Popliteal CTO: DCB or Supera stent

Lawrence A. Garcia, MD
Chief, Section Interventional Cardiology
and Vascular Interventions
Director, Vascular Medicine
St. Elizabeth's Medical Center
Tufts University School of Medicine
Boston, MA

Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

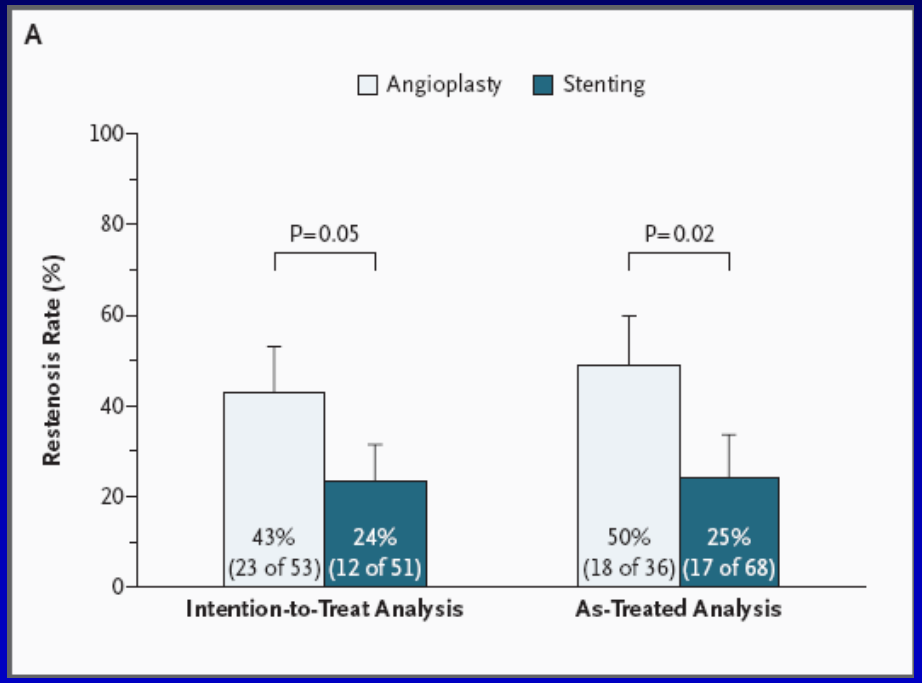
Affiliation/Financial Relationship	Company
• Grant/Research Support	• iDev, Covidien/Medtronic
• Consulting Fees/Honoraria	• Covidien/Medtronic, Boston Scientific, Angiosculpt/Spectranetics
• Major Stock Shareholder/Equity	• Arsenal, Primacea, TissueGen, CV Ingenuity, Scion Cardiovascular, Spirox, Essential Medical
• Royalty Income	• None
• Ownership/Founder	• None
• Intellectual Property Rights	• None
• Other Financial Benefit	• None

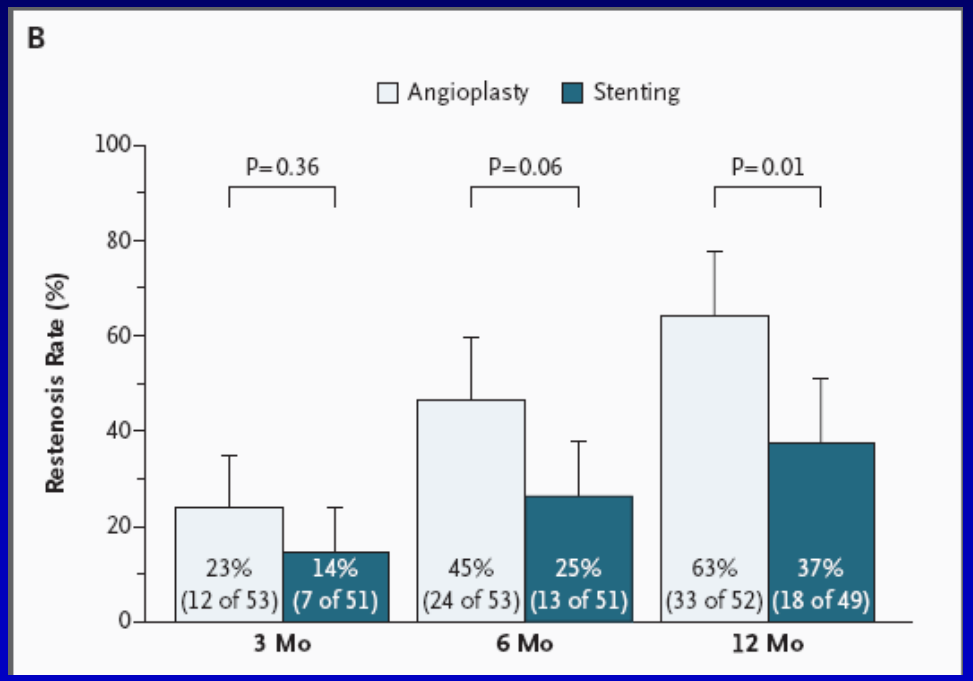
Trials to date

- All SFA trials with little exception enrolled to the P2 segment.
- No data from large trials on the P3 and below segment
- Registry data
- Comparator trials not available

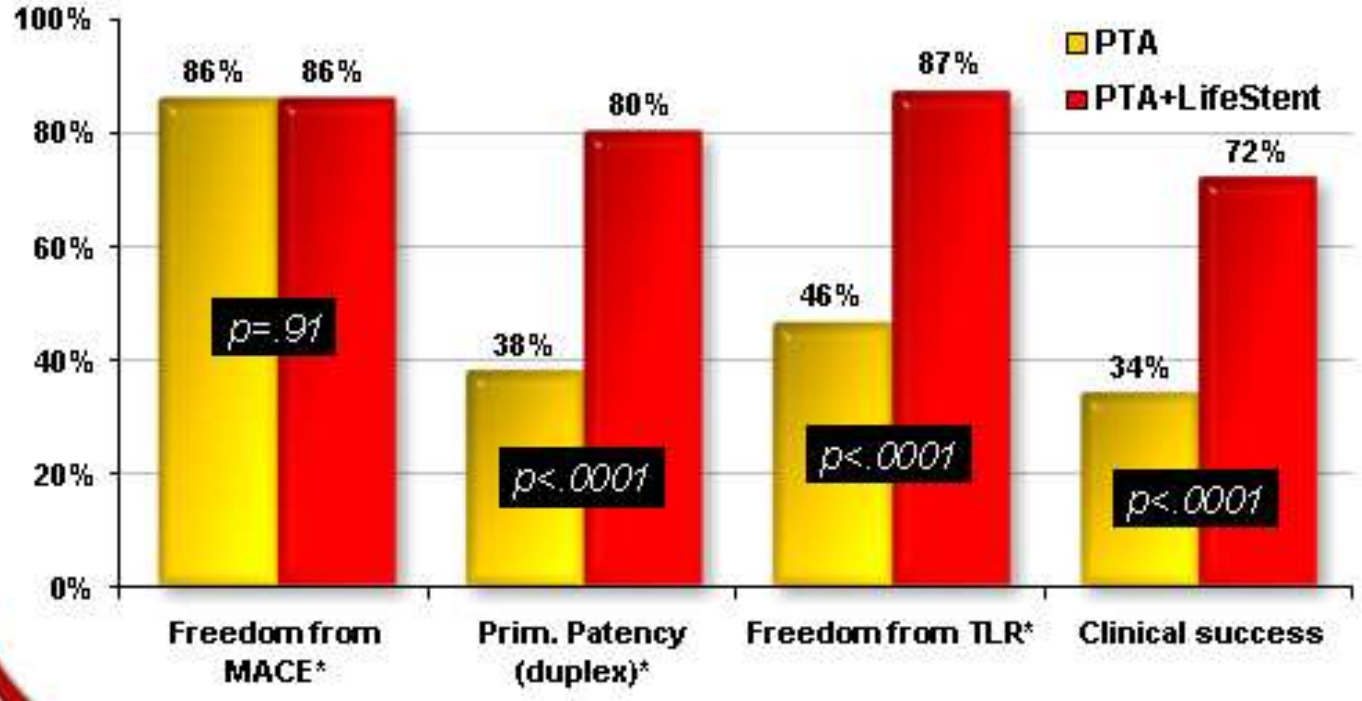
Balloon Angioplasty versus Implantation of Nitinol Stents in the Superficial Femoral Artery

Martin Schillinger, M.D., Schila Sabeti, M.D., Christian Loewe, M.D., Petra Dick, M.D., Jasmin Amighi, M.D., Wolfgang Mlekusch, M.D., Oliver Schlager, M.D., Manfred Cejna, M.D., Johannes Lammer, M.D., and Erich Minar, M.D.





12-Month Results



*Data from Kaplan-Meier Survival Analysis

THE RESILIENT TRIAL

Stroll Primary Patency

	12 months	24 months	36 months
Primary Patency (KM estimate) (PSVR < 2.5)	81.7%	74.9%	72.7%
DUS Patency (PSVR < 2.5)	81.1% (154/190)	83.5% (132/158)	83.9% (115/137)
Absence of Clinically Driven TLR	87.4% (202/231)	79.0% (173/219)	75.8% (157/207)

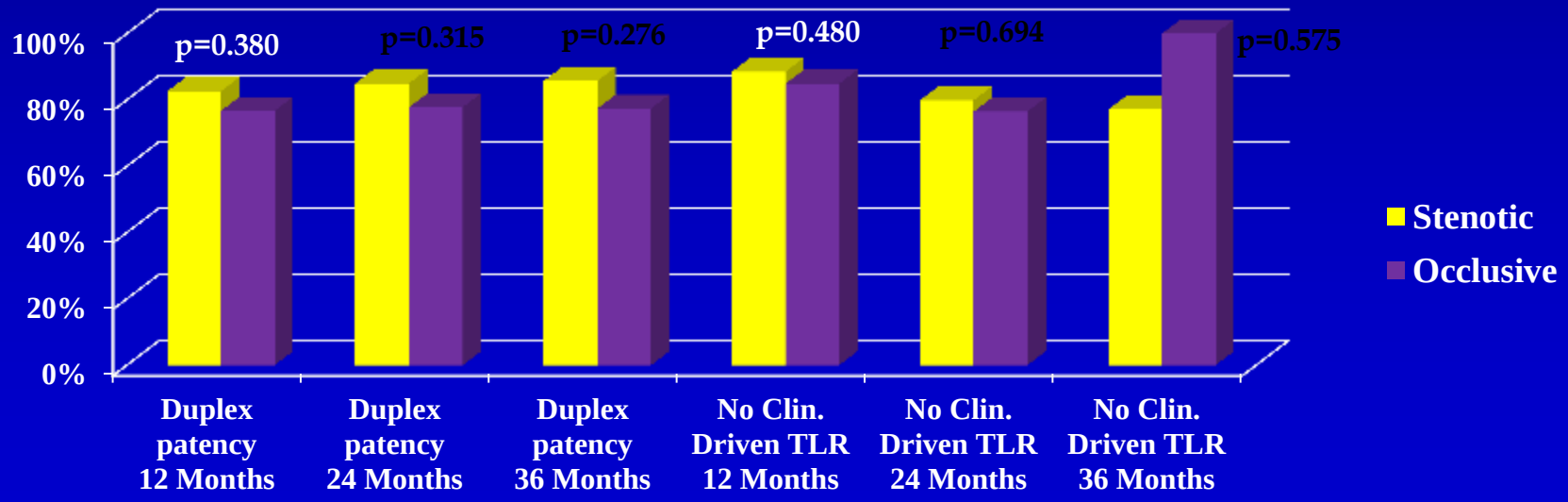
Primary Patency: *composite endpoint of absence of clinically driven TLR and DUS assessed binary restenosis defined as diameter stenosis >50% (non-patent).*

DUS patency: *stent non-patency defined as a diameter stenosis >50% with a specific a peak systolic velocity ratio as measured by Duplex Ultrasonography*

Clinically driven TLR: *any intervention in the stented target lesion following documented recurrent symptomatic leg ischemia by Rutherford/Becker Classification (2,3,4) with a resting or exercise ABI <0.8 and >50% diameter in-lesion stenosis by angiography. Or >70% in-lesion diameter stenosis by angiography in the absence of ischemic signs and symptoms.*

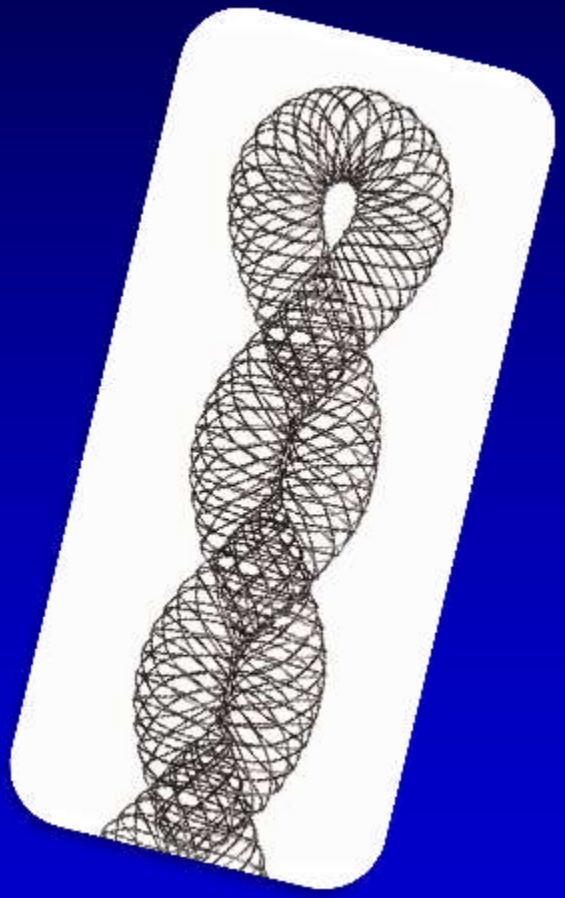
Efficacy in Total Occlusions

	Stenotic			Occlusive		
	12 Month	24 Month	36 Month	12 Month	24 Month	36 Month
Duplex patency (PSVR < 2.5)	82.6% (119/144)	85.0% (102/120)	85.7% (90/105)	76.7% (33/43)	77.8% (28/36)	77.4% (24/31)
Absence of Clinically Driven TLR	88.5% (154/174)	79.9% (131/164)	77.1% (118/153)	84.9% (45/53)	76.5% (39/51)	73.1% (38/52)



SUPERB trial

- SUPERA was designed to be highly fracture resistant and dynamically conformable to closely mimic vascular anatomy and maintain optimal patency
- Single arm registry compared to FDA accepted OPG. Treatment level to the P2 segment



Angiographic Core Lab Analysis

Baseline Characteristics	N= 266 Lesions
Mean lesion length	
Core lab*	77.7 mm
(Site)**	(83.2mm)
Calcification	
Moderate	27.9%
Severe	44.9%
Occlusions	24.7%

72.8%

Lesion Location

Proximal SFA
12.4%

Mid SFA
53.8%

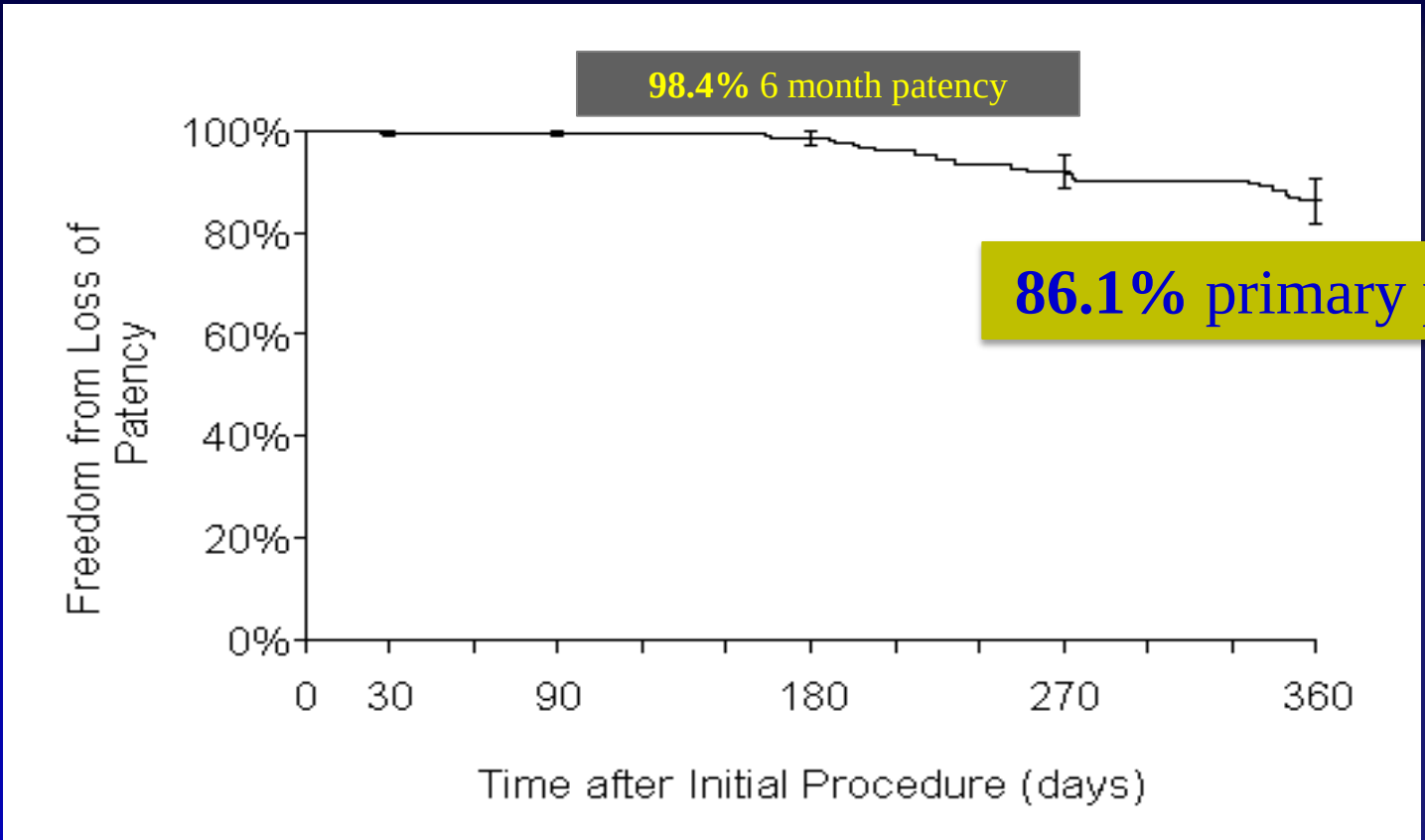
*Distal SFA****
31.9%

*Popliteal****
1.9%

* *Core lab assessed length from 20% DS to 20% DS*
** *Site measurement as normal to normal*

*** *A total of 10.9% of lesions were popliteal artery only, or lesions extending from distal SFA into the proximal popliteal artery*

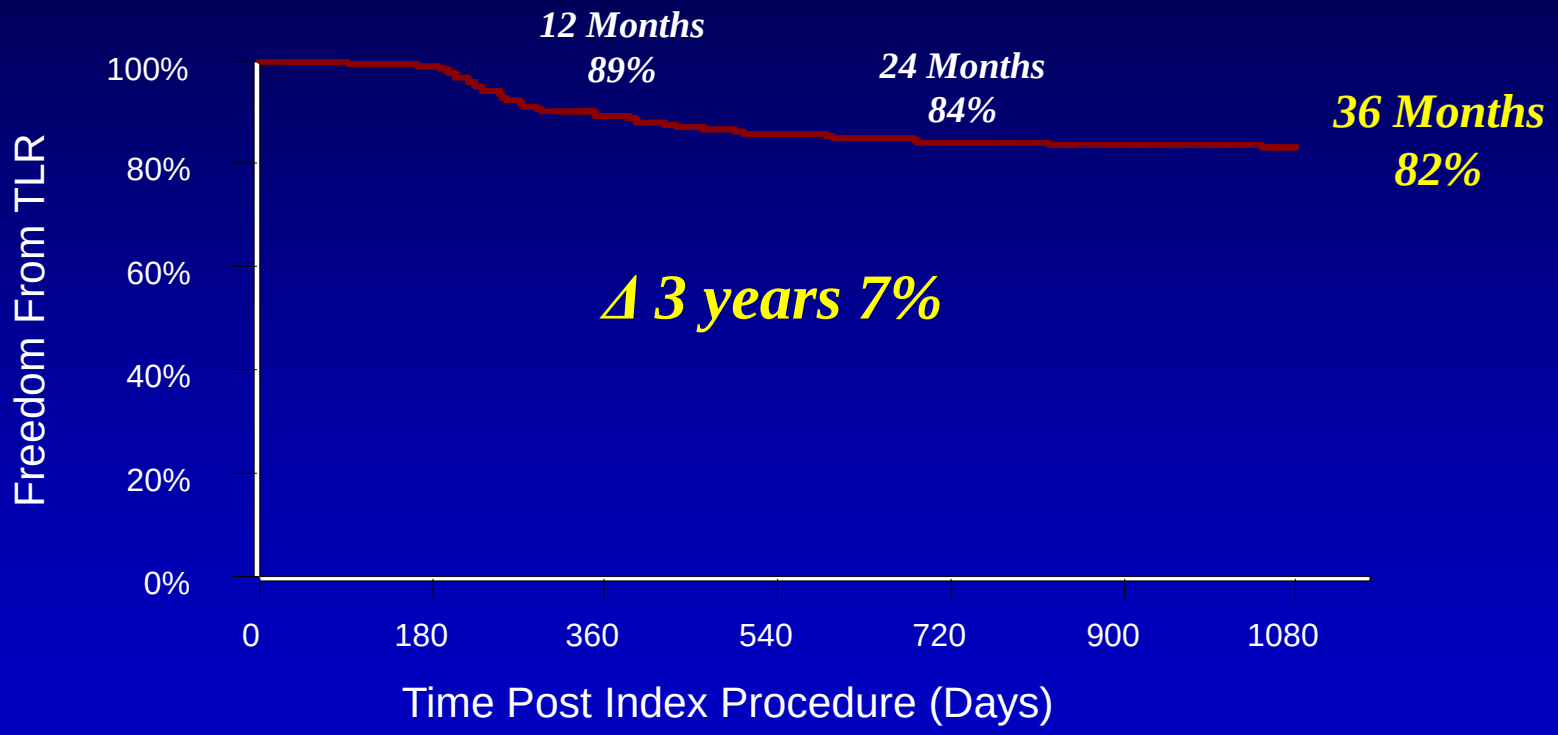
Freedom from Loss of Primary Patency at 1 Year (PSVR < 2.0)



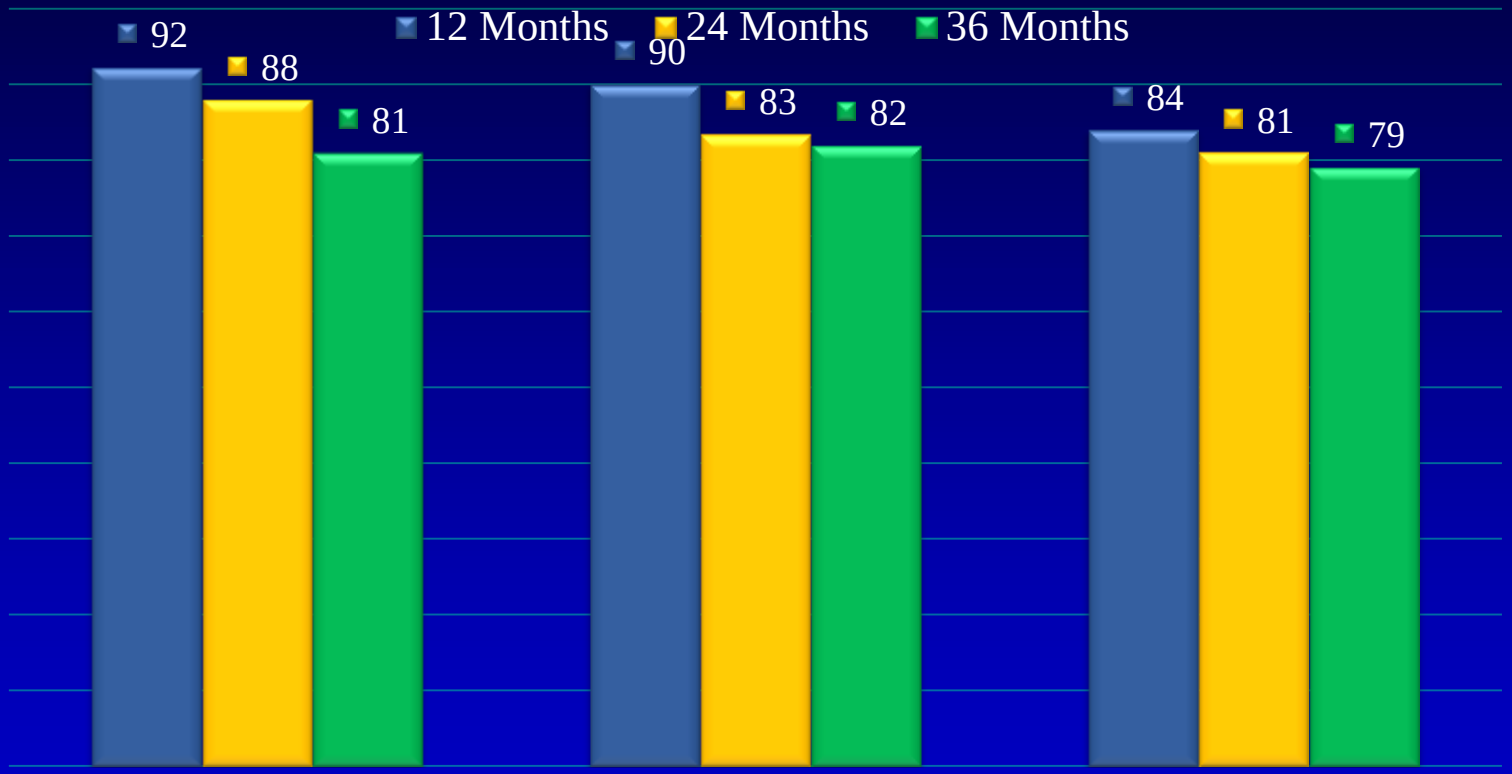
Freedom from TLR = 90%

Survival Analysis conducted by HCRI

Freedom From TLR Through 3 Years



Freedom From TLR Across Lesion Lengths



Mean Lesion Length	*35.4 mm*	*73.5mm*	*126.1 mm*
Min, Max Lesion Length	*8.5, 55.0 mm*	*55.5, 91.5 mm*	*96.1, 236.4 mm*

Supera popliteal registry

Table 2. Angiographic and Procedural Characteristics in 101 Recipients of 125 Popliteal Artery Stents

Treated leg	
Right	46 (45.5)
Left	55 (54.5)
Stented arterial segment	
P1	39 (38.4)
P2	48 (47.5)
P3	14 (13.9)
Total occlusion	48 (47.5)
Stenosis	53 (52.5)
Calcifications	
None	20 (19.8)
Mild	29 (28.7)
Moderate	21 (20.8)
Severe	31 (30.7)
Vessel run-off	
0 or 1 vessel	41 (40.6)
2 or 3 vessels	60 (59.4)
Lesion length, mm*	58.4 ± 34.3 (10–200)
Stent length, mm	84.3 ± 45.1 (40–240)

Table 3. Stent Patency Rates, ABI, and Cumulative Numbers of Adverse Events at 6 and 12 Months of Follow-Up

		Follow-Up (Months)	
	Baseline	6	12
Stent patency, %			
Primary	—	94.6 ± 2.3	87.7 ± 3.7
Secondary	—	97.9 ± 1.5	96.5 ± 2.0
Ankle-brachial index	0.58 ± 0.15	0.93 ± 0.19*	0.97 ± 0.18*
Cumulative adverse events			
Death	—	5	10
In-stent occlusion	—	3	4
>50% in-stent restenosis	—	3	6
Amputation	—	0	1
Repeat percutaneous recanalization	—	3	7

Values are mean ± SD (SE for stent patency results), or number of observations. Note: The same patient may have suffered >1 adverse event. *$p < 0.001$.
ABI = ankle-brachial index.

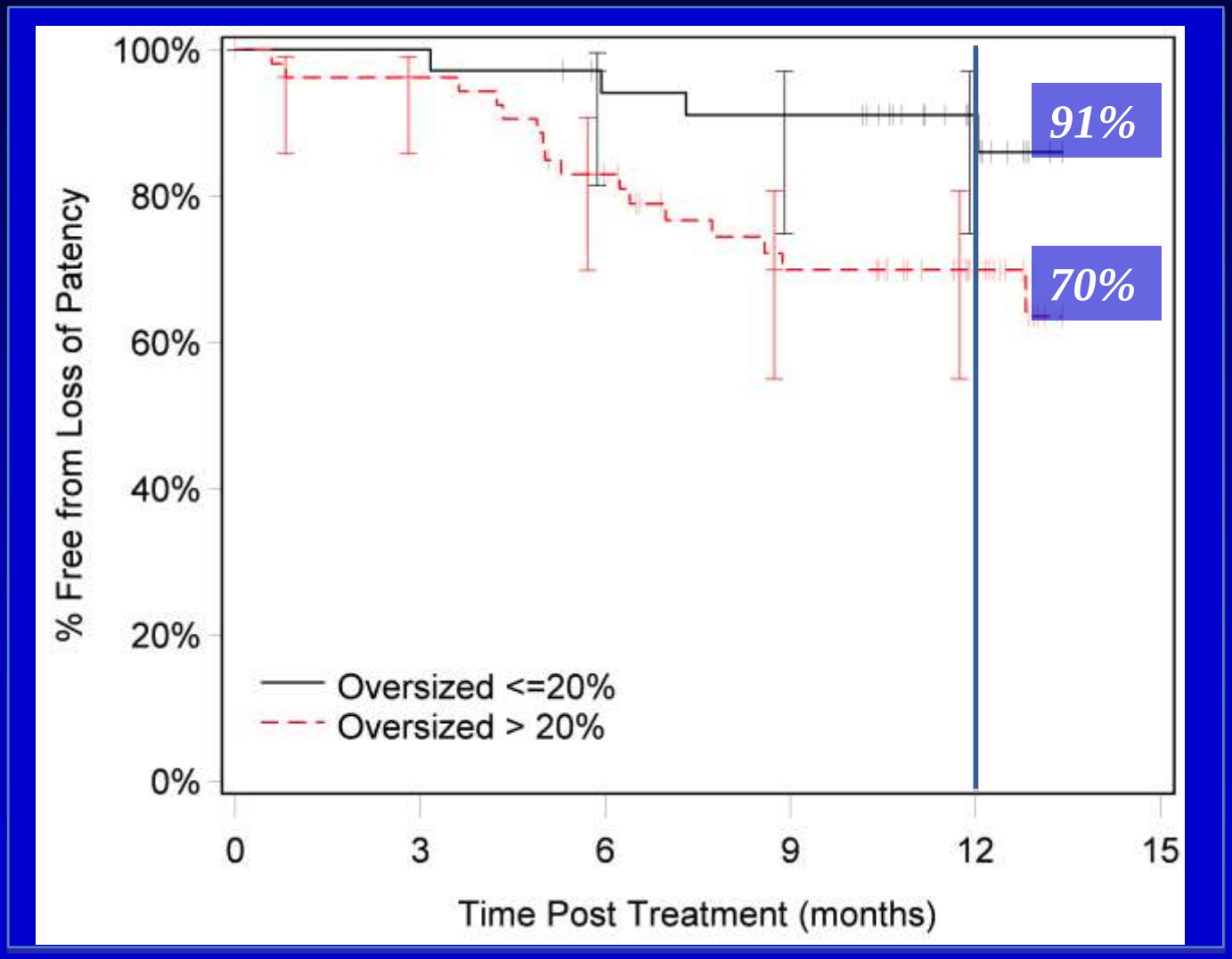
Scheinert D, et al JACC Intev 2013

VIPER Lesion Characteristics

	Gore VIPER Clinical Study
Patients Enrolled	**119**
Treated Occlusions	**56%**
Lesion Length	**19 cm**
Lesion Calcification	
none-mild	**39%**
moderate-severe	**61%**
Tibial Runoff	
1 vessel	**21%**
2 vessel	**33%**
3 vessel	**46%**
Patients Enrolled	**119**

One patient excluded for treatment with device without heparin

Effects of Device Sizing: Proximal



THUNDER 5 years

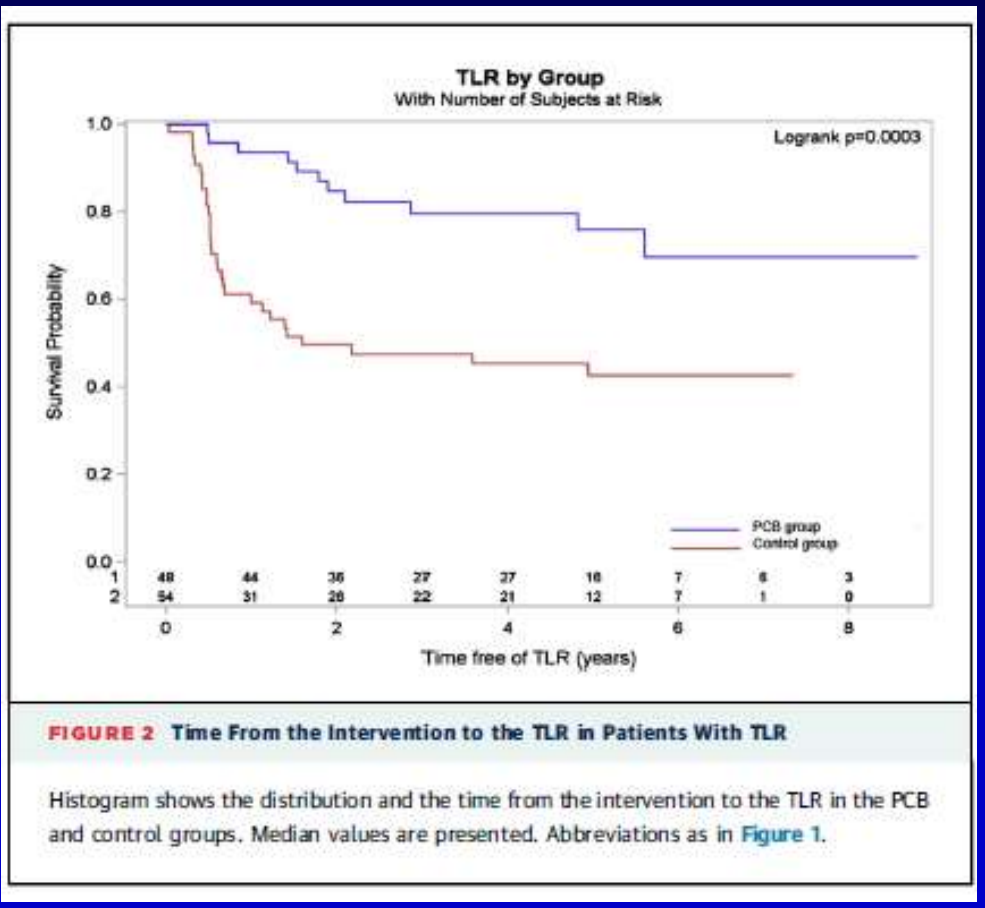


FIGURE 2 Time From the Intervention to the TLR in Patients With TLR

Histogram shows the distribution and the time from the intervention to the TLR in the PCB and control groups. Median values are presented. Abbreviations as in Figure 1.

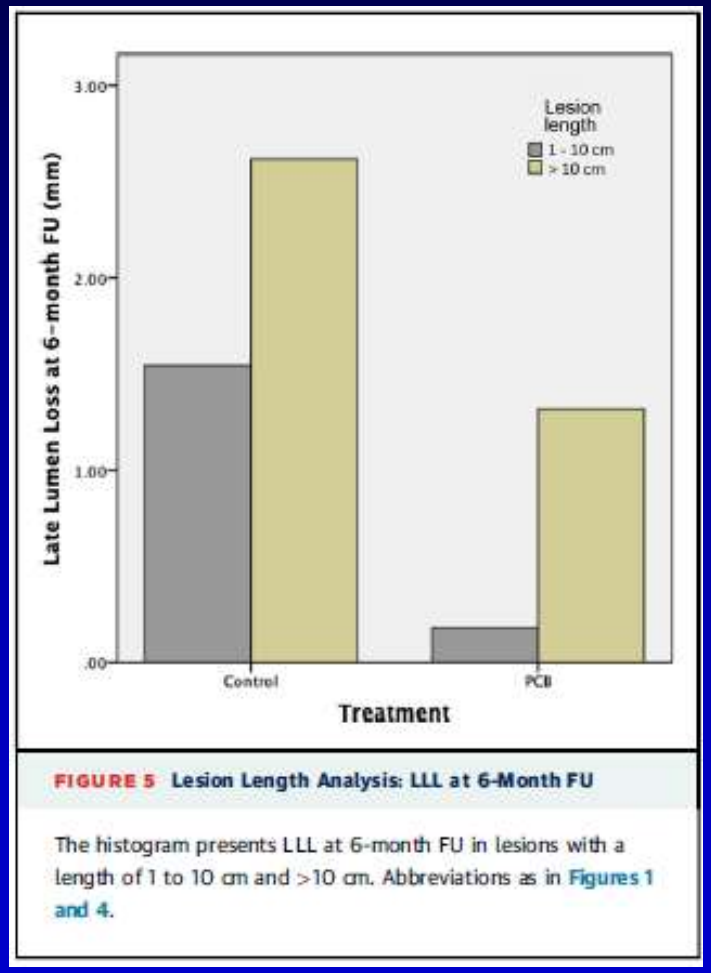


FIGURE 5 Lesion Length Analysis: LLL at 6-Month FU

The histogram presents LLL at 6-month FU in lesions with a length of 1 to 10 cm and >10 cm. Abbreviations as in Figures 1 and 4.

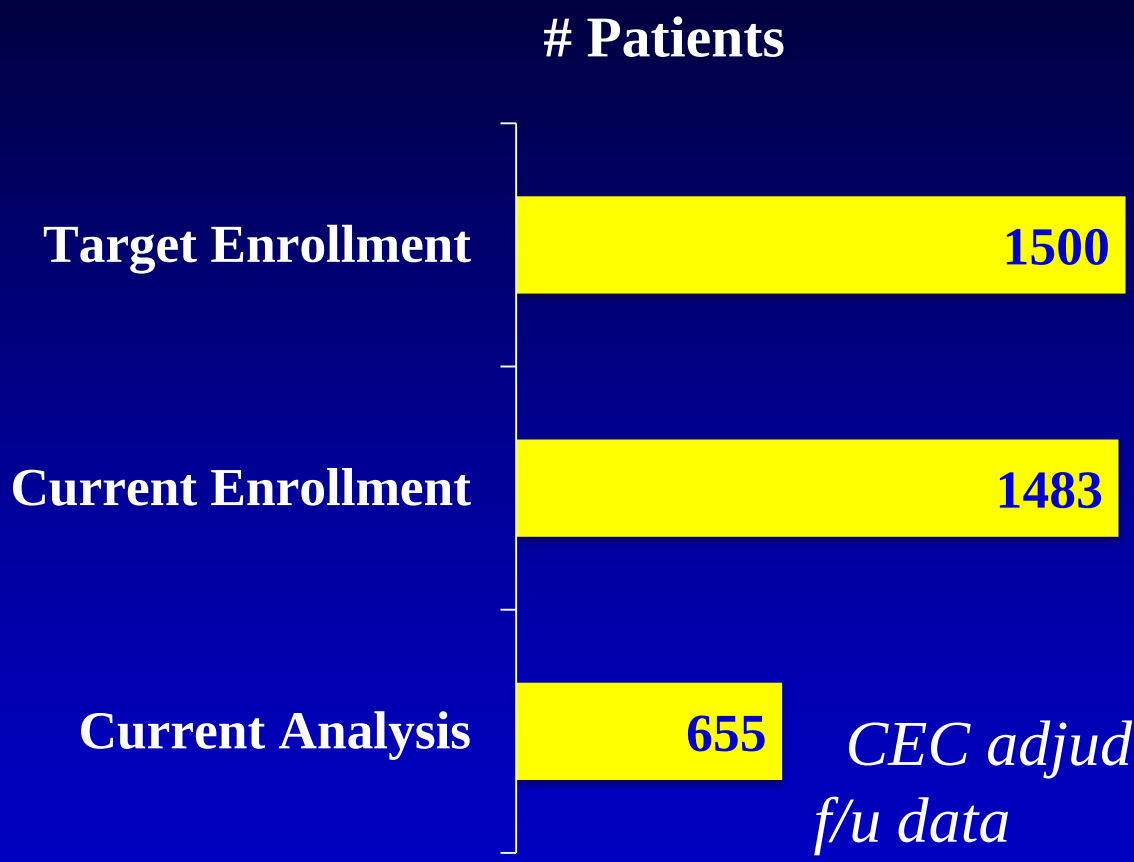
Tepe G, et al JACC Interv Jan 2015

IN.PACT SFA Trial and IN.PACT Global Study

Complementary Targets

IN.PACT SFA	IN.PACT GLOBAL
RCT	Single-arm
331 patients	1500 patients
57 sites (US, EU)	67 sites (EU, Mid-East, Asia, CDN, Au, South Am)
Systematic pre-dil	Pre-dil at physician's discretion
Single lesions ~TASC A-B; SFA / P1; No severe Ca++	Single or multiple lesions within full fem-pop; ANY TASC type

IN.PACT Global Status



CEC adjudicated 1-Year f/u data

IN.PACT Global Primary Endpoints

Efficacy

- **Clinical cohort:** 12-month Freedom from clinically-driven TLR [1]
- **Imaging cohort:** 12-month Primary Patency [2]

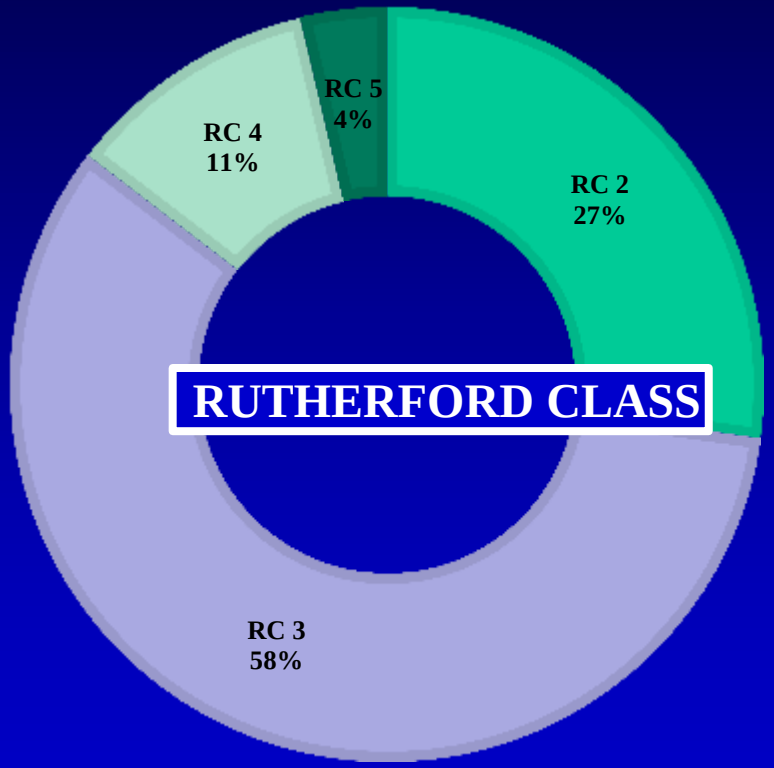
Safety

- **Composite**
  - 30-day freedom from device- and procedure-related mortality
  - 12-month freedom from major target limb amputation and clinically driven TVR

1. *Any re-intervention within the target lesion(s) due to symptoms or drop of ABI of ≥ 20% or > 0.15 when compared to post-index procedure baseline ABI.*
2. *Freedom from clinically-driven target lesion revascularization (TLR) and freedom from restenosis as determined by DUS Peak Systolic Velocity Rate (PSVR) ≤ 2.4. Primary Patency of the de novo ISR, long lesion ≥ 15 cm and CTO ≥ 5 cm will be calculated separately.*

Baseline Clinical Characteristics

N	**655**
Age (Y)	**69.2 ± 10.2**
Male Gender (%)	**67.2% (440/655)**
Diabetes (%)	**41.2% (269/653)**
Hypertension (%)	**83.6% (546/653)**
Hyperlipidemia (%)	**73.1% (470/643)**
Current Smoker (%)	**33.6% (220/655)**
Obesity (BMI ≥ 30 kg/m²)	**20.6% (134/649)**
Coronary Artery Disease (%)	**43.3% (270/624)**
Carotid Artery Disease (%)	**21.5% (122/568)**
Renal Insufficiency [1]	**11.9% (70/595)**
On Dialysis	**3.2% (21/651)**
Previous Peripheral Revasc. (%)	**57.3% (375/655)**
Concomitant BTK Disease	**45.7% (283/619)**
ABI	**0.675 ± 0.233**



Lesion/Procedural Characteristics

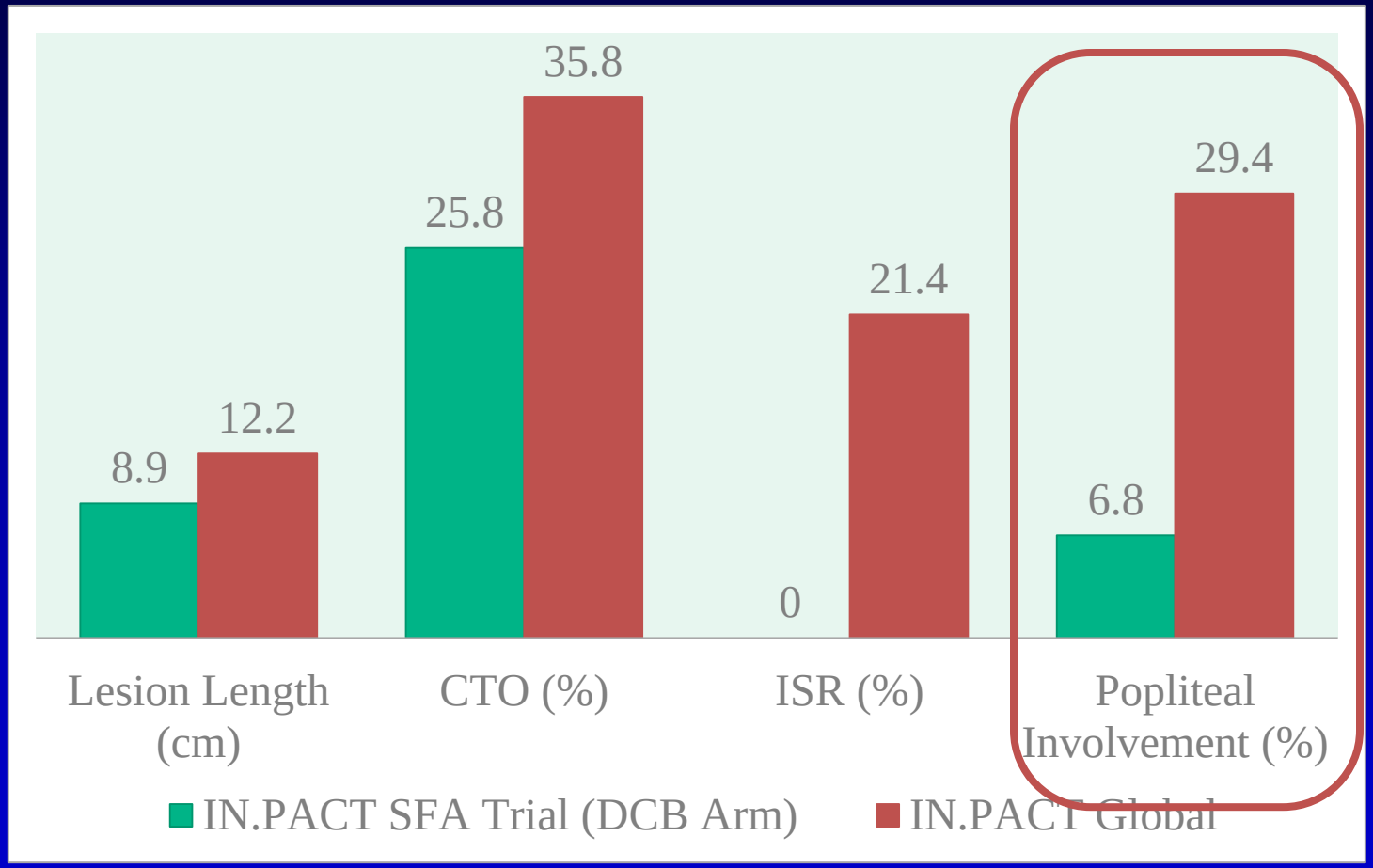
Lesions (N)	**763**
Lesions per Patient (N)	**1.16**
Lesion Type:	
de novo	**70.6% (539/763)**
restenotic (no ISR)	**8.0% (61/763)**
ISR	**21.4% (163/763)**
Lesion Length (cm)	**12.23 ± 9.59**
Total Occlusions (%)	**35.8% (273/763)**
Severe Calcification (%)	**10.4% (79/761)**
RVD (mm)	**5.164 ± 0.684**
Diameter Stenosis pre (%)	**88.7 ± 12.2**
Dissections (%): 0	**60.2% (459/762)**
A-C	**33.9% (258/762)**
D-F	**5.9% (45/762)**

Note: IN.PACT Admiral is not indicated for ISR in the U.S.

Pre-dilatation (%)	**75.4% (494/655)**
Post-dilatation (%)	**31.0% (201/648)**
Provisional Stent (%)	**24.7% (160/648)**
Device Success [1]	**99.4% (1264/1271)**
Procedure Success [2]	**99.8% (646/647)**
Clinical Success [3]	**99.5% (644/647)**

1. *Device success: successful delivery, inflation, deflation and retrieval of the intact study balloon device without burst below the RBP*
2. *Procedure success: residual stenosis of ≤ 50% (non-stented subjects) or ≤ 30% (stented subjects) by core lab (if core lab was not available then the site reported estimate was used)*
3. *Clinical success: procedural success without procedural complications (death, major target limb amputation, thrombosis of the target lesion, or TVR) prior to discharge)*

IN.PACT SFA and IN.PACT Global Lesion Characteristics



Note: IN.PACT Admiral is not indicated for ISR in the U.S.

IN.PACT SFA and IN.PACT Global 12-months Results Summary

	IN.PACT SFA (DCB Arm) N=220	IN.PACT Global N=655
CD-TLR	2.4%	8.7%
CD-TVR	4.3%	9.5%
Thrombosis	1.4%	3.8%
Target Limb Major Amputation	0.0% (0)	0.3% (2)

	IN.PACT SFA	IN.PACT Global
Lesion Length	8.9 cm	12.2 cm
CTO	25.8%	35.8%
ISR	0.0%	21.4%
Baseline RC > 3	5%	15%

Popliteal intervention

- Currently all trial designs are non-specific to the popliteal
  - Seems as challenging as the SFA for revascularization
- PTA/stenting may afford the optimal initial benefit
  - Long term data lacking
    - SUPERA popliteal registry 5 year outcomes 76%
    - Biomimetic design appears very attractive for this anatomic location
  - Of all stent designs interwoven may afford the best primary patency still speculative
- DCB data appears compelling though not directly tested thus far
  - Popliteal segments seem attractive if formally studied
  - Infra-popliteal segments appear negative thus far
- Only direct comparator studies will either validate or impugn one device from another
  - All combinations need scientific validation