

# DES OR DEB? LESION SELECTION IS WHAT MATTERS

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# Conflicts of interest

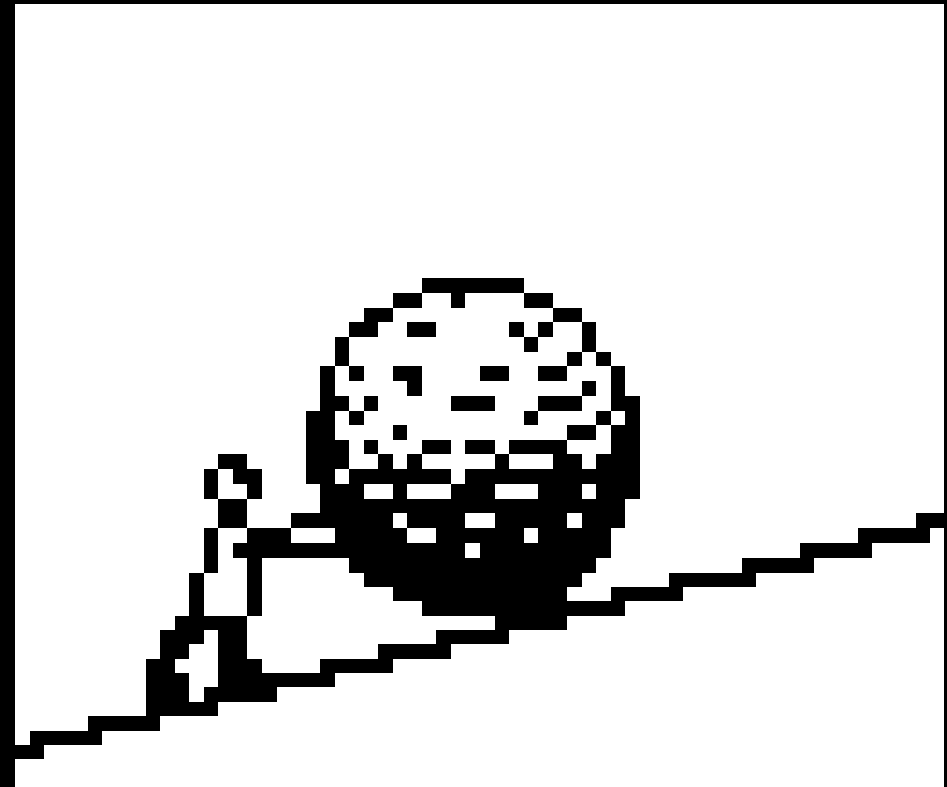
- ▣ Nothing to declare

# Medical Decision Making

- **Anatomy Attributes** (lesion location, morphology, length, etc)
- **Device Attributes** (scaffolding, anti-restenosis, costs, etc)
- **Individualised Treatments** (Customised therapies)
- **Evidence-Based Medicine** (EBM-MDM)

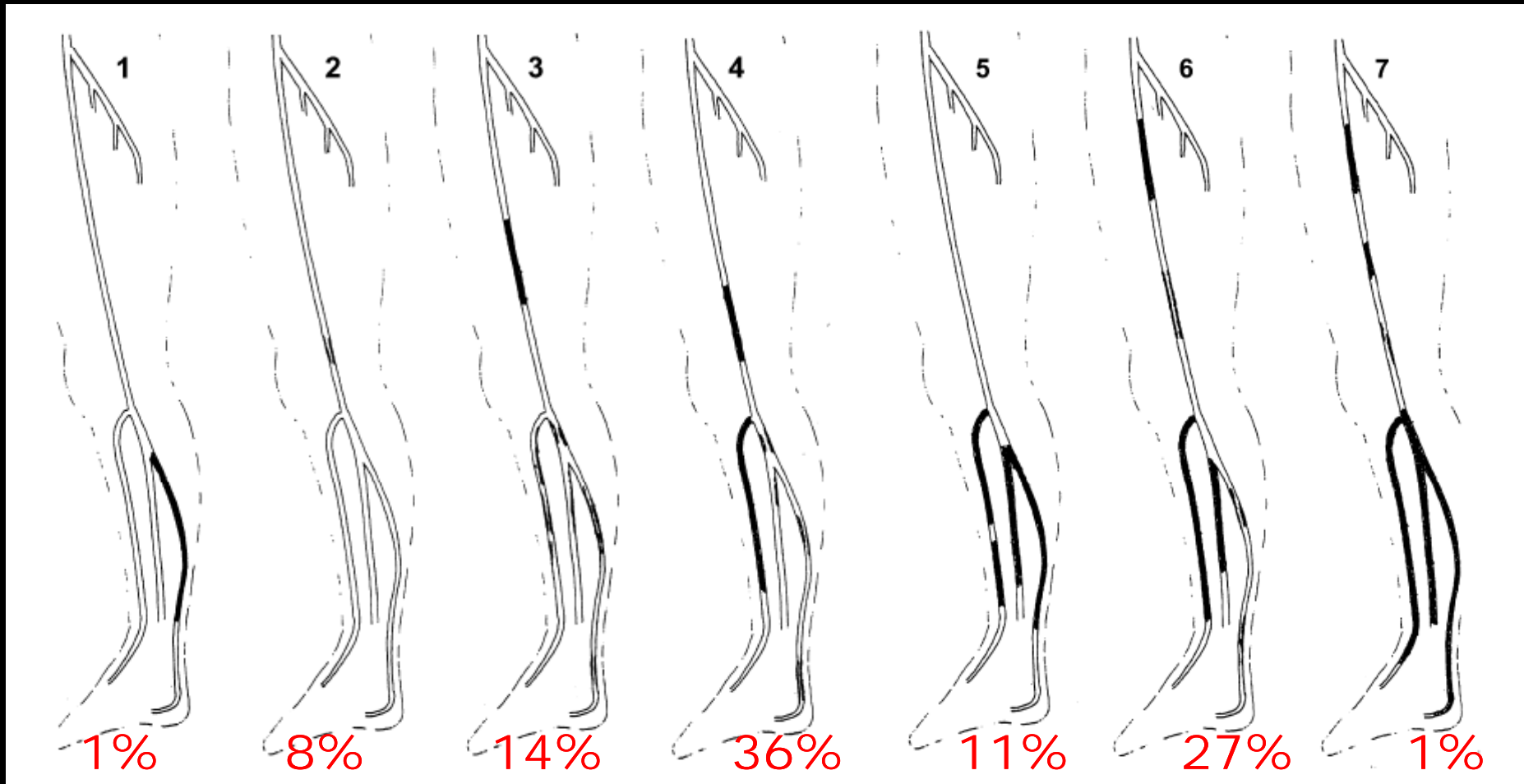
# The fight against restenosis...

- ▣ PTA
- ▣ Artherectomy
- ▣ Cutting Balloon
- ▣ Scoring Balloon
- ▣ Cryoplasty
- ▣ Brachytherapy (b,g)
- ▣ Laser
- ▣ Nitinol Stent
- ▣ Drug Eluting Stent
- ▣ Covered Stent
- ▣ Drug Eluting Balloon



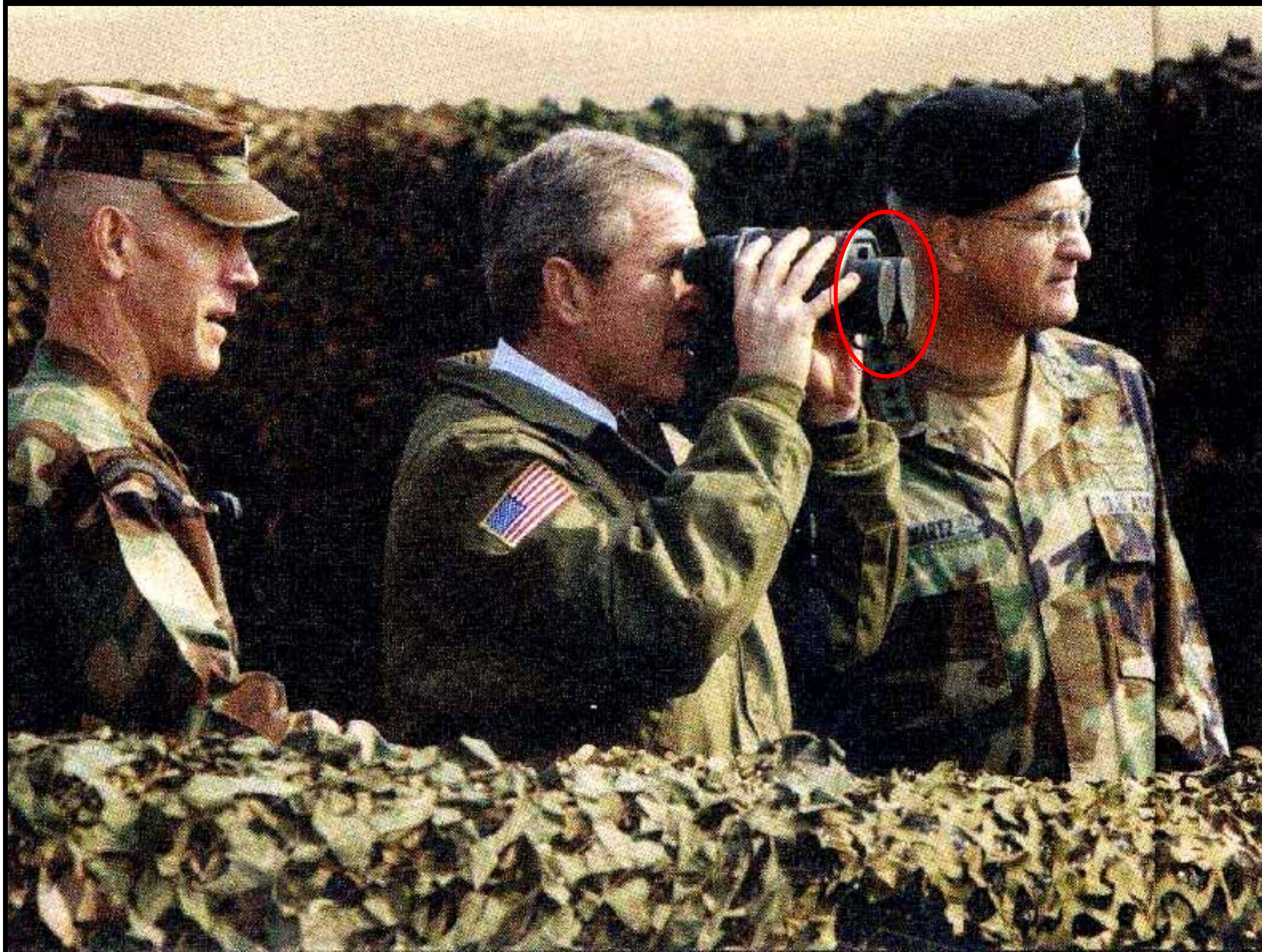
....a fight for Sisyphos?

# Lesion classification in CLI



- ~ 50% long occlusions (>10cm)
- ~ 30% three-vessel occlusive lesions
- ~ 50% at least one patent distal foot vessel

*L. Graziani et al.  
Eur J Vasc Endovasc Surg 2007*

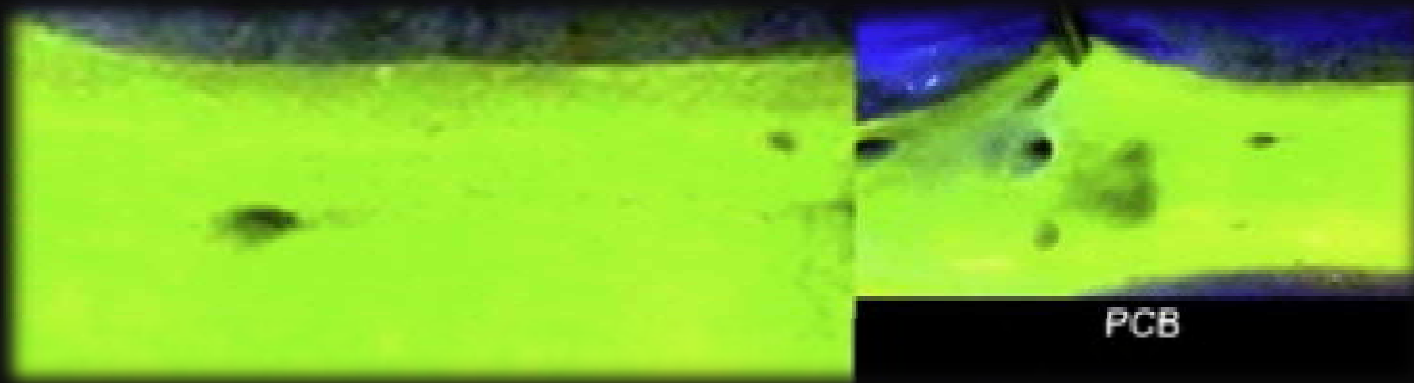
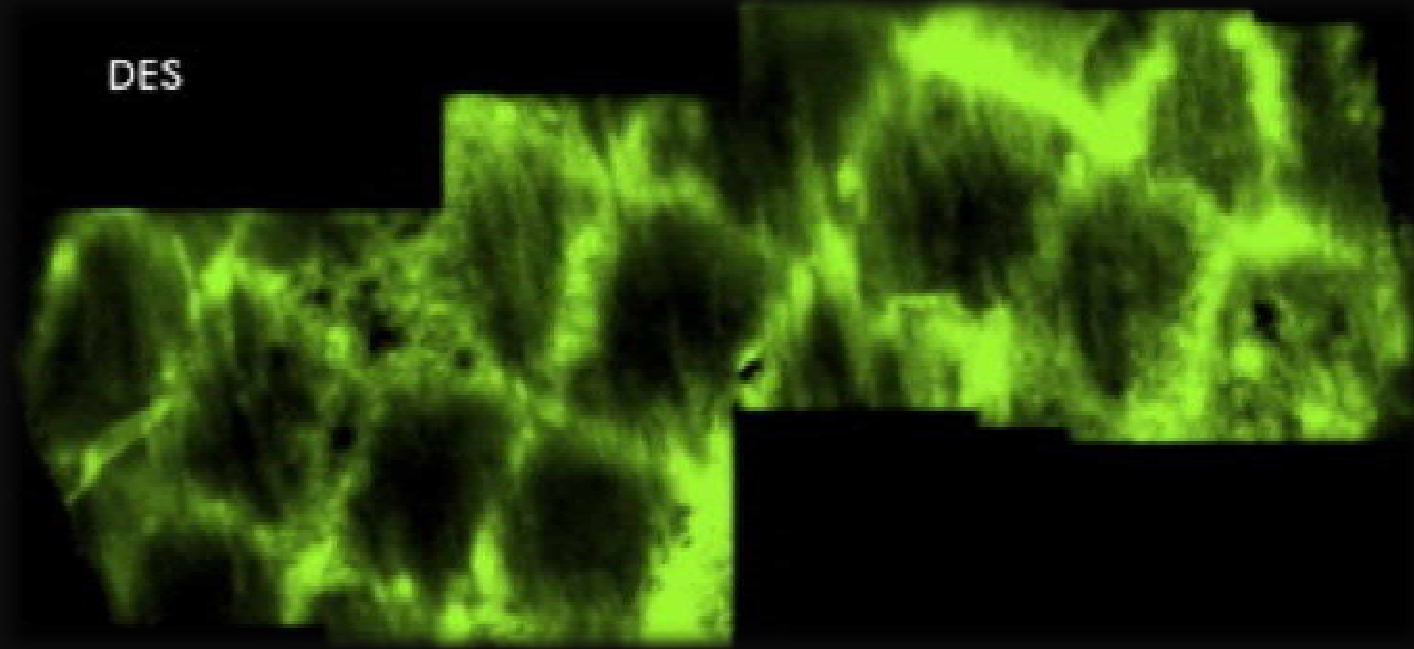


# Outcome metrics

- Safety and immediate success
- Limb salvage / Amputation-free survival
- Primary patency / Vascular restenosis
- Event-free survival or sustained clinical improvement = no death, no major amputation, no repeat procedures
- Cost-benefit analysis

# DES & DCB

DES



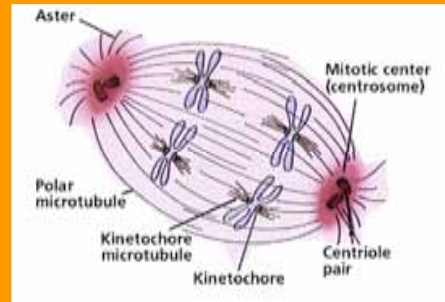
*Animal studies (Scheller B. et al. Circulation 2004 & Huang et al. Circulation 2011)*



# Why Paclitaxel for DEB? Why Olimus for DES?

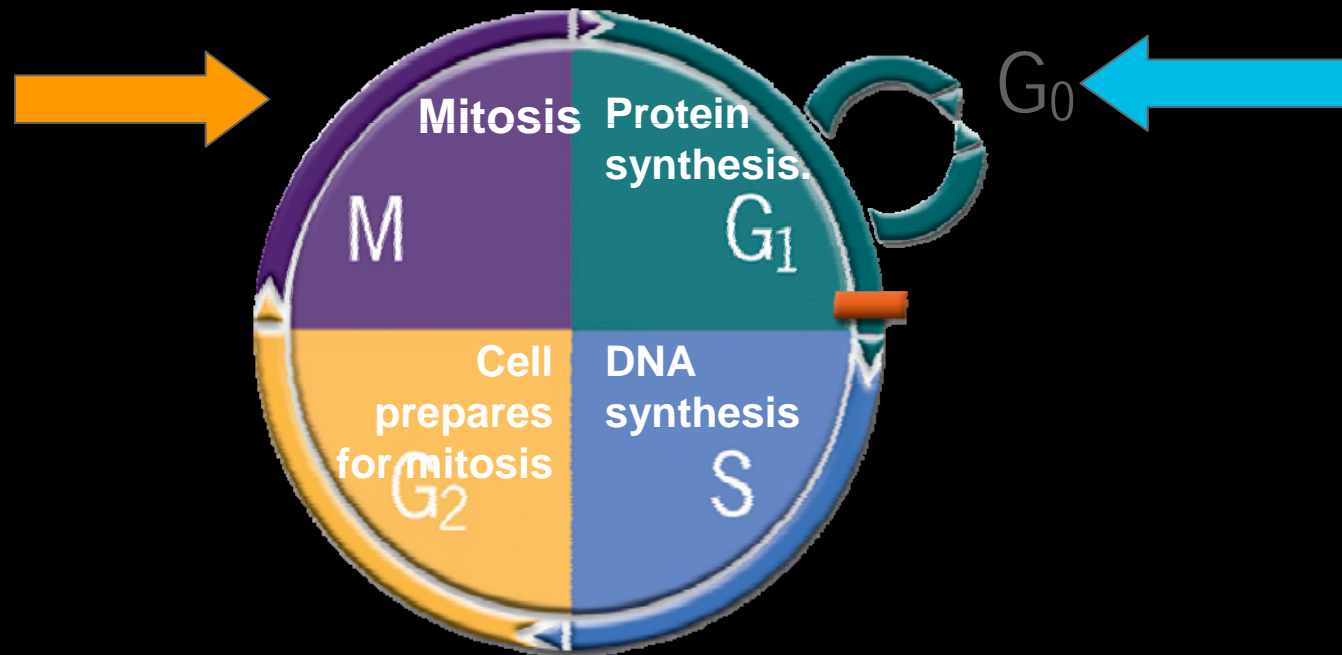
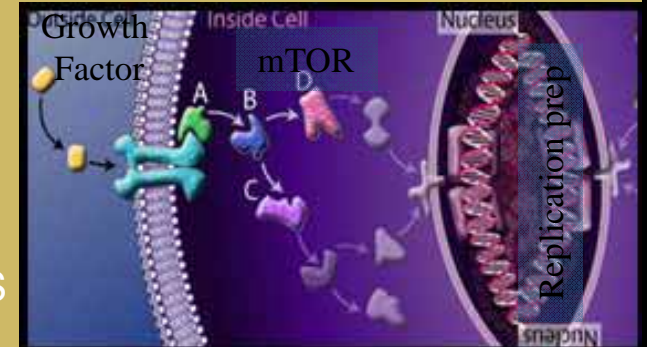
## Paclitaxel

Interferes with cell division at the M phase, after DNA synthesis has occurred. Cells are in an abnormal state with twice the normal DNA content, which leads to cell death by apoptosis



## ABT-578 Rapamycin Everolimus

Interfere with cell growth at the G1/S transition, before DNA synthesis has occurred. Cells return to the resting phase (G0) without dying and can reenter the cell cycle later again



# Available evidence about infrapopliteal drug-eluting stents

- Non-randomized studies
- Low-volume single-center studies
- Single-arm cohort series (no control)
- Retrospective analyses
- **Multicenter randomized trials**
- **YUKON-BTX, DESTINY, ACHLLES**

*Siablis D, et al. J Endovasc Ther 2005*  
*Scheinert D, et al. Eurointervention 2006*  
*Siablis D, et al. J Endovasc Ther 2007*

*Bosiers M, et al. J Cardiovasc Surg (Torino) 2006*  
*Commeau P, et al. Catheter Cardiovasc Interv 2006*  
*Siablis D et al. J Vasc Interv Radiol 2007*

# The YUKON Study (2011)

- Prospective, randomized, multicenter, double-blind trial in **Germany**
- **Polymer-free sirolimus-eluting stent** *versus* **placebo-coated bare metal stent**
- **161** patients with **IC** or **CLI**
- Lesion length **31+/-9mm** (1.3 stents/lesion, range 1-3)

# The DESTINY Study (2012)

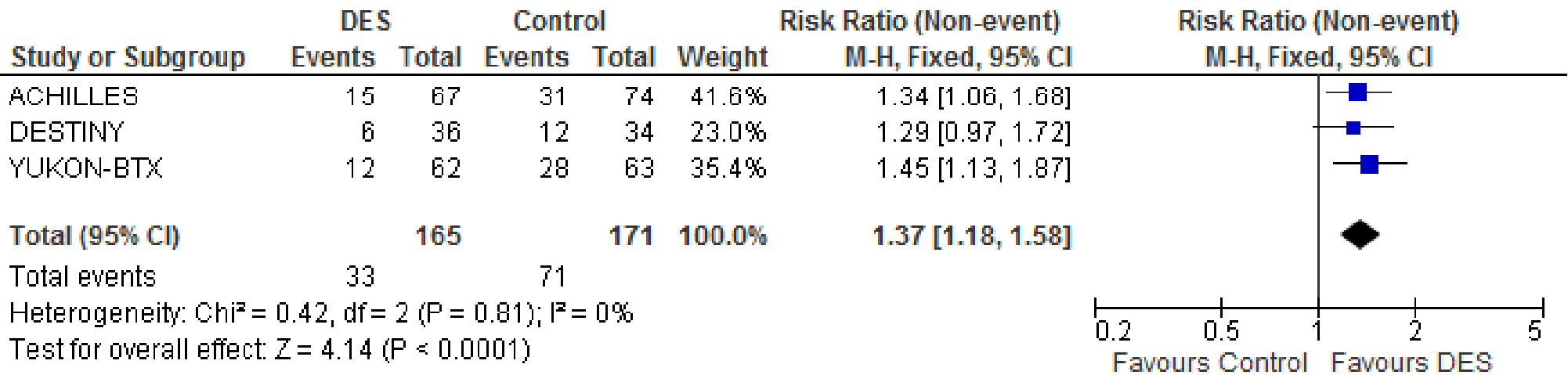
- Multicenter European RCT
- Company sponsored (ABBOTT)
- Xience V everolimus-eluting stent *versus*  
Multi-link Vision bare metal stent
- 140 patients with CLI (154 lesions)
- Lesion length 15.9 vs 18.9mm (3-40mm)

# The ACHILLES Study (2012)

- Multicenter European RCT
- Company sponsored (CORDIS)
- CYPHER sirolimus-eluting stent *versus* plain balloon angioplasty
- 200 patients with IC or CLI
- Lesion length  $27\pm 21$ mm (1.8 stents/lesion)

# Vessel restenosis >50%

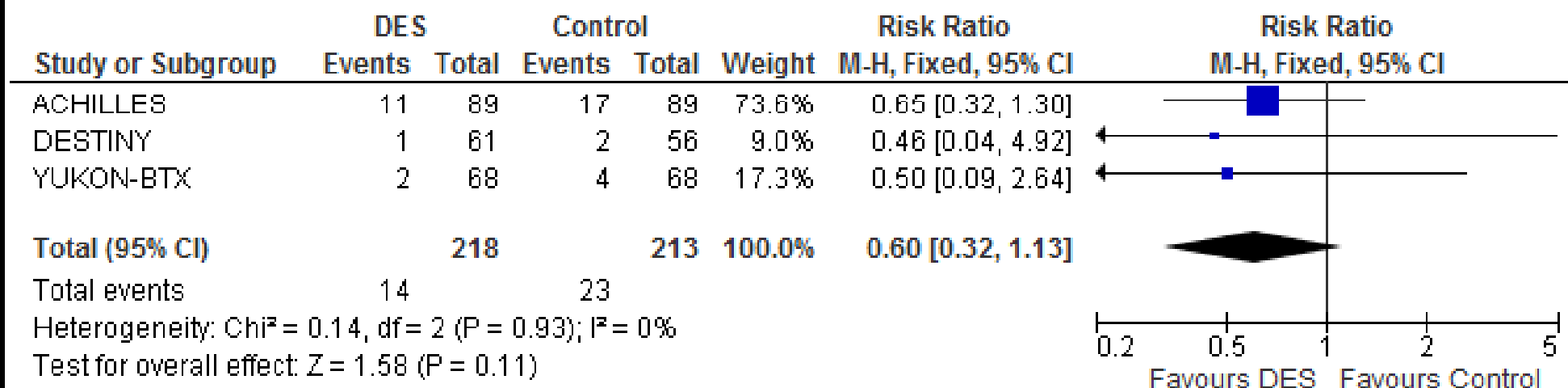
## Primary patency



	Pooled	95% CIs
Relative Risk Reduction	52%	31 – 66%
Absolute Risk Difference	-21%	(-31) – (-12)%
<b>Number-Needed-to-Treat</b>	<b>4.8</b>	<b>3.2 – 8.3</b>

# Limb amputations

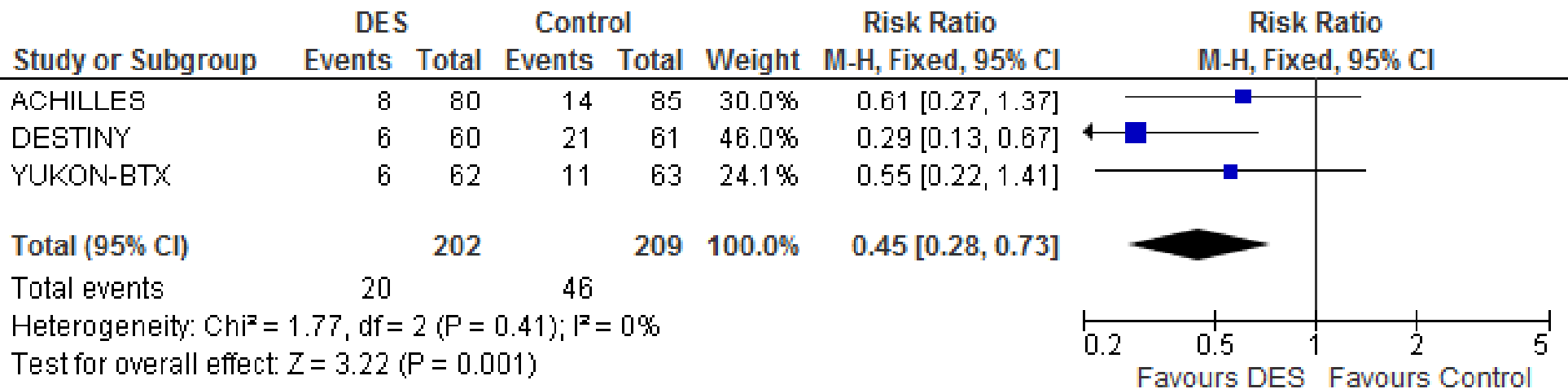
## Limb amputations



	Pooled	95% CIs
Relative Risk Reduction	40%	(-13) – 68%
Absolute Risk Difference	-4%	(-9) – (+1)%
Number-Needed-to-Treat	n/a	n/a

# Target lesion revascularization

## Target lesion revascularization

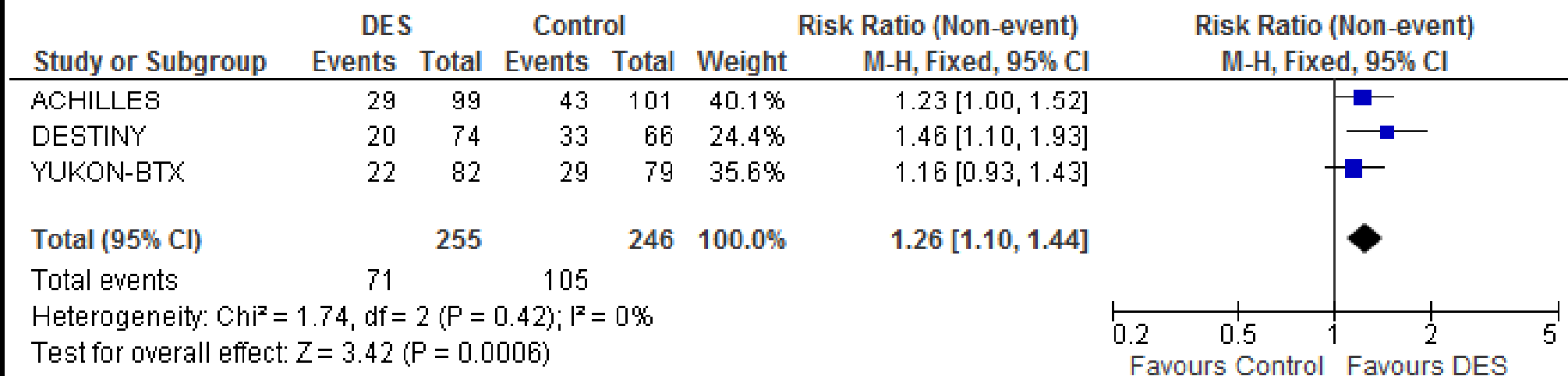


	Pooled	95% CIs
Relative Risk Reduction	55%	27 –72%
Absolute Risk Difference	-12%	(-19) – (-5)%
<b>Number-Needed-to-Treat</b>	<b>8.3</b>	<b>5.3 – 20.0</b>



# Event-free survival

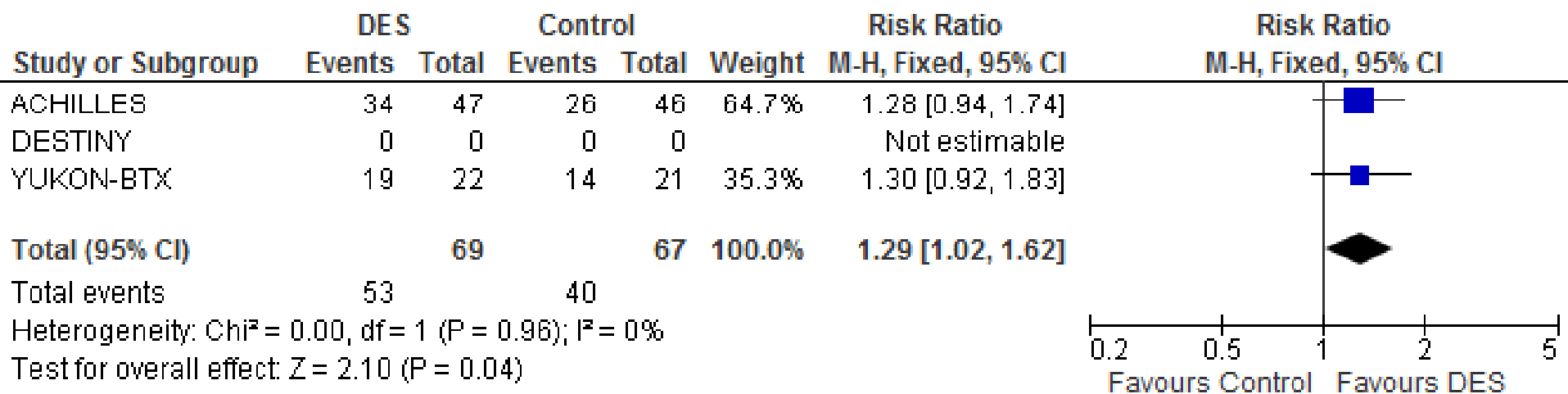
## Event-free survival



	Pooled	95% CIs
Relative Risk Increase	26%	10 – 44%
Absolute Risk Difference	15%	7 – 23%
<b>Number-Needed-to-Treat</b>	<b>6.7</b>	<b>4.4 – 14.3</b>

# Wound healing

## Wound healing



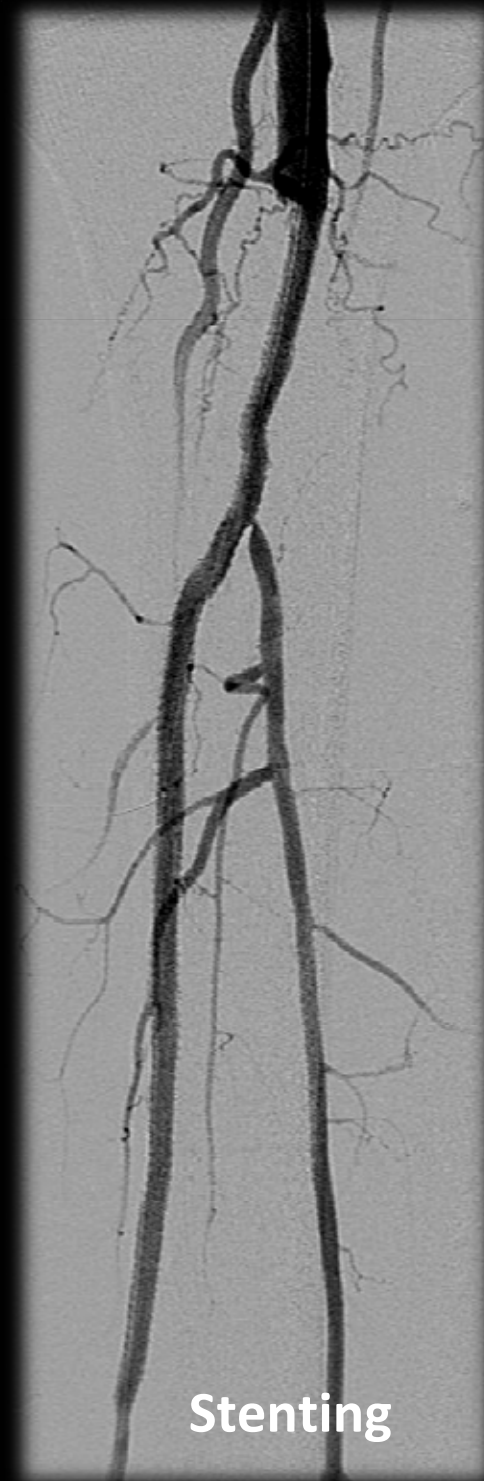
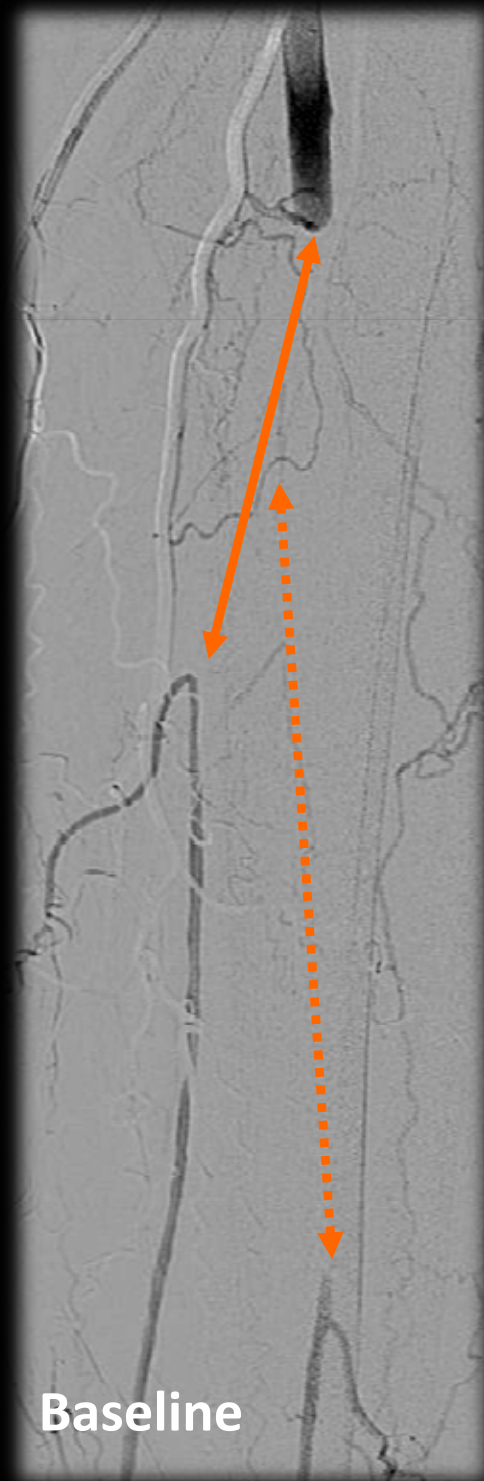
	Pooled	95% CIs
Relative Risk Increase	29%	2 – 62%
Absolute Risk Difference	17%	2 – 32%
<b>Number-Needed-to-Treat</b>	<b>5.9</b>	<b>3.1 – 50.0</b>

# Sum up

- **Level I-A** evidence for olimus-eluting stents for **FOCAL** infrapopliteal lesions
- DES **inhibit restenosis & reduce TLR**
- DES **improve wound healing & increase event-free survival**

CLI  
case  
study:

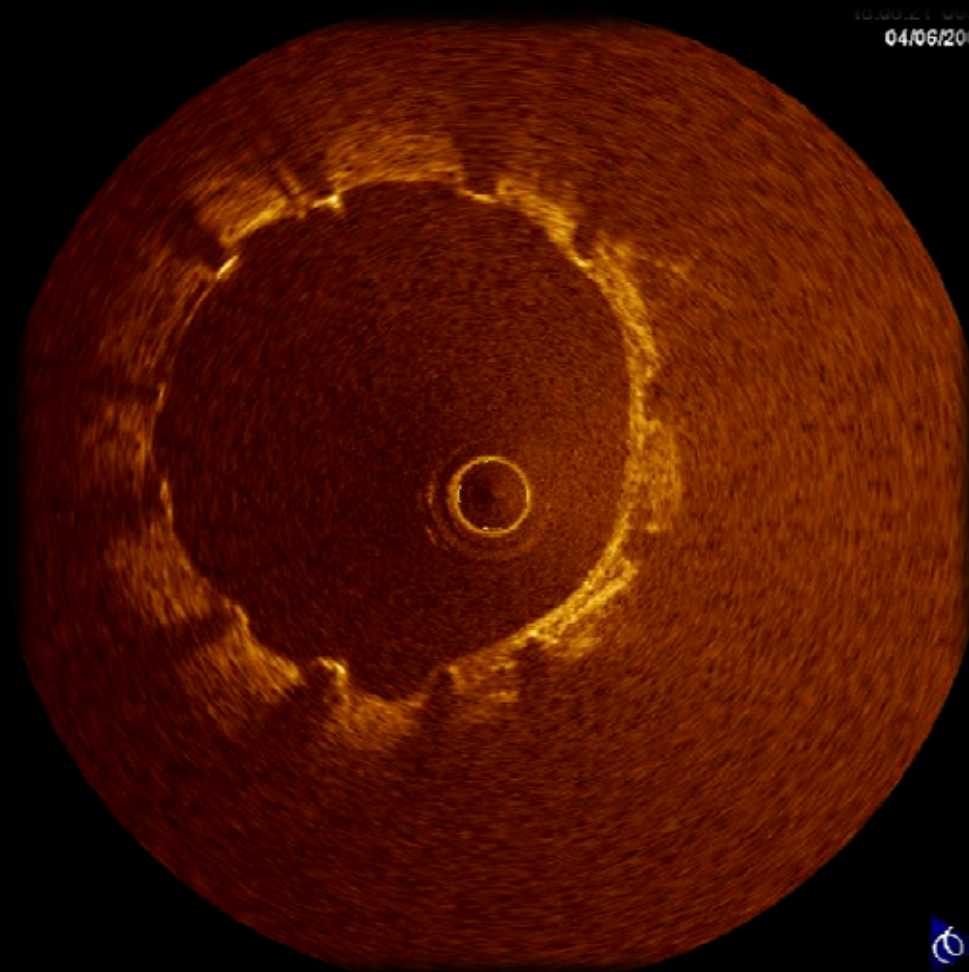
long  
metal  
jacket



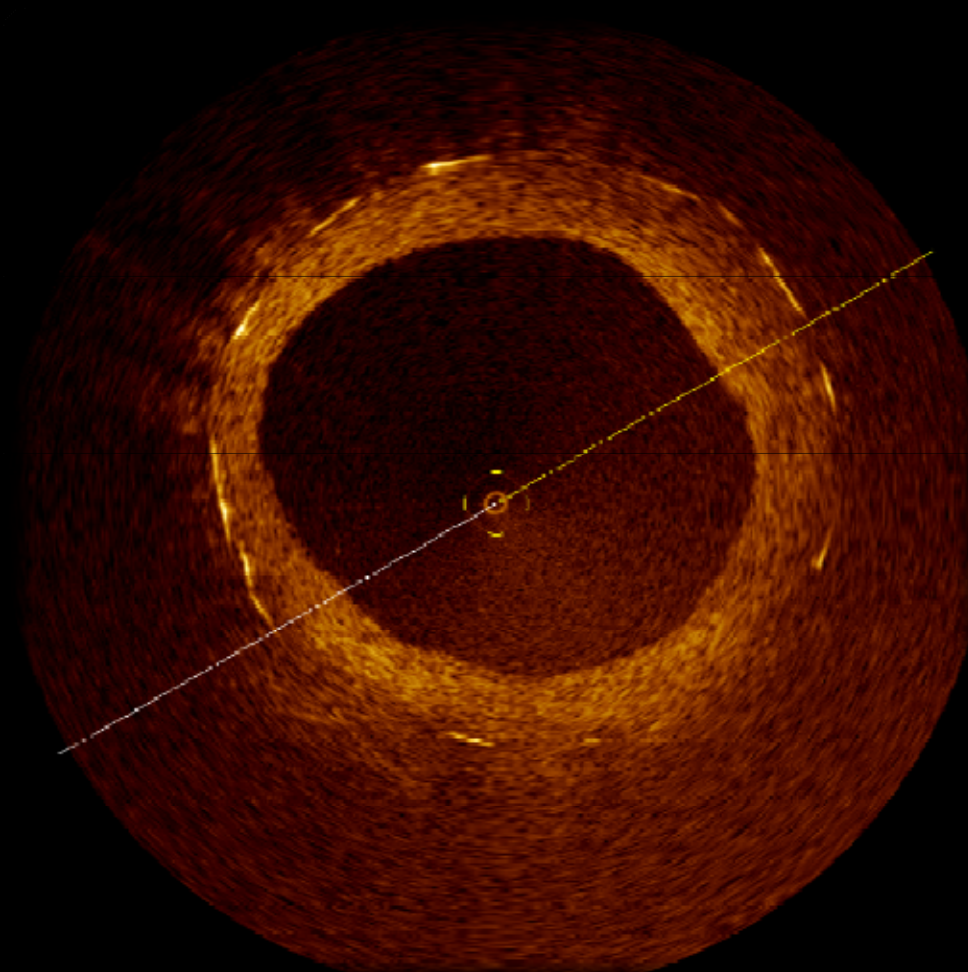
2-year  
follow-up



# Optical Coherence Tomography

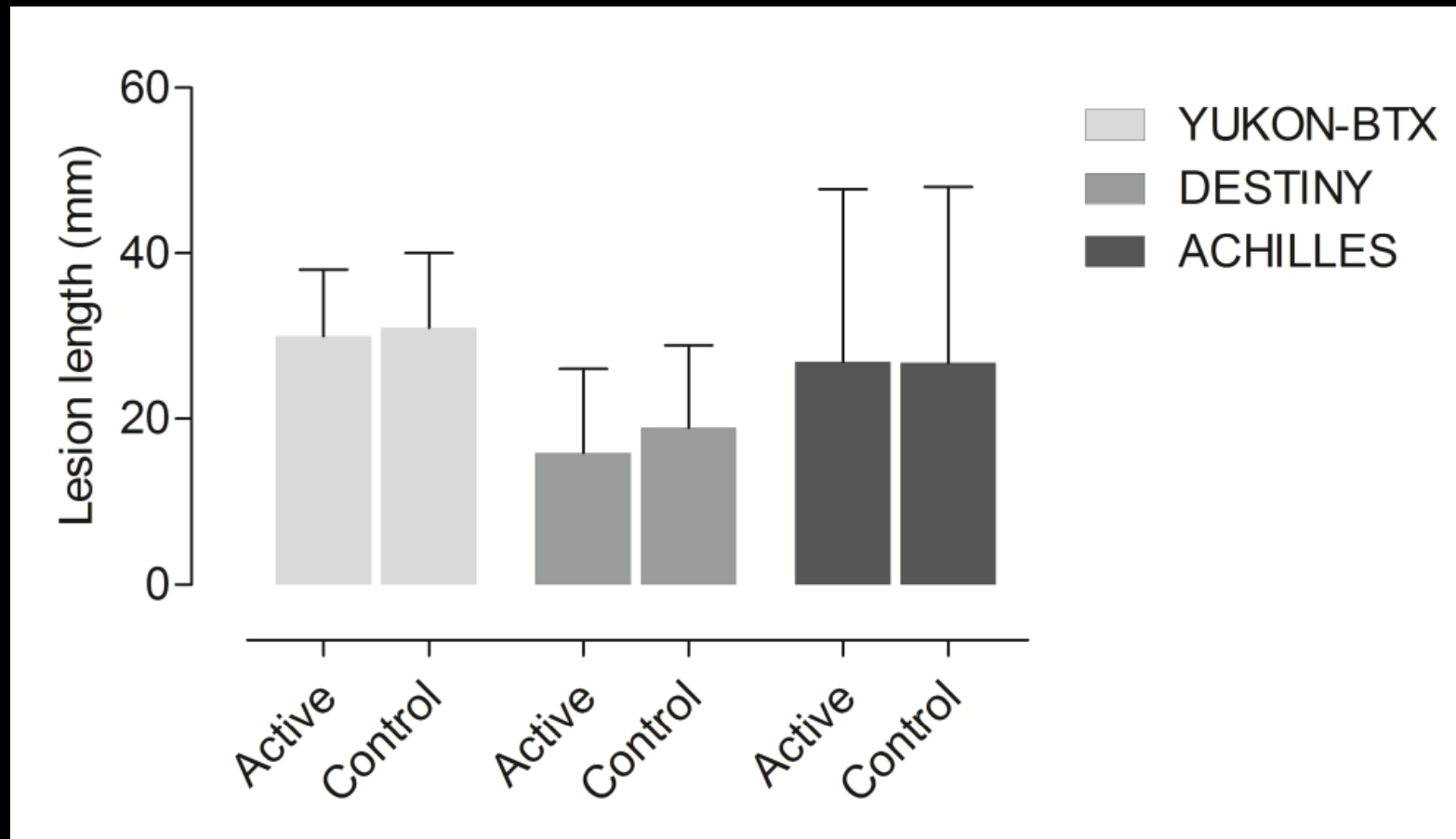


6 months

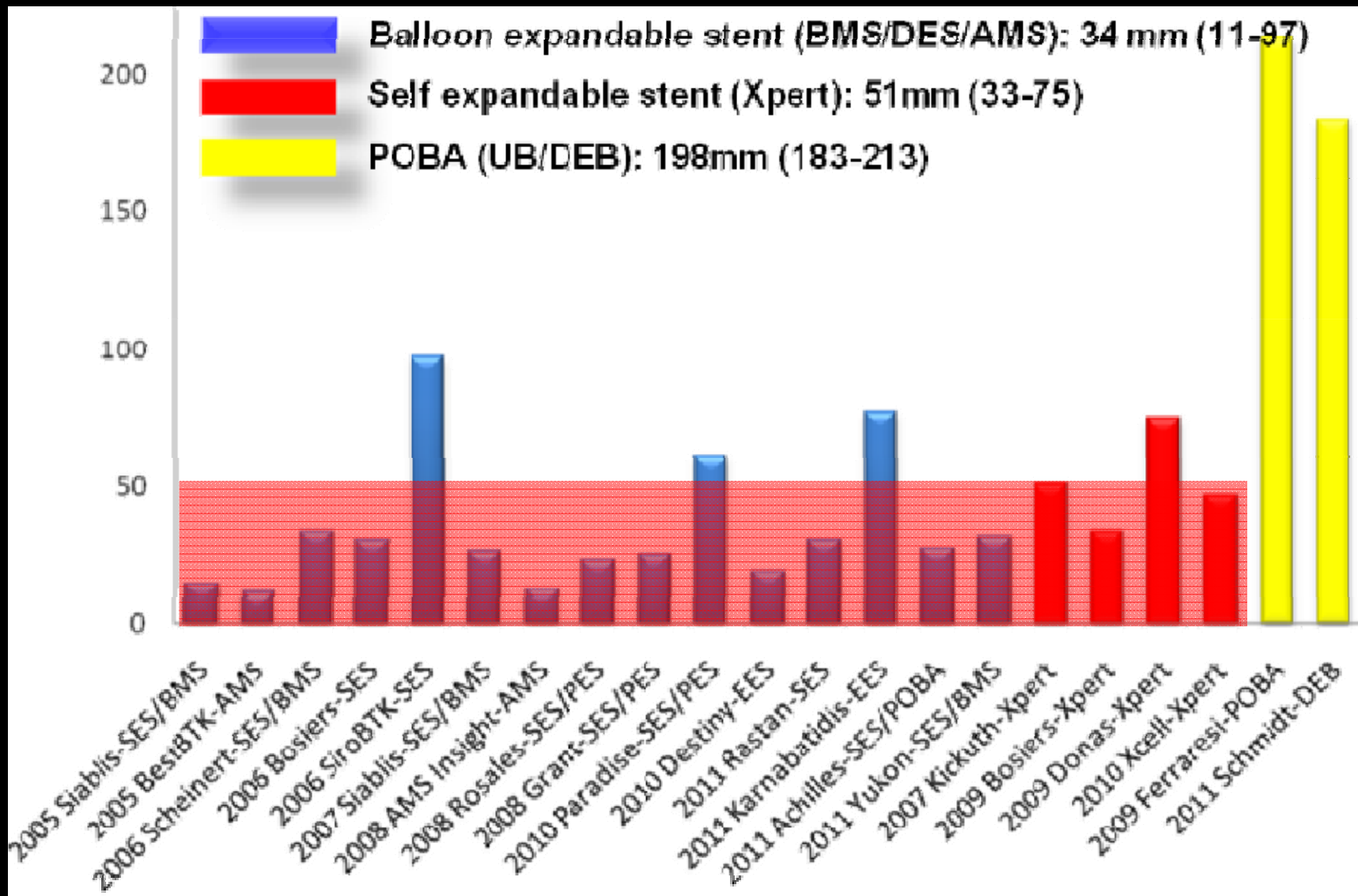


2 years

# Lesion length of 3 RCTs



# Length of BTK treated lesion





# First Experience With Drug-Eluting Balloons in Infrapopliteal Arteries

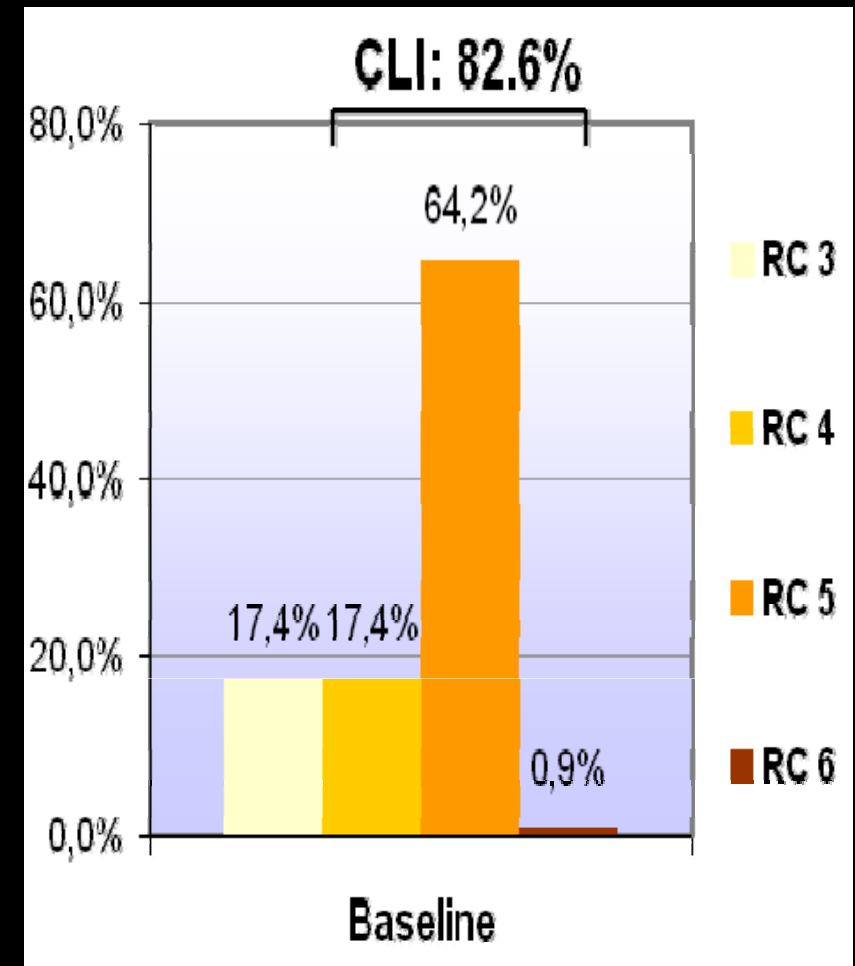
## Restenosis Rate and Clinical Outcome

Andrej Schmidt, MD,\* Michael Piorkowski, MD,\* Martin Werner, MD,\* Matthias Ulrich, MD,\*  
Yvonne Bausback, MD,\* Sven Bräunlich, MD,\* Henrik Ick, MD,\* Johannes Schuster, MD,\*  
Spiridon Botsios, MD,\* Hans-Joachim Kruse, MD,† Ramon L. Varcoe, MD,‡ Dierk Scheinert, MD\*  
*Leipzig and Zschopau, Germany; and Sydney, Australia*

<b>Objectives</b>	The purpose of this study was to investigate the efficacy of drug-eluting balloons (DEBs) in the treatment of long infrapopliteal lesions with regard to the short-term restenosis rate and midterm clinical result.
<b>Background</b>	Restenosis rates of long-segment tibial artery disease are very high. Recently, a restenosis rate of 69% at 3 months after standard balloon angioplasty was demonstrated.
<b>Methods</b>	Infrapopliteal angioplasty was performed with a paclitaxel-eluting balloon (In.Pact Amphirion, Medtronic, Minneapolis, Minnesota). Clinical and angiographic follow-up was performed at 3 months to detect binary restenosis, and further clinical assessment was performed over a 12-month period thereafter.
<b>Results</b>	In 104 patients, 109 limbs were treated for critical limb ischemia (82.6%) or severe claudication (17.4%). Mean lesion length of the arteries treated was $176 \pm 88$ mm. Angiography studied in 84 treated arteries at 3 months showed a restenosis in 27.4% (19.1% had restenosis of more than 50%, and 8.3% were totally occluded) and usually occurred focally. Only in 9.5% of all angiographically followed up arteries was the entire treated segment restenosed or reoccluded. During a follow-up period of $378 \pm 65$ days, 1 patient was lost and 17 died. Of the 91 limbs remaining in the analysis, clinical improvement was present in 83 (91.2%). Complete wound healing occurred in 74.2%, whereas major amputation occurred in 4 patients, resulting in limb salvage of 95.6% for patients with critical limb ischemia.
<b>Conclusions</b>	The early restenosis rate of long-segment infrapopliteal disease is significantly lower after treatment with DEBs compared with historical data using uncoated balloons. Randomized trials are required to show whether this difference will lead to improvement in clinical outcomes. (J Am Coll Cardiol 2011;58:1105–9) © 2011 by the American College of Cardiology Foundation

# Below-the-knee DEB

<b>Study type</b>	Prospective single center, single arm, investigator initiated study
<b>Objective</b>	Assess <b>IN.PACT Amphirion™</b> efficacy for the treatment of long BTK lesions occlusions
<b>Population</b>	Symptomatic patients with CLI or severe claudication
<b>Eligibility</b>	At least one lesion BTK $\geq$ 80 mm
<b>Primary Endpoint</b>	3 month restenosis rate
<b>Nr of patients</b>	104 / 109 limbs



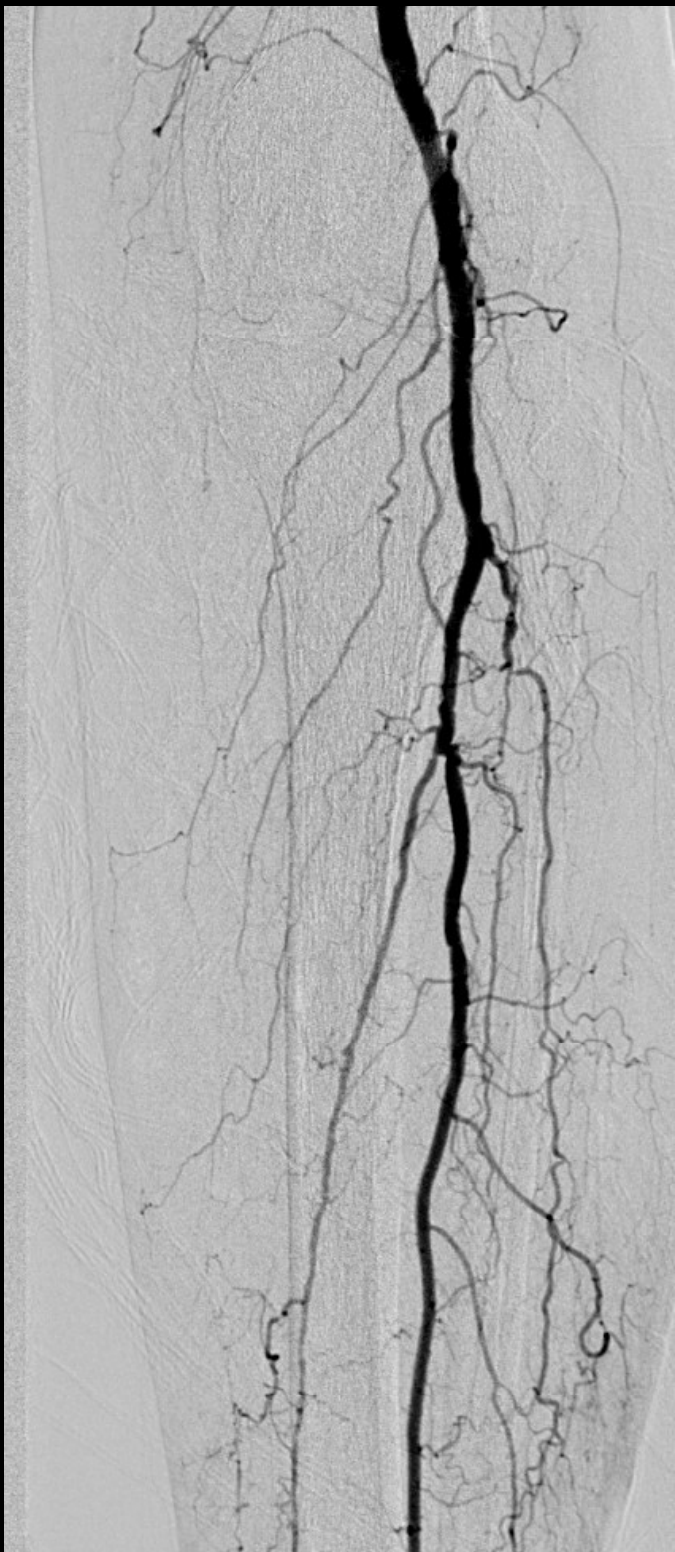
# Below-the-knee DEB

	<b>DEB</b> (angio subgroup)	<b>DEB</b> (angio subgroup)
# patients / limbs	74 / 79	<b>3m Ang. FU</b>
Male gender	51 (68.9%)	<b>Restenosis (&gt;50%) 27.4%</b>
mean age (y)	73.5 ± 9.3	<b>Full-segment Resten. 10%</b>
diabetics	54 (73%)	<b>Restenosis Length 64 mm</b>
Renal insuff.	34 (45.9%)	<b>12m Clinical FU</b>
RC 3	16 (20.3%)	<b>Deaths 16.3%</b>
RC 4	14 (17.7%)	<b>Limb Salvage 95.6%</b>
RC 5	49 (62%)	<b>Clinical Improvement 91.2%</b>
RC 6	0 (0%)	<b>Compl. wound healing 74.2%</b>
avg lesion length	173 ± 87 mm	<b>TLR 17.3%</b>
Tot occlusions	61.9%	

# Below-the-knee DEB vs. historical cohort

	<b>DEB</b> (angio subgroup)	<b>PTA*</b> (historical group)
# patients / limbs	74 / 79	58 / 62
Male gender	51 (68.9%)	38 (65.5%)
mean age (y)	73.5 ± 9.3	70.5 ± 8.08
diabetics	54 (73%)	52 (89.7%)
Renal insuff.	34 (45.9%)	30 (51.7%)
RC 3	16 (20.3%)	0 (0%)
RC 4	14 (17.7%)	16 (25.8%)
RC 5	49 (62%)	46 (74.2%)
RC 6	0 (0%)	0 (0%)
avg lesion length	<b>173 ± 87 mm</b>	<b>183 ± 75 mm</b>
Tot occlusions	61.9%	64.9%

	<b>DEB</b> (angio subgroup)	<b>PTA*</b> (historical group)
<b>3m Angiographic FU</b>		
<b>Restenosis (&gt;50%)</b>	<b>27.4%</b>	<b>69%</b>
<b>Full-segment Resten.</b>	<b>10%</b>	<b>56%</b>
<b>Restenosis Length</b>	<b>64 mm</b>	<b>155 mm</b>
<b>12m Clinical FU      15m Clinical FU</b>		
Deaths	16.3%	10.5%
Limb Salvage	95.6%	100%
Clinical Improvement <sup>(1)</sup>	91.2%	76.5%
Compl. wound healing	74.2%	78.6%
TLR	17.3%	50%







# BTK algorithm

Focal  
Lesions

- DES ✓
- Level I-A

Long  
Lesions

- DCB ?
- Level II-B



# Conclusions (I)

- ❖ Infrapopliteal drug-eluting stents inhibit restenosis and reduce repeat procedures
- ❖ Infrapopliteal drug-eluting stents significantly improve overall patient event-free survival

## Conclusions (II)

- ❖ Infrapopliteal drug-eluting stents are indicated for spot stenting of focal below-the-knee lesions or as bail-out
- ❖ Infrapopliteal drug-eluting balloons might have a role for long lesions to avoid permanent metal scaffolds



Thank You