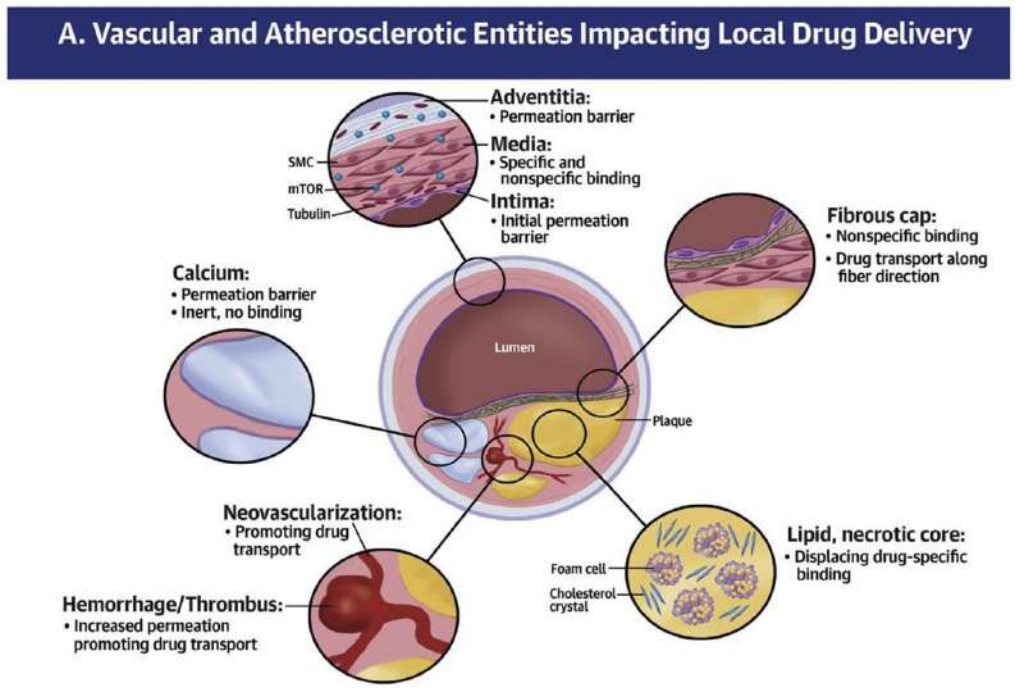
BALON CON DROGAS

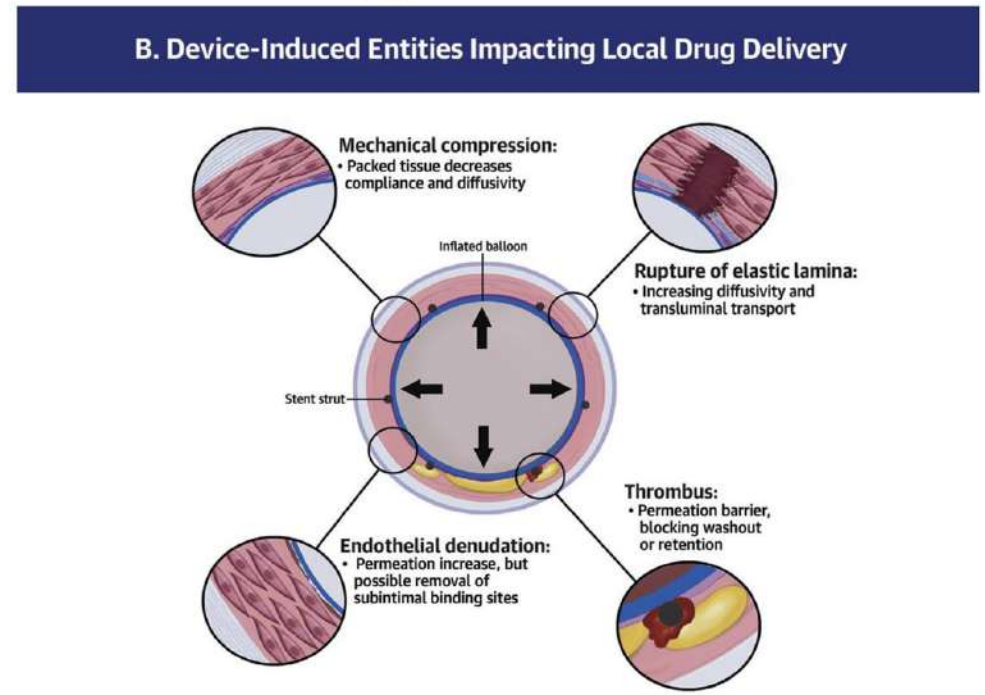
SOLACI

Lima, Peru: 16,17 Noviembre 2023

Dr. Ruben Piraino

Balones Con Drogas (DCB) Mecanismo de Accion

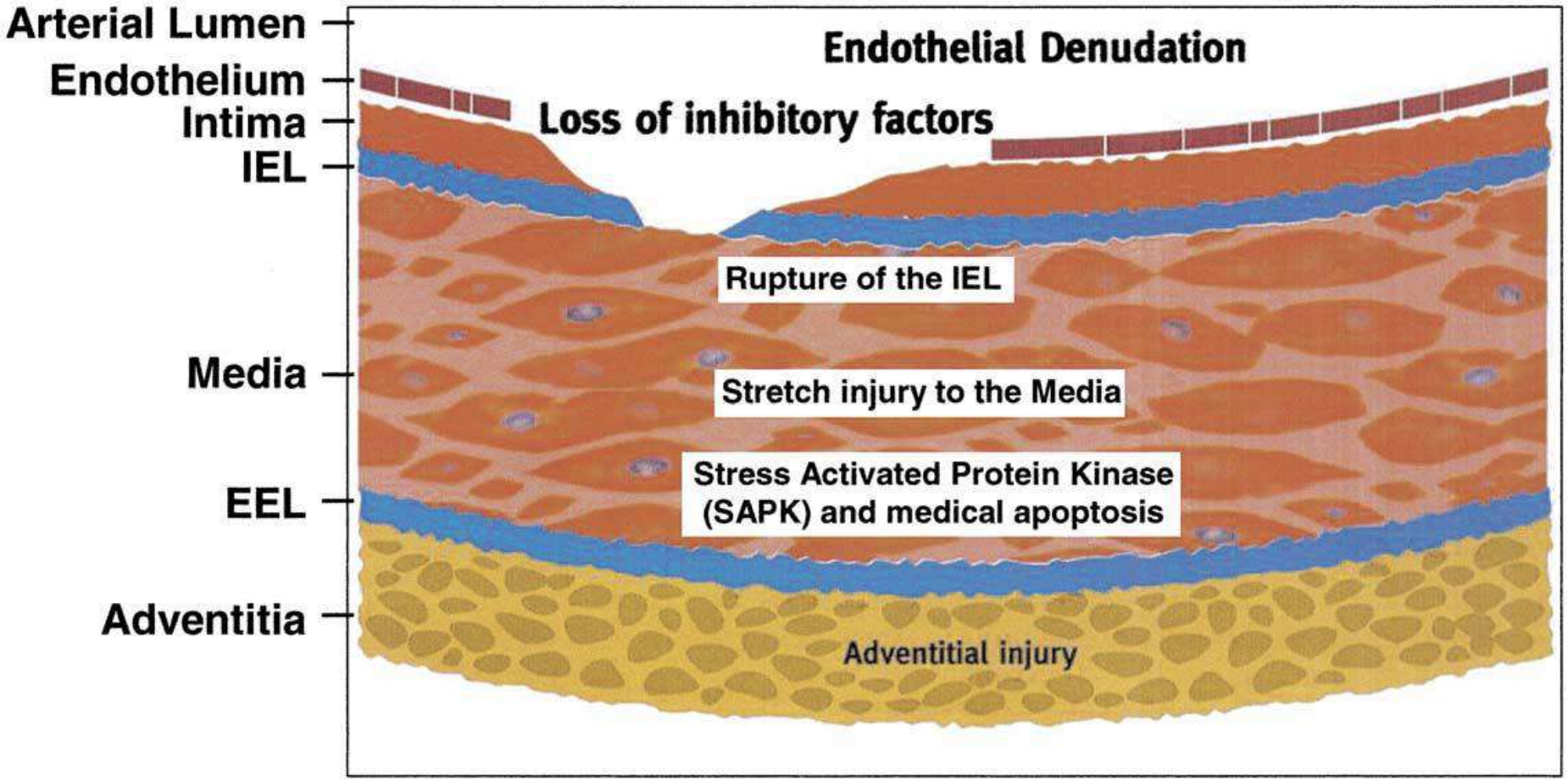




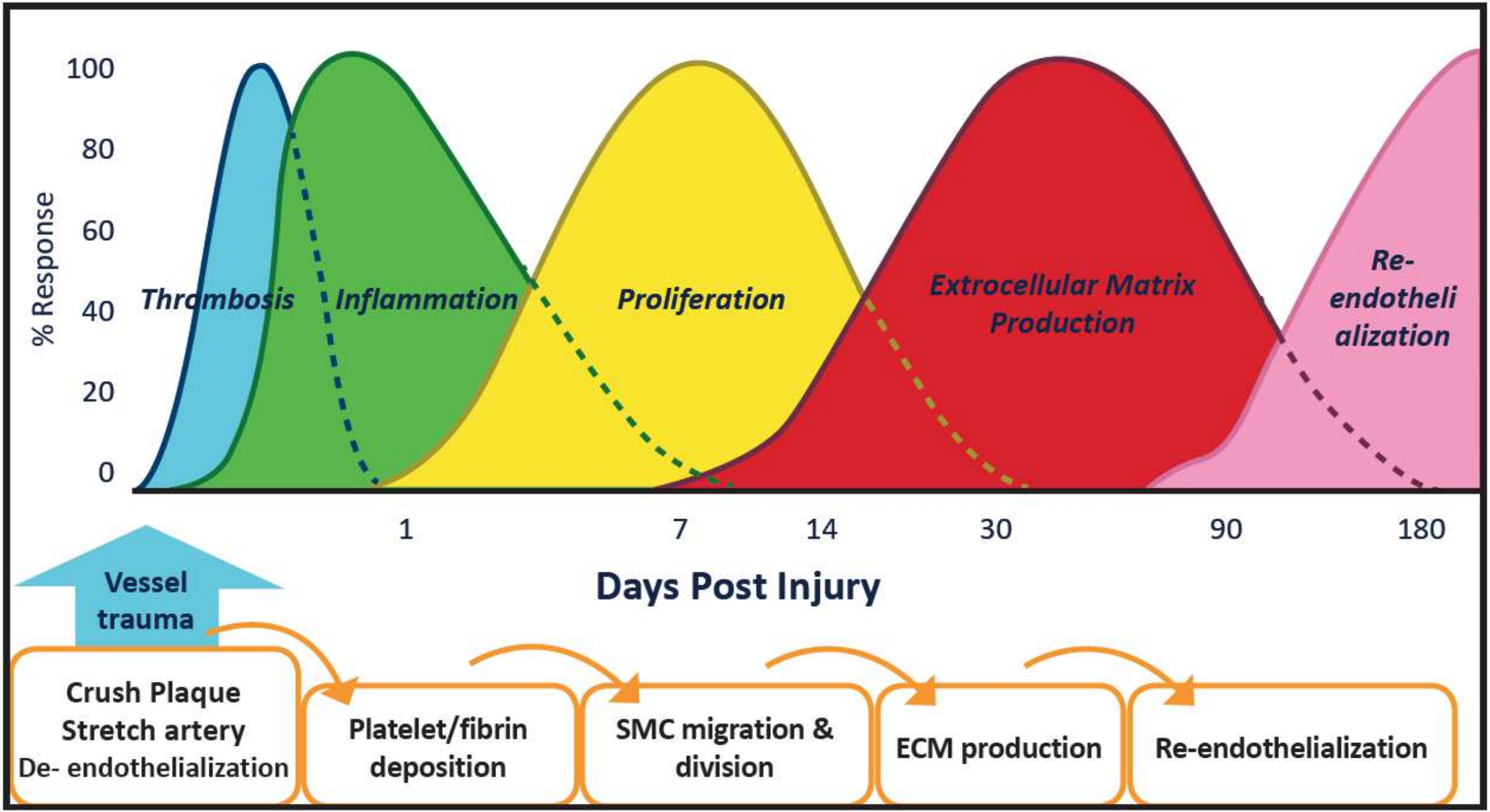
Influence of Vascular Biology and Intervention on Drug Delivery

Vascular, atherosclerotic, and device-induced aspects affecting local drug delivery. (A) In the healthy artery, the intima, media, and adventitia present with different levels of permeation blockage, as well as specific and nonspecific binding sites for delivered drug. In the diseased lesion, calcium, lipid, fibrous, and hemorrhagic entities all modify uptake and retention. (B) Device-induced aspects such as endothelial denudation, elastic lamina rupture, mechanical compression, and thrombus also influence the delivery of drug. mTOR = mammalian target of rapamycin; SMC = smooth muscle cell.

Severidad de la Injuria Vascular y Activacion de los Mecanismos de Reestenosis

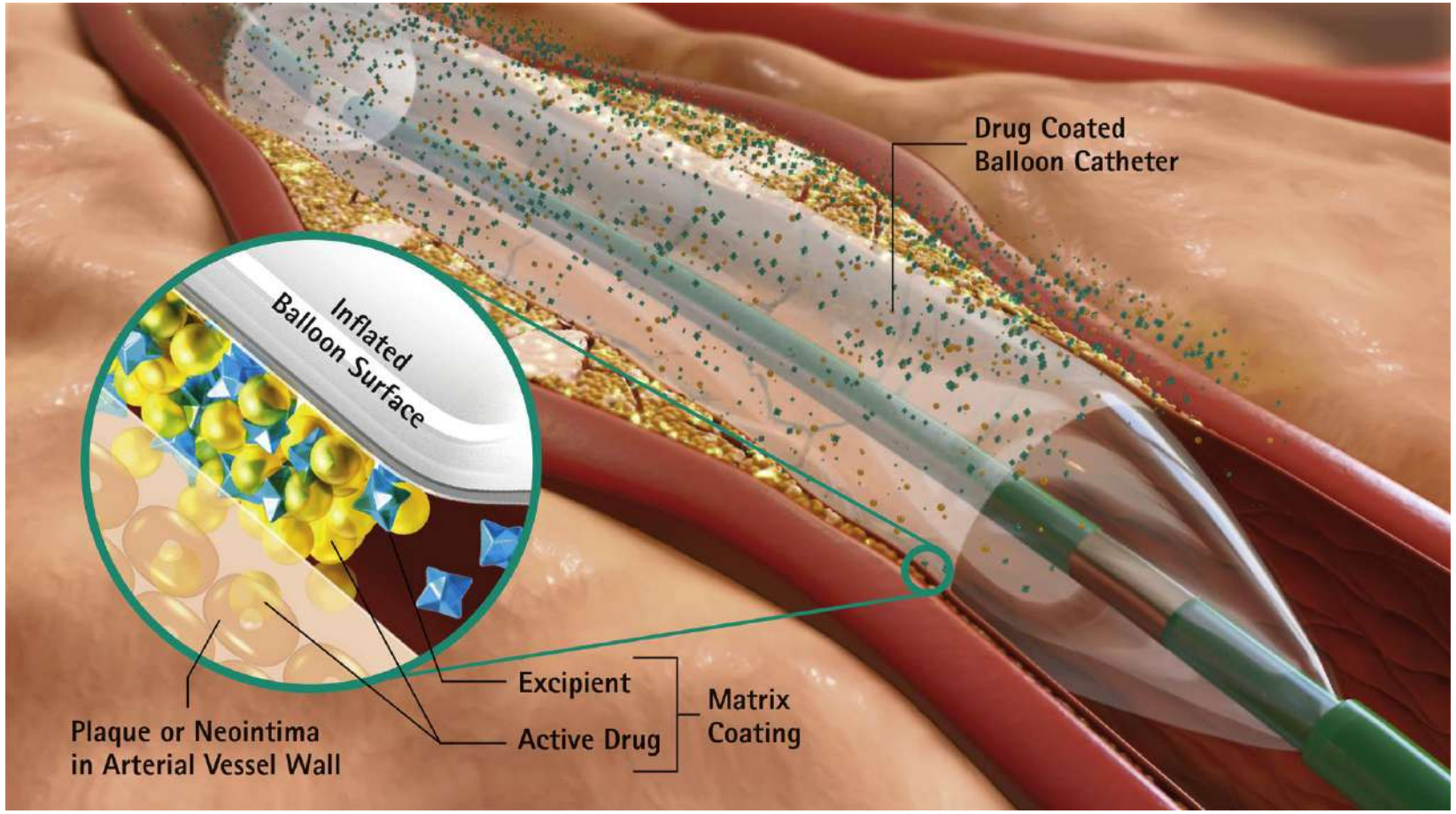


Serruys et al. JACC Vol. 44, No. 4, 2004 August 18, 2004:733–9


100
80
60
40
20
0
% Response
Thrombosis
Inflammation
Proliferation
Extrocellular Matrix Production
Re-endotheli alization
1
7
14
30
90
180
Days Post Injury
Vessel trauma
Crush Plaque
Stretch artery
De- endothelialization
Platelet/fibrin deposition
SMC migration & division
ECM production
Re-endothelialization

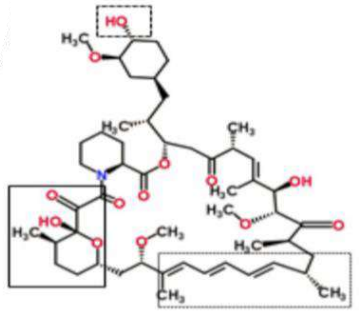
BALON CON DROGAS:

Transferencia Rapida y Homogenea de Farmacos, sin implantes permanentes

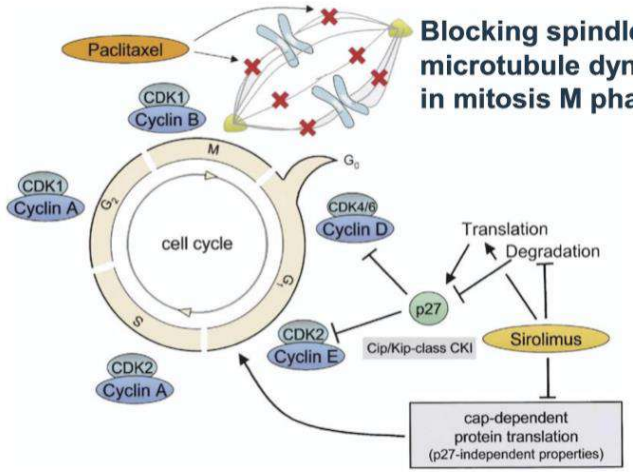


Sirolimus vs Paclitaxel

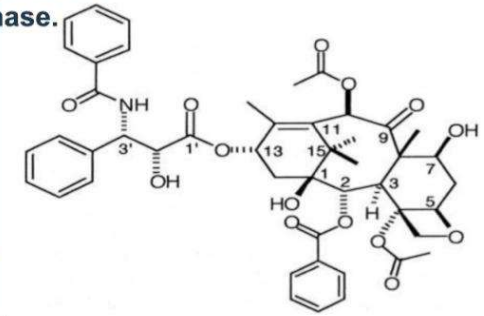
Sirolimus



Solid line : FKBP12 binding site
Dotted line : mTOR binding site



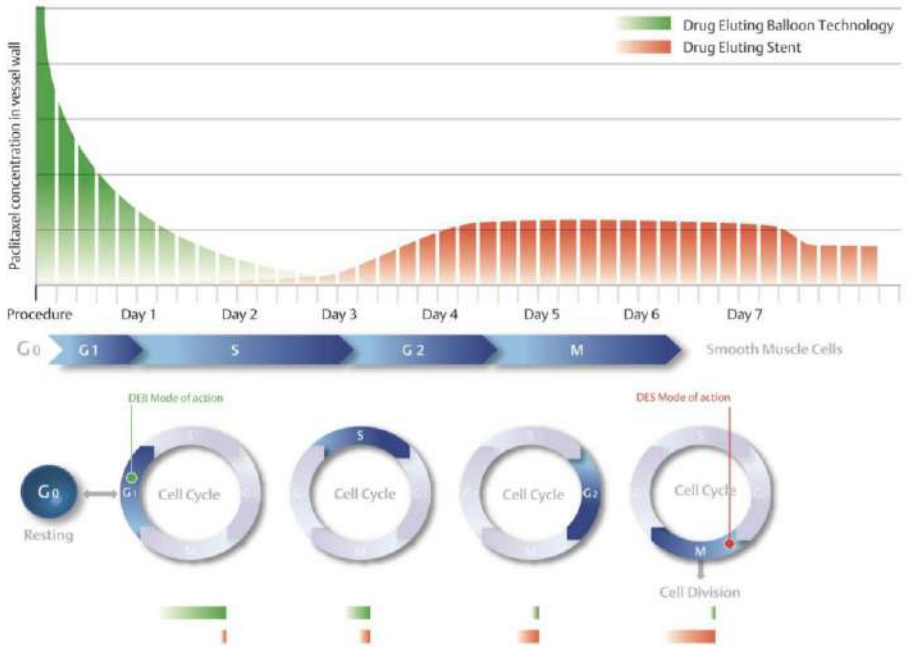
Paclitaxel



Citostaico
Lenta Absorcion Tisular
Corta Retencion Tisular

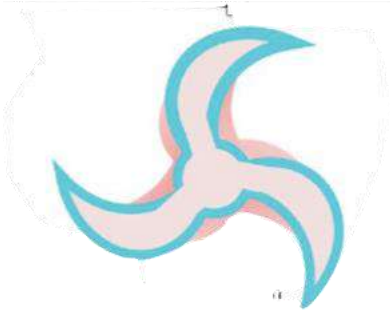
Citotoxico
Rapida Transferencia Tisular
Prolongada Retencion Tisular

El recubrimiento con balón solo con paclitaxel no tuvo ningún efecto en el modelo.
Por el contrario, el recubrimiento con paclitaxel y el agente de contraste de rayos X iopromida como excipiente mostró una reducción pronunciada y dependiente de la dosis de la formación de neointima incluso después de 4 semanas.



- Endothelium re-growth not interrupted
- Endothelialization completed within one month

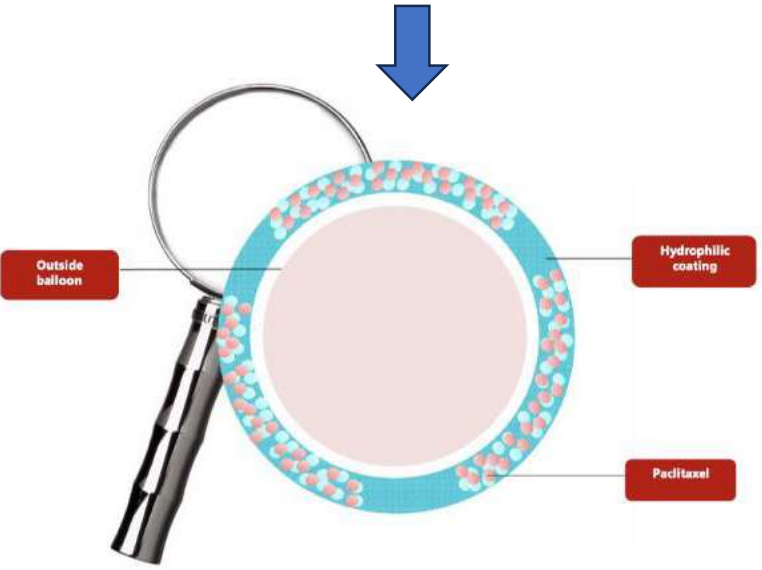
La alta lipofilia y las propiedades de unión favorables del paclitaxel lo convirtieron en el único fármaco utilizado en DCB durante mucho tiempo. Sin embargo, la eficacia y seguridad del sirolimus y sus análogos en los stents farmacológicos (DES) promovieron el desarrollo de nuevas tecnologías.



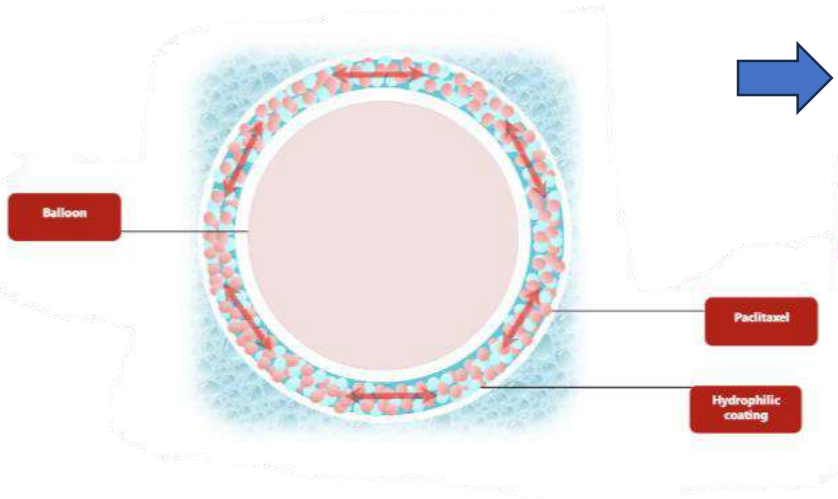
CINETICA DEL BALON FARMACOLOGICO

La transferencia intracelular local efectiva de fármacos la realiza en solo 30 a 60 segundos de contacto entre el catéter de balón inflado y la superficie del vaso.

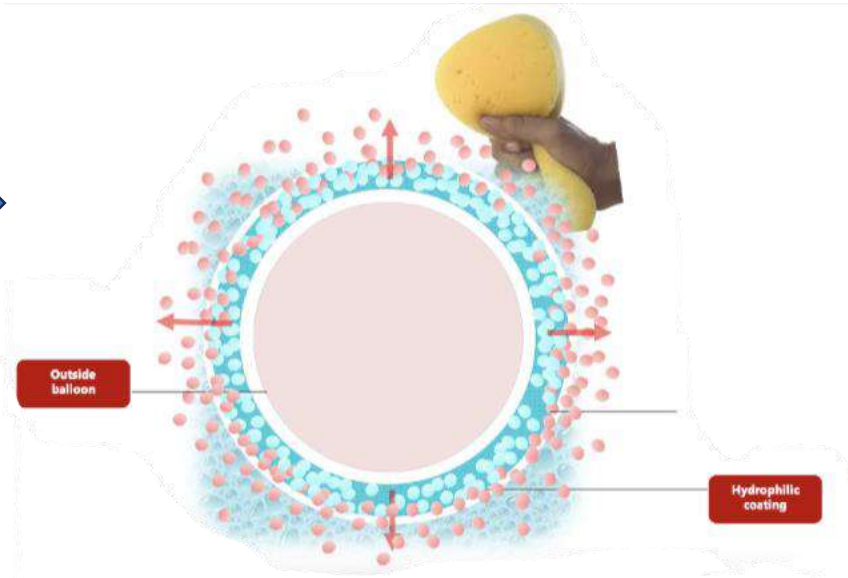
BALON PLEGADO



BALON DESPLEGADO
Distribucion Heterogenea



PACLITAXEL HUMEDO
Distribucion Homogenea



BALON A PRESION
“Efecto Esponja”

Porque usar Balones Farmacologicos?

- El uso de DCB es en la reestenosis intrastent (BMS y DES), los vasos pequeños de novo y los altos riesgos de sangrado.
- TAMBIÉN: lesiones en bifurcación, enfermedad de grandes vasos, diabetes mellitus (reducción de DAPT).
- El DCB solo no se asocia con una tasa más alta de trombosis aguda o tardía.

Resúmenes

Los DES todavía tienen algunas limitaciones en ciertas condiciones clínicas y anatómicas. (oclusión de la rama lateral, inducir neoaterosclerosis, etc.)

Los DCB son una estrategia terapéutica novedosa para la enfermedad de las arterias coronarias.

Además de la ISR, nuevos datos muestran posibles usos en la enfermedad arterial coronaria nativa.

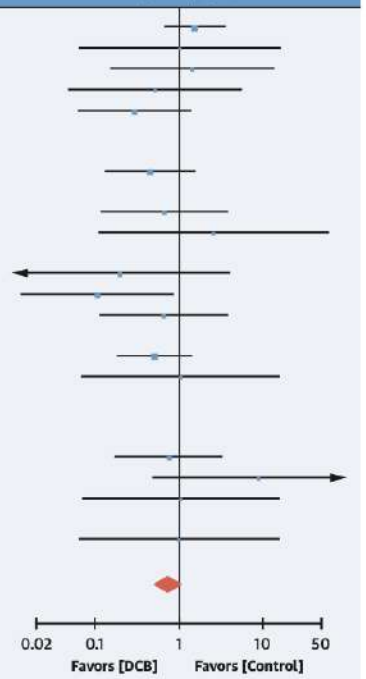
NO SE DETECTO AUMENTO DE LA MORTALIDAD EN CAD TRATADOS CON PCB

Resumen de los efectos del tratamiento del balón recubierto con paclitaxel versus tratamientos alternativos

FIGURE 2 All-Cause Mortality Within 1 Year

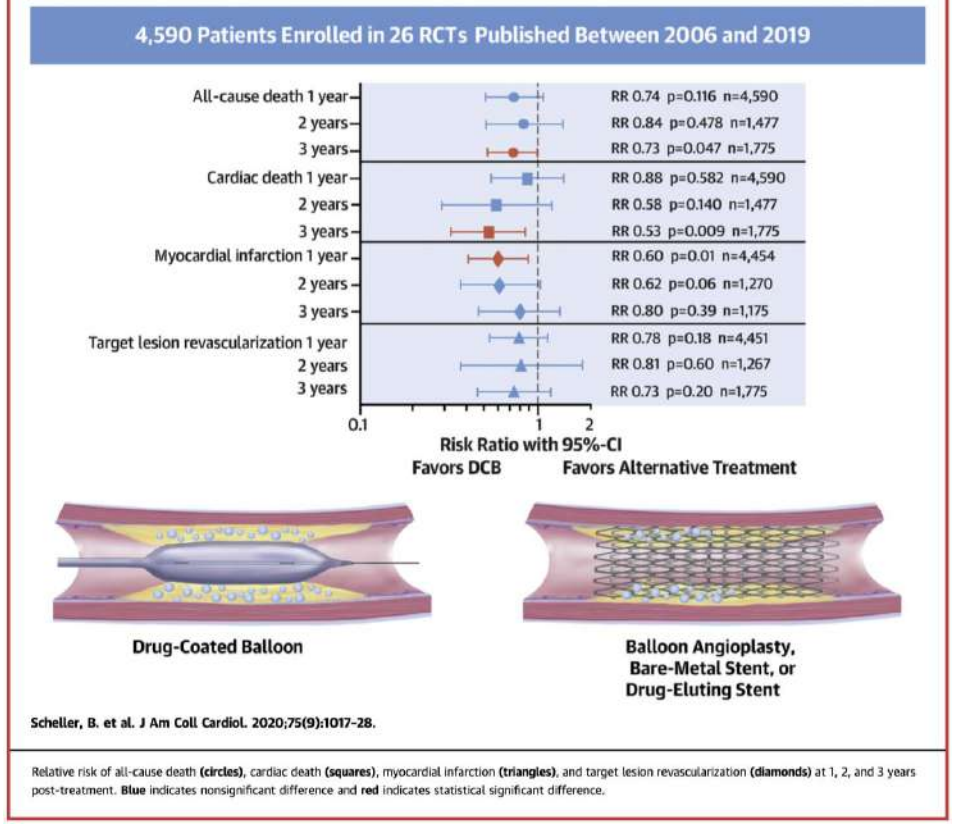
Study or Subgroup	DCB Events	DCB Total	Control Events	Control Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Basket Small 2	14	382	9	376	14.6%	1.53 [0.67, 3.49]
BELLO	1	90	1	92	1.6%	1.02 [0.06, 16.10]
Biolux RCT	3	147	1	70	2.2%	1.43 [0.15, 13.49]
DARE	1	137	2	141	3.2%	0.51 [0.05, 5.61]
DEBUT	2	102	7	106	11.1%	0.30 [0.06, 1.40]
Gobic STEMI	0	38	0	37		Not estimable
Habara 2011	0	25	0	25		Not estimable
ISAR DESIRE III	3	137	13	265	14.3%	0.45 [0.13, 1.54]
Nishiyama 2016	0	27	0	33		Not estimable
Paccocath ISR I/II	2	54	3	54	4.8%	0.67 [0.12, 3.83]
Patent C	1	33	0	28	0.9%	2.56 [0.11, 60.44]
PEPCAD BIF	0	32	0	32		Not estimable
PEPCAD China ISR	0	109	2	106	4.1%	0.19 [0.01, 4.01]
PEPCAD DES	1	72	5	38	10.5%	0.11 [0.01, 0.87]
PEPCAD II	2	66	3	65	4.9%	0.66 [0.11, 3.80]
PEPCAD Japan SVD	0	92	0	41		Not estimable
PEPCAD NSTEMI	5	104	10	106	15.9%	0.51 [0.18, 1.44]
PICCOLETO	1	28	1	29	1.6%	1.04 [0.07, 15.77]
Restore China SVD	0	116	0	114		Not estimable
Restore Korea	0	86	0	86		Not estimable
Revelation	0	60	0	60		Not estimable
RIBS IV	3	154	4	155	6.4%	0.75 [0.17, 3.32]
RIBS V	4	95	0	94	0.8%	8.91 [0.49, 163.15]
SEDUCE	1	24	1	25	1.6%	1.04 [0.07, 15.73]
Shin 2015	0	44	0	22		Not estimable
TIS	1	68	1	68	1.6%	1.00 [0.06, 15.66]
Total (95% CI)		**2,322**		**2,268**	**100.0%**	**0.74 [0.51, 1.08]**
Total events	45		63			

Heterogeneity: $Chi^2 = 13.55$, df = 16 (P = 0.63); $I^2 = 0\%$
Test for overall effect: Z = 1.57 (P = 0.12)



Forest plot as risk ratios (RRs) with corresponding 95% confidence intervals (CIs) for each trial using an M-H fixed effect model. The **size of central markers** reflects the weight of each study. ISR = in-stent restenosis; M-H = Mantel-Haenszel; RCT = randomized controlled trial; STEMI = ST-segment elevation myocardial infarction; other abbreviations as in Figure 1.

CENTRAL ILLUSTRATION Summary of Treatment Effects for Paclitaxel-Coated Balloon Versus Alternative Treatments



Scheller, B. et al. J Am Coll Cardiol. 2020;75(9):1017-28.

Relative risk of all-cause death **(circles)**, cardiac death **(squares)**, myocardial infarction **(triangles)**, and target lesion revascularization **(diamonds)** at 1, 2, and 3 years post-treatment. **Blue** indicates nonsignificant difference and **red** indicates statistical significant difference.

Riesgo relativo de muerte por todas las causas (círculos), muerte cardíaca (cuadrados), infarto de miocardio (triángulos) y revascularización de la lesión diana (diamantes) a los 1, 2 y 3 años después del tratamiento. El azul indica una diferencia no significativa y el rojo indica una diferencia estadísticamente significativa

DCB en restenosis intrastent

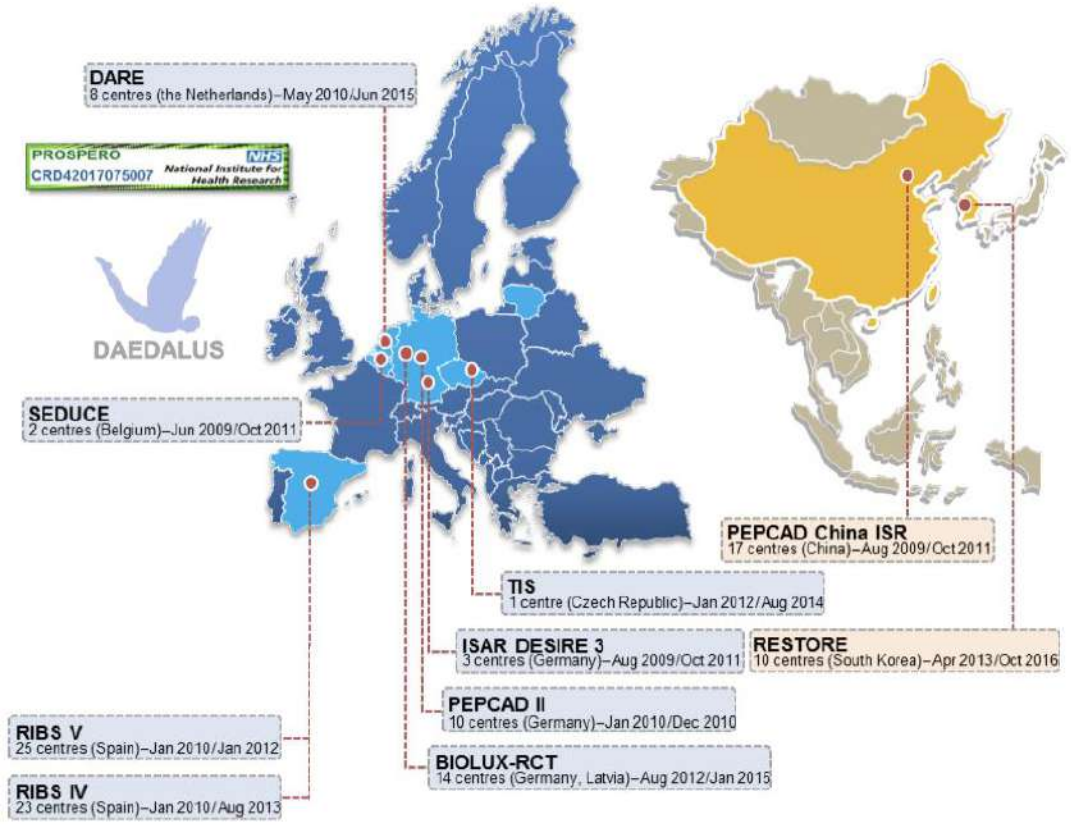
DCB en REESTENOSIS INTRASTENT

Recommendations	Class	Level
Restenosis		
DES are recommended for the treatment of in-stent restenosis of BMS or DES.	I	A
Drug-coated balloons are recommended for the treatment of in-stent restenosis of BMS or DES.	I	A
In patients with recurrent episodes of diffuse in-stent restenosis, CABG should be considered by the Heart Team over a new PCI attempt.	IIa	C
IVUS and/or OCT should be considered to detect stent-related mechanical problems leading to restenosis.	IIa	C

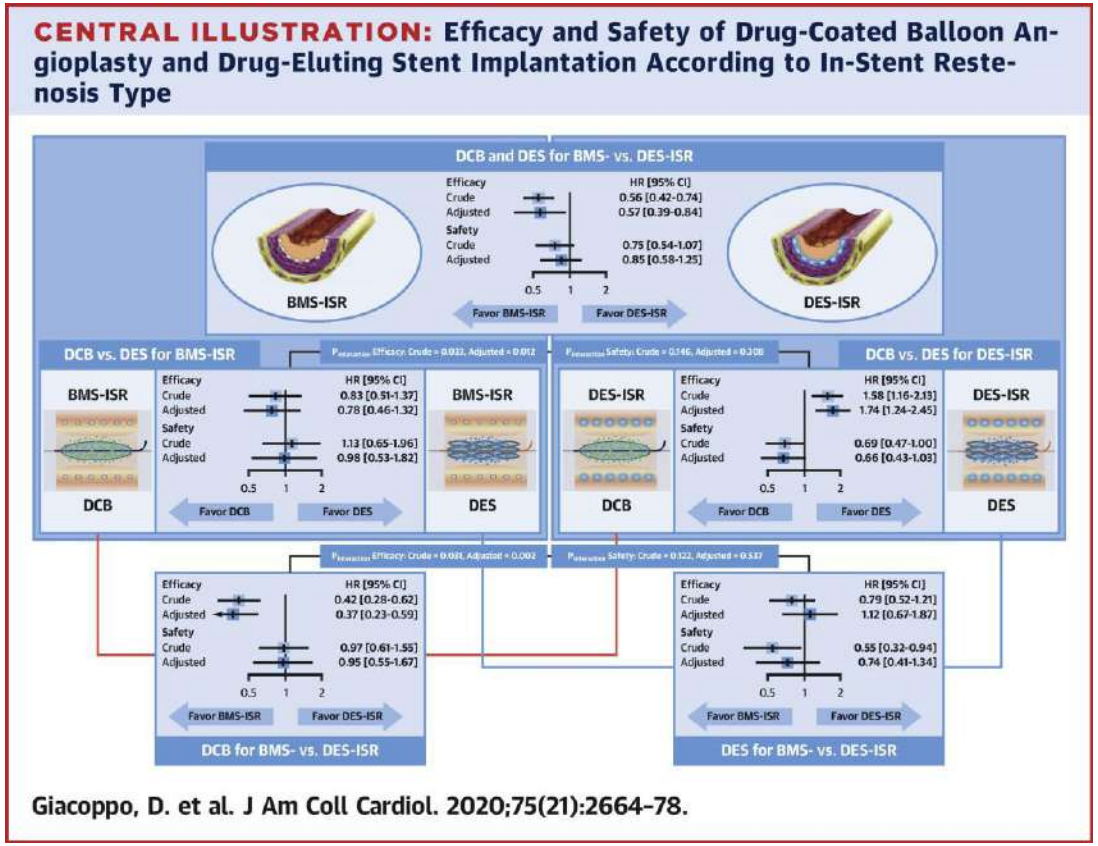
2018 ESC/EACTS Guidelines on myocardial revascularisation European Heart Journal (2018) 00, 1-96 - doi:10.1093/eurheartj/ehy394

DAEDALUS Collaboration: Seguridad (M/I) Eficacia (TLR)

BMS ISR : DCB o DES ? – DES ISR : DCB o DES ?



DAEDALUS Collaboration | Giacoppo et al. | Eur Heart J 2019

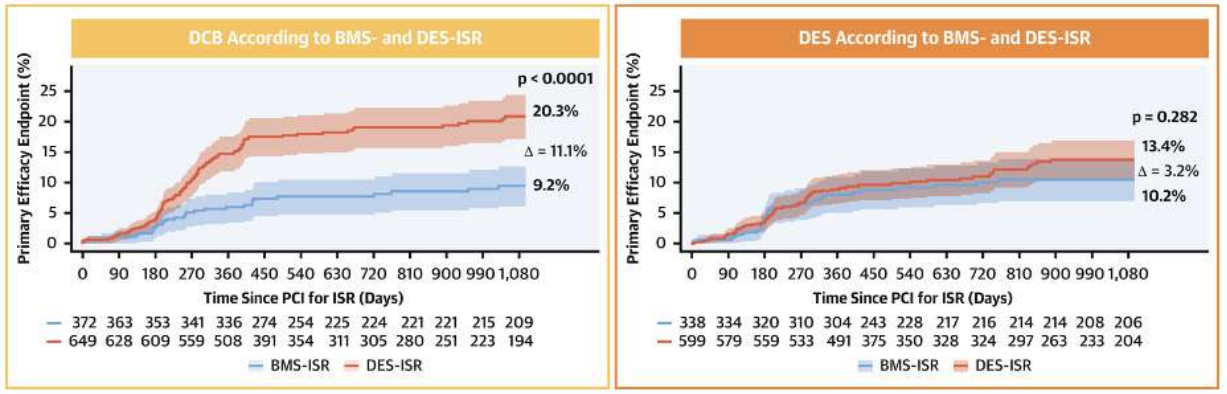


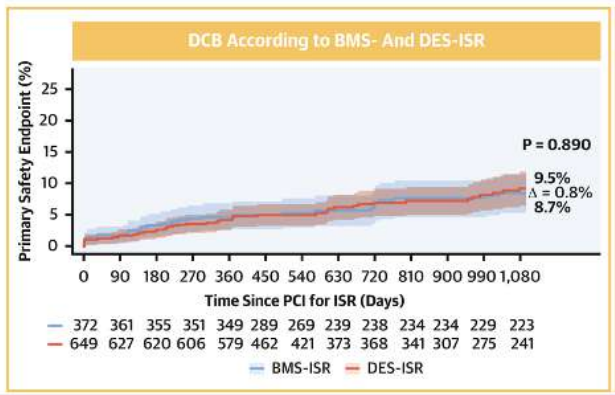
Giacoppo, D. et al. J Am Coll Cardiol. 2020;75(21):2664-78.

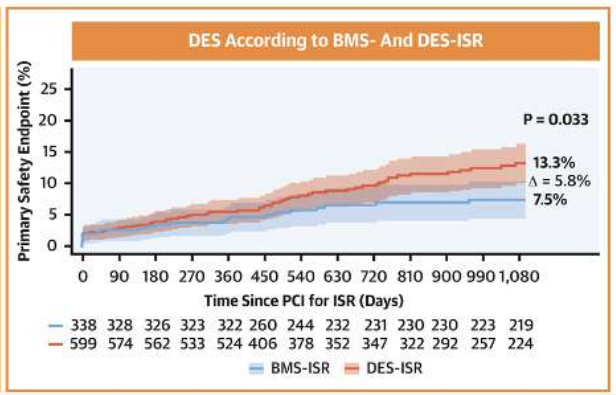
BMS ISR : DCB = DES – DES ISR : DCB < DES

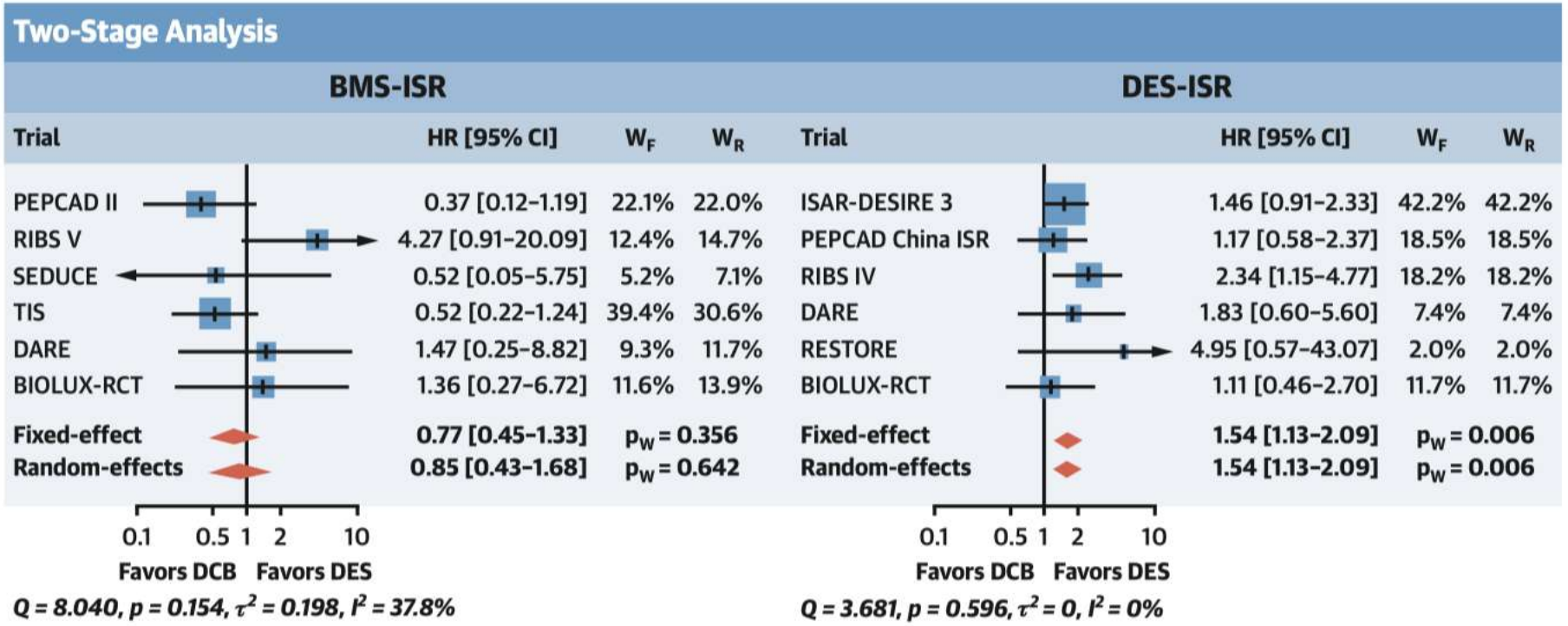
EFICACIA (TLR)

SEGURIDAD (M/I)



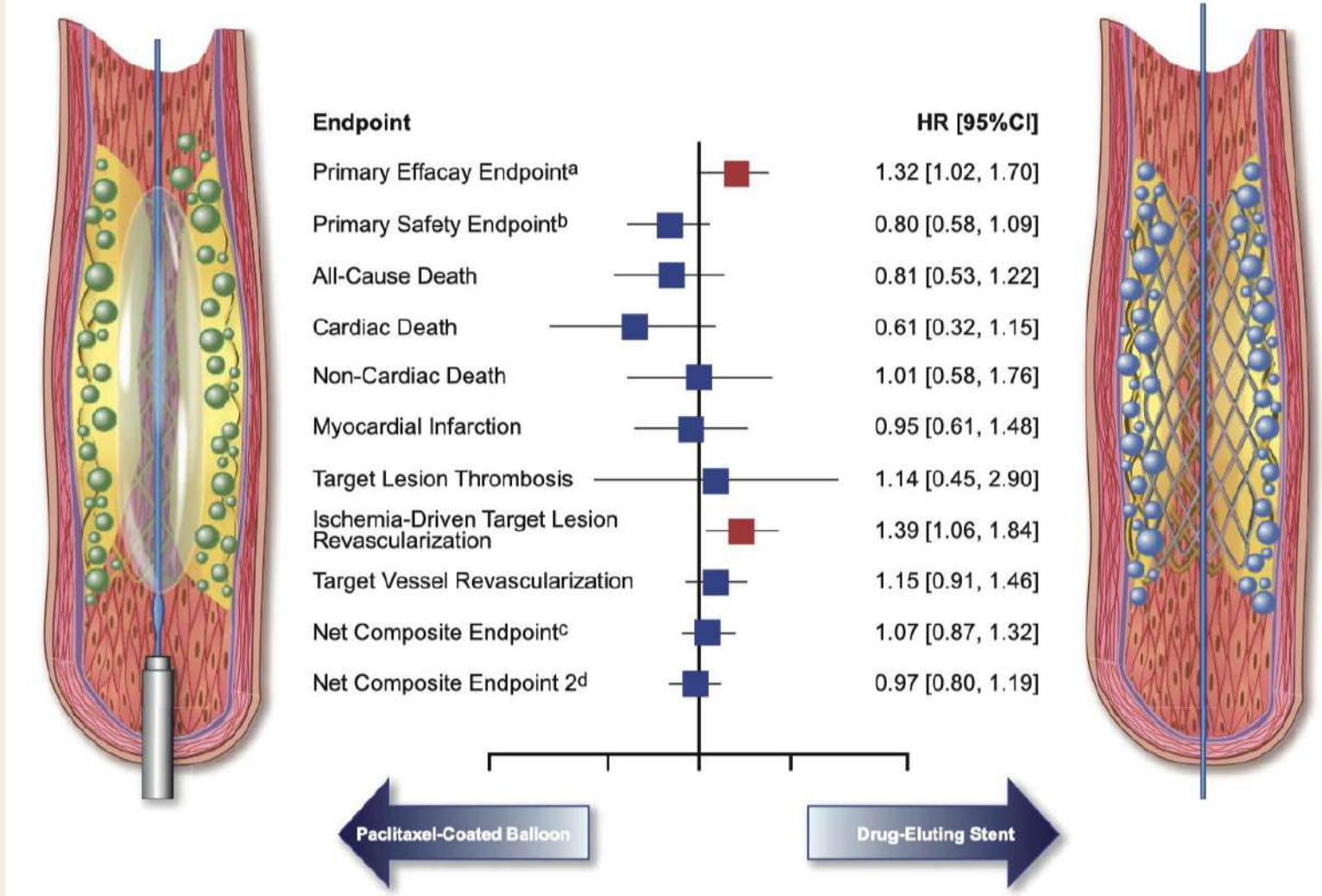






DAEDALUS
DCB vs DES en RIS

DCB vs. DES para el tratamiento de la REESTENOSIS INTRA STENT: un metanálisis de 10 ensayos clínicos aleatorizados (estudio DAEDALUS)



Take home figure Summary of the treatment effects for angioplasty with paclitaxel-coated balloon vs. repeat stenting with drug-eluting stent in patients treated for coronary in-stent restenosis. [a]Primary efficacy endpoint was target lesion revascularization; [b]primary safety endpoint was the composite of death, myocardial infarction, or target lesion thrombosis; [c]net composite endpoint 1 refers to the composite of death, myocardial infarction, target lesion thrombosis, or target lesion revascularization; [d]net composite endpoint 2 refers to the composite of death, myocardial infarction, target lesion thrombosis, or target vessel revascularization.

European Heart Journal (2019) 0, 1–14 doi:10.1093/eurheartj/ehz594

DCB en Lesiones de NOVO

PEQUEÑOS VASOS

Actualización DCB: Resumen de las indicaciones clínicas y anatómicas actuales

El uso de DCB en la enfermedad de novo está menos establecido y carece en la actualidad de datos de ensayos clínicos convincentes para su uso rutinario

DE NOVO

1- Enfermedad de los vasos sanguíneos pequeños/enfermedad difusa

2- Pacientes con alto riesgo hemorrágico

3- Síndrome coronario agudo

4- Bifurcación ICP

Solo DCB vs DES en Pequeños Vasos de NOVO
en Estudios Randomizados

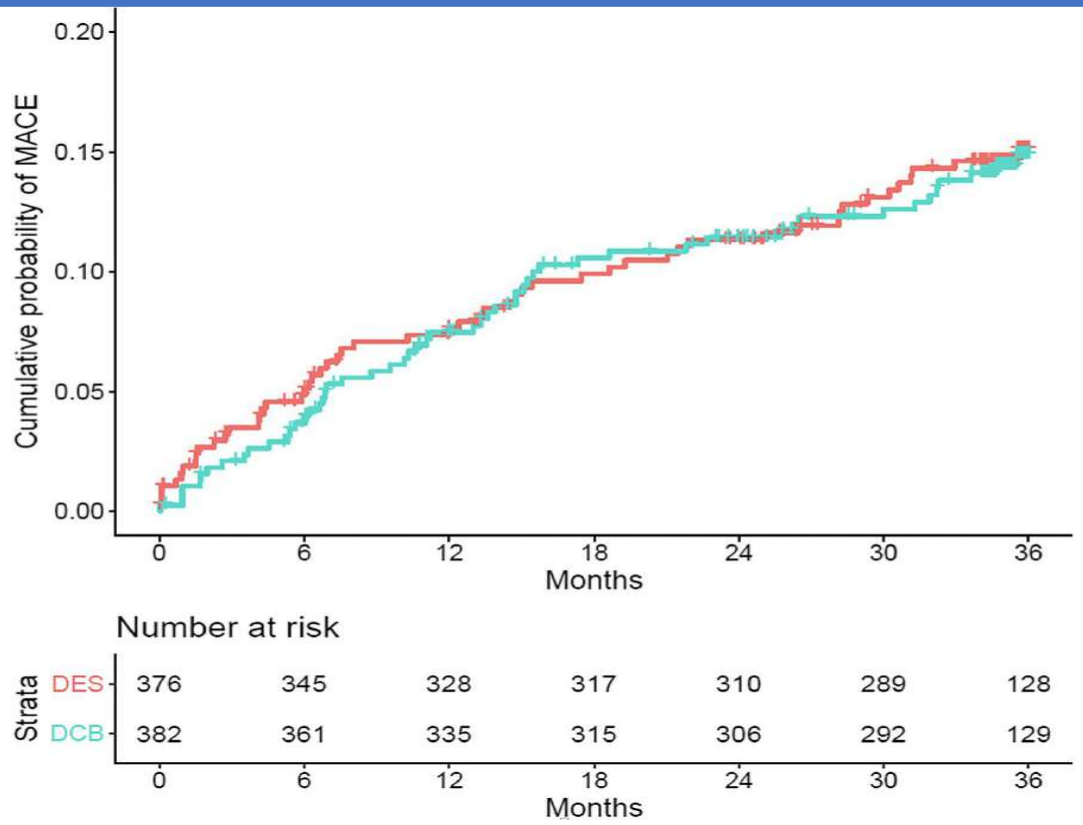
TABLE 3 Randomized Controlled Trials of DCB Only in De Novo Lesions of Small Coronary Vessels

Study Name (Ref. #)	Comparators	n	Follow-Up Duration	Angiographic Follow-Up	p Value	MACE (%)	p Value	TLR (%)	p Value
PICCOLETO (58)	Dior PCB vs. TAXUS Liberté PES	57	6 months (angio) 9 months (clinical)	MLD 1.11 ± 0.65 mm vs. 1.94 ± 0.72 mm	0.0002	35.7 vs. 13.8	0.054	32.1 vs. 10.3	0.15
BELLO (59,66)	IN.PACT Falcon PCB vs. TAXUS Liberté PES	182	6 months (angio) 12 months (clinical) 3 yrs (clinical)	LLL 0.08 ± 0.38 mm vs. 0.29 ± 0.44 mm	0.001	10 vs. 16.3 14.4 vs. 30.4	0.21 0.015	4.4 vs. 7.6	0.37
RESTORE SVD (61)	Restore PCB vs. Resolute Integrity ZES	230	9-12 months (angio) 12 months (clinical)	LLL 0.26 ± 0.42 mm vs. 0.30 ± 0.35 mm, diameter stenosis 29.6 ± 2.0% vs. 24.1 ± 2.0%	0.41, <0.001	9.6 vs. 9.6	1.0	4.4 vs. 2.6	0.72
BASKET-SMALL 2 (60)	Sequent Please PCB vs. TAXUS Element PES and Xience EES	758	6 months (angio)* 12 months (clinical)	LLL 0.13 mm (−0.14 to 0.57 mm) vs. 0.10 mm (−0.16 to 0.34 mm)	0.72	8 vs. 8	0.918, 0.0152†	3.4 vs. 4.5	0.438

Only randomized controlled trials in patients with lesions in native coronary vessels ≤2.75 or 3.0 mm are included. *Only clinically indicated angiography. †Noninferiority.
ZES = zotarolimus-eluting stent; other abbreviations as in Tables 1 and 2.

JACC:CARDIOVASCULAR INTERVENTIONS VOL. 13, NO. 12, 2020
JUNE 22, 2020:1391–40

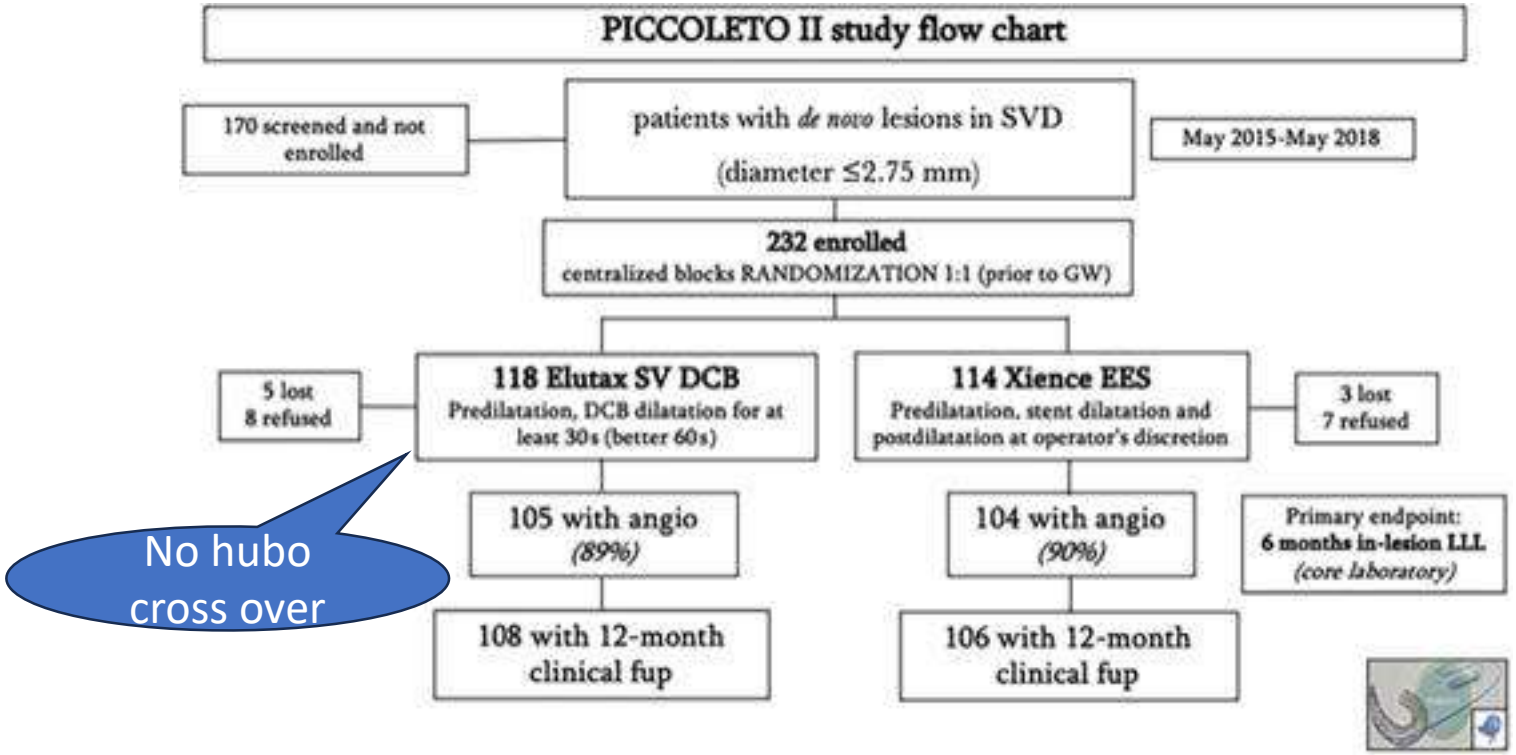
BASKET SMALL 2 trial – 3 años sgto.
Vasos < 3mm



La EFICACIA del tramiento entre PEB vs DES no difirio a 3 años de seguimiento

PICCOLETO II: Elutax DCB vs Xience DES

Punto Final Primario LLL



Bernardo Cortese et al. *J Am Coll Cardiol Intv* 2020; 13:2840-2849.

PCB vs EES para vasos pequeños (Elutax vs Xience) <2.75mm PICCOLETO II Randomized Clinical Trial

En este ensayo clínico aleatorizado multicéntrico en pacientes con lesiones de novo de SVD, se encontró que DCB de nueva generación fue superior a EES en cuanto a LLL como patrón angiográfico y comparable en cuanto al resultado clínico.

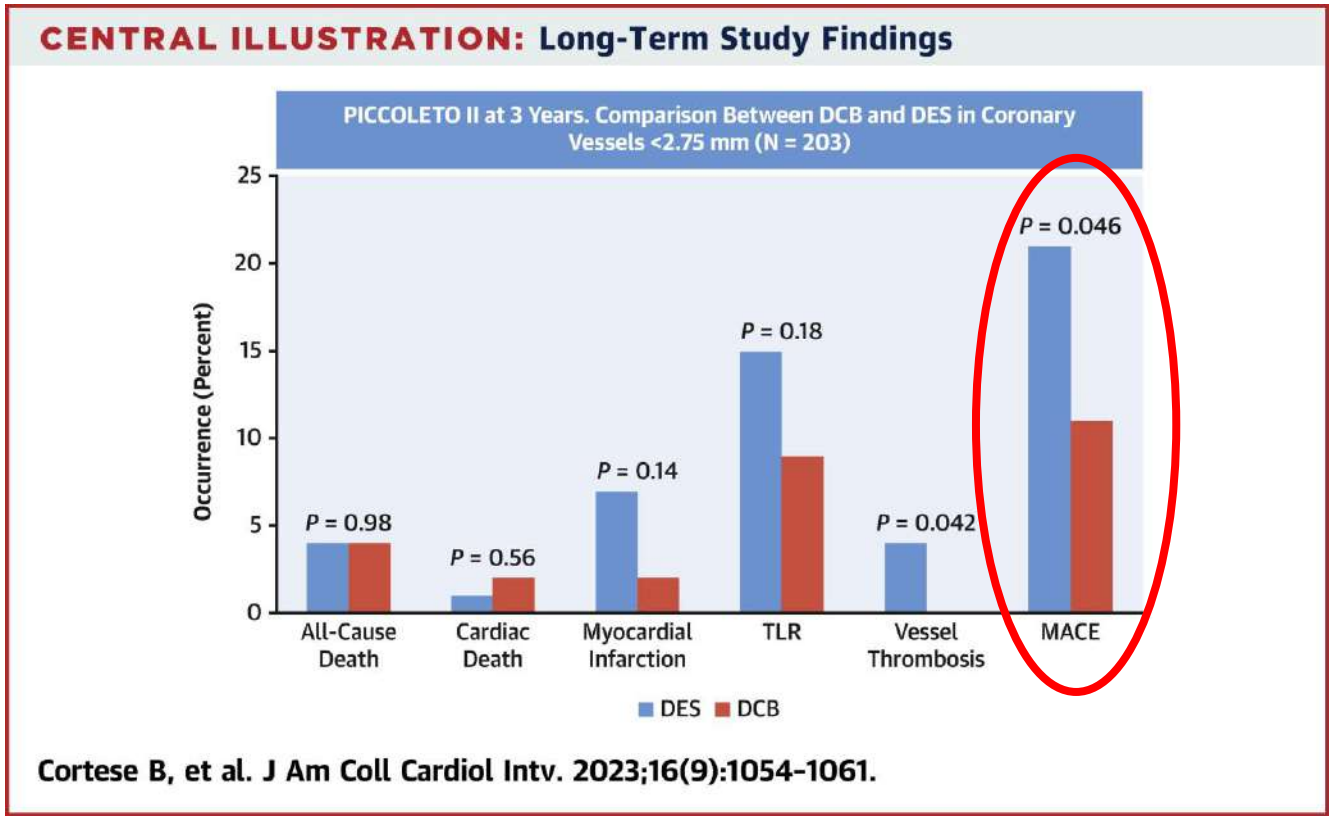
Cortese, B. et al. J Am Coll Cardiol Intv. 2020;13(24):2840–9.

TABLE 3 Outcomes at 6-Month Angiographic Follow-Up

	DES (n = 104)	DCB (n = 105)	p Value
Pre-procedure			
RVD, mm	2.18 ± 0.4	2.23 ± 0.4	0.46
MLD, mm	0.83 ± 0.4	0.82 ± 0.5	0.98
Stenosis, % of lumen diameter	76 ± 15	75 ± 17	0.83
Lesion length, mm	14.0 ± 6.9	13.5 ± 7.3	0.75
Post-procedure, in-lesion			
MLD, mm	2.29 ± 0.4	1.89 ± 0.3	0.02
Stenosis, % of lumen diameter	13.1 ± 18	21.4 ± 22	0.20
Acute gain, mm	1.47 ± 0.3	0.99 ± 0.4	0.03
Post-procedure, in-segment			
MLD, mm	1.93 ± 0.3	1.73 ± 0.3	0.04
Stenosis, % of lumen diameter	26.8 ± 12	29.6 ± 16	0.55
Acute gain, mm	1.10 ± 0.2	0.85 ± 0.2	0.05
At follow-up, in-lesion			
MLD, mm	2.12 ± 0.53	1.85 ± 0.49	0.14
Stenosis, % of lumen diameter	21.6 ± 13	25.1 ± 11	0.37
Binary restenosis	7 (6.5)	7 (6.3)	0.98
Late loss, mm	**0.17**	**0.04**	**0.03 for superiority**
At follow-up, in-segment			
MLD, mm	1.79 ± 0.48	1.74 ± 0.46	0.69
Stenosis, % of lumen diameter	32.2 ± 19	36.6 ± 21	0.78
Binary restenosis	10 (9.6)	11 (10.5)	0.94
Late loss, mm	0.14 ± 0.38	0.01 ± 0.25	**0.03 for superiority**
Net luminal gain*	0.96 ± 0.23	0.84 ± 0.19	0.49

Values are mean ± SD or n (%). *Acute gain − late lumen loss. **Bold** indicates a primary endpoint.
MLD = minimal lumen diameter; RVD = reference vessel diameter; other abbreviations as in Table 1.

Piccoleto II (Elutax PEB vs EES) 3 años sgto. Vasos Pequeños < 2.75 mm



La experiencia clinica y los estudios realizados sugieren que los Balones Cubiertos con Drogas son el major Tratamiento paa Vasos Pequeños y Enfermedad Difusa

DCB en Lesiones de NOVO

GRANDES VASOS

DCB GRANDES VASOS

El tratamiento de las lesiones de novo con DCB todavía encuentra importantes problemas de aceptación.

- El argumento en contra del uso de DCB generalmente se basa en el resultado angiográfico agudo
  - con retroceso temprano
  - la preocupación por las disecciones que causan oclusiones vasculares agudas.

Solo DCB Grandes Vasos de NOVO (>2.75 – 3.0 mm)
en Estudios mayores de 100 ptes

TABLE 4 DCB Only in De Novo Lesions of Large Coronary Vessels

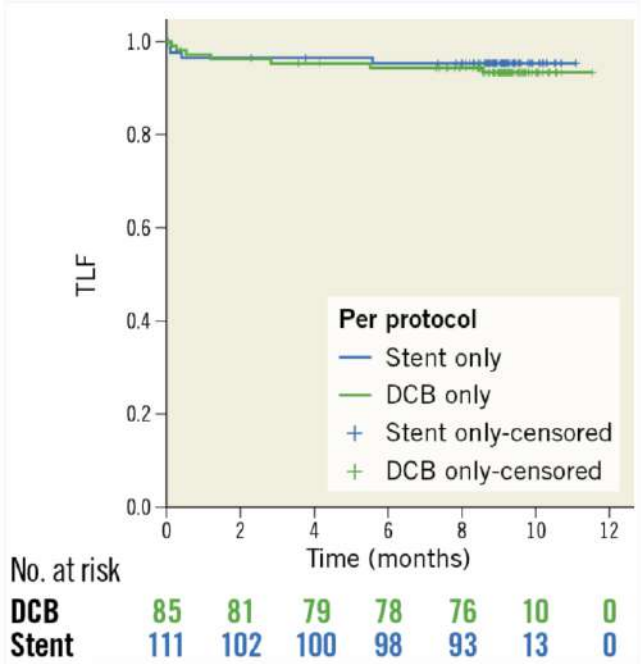
Study Name/ First Author et al. (Ref. #)	DCB	n	≥2.75-mm DCB (%)	≥3.0-mm DCB (%)	Bailout Stent (%)	MACE (%)	TLR (%)
					PROMEDIO 9% (0.5-22%)	4.9%. (1.9-9.4%)	1,7% (1-3.1%)
DELUX (70)	Pantera Lux	105		23	22	9.4 (12 months)	3.1 (12 months) (TVR)
FALCON (69)	In.Pact Falcon	326	25		4.8	8.0 (12 months)	4.9 (12 months)
Venetsanos et al. (53)	SeQuent Please, In.Pact Falcon, Pantera Lux	985		6	8		3 (12 months)
Rosenberg et al. (54)	Sequent Please	731	21		6	5.6 (9 months)	2.3 (9 months)
Uskela et al. (68)	Sequent Please	463	79	60	12	6.1 (stable CAD, 12 months)	1.4 (stable CAD, 12 months)
Yu et al.(108)	Sequent Please	595	36		0.5	0 (10 months)	0 (10 months)
DEBUT (57)	Sequent Please vs. BMS (RCT)	103	76	64	2	1.9 (9 months)	0 (9 months)
PEPCAD-NSTEMI (62)	Sequent Please vs. BMS and DES (RCT)	104			17.4	3.8 (9 months)	1.0 (9 months)

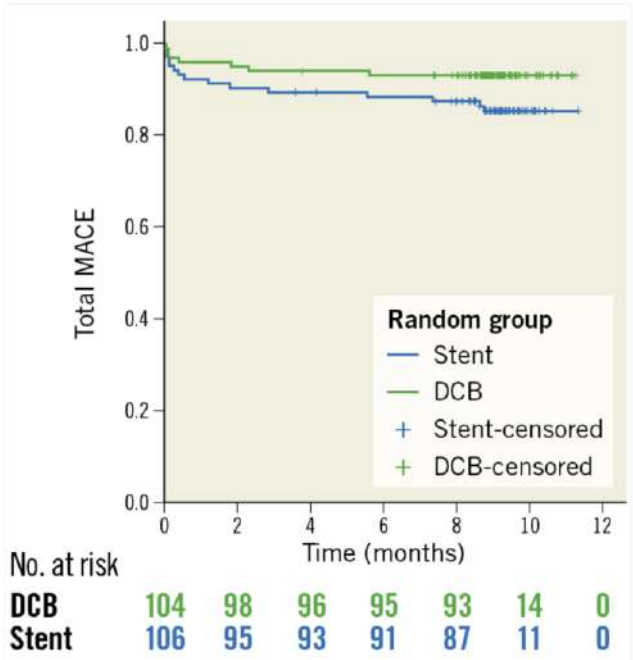
Only studies including de novo lesion treatment in 100 patients or more and reporting device diameter are included.
CAD = coronary artery disease; RCT = randomized controlled trial; other abbreviations as in Tables 1 and 2.

JACC:CARDIOVASCULAR INTERVENTIONS VOL. 13, NO. 12, 2020
JUNE 22, 2020:1391–40

SINDROME CORONARIO AGUDO

BMS/DES vs DCB de Novo en SCA PEPCAD NSTEMI





Conclusiones: En los pacientes con NSTEMI, el tratamiento de las lesiones coronarias de novo con BCD no fue inferior al de la colocación de stents con BMS o DES.

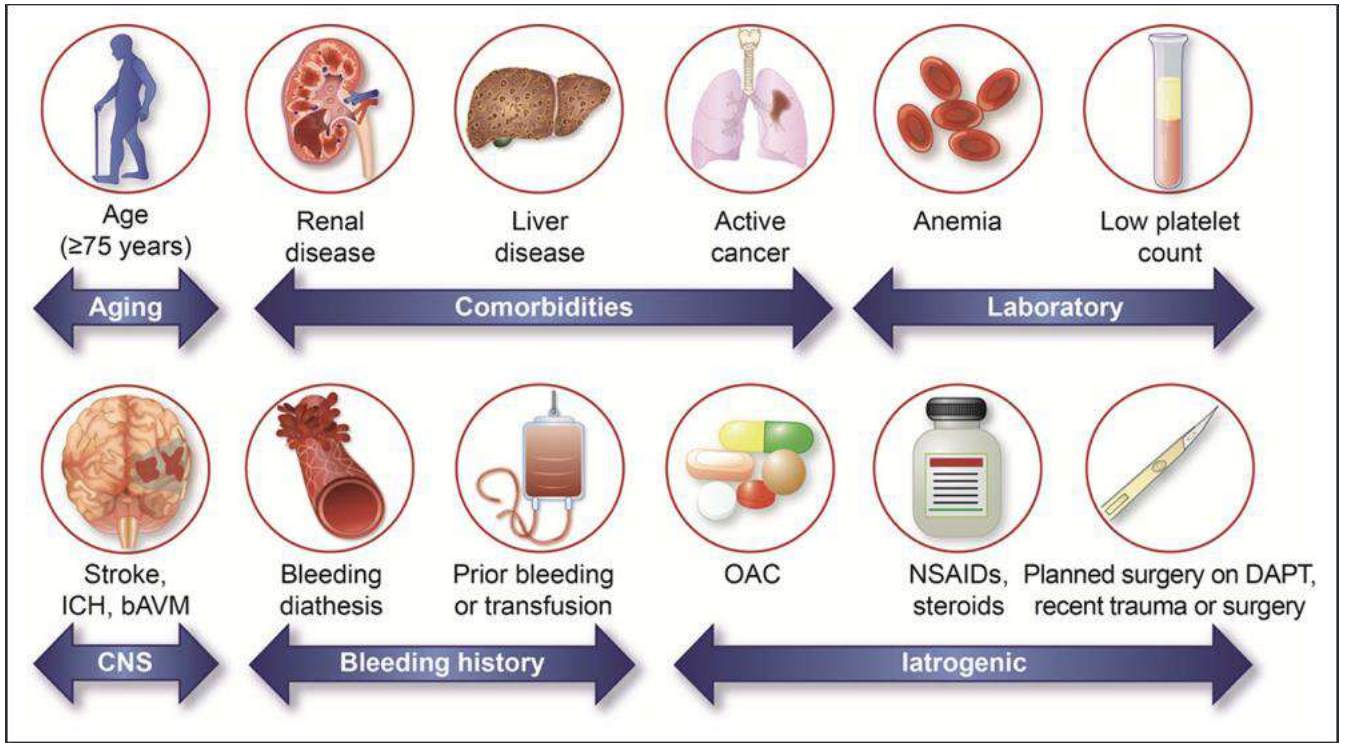
TABLE 4 DCB Only in De Novo Lesions of Large Coronary Vessels

Study Name/ First Author et al. (Ref. #)	DCB	n	≥2.75-mm DCB (%)	≥3.0-mm DCB (%)	Bailout Stent (%)	MACE (%)	TLR (%)
PEPCAD-NSTEMI (62)	Sequent Please vs. BMS and DES (RCT)	104			17.4	3.8 (9 months)	1.0 (9 months)

EuroIntervention 2020;15:1527-1533. DOI: 10.4244/EIJ-D-19-00723

DCB en ALTO RIESGO HEMORRAGICO

Factores asociados a un mayor riesgo de sangrado tras una intervención coronaria percutánea.



bAVM indicates brain arteriovenous malformation; CNS, central nervous system; DAPT, dual antiplatelet treatment; ICH, intracranial hemorrhage; NSAID, nonsteroidal anti-inflammatory drug; and OAC, oral anticoagulation.

CirculationVolume 140, Issue 3, 16 July 2019; Pages 240-261

Drug-coated balloon versus drug-eluting stents in small coronary artery disease with and without high bleeding risk

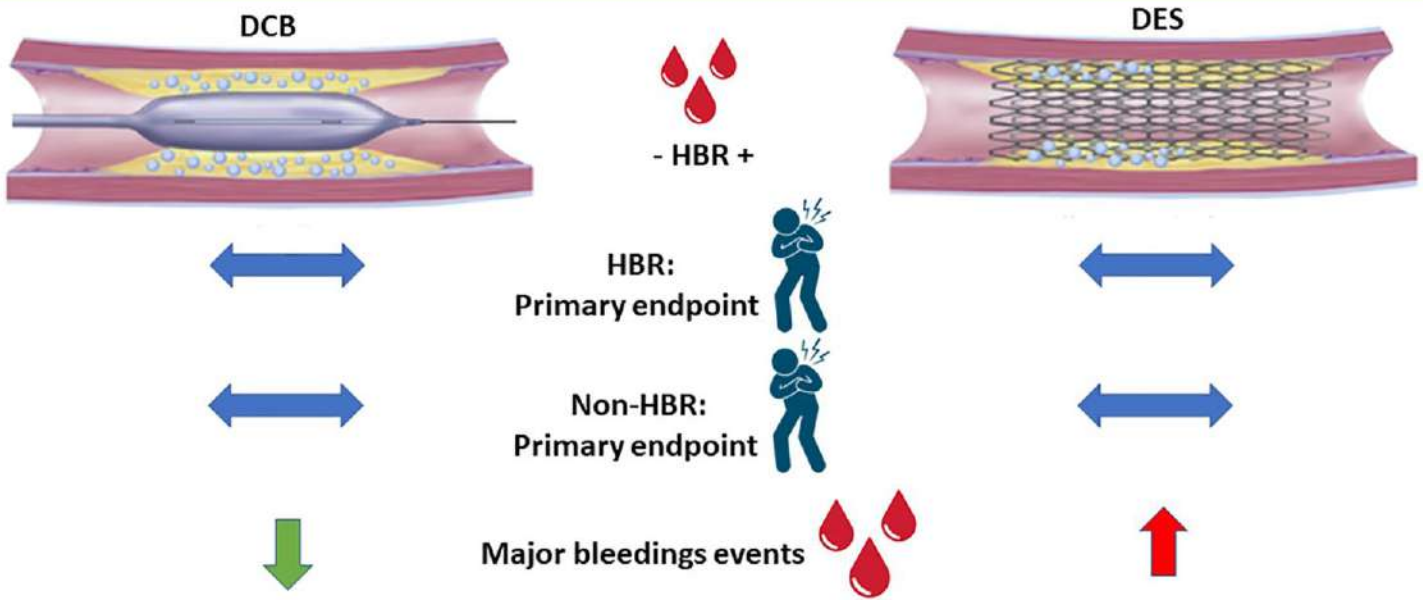
Large multi-center, randomized, controlled, non-inferiority trial (BASKET-SMALL 2) (n=758)

Efficacy and safety of DCBs versus second-generation DESs in small vessel coronary artery disease (<3 mm)

Primary endpoint: composite of cardiac death, non-fatal myocardial infarction, and target vessel revascularization during 3 years

Prespecified subgroup analysis in patients with and without high bleeding risk (HBR)

155 (20%) patients with HBR, 66 randomized to DCB and 89 to DES implantation.



Los DCB fueron igualmente seguros y efectivos que los DES de generación actual en el tratamiento de las arterias coronarias <3 mm, independientemente del riesgo de sangrado. En los pacientes tratados con DCB, hubo una tendencia hacia una reducción de los eventos hemorrágicos graves a los 3 años.

Bruno Scheller. Circulation: Cardiovascular Interventions. Drug-Coated Balloon for Small Coronary Artery Disease in Patients With and Without High-Bleeding Risk in the BASKET-SMALL 2 Trial, Volume: 15, Issue: 4, Pages: e011569, DOI: (10.1161/CIRCINTERVENTIONS.121.011569)

DEBUT: DCB lesiones de novo con HBR vasos >3mm

La DEB fue superior a la BMS con menor tasa de MACE (1,9% vs. 12,4%) en pacientes con riesgo hemorrágico sin TLR o cierre agudo del vaso a los 9 meses

Predilatation using a SC/NC/cutting balloon of **the nominal vessel size** followed by the single-blind randomized treatment:

- 12 patients were excluded after predilatation due to flow-limiting dissection or > 30% recoil

Paclitaxel-coated DEB (SeQuent Please)

- n=103
- ≥ 30 s application
- mean diameter 3.02 mm
- mean length 19.6 mm

4 % bailout stenting

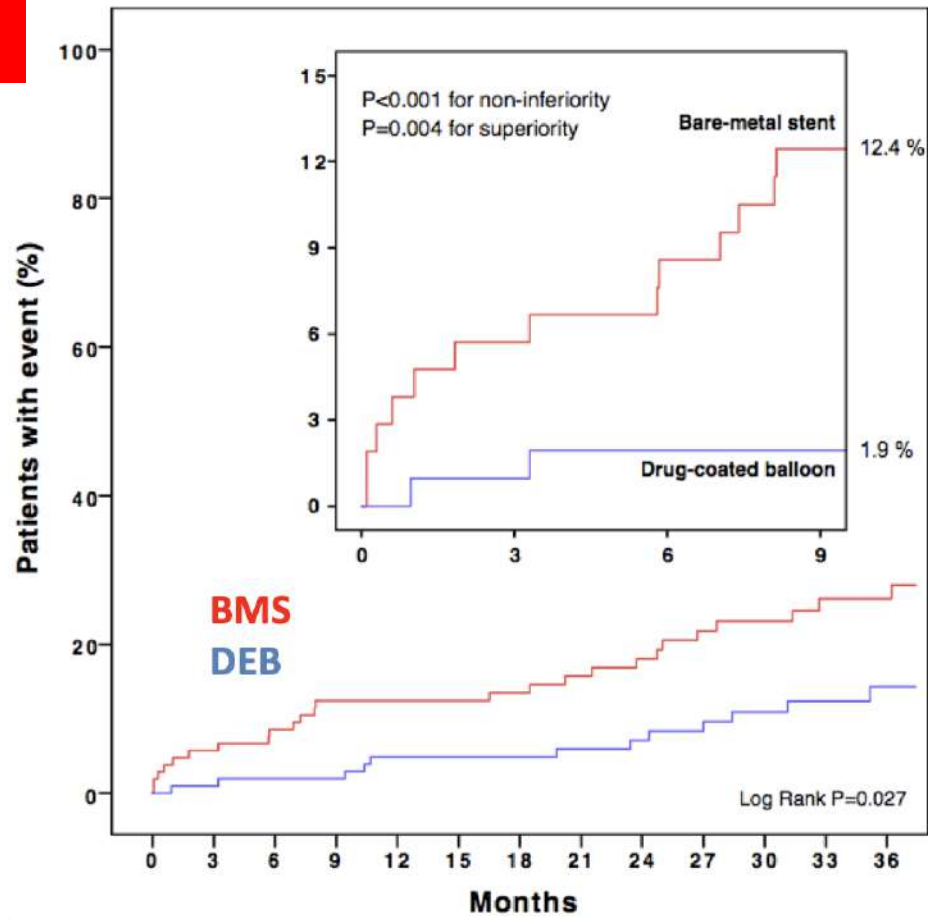
- if flow-limiting dissection or significant recoil (<30%) after DEB treament

BMS

- n=105
- mean diameter 3.08 mm
- mean length 16.3 mm
- inflation/postdilatation pressure 16 ATM

DAPT duration was 1 month in stable CAD and 6 months after ACS in both groups

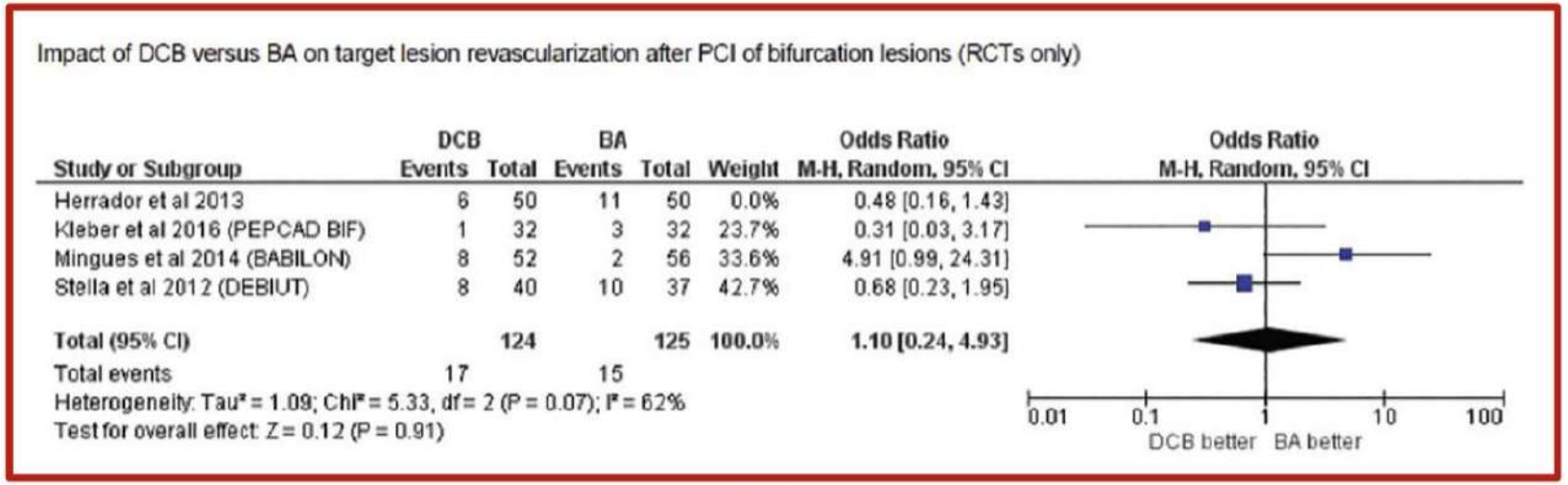
Clinical Trials.gov: NCT01781546



DCB en BIFURCACIONES

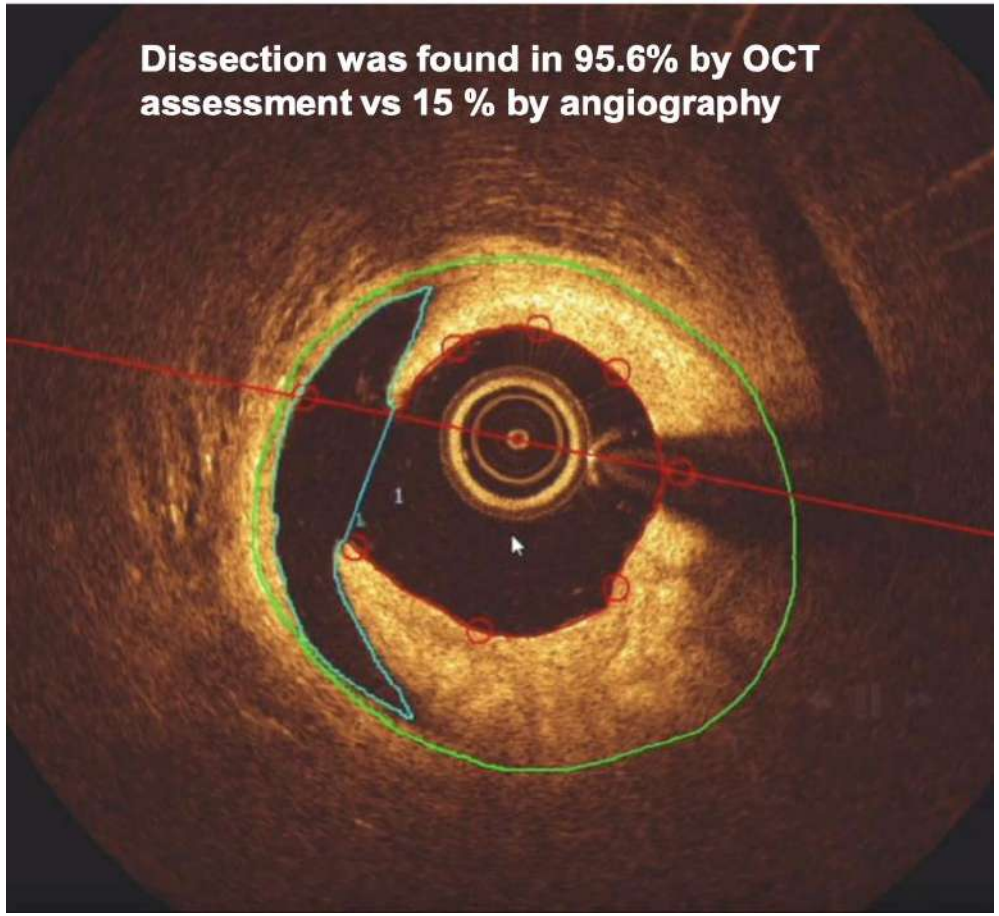
DCB en BIFURCACIONES

- El Club Europeo de Bifurcación PROVSIONAL STENTING
- DOS STENTS mayor riesgo de mortalidad a largo plazo en comparación con la técnica provisional.
- Debido a la creciente complejidad de las lesiones en bifurcación y a la creciente evidencia sobre la eficacia y seguridad del uso de DCB en lesiones de novo de vasos pequeños y grandes, el concepto de "no dejar nada atrás" con el uso de DCB en ICP en bifurcación está ganando terreno recientemente.



SCB vs PCB

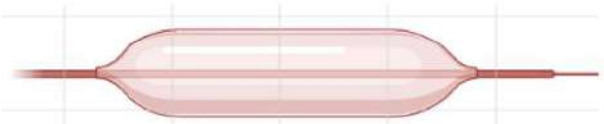
SCB vs PCB



- Con el SCB, la pérdida tardía aumenta en función del volumen de disección, mientras que con el PCB, la pérdida tardía no está relacionada con la disección e incluso disminuye en función del aumento del volumen de disección.

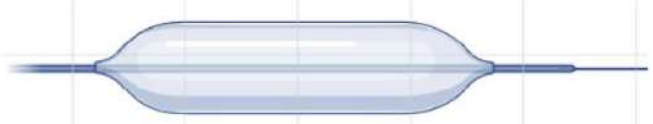
SCB vs PCB : TRANSFORM I

Sirolimus-coated balloon
(Magic Touch SCB™)



Late Loss: 0.32mm
Late Lumen Enlargement: 30.0%
Dissection: Unfavorable

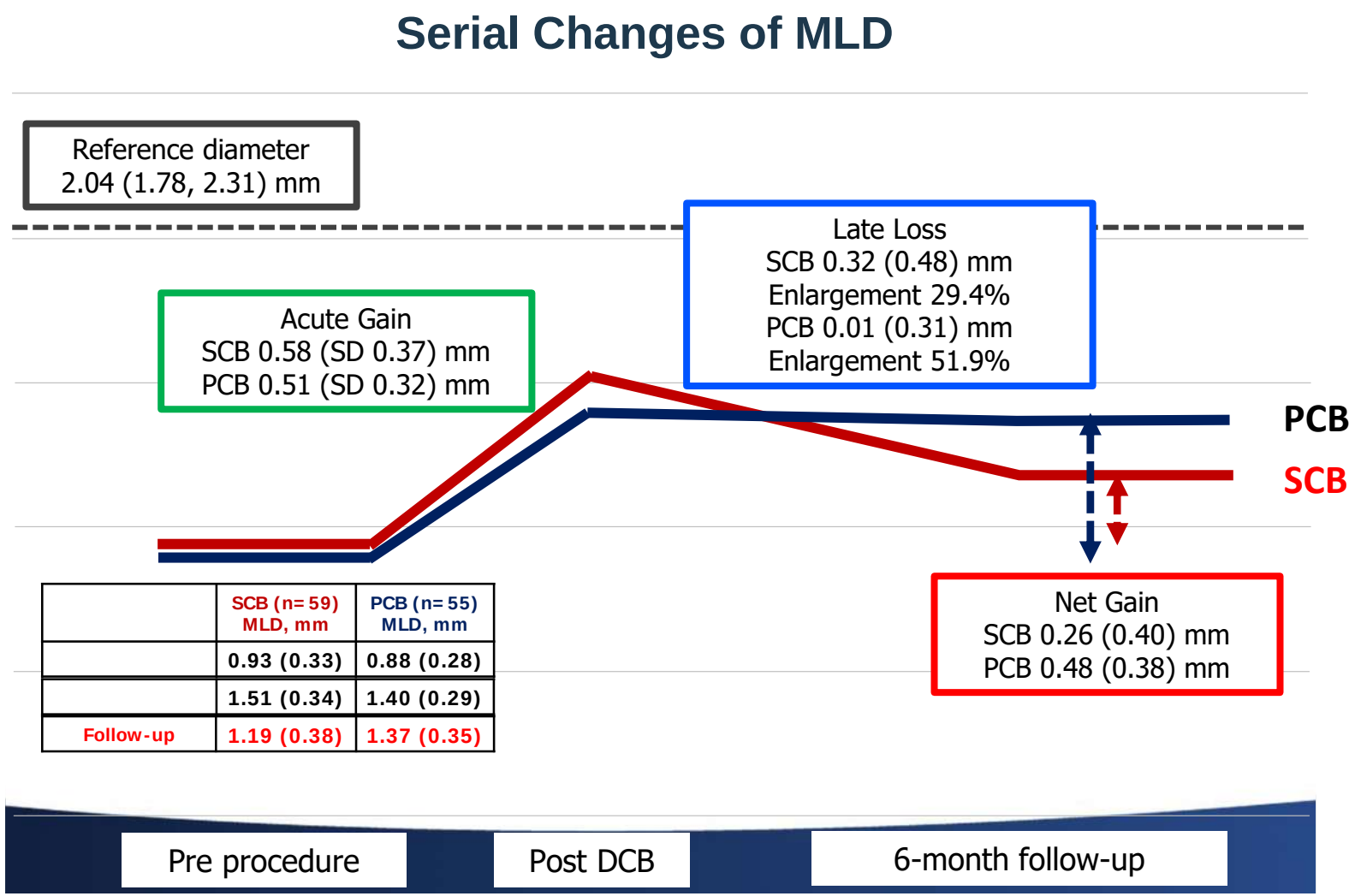
Paclitaxel-coated balloon
(SeQuent Please Neo™)



Late Loss 0.00mm
Late Lumen Enlargement 53.7%
Dissection: or Irrelevant or Favorable

Primary Endpoint: 6-month Angiographic Net Lumen Gain
SCB vs PCB: 0.25 vs 0.48mm

MLD: PCB vs SCB



TRANSFORM SCB vs PCB : CONCLUSIONES

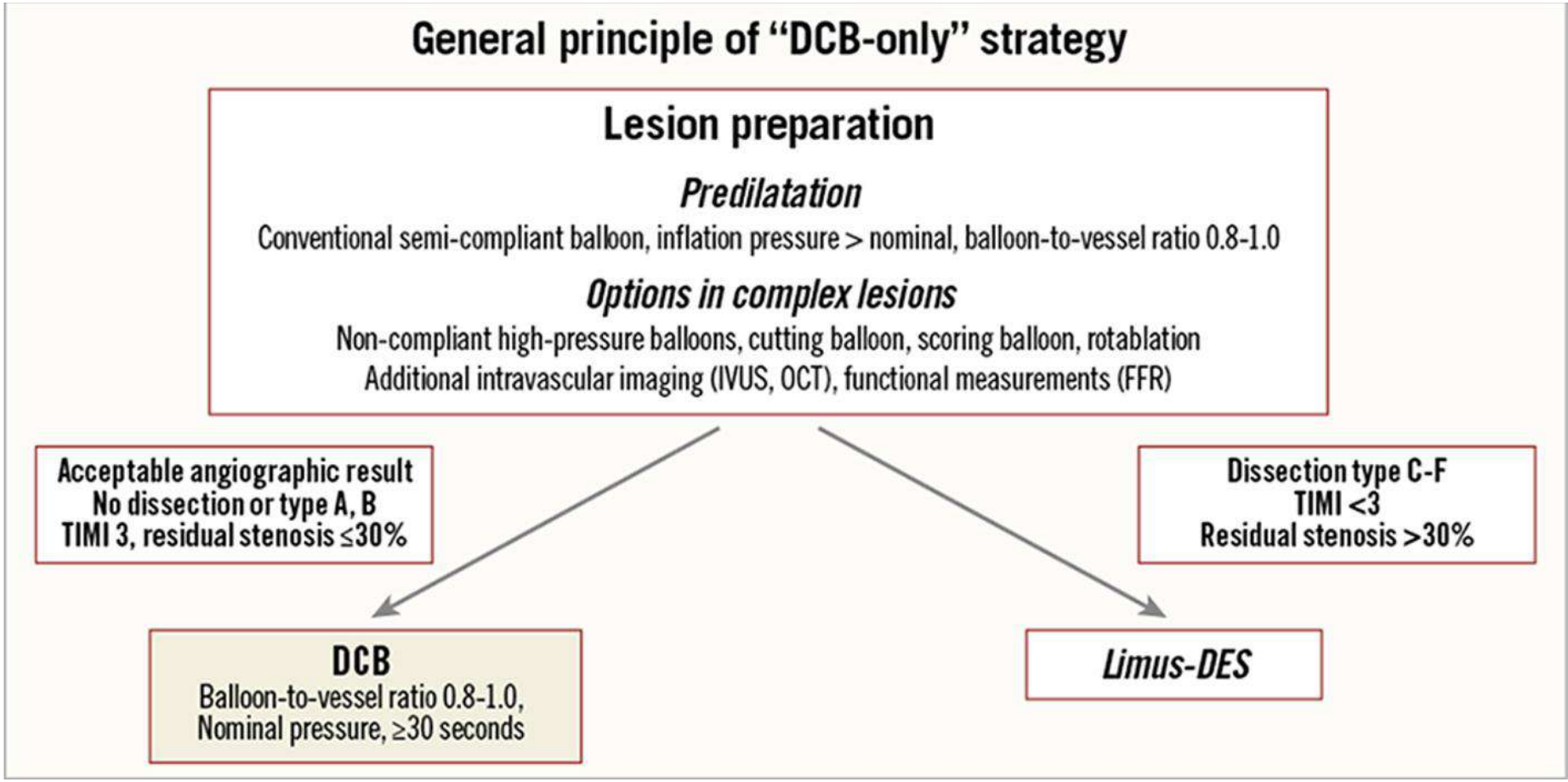
- El Sirolimus Magic Touch no demostró no inferioridad en comparación con el Paclitaxel SeQuent Please Neo en términos de ganancia neta angiográfica a los 6 meses.
- La relación entre la pérdida tardía y el volumen de disección aguda, cuantificada por OCT, indica que la formulación del recubrimiento en el Magic Touch no anula el proceso reestenótico desencadenado por el aumento del barotrauma como lo hace el Sequent please neo.
- Se justifican estudios más amplios y a más largo plazo con poder estadístico para determinar la eficacia del balón de recubrimiento de sirolimus frente al balón de recubrimiento de paclitaxel y para confirmar la ausencia (o presencia) de un efecto de clase en los DCB.

ESTRATEGIA de TRAMIENTO solo con DCB

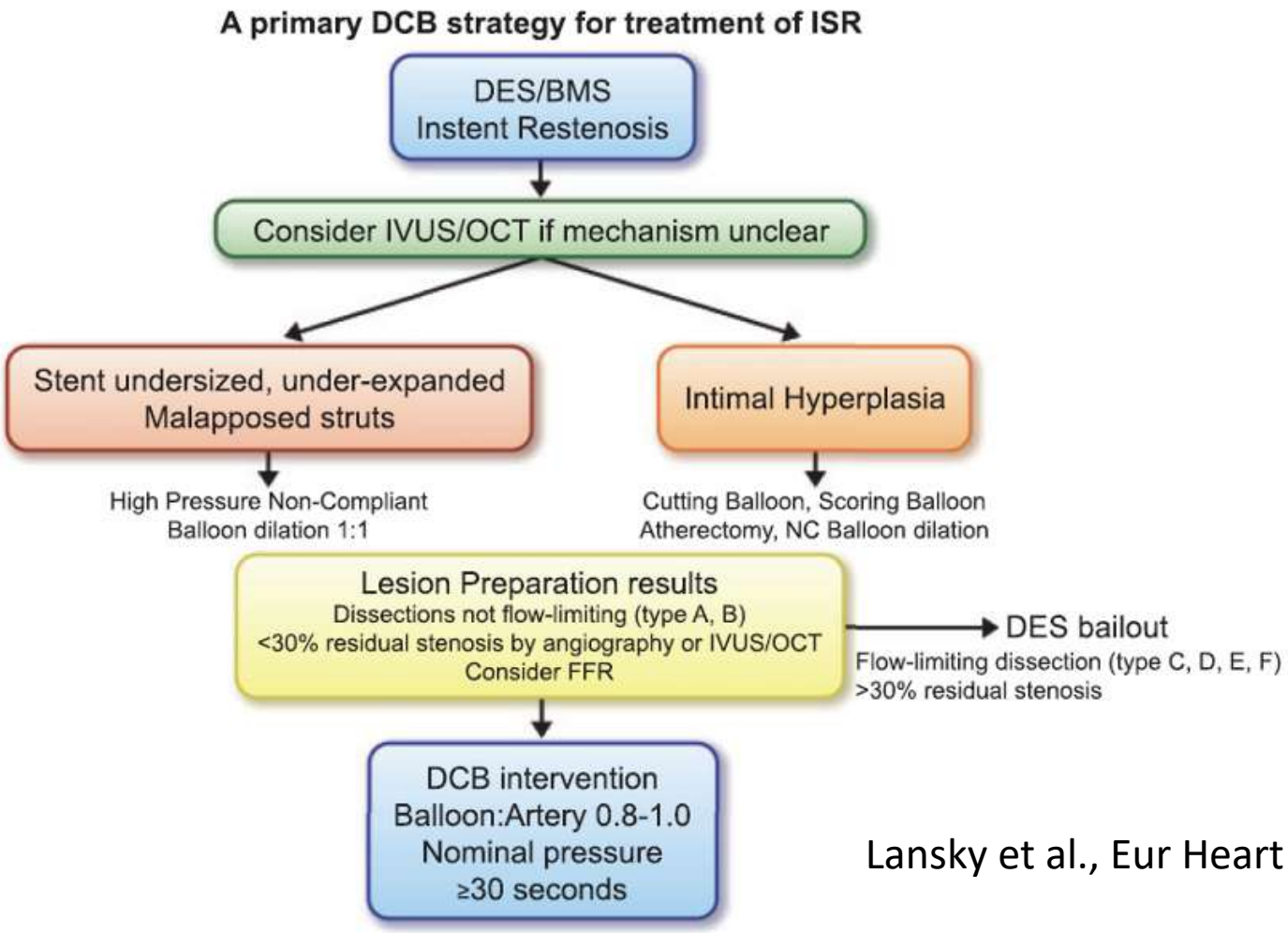
el DCB debía ser de 2 a 3 mm más largo en cada lado que el balón de predilatación para evitar desajustes geográficos y se infló a presión nominal durante al menos 30 segundos.

Cuando hubo disecciones limitantes del flujo después del tratamiento con DCB a pesar de un resultado aceptable después de la preparación de la lesión, se realizó ICP con BMS o DES.

vasos > 2.75
bail out
9% (0.5-22%)



ESTRATEGIA de TRAMIENTO de la RIS con DCB



Lansky et al., Eur Heart J. 2020 Oct 7;41(38):3729-3731

DCB

BALONES EXISTENES EN EL MERCADO

Company	Product	Drug	Drug Concentration (μg/mm²)	Excipient	Balloon Diameter (mm)	Balloon Length (mm)	De Novo Lesions Assessment
B. Braun Melsungen AG (Melsungen, Germany)	SeQuent Please	Paclitaxel	3	Iopromide (PACCOCATH technology)	2–4	10–40	RCT: Basket small 2 (n = 382) [23,24]; DEBUT (n = 103) [31]; PEPCAD NSTEMI, (n = 104) [32]; Funatsu et al. (n = 92) [40]; Gobic et al. (n = 38) [41]; Shin et al. (n = 20) [42]; PEPCAD-BIF (n = 32) [34]; BABILON (n = 52) [33]; Nishiyama et al. (n = 30) [43]. OS: Rosenberg et al. (n = 731) [19]; Uskela et al. (n = 463) [28]; Yu et al. (n = 595) [29]; Venetsanos et al. (n = 4483) [44]; Onishi et al. (n = 196) [45]; Merinopoulos et al. (n = 408) [30]; Funayama et al. (n = 111) [46].
Medtronic-Invatec (Roncadelle, Italy)	PREVAIL (previously In.Pact Falcon)	Paclitaxel	3.5	Urea	2–4	10–30	RCT: BELLO (n = 90) [21,22]. OS: Venetsanos et al. (n = 1071) [44]; Merinopoulos et al. (n = 21) [30]; FALCON Registry (n = 757) [47]; PREVAIL (n = 50) [48].
Eurocor GmbH (Bonn, Germany)	Dior I / Dior II	Paclitaxel	3	No Excipient (Nanoporous balloon surface) / Shellac	2–4	10–30	RCT: PICCOLETO SMALL VESSELS (n = 57) [20]. OS: 001-DIOR (n = 49) [49]; Valentines II (n = 103) [17]; DEAR (n = 91) [50]; Vaquerizo et al. (n = 104) [18].
Biosensors International (Singapore)	Biostream	Paclitaxel	3	Shellac	2–4	15–30	-
Biotronik AG (Baar, Switzerland)	Pantera Lux	Paclitaxel	3	BTHC	2–4	10–30	RCT: REVELATION (n = 60) [39]; DELUX large (n = 105) [27]. OS: Venetsanos et al. (n = 1161) [44]; PAPPA (n = 100) [38]; BIOLUX-I (n = 35) [35]; SARPEDON (n = 58) [37].
Angioscore/Philips (Fremont, California)	AngiosculptX	Paclitaxel	3	NDGA	2–3.5	10–20	-
Boston Scientific (Natick, Massachusetts)	Agent	Paclitaxel	2	ATBC	2–4	12–30	-
Aachen Resonance GmbH (Aachen, Germany)	Elutax I-Elutax II / Elutax SV	Paclitaxel	2.2	No excipient / Dextran Sulfate	2–4	10–40	RCT: PICCOLETO (n = 118) [20]. OS: DCB-RISE (n = 544) [51].
Blue Medical BV/Wellinq (Helmond, The Netherlands)	Protégé/Protégé NC	Paclitaxel	3	BTHC	2–4	10–30	OS: PEARL Registry (n = 131) [52].
Minvasys (Gennevilliers, France)	Danubio	Paclitaxel	2.5	BTHC	1.5–4	10–40	OS: DEBSIDE (n = 52) [36].
iVascular (Barcelona, Spain)	Essential	Paclitaxel	3	BTHC	1.5–4.5	10–40	OS: Abellas-Sequeiros et al. (n = 71) [53].
Cardionovum (Bonn, Germany)	Restore	Paclitaxel	3	Shelloic Acid	2–4	15–30	RCT: RESTORE SVD (n = 116) [25,26].
Eucatech (Weil am Rhein, Germany)	Support C	Paclitaxel	3	BTHC	2–4	10–30	-
Nano Therapeutics (Surat, India)	Curex PTCA	Paclitaxel	2.3	BTHC	2–4.5	9–41	-
B.Braun Melsungen AG (Melsungen, Germany)	SeQuent SCB	Sirolimus (crystalline)	4	-	2.5–3.5	15–30	OS: Ahmad et al. (n = 70) [16].
Concept Medical Inc. (Tampa, Florida)	Magic Touch	Sirolimus	1.27	Phospholipid Based Excipient	1.5–4	10–40	RCT: TRANSFORM I (n = 114) [54]. OS: EASTBOURNE (n = 596) [6]; NANOLUTE (n = 225) [55]; FASICO (n = 18) [56].
Med Alliance (Nyon, Switzerland)	Selution	Sirolimus	1	MicroReservoirs embedded with CAT coating, proprietary amphipathic lipid technology	2–7	20–150	-
Orchestra Biomed /Terumo (New Hope, Pennsylvania)	Virtue SAB	SirolimusEFR Formulation	-	No Excipient (Perforated Balloon Surface: angioinfusion)			-

ATBC: Acetyl tributyl citrate. BTHC: Butyryl-tri-hexyl citrate. CAT: Cell Adherent Technology. NDGA: nordihydroguaiaretic acid. OS: Other (i.e., non-randomized) studies. RCT: Randomized clinical trials.

ANTIAGREGACION DCB

- Consenso internacional sobre el balón recubierto de fármaco, DAPT durante 4 semanas después de una estrategia de DCB solo de novo y en pacientes con síndrome coronario crónico

Jeger, R.V.et al.Drug-coated balloons for coronary artery disease: Third report of the International DCB Consensus Group. JACC Cardiovasc. Interv. 2020, 13, 1391–1402.

Neumann, F.J.et al. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur. Heart J. 2019, 40, 87–165.

ANTIAGREGACION DCB – BASKET SMALL 2 HBR

- Después de la ICP, el DAPT se administró con aspirina (100 mg/día) y clopidogrel (75 mg/día), prasugrel (10 mg/día) o ticagrelor (90 mg dos veces al día).
- DAPT en pacientes estables: 4 semanas para DCB
- DAPT en síndrome coronario agudo durante 12 meses.
- DAPT en DCB + BMS: durante 3 meses
- DAPT en DCB + DES: durante 6 meses
- En los pacientes con anticoagulación oral, se siguieron las guías vigentes, independientemente del tratamiento con DCB o DES.

CONCLUSIONES

Mensajes DCB
evidencia favorable a BALONES CON DROGAS

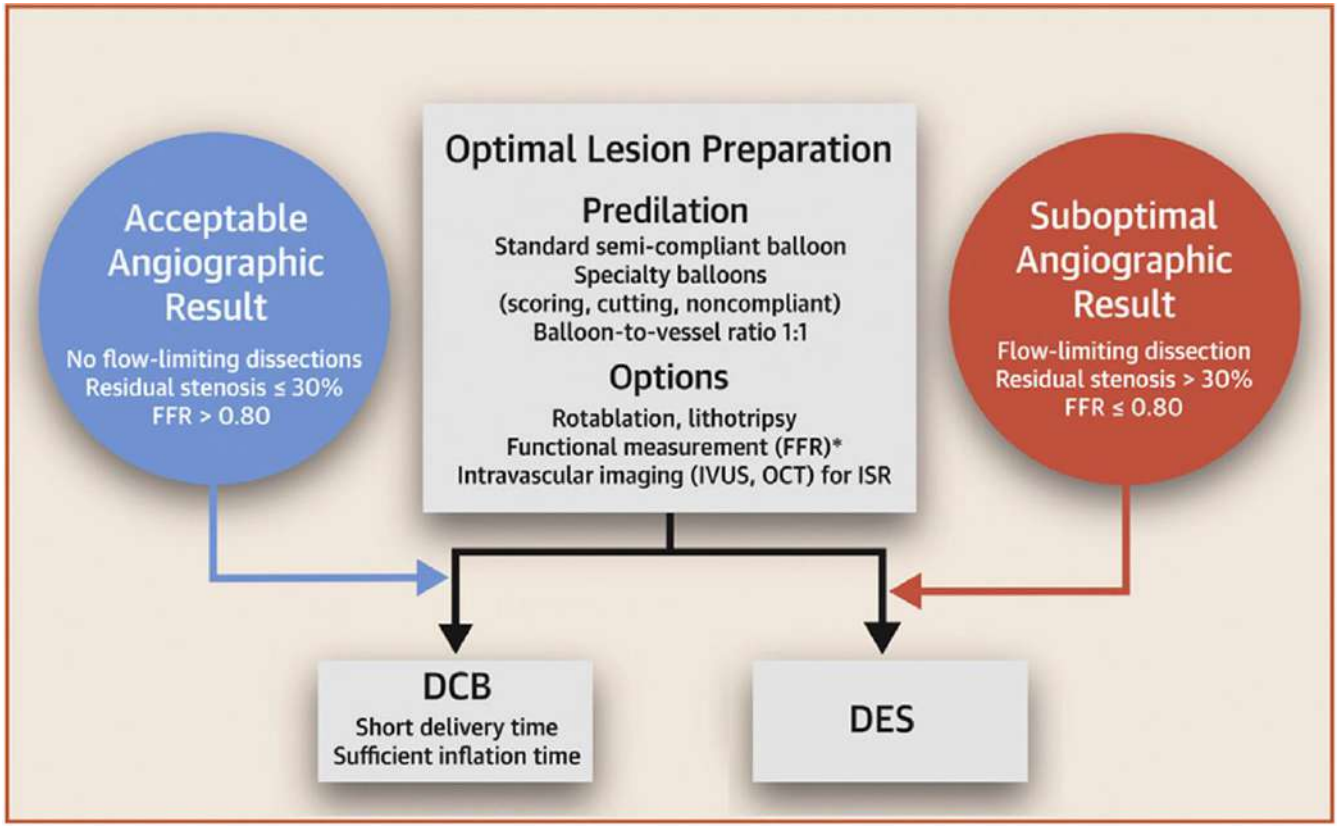
- REESTENOSIS INTRASTENT
- PEQUEÑOS VASOS Y ENFERMEDAD DIFUSA
- ALTO RIESGO DE SANGRADO: BASKET SAMALL 2 - DEBUT
- SINDROMES CORONARIOS AGUDOS: PEPCAD
- BIFURCACIONES METAANALISIS RESULTADOS PROMISORIOS
- GANDES VASOS FALTA EVIDENCIA

GRACIAS POR SU ATENCION

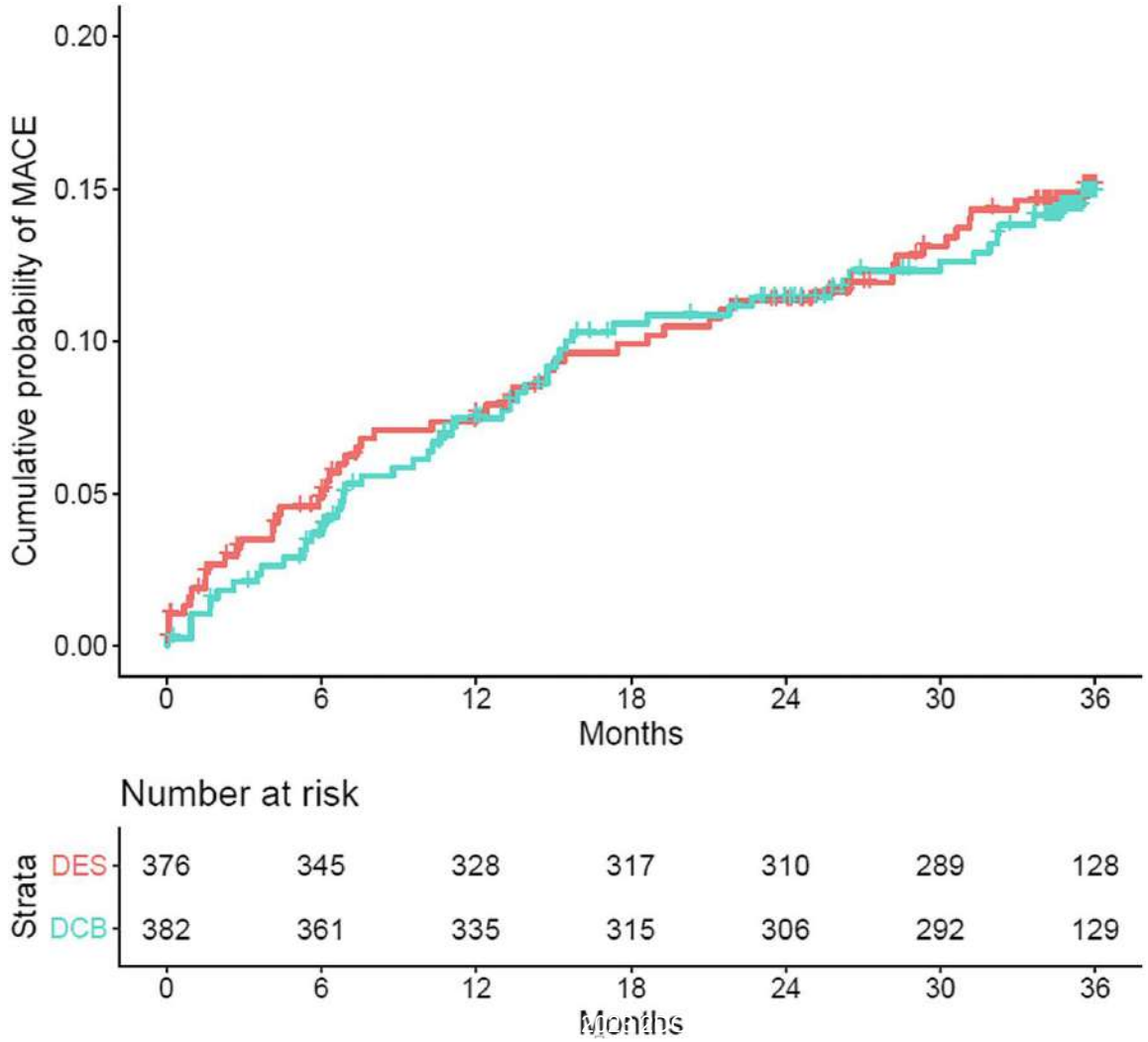
Coronary Drug-Coated Balloons for De Novo and In-Stent Restenosis Indications

Daniele Giacoppo, MD, MSc, PhD, Jorge Saucedo, MD, Bruno Scheller, MD

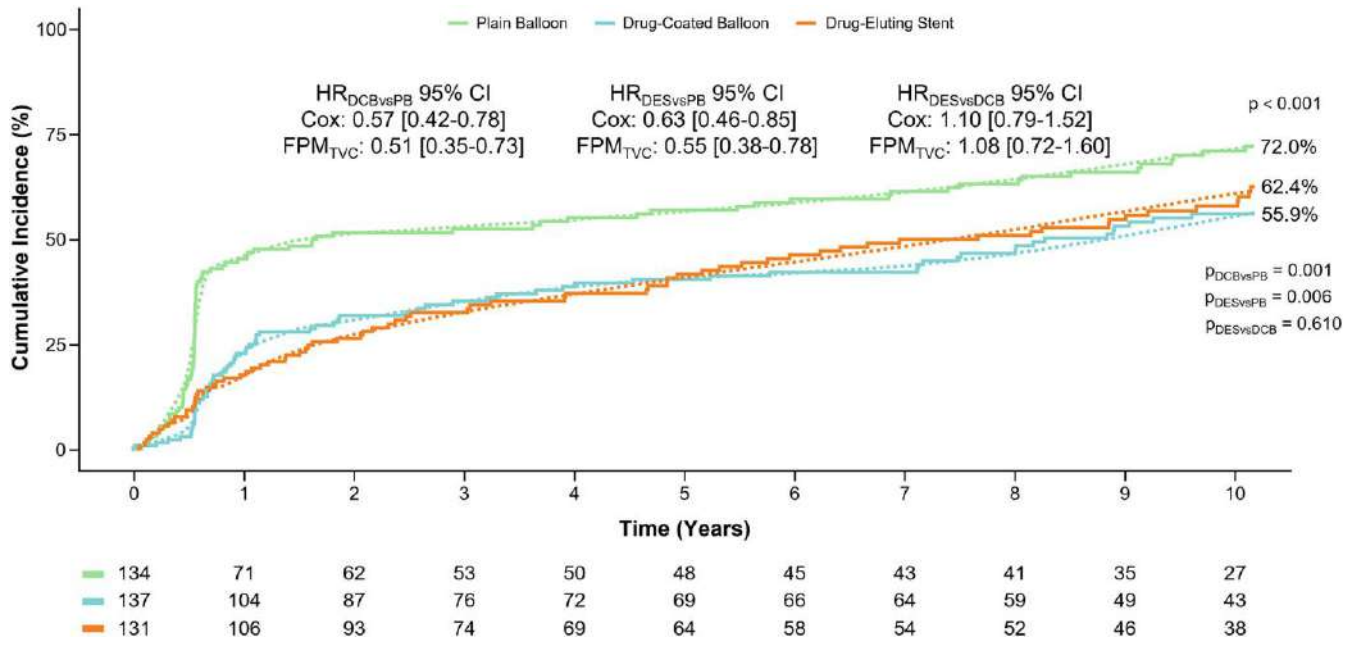
Journal of the Society for Cardiovascular Angiography & Interventions
Volume 2 Issue 3 (May 2023)
DOI: 10.1016/j.jscai.2023.100625

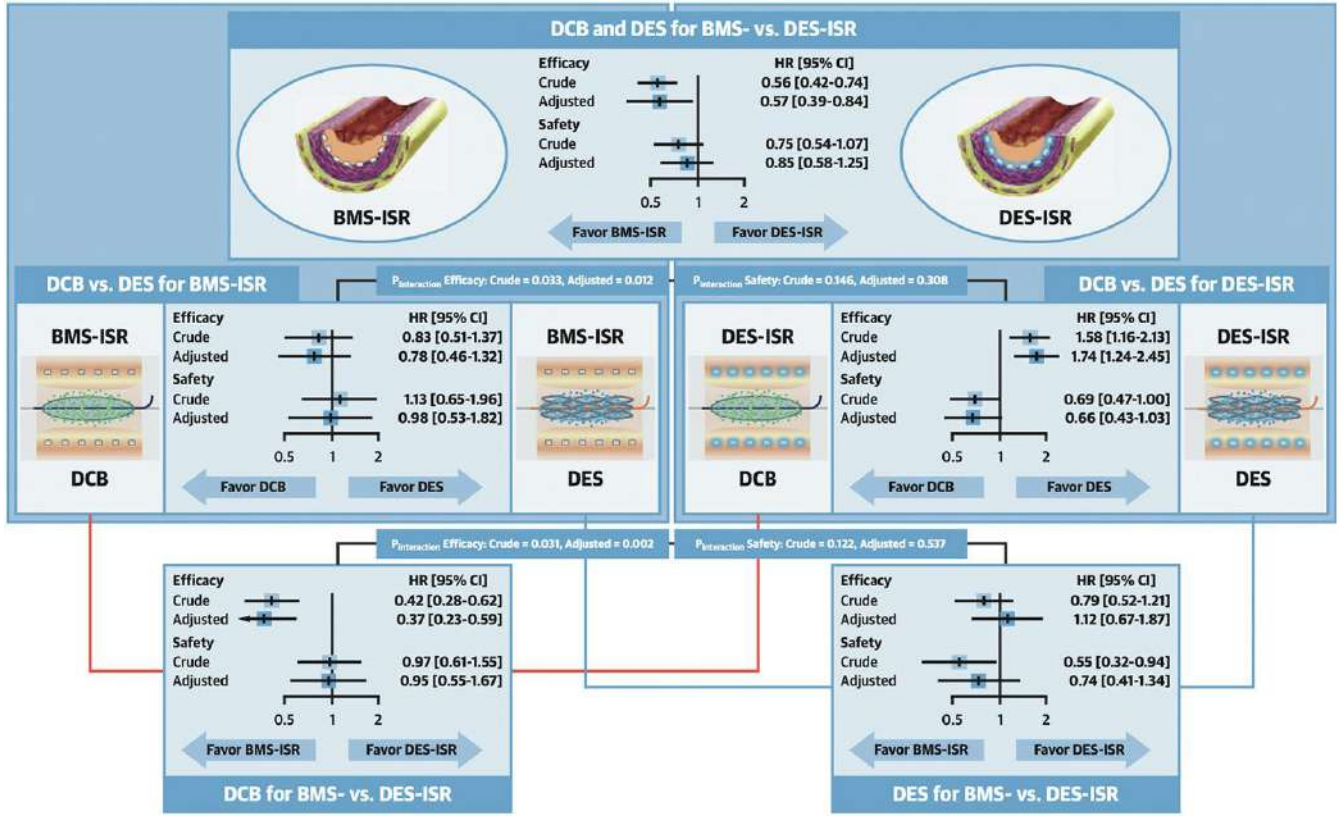


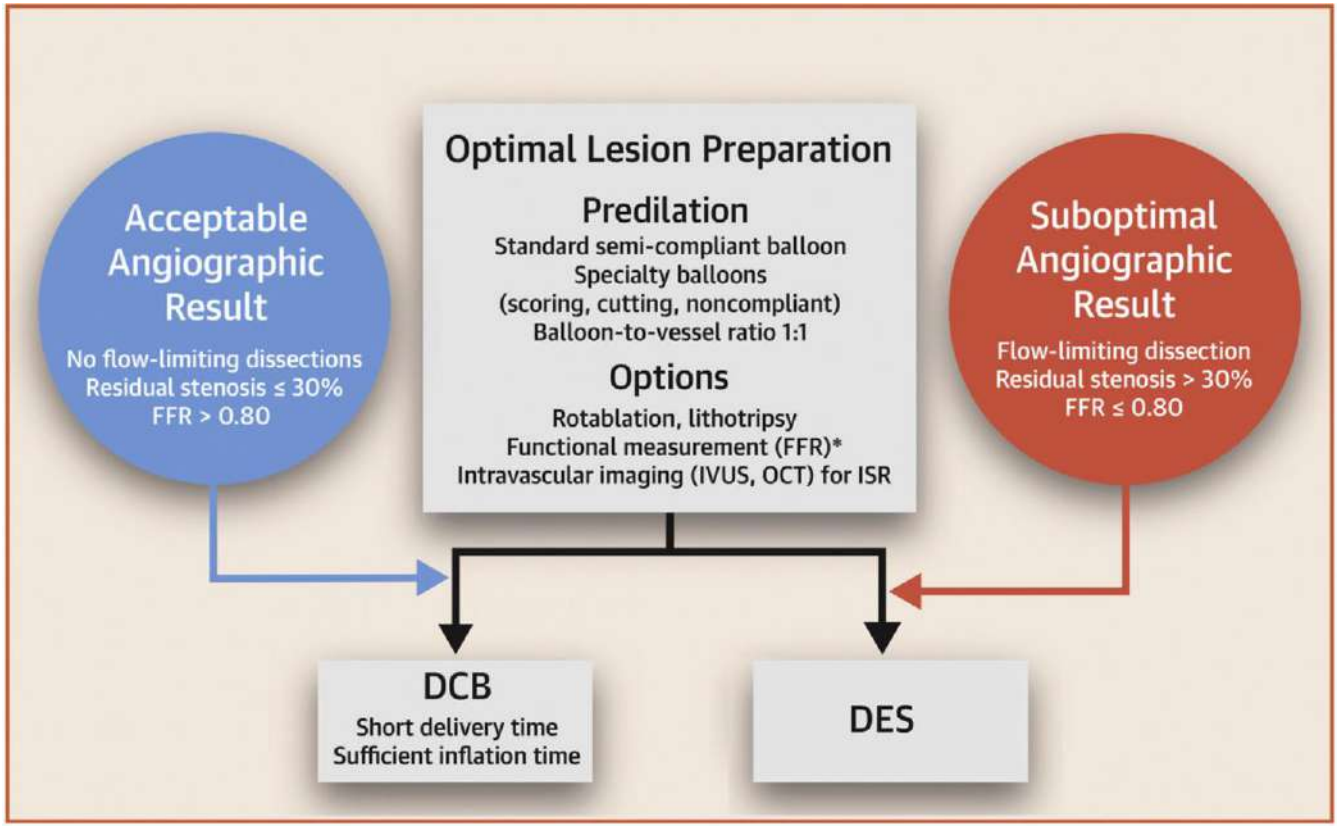
BASKET SMALL 2 trial – 3 años sgto.

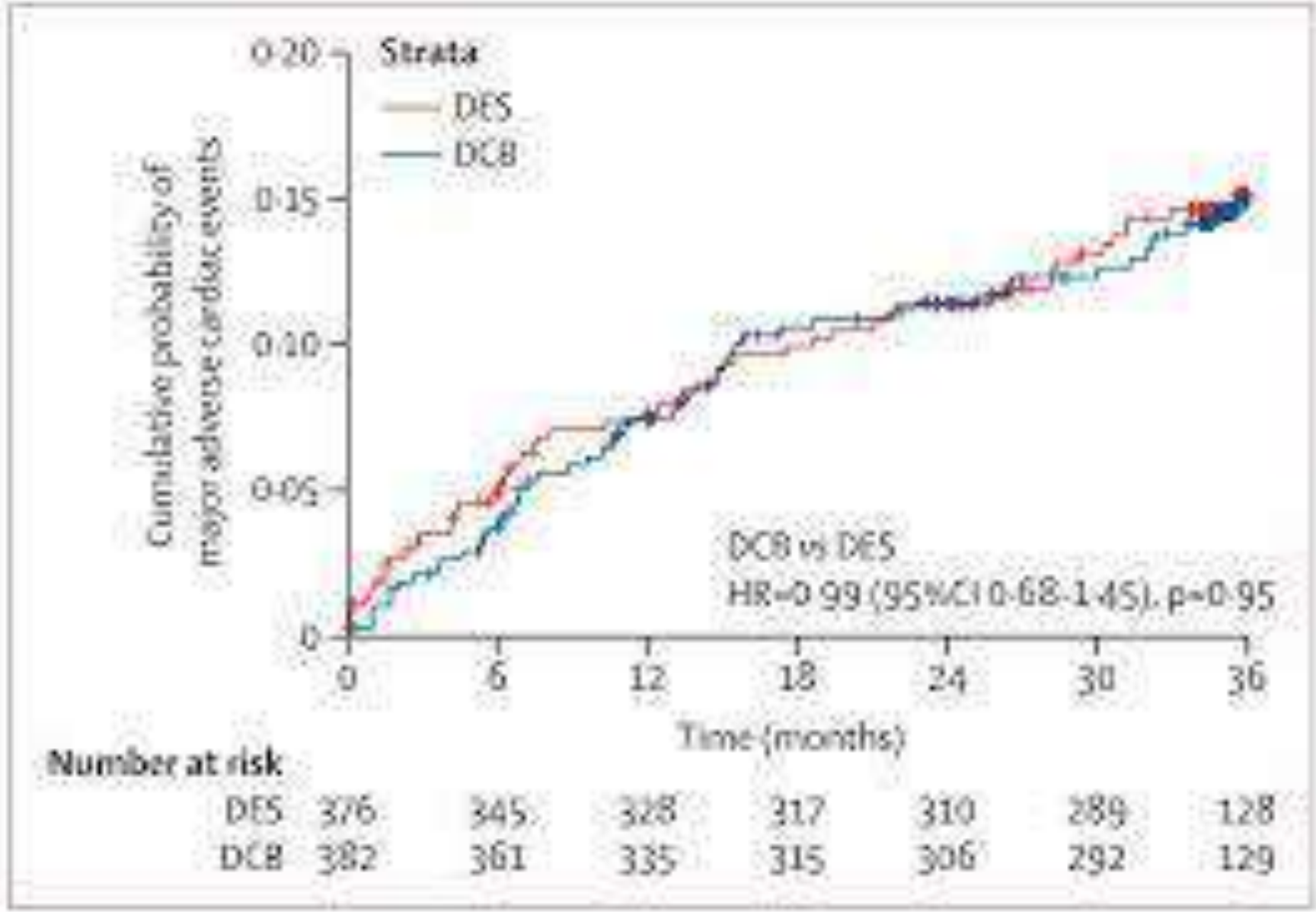


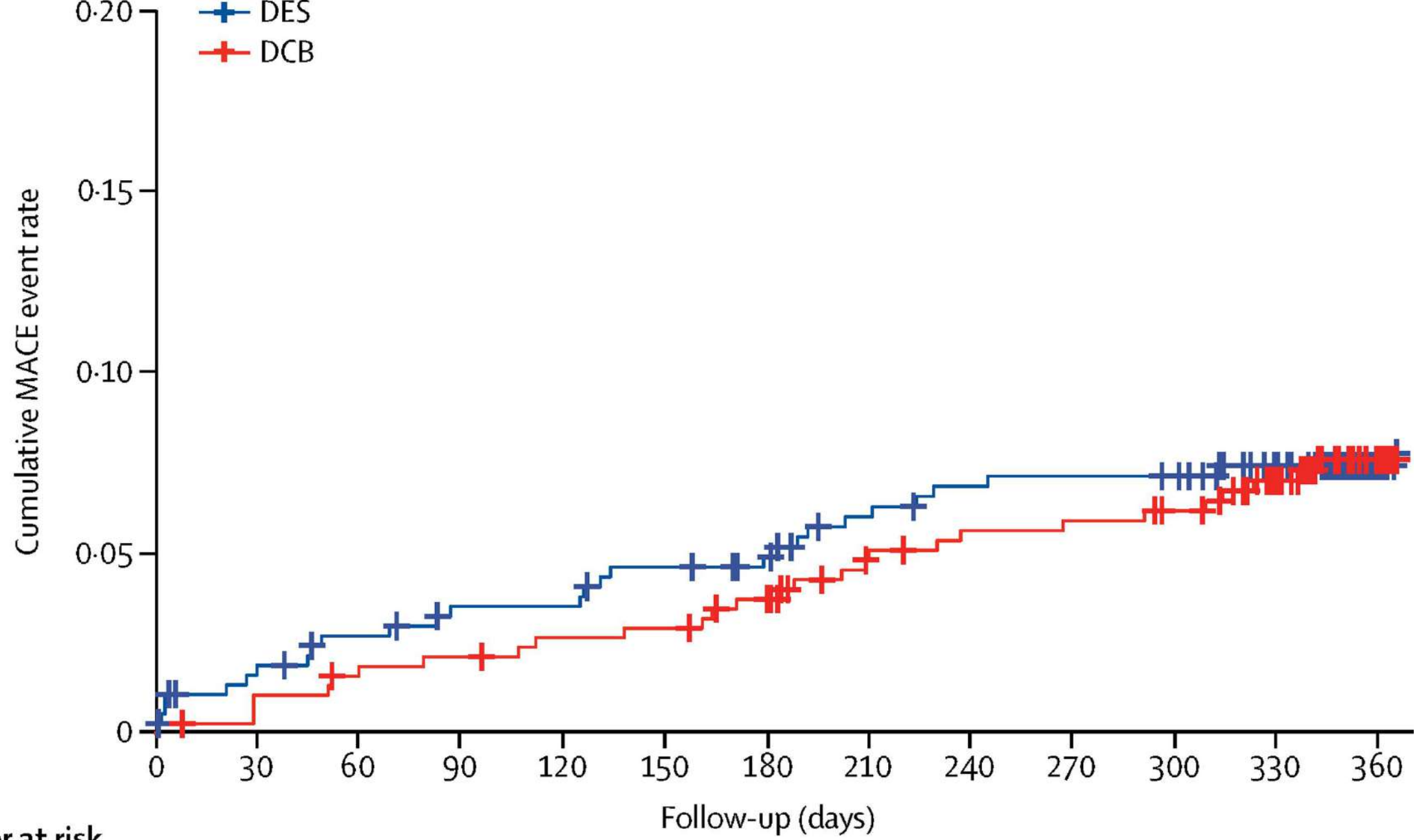
ISAR DESIRE 3 trial








Strata
DES
DCB
Cumulative probability of major adverse cardiac events
0·20
0·15
0·10
0·05
0
DCB vs DES
HR=0·99 (95%CI 0·68–1·45), p=0·95
0
6
12
18
24
30
36
Time (months)
Number at risk
DES 376 345 328 317 310 289 128
DCB 382 361 335 315 306 292 129



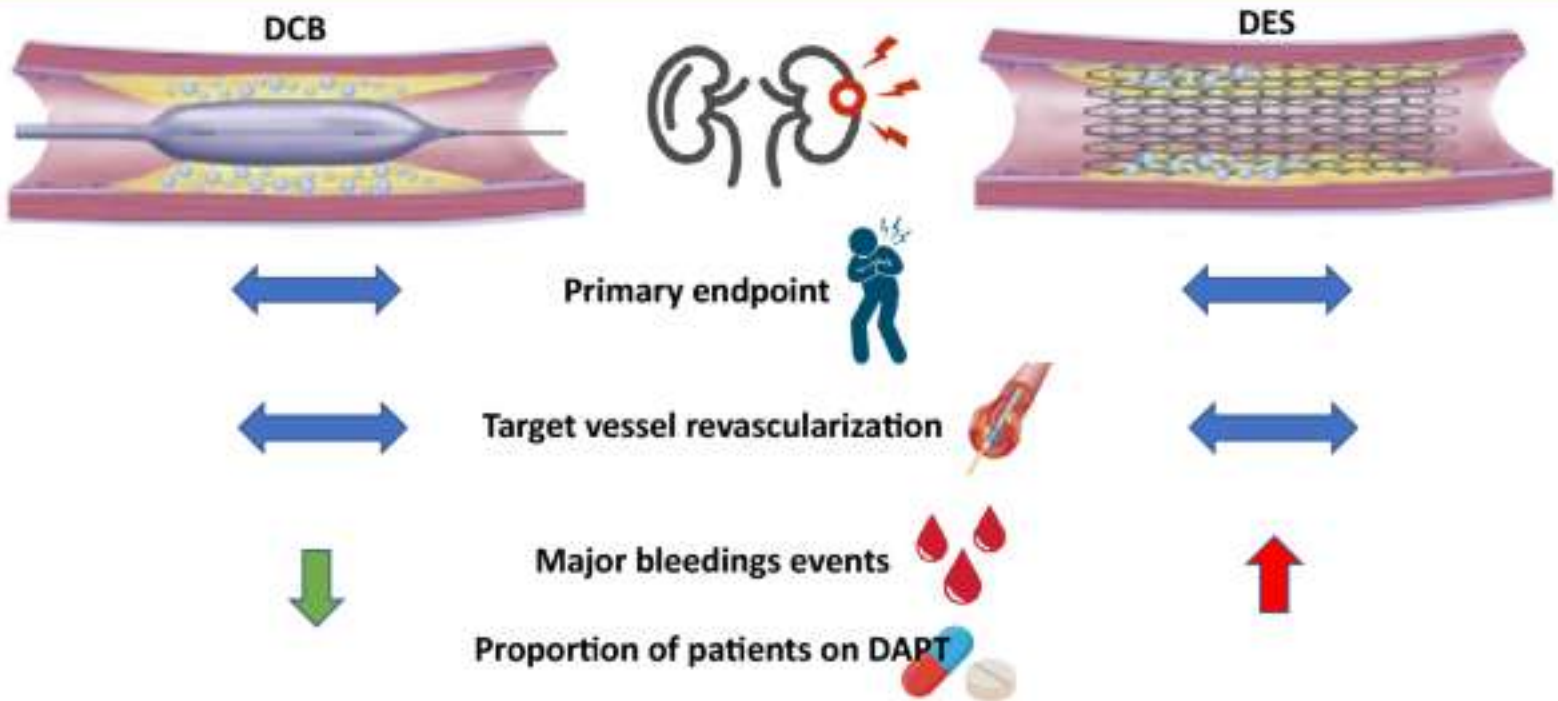
Number at risk

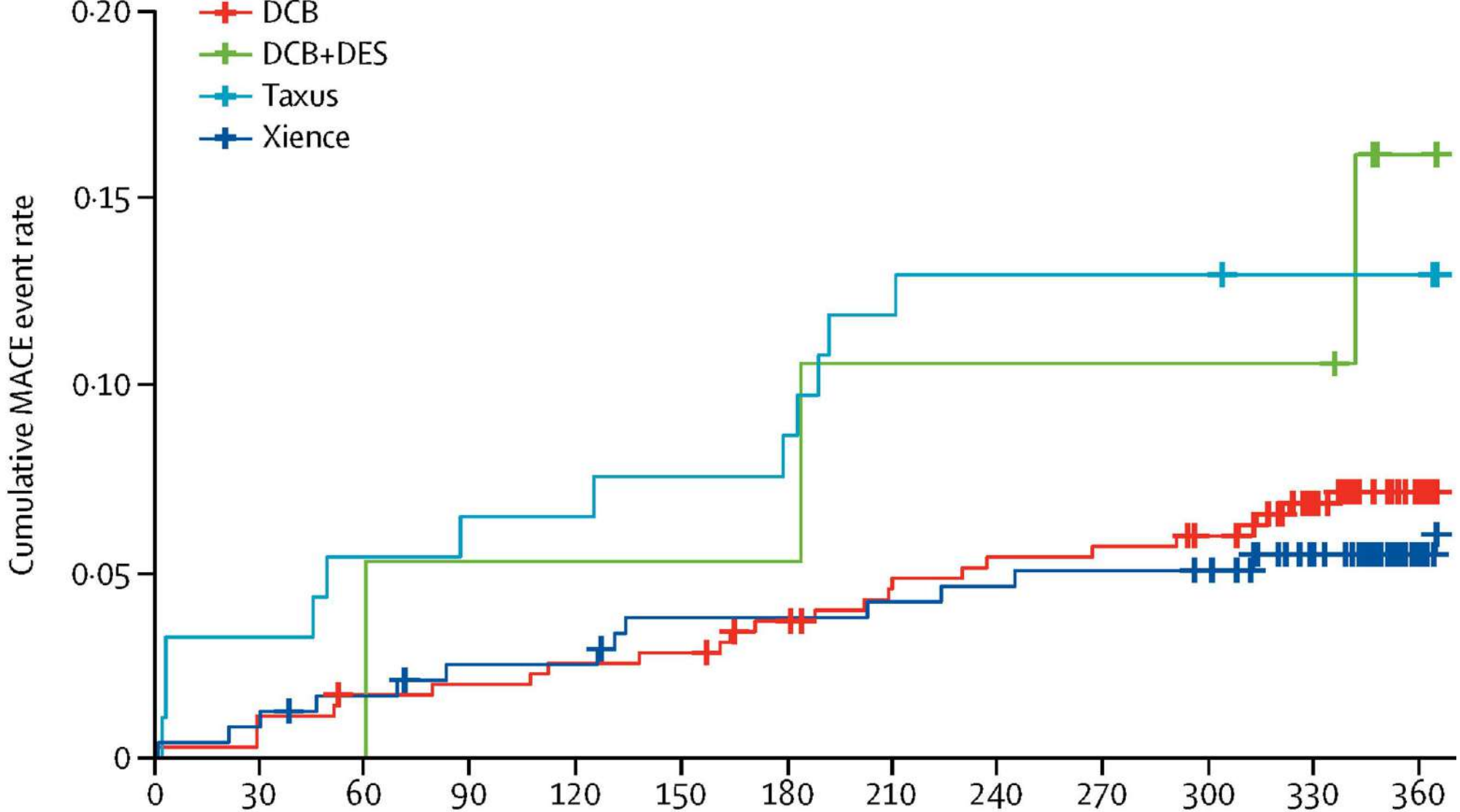
DES	376	366	360	355	355	350	346	337	333	332	331	317	284
DCB	382	376	373	371	368	367	362	351	347	346	343	326	295

Drug-coated balloon versus drug-eluting stents in small coronary artery disease with and without chronic kidney disease

Large multi-center, randomized, controlled, non-inferiority trial (BASKET-SMALL 2) (n=758)
Efficacy and safety of DCBs versus second-generation DESs in small vessel coronary artery disease (<3 mm)
Primary endpoint: composite of cardiac death, non-fatal myocardial infarction, and target vessel revascularization during 3 years

Prespecified subgroup analysis in patients with chronic kidney disease (eGFR <60 ml/min/1.73 m^2)
174 (23%) patients with CKD, 91 randomized to DCB and 83 to DES implantation.



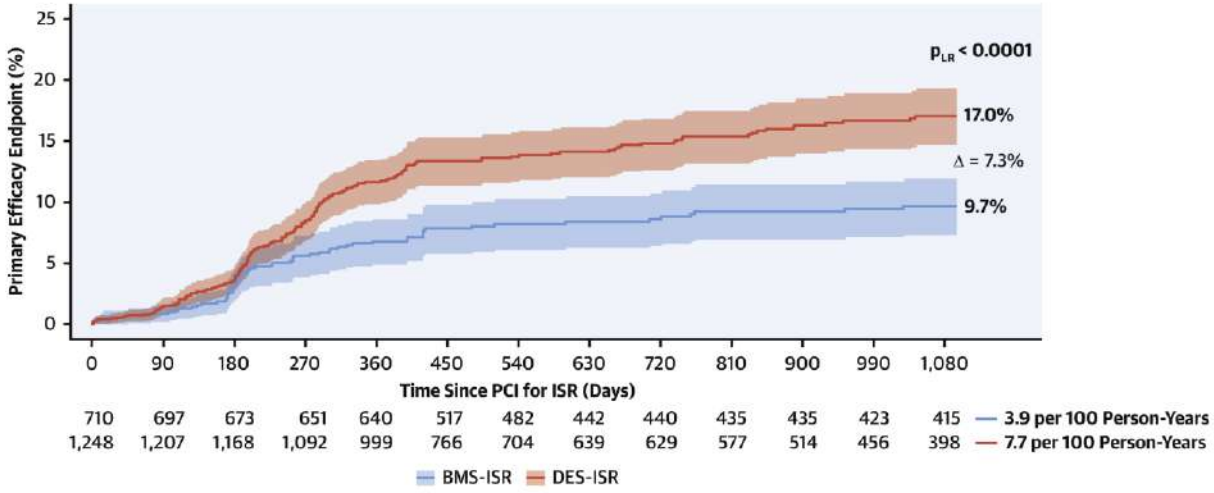


Number at risk

DCB	356	352	349	348	346	345	340	335	332	331	328	311	284
DCB+DES	19	19	19	18	18	18	18	17	17	17	17	17	13
Taxus	93	90	88	87	87	86	85	82	81	81	81	80	80
Xience	243	239	236	233	233	229	229	228	227	226	225	212	185

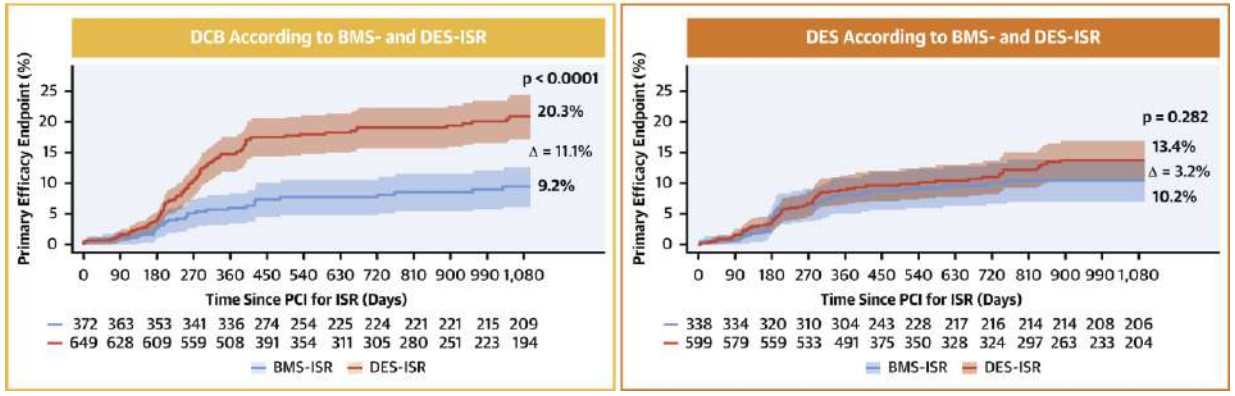
EFICACIA (TLR)

BMS-ISR	DES-ISR	HR [95% CI]	p_W	HR_{adj} [95% CI]	p_{Wadj}
62 / 710	181 / 1,248	0.56 [0.42-0.74]	< 0.0001	0.57 [0.39-0.84]	0.004



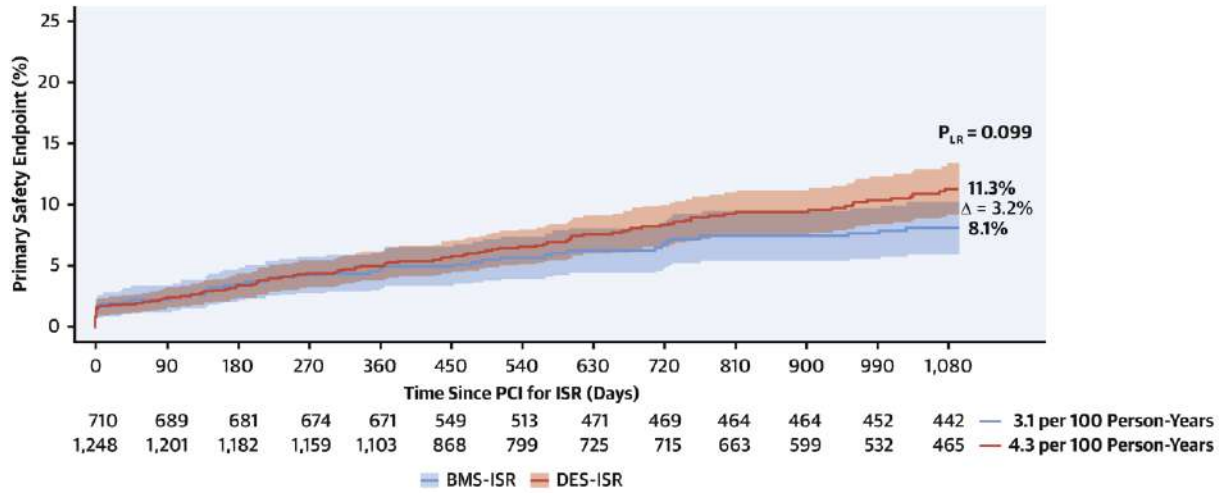
Crude Risk	HR [95% CI]	p_W	$p_{interaction}$
DCB	0.42 [0.28-0.62]	< 0.0001	0.031
DES	0.79 [0.52-1.21]	0.283	

Adjusted Risk	HR_{adj} [95% CI]	p_{Wadj}	$p_{interaction}$
DCB	0.37 [0.23-0.59]	< 0.0001	0.002
DES	1.12 [0.67-1.87]	0.672	



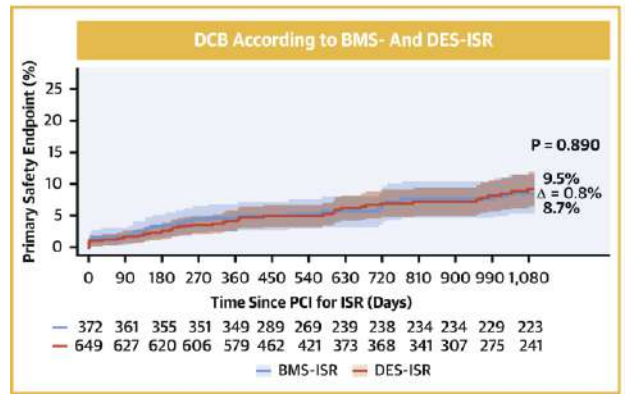
SEGURIDAD (M/I)

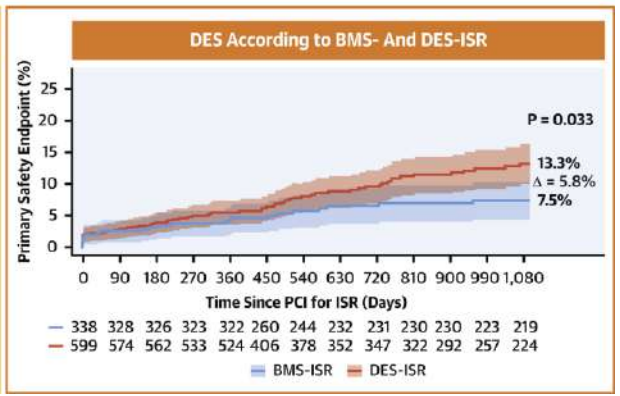
BMS-ISR	DES-ISR	HR [95% CI]	p_W	HR_{adj} [95% CI]	p_{Wadj}
51 / 710	109 / 1,248	0.75 [0.54-1.07]	0.116	0.85 [0.58-1.25]	0.404



Crude Risk	HR [95% CI]	P_W	$P_{interaction}$
DCB	0.97 [0.61-1.55]	0.890	0.122
DES	0.55 [0.32-0.94]	0.029	

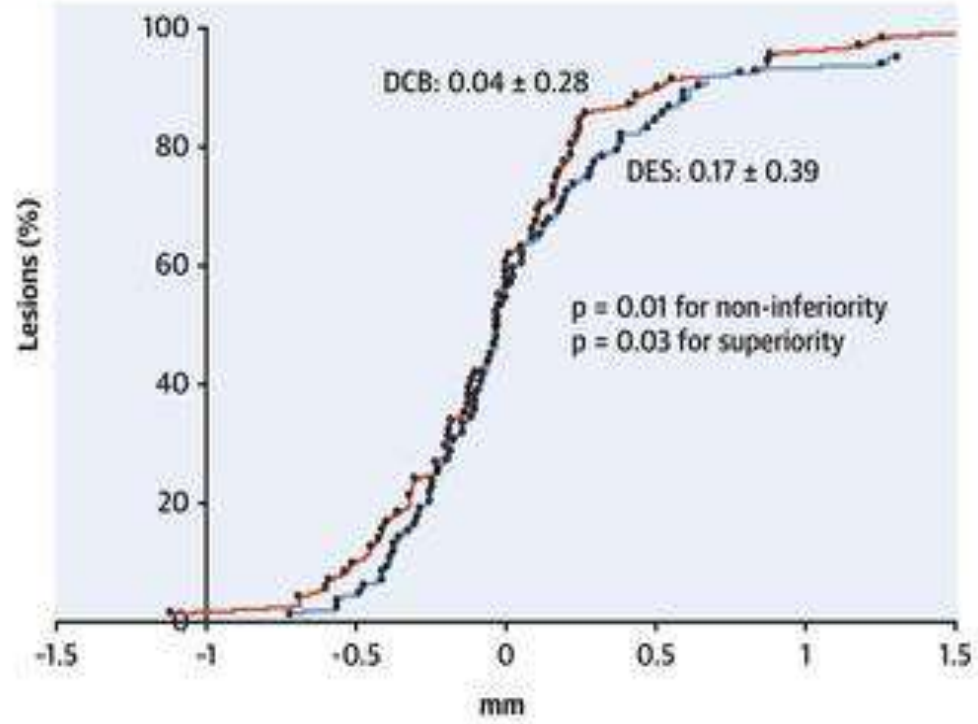
Adjusted Risk	HR_{adj} [95% CI]	P_{Wadj}	$P_{interaction}$
DCB	0.95 [0.55-1.67]	0.869	0.537
DES	0.74 [0.41-1.34]	0.317	



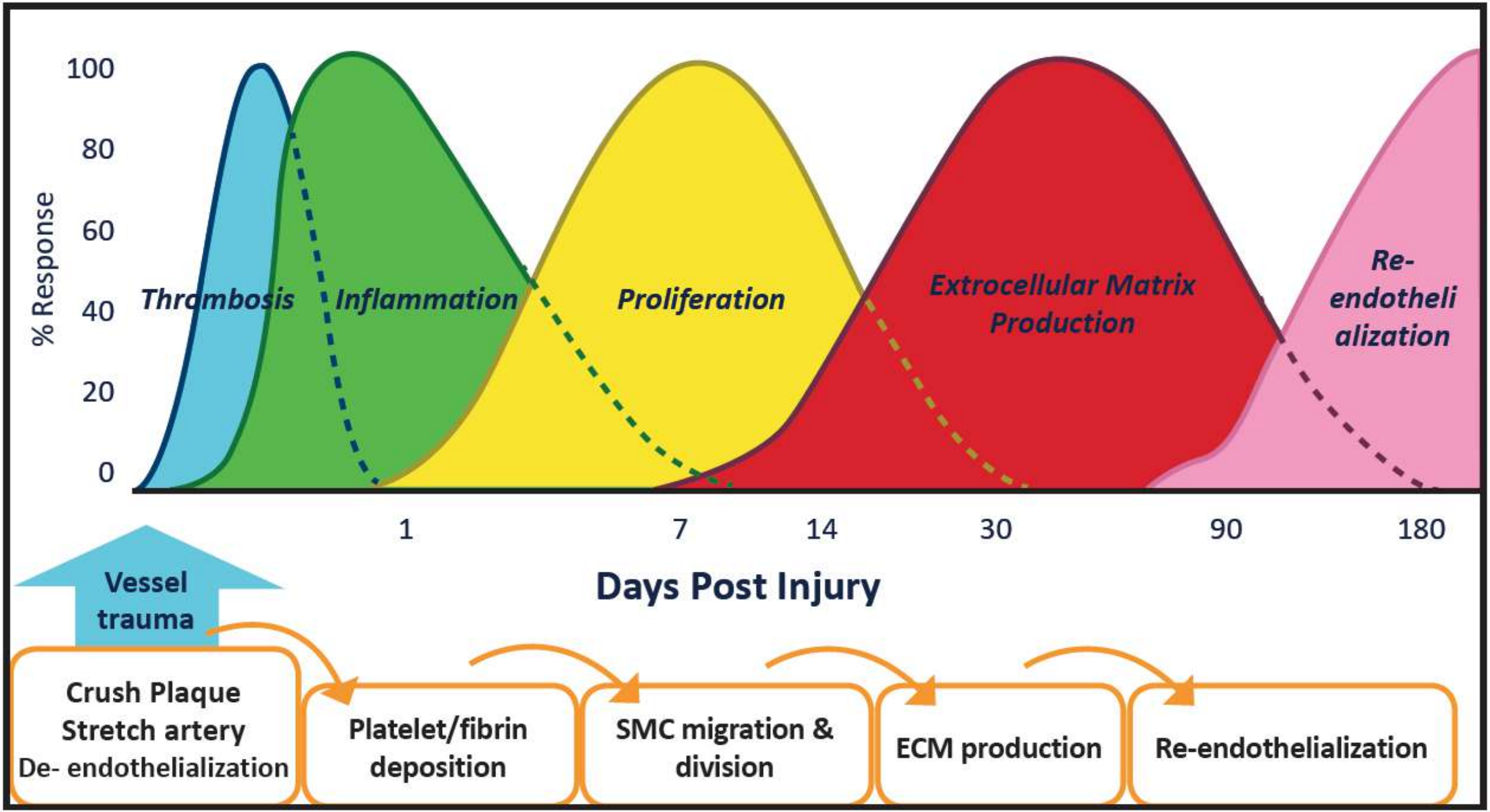


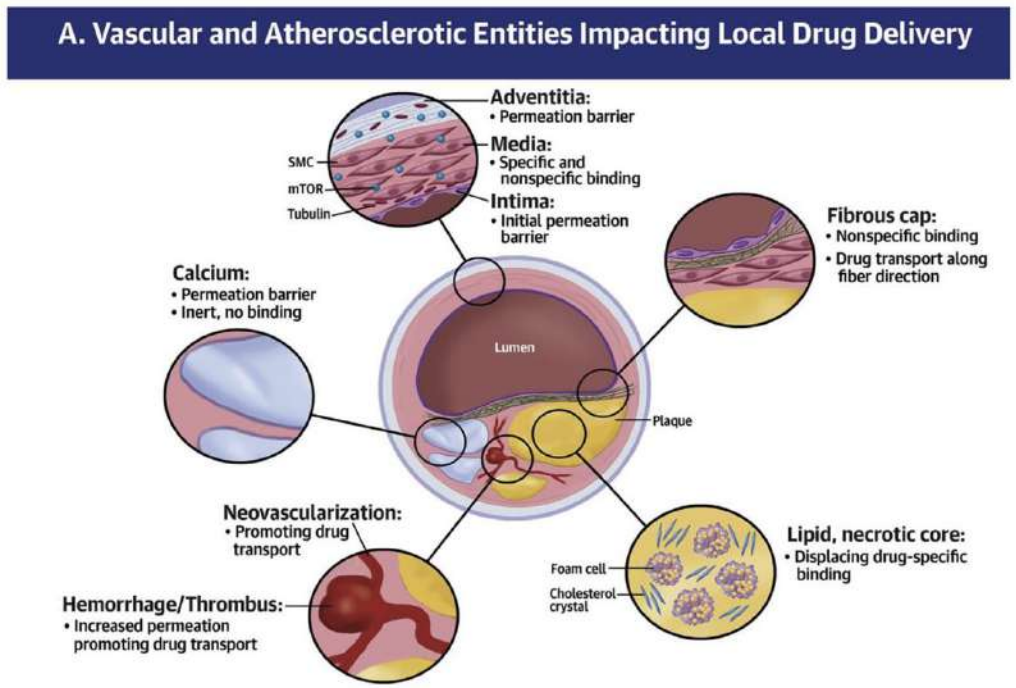
PICCOLETO II: Favorable DCB (menor LLL)

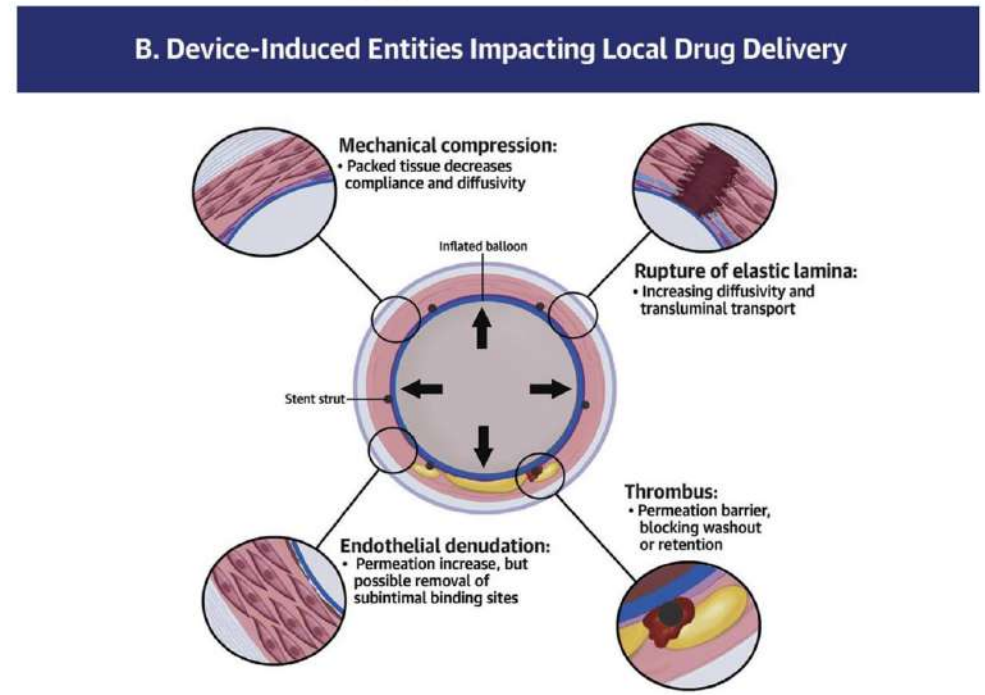
CENTRAL ILLUSTRATION: Primary Measure of Outcome, In-Lesion Late Lumen Loss



Cortese, B. et al. J Am Coll Cardiol Intv. 2020;13(24):2840-9.


100
80
60
40
20
0
% Response
Thrombosis
Inflammation
Proliferation
Extrocellular Matrix Production
Re-endotheli alization
1
7
14
30
90
180
Days Post Injury
Vessel trauma
Crush Plaque
Stretch artery
De- endothelialization
Platelet/fibrin deposition
SMC migration & division
ECM production
Re-endothelialization





Influence of Vascular Biology and Intervention on Drug Delivery

Vascular, atherosclerotic, and device-induced aspects affecting local drug delivery. (A) In the healthy artery, the intima, media, and adventitia present with different levels of permeation blockage, as well as specific and nonspecific binding sites for delivered drug. In the diseased lesion, calcium, lipid, fibrous, and hemorrhagic entities all modify uptake and retention. (B) Device-induced aspects such as endothelial denudation, elastic lamina rupture, mechanical compression, and thrombus also influence the delivery of drug. mTOR = mammalian target of rapamycin; SMC = smooth muscle cell.