



HOT TOPICS IN CARDIOLOGIA 2024

27 e 28 Novembre 2024

Villa Doria D'Angri - Via F. Petrarca 80,
Napoli

Rivascolarizzazione
percutanea nella sindrome
coronarica cronica: quali
indicazioni dalle
nuove linee guida?

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UOC Cardiologia con UTIC

2024 ESC Guidelines for the management of chronic coronary syndromes



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¹ Representing the European Association for Cardio-Thoracic Surgery (EACTS)

New recommendations (16)



Recommendations	Class	Level
Assessment of procedural risks and post-procedural outcomes		
Intracoronary imaging guidance by IVUS or OCT is recommended when performing PCI on anatomically complex lesions, in particular left main stem, true bifurcations, and long lesions.	I	A
Intracoronary pressure measurement (FFR or iFR) or computation (QFR):		
• is recommended to guide lesion selection for intervention in patients with multivessel disease;	I	A
• should be considered at the end of the procedure to identify patients at high risk of persistent angina and subsequent clinical events;	IIa	B
• may be considered at the end of the procedure to identify patients who are not amenable to treatment with additional PCI.		
Choice of revascularization modality		
It is recommended that physicians select the most appropriate revascularization strategy based on patient profile, coronary anatomy, procedural factors, and outcome expectations.		

New recommendations (17)



Recommendations	Class	Level
Mode of revascularization in patients with chronic coronary syndrome		
Left main disease		
In CCS patients at low surgical risk with significant left main coronary stenosis, CABG:		
• is recommended over medical therapy alone to improve survival;	I	A
• is recommended as the overall preferred revascularization mode over PCI, given the lower risk of spontaneous myocardial infarction and repeat revascularization.	I	A
In CCS patients with significant left main coronary stenosis of low complexity (SYNTAX score <22), PCI should be considered as an alternative to CABG, given its lower invasiveness and non-inferior survival.	I	A

Revised recommendations (18)



2018 Guidelines on myocardial revascularization	Class	Level	2024 Guidelines	Class	Level
Anatomically and clinically based recommendations for revascularization in CCS					
Left main with multivessel disease					
For left main disease with high SYNTAX score (≥ 33), PCI.	III	B	In CCS patients at high surgical risk, PCI may be considered over medical therapy alone.	IIb	B
Multivessel disease and diabetes					
For CCS patients with diabetes and three-vessel disease with low SYNTAX score 0–22, PCI.	IIb	A	In CCS patients at very high surgical risk, PCI should be considered over medical therapy alone to reduce symptoms and adverse outcomes.	IIa	B
For CCS patients with diabetes and three-vessel disease with intermediate or high SYNTAX score (>22), PCI.	III	A			

2024 ESC Guidelines for the management of chronic coronary syndromes (European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

Revised recommendations (16)

2018 Guidelines on myocardial revascularization	Class
Recommendations for revascularization in patients with chronic coronary syndrome	
Revascularization to improve outcomes - In patients with one- or two-vessel disease, PCI should be considered as an alternative to CABG when complete revascularization is achieved.	IIa

In patients with three-vessel disease, PCI should be considered after careful evaluation by the Heart Team, taking into account the patient's coronary anatomy, the expected completeness of revascularization, and the presence of comorbidities.

Revised recommendations (17)

2018 Guidelines on myocardial revascularization	Class	Level	2024 Guidelines	Class	Level
Anatomically and clinically based recommendations for revascularization in CCS					
Left main disease					
Left main disease with low SYNTAX score (0 - 22), PCI.	I	A	In CCS patients with significant left main coronary stenosis of low complexity (SYNTAX score ≤ 22), in whom PCI can provide equivalent completeness of revascularization to that of CABG, PCI is recommended as an alternative to CABG, given its lower invasiveness and non-inferior survival.	I	A
Left main disease with intermediate SYNTAX score (23 - 32), PCI.	IIa	A	In CCS patients with significant left main coronary stenosis of intermediate complexity (SYNTAX score 23–32), in whom PCI can provide equivalent completeness of revascularization to that of CABG, PCI should be considered, given its lower invasiveness and non-inferior survival.	IIa	A

2024 ESC Guidelines for the management of chronic coronary syndromes (European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

Recommendations	Class	Level
Mode of revascularization in patients with chronic coronary syndrome		
Left main disease		
In CCS patients at low surgical risk with significant left main coronary stenosis, CABG should be considered as the preferred revascularization mode over PCI, given the lower risk of spontaneous myocardial infarction and repeat revascularization.	I	C
In CCS patients at intermediate surgical risk with significant left main coronary stenosis, CABG should be considered as the preferred revascularization mode over PCI, given the lower risk of spontaneous myocardial infarction and repeat revascularization.	I	C
Choice of revascularization modality		
In CCS patients at low surgical risk with significant left main coronary stenosis, CABG should be considered as the preferred revascularization mode over PCI, given the lower risk of spontaneous myocardial infarction and repeat revascularization.	I	C

2024 ESC Guidelines for the management of chronic coronary syndromes (European Heart Journal; 2024 – doi: 10.1093/eurheartj/ehae177)

Figure 1
Central illustration:
Clinical presentations
of CCS and
mechanisms of
myocardial ischaemia

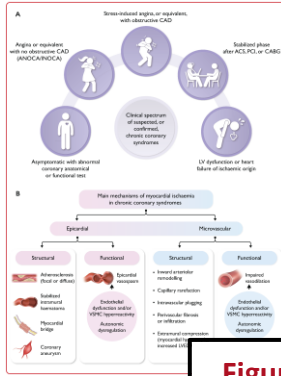


Figure 4
Estimation of the
clinical likelihood of
obstructive CAD

1 Symptom score (0–3 points)

Chest pain characteristics		Symptom score
Type and location	Constricting discomfort located retrosternally or in neck, jaw, shoulder or arm (1 point)	Main symptom either: Chest pain (0–3 points) or Dyspnoea (2 points)
Aggravated by	Physical or emotional stress (1 point)	
Relieved by	Rest or nitrates within 5 min (1 point)	
Dyspnoea characteristics		
Shortness of breath and/or trouble catching breath aggravated by physical exertion (2 points)		

2 Number of risk factors for CAD (0–5):
Family history, smoking, dyslipidaemia, hypertension and diabetes

3 Risk Factor-weighted Clinical Likelihood (RF-CL)

Figure 5
Adjustment and
reclassification of the
estimated clinical
likelihood of
obstructive CAD

1 Risk Factor-weighted Clinical Likelihood (RF-CL) (Class I)

Number of risk factors	Symptom score 0–1 point		Symptom score 2 points		Symptom score 3 points	
	Women	Men	Women	Men	Women	Men
Age 30–39	0-1	0-1	1-2	1-2	2-3	2-3
Age 40–49	1-2	1-2	2-3	2-3	3-4	3-4
Age 50–59	2-3	2-3	3-4	3-4	4-5	4-5
Age 60–69	3-4	3-4	4-5	4-5	5-6	5-6
Age 70–80	4-5	4-5	5-6	5-6	6-7	6-7

2 Adjust clinical likelihood based on abnormal clinical findings

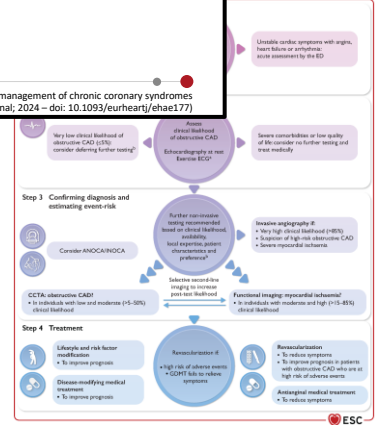
- Raising ECG changes (Q-wave or ST-segment/T-wave changes)
- Exercise ECG with abnormal findings (LV dysfunction (poor or segmental), Non-sustained arrhythmias, Peripheral artery disease, Coronary risk factors on pre-existing chest CT)

3 Consider reclassification of low RF-CL (P=1–15%) using CACS to identify very low (5%) CACS-CL (Class IIa)

Figure 3
Main CCS symptoms:
angina and exertional
dyspnoea

Dyspnoea

Quality	• Difficulty to exhale • With sweating	• Difficulty catching breath
Trigger	• Both at rest and on effort • While coughing	• On effort
Relief	• Slowly subsiding at rest or after initiation of bronchodilators	• Rapidly subsiding after effort discontinuation



La rivascolarizzazione in CCS può

▶ **Migliorare i sintomi**

- ▶ Ridurre angina o equivalente anginosi
- ▶ In caso di Failure della terapia medica ottimale

▶ **Ridurre Ischemia**

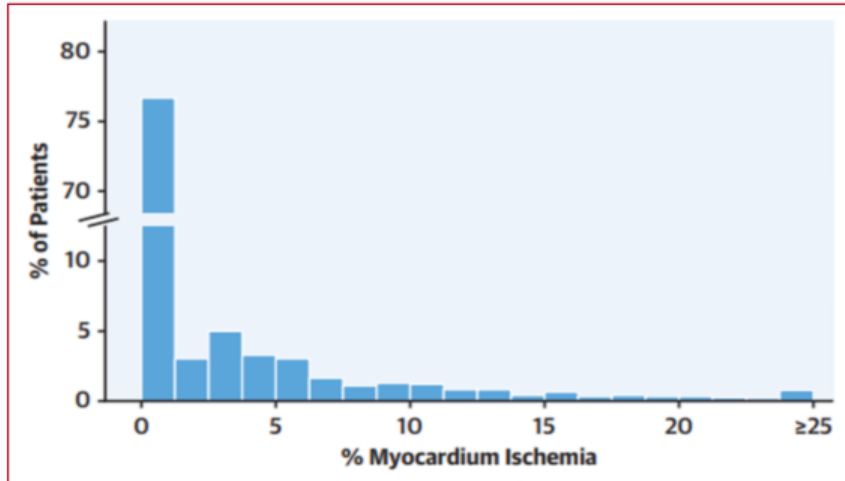
- ▶ Va documentata con test adeguati

▶ **Migliorare la prognosi**

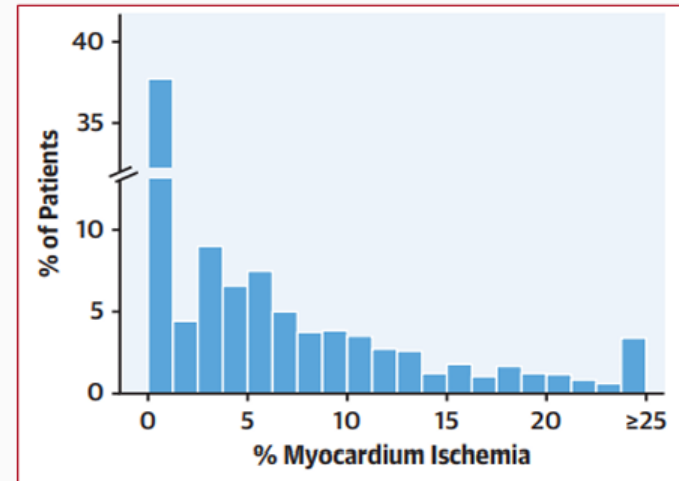
- ▶ Quando vi è estensione della coronaropatia in più vasi
- ▶ Coinvolgimento del Tronco comune
- ▶ Scompenso cardiaco

Proportion of Patients with Ischemic Myocardium as a Function of Ischemia

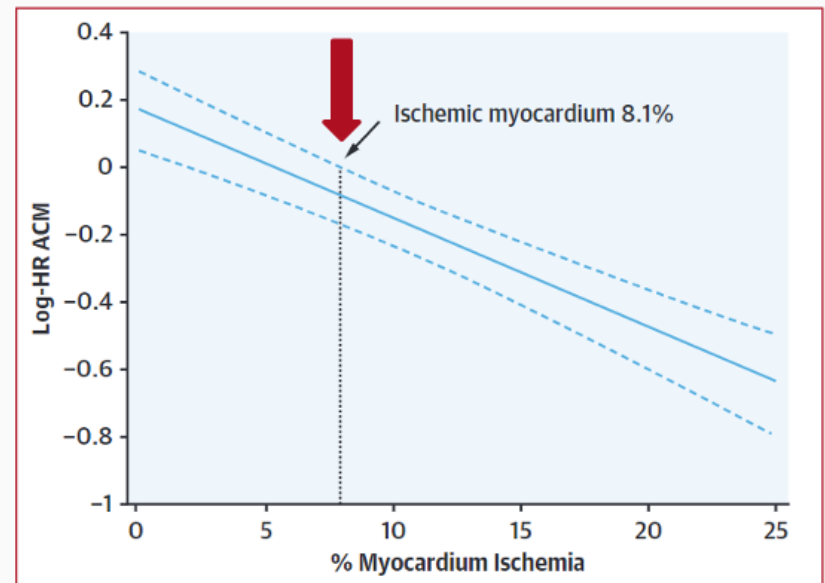
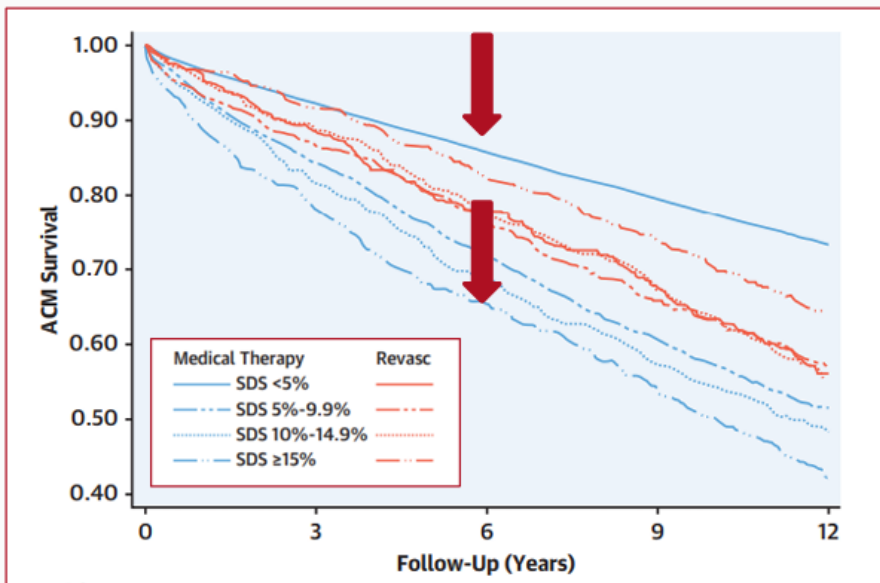
All Patients



Patients with LVEF <45%



Revascularization vs Medical Therapy and Extent of Ischemia



Come calcolare ischemia

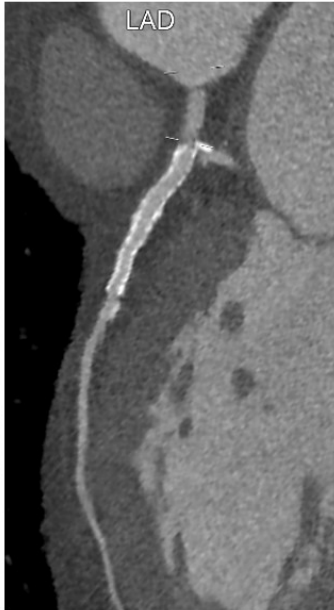
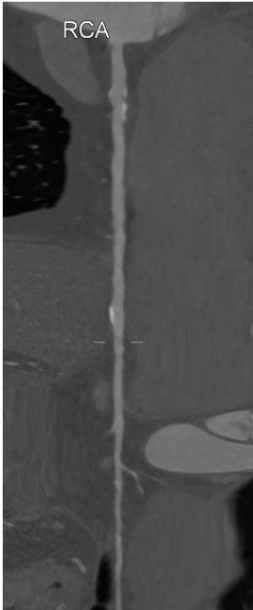
- ▶ PET
- ▶ Stress Ecografia
- ▶ RMN con stress

- ▶ Tac con stress



59 anni M, agosto 2022 NSTEMI sottoposto a PTCA ed impianto di DES su IVA

Clinical case #1

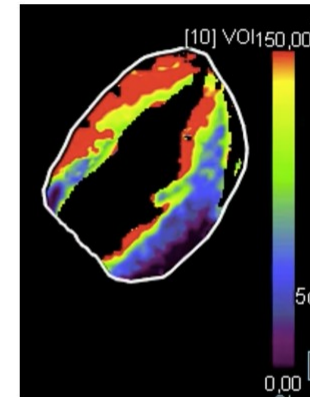
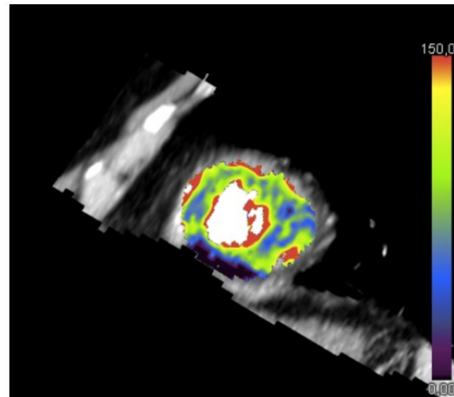
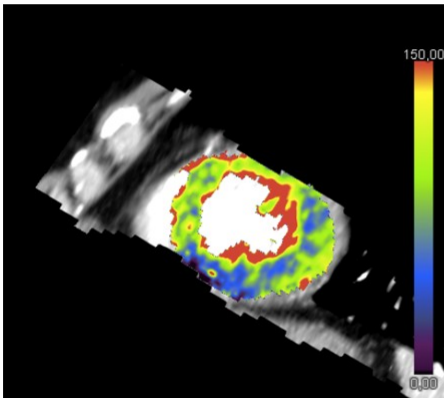


Clinical case #1

CTP Acquisizione: dinamica, scanner DSCT

Stress Agent: regadenoson

Mdc ev: visipaque 320 mg/l, @40 cc 5.5.ml/s



69 Myocardial Blood Flow
MBF / (mL/100mL/min)

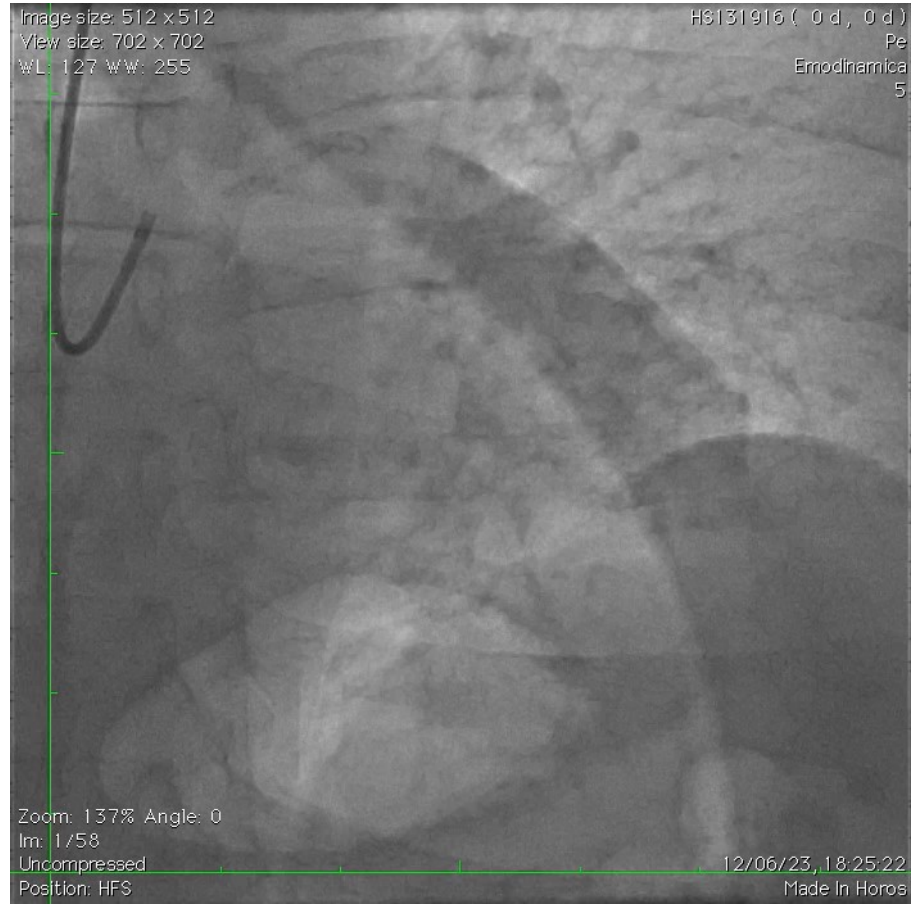


Image size: 512 x 512
View size: 702 x 702
WL: 127 WW: 255

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Pe
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Zoom: 137% Angle: 0
Im: 1/58
Uncompressed
Position: HFS

12/06/23, 18:25:22
Made In Horos

Trattamento del Tronco Comune

- ▶ Pazienti con bassa complessità Syntax <22 possono essere trattati con PCI perché più semplice rispetto al CABG
- ▶ Pazienti con complessità intermedia SYN >23 e <32 , dove PCI può essere completa come con CABG si preferisce la PCI.

Syntax Score

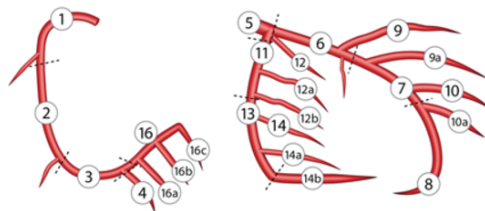
SYNTAX SCORE II

CARDIOALYSIS Boston Scientific

Score: 15 Dominance: right Current lesion: 1/1

For reliable results, please do not use your browser's back button - Calculator version 2.28

Segments:	Lesions:	1
RCA	RCA proximal	1
	RCA mid	2
	RCA distal	3
	Posterior descending	4
	Posterolateral from RCA	16
	Posterolateral from RCA	16a
	Posterolateral from RCA	16b
	Posterolateral from RCA	16c
LM	Left main	5
LAD	LAD proximal	6
	LAD mid	7
	LAD apical	8
	First diagonal	9
	Add. first diagonal	9a
	Second diagonal	10
	Add. second diagonal	10a
LCX	Proximal circumflex	11
	Intermediate/anterolateral	12
	Obtuse marginal	12a
	Obtuse marginal	12b
	Distal circumflex	13
	Left posterolateral	14
	Left posterolateral	14a
	Left posterolateral	14b



3. Specify which segments are diseased for **lesion 1**. 
Click on the coronary tree image to select or unselect segments.

Segments:	Lesion:	1
RCA	RCA proximal	1 <input type="checkbox"/>
	RCA mid	2 <input type="checkbox"/>
	RCA distal	3 <input type="checkbox"/>
	Posterior descending	4 <input type="checkbox"/>
	Posterolateral from RCA	16 <input type="checkbox"/>
	Posterolateral from RCA	16a <input type="checkbox"/>
	Posterolateral from RCA	16b <input type="checkbox"/>
	Posterolateral from RCA	16c <input type="checkbox"/>
LM	Left main	5 <input checked="" type="checkbox"/>
LAD	LAD proximal	6 <input type="checkbox"/>
	LAD mid	7 <input checked="" type="checkbox"/>
	LAD apical	8 <input type="checkbox"/>
	First diagonal	9 <input type="checkbox"/>
	Add. first diagonal	9a <input type="checkbox"/>
	Second diagonal	10 <input type="checkbox"/>
	Add. second diagonal	10a <input type="checkbox"/>
LCX	Proximal circumflex	11 <input checked="" type="checkbox"/>
	Intermediate/anterolateral	12 <input type="checkbox"/>
	Obtuse marginal	12a <input type="checkbox"/>
	Obtuse marginal	12b <input type="checkbox"/>
	Distal circumflex	13 <input type="checkbox"/>
	Left posterolateral	14 <input type="checkbox"/>
	Left posterolateral	14a <input type="checkbox"/>
	Left posterolateral	14b <input type="checkbox"/>

next

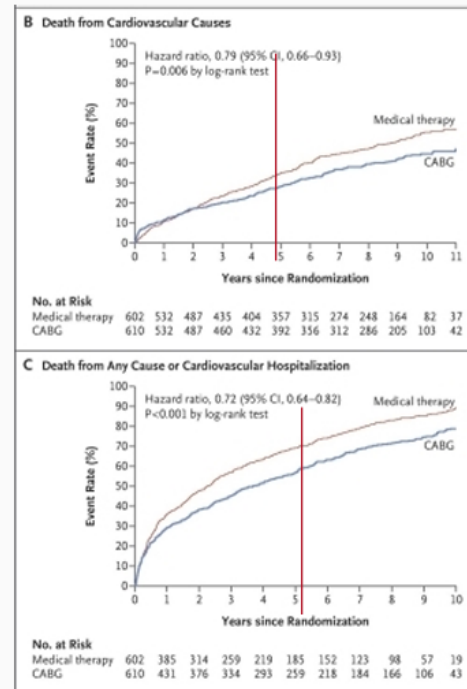
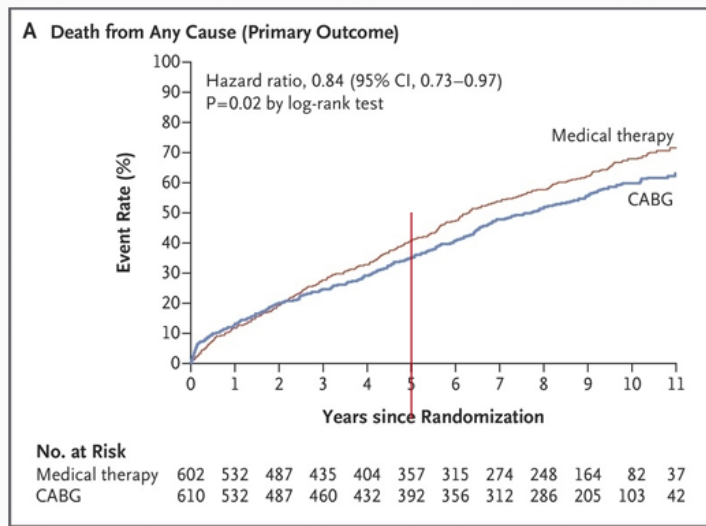
[Click here for segment definitions](#)

Pazienti MVD con FE ridotta

- ▶ Preferire sempre il CABG sulla terapia medica se $FE < 35\%$
- ▶ PCI possibile solo se è alto il rischio chirurgico ma è sconsigliata se Syn score >33
- ▶ PCI o CABG nei casi MVD devono essere valutati da Heart Team
 - ▶ Se non disponibile on site, HT è consigliato per scegliere il miglior trattamento possibile per il paziente
 - ▶ La comunicazione con il paziente deve essere bilanciata e chiara
 - ▶ La scelta del paziente deve essere presa in massima considerazione

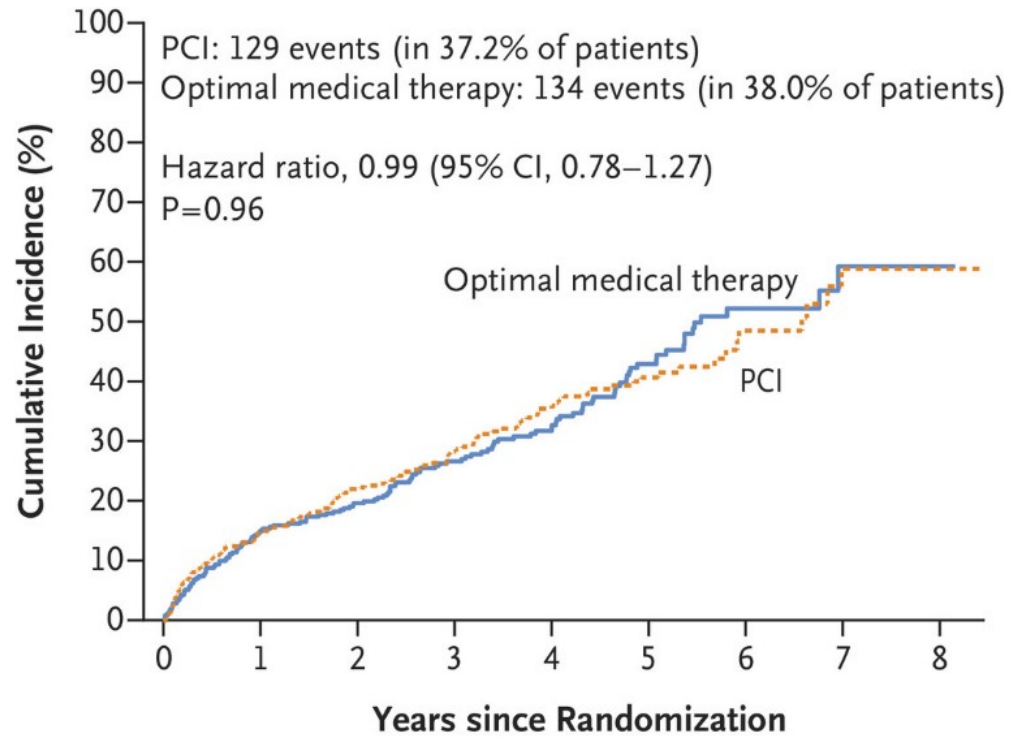
Coronary-Artery Bypass Surgery in Patients with Left Ventricular Dysfunction

STICHES



reduction AMI type I

Revived-BCIS 2



No. at Risk

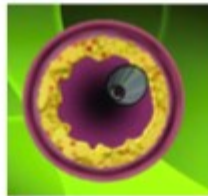
PCI	347	295	262	179	130	80	32	14	3
Optimal medical therapy	353	299	276	191	142	82	33	10	1

Lesion preparation strategies for calcific CAD

Ablative techniques



Rotational atherectomy



Orbital atherectomy

modification/ablation of the plaque composition (especially the hard-calcified component) to promote stent expansion

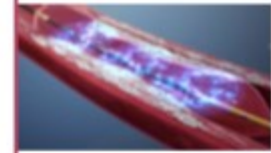
Balloon-based techniques



Super high-pressure balloon



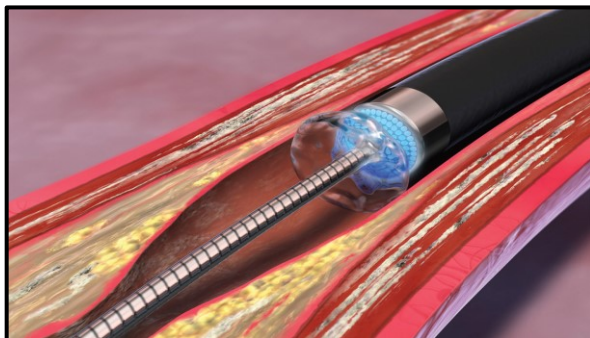
Cutting-/Scoring balloon



Intravascular lithotripsy

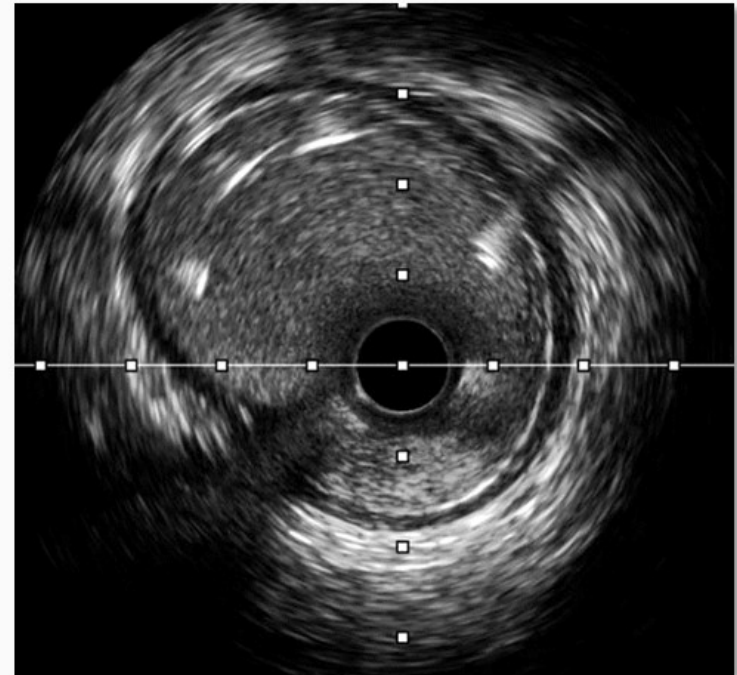
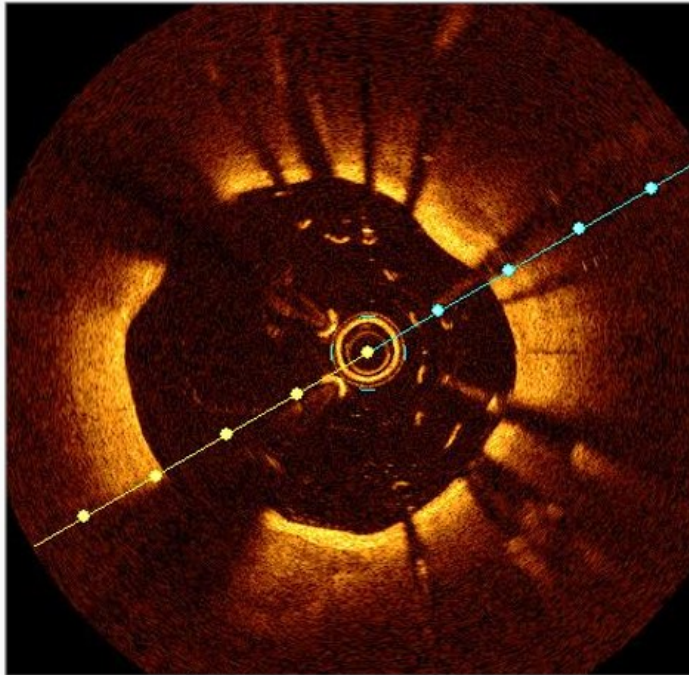
cracking of the calcium component to increase plaque elasticity and allow stent expansion

De Maria et al. JACC Int. 2019



Laser Excimeri

Which intravascular imaging (IVI) for MVD

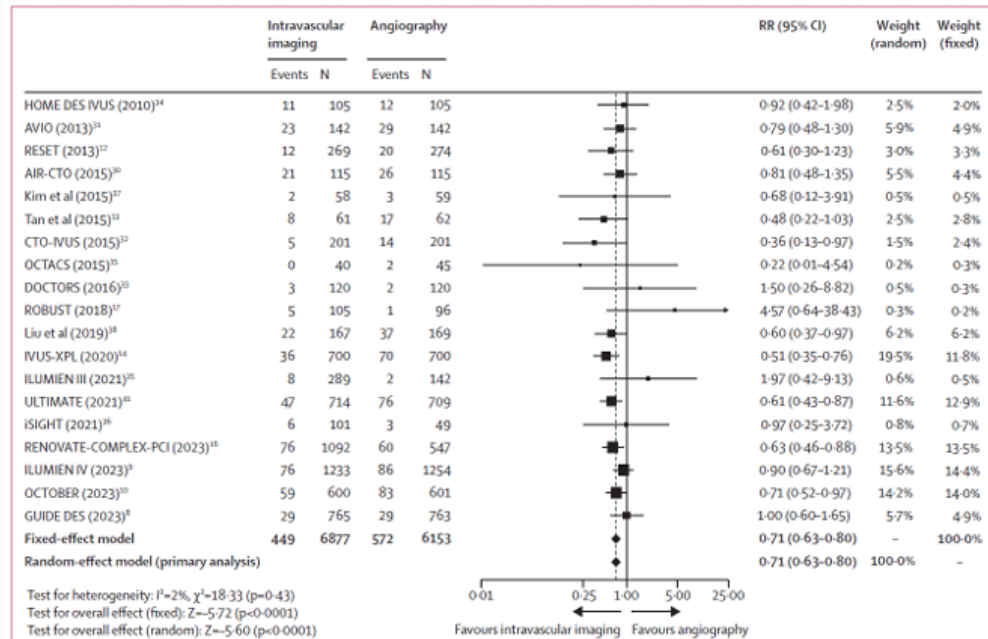


The totality of data

- 22 randomized trials
 - *IVUS vs angiography*
 - *OCT vs angiography*
 - *IVUS or OCT vs angiography*
 - *OCT vs IVUS*
 - All using DES
- 15.964 patients
- Mean FU: 24.7 months
- Primary endpoint: TLF

Intravascular imaging-guided coronary drug-eluting stent implantation: an updated network meta-analysis

Gregg W Stone, Ewald H Christiansen, Ziad A Ali, Lene N Andreassen, Akiko Maehara, Yousef Ahmad, Ulf Landmesser, Niels R Holm



The totality of data

- 22 randomized trials
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 - *OCT vs IVUS*
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IVUS/OCT vs angiography

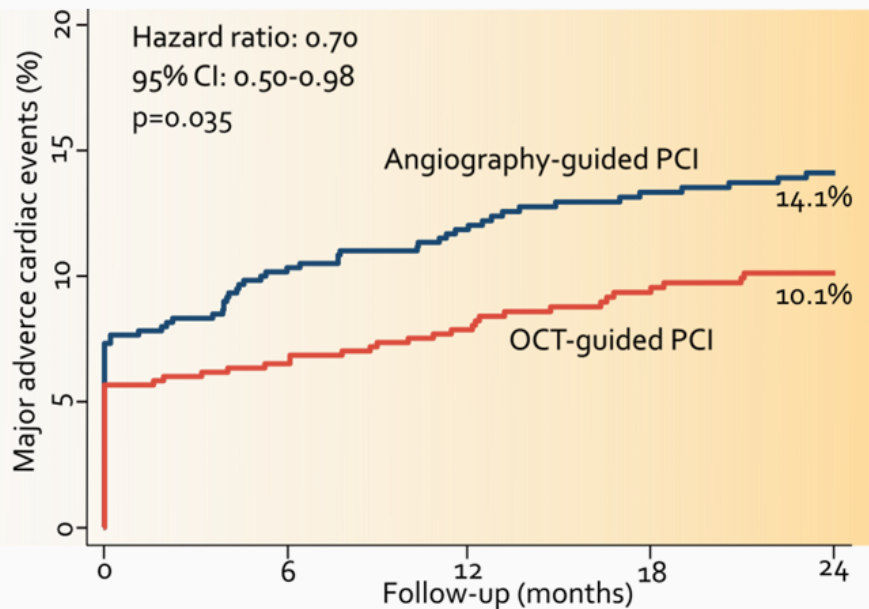
Reduction by imaging-guided PCI:

- Target Lesion Failure: 29%
- Cardiac death: 45%
- Target vessel MI: 18%
- Ischemia-driven TLR: 28%
- Stent thrombosis: 47%
- Any MI: 16%
- All-cause mortality: 25%

Stone et al The Lancet 2024

Since: IVUS-ACS trial and OCCUPI added to the superiority of IVUS and OCT over angiographic guidance

Routine OCT vs ad hoc IVUS (16%)



No. At Risk:	0	6	12	18	24
OCT-guided PCI	600	553	537	472	439
Angiography-guided PCI	601	534	509	452	408



30% RR reduction

THE NEW ENGLAND JOURNAL of MEDICINE

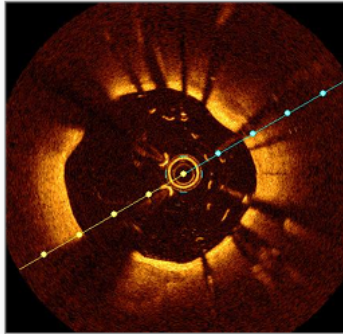
ORIGINAL ARTICLE

OCT or Angiography Guidance for PCI in Complex Bifurcation Lesions
 N.R. Holm, L.N. Anderson, O. Haghighi, P. Laarmann, I. Kuzman, J. Bennett, N.T. Olsen, J. Odenstedt, P. Hoffmann, J. Dem, S. Choudhary, P. Okane, S.H. Bollow Rasmussen, M. Hergert, O. Haindrup, J.P. Van Ruyck, S. Biscaglia, L.J.H. Mogensen, L. Henszki, F. Bazzucchi, C. Hasler-Esk, D. Mylotte, M.S. Linares, L. Koltowski, P. Knaapen, S. Calcic, N. Witt, I. Santos-Pardo, S. Wallons, J. Linnberg, A.T. Kristensen, L.O. Jensen, F. Calais, J. Coddum, A. Mchiche, O.A. Kaganler, T. Hosenhamer, S. Kuecher, A. Elshahar, J.C. Spratt, and E.H. Christiansen, for the OCTOBER Trial Group*

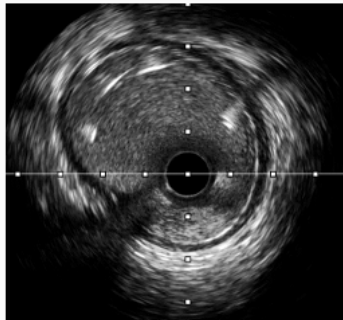
MACE: cardiac death, target lesion myocardial infarction, ischemia-driven target lesion revascularization

Kaplan Meier estimates
 Comparison by unadjusted Cox analysis
 Confirmed by adjusted Cox analysis

Indications that could favor IVUS or OCT

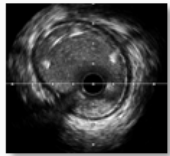


- Culprit detection
- Stent failure
- Complex bifurcations
- Calcified lesions

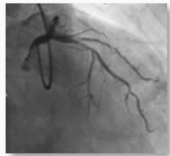


- Ostial Left Main
- CTO
- Renal failure
- Poor guide support

OCT or IVUS?



vs.

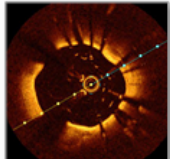


IVUS vs Angio

Direct estimate (12 trials, 6856 patients)

Indirect estimate

Network estimate



vs.

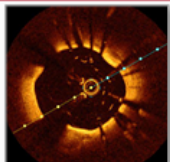


OCT vs Angio

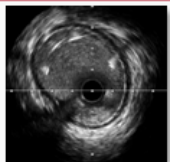
Direct estimate (8 trials, 4726 patients)

Indirect estimate

Network estimate



vs.

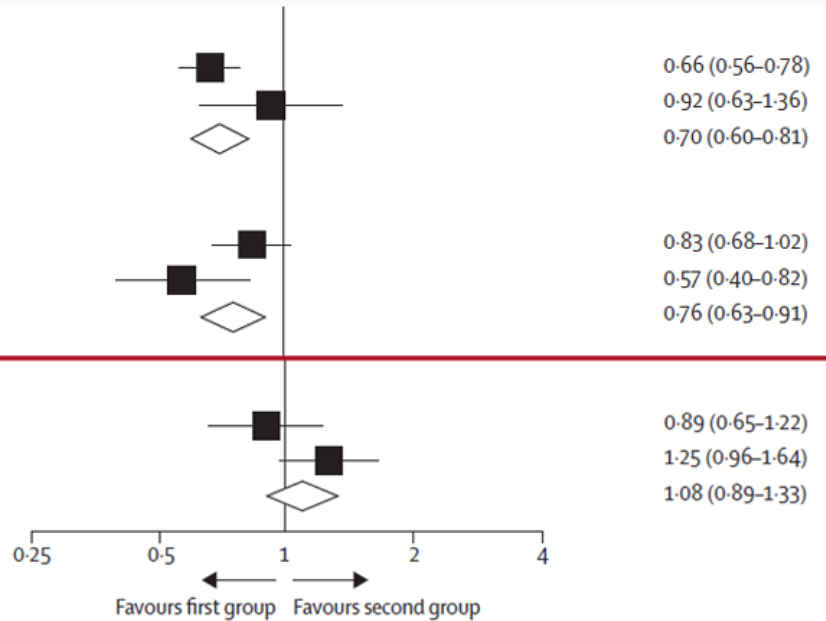


OCT vs IVUS

Direct estimate (5 trials, 3324 patients)

Indirect estimate

Network estimate



Target lesion failure at median 24.7months
Stone et al. The Lancet 2024

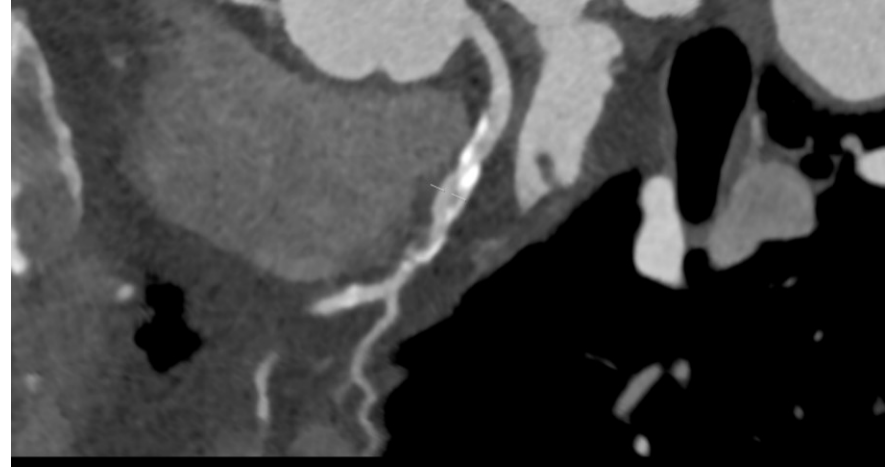
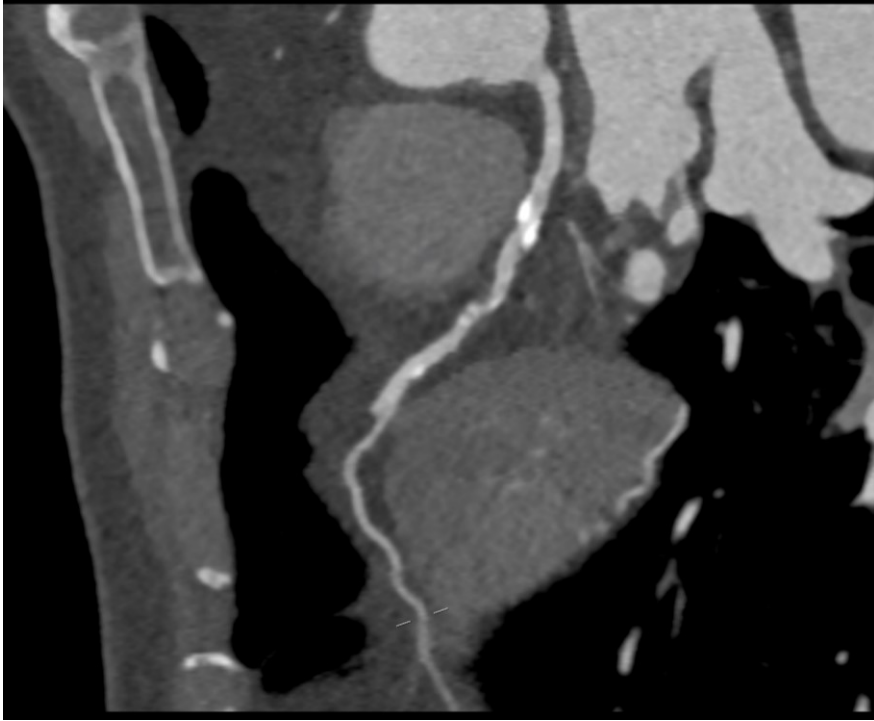
Calcium Score



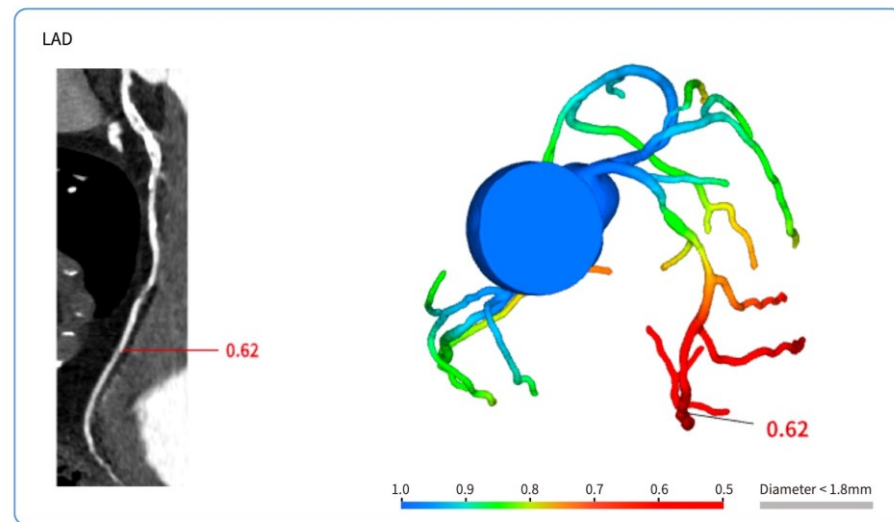
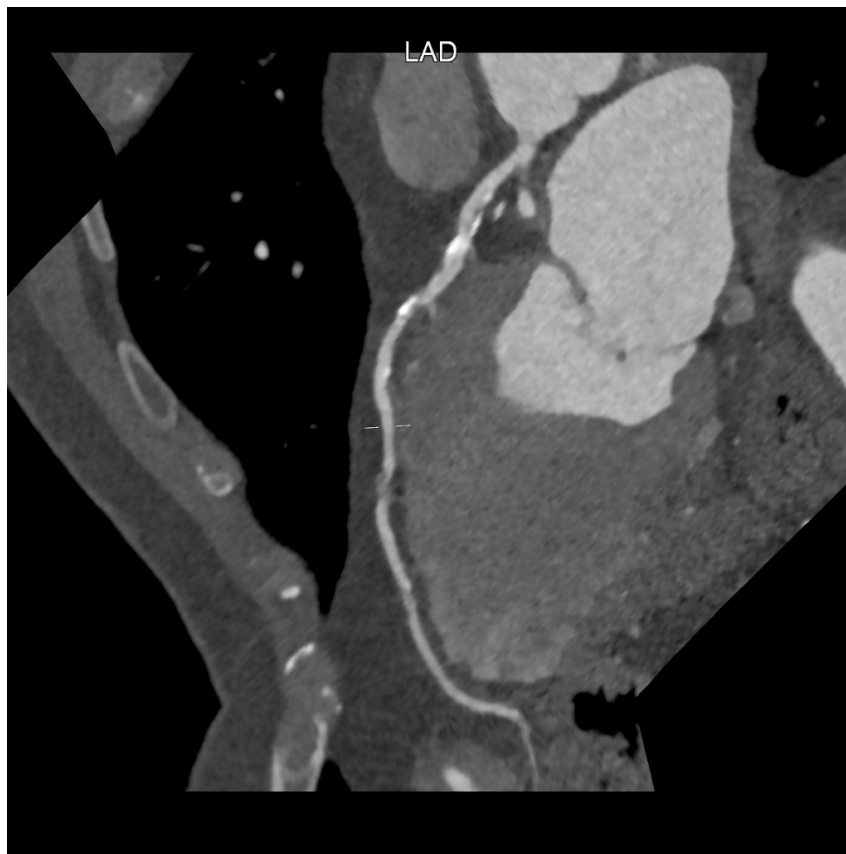
Artery	Lesions	Volume / mm ³	Equiv. Mass / mg	Score
LM	1	137,1	34,90	162,2
LAD	4	520,5	151,85	643,4
CX	5	174,7	34,89	207,5
RCA	1	36,0	8,18	43,7
Ca	0	0,0	0,00	0,0
Total	11	868,3	229,82	1056,8
U1	0	0,0	0,00	0,0
U2	0	0,0	0,00	0,0

Settings
Score Type: Agatston equivalent, Threshold: 130 HU (105,3 mg/cm² CaHA)
Mass calibration factor: 0.81

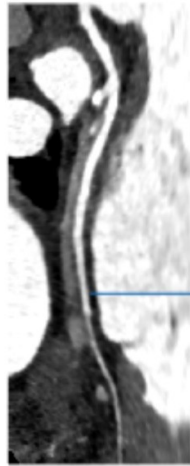
Grazie a Serena Dell'Aversana



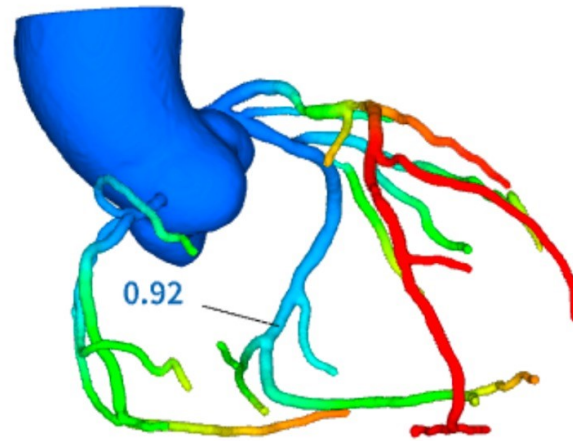
CORO TAC ed FFRCT



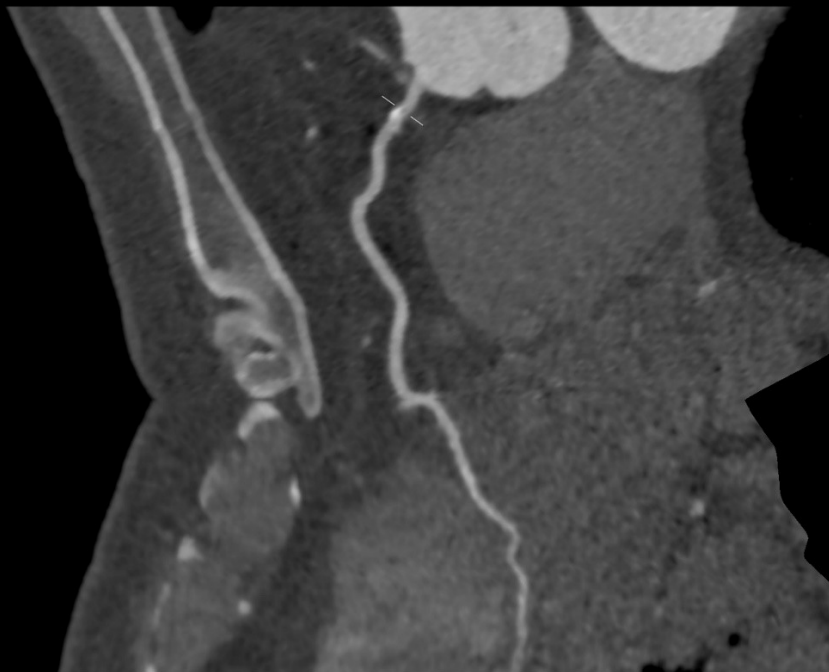
LCX



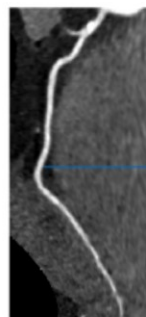
0.92



RCA_2

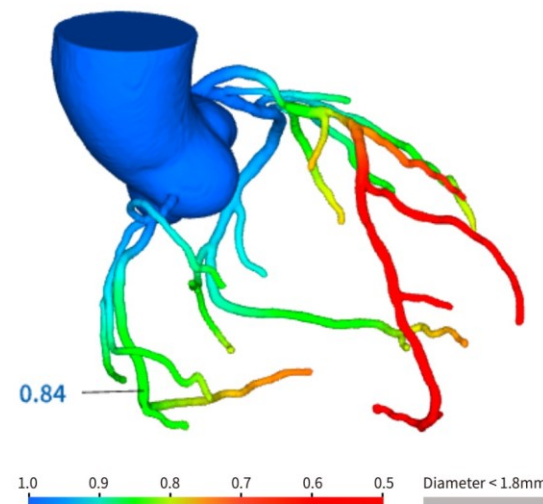


RCA



0.84

0.84

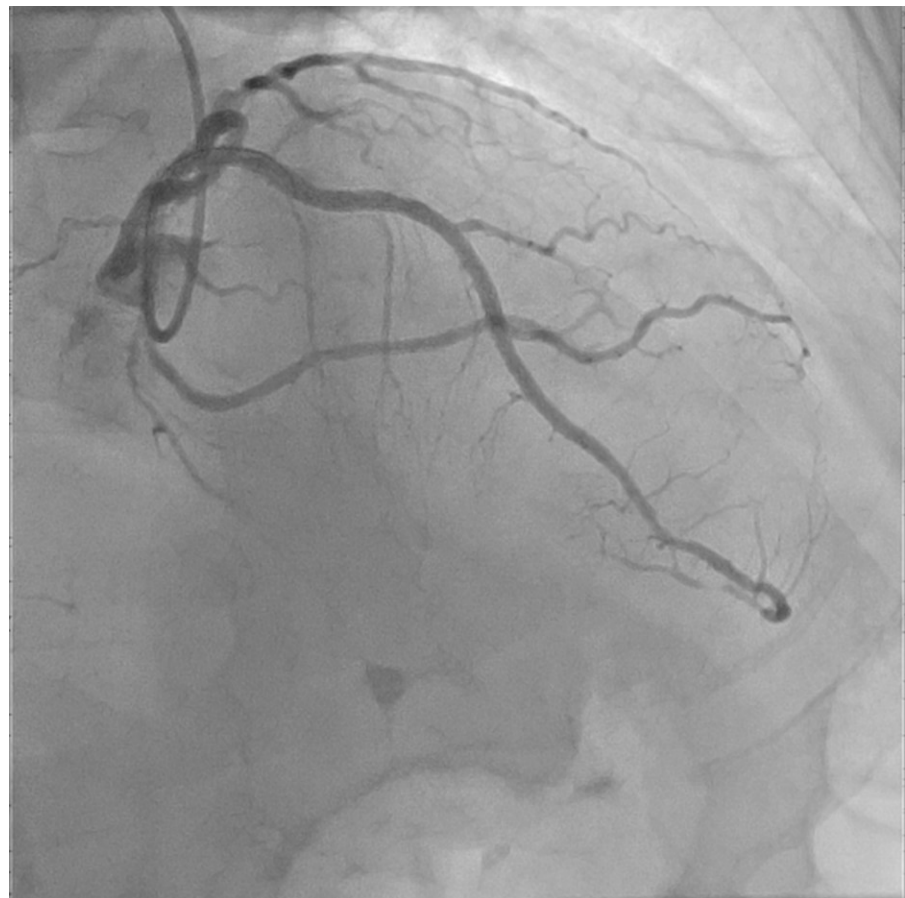
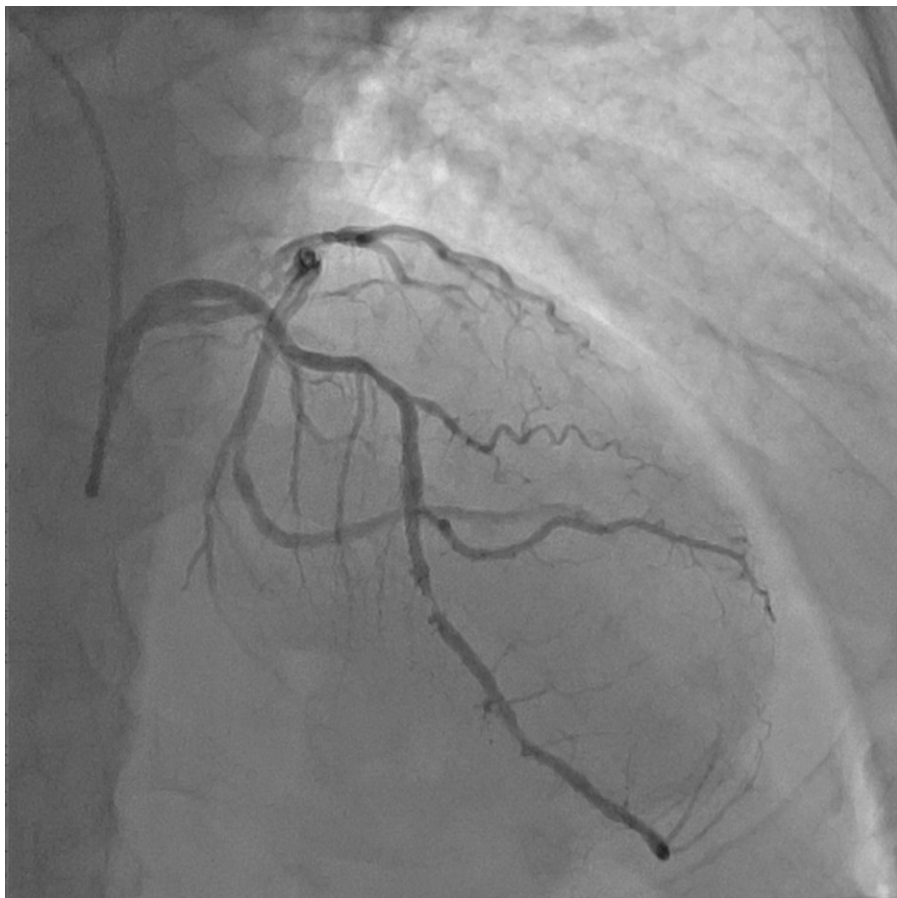


1.0 0.9 0.8 0.7 0.6 0.5 Diameter < 1.8mm

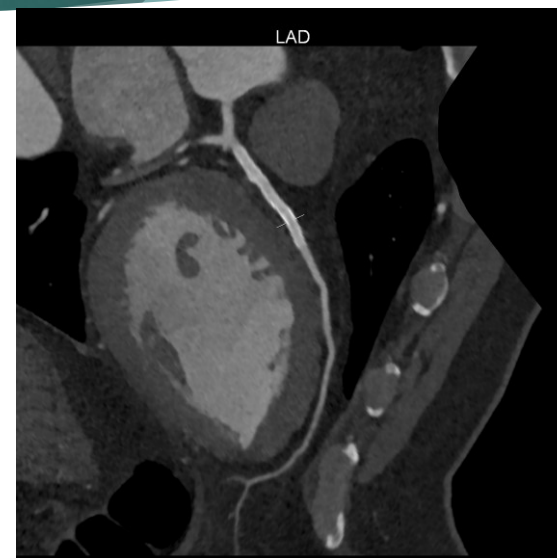


Branch	Vessel	DVFFR
Left Coronary	LAD	0.62
	LCX	0.92
Right Coronary	RCA	0.84

**Preparazione della placca con Laser e poi Shockwave
Impianto di 2 stent 3.0x33 e 3.5 28**



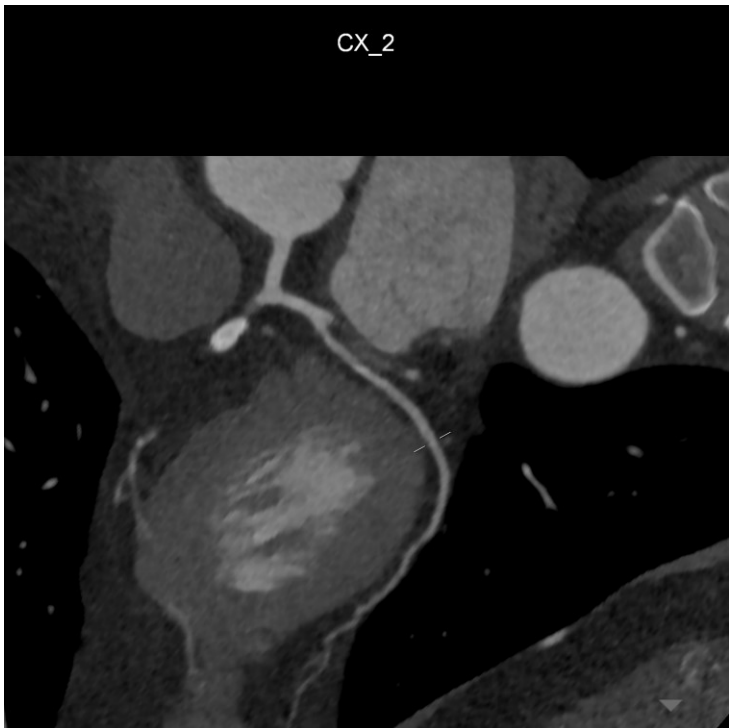
Studio della placca



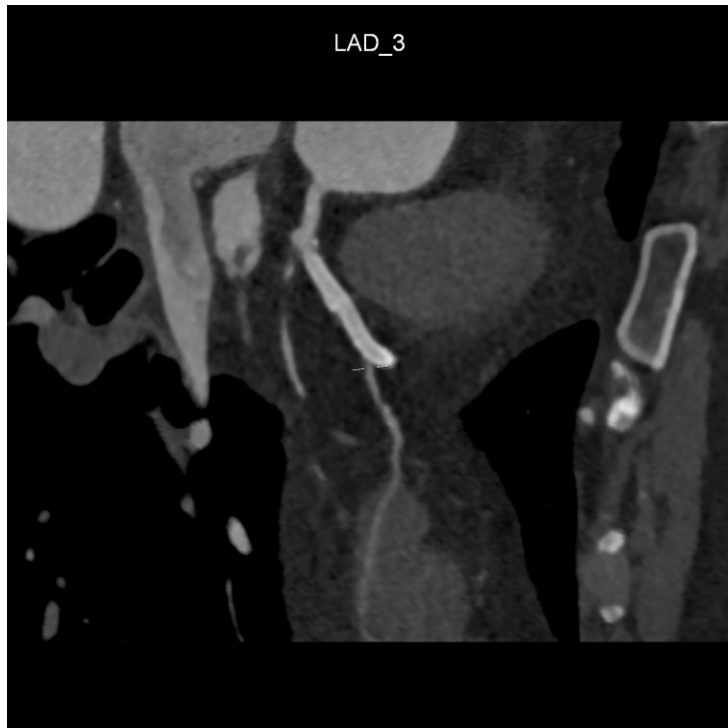
Grazie a Serena Dell'Aversana



CX_2



LAD_3

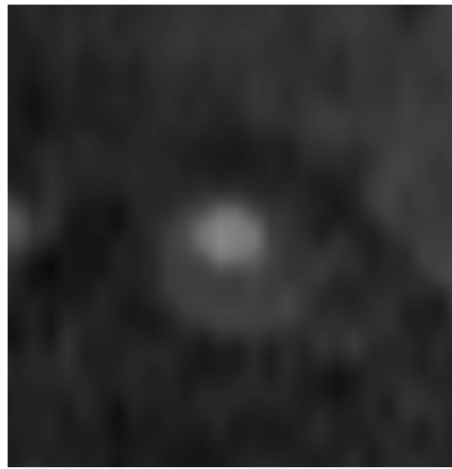


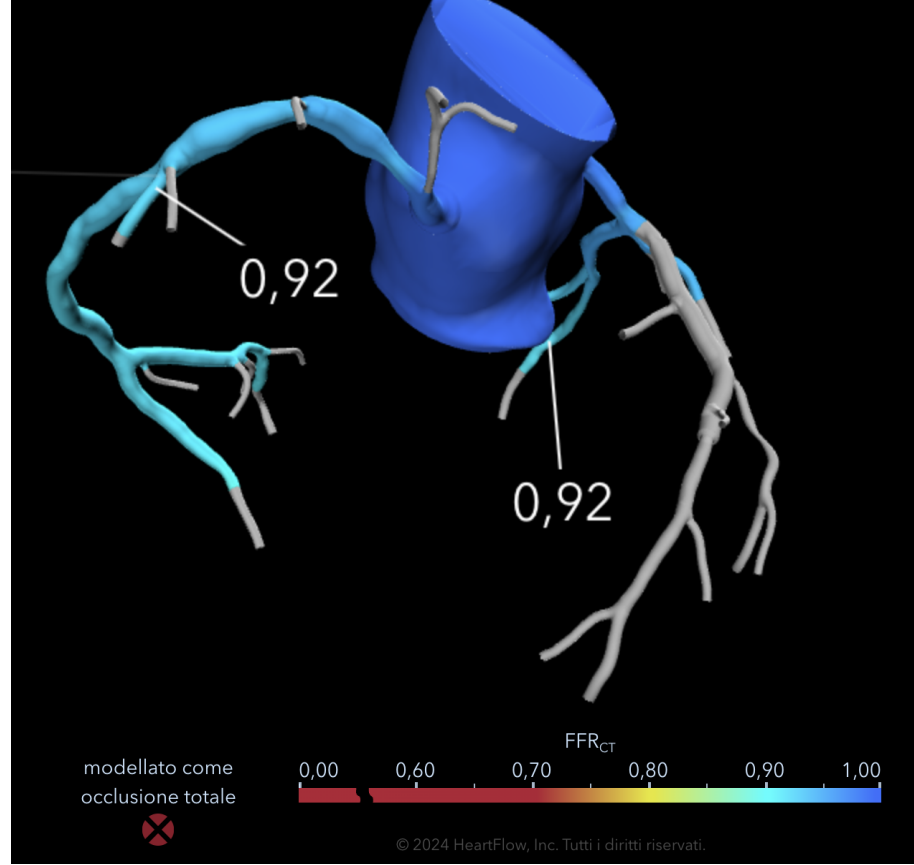
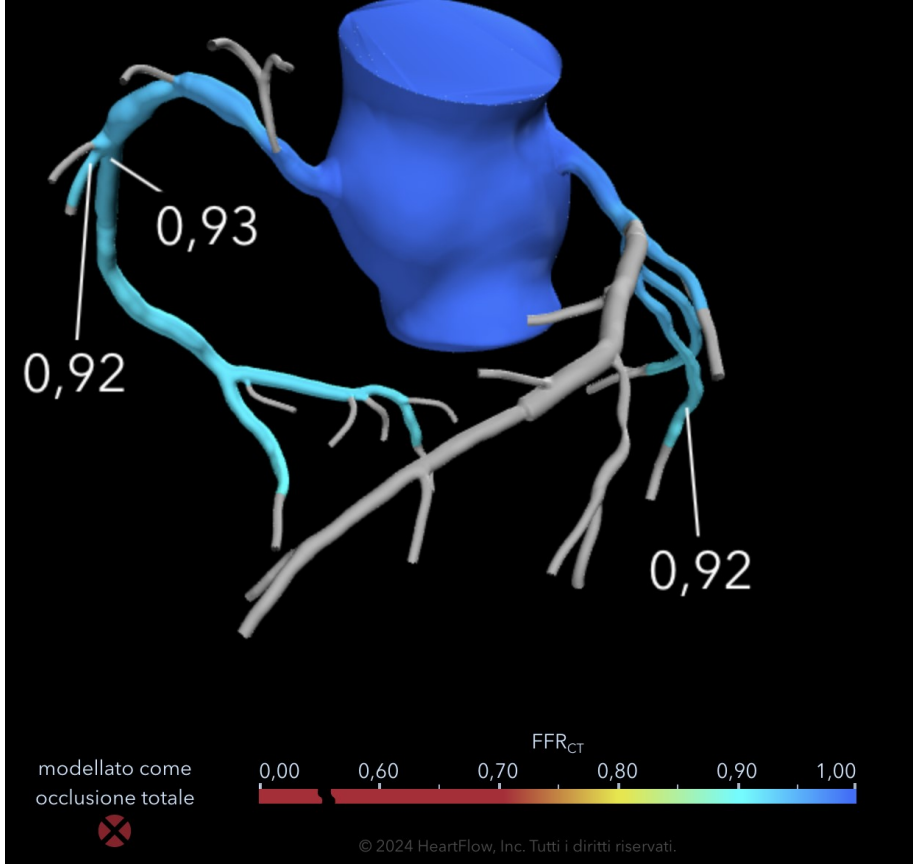
RCA

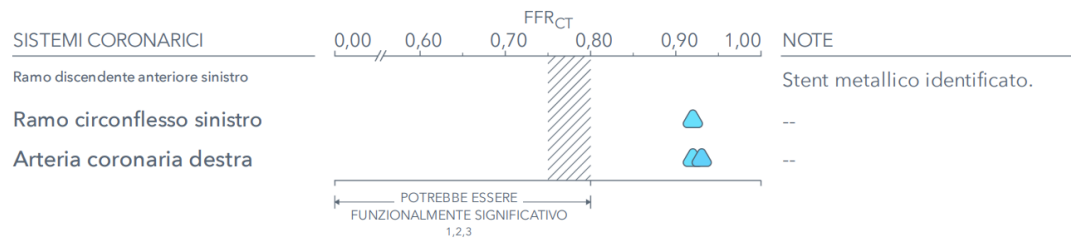
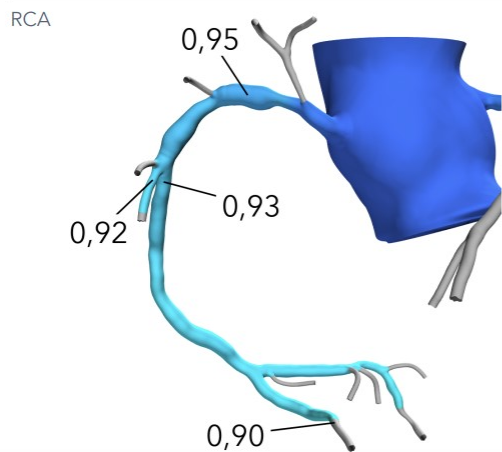
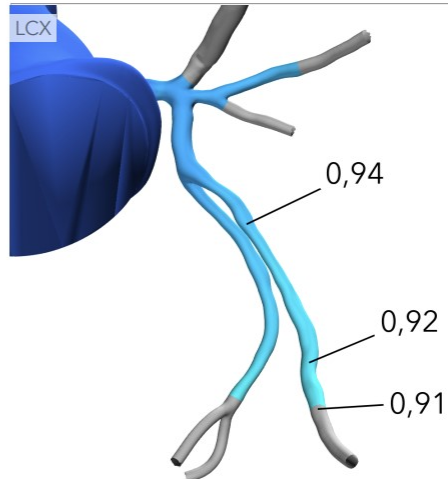
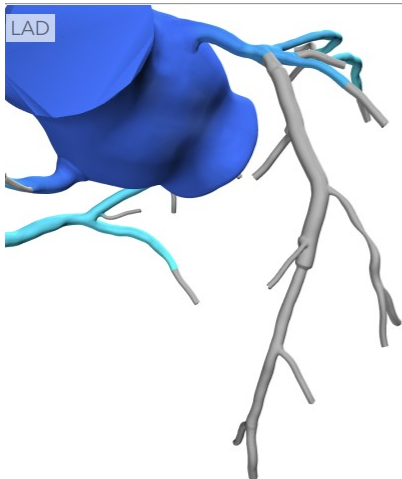
A: 67 %
D: 42 %

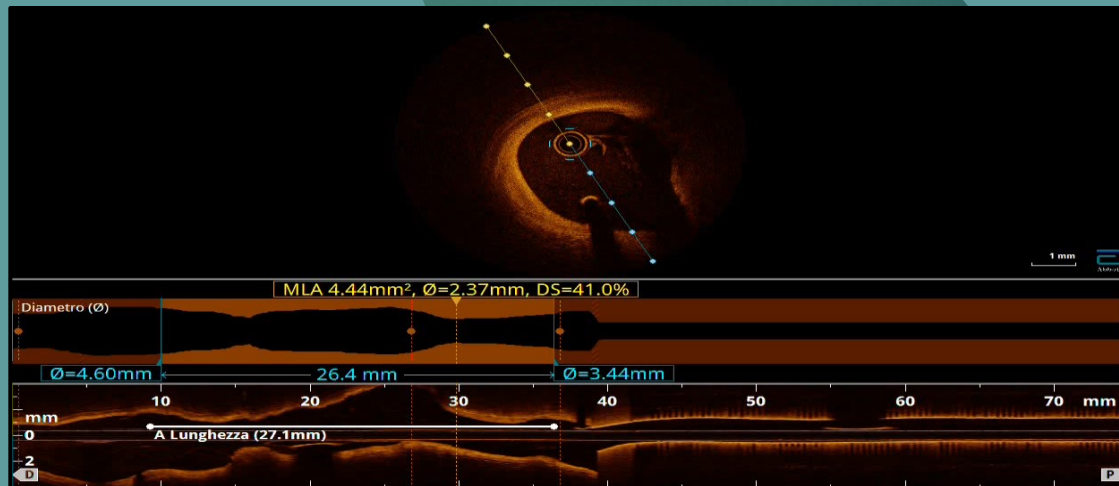
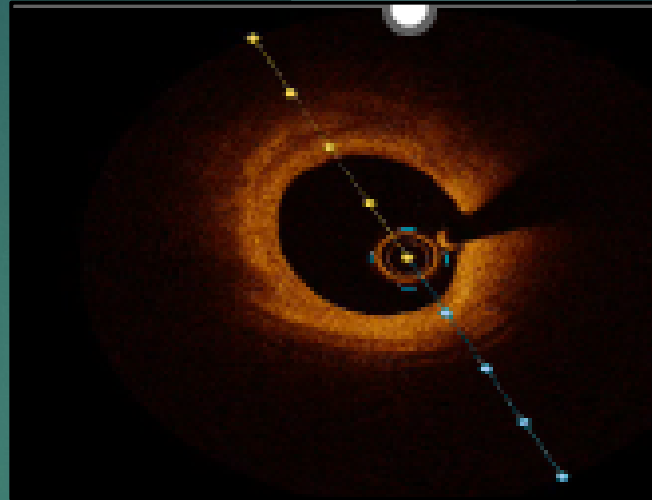
▲ = 9,9 mm

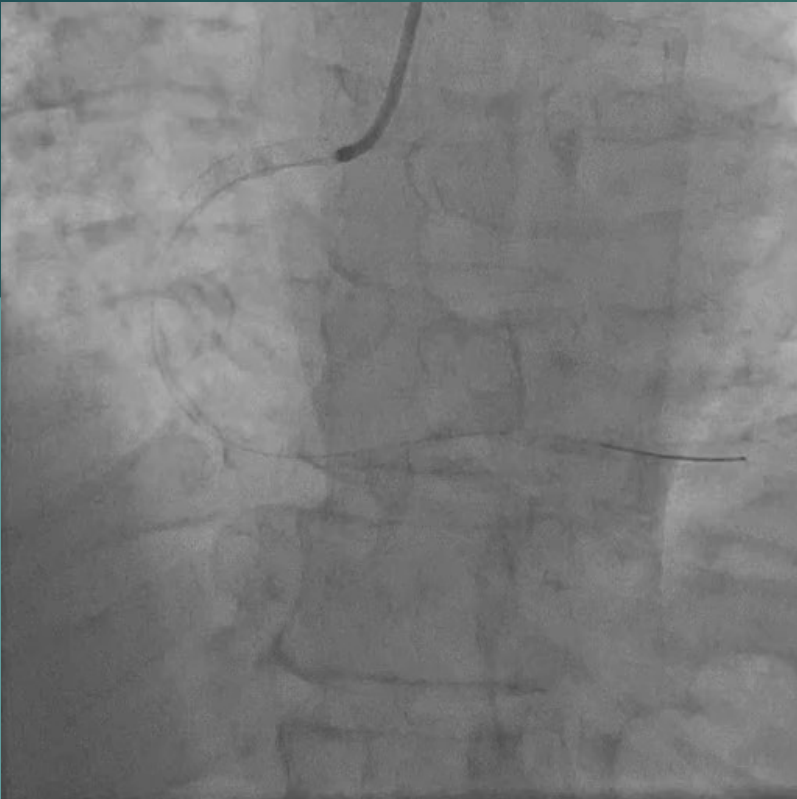
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Conclusioni

Le linee guida CCS 2024 sono centrate sul paziente

Ritagliano un ruolo importante alla rivascolarizzazione percutanea
Sia come prima scelta ma anche in alternativa al by pass in molti setting clinici
In accordo condiviso in Heart Team

Le tecniche di Imaging intravascolare devono essere implementate anche per
Ridurre il gap con la CCH

Le nuove tecniche diagnostiche TAC (Con stress Farmacologico e con FFR)
Già da oggi permettono di praticare diagnosi precise e permettono di
Programmare le tecniche di rivascolarizzazione più adeguate





Figure 11

Antithrombotic treatment in CCS patients undergoing PCI

