

LA CURA
DELLA PERSONA
CON DIABETE
NELL'ERA DELL'
INTELLIGENZA
ARTIFICIALE



TRAGUARDI, SFIDE E NUOVI ORIZZONTI
RESPONSABILE SCIENTIFICO Paolo Carbone

JESI (AN) | 11 ottobre 2025
Hotel Federico II

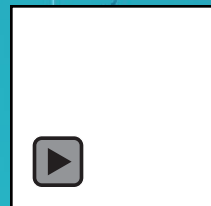
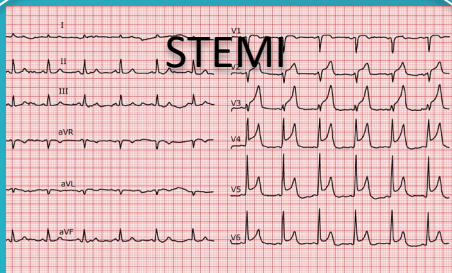
Cosa accade se qualcosa va storto... la rivascolarizzazione miocardica nel paziente diabetico

Tommaso Piva

UOSD Emodinamica Interventistica Strutturale e Pediatrica
AOU Marche

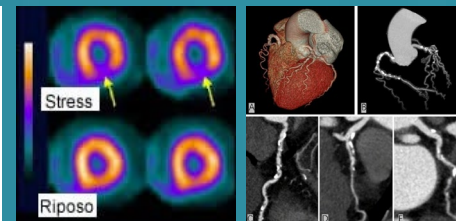
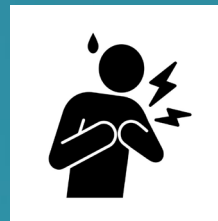
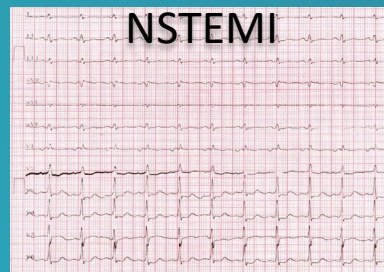
Quanto può andare storto?

PRESENTAZIONE CLINICA



ACS

CCS



Comorbidità
Fragilità,
Condizioni socio-
culturali,
etc

CTO

1-2
VD

LM

MVD

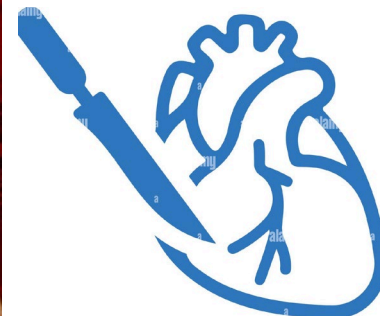
Small V
diffuse D

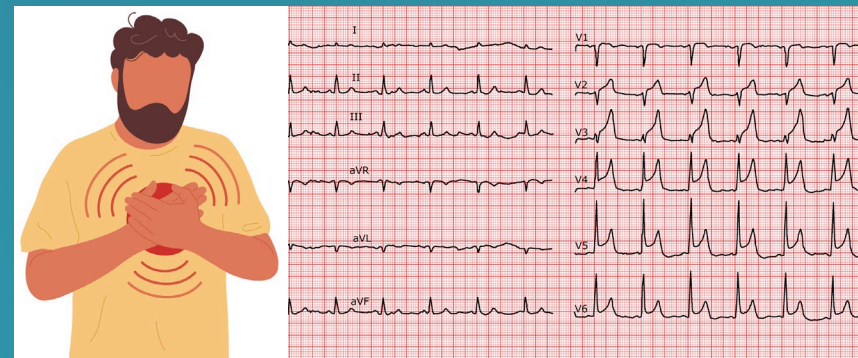
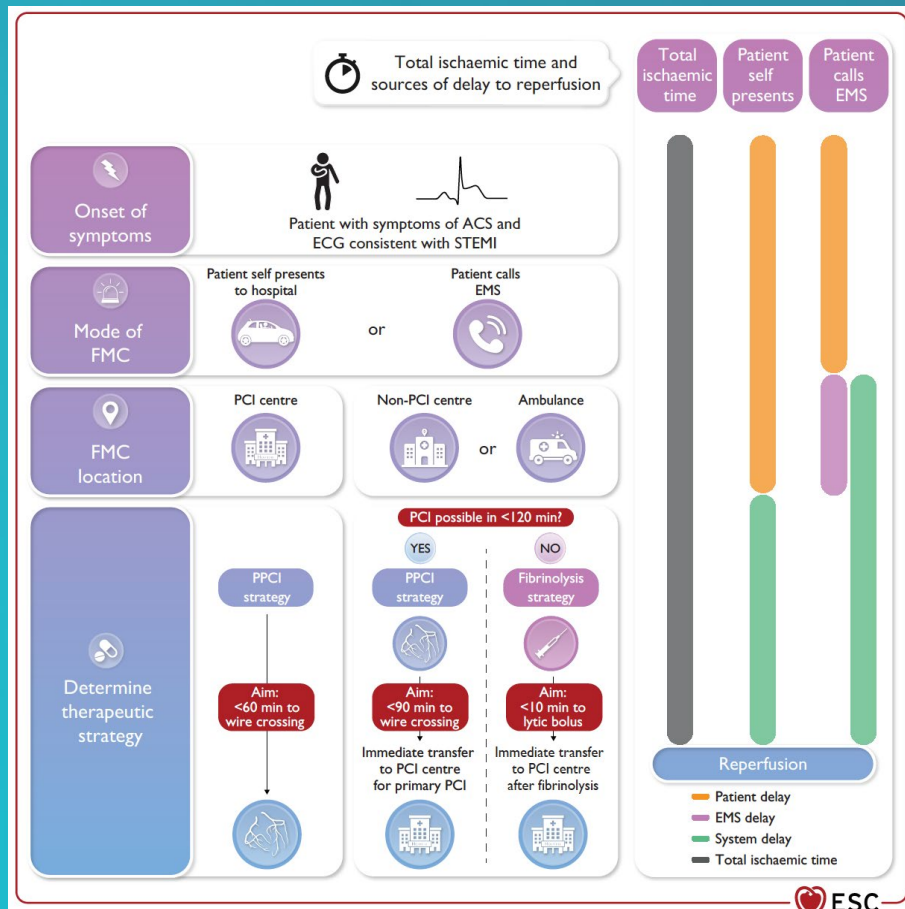
Ca⁺⁺,
tortuosità

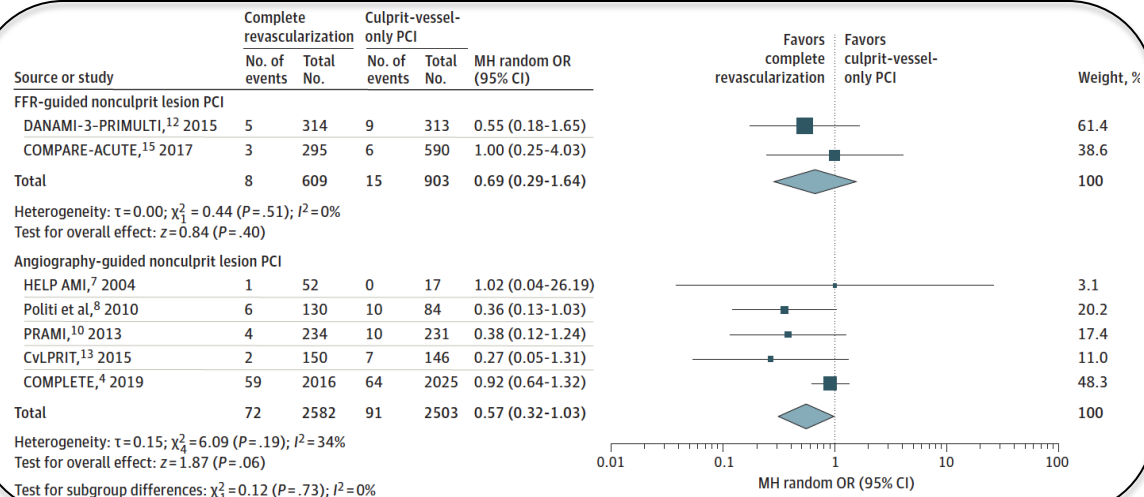
Depressed
LVEF
↓
Instabilità
emodinamica

Cardiologia Interventistica

VS Cardiochirurgia







Rivascolarizzazione completa raccomandata durante PCI indice o entro 45 gg



Su guida angioX





STRATIFICAZIONE DEL RISCHIO





Strategia di rivascularizzazione (IRA-PCI, MVD PCI/CABG) basata su:

- Stato clinico
- Comorbidità
- Complessità lesioni

Secondo i principi generali della rivascularizzazione

I

B



Angina o equivalenti
nonostante OMT



Rivascolarizzazione miocardica
di stenosi funzionalmente
significative

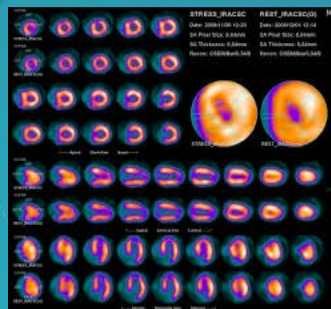
Per migliorare i
sintomi

Myocardial revascularization in CCS is recommended when angina persists despite treatment with anti-anginal drugs or in patients with a documented large area of ischaemia (>10% LV).





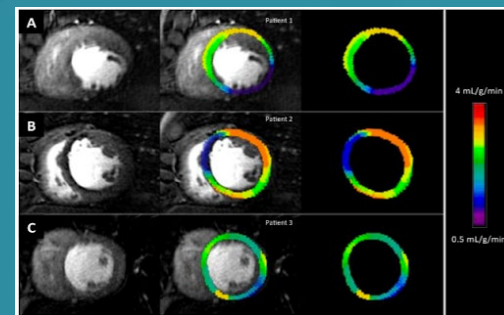
Exercise ECG:
Duke Treadmill
Score <-1



Stress
SPECT/PET
perfusion
imaging: area
di ischemia
≥10% del
miocardio



Stress echo:
≥3/16
segmenti con
ipocinesia or
acinesia stress-
indotta



Stress CMR:

- Ipoperfusione da stress
≥2/16 segmenti
- o disfunzione ≥3
segmenti con
dobutamina

ISCHEMIA vs CORONAROPATIA

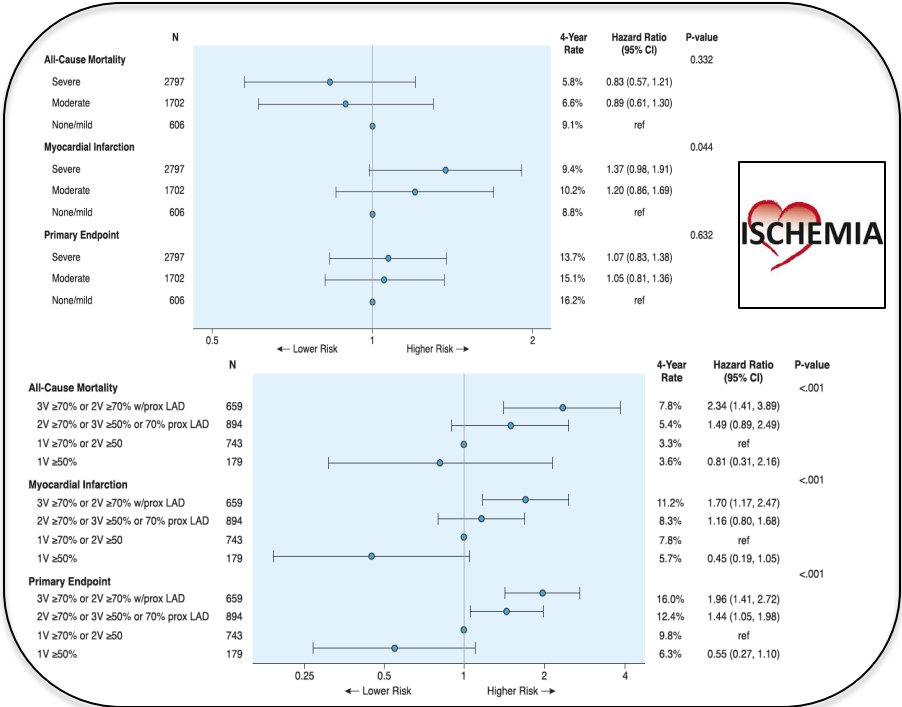
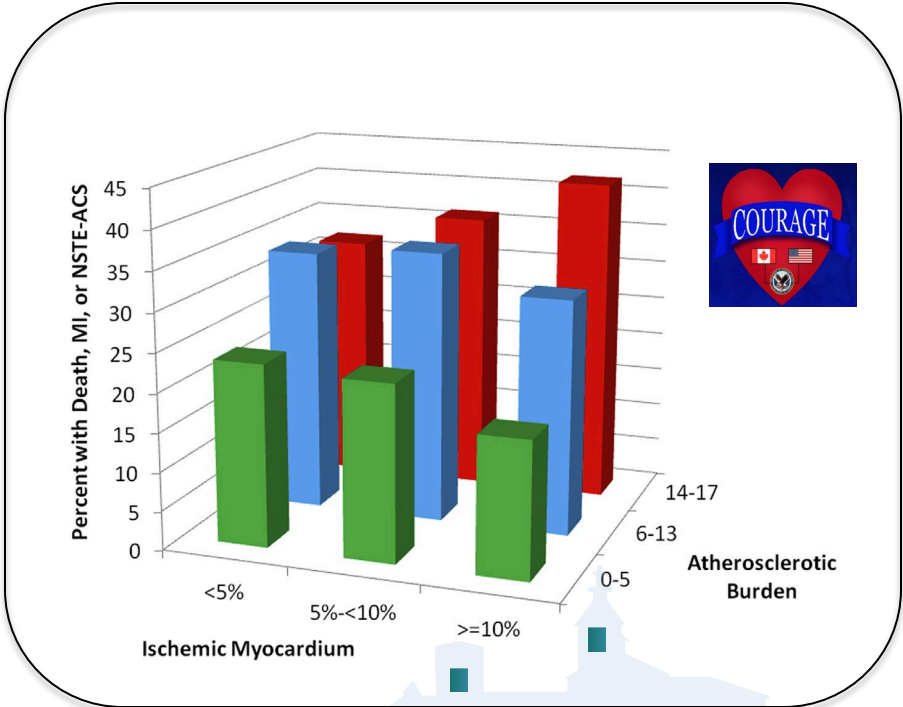


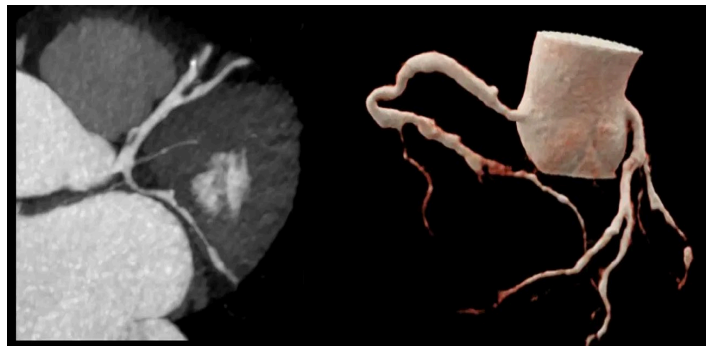
LM ≥50%

3 VD ≥70%

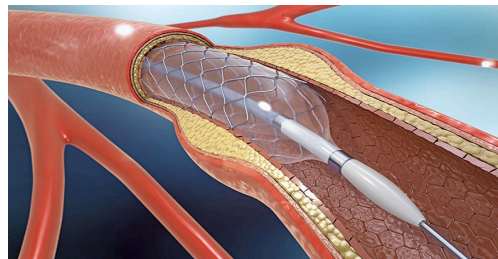
2 VD ≥70% inclusa LAD prox

LAD ≥70% con FFR-CT ≤0.8.

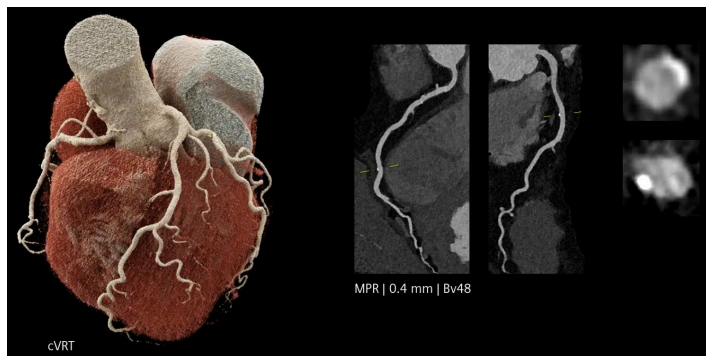
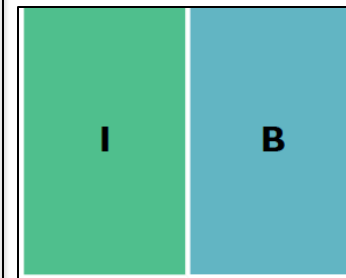




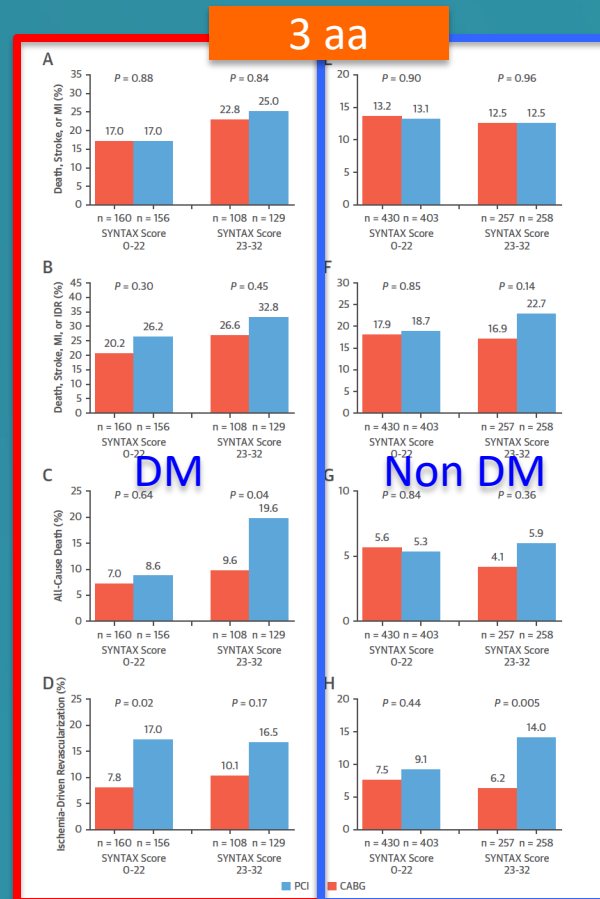
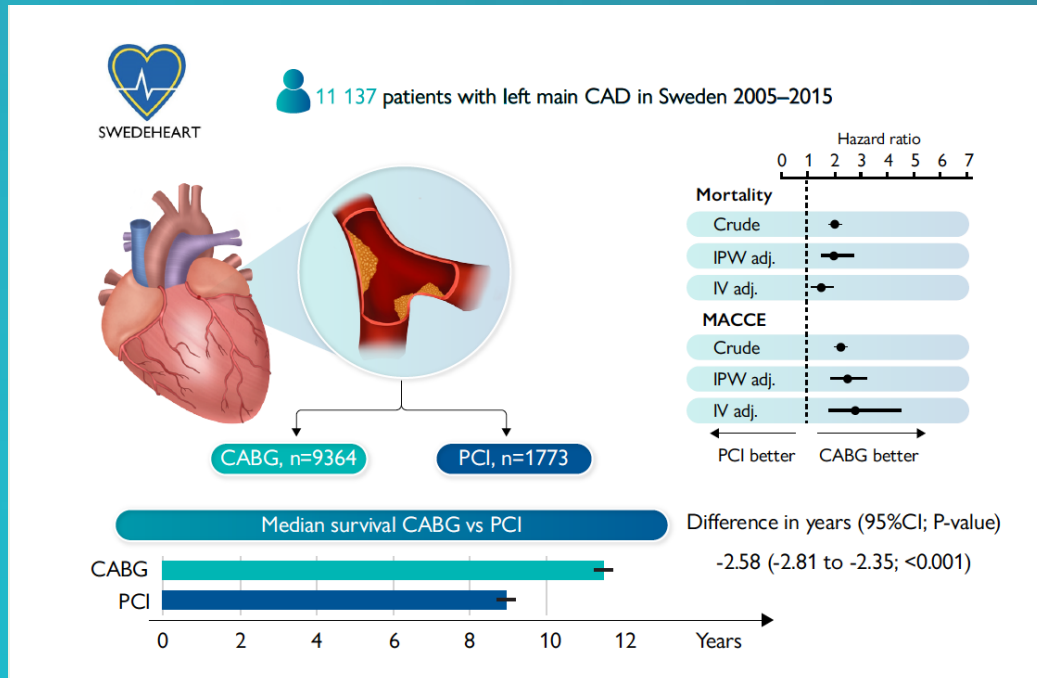
- Pz sintomatico in OMT
- +1VD o 2VD non coinvolgente LAD



Per migliorare sintomi



3 aa



Pooled analysis

PRECOMBAT

NOBLE

EXCEL

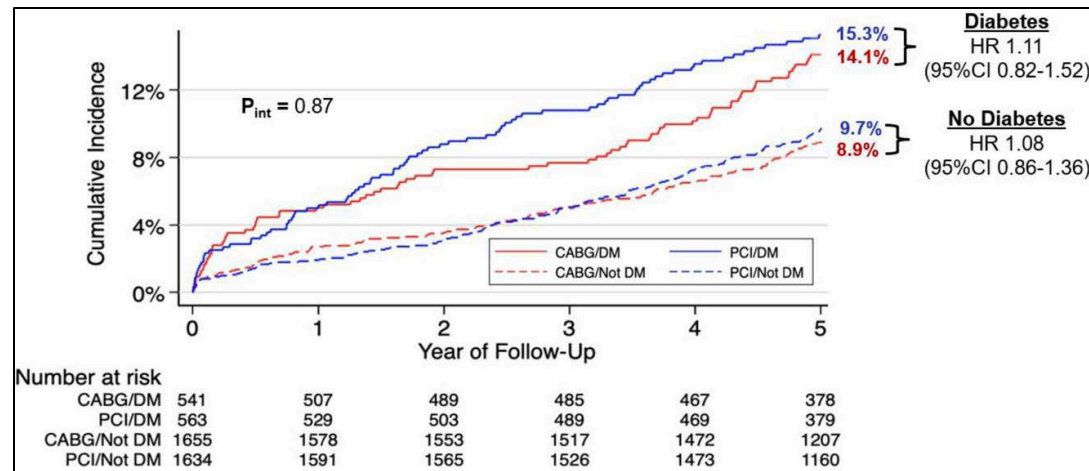
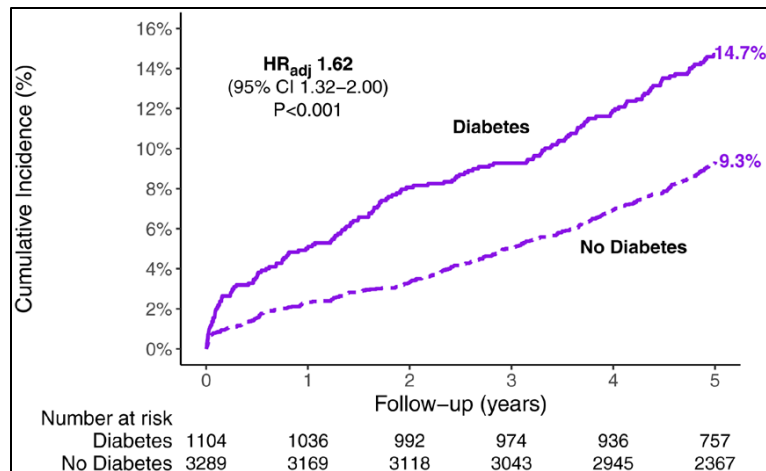
SYNTAX

Primary endpoint:

all-cause death through 5 years

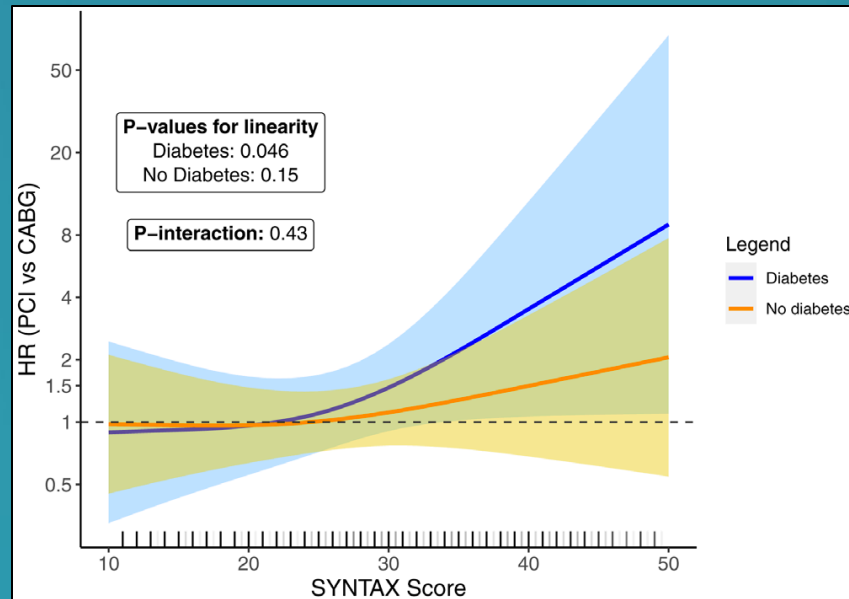
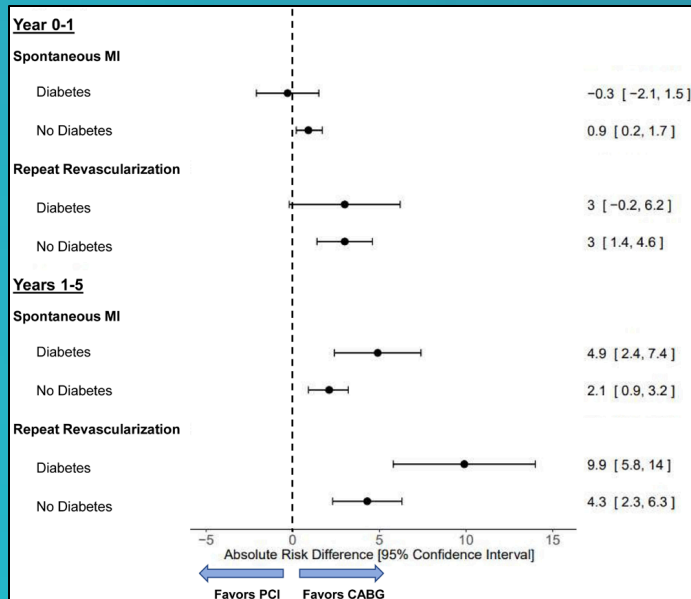
Secondary endpoints:

5-y CV death, NonCV death, Spontaneous MI, Procedural MI, Stroke, Repeat coronary revascularization



Tronco comune (LM)

PCI vs CABG

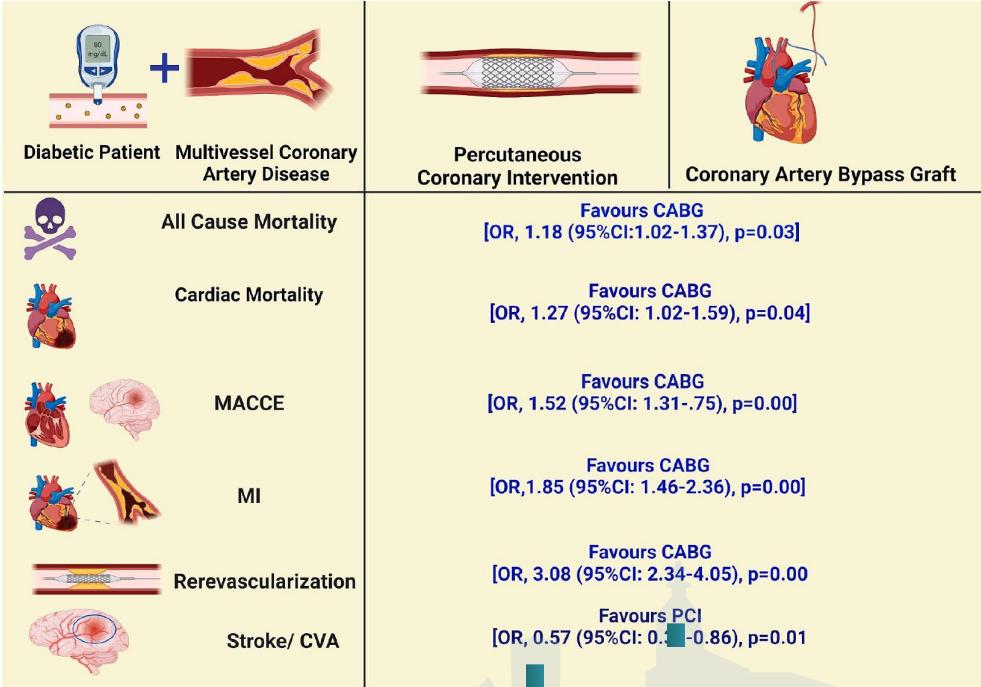
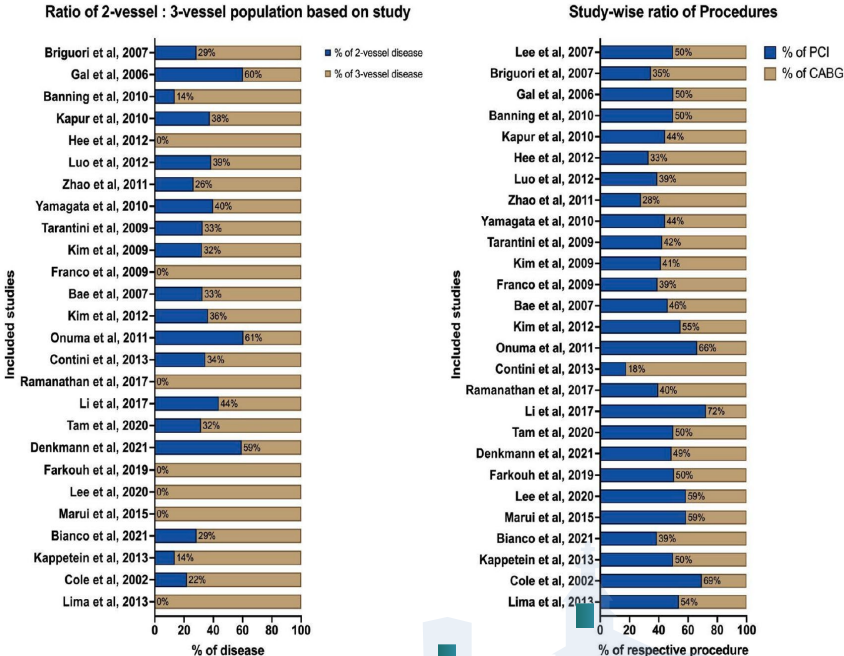


DM + MVD includente TC/IVA

Meta-analisi 27 studi:
6 RCT + 21 osservazionali

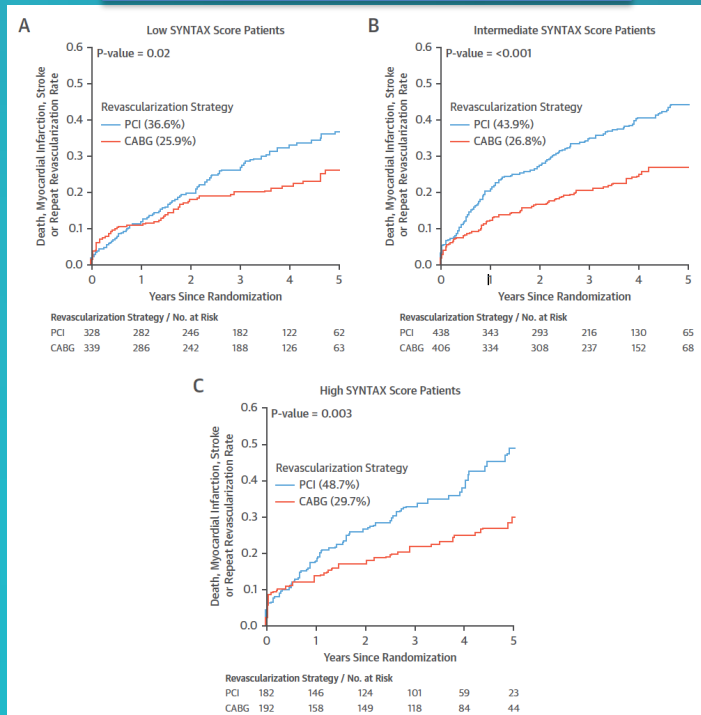
PCI vs CABG

92% DES (+++ I generazione!!!), 8% BMS

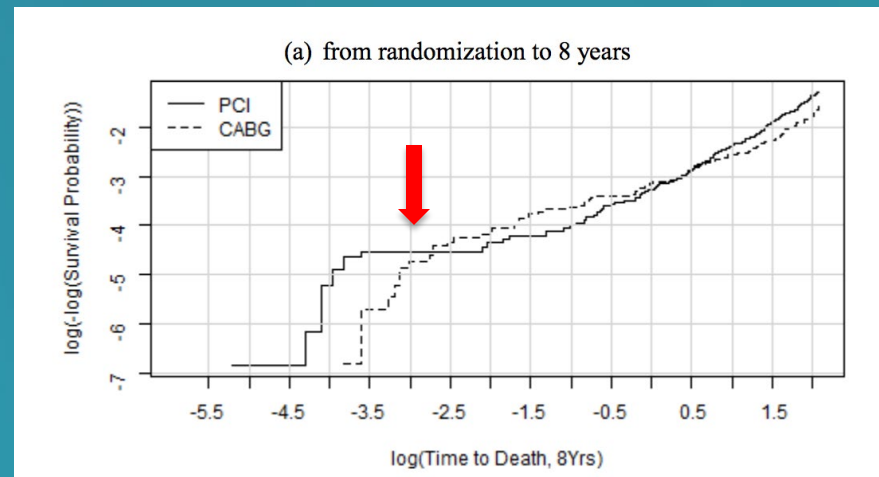


DM + malattia multivasale (MVD) includente IVA

Valore del Syntax Score



PCI vs CABG

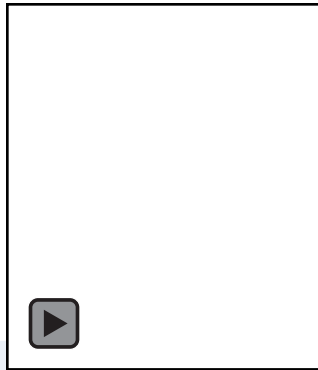
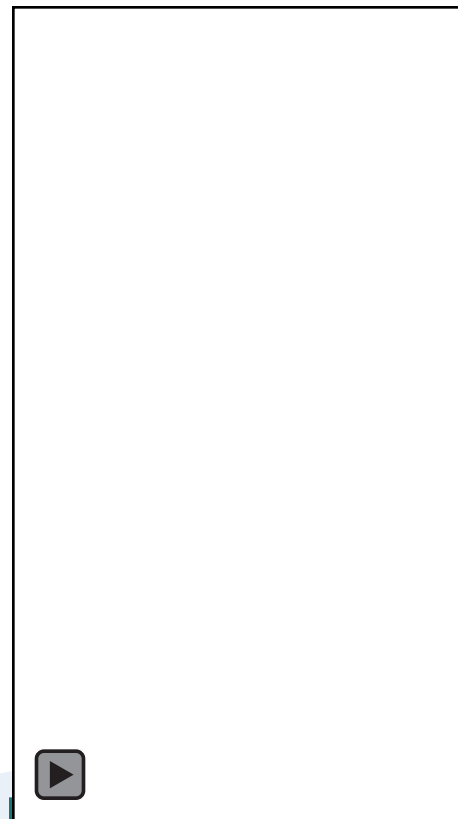
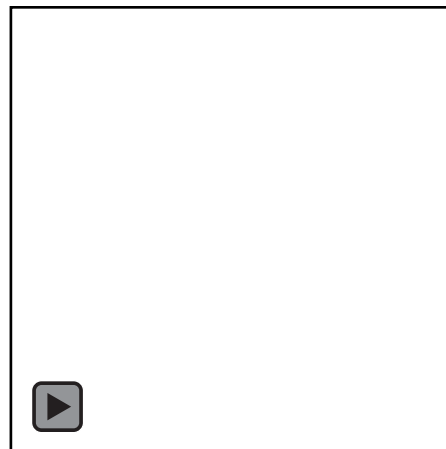
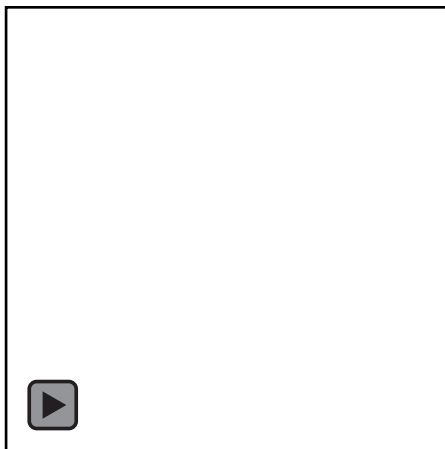
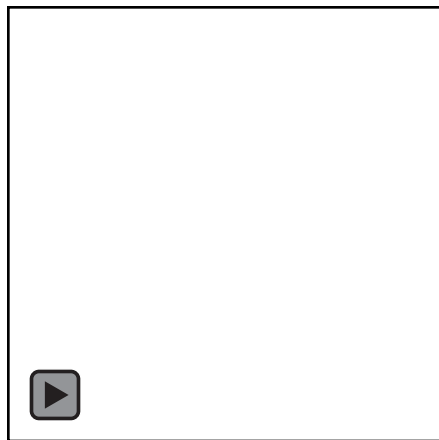


Pz giovani

Subgroup	PCI Total N	CABG Total N	PCI 8 Yr Event Rate	CABG 8 Yr Event Rate	Unadjusted Hazard Ratio	Interaction P-Value
Overall	478	465	23.7	18.7		
Age at randomization						0.01
<=63.3	230	240	20.7	10.2		
>63.3	248	225	26.3	27.6		

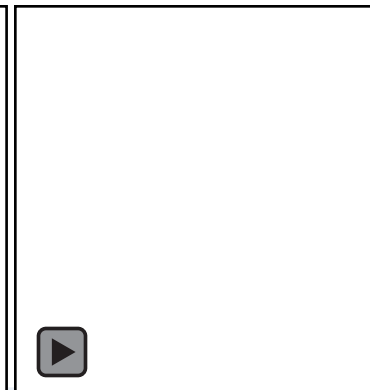
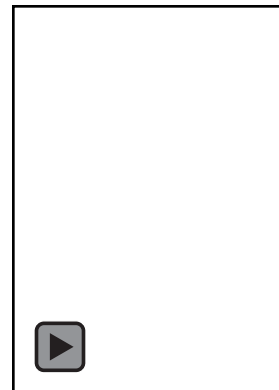
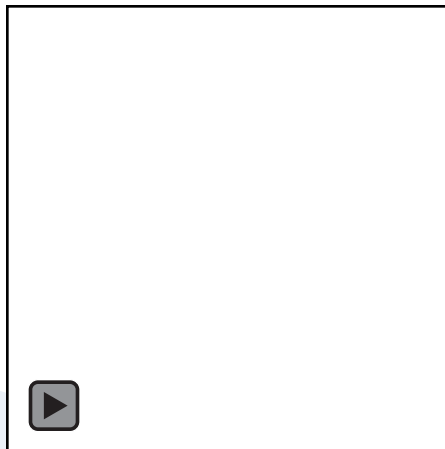
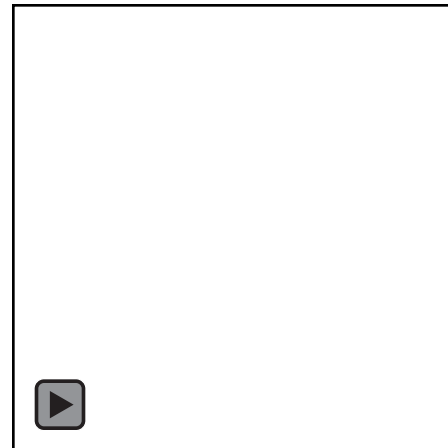
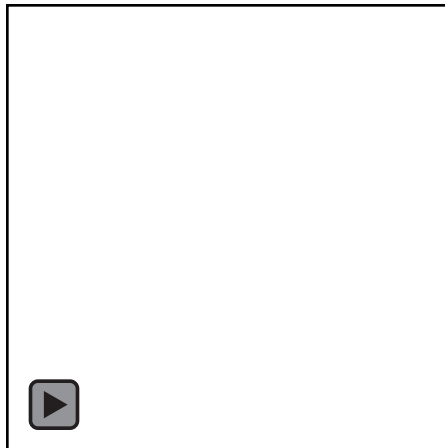
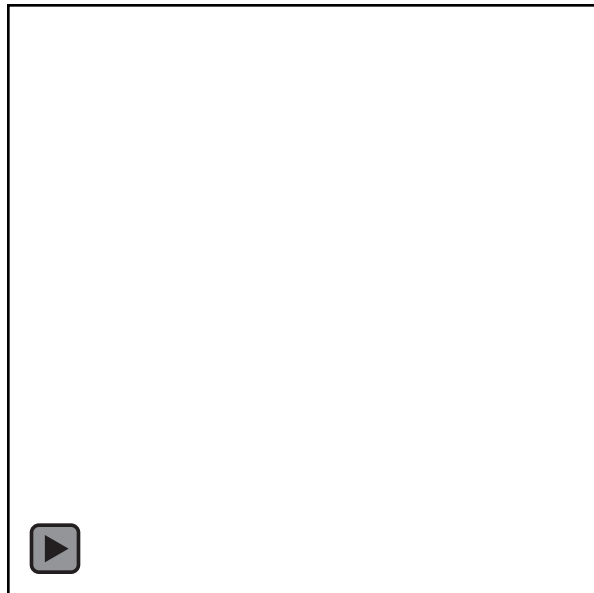
PCI better

CABG better

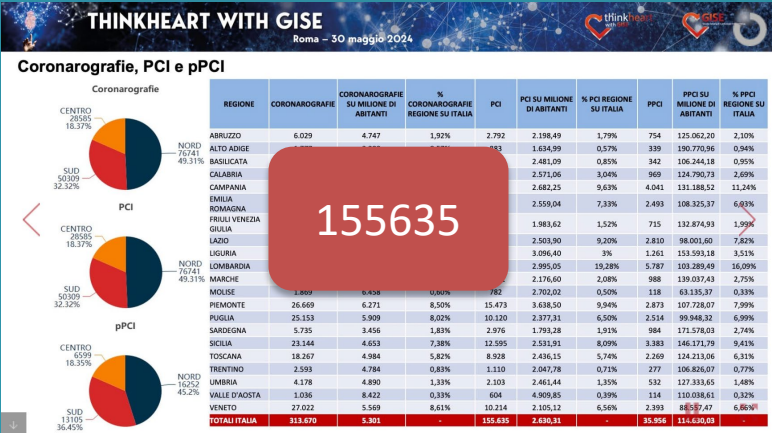
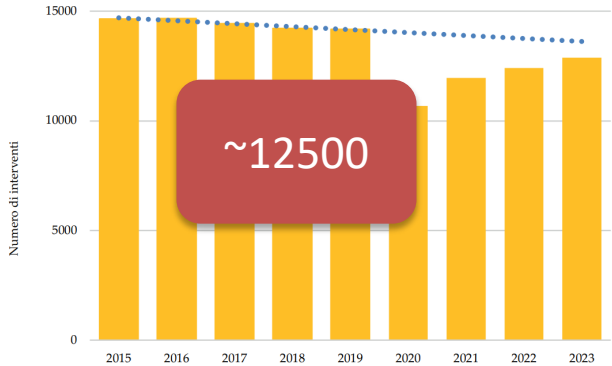


Gap tra teoria e pratica

PCI vs CABG



Numero di bypass aorto-coronarici isolati. Italia, 2015-2023

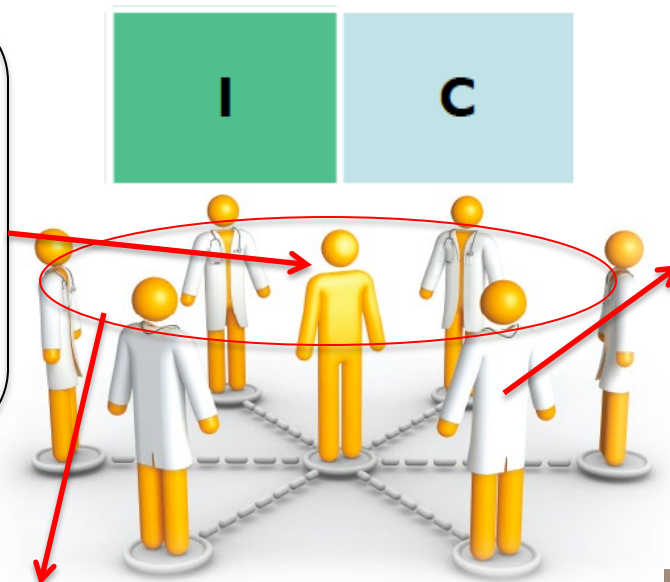


È veramente un gap?

HEART TEAM E PZ AL CENTRO

Scelta PATIENT-CENTERED su rivascolizzazione e sue modalità:

- Preferenze del pz
- health literacy
- Contesto culturale
- Supporto sociale



Medico: scegliere CABG/PCI in base a:

- Profilo del pz
- Anatomia coronarica
- Fattori procedurali
- LVEF
- Preferenze
- Aspettativa di outcome,

Heart Team (completo!)

- in casi clinici complessi
- PCI vs CABG (++ se stesso livello di raccomandazione!)
- Goal: trattamento più appropriato per outcomes e QoL



È veramente un gap?

LE ECCEZIONI

TC significativo

- + SYNTAX score 22-32 (se DM2 <22?)
- + rivasc. completa

Ila

B

Rischio CCH
alto/proibitivo



TC significativo

Ila

B

MVD

- + DM

Ila

B

MVD funzionalmente significativa

- + LVEF $\leq 35\%$

Ilb

B

Trattamento delle lesioni giuste



Giusto trattamento delle lesioni

I

A

OPTIVUS-Complex PCI Multivessel Cohort

1023 patients who underwent multivessel IVUS-guided PCI with stenting including LAD

2 withdrew consent

Study population

1021 patients included in the analysis

Patients with diabetes
560 patients (54.8%)

Patients without diabetes
461 patients (45.2%)

DES > 28 mm

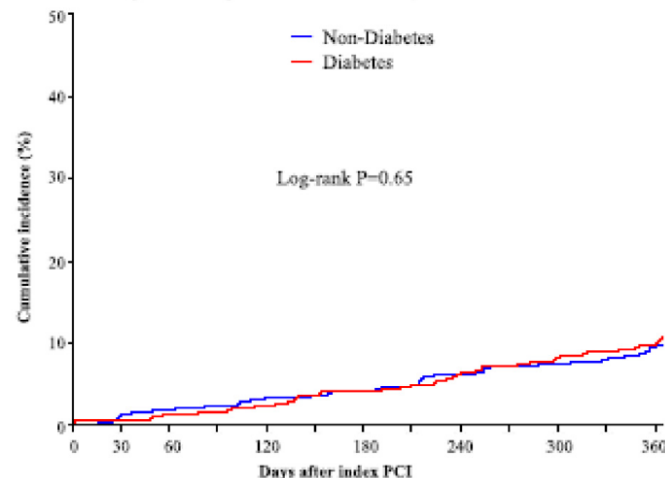
- MSA > distal reference lumen area

DES < 28 mm

- MSA > 0,8x average reference lumen area (dist A + prox A)/2

Primary endpoint

(A composite of death from any cause, myocardial infarction, stroke, or any coronary revascularization)



Non solo angiografia...

DIAGNOSTICA INTRACORONARICA

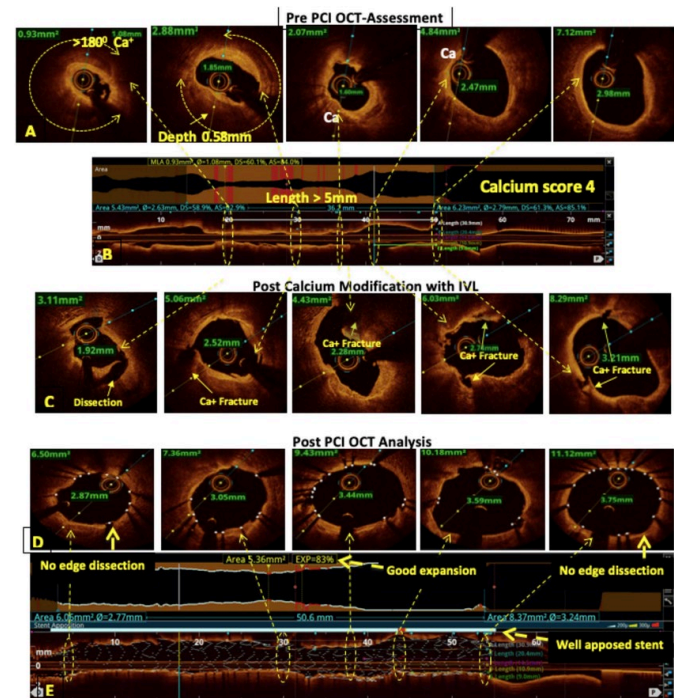
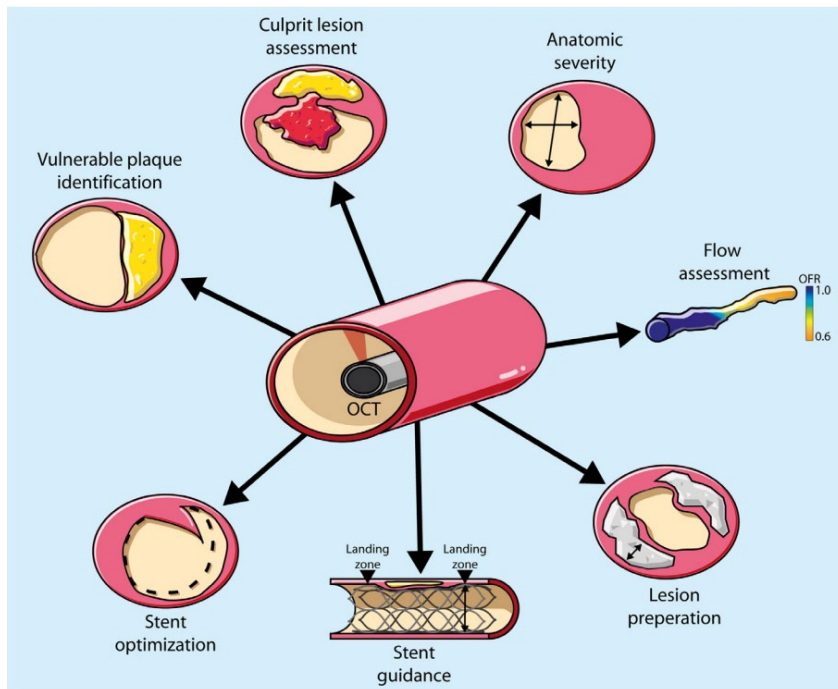
Trattamento delle lesioni giuste



Giusto trattamento delle lesioni

I

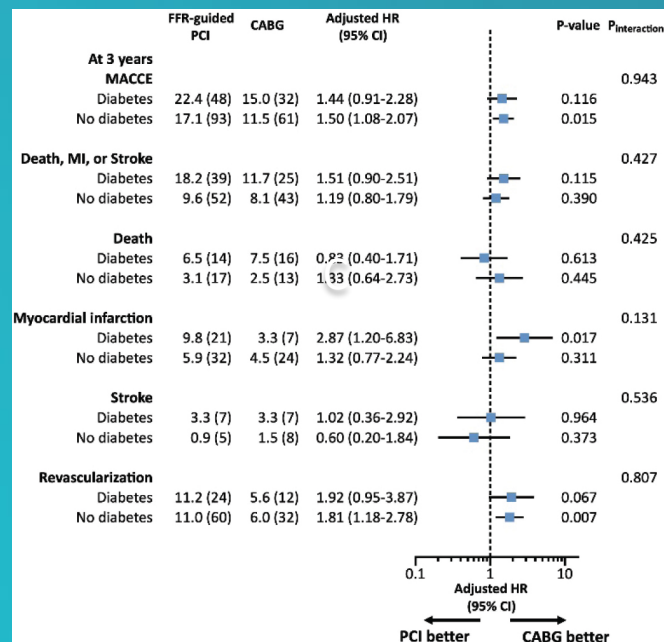
A



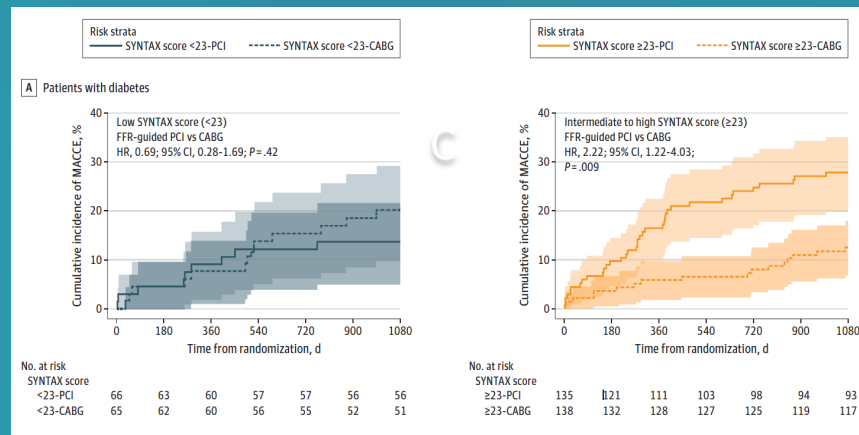
Non solo angiografia...

FISIOLOGIA CORONARICA

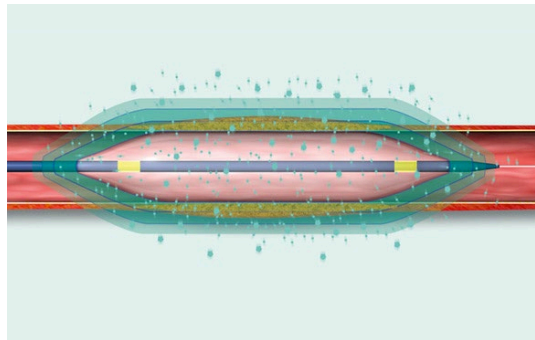
FAME-3 3 aa



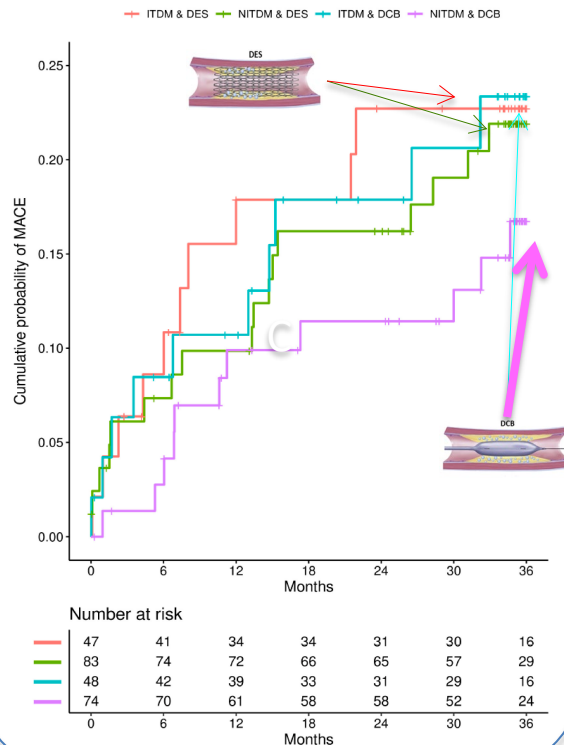
SYNTAX score < 23 PCI FFR-guidata



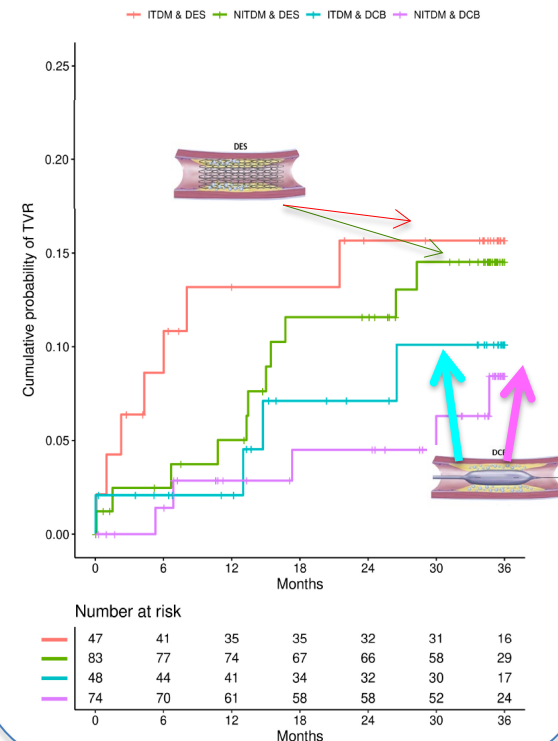
BASKET-SMALL trial



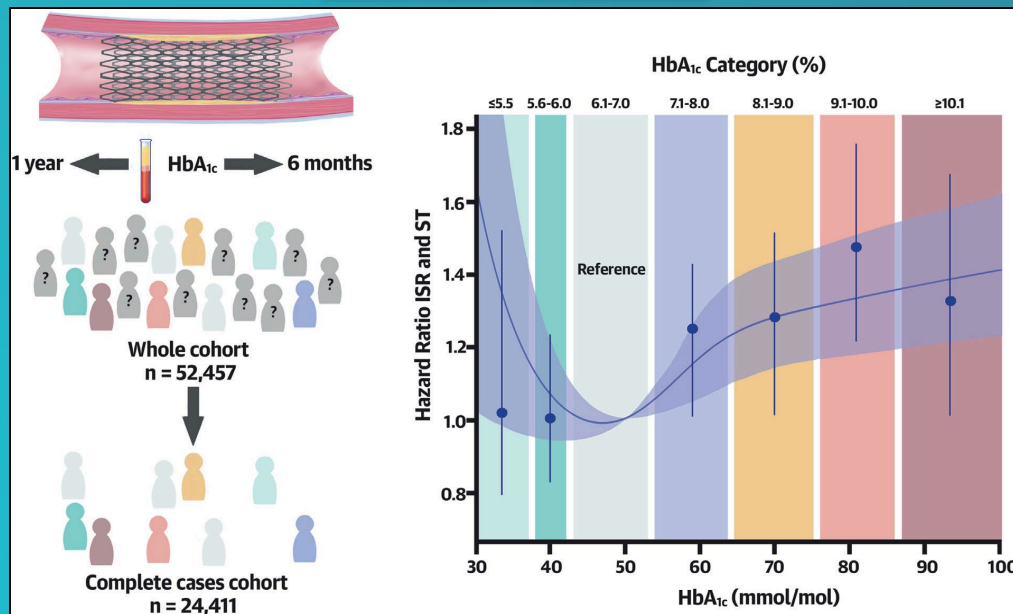
MACE



TLR



1) J-shaped curve



2) Rischio Relativo x p-endpoint

↑↑ pz <65 years vs pz ≥ 65 aa



Controllo glicemico meno stringente in pz ≥ 65 aa?

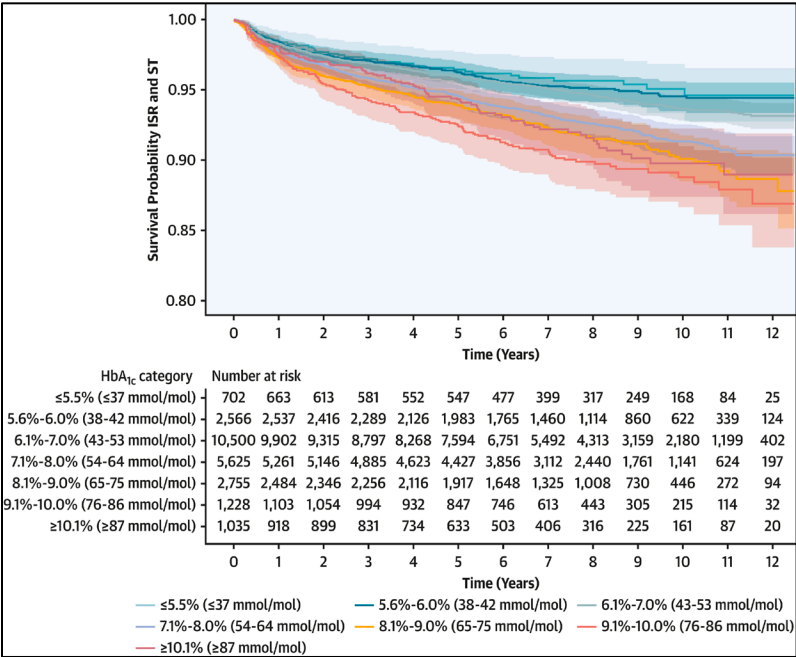
3) Rischio Relativo x p-endpoint

non cambia con insulino-dipendenza (P . 0.9)



Insulino-dipendenza limite per PCI?

Stent failure



IL CONTROLLO GLICEMICO

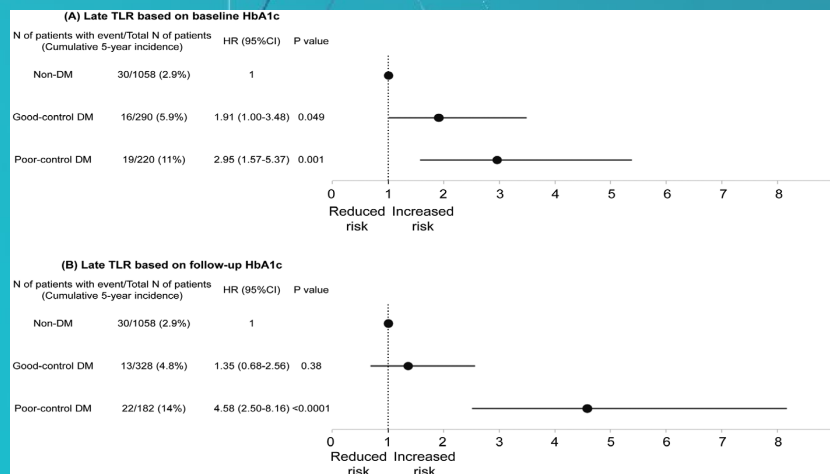
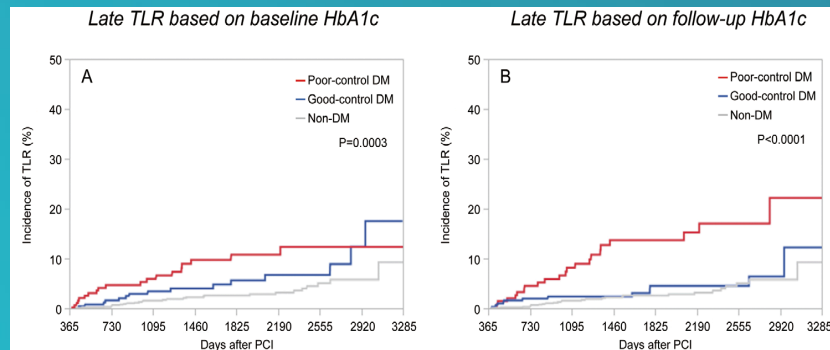
4) Valutazione di HbA_{1c} aggiornata nel follow-up, con possibilità di cambi di categoria



Tempo di esposizione all'iperglicemia = fattore di rischio modificabile per stent failure

All Subjects in the Complete Case Model (N = 24,411)

Beta-blockers	20,200 (82.7)
Calcium inhibitors	361 (1.5)
ACE inhibitors	12,595 (51.6)
ARB	2,685 (11.0)
ASA preprocedure	22,937 (94.0)
P2Y ₁₂ inhibitor preprocedure	20,354 (83.4)
Oral anticoagulant	1,393 (5.7)
Oral lipid-lowering medications	21,619 (88.6)
PCSK-9 inhibitors	31 (0.1)
Glucose-lowering medications	15,112 (61.9)
Diet	9,299 (38.1)
Metformin	10,346 (42.4)
SGLT2 inhibitors	469 (1.9)
GLP-1R agonists	637 (2.6)
DPP4 inhibitors	1,408 (5.8)
Sulfonylurea	2,456 (10.1)
Insulin	6,739 (27.6)

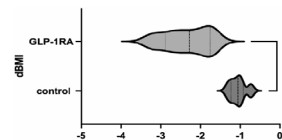


- **Baseline:** DM in buon controllo glicemico vs non DM > rischio di late TLR
- **FU 1 a:** DM in buon controllo glicemico incremento di rischio di late TLR non statisticamente significativo vs non DM

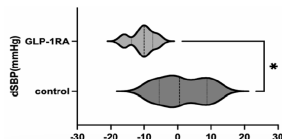


Riduzione della late TLR: controllo glicemico ottimale subito dopo PCI + importante che prima della PCI

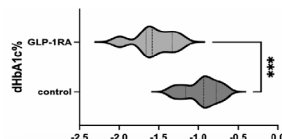
BMI



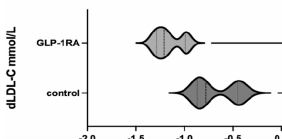
sBP



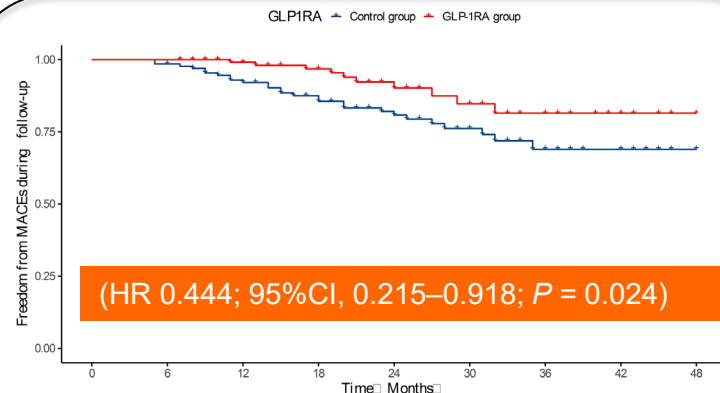
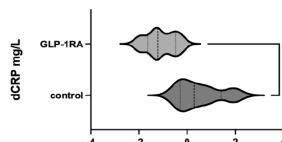
HbA1c



LDLc



PCR



	0	6	12	18	24	30	36	42	48
Control group	131	129	110	88	65	42	20	14	1
GLP-1RA group	131	131	96	78	44	31	18	8	2

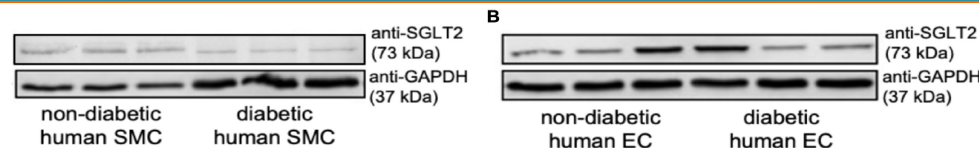
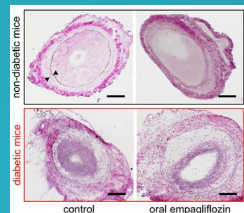
ISR:

- 2.78% GLP-1RA vs 11.54% control group ($P = 0.028$)

Non-target lesion progression (QCA):

- 10.19% GLP-1RA vs 22.12% control group ($P = 0.037$)

SGLT2 è espresso nelle cell. vascolari umane



Empagliflozin

in vivo (denudazione elettrica di carotide murina)

C. Endoteliali:

- accelerata riendotelizzazione nel topo diabetico (ma non in topo sano)

C. Musc Lisce:

- Rallentamento della proliferazione di cellule neointimali e della formazione di neointima (nel topo sia diabetico sia sano)

in vitro

C.Endoteliali:

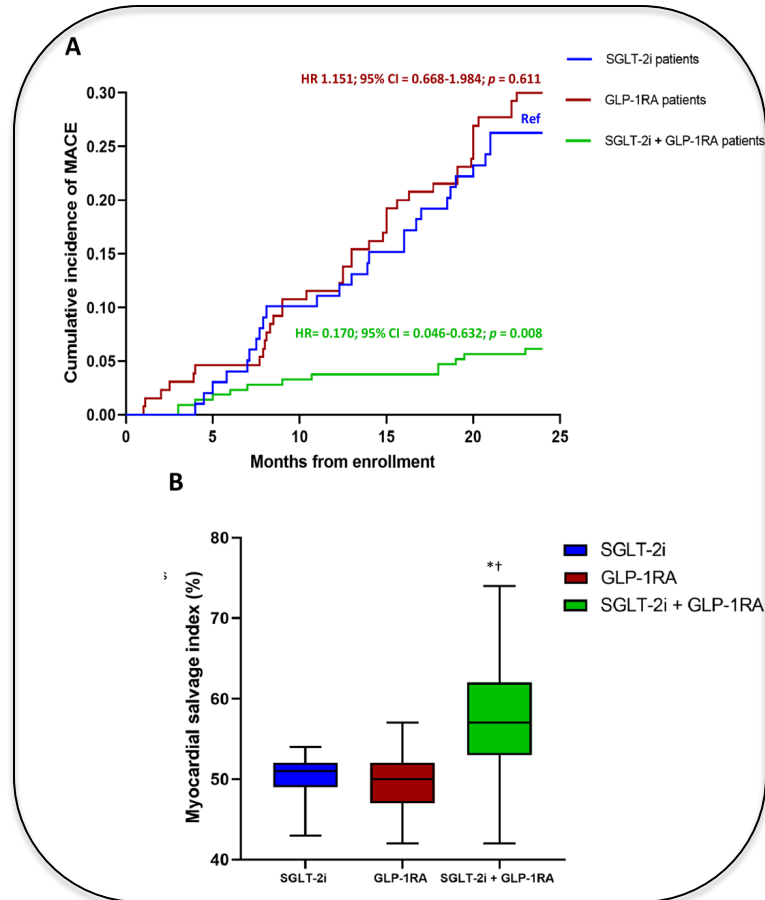
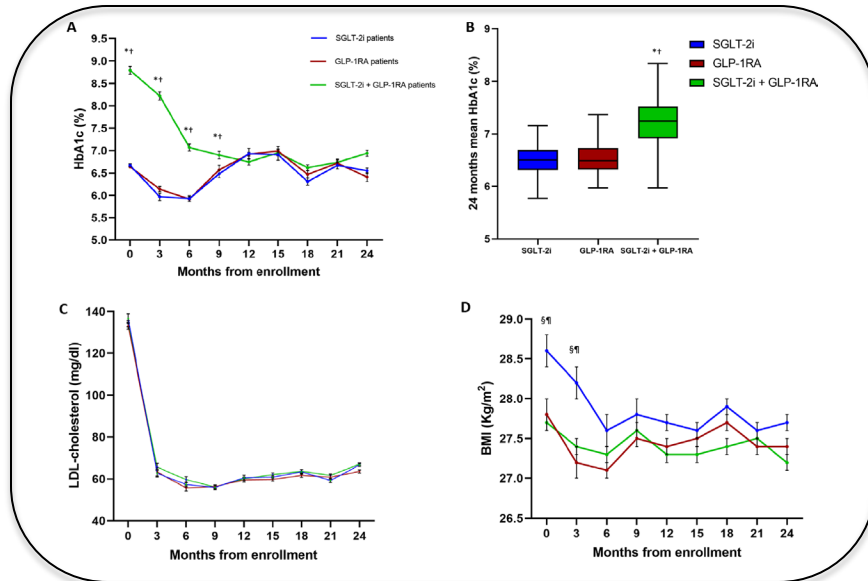
- accelerazione della proliferazione e migrazione di cellule endoteliali umane di diabetico (ma non di soggetto sano)

C. Musc. Lisce:

- rallentamento della proliferazione (sia in cell di diabetico sia di soggetto sano)

SGLT2is e GLP1

Possibile effetto additivo



SGLT2i



GLP-1RA

↓ heart failure and kidney-related events



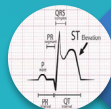
↓ atherosclerosis-related events

Se qualcosa va storto...

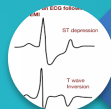
Take home



Rivascolarizzazione per sintomi e prognosi



STEMI: PCI primaria + rivascolarizzazione completa deferred



NSTEMI e CCS: scelta tailored: sede e estensione CAD ; LVEF e compenso ; Condizioni generali, fattori personali



Criteri generali in DM: 2 VD senza IVA → PCI ; 3 VD/LM LVEF<35%
→ BAC



Real world: pz al centro; heart team; PCI/CABG = 12/1



Ottimizzazione PCI e Terapia: outcomes migliori non ancora totalmente inclusi nei trial

