

14<sup>th</sup>

AICT

ASIAN INTERVENTIONAL CARDIOVASCULAR THERAPEUTICS  
THE OFFICIAL CONGRESS OF APSIC

# CABG vs PCI in Multivessel disease

Balbir Singh, INDIA

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Speaker's name : Balbir, SINGH, Gurgaon

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# Advances in CABG and PCI

## CABG

- First surgery 1960
- LIMA graft
- Complete revascularisation
- Off pump surgery
- Ventricular reconstruction surgery

## PCI

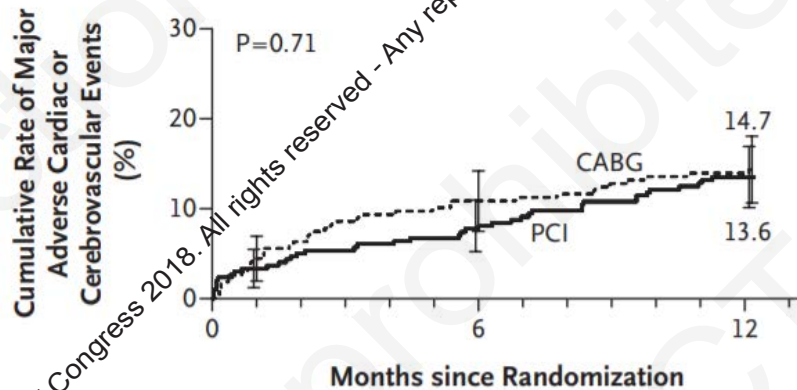
- Balloon angioplasty 1977
- Stent( BMS)
- DES
- 2 nd generation DES
- Intravascular imaging
- FFR

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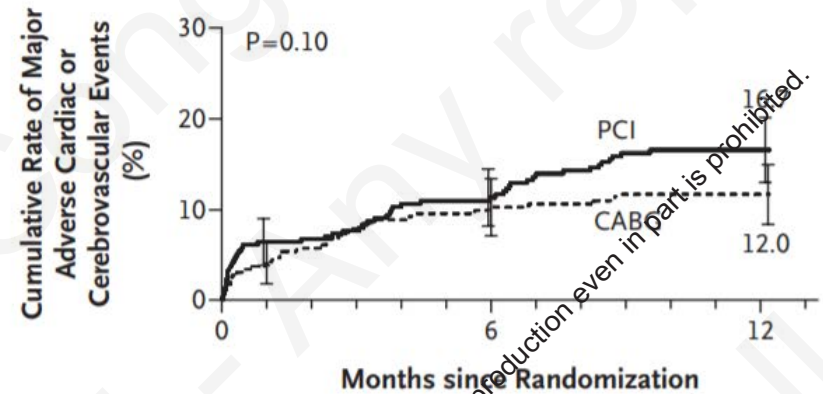
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# Percutaneous Coronary Intervention versus Coronary-Artery Bypass Grafting for Severe Coronary Artery Disease

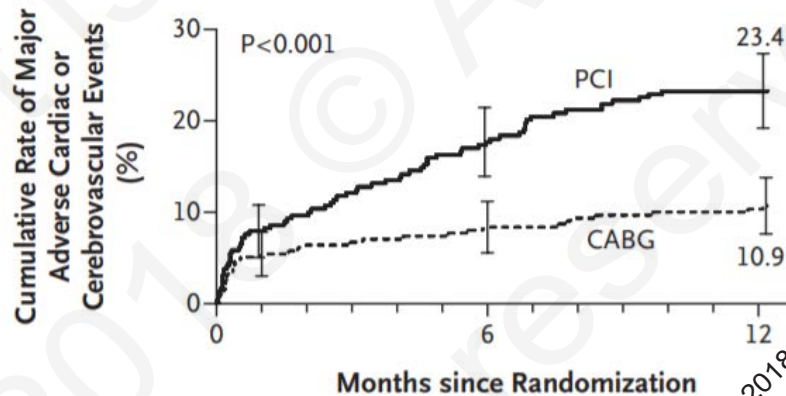
**A Low SYNTAX Score**



**B Intermediate SYNTAX Score**

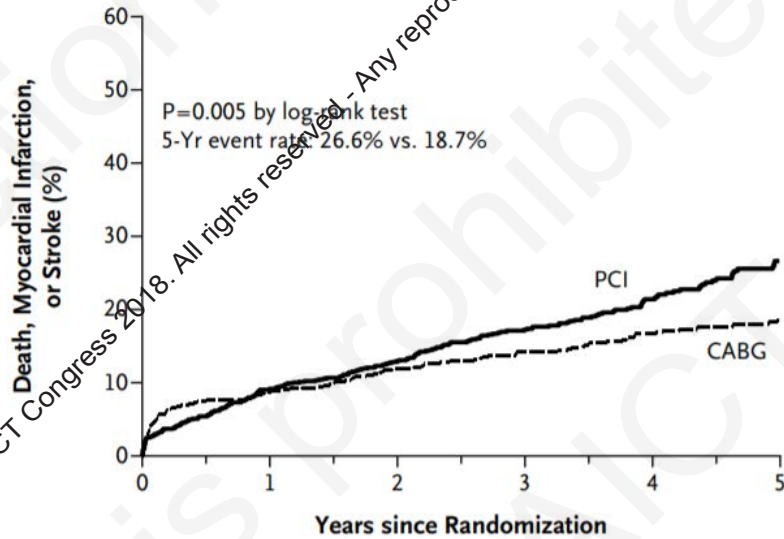


**C High SYNTAX Score**



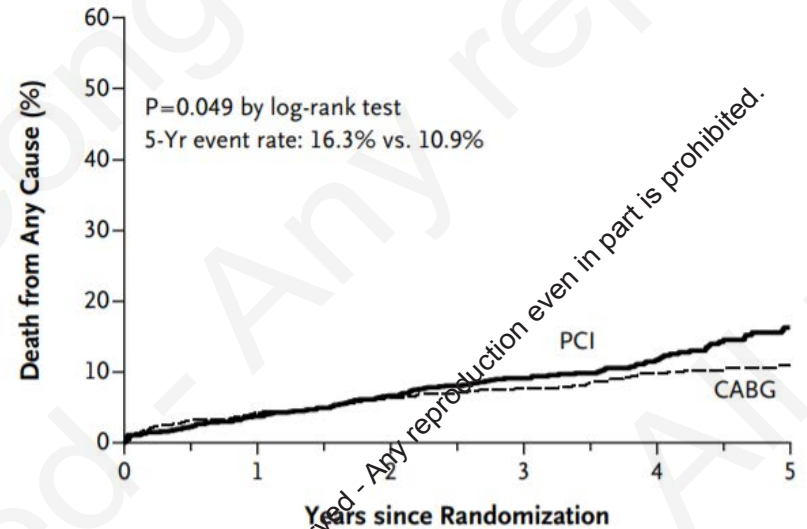
# Strategies for Multivessel Revascularization in Patients with Diabetes

**A Primary Outcome**



No. at Risk							
PCI	953	848	788	625	416	219	
CABG	947	814	758	613	422	221	

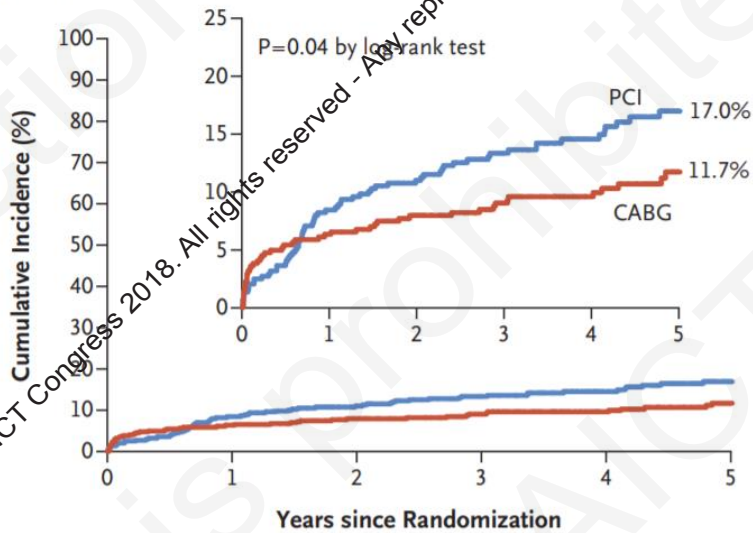
**B Death**



No. at Risk							
PCI	953	845	685	466	243		
CABG	947	855	806	655	449	238	

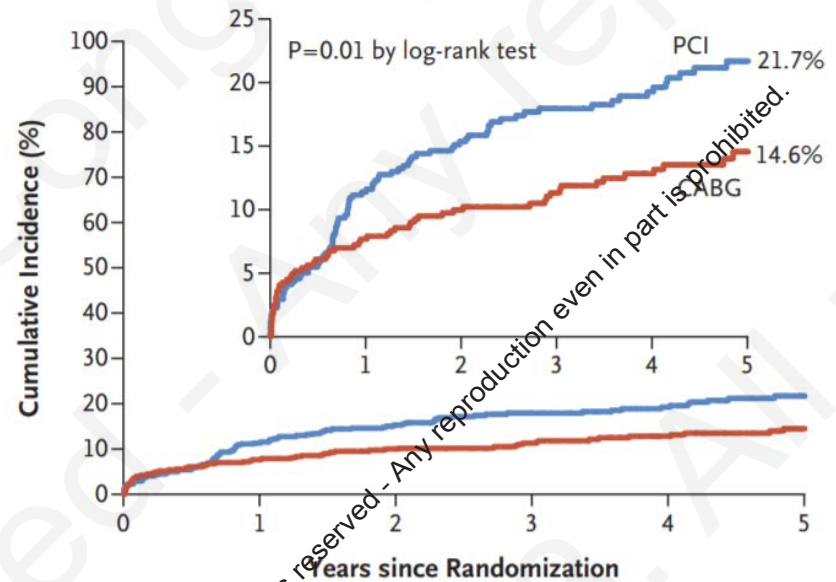
# Trial of Everolimus-Eluting Stents or Bypass Surgery for Coronary Disease

**A Primary Composite End Point**



No. at Risk	0	1	2	3	4	5
PCI	438	402	362	305	242	126
CABG	442	415	377	326	262	145

**B Death, Myocardial Infarction, Stroke, or Repeat Revascularization**



No. at Risk	0	1	2	3	4	5
PCI	438	389	341	288	229	117
CABG	442	409	368	317	250	137

BEST TRIAL

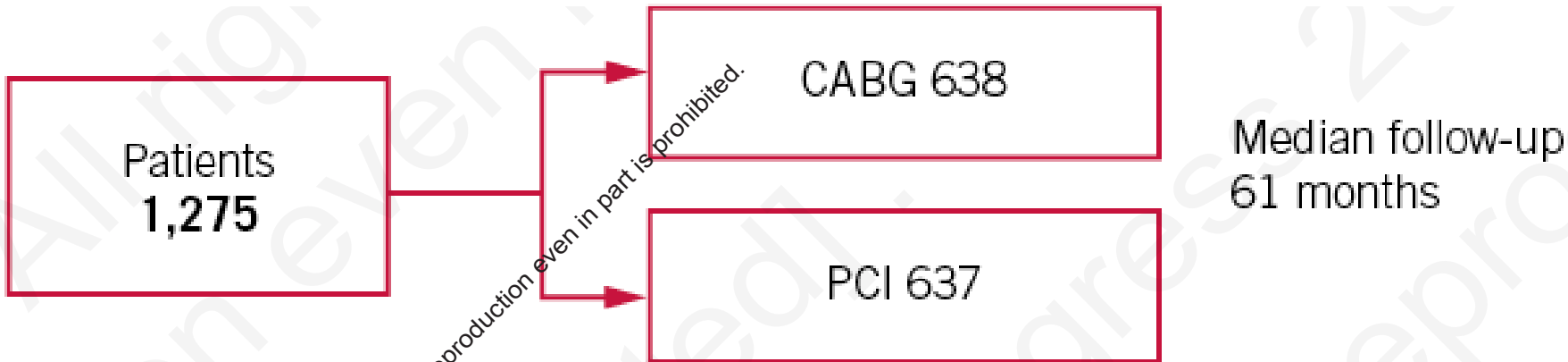
Park et al n engl j med 372;13, 2015

**Recommendation for the type of revascularization (CABG or PCI) in patients with SCAD with suitable coronary anatomy for both procedures and low predicted surgical mortality.**

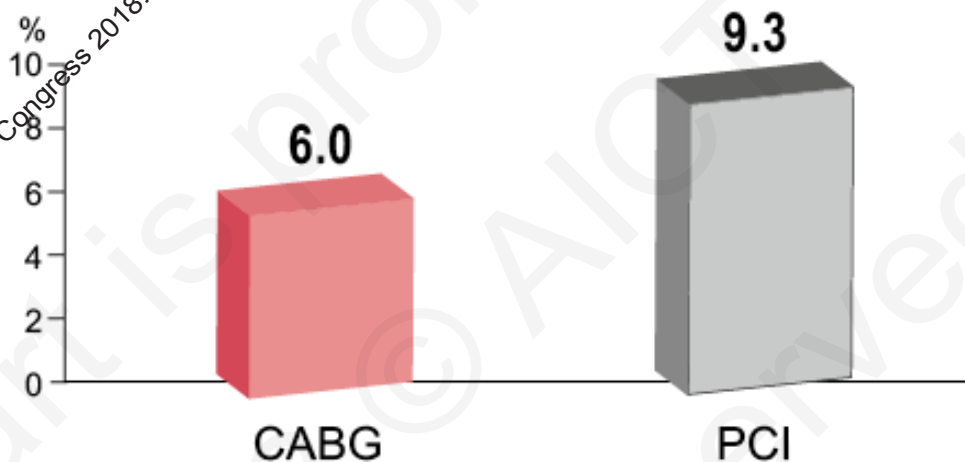
Recommendations according to extent of CAD	CABG		PCI		Ref <sup>c</sup>
	Class <sup>a</sup>	Level <sup>b</sup>	Class <sup>a</sup>	Level <sup>b</sup>	
One or two-vessel disease without proximal LAD stenosis.	IIb	C	I	C	
One-vessel disease with proximal LAD stenosis.	I	A	I	A	107,108,160, 161,178,179
Two-vessel disease with proximal LAD stenosis.	I	B	I	C	108,135,137
Left main disease with a SYNTAX score ≤ 22.	I	B	I	B	17,134,170
Left main disease with a SYNTAX score 23–32.	I	B	IIa	B	17
Left main disease with a SYNTAX score >32.	I	B	III	B	17
Three-vessel disease with a SYNTAX score ≤ 22.	I	A	I	B	17,157,175,176
Three-vessel disease with a SYNTAX score 23–32.	I	A	III	B	17,157,175,176
Three-vessel disease with a SYNTAX score >32.	I	A	III	B	17,157,175,176

CABG: coronary artery bypass grafting; LAD: left anterior descending coronary artery; PCI: percutaneous coronary intervention; SCAD: stable coronary artery disease. <sup>a</sup>Class of recommendation. <sup>b</sup>Level of evidence. <sup>c</sup>References.

EuroIntervention 2015;10:1024-1094 published online ahead of print September 2014  
**2014 ESC/EACTS Guidelines on myocardial revascularization**



Death from any cause (median 61 months)  
 HR 0.65 (95% CI 0.43-0.98)  
 p=0.039



**Long-term death after revascularisation non-diabetic patients with MV-disease:  
 SYNTAX / BEST meta-analysis** Chang et al. *J Am Coll Cardiol* 2016;68:29-36



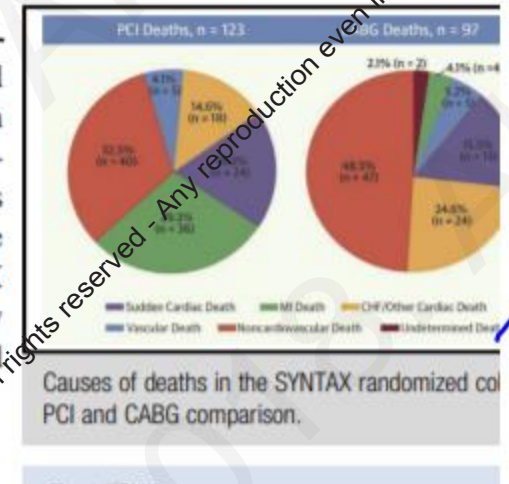
## FEATURED EXPERT OPINION: ACQUIRED: VALVE

### Why surgery won the SYNTAX trial and why it matters

Michael Mack, MD, Heike Baumgarten, MD, and Bruce Lytle, MD

#### ABSTRACT

The Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) trial cause of death analysis shows that cardiac death due to myocardial infarction is 10 times higher with percutaneous coronary intervention than coronary artery bypass grafting in the higher-risk patients. There was a clear advantage for surgery in the prevention of death in both the intermediate and high SYNTAX score groups with 3-vessel disease and in the high SYNTAX score group with left main disease, and that incremental advantage is statistically significant and widening with time, which should be transparently communicated to patients. (J Thorac Cardiovasc Surg 2016;152:1237-40)

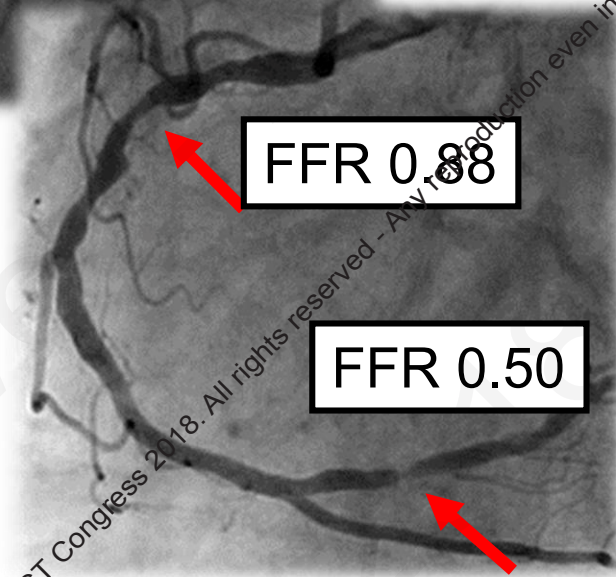
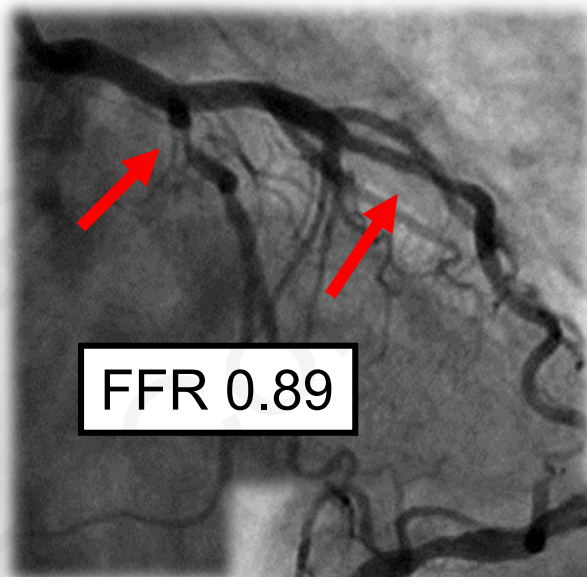
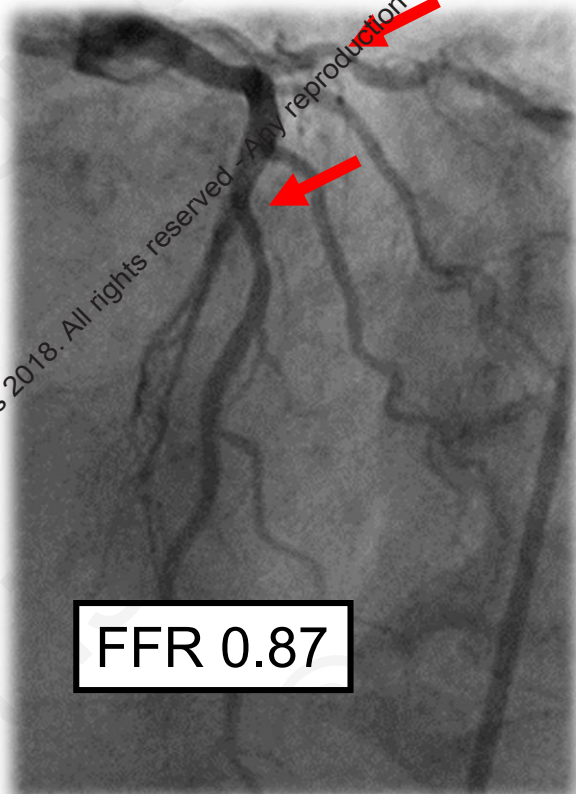


# State of art PCI

- Physiology
- Imaging
- Bifurcation lesions ( using the EBC guidelines)
- CTO management
- Management of calcified lesions
- Quality of stents

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# FFR in stable lesions

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FAME 2	Compare-Acute
<p>ORIGINAL ARTICLE</p> <p><b>Fractional Flow Reserve-Guided PCI for Stable Coronary Artery Disease</b></p> <p>Samir Bajaj, M.D., Ph.D., William F. Fearon, M.D., Nico H.J. Pijls, M.D., Ph.D., Frank de Bruin, M.D., Ph.D., Pim Tonino, M.D., Ph.D., Zsolt Piroth, M.D., Peter Jeger, M.D., Samir Mahabadi, M.D., Gilles Rioufol, M.D., Ph.D., Niko Witt, M.D., Ph.D., Peter Kala, M.D., Philip McCarthy, M.D., Thomas Engström, M.D., Keith Oldroyd, M.D., Kriston Mavromatis, M.D., Ganesh Manoharan, M.D., Peter Verlee, M.D., Ole Frøbert, M.D., Nick Curzen, B.M., Ph.D., Jane B. Johnson, R.N., B.S.N., Andreas Limacher, Ph.D., Eusebio Nunez, Ph.D., and Peter Jansz, M.D., for the FAME 2 Trial Investigators*</p>	<p>ORIGINAL ARTICLE</p> <p><b>Fractional Flow Reserve-Guided Multivessel Angioplasty in Myocardial Infarction</b></p> <p>Pieter C. Smits, M.D., Ph.D., Mohamed Abdel-Wahab, M.D., Franz Josef Neumann, M.D., Bianca M. Boxxma-de Klerk, Ph.D., Ketil Lunde, M.D., Carl E. Serruys, M.D., Zsolt Piroth, M.D., David Horak, M.D., Adrian Włodarczyk, M.D., J. Ong, M.D., Rainer Hambrecht, M.D., Oskar Angerås, M.D., Gert F. van de Walle, M.D., Ph.D., and Elmira Omerovic, M.D., for the Compare-Acute Investigators*</p>

**DANAMI-3-PRIMULTI**

Complete revascularisation versus treatment of the culprit lesion only in patients with ST-segment elevation myocardial infarction and multivessel disease (DANAMI-3-PRIMULTI): an open-label, randomised controlled trial

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# Pooled analysis

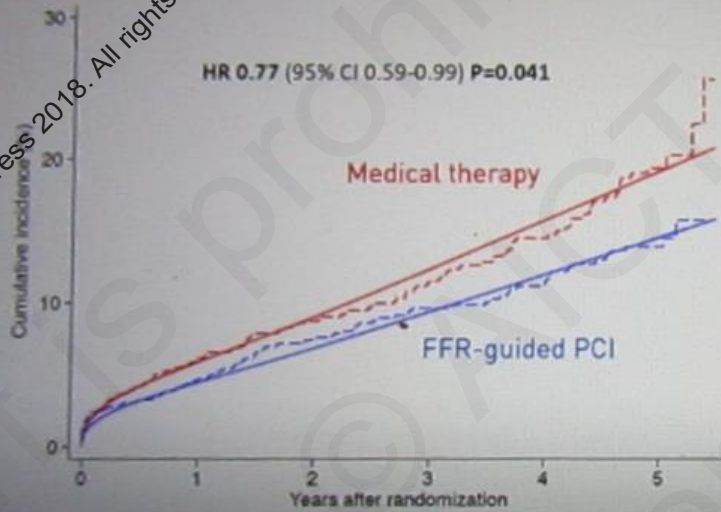
Total number of patients included in this pooled analysis:

- 2400 patients

- 1056 patients randomized to **FFR-guided PCI**
- 1344 patients randomized to **Medical therapy**

- Primary endpoint: cardiac death or myocardial infarction
- Secondary endpoints: composite of all-cause death or myocardial infarction and the individual components: myocardial infarction, cardiac death, and all-cause death
- Subgroup analyses: clinical presentation, patients with at least 1 FFR-positive lesion, age, sex, diabetes

### All-cause death or myocardial infarction



### Myocardial infarction



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# CONCLUSIONS

1. Initial FFR-guided PCI strategy resulted in a sustained clinical benefit, as compared with medical therapy alone, with regard to the composite primary end point of death, myocardial infarction, or urgent revascularization at 5 years.
2. Patients without hemodynamically significant stenoses had a favorable long-term outcome with medical therapy alone.

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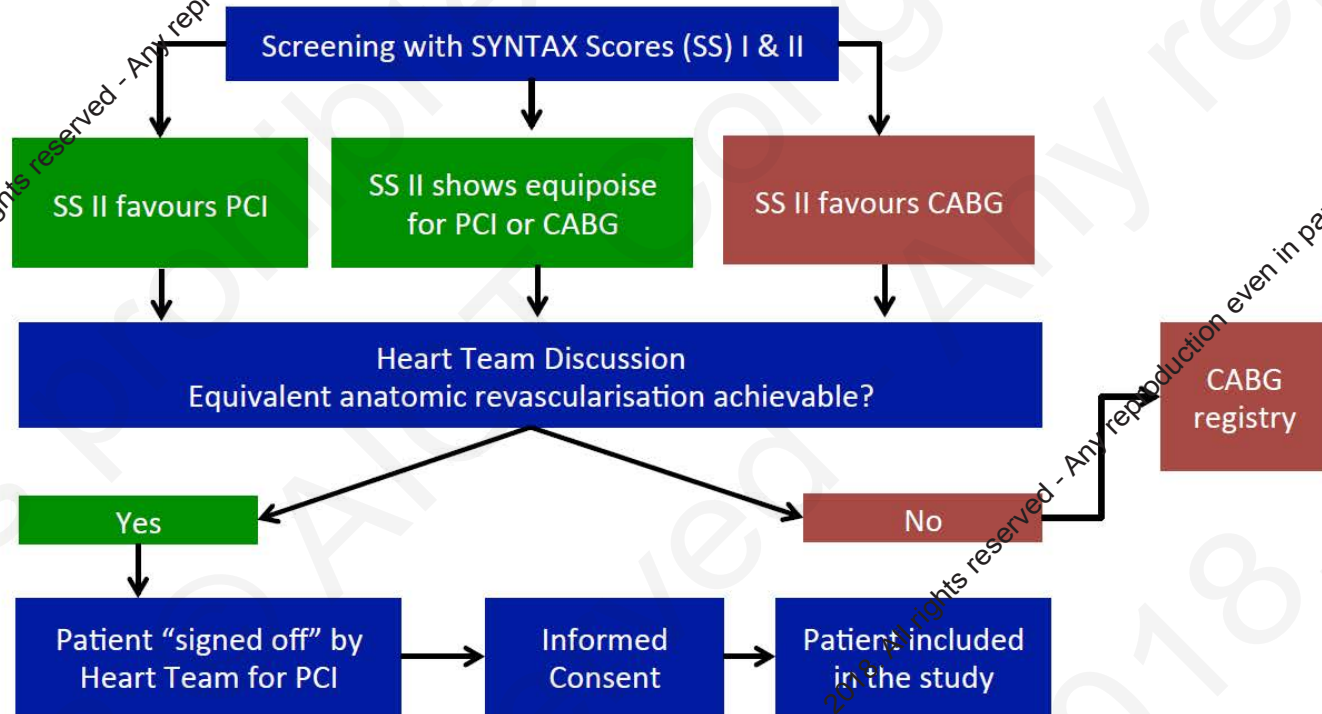
# LIMITATIONS OF OCULOSTENOTIC REFLEX

- The potential benefit of revascularization depends on the presence and extent of myocardial ischemia.
- Performing PCI on nonischemic stenoses is not beneficial and is probably harmful.
- Thus, careful selection of ischemia-inducing stenoses is essential for deriving the greatest benefit from revascularization in patients with stable coronary artery disease.

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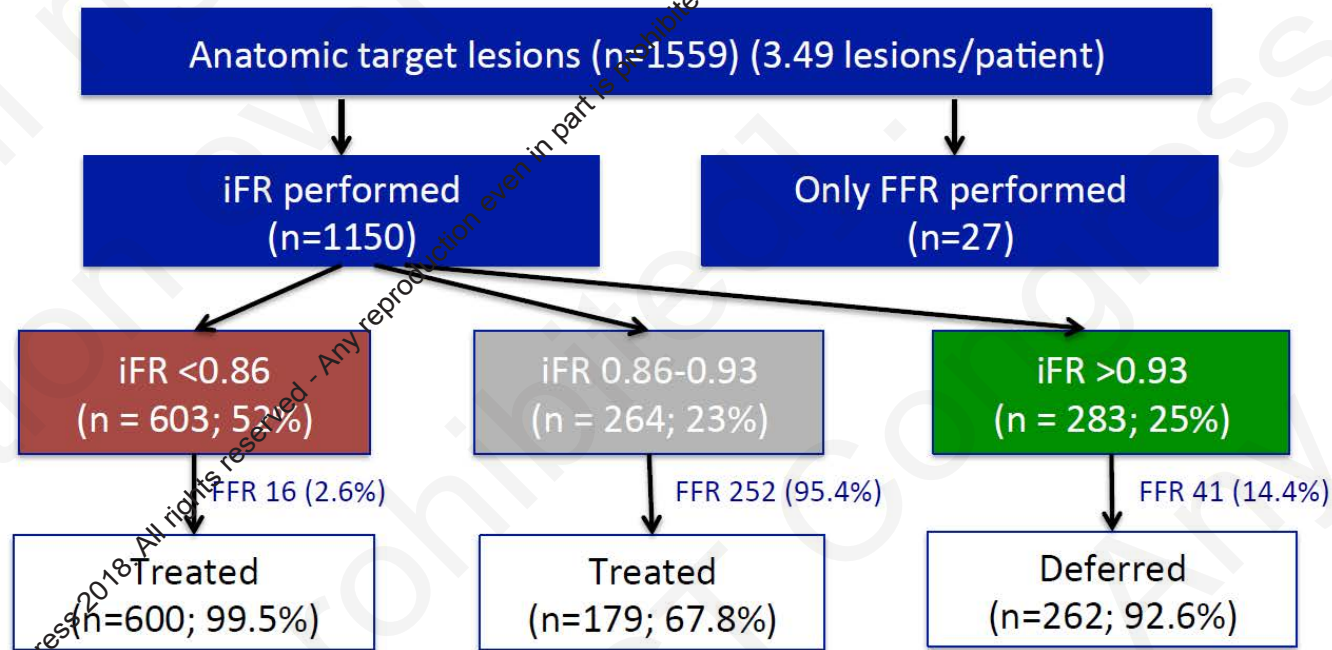
# Study flowchart: patient inclusion



# SYNTAX Score II

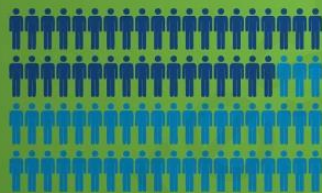
	SYNTAX II	SYNTAX I PCI arm	P value
<b>Components of the SYNTAX Score II</b>			
Age	66.7 ± 9.7	66.7 ± 9.1	0.99
Gender (Male)	93.2%	93.0%	0.93
Cr Clearance (mL/min)	82.0 ± 26.9	87.3 ± 28.5	0.008
Ejection Fraction (%)	58.1 ± 8.3	61.8 ± 11.3	<0.001
Peripheral Vascular Disease	7.7%	9.5%	0.37
COPD	10.8%	12.7%	0.42
Anatomic SYNTAX Score	20.3 ± 6.4	22.8 ± 8.7	<0.001
<b>SYNTAX Score II PCI</b>	<b>30.2 ± 8.6</b>	<b>30.6 ± 8.7</b>	<b>0.528</b>
Predicted 4-yr mortality PCI (%)	8.9 ± 8.8%	9.2 ± 8.7%	0.640
<b>SYNTAX Score II CABG</b>	<b>29.1 ± 10.4</b>	<b>29.1 ± 9.6</b>	<b>1.0</b>
Predicted 4-yr mortality CABG (%)	9.0 ± 9.3	8.5 ± 8.1	0.440

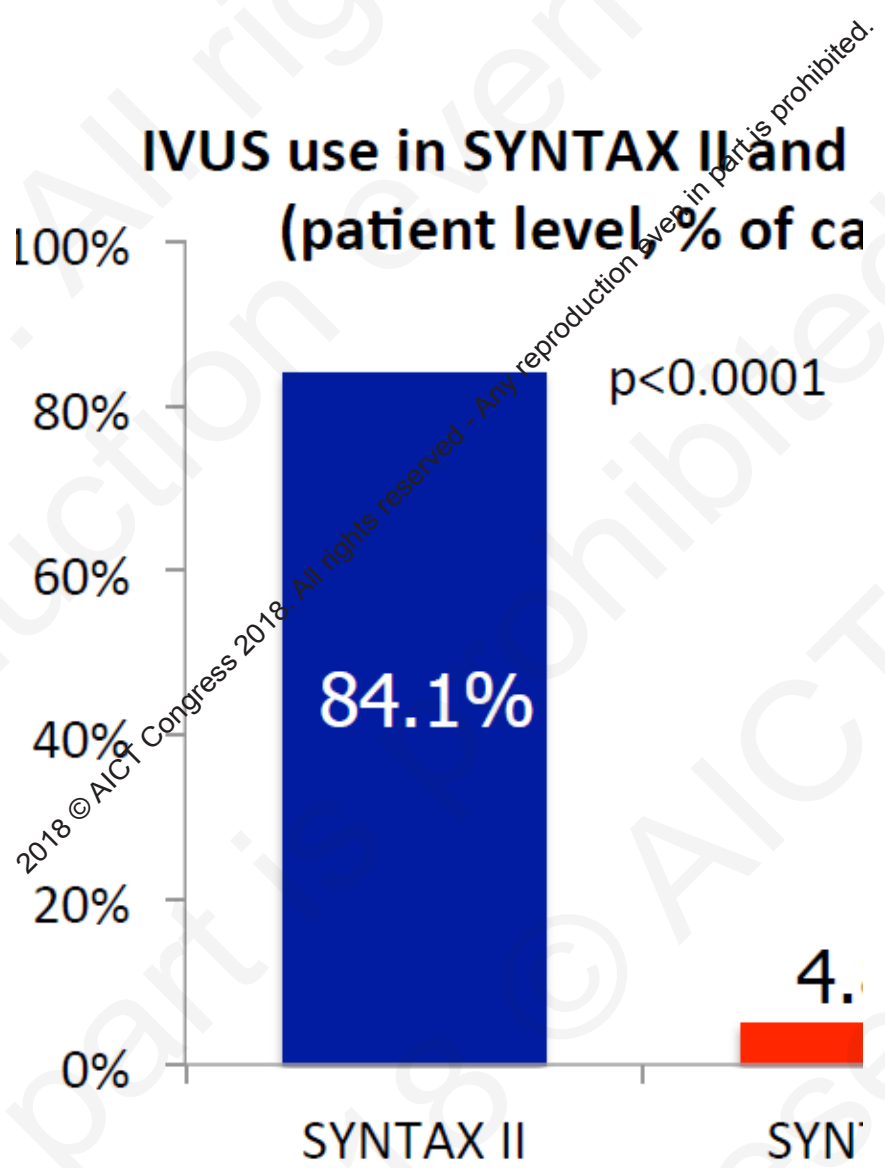
# Physiological stenosis interrogation



## PHYSIOLOGY

The right patients were treated for the right reasons when physiology (FFR/iFR) is utilized.





## STENT OPTIMIZATION

IVUS helps to optimize stent placement as a part of contemporary PCI.

The infographic features a white silhouette of a person holding a green heart with the text "84%" inside. To the right is a donut chart with a green segment and the text "30%".

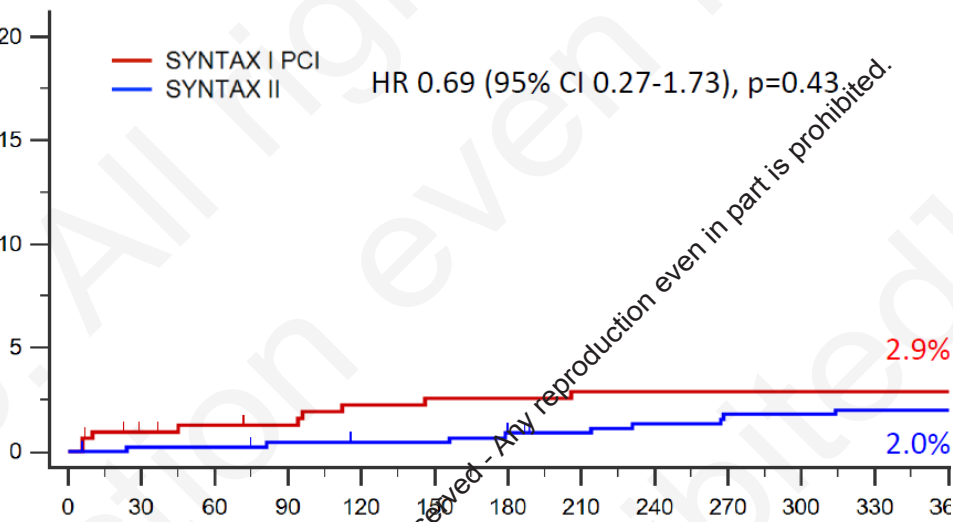
# CTO success in SYNTAX 2 Trial

## ➤ CROSSING

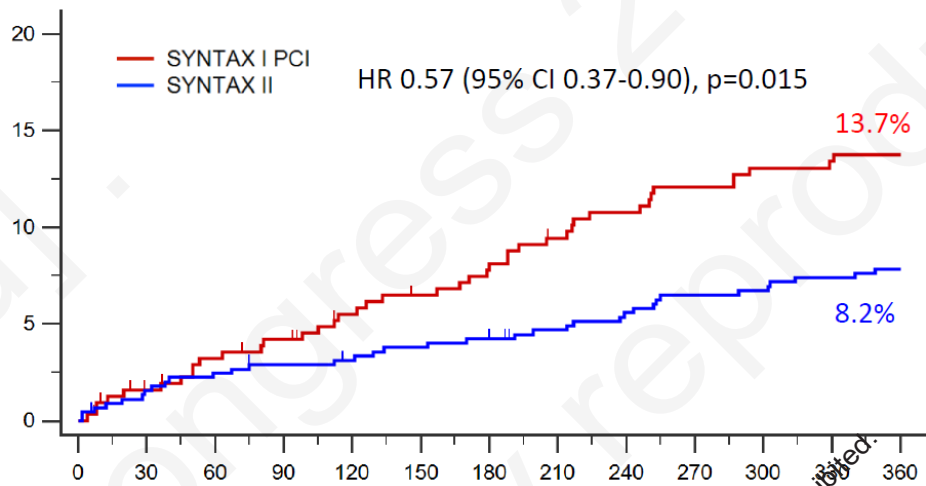
Contemporary CTO PCI in SYNTAX II Trial demonstrated a significantly higher procedural success rate compared to those in SYNTAX I.

PCI with CTO procedural success rates jumped from **53% in SYNTAX I to 87% in SYNTAX II**. Representing a **64% increase in successful CTO treatment**.

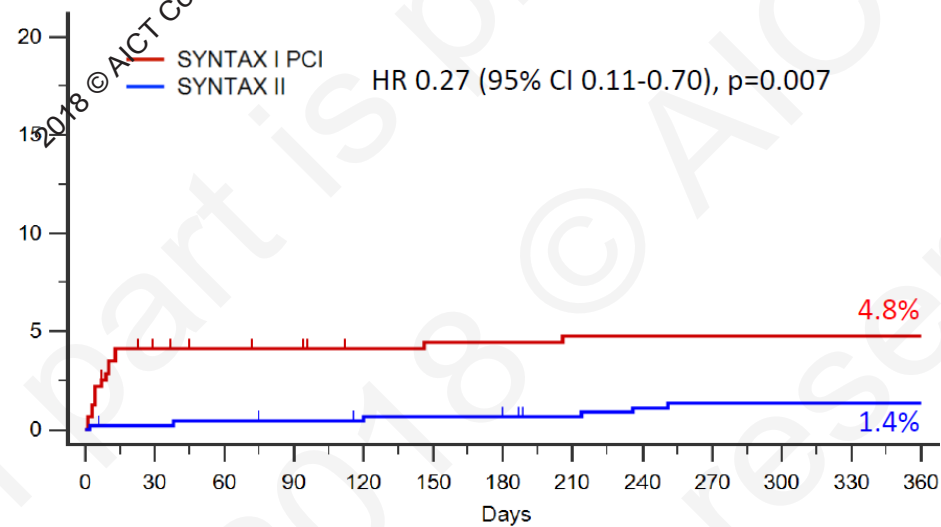




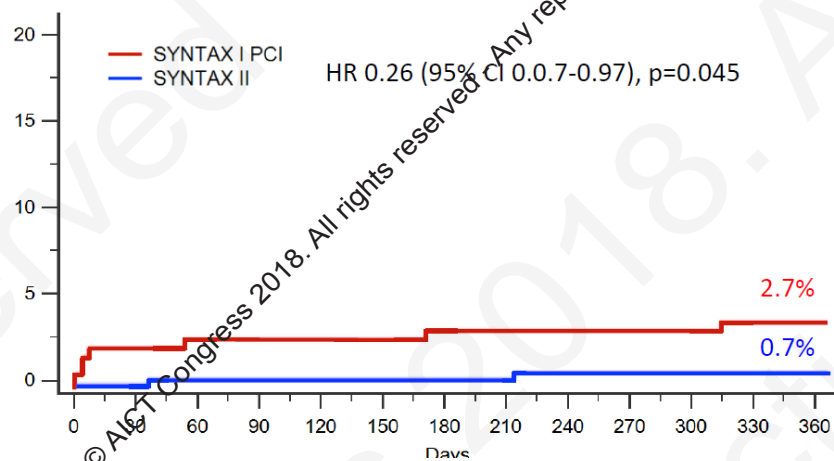
DEATH



ANY REVASCULARISATION



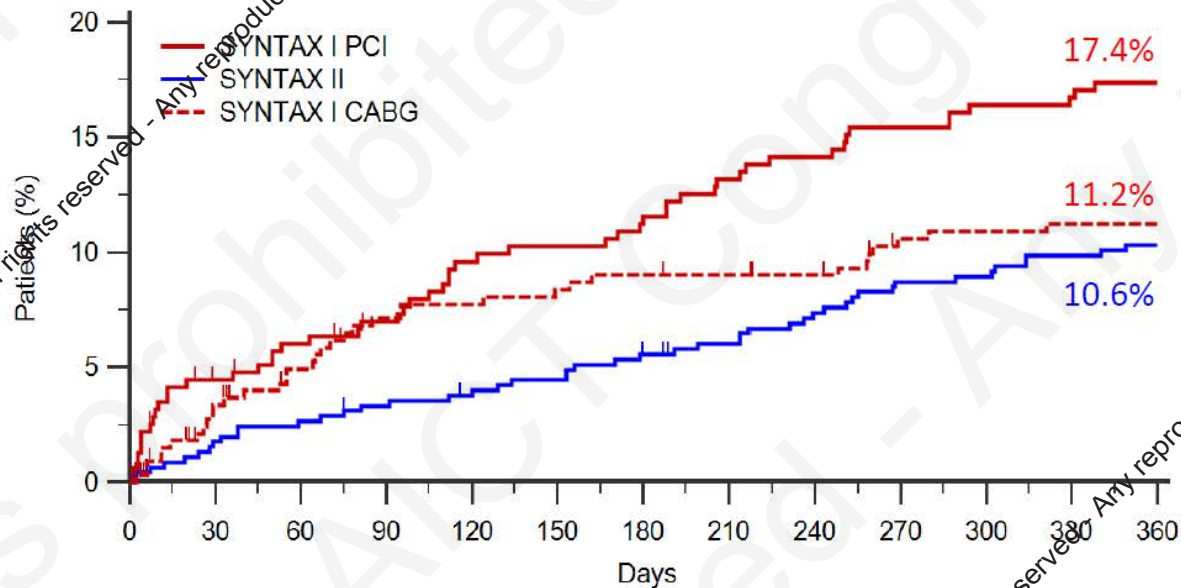
MI



DEFINITE ST



# MACCE SYNTAX II and SYNTAX I PCI / CABG



SYNTAX I PCI	315	298	292	288	280	278	274	269	266	262	259	258	256
SYNTAX II	450	441	437	433	429	427	421	417	411	405	404	400	398
SYNTAX I CABG	334	313	304	295	293	291	289	288	287	279	278	277	277

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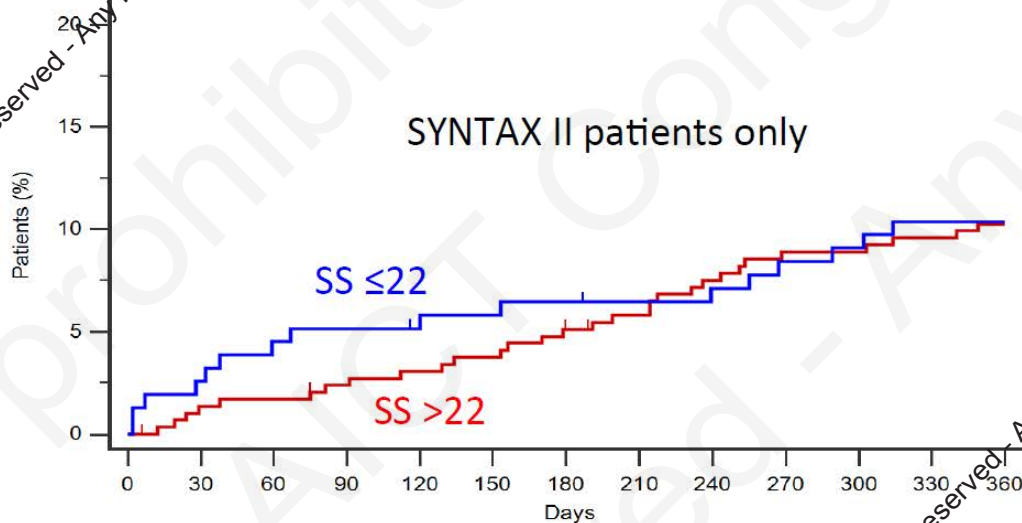
# Advances in the SYNTAX 2 trial

1. New stratification tool – clinical variables
2. Use of IFR and FFR
3. Second generation DES – Synergy
4. IVUS guided stent optimisation (MUSIC criteria)
5. Contemporary CTO revascularisation techniques
6. Guideline based OMT (LDL < 1.8)

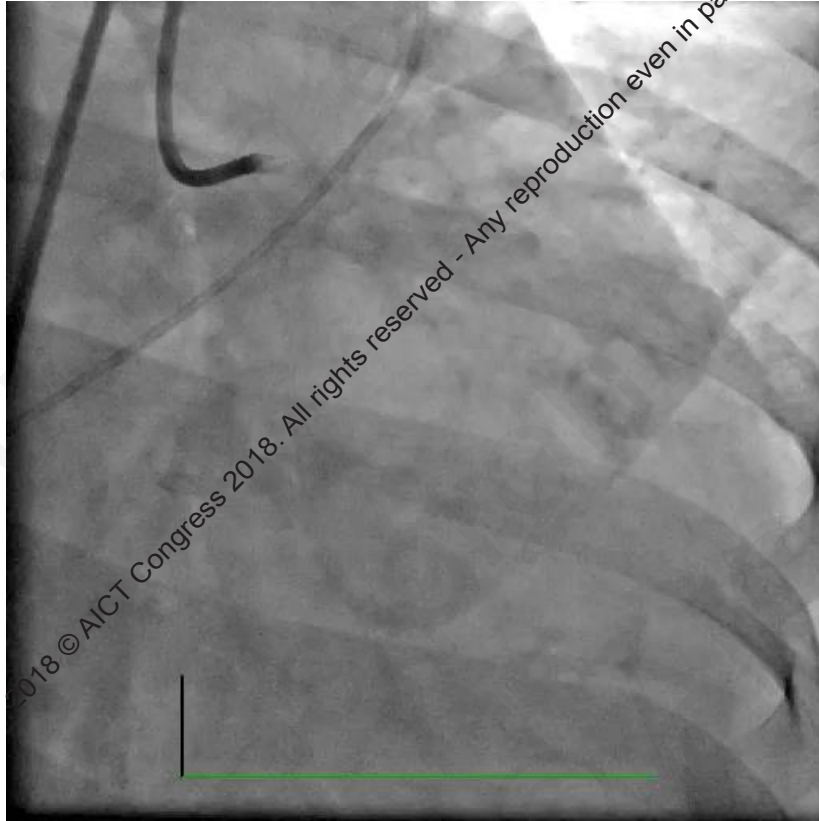




## SYNTAX II MACCE in SS I $\leq 22$ and $>22$



SYNTAX SCORE $>22$	295	290	289	286	284	282	277	274	269	265	263	261
SYNTAX SCORE $\leq 22$	155	151	148	147	145	145	144	143	142	140	139	137



Case  
64 yrs old lady  
Type 2 diabetes on insulin for >20 yrs  
HbA1c- 8.8  
Severe Diabetic Neuropathy ,  
Retinopathy

Symptoms – 2 HF admissions in 3 months  
LVEF – 25% , PASP -48mm, mild MR  
PET scan – no infarction , large areas of Hibernation  
S Creatinine 1.2 mg%, Urine micoalbuminuria present


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## SYNTAX Score overview

The SYNTAX Score has been calculated successfully for this patient.


Please note that this anatomy was not covered in the SYNTAX Trial.

Print results or save as PDF  
The fields below are optional

 Patient ID:

Name:

Date of birth:

 Continue with next patient  
Current data will be lost, please print/save first

## SYNTAX Score II



Decision making -between CABG and PCI- guided by the SYNTAX Score II to be endorsed by the Heart Team.

### PCI

SYNTAX Score II: 53.8  
PCI 4 Year Mortality: 40.7 %

### CABG

SYNTAX Score II: 26.4  
CABG 4 Year Mortality: 5.1 %

Treatment recommendation: CABG

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# Heart Team Approach

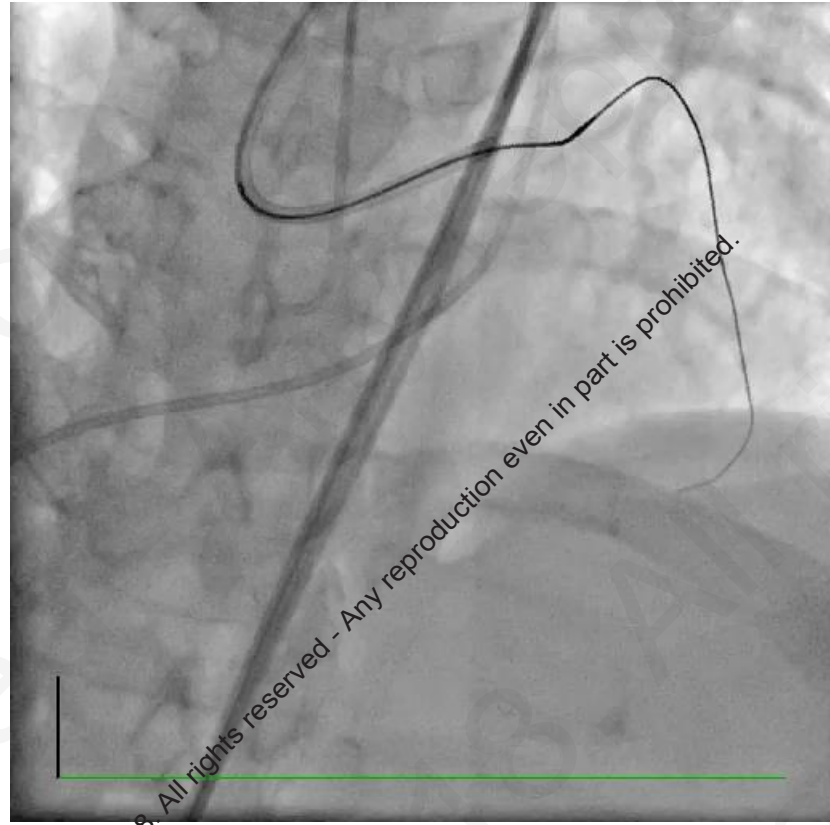
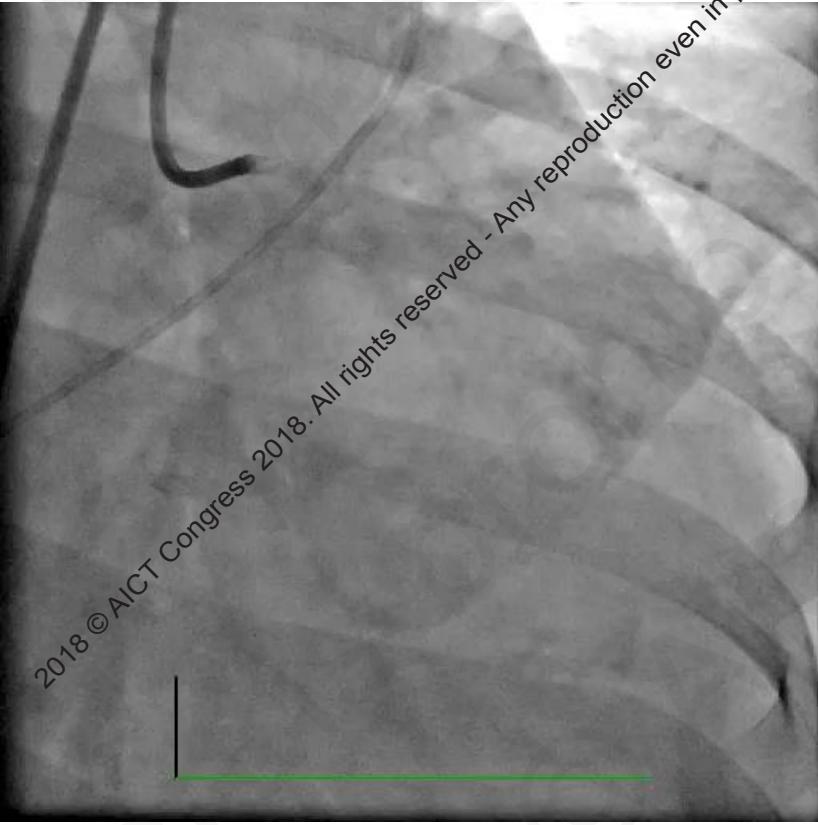
Cardiologist

Cardiac  
Surgeon

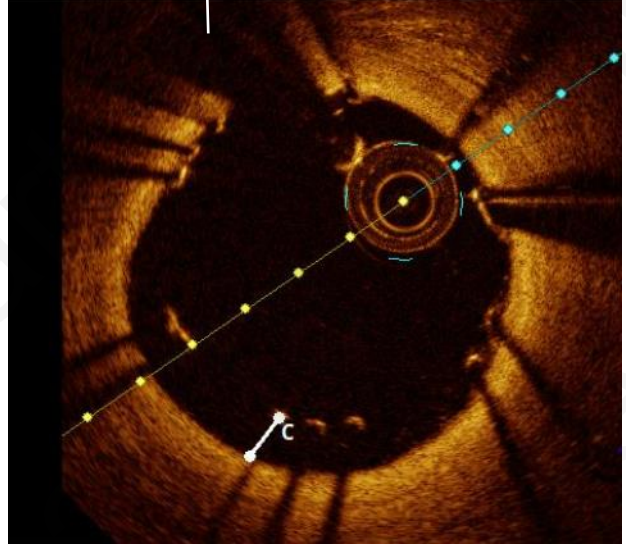
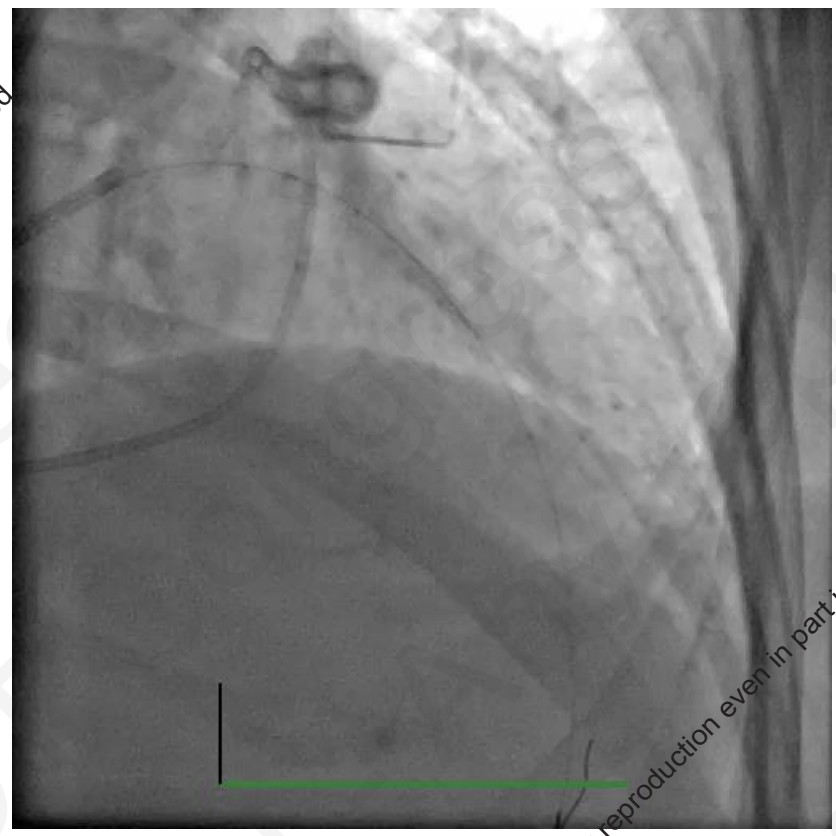
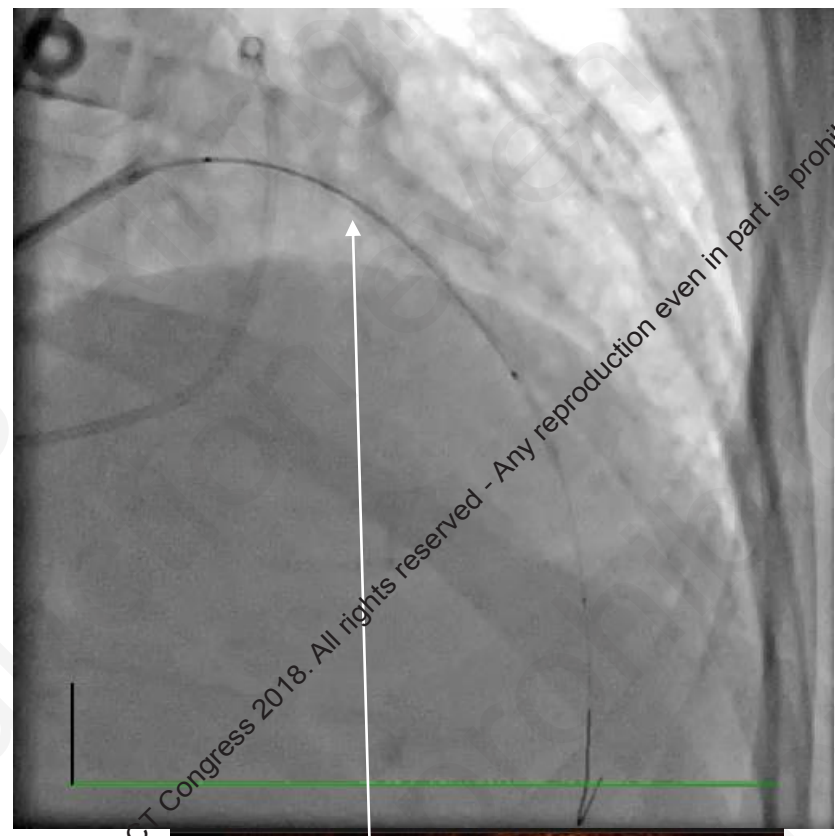
Patient and  
Family

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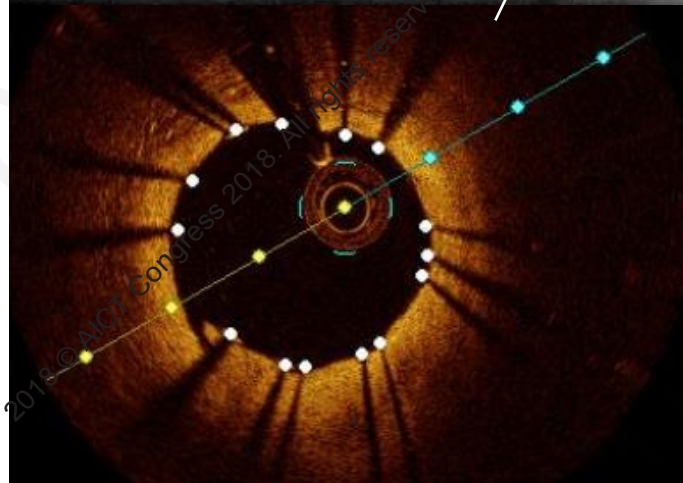
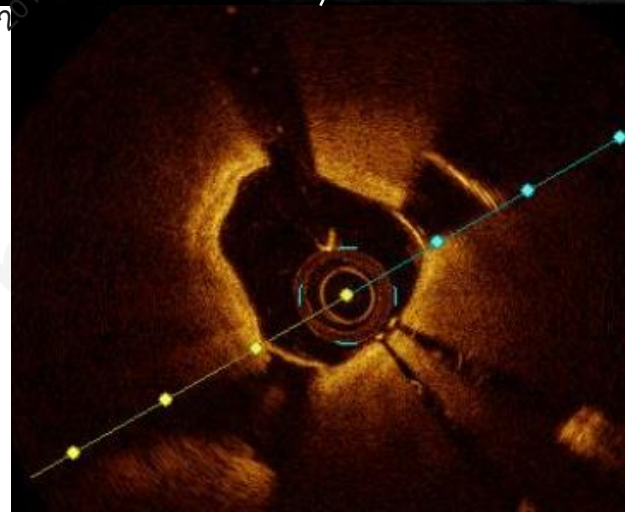
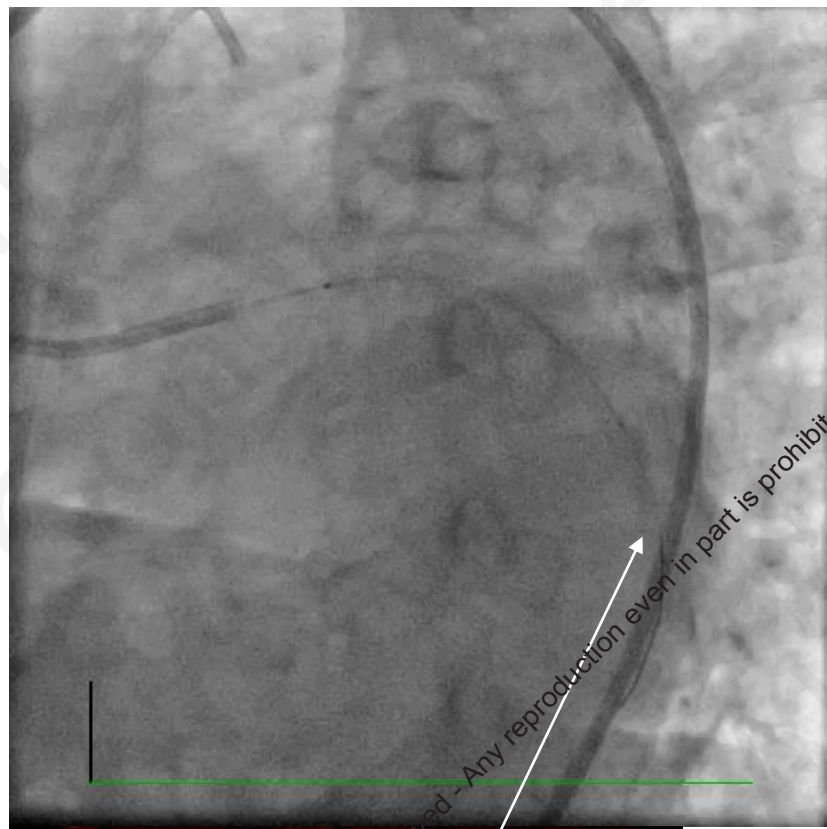
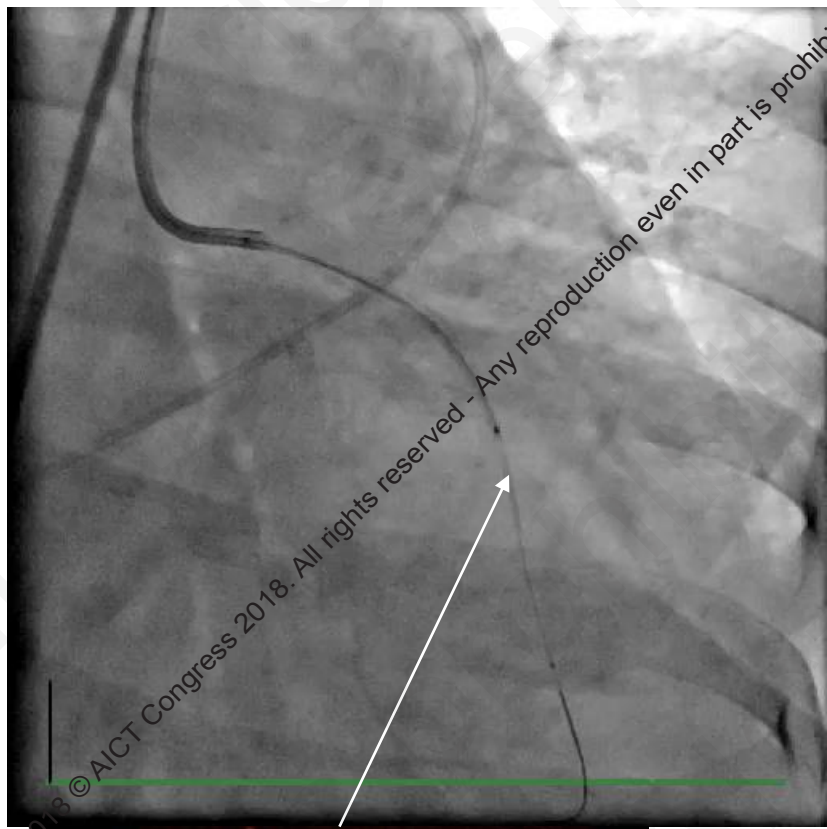


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# Follow up at 6 m

- LVEF – 45%
- Asymptomatic
- Diabetes still controlled
- OMT = ARNI , beta blockers , ivabradine high dose  
statins , aspirin and ticagrelor
- Diabetes is still uncontrolled

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# CONCLUSION

## **Multivessel PCI on its 40th anniversary: finally a match for CABG?**

Gregg W Stone ✉

*European Heart Journal*, Volume 38, Issue 42, 7 November 2017, Pages 3135–3138,

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