Angioplasty Summit TCT Asia Pacific 2007
Wednesday, April 25 ~ Friday, April 27, 2007

CVRF

Percutaneous Therapy for Left Main & Multivessel CAD:

SYNTAX

Ted Feldman, M.D., FSCAI, FACC

Angioplasty Summit

April 25-27th 2007

Seoul, Korea

EVANSTON NORTHWESTERN HEALTHCARE

Ted Feldman MD, FACC, FSCAI

Disclosure Information

The following relationships exist:

Grant support: Abbott, Atritech, BSC, Cardiac Dimensions, Cordis, Evalve, EV3, St Jude, .
Consultant: BSC, Cardiac Dimensions, Cordis, Edwards,Myocor
Speaker: Boston Scientific

Off label use of products and investigational devices will be discussed in this presentation

Letters to the Editor

TRANSLUMINAL DILATATION OF CORONARY-ARTERY STENOSIS

SIR,—In September, 1977, we introduced a technique for percutaneous transluminal coronary angioplasty (P.T.A.). This technique consists of a catheter system introduced via the femoral artery under local anæsthesia. A preshaped guiding catheter is positioned into the orifice of the coronary artery and through this catheter a dilatation catheter is advanced into the branches of the artery. This dilatation catheter (outer diameter 0·5–1·25 mm) has a sausage-shaped distensible segment (balloon) at the tip.

After traversing the stenotic lesion the distensible segment is inflated with fluid (50% contrast material, 50% saline) to a maximum outer diameter of 3·0–3·8 mm by a pump-controlled pressure of 5 atmospheres (about 500 kPa). This pressure compresses the atherosclerotic material in a direction perpendicular to the wall of the vessel thereby dilating the lumen.

DETAILS OF FIVE CASES TREATED BY P.T.A.

Patient	Age	Sex	Date of dilatation	Stenosis	Primary success
1	38	M	Sept. 16, 1977	L.A.D. 85%	+
2*	44	M	Oct. 18, 1977	L.C.A. 70% (calcified)	–
			Jan. 10, 1978	R.C.A. 80%	+
3	43	M	Nov. 21, 1977	L.A.D. 75%	+
			Nov. 21, 1977	R.C.A. 95%	+
4*	43	M	Nov. 24, 1977	L.C.A. 80%	+
5	61	M	Dec. 20, 1977	L.A.D. 95%	+

L.C.A.=main left coronary artery; L.A.D.=left anterior descending; R.C.A.=right coronary artery.
*Dilatation done at University Hospital, Frankfurt.

Experience with over 250 peripheral-artery lesions treated by this technique has demonstrated, via morphological studies, that the atheroma can be compressed leaving a smooth luminal surface. The patency-rate, two years after dilatation of iliac and femoropopliteal atherosclerotic lesions, was greater than 70%.[1]

After experimental[2] and intraoperative[3] studies the first percutaneous coronary dilatation was done on Sept. 16, 1977. Five patients with severe stenotic lesions of the coronary arteries associated with refractory angina have so far been treated by coronary P.T.A. (table). Angiograms for one of these patients are shown in the figure. No complications were noted. Follow-up studies by serial stress-testing with myocardial imaging (thallium-201) and angiography suggest that P.T.A. may be an effective treatment in certain patients with severe discrete non-calcified lesions of the coronary arteries.

This technique, if it proves successful in long-term follow-up studies, may widen the indications for coronary angiography and provide another treatment for patients with angina pectoris.

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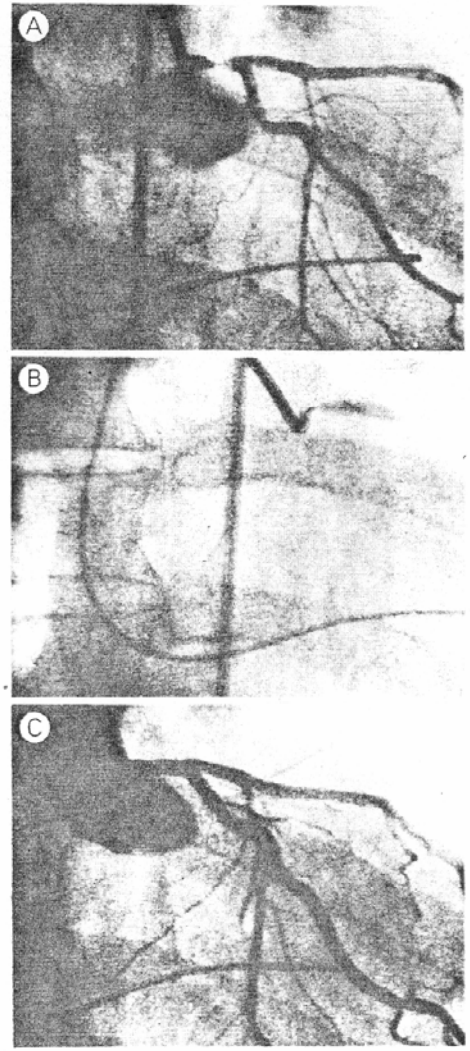
ANDREAS GRÜNTZIG

1. Grüntzig, A. Die perkutane transluminale Rekanalisation chronischer Arterienverschlüsse mit einer neuen Dilatationstechnik; p. 50. Baden-Baden, 1977.
2. Grüntzig, A., Riedhammer, H. H., Turina, M., Rutishauser, W. *Verh. Dt. ges. Kreislaufforschg.* 1976, **42**, 282.
3. Grüntzig, A., Myler, R., Hanna, E., Turina, M. *Circulation*, 1977, **56**, 84 (abstr.).



Details of patient 3.

43-year-old man with severe angina pectoris since September, 1977. First angiogram (Nov. 11) revealed severe stenosis of the main L.C.A. and only slight wall abnormalities in some of the branches of L.C.A. After informed consent P.T.A. was done on Nov. 21.

(A) The angiogram before P.T.A. (done under nitroglycerine cover), with the guiding catheter in the orifice showed 80% proximal stenosis of the L.C.A.

(B) After passage of the dilatation catheter the distensible balloon segment was inflated twice to a maximum outer diameter of 3·7 mm. During the dilatation the patient experienced a short period of angina pectoris which quickly disappeared after deflation of the balloon.

(C) The angiogram after the procedure showed a good result without complications. There was no enzyme rise or E.C.G. change after the treatment. A good clinical result has persisted in the following weeks, confirmed by stress tests.

The LANCET
FEBRUARY 4, 1978

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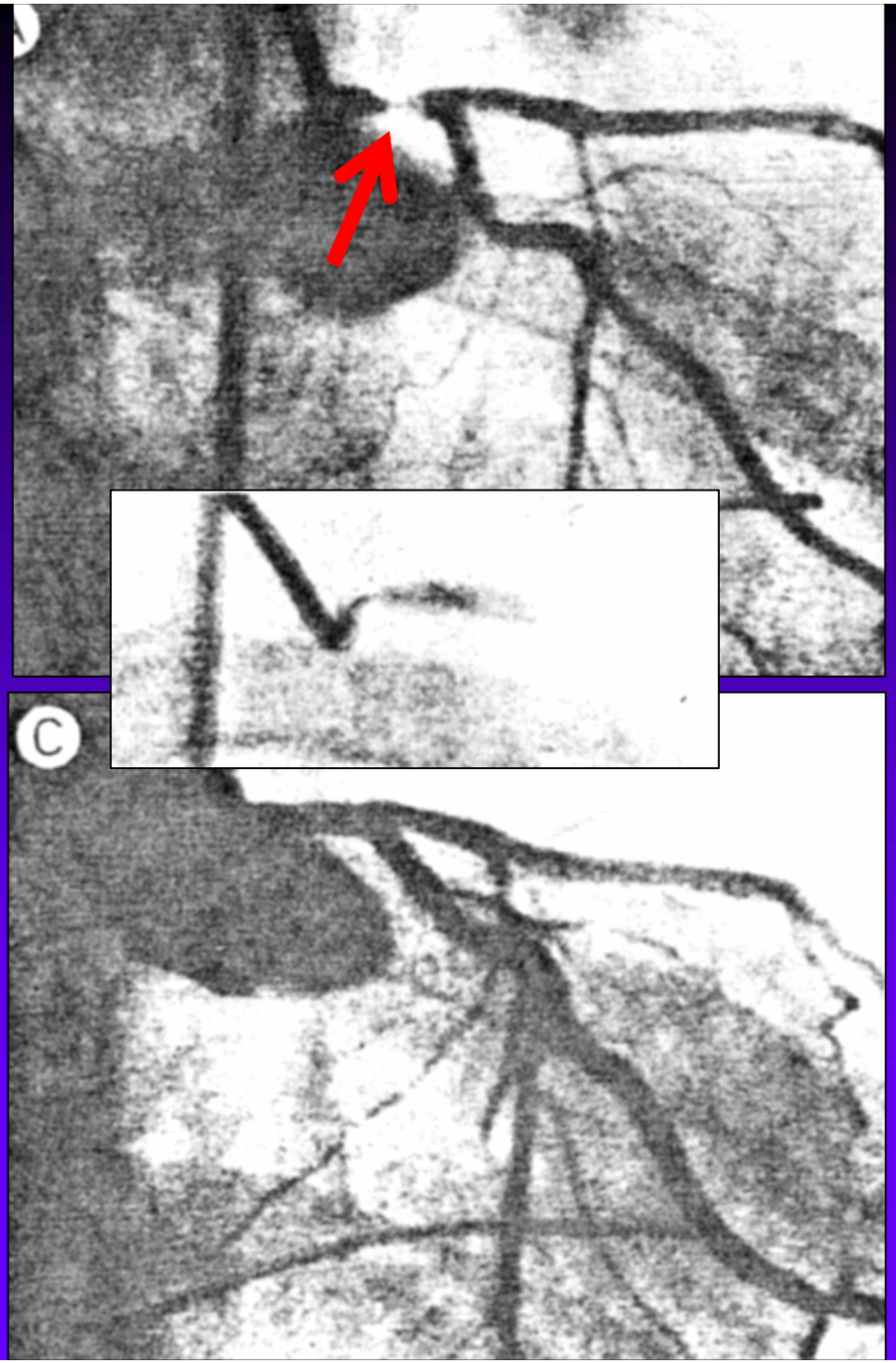

C


I DO
CABG
FOR FOOD

CABG is better…

The NEW ENGLAND JOURNAL of MEDICINE

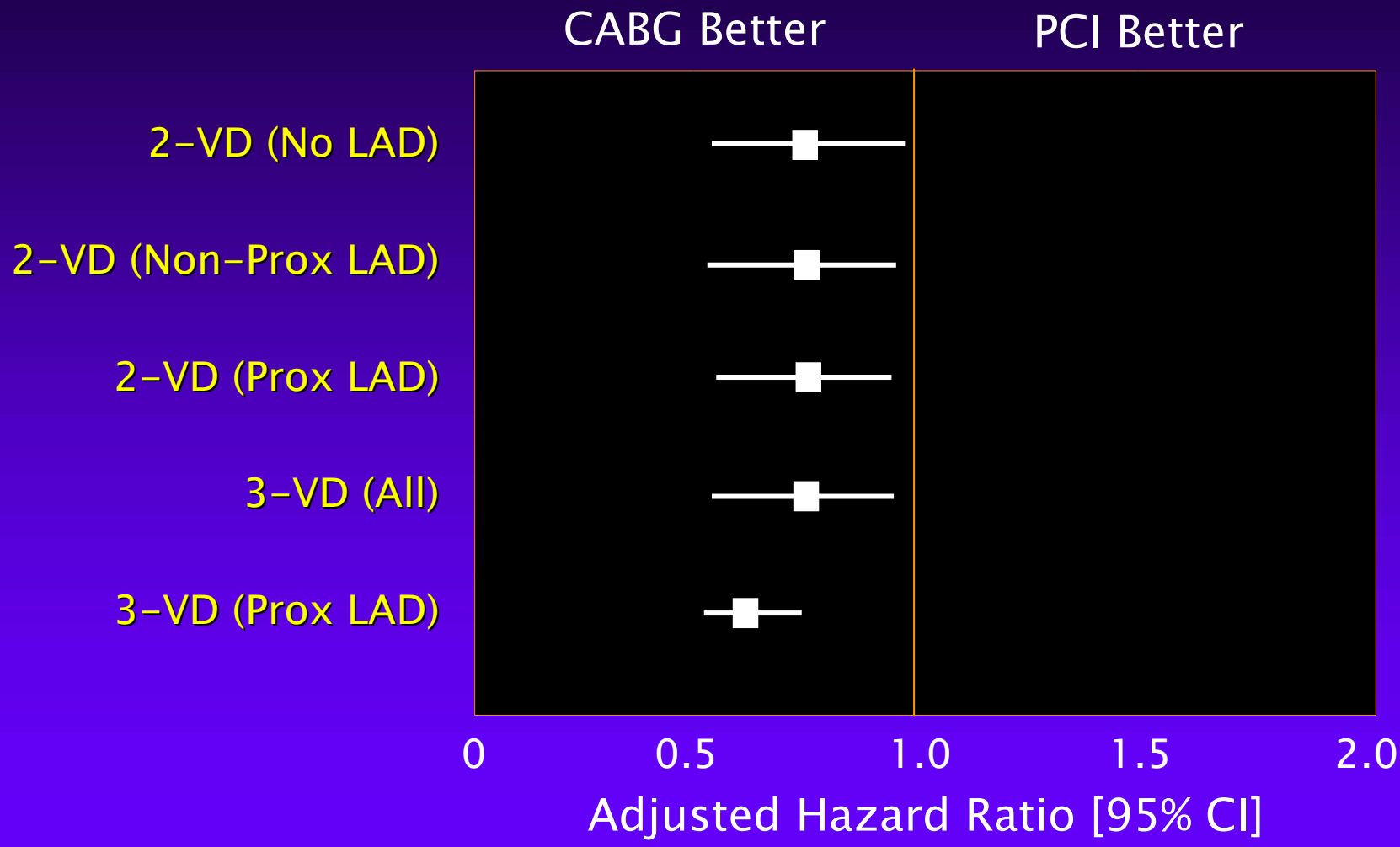
ORIGINAL ARTICLE

Long-Term Outcomes of Coronary-Artery Bypass Grafting versus Stent Implantation

Edward L. Hannan, Ph.D., Michael J. Racz, Ph.D., Gary Walford, M.D., Robert H. Jones, M.D., Thomas J. Ryan, M.D., Edward Bennett, M.D., Alfred T. Culliford, M.D., O. Wayne Isom, M.D., Jeffrey P. Gold, M.D., and Eric A. Rose, M.D.

NEJM 2005;352:2174–2183

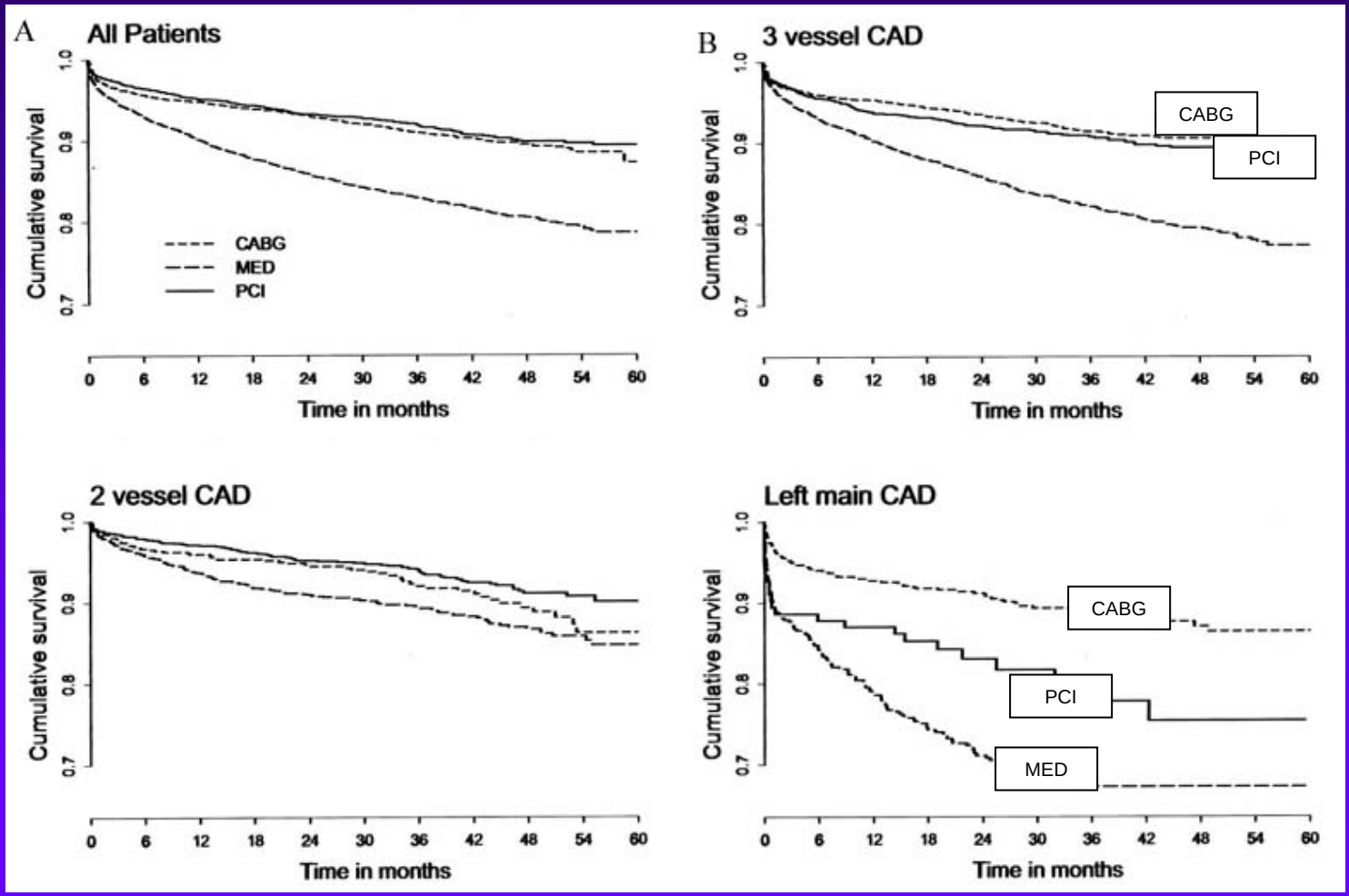
Hazard Ratio for Death following CABG *vs.* PCI



NEJM 2005;352:2174-2183

Long-term survival in 11,661 patients with multivessel CAD in the era of stenting (1995-98):

A report from the Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease (APPROACH) Investigators



PCI is better…

Superior Treatment Modality CABG PCI No difference

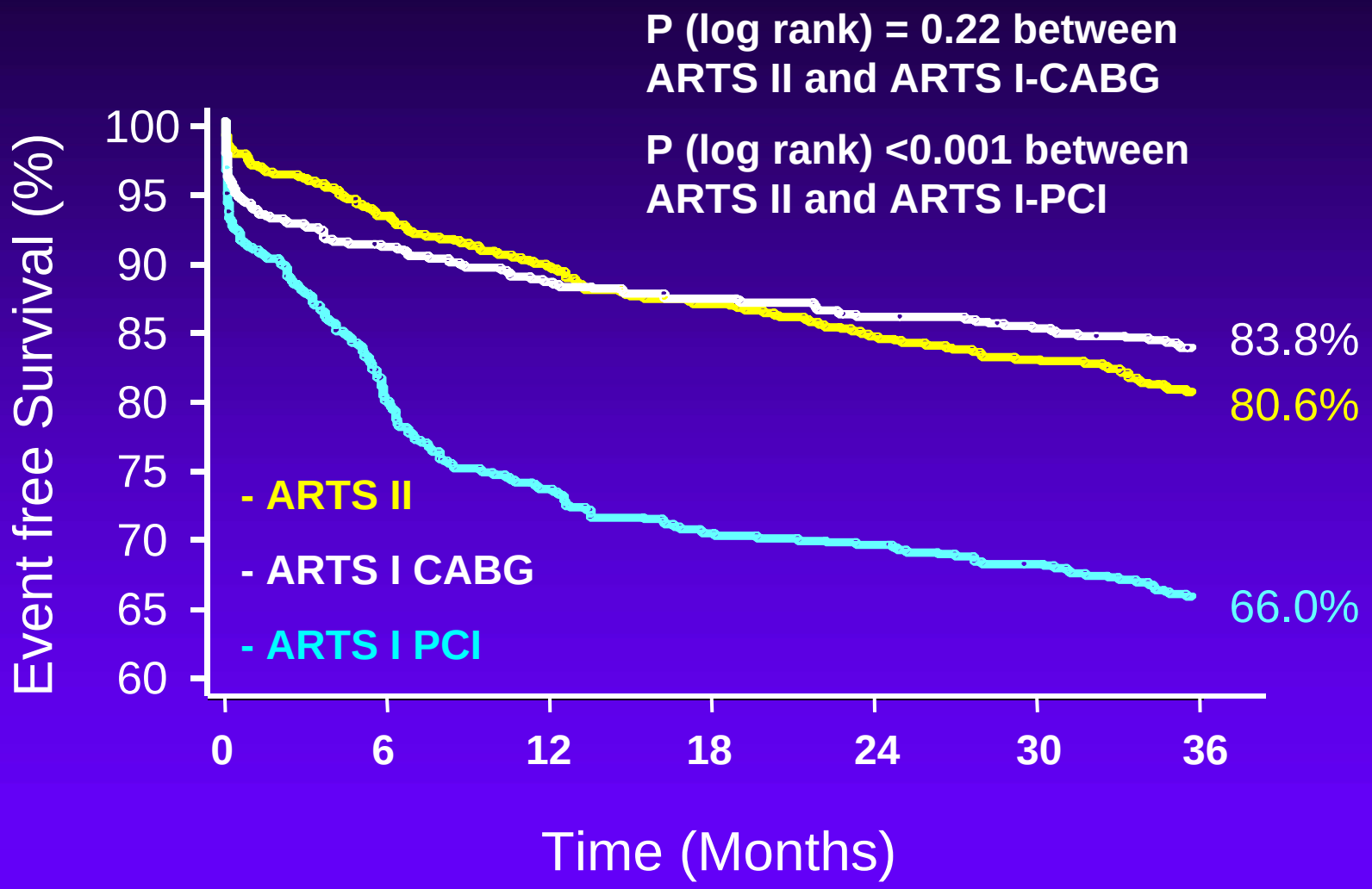
Trial	Clinical Parameters			Angiographic Endpoints	Cost Assessment
	Mortality & MI	Angina Relief	Repeat Revascularization		
GABI	PCI	PCI	Significant decrease of revascularization expected with DES	No difference	n/a
EAST	No difference	CABG		CABG	PCI
RITA	No difference	CABG		n/a	n/a
ERACI	No difference	CABG		n/a	PCI
CABRI	No difference	CABG		n/a	n/a
BARI	No difference	n/a		n/a	n/a
MASS-2	CABG (MI)	n/a		n/a	No difference
AWESOME	No difference	No difference		n/a	n/a
ERACI-2	PCI	n/a		CABG	No difference
SoS	CABG (Mortality)	CABG		n/a	n/a
ARTS	No difference	n/a	CABG	n/a	PCI

ARTS II - Procedural Characteristics

	ARTS II N=607 pts N=2160 les.	ARTS I (CABG) N=605 pts N=1638 les.	ARTS I (PCI) N=600 pts N=1606 les.
Lesions, #	3.6 ↗	2.8	2.8
Stented les. / anast. seg., #	3.2 ↗	2.8	2.5
Stents, #	3.7 ↗	-	2.8
Max. inflation pressure, atm	16.4 ↗	-	14.6
Total stent length, mm	72 ↗	-	48
(range)	12-253	-	8-165
GP IIb/IIIa inhibitor use, %	32	-	-
Use of arterial conduit, %	-	93	-
Duration of procedure, mins	85 ↘	193	99
Hospital stay, days since procedure	3.4	9.6	3.9

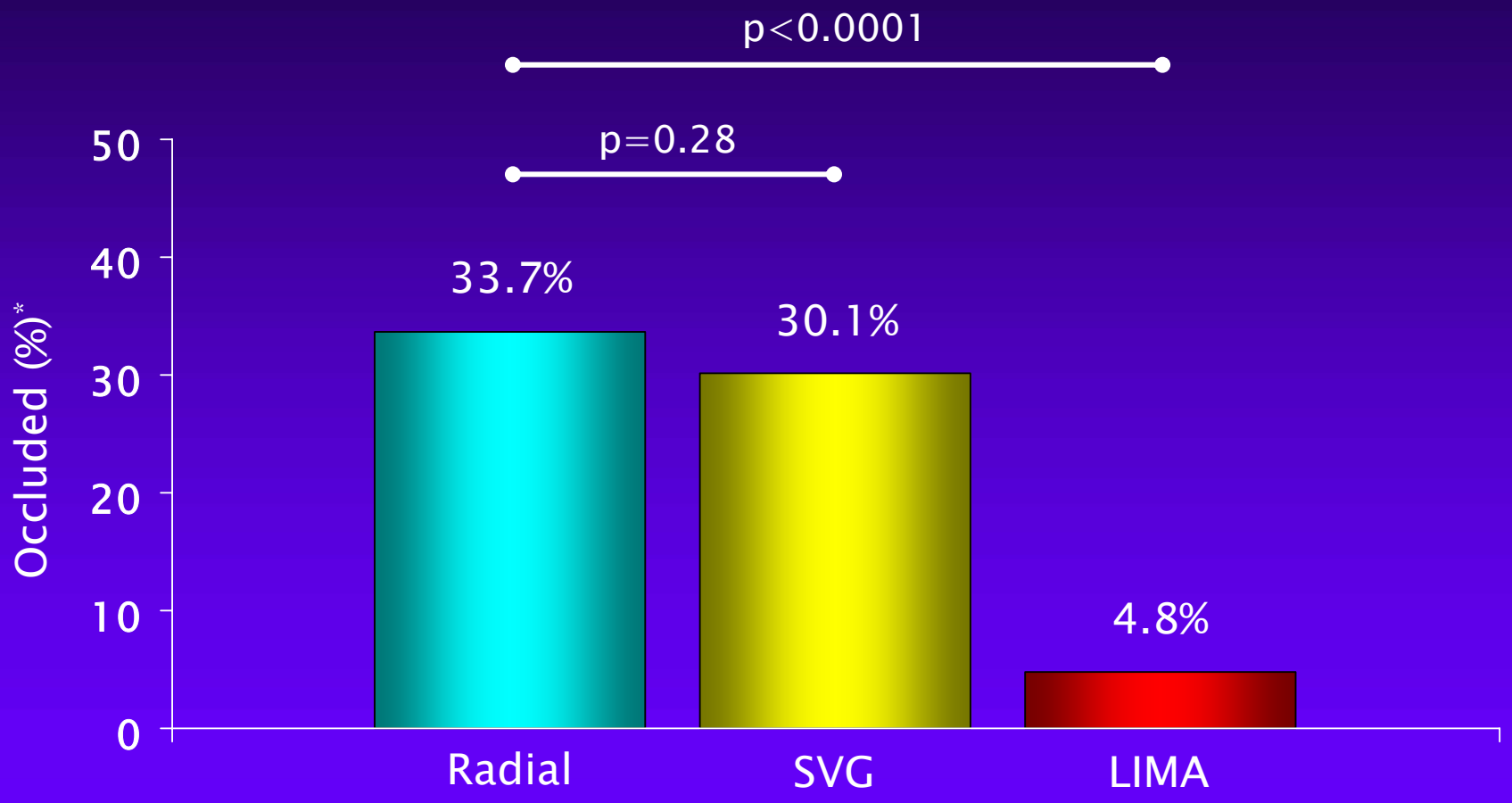
Figures in Orange indicate statistical difference (95% CI) between ARTS II and ARTS I groups

ARTS II - MACCE up to 3 years



The old vein graft…

Graft Patency
LIMA, SVG and Radial artery grafts



*Mean follow-up 565 ± 511 days

Circ 2004;109:2086-2091

THE NATION'S NEWSPAPER
USA TODAY
NO. 1 IN THE USA

March 27, 2007

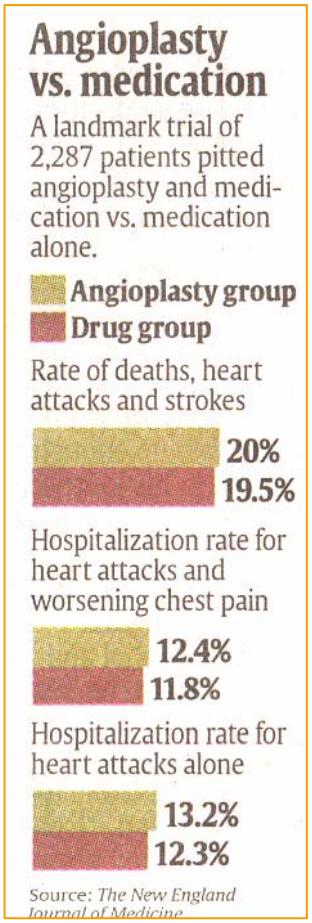
Medicine enough for pain in chest?

Study sees way to avoid angioplasty

By Steve Sternberg
USA TODAY

NEW ORLEANS — Thousands of people with crushing chest pain who once opted for angioplasty as a quick fix may change their minds based on a landmark study out Monday showing that medication costs less, poses fewer risks and works just as well.

"I think this will change the discussion between the patient and doctor," says Raymond Gibbons of the



PCI is just as good…

Evolution of Revascularization

+ Improved technique
+ Improved stent design
+ DES

- Restenosis
- Repeat revascularization

+ Off pump technique
+ Less invasive approach
+ Increased arterial revascularization
+ Optimal perioperative monitoring

- High costs
- Invasive

Over the last decade, the standard of care for both CABG and PCI has continuously improved, leveling the playing field.

SYNTAX

Inclusions

- Stable/unstable angina
- De novo 3VD
- Left Main
- Left Main equivalent
- Left main with 1,2,3 vessel disease

Exclusions

- Age < 21 Years
- Previous CABG or PCI
- Acute Myocardial Infarction (CK > 2 x ULN)
- Concomitant cardiac Surgery
- Participation in other trial
- Uncertainty Adherence to protocol
- Pregnancy

Patient Flow

screening — Patients with de novo 3-vessel-disease and/or left main disease

registration — Physician Team (surgeon and interventionalist)

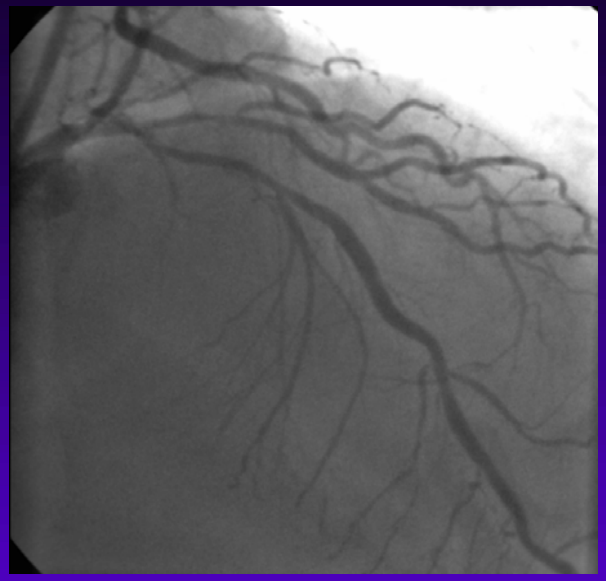
amenable for both treatments options → Multi-center randomized controlled trial

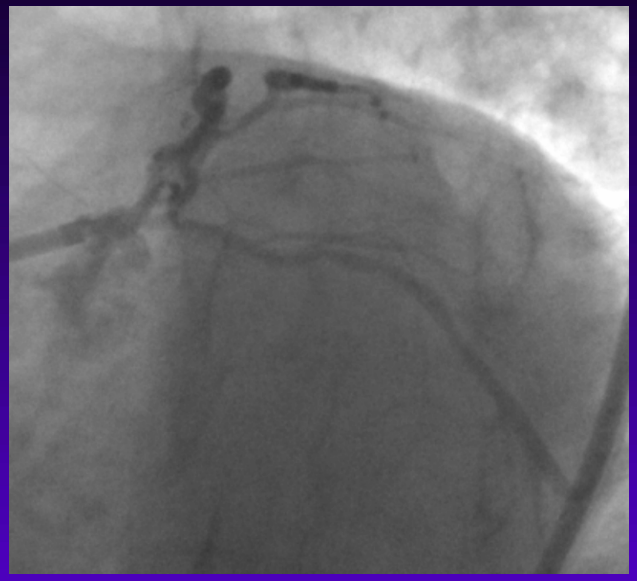
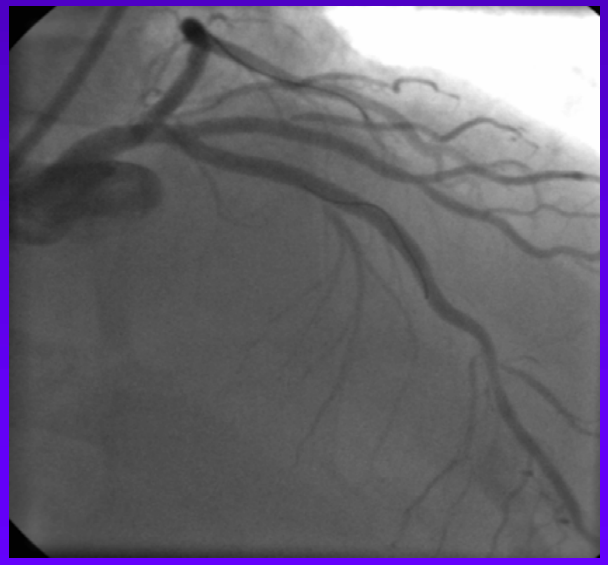
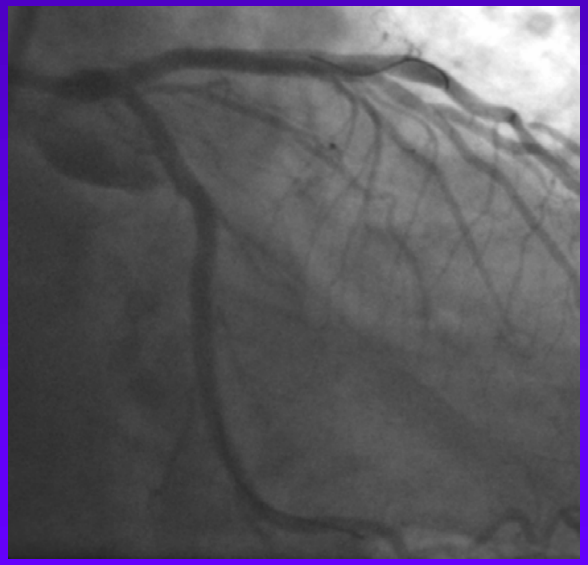
Randomization: TAXUS *vs* CABG

amenable for ≤1 interventional treatment → Registries

- define CABG only population
- define PCI only population
- define patients/physicians refusing randomization

SYNTAX




Patient-related factors			Cardiac-related factors		
Age (years)	0	0	Unstable angina[6]	No	0
Gender	Select	0	LV function	Select	0
Chronic pulmonary disease[1]	No	0	Recent MI[7]	No	0
Extracardiac arteriopathy[2]	No	0	Pulmonary hypertension[8]	No	0
Neurological dysfunction[3]	No	0	**Operation-related factors**		
Previous Cardiac Surgery	No	0	Emergency[9]	No	0
Creatinine > 200 µmol/ L	No	0	Other than isolated CABG	No	0
Active endocarditis[4]	No	0	Surgery on thoracic aorta	No	0
Critical preoperative state[5]	No	0	Post infarct septal rupture	No	0

Standard ***Euro*SCORE** 0

Note: Standard is now default calculator

Calculate Clear Print

About the *"logistic"* euroSCORE

Two risk calculators are available on this website: the simple additive EuroSCORE and the full logistic EuroSCORE. The reason for having both is explained below.

The simple additive EuroSCORE model is now well established and has been validated in many patient populations across the world. It is easy to use, even at the bedside. It is very valuable in quality control in cardiac surgery and gives quite a useful estimate of risk in individual patients. However, particularly in very high risk patients, the simple additive model may sometimes underestimate the risk when certain combinations of risk factors co-exist. The full logistic version of EuroSCORE produces more accurate risk prediction for a particular high risk patient. Its main disadvantage is that the risk has to be calculated in quite a complex way - not by mental arithmetic or "on the back of an envelope".

You are invited to try out both models and to use the one most suitable to your practice.

By selecting *"Standard* euroSCORE" euroSCORE values are simply added to estimate risk of death as described in Roques F, Nashef SA, et al. Eur J Cardiothorac Surg. 1999 Jun;15(6):816-22

By selecting *"Logistic* euroSCORE" - euroSCORE predicted mortality is calculated as described in Roques F, Michel P, Goldstone AR, Nashef SA. *Eur Heart J.* 2003 May;**24**(9):882-3

Notes

[1] ***Chronic pulmonary disease*** Long term use of bronchodilators or steroids for lung disease

[2] ***Extracardiac arteriopathy*** One or more of claudication, carotid occlusion or >50% stenosis, previous or planned intervention on the abdominal aorta, limb arteries or carotids

[3] ***Neurological dysfunction*** Disease severely affecting ambulation or day-to-day functioning

[4] ***Active endocarditis*** Patient still on antibiotic treatment for endocarditis at time of surgery

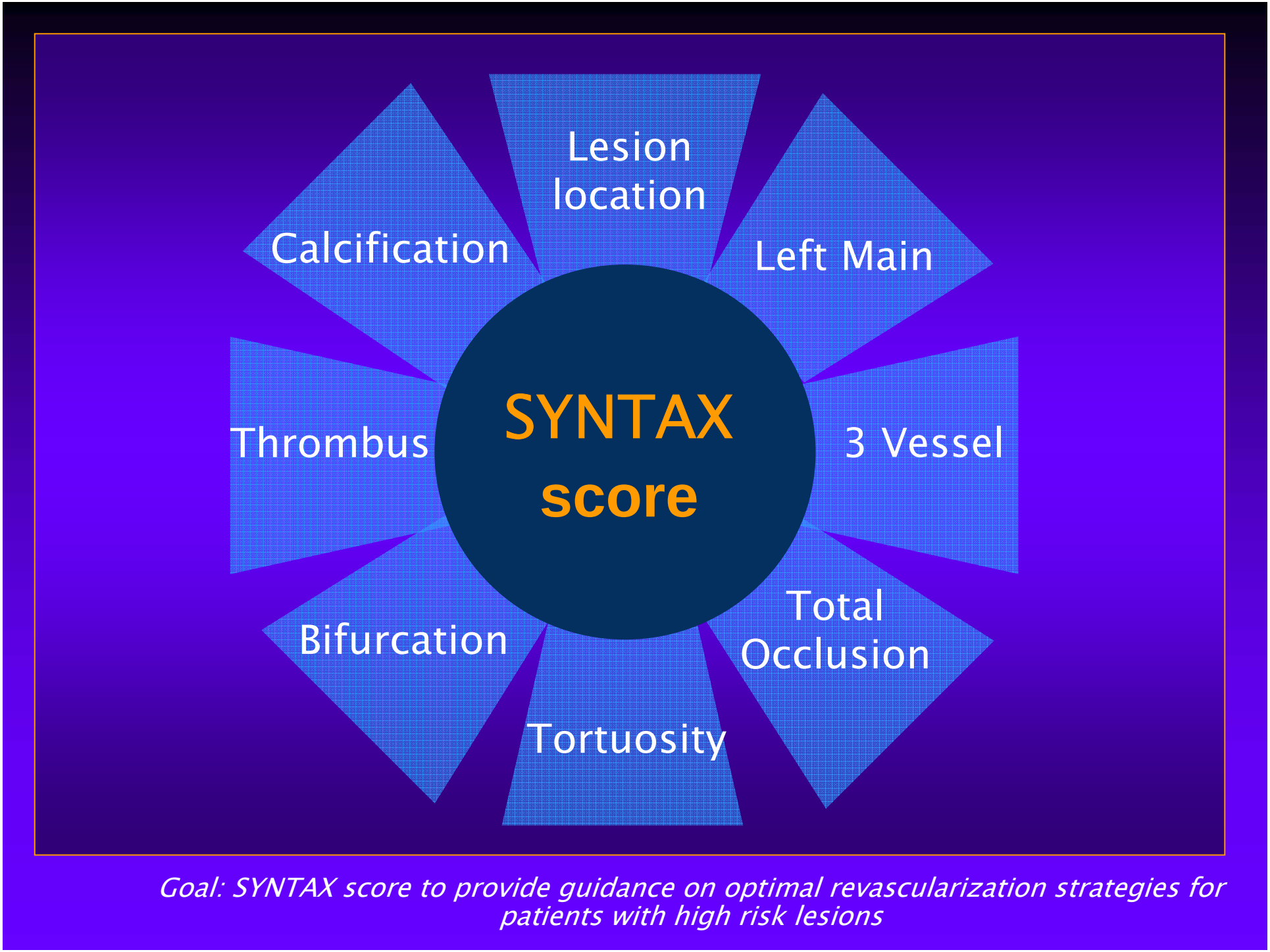
[5] ***Critical preoperative state*** Ventricular Tachycardia / Ventricular Fibrillation or aborted sudden death, preoperative cardiac massage, preoperative ventilation before anaesthetic room, preoperative inotropes or IABP, preoperative Acute Renal Failure (anuria or oliguria <10ml/hr)

[6] ***Unstable angina*** Rest angina requiring i.v. nitrates until arrival in anaesthetic room

[7] ***Recent MI*** Myocardial infarction within 90 days

[8] ***Pulmonary hypertension*** Systolic pulmonary artery pressure >60mmHg

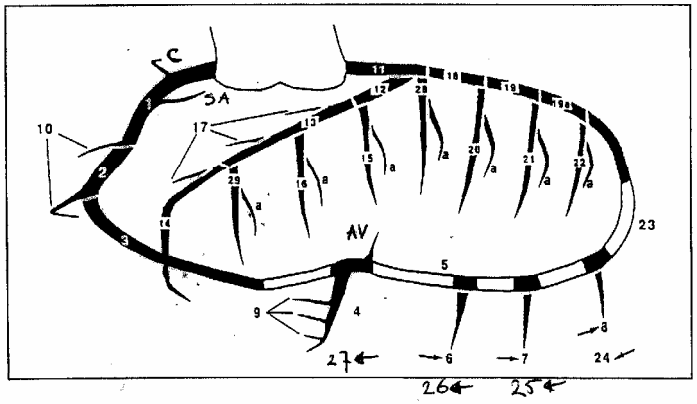
[9] ***Emergency*** Operation before beginning of next working day



Goal: SYNTAX score to provide guidance on optimal revascularization strategies for patients with high risk lesions

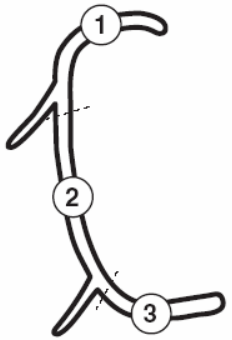
Identify coronary segment(s) with significant (> 50%) stenosis at previous angiography
(tick all that apply)

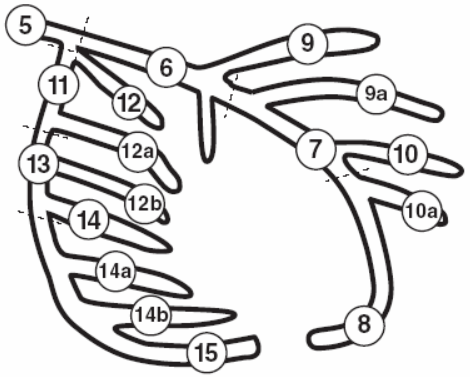
☐ 1. Prox RCA	☐ 11. LMCA	☐ 19. Mid CX	☐ 25. 2nd LPL
☐ 2. Mid RCA	☐ 12. Prox LAD	☐ 19a. Dist CX	☐ 26. 3rd LPL
☐ 3. Dist RCA	☐ 13. Mid LAD	☐ 20. 1st OM	☐ 27. LPDA
☐ 4. RPDA	☐ 14. Dist LAD	☐ 20a. LAT 1st OM	☐ 28. Ramus/OD
☐ 5. RPLS	☐ 15. 1st Diag	☐ 21. 2nd OM	☐ 28a. LAT Ramus/OD
☐ 6. 1st RPL	☐ 15a. LAT 1st Diag	☐ 21a. LAT 2nd OM	☐ 29. 3rd Diag
☐ 7. 2nd RPL	☐ 16. 2nd Diag	☐ 22. 3rd OM	☐ 29a. LAT 3rd Diag
☐ 8. 3rd RPL	☐ 16a. LAT 2nd Diag	☐ 22a. LAT 3rd OM	☐ C. Conus
☐ 9. Inf. Septal	☐ 17. 1st Septal	☐ 23. LAV	☐ SA. Sinoatrial
☐ 10. AC Marg	☐ 18. Prox CX	☐ 24. 1st LPL	☐ AV. AV Nodal



BARI

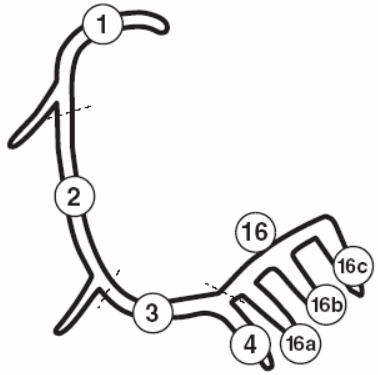
Left dominance

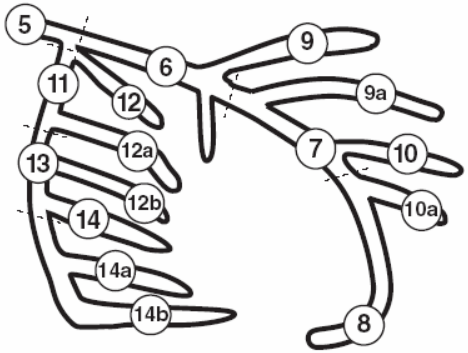




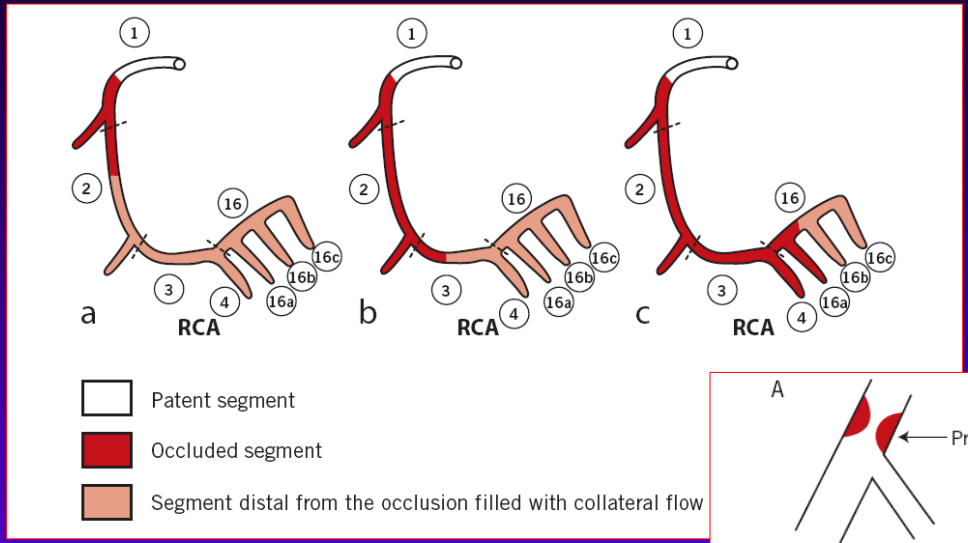
ARTS 1&2/ Syntax

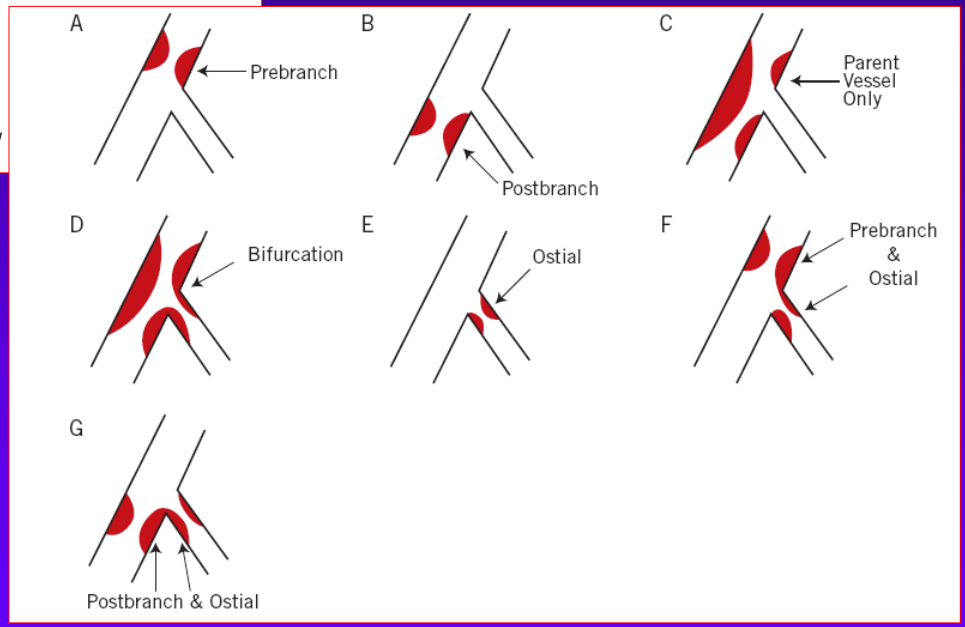
Right dominance





SYNTAX Score



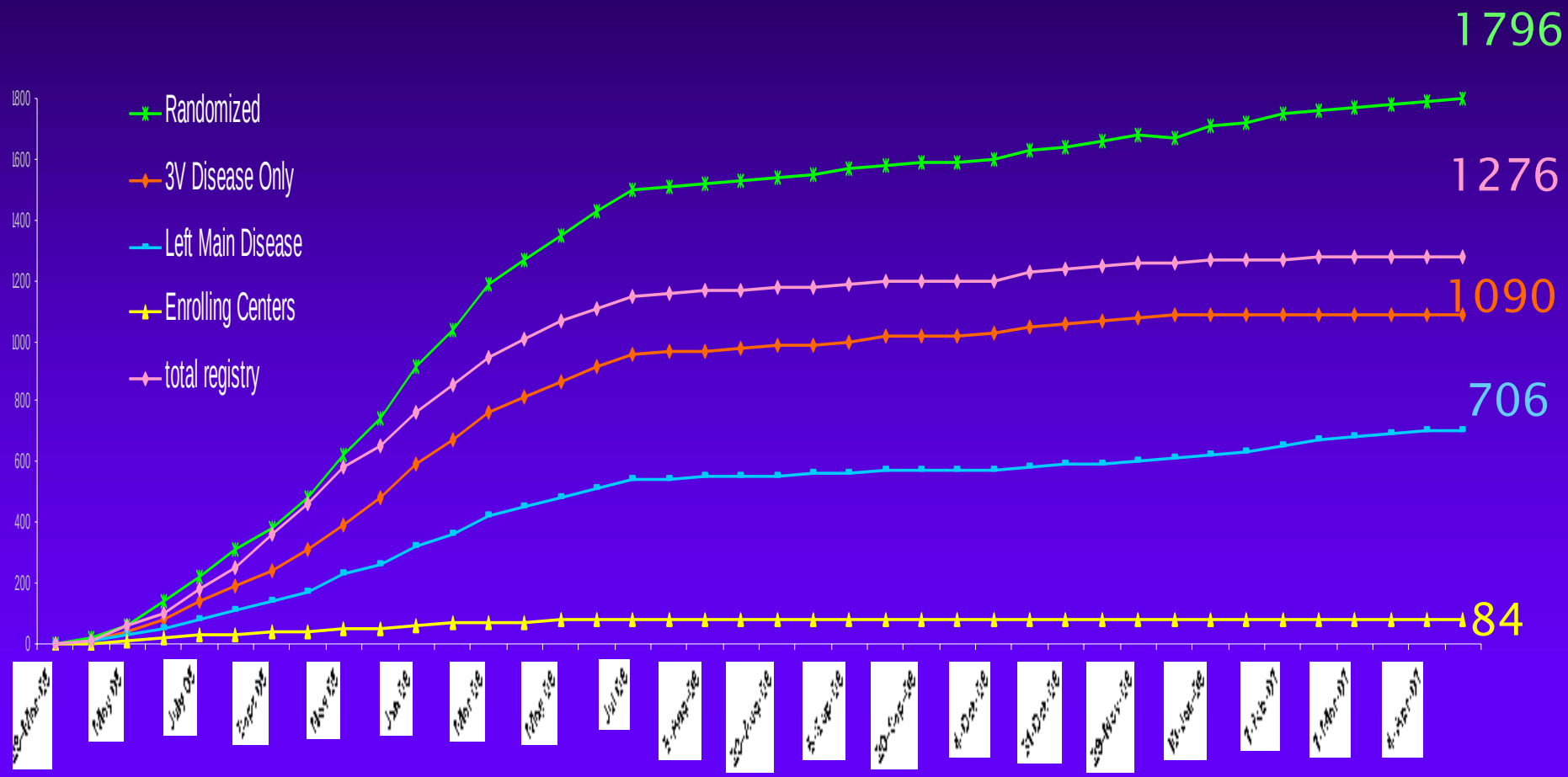


- Occlusion
- Ostial location
- Tortuosity
- Length >20mm
- Heavy calcification
- Thrombus
- Diffuse disease

Raw SYNTAX Score —*MACE (1 yr)*→ *Weighted SYNTAX Score*

EuroInterv 2005;1:219-227

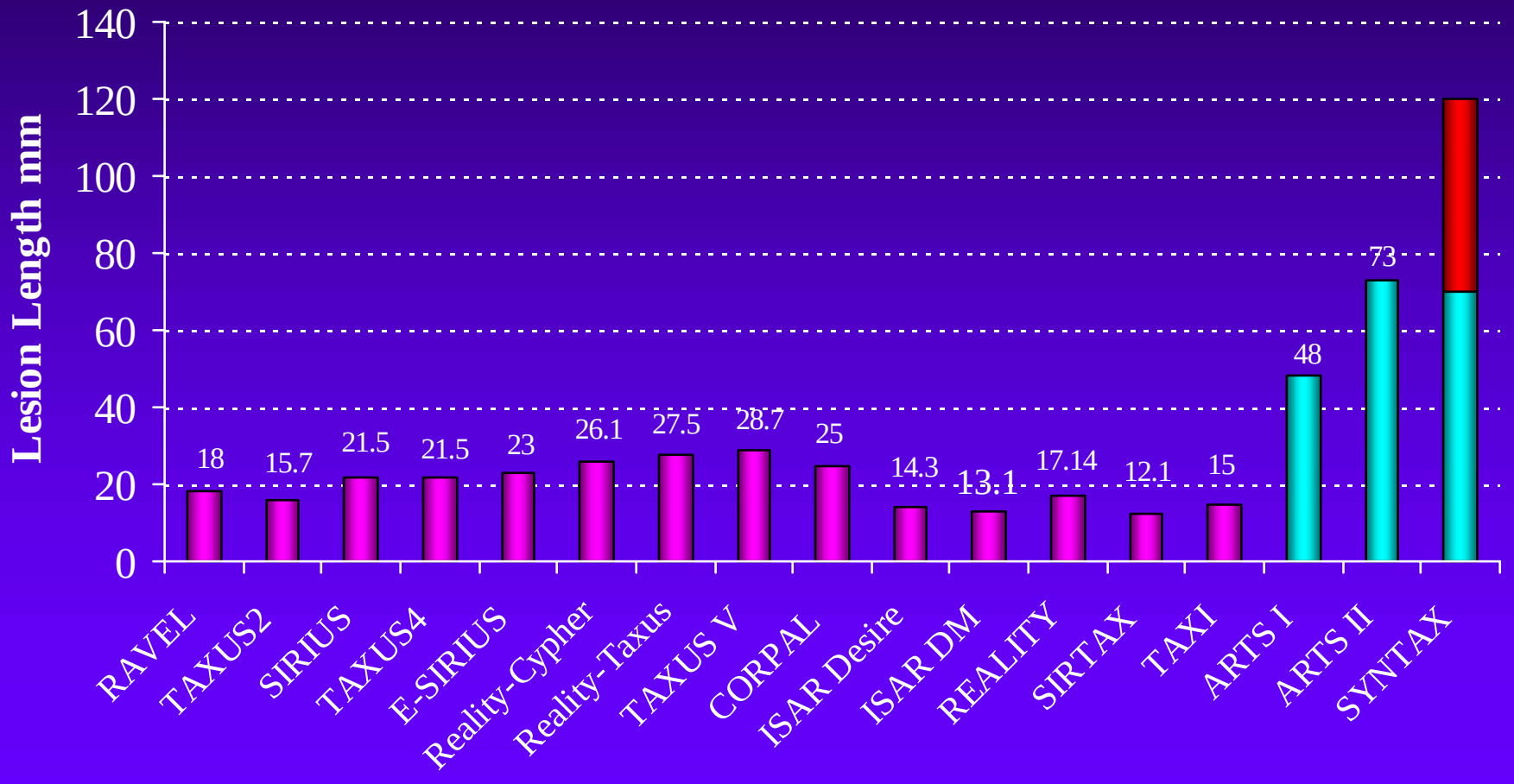
Overall enrollment – Apr 18



One patient to go 4/24/2007……

DES Trial Comparison

Lesion Length



Left Main Stenosis