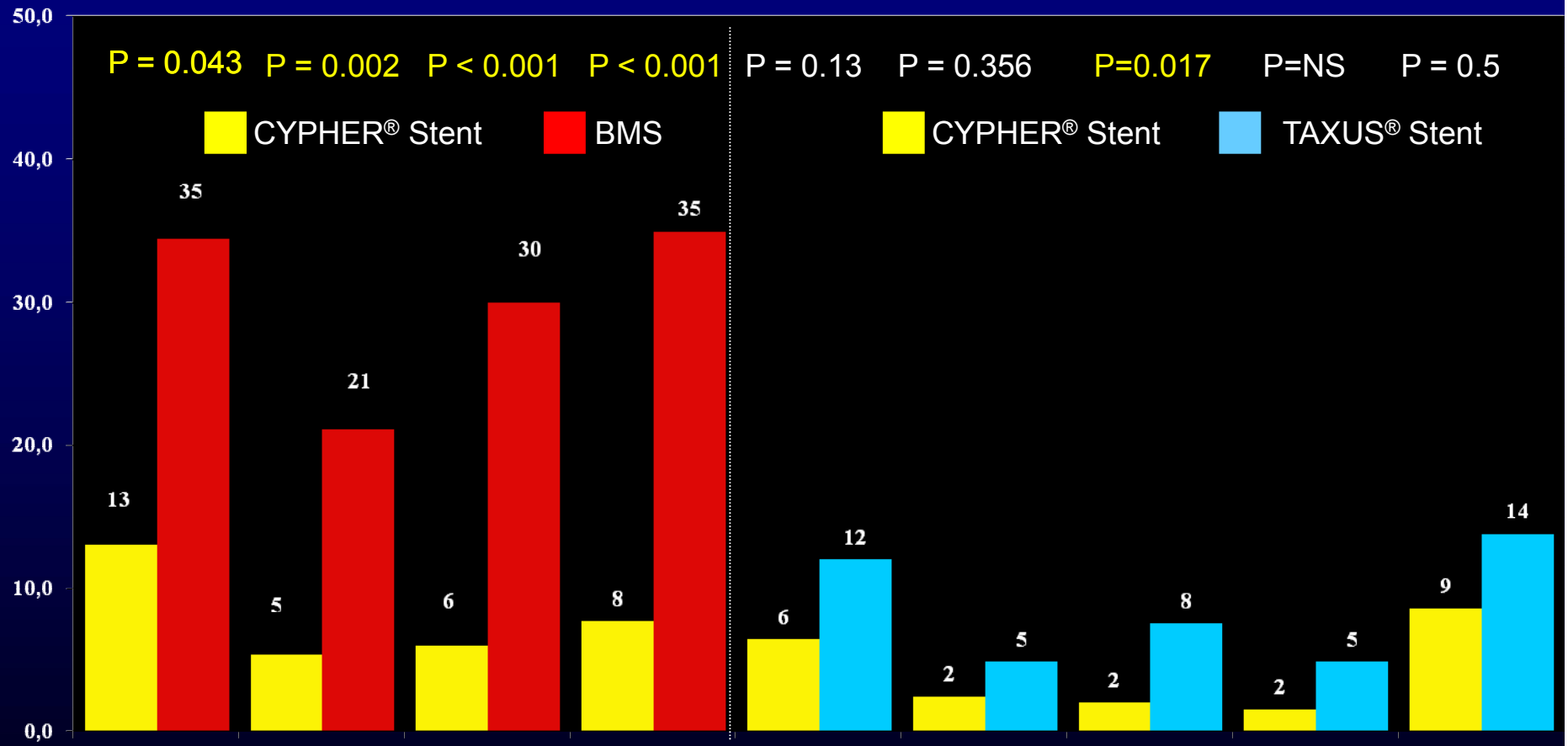


BMS	1228	101/1228	23/1228	11/547	12/429	3384	170/3384	39/2396	34/1614	34/1351
PES	1161	82/1161	49/989	14/513	5/148	3466	215/3466	59/2866	28/1533	17/659
SES	1373	99/1373	32/981	22/640	11/228	3505	175/3505	49/2667	22/1566	16/777

Courtesy of P Juni

Summary of TLR Findings From Dedicated Randomized Trials Specifically Evaluating Diabetic Patients

TLR (% of Patients; * *Italian RCT evaluated SES vs. PES in different lesions within the same patient*)
None of these trials were powered to detect differences in clinical outcomes



Chan. C. et al., TCT 2005; Oral Pres.

Baumgart, D., et al., JACC 2007; 50:1627–34.

Maresta A., et al., AJC 2008; 101: 1560-6.

Jimenez-Quevedo, P., et al., *Eur Heart J* 2816:1946-52.

Dibra A., et al., NEJM 2005; 353:663-70.

Kim MH., et al., J Interven Cardiol 2008; 21:225–231.

Lee S-W., et al., *JACC* 2008;52;727-33.

Jensen L., et al., *Eur Heart J* 2008; e-publication Oct 2, 2008.

Tomai F., et al., *Diabetes Care* 2008: 31:15–19.

2-Year Clinical Outcomes of the DES-DIABETES Trial

Table 1 Clinical Outcomes at 2 Years

Variable	SES (n = 200)	PES (n = 200)	p Value
9-month outcomes			
Death	0	1 (0.5%)	0.999
Cardiac	0	1 (0.5%)	
Noncardiac	0	0	
MI	1 (0.5%)	1 (0.5%)	0.999
Q-wave	0	1 (0.5%)	
Non–Q-wave	1 (0.5%)	0	
TLR	4 (2.0%)	15 (7.5%)	0.017
Stent thrombosis	1 (0.5%)	0	0.999
Acute (<1 day)	1 (0.5%)	0	
Subacute (1 day to 1 month)	0	0	
Late (1 to 9 months)	0	0	
TVR	7 (3.5%)	16 (8.0%)	0.053
Death/MI/TVR	7 (3.5%)	17 (8.5%)	0.035
MACE (death/MI/TLR)	4 (2.0%)	16 (8.0%)	0.010
2-year outcomes			
Death	0	3 (1.5%)	0.248
Cardiac	0	2 (1.0%)	
Noncardiac	0	1 (0.5%)	
MI	1 (0.5%)	2 (1.0%)	0.999
Q-wave	0	2 (1.0%)	
Non–Q-wave	1 (0.5%)	0	
TLR	7 (3.5%)	22 (11.0%)	0.004
Stent thrombosis	2 (1.0%)	0	0.499
Acute (<1 day)	1 (0.5%)	0	
Subacute (1 day to 1 month)	0	0	
Late (1 to 12 months)	0	0	
Very late (>12 months)	1 (0.5%)	0	
TVR	11 (5.5%)	24 (12.0%)	0.014
Death/MI/TVR	11 (5.5%)	28 (14.0%)	0.004
MACE (death/MI/TLR)	7 (3.5%)	25 (12.5%)	0.001

MACE = major adverse cardiac event(s); MI = myocardial infarction; PES = paclitaxel-eluting stent(s); SES = sirolimus-eluting stent(s); TLR = target lesion revascularization; TVR = target vessel revascularization.

Lee S-W et al, *J. Am. Coll. Cardiol.* 2009;53;812-813

Meta-Analysis of Five Randomized Clinical Trials Comparing *Sirolimus*- Versus *Paclitaxel*-Eluting Stents in Patients With Diabetes Mellitus

Feng Zhang, MD†, Lili Dong, MD†, and Junbo Ge, MD*

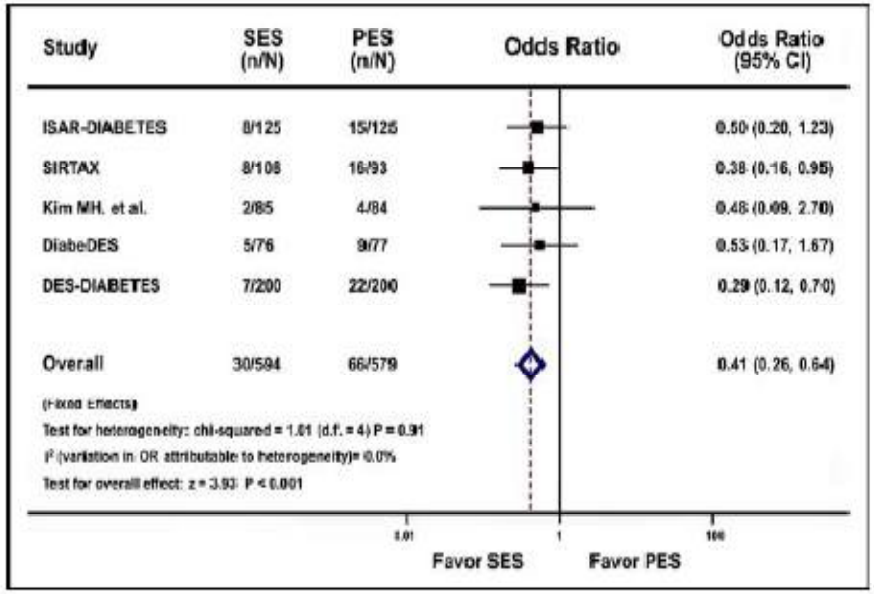


Figure 1. ORs of TLR associated with SES versus PES in patients with diabetes. The size of the *data marker* is proportional to the weight of the individual study, measured as the inverse of the variance in the study using the Mantel-Haenszel procedure.

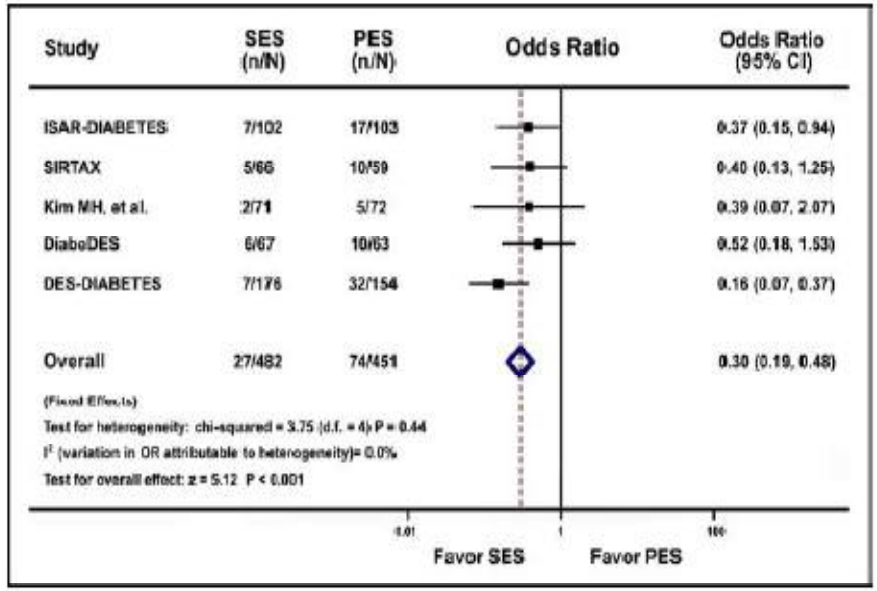
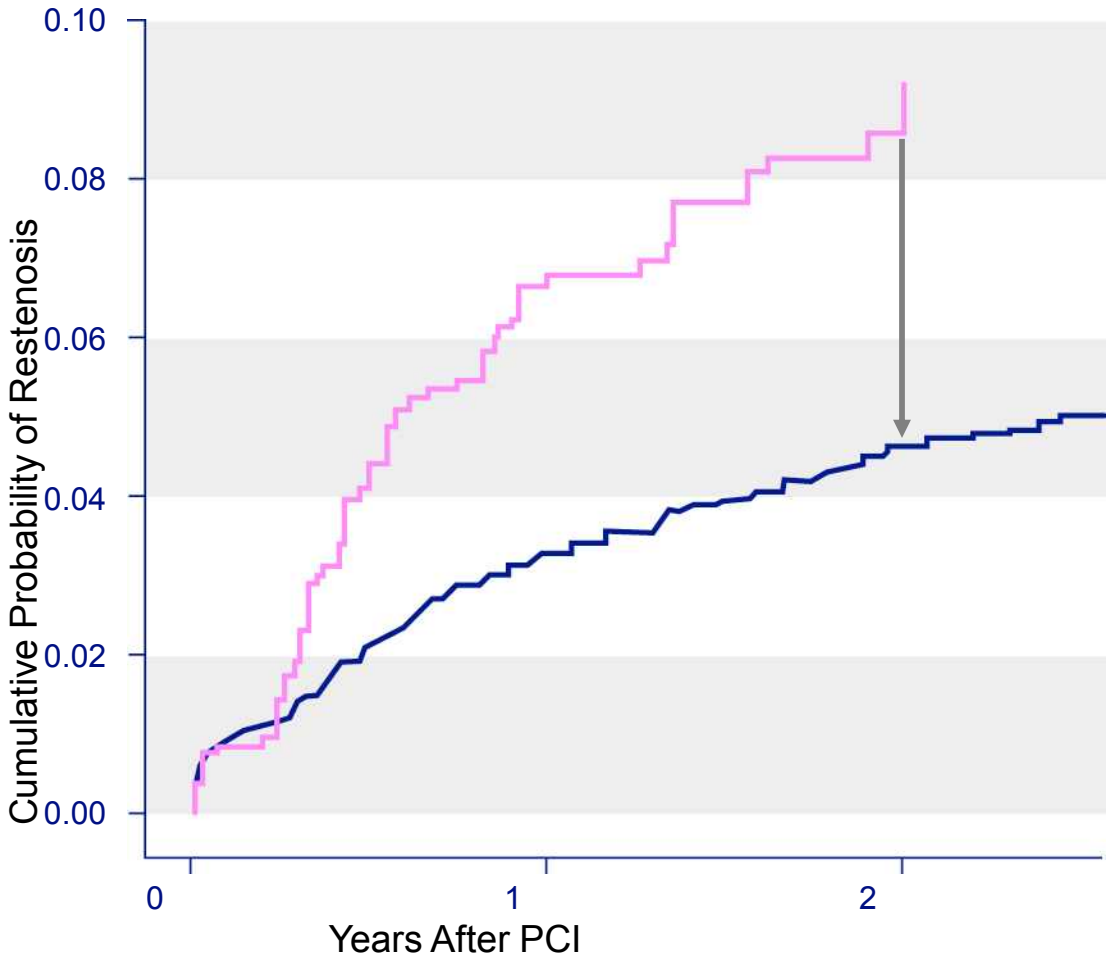


Figure 2. ORs of angiographic restenosis associated with SES versus PES in patients with diabetes. The size of the *data marker* is proportional to the weight of the individual study, measured as the inverse of the variance in the study using the Mantel-Haenszel procedure.

Am J Cardiol 2010;105:64–68)

SCAAR Registry

Diabetes, Adjusted



	Relative Risk	95% CI
Endeavor vs. CYPHER	1.99	1.43 – 2.77

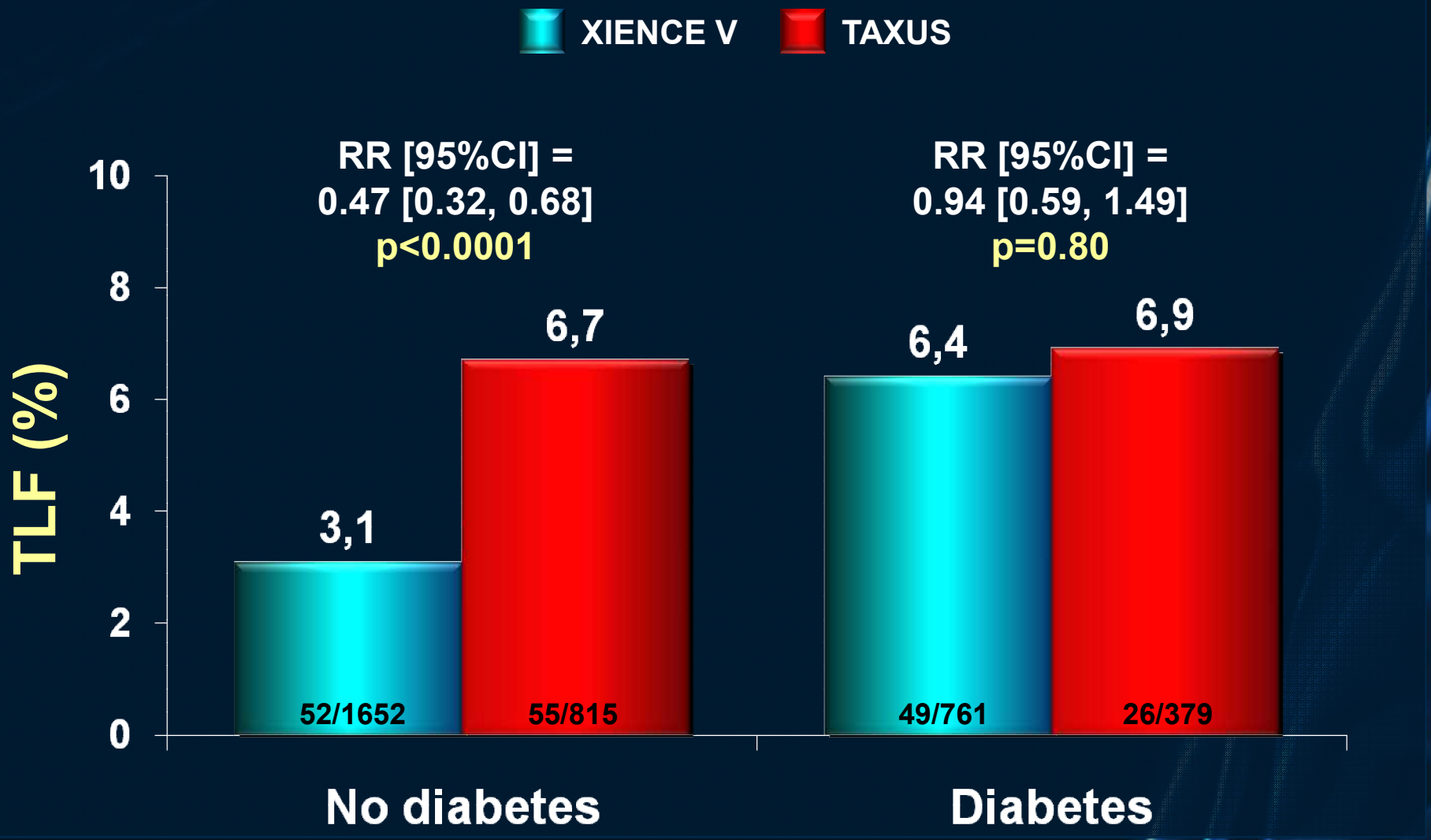
Difference Statistically Significant

CYPHER® Stent (n = 2615)

Endeavor™ Stent (n = 881)

B Lagerqvist, ESC 2008.

Impact of Diabetes on TLF



TLF = cardiac death, target vessel MI, or ischemia-driven TLR

$P_{interaction} = 0.02$

SE2930992 Rev. A

Gregg Stone, SPIRIT IV 1 Year Results, TCT 2009

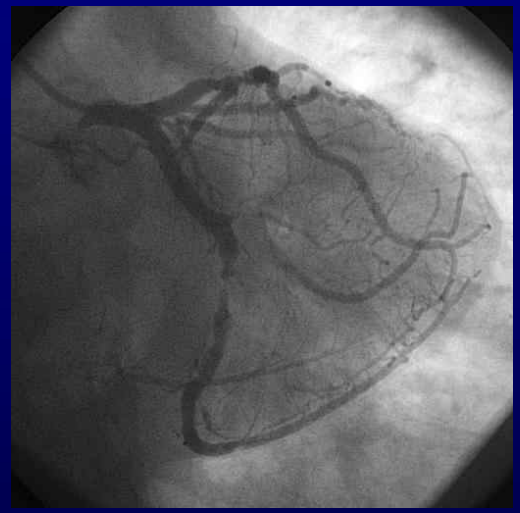
Spirit IV

In conclusion,

- In patients who can be treated by PCI or CABG, data from randomized trials clearly favor CABG
- However, PCI is a safe alternative to CABG in non-insulin requiring patients with a low or intermediate SYNTAX score after carefull evaluation of co-morbidities
- PCI outcome in diabetic patients is improved by the use of DES
- Lower late loss and TLRs are achieved with the Cypher stent

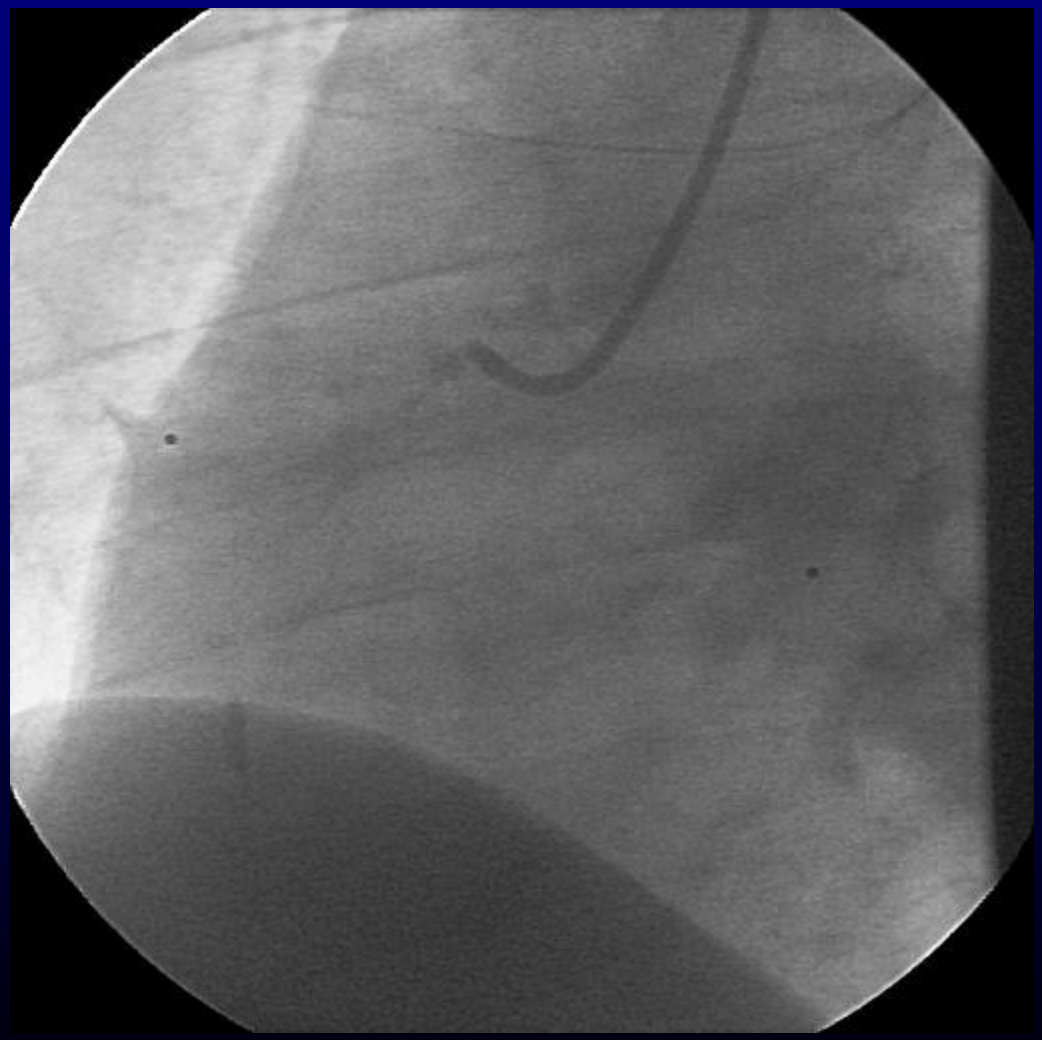
Complex situations

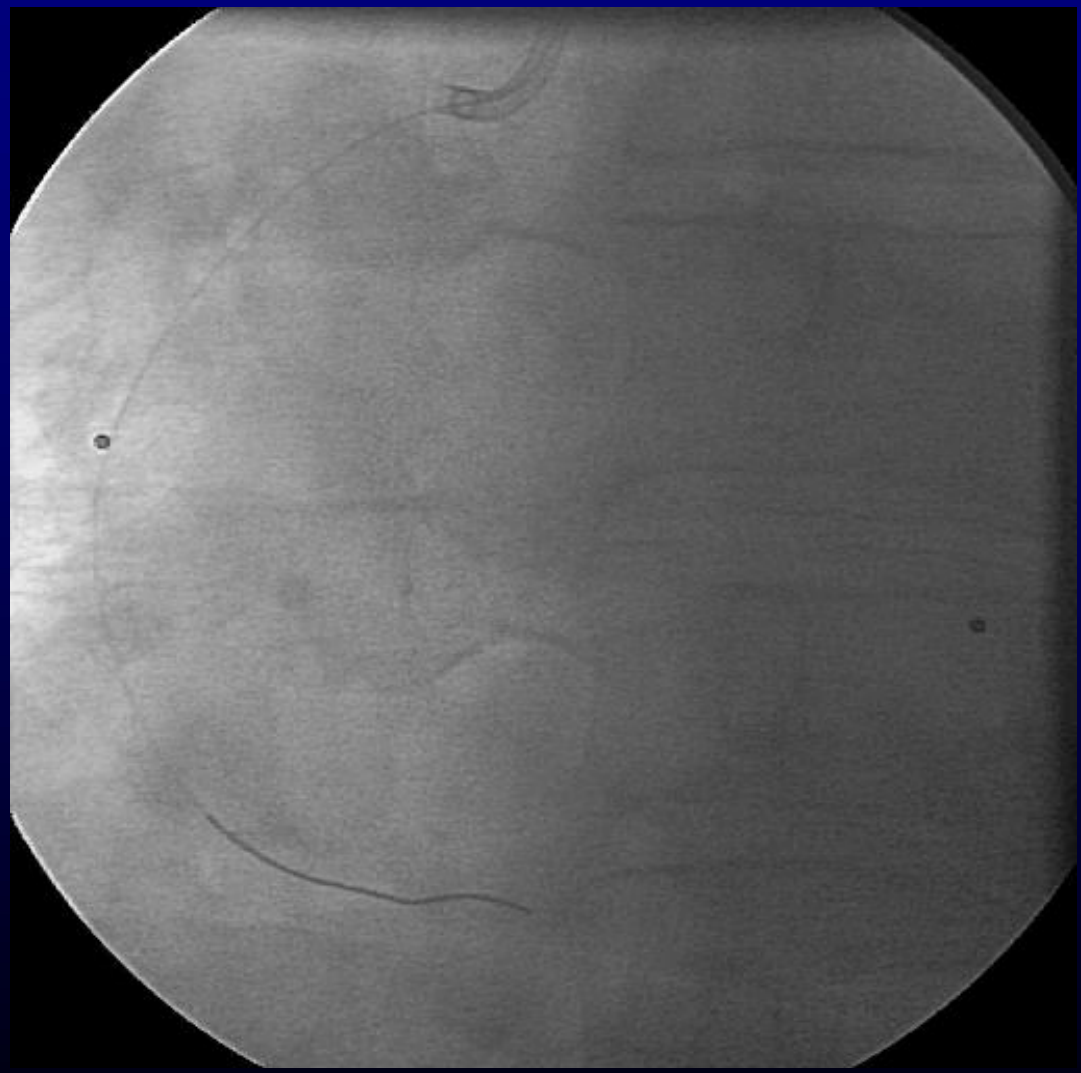
- Diabetes

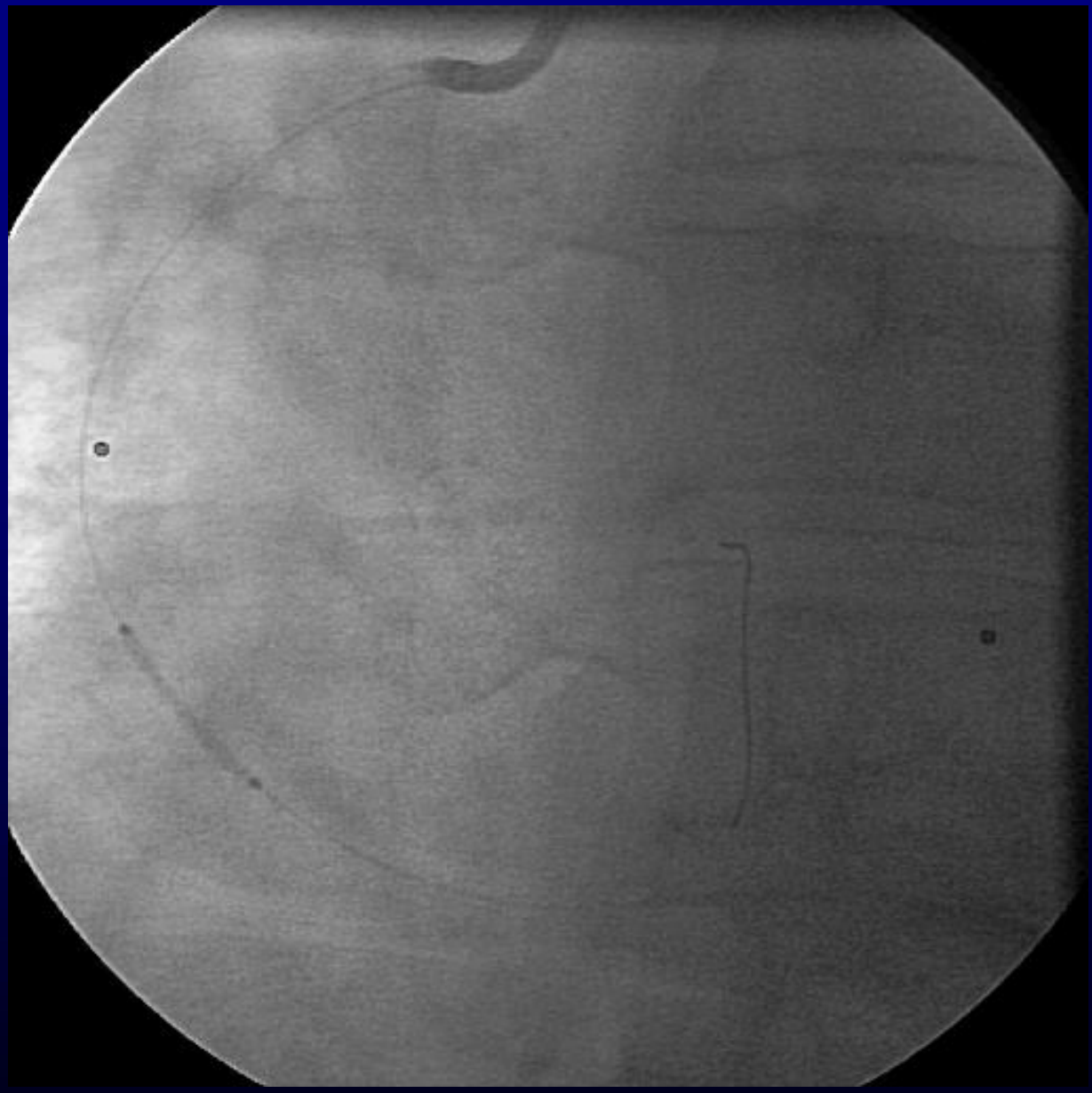


- Acute myocardial infarction

38 year old male patient, smoker, diabetes, Inferior MI
Two hours after onset of chest pain

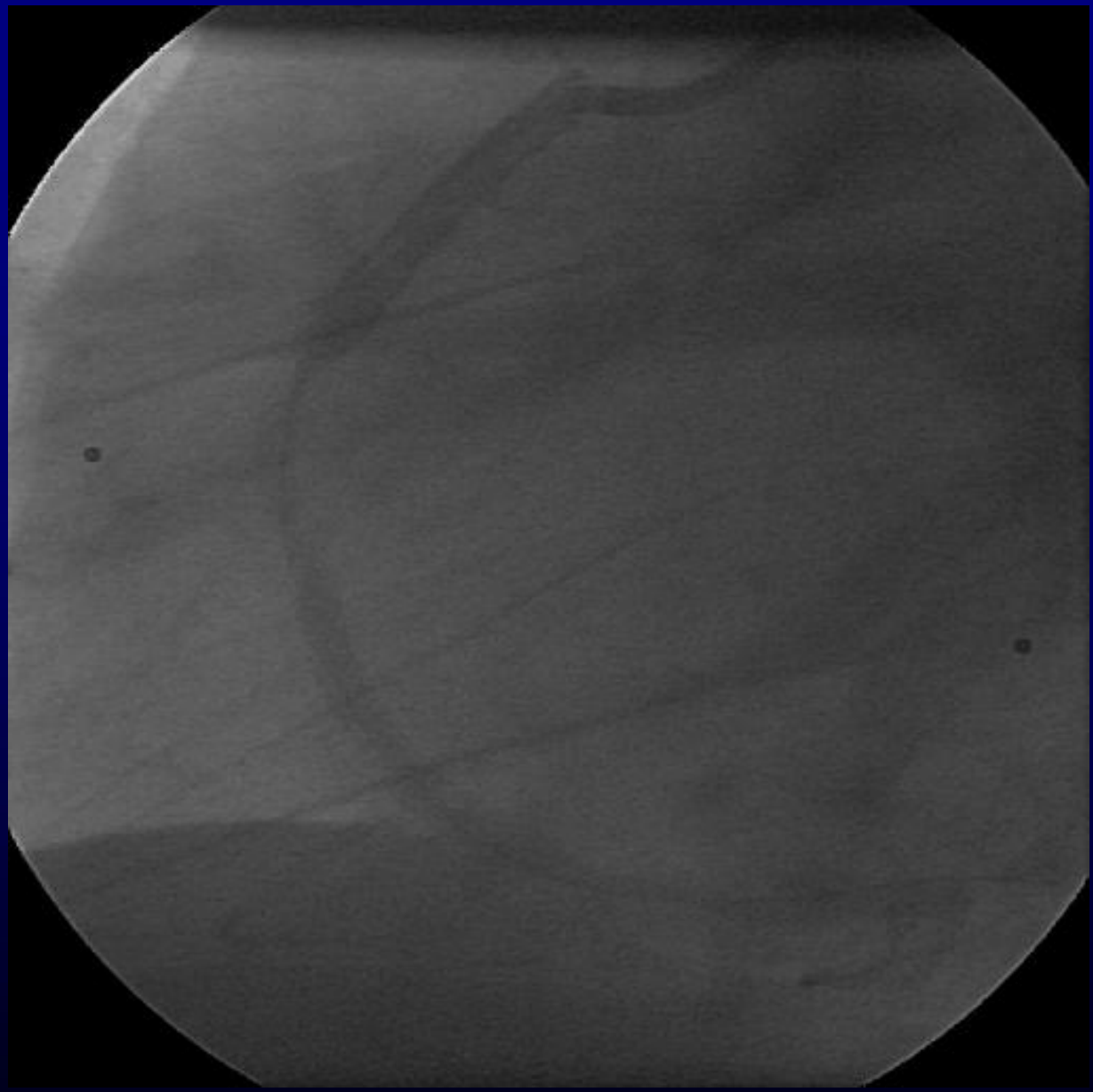






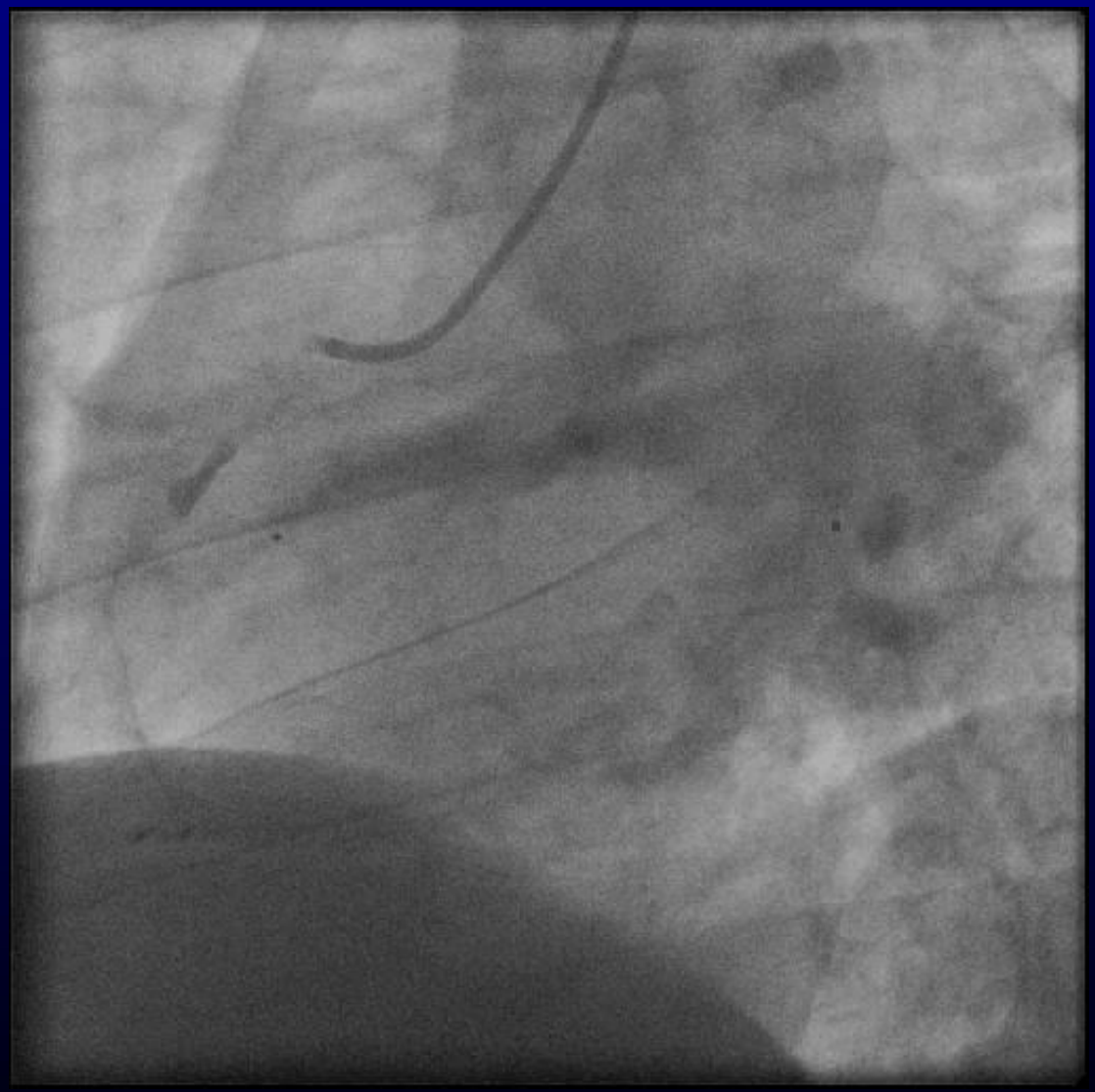
3.0 15 mm Vision

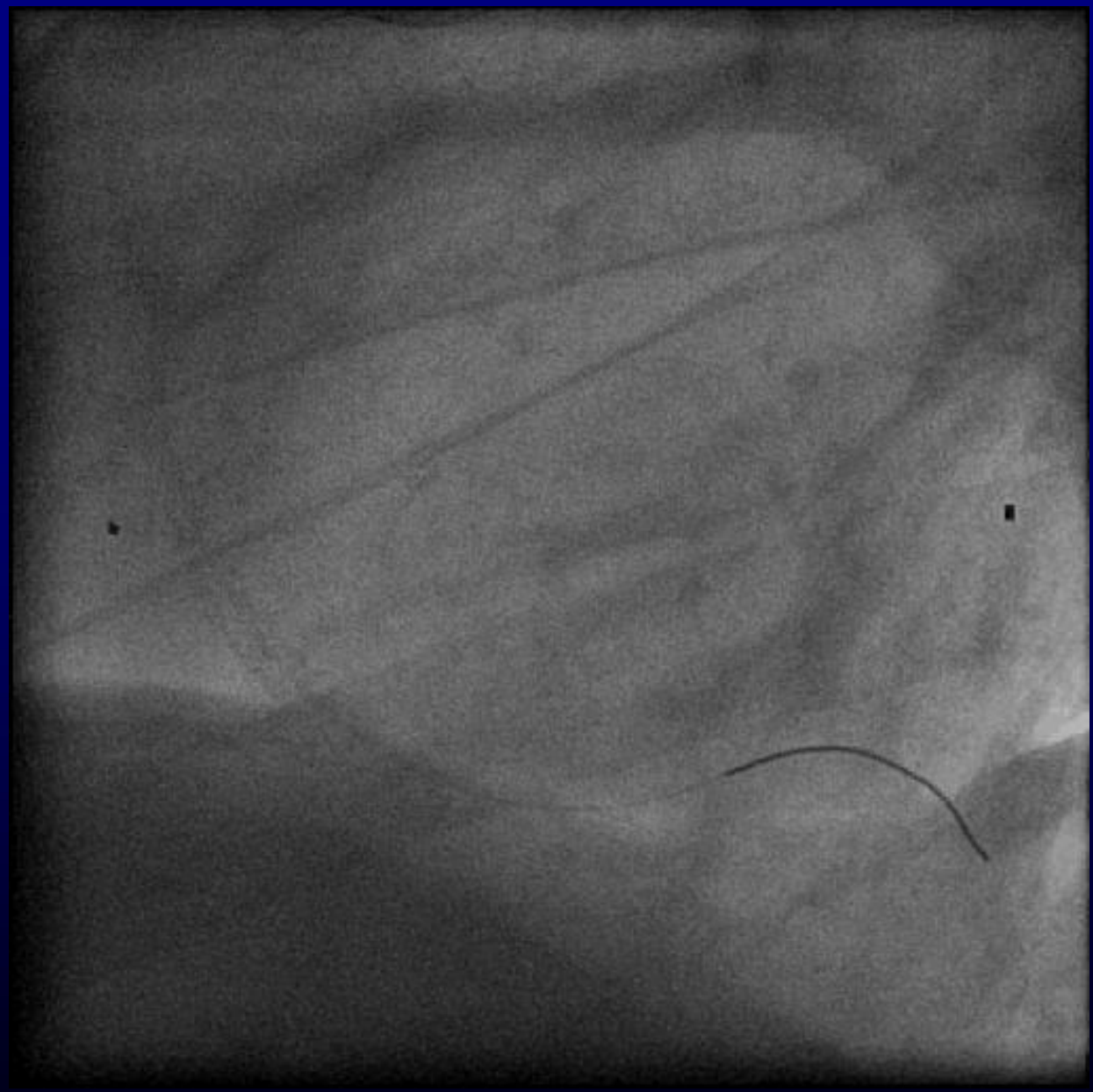
6 months later, acute coronary syndrome

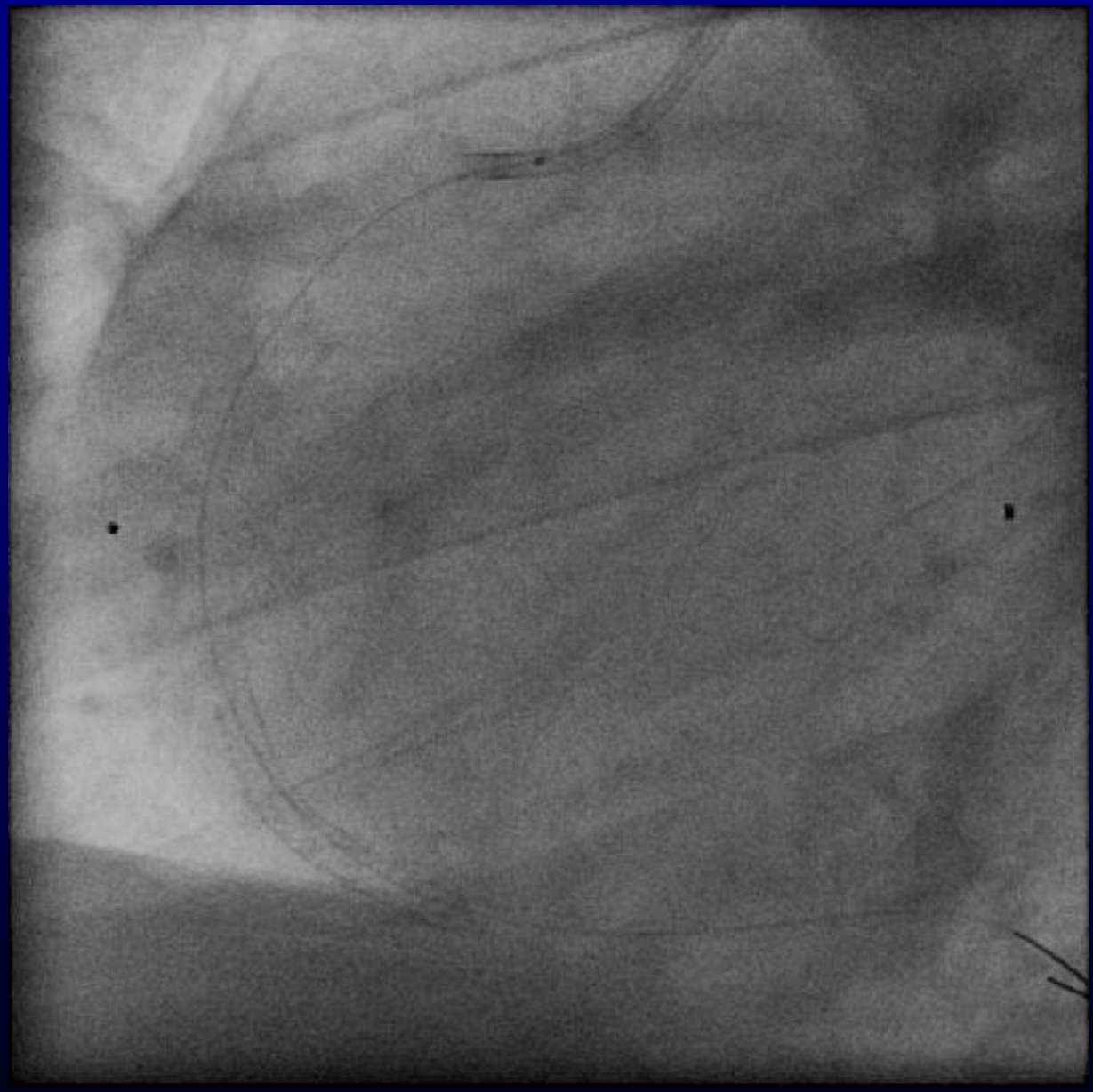


Restenosis, treated with a BMS !!!

Four months later, repeat inferior myocardial infarction







3.5 28 mm DES

TYPHOON 4 yr FU

Study Design

715 Patients Presenting within 12 hours after Onset of Symptoms of a First AMI Requiring Primary PCI of a Native Coronary Artery

Randomization 1:1

CYPHER® or CYPHER Select® Sirolimus-eluting Stent (356 patients)

1 withdrew consent post-PCI

Sirolimus-eluting Stent (355 patients)

Any Bare-Metal Stent (359 patients)

2 withdrew consent post-PCI

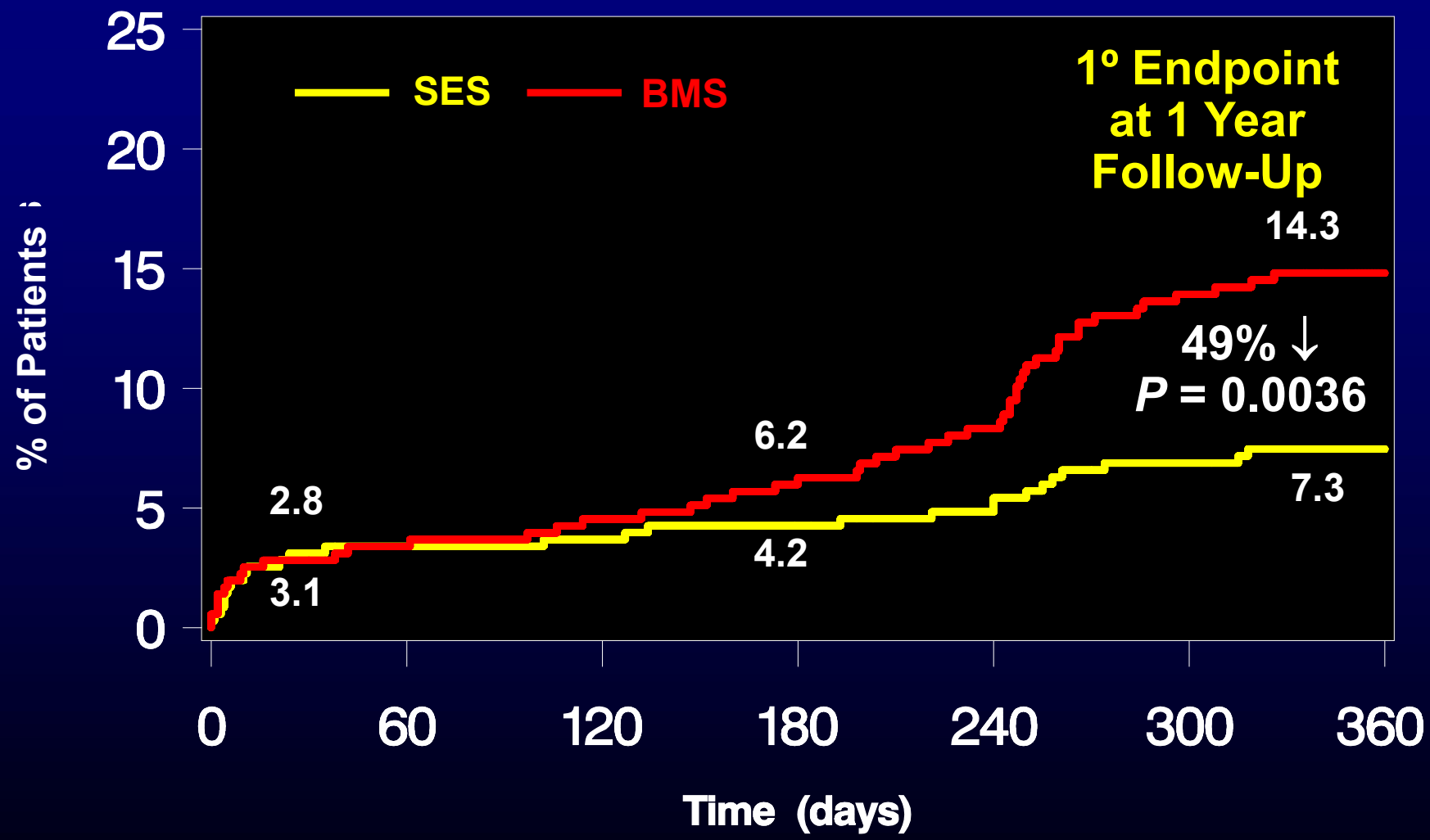
Any Bare-Metal Stent (357 patients)

Primary Endpoint: Target Vessel Failure at 1 Year

Defined as Composite of Ischemia Driven Target Vessel Revascularization (TVR), recurrent Myocardial Infarction (MI), or Target Vessel–related Cardiac Death

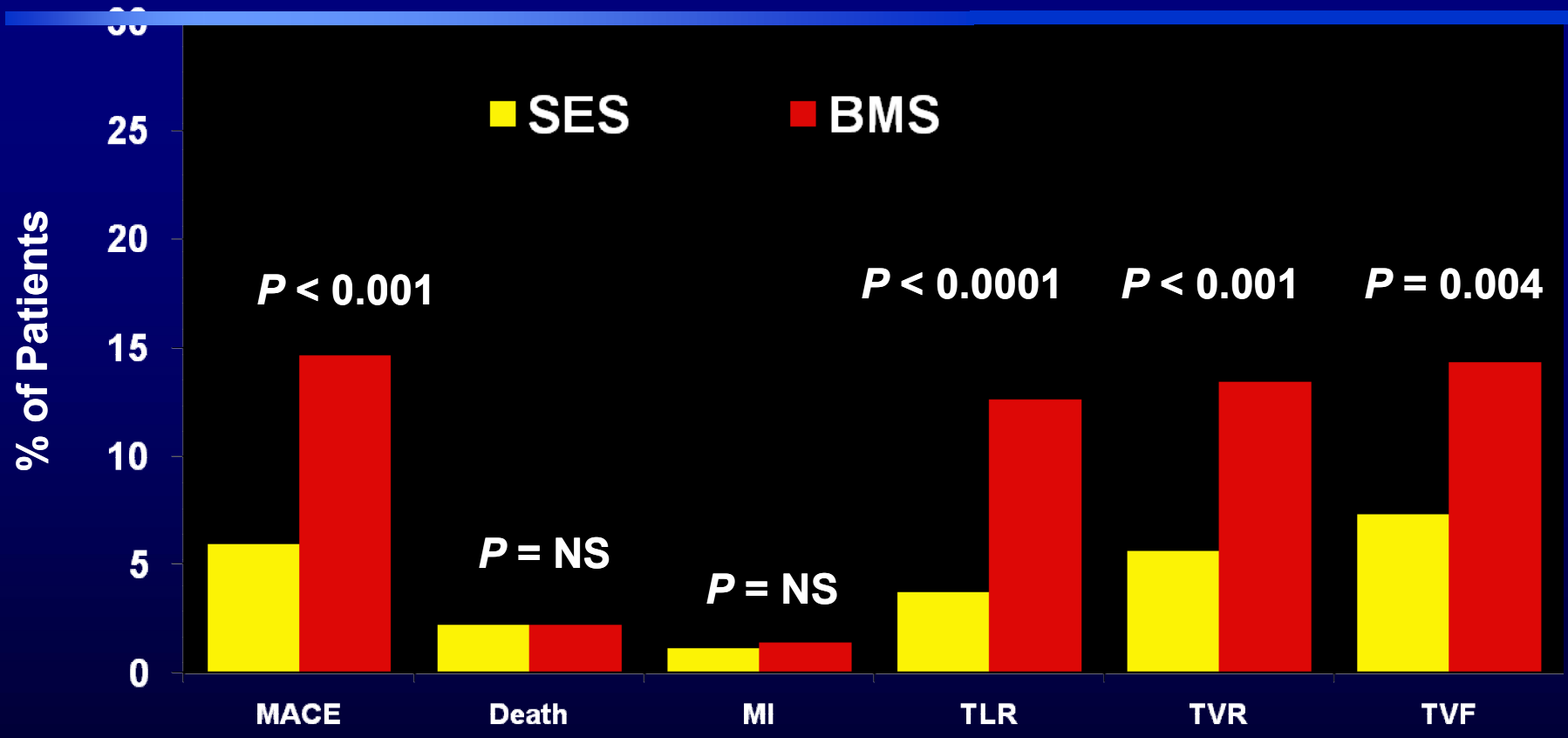
Spaulding C., et al., *New Engl J Med* 2006; 355:1093-104.

Primary Endpoint (TVF*) Through 360 Days



* Defined as ischemia driven TVR, recurrent MI, or target vessel-related cardiac death

Clinical Outcomes Through 360 Days



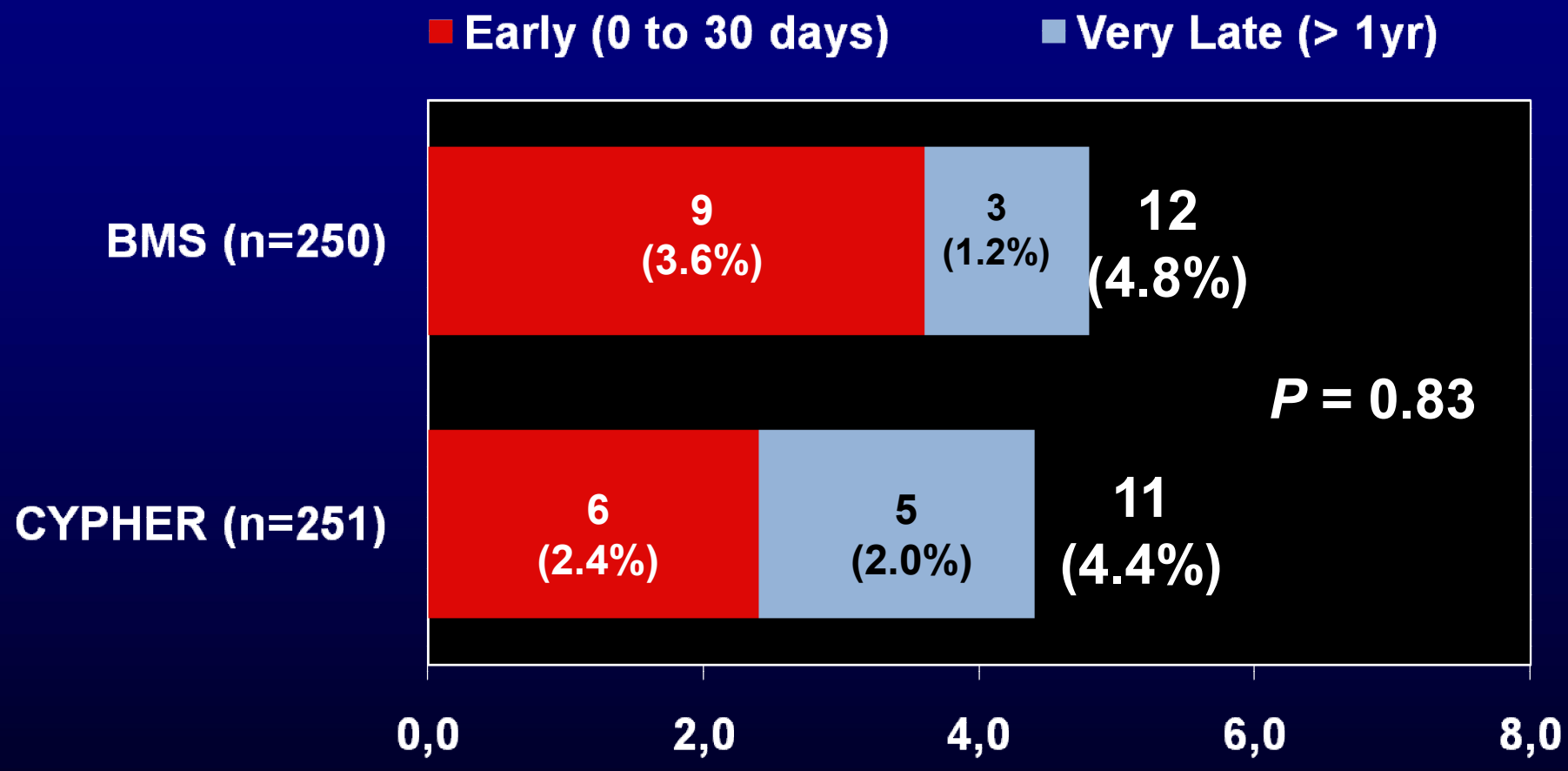
Death, re-MI, or TLR

Primary Endpoint*

* Defined as ischemia driven TVR, recurrent MI, or target vessel-related cardiac death

TYPHOON 4 yr FU

ARC Definite/Probable Stent Thrombosis at 4 Years



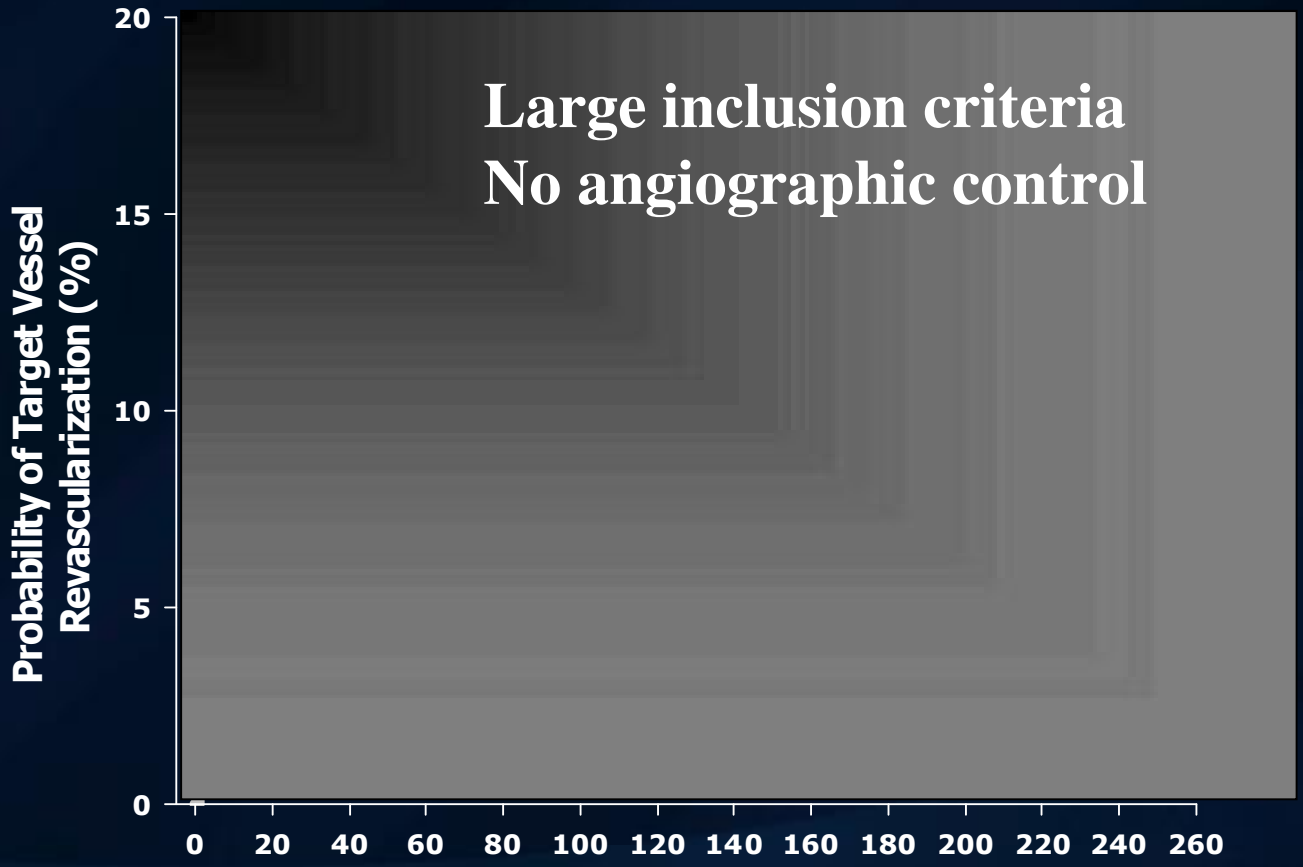
No late (>30 days to 1 yr) definite/probable stent thrombosis

ARC/Dublin definitions. Hierarchical events

8 Month Outcomes

Target Vessel Revascularization

(CEC adjudicated)



No. at Risk					
Uncoated Stent	372	355	347	331	322
Sirolimus-Stent	372	357	355	351	350

MULTISTRATEGY

Meta-analysis of DES trials in AMI

DES vs BMS in STEMI Patients[1]

Study	No. of patients	Mean age (years)	Type of DES	Primary endpoint	Length of thienopyridine therapy (months)	Mean length of follow-up (months)
BASKET-AMI[2]	216	62.2	PES SES	Cardiac death, myocardial infarction, or reintervention	6	18.0
Di Lorenzo[3]	270	64.0	PES SES	Death, myocardial infarction, or reintervention	6	12.0
HAAMU-STENT[4]	164	63.0	PES	Angiographic late lumen loss	12	16.7
MISSION[5]						12.0
PASSION[6]						12.0
SESAMI[7]	320	61.6	SES	Angiographic binary restenosis	12	12.3
STRATEGY[8]	175	62.6	SES	Death, myocardial infarction, stroke, or angiographic binary restenosis	3	24.2
TYPHOON[9]	712	59.3	SES	Cardiac death, myocardial infarction, or reintervention	6	12.1

OVER 3000 patients included in trials Comparing SES and BMS in AMI !!!

1. Kastrati A, et al. Eur Heart J. 2007;28:2706-2713. 2. Pittl C, et al. Eur Heart J. 2006;27:650 (abstract suppl). 3. Di Lorenzo E, et al. ACC Scientific Sessions 2005. Presentation 2303. 4. HAAMU-STENT trial. Available at wwwcardiosourcecom/pops/trialSumasp?trialID=1492. Accessed 5 March 2007. 5. van der Hoeven BL, et al. J Am Coll Cardiol. 2008;51(6):618-26. 6. Laarman GJ et al. N Engl J Med. 2006; 355:1105-13. 7. Menichelli M, et al. J Am Coll Cardiol. 2007;49(19):1924-30. 8. Valgimigli M, et al. JAMA. 2005;293(17):2109-17. 9. Spaulding C, et al. N Engl J Med. 2006;355(11):1093-104.

DES in AMI

- DES reduce repeat revascularization after primary PCI for AMI
- Selection of best candidate: high risk of restenosis
  - Diabetes, small vessel (<3 mm), long lesions (>15 mm)
  - After thromboaspiration and nitrates
  - In patients with no contra-indication to prolonged dual antiplatelet therapy
- Reduction of mortality in AMI
  - Increase reperfusion rates
  - Decrease door to balloon times
  - Thromboaspiration, medical therapy, patient education

Choose your equipment carefully in difficult situations !!!!