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What is best Solution for ISR after SFA stenting:

Redo PTA (POBA), Drugcoated balloons (DEB) or Stent-Grafts ?

2 year results of the RELINE trial comparing Viabahn stent-grafts to POBA

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Disclosure slide

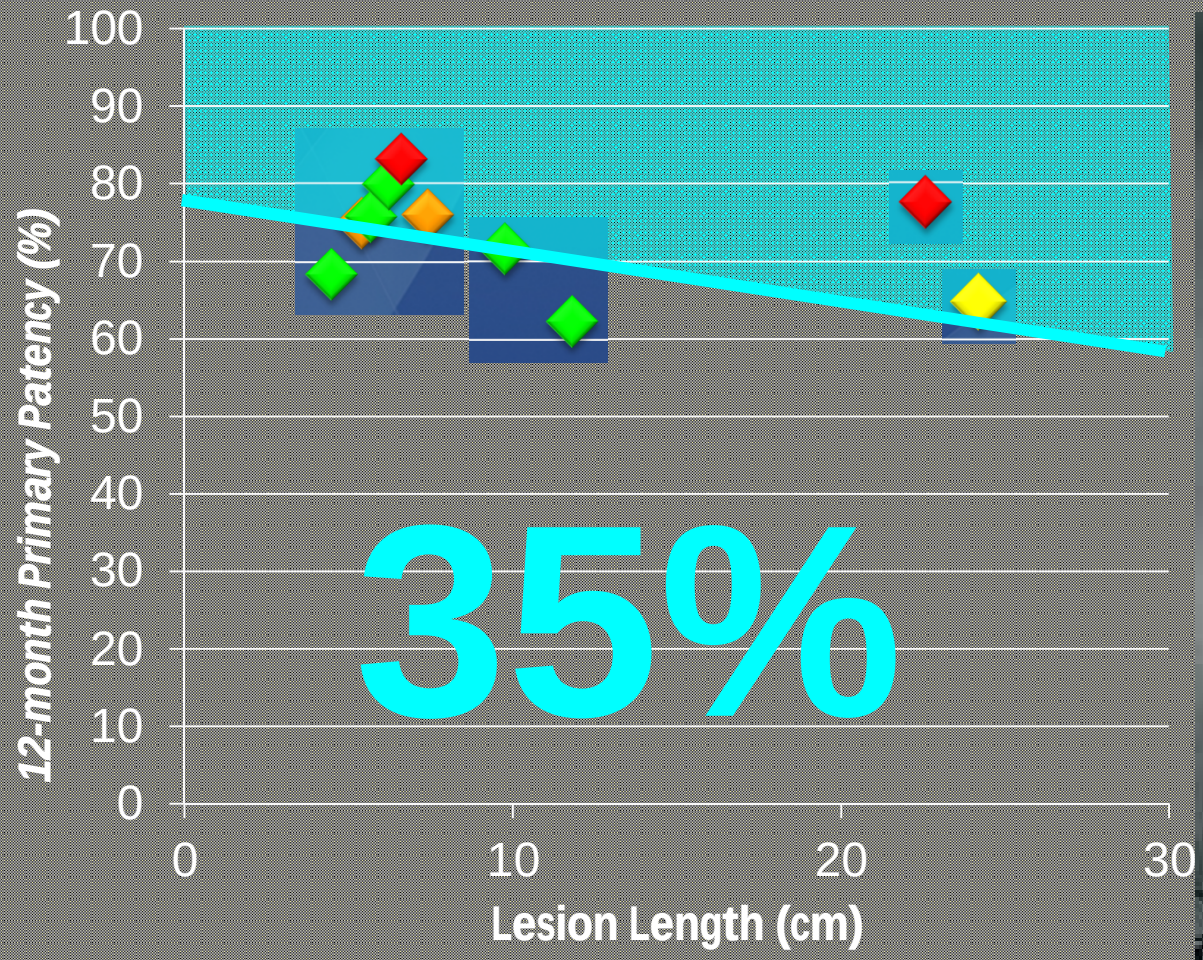
Speaker name: Koen Keirse, MD

☐ I have the following potential conflicts of interest to report:

- ☐ Consulting
- ☐ Employment in industry
- ☐ Stockholder of a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)

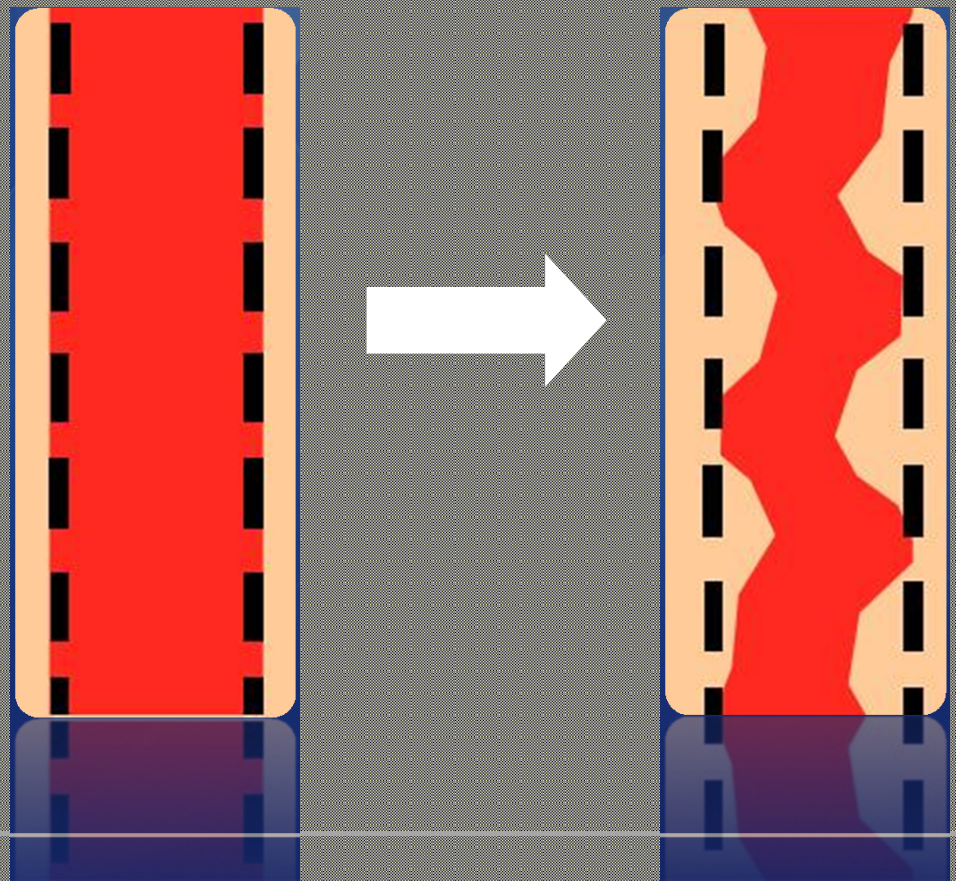
☑ I do not have any potential conflict of interest

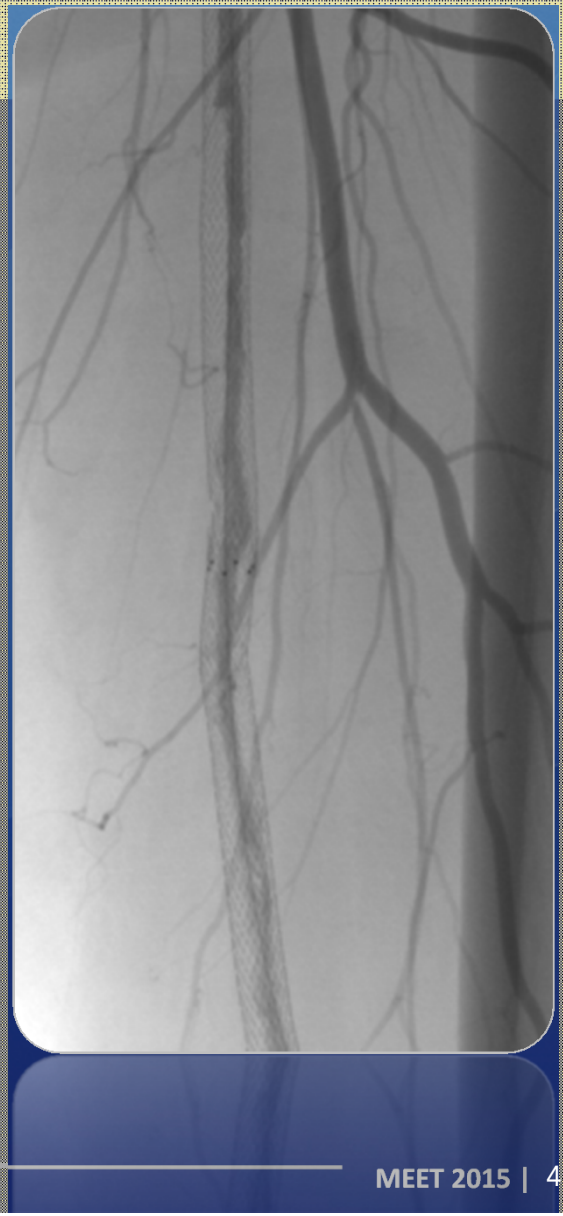
Results with modern angioplasty/stent technology in the SFA

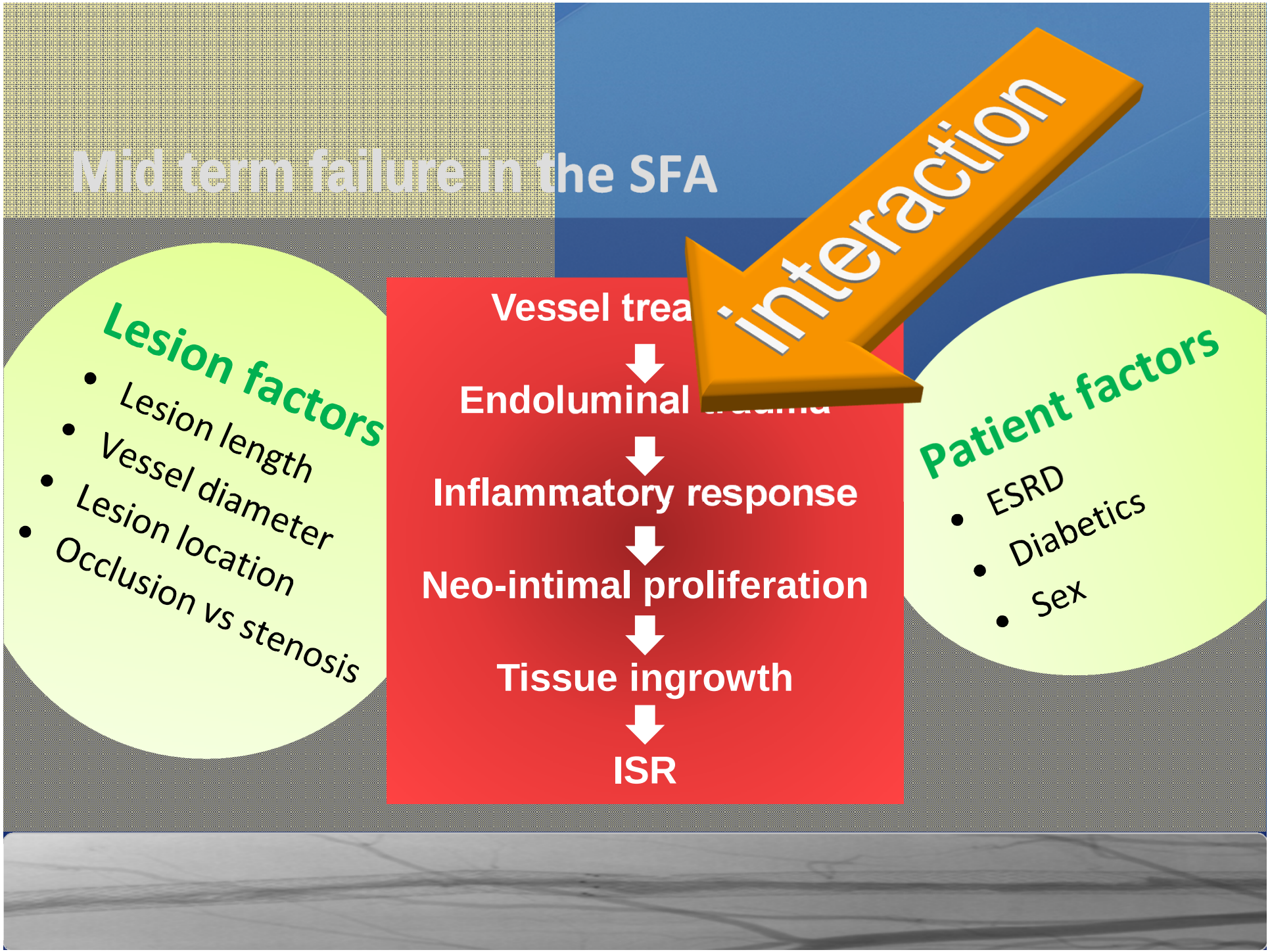


Neointimal Hyperplasia

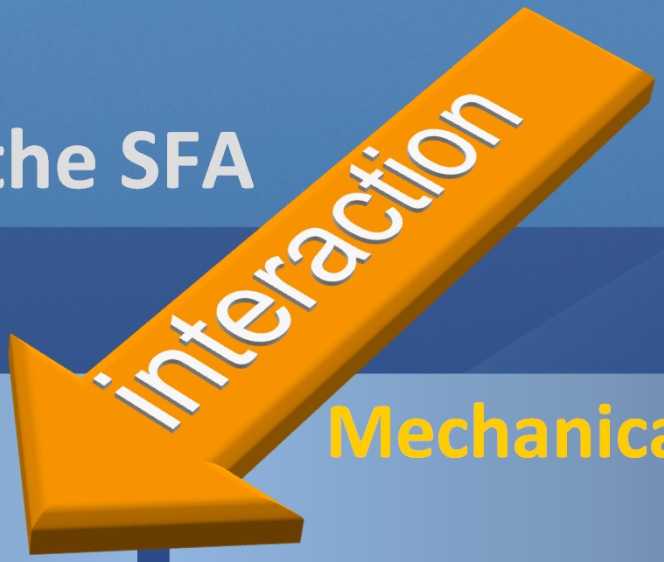
- Achilles' heel of SFA stenting






Mid term failure in the SFA
Lesion factors
Lesion length
Vessel diameter
Lesion location
Occlusion vs stenosis
Vessel trea
Endoluminal
Inflammatory response
Neo-intimal proliferation
Tissue ingrowth
ISR
Interaction
Patient factors
ESRD
Diabetics
Sex

Mid term failure in the SFA



Chemical block

Inhibiting smooth muscle cell migration and proliferation

DEB

DES

Mechanical block

Creating physical barrier &

Remove the stimulus for ISR from the equation

Covered stents

What is the best current treatment for in-stent re-stenosis?

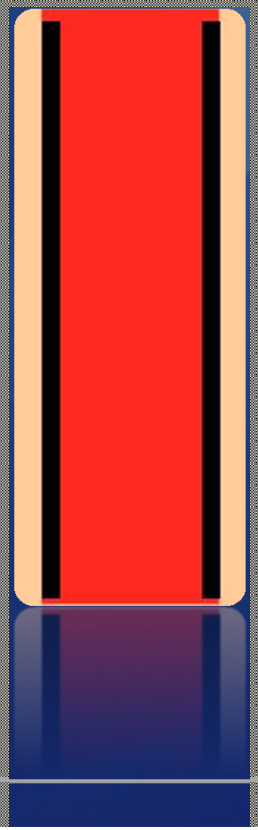
Results in the literature on ISR

	Primary Patency	Period
Balloons		
Cryoballoon	0%	12 months
PTA	27%	6 months
Cutting Balloon	35%	6 months
Atherectomy		
Mechanical (Rotarex)	26%	13 months
Mechanical (SilverHawk)	50%	18 months
Laser	No data – registry in progress	
BMS	No data	
DCB	No data - studies in progress	
DES (Zilver PTX)	76% Freedom from TLR	12 months

What about stent-grafts for in-stent restenosis ?

Stent-Grafts to Prevent Neointimal Hyperplasia …?

Mechanical Barrier



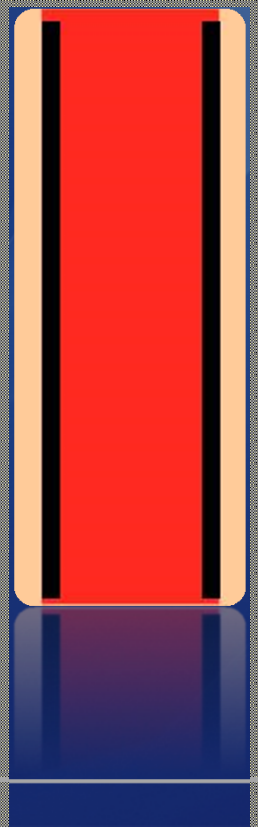
New generation Gore Viabahn endoprosthesis

Original stimulus for stenosis removed from the equation

Pore size provides a barrier to tissue ingrowth

Stent-Grafts to Prevent Neointimal Hyperplasia …?

Mechanical Barrier



New generation Gore Viabahn endoprosthesis

Original stimulus for stenosis removed from the equation

Pore size provides a barrier to tissue ingrowth

Endoprosthesis for ISR

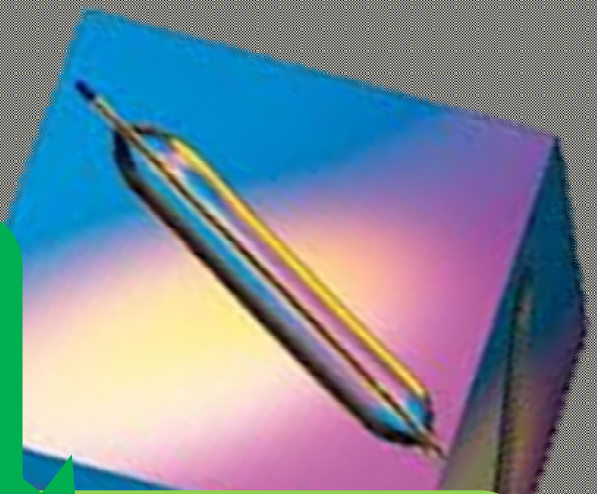
Literature results

	N° of patients	Average lesion length	Primary patency
Kazemi TCT 2006	17	15 cm	65% @12M
Ansel EVT 2007	27	26 cm	52% @18M
Soukas 2011	27	24.5 cm	85.1% @12M
Monahan JVS 2011	24	N/A	62% @12M

-> non-randomized, single center data

The RELINE Trial

Prospective, randomized, multicenter trial



1:1 randomization
83 patients*
Rutherford 2-5

39
VIABAHN
Endo**prost**hesis

44
PTA alone

* After Protocol Deviations were excluded

The RELINE Trial: Endpoints

- **Primary patency at 12 months**
  - no evidence of restenosis or occlusion within the originally treated lesion based on color-flow duplex ultrasound (CFDU) measuring a peak systolic velocity ratio ≤2.5 and without target lesion revascularization (TLR) within 12 months

- **Primary Patency at 24 months**
  - No evidence of restenosis/occlusion within the treated lesion based on CFDU (peak systolic velocity ratio ≤2.5) & without TLR within 24 months

The RELINE Trial: Key inclusion criteria

- **Rutherford classification from 2 to 5**
- Ankle-brachial index ≤ 0.8
- Restenotic or reoccluded lesion located **in a stent (implanted > 30 days)** in the **superficial femoral artery**
- Total target lesion length **between 4 and 27 cm** (comprising in-stent restenosis and adjacent stenotic disease)

The RELINE Trial: Patient demographics

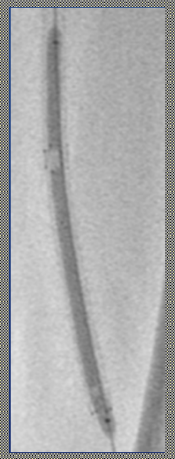
Characteristic	VIABAHN ISR N=39	PTA N=44	p-value
General			
Male *(%)*	29 *(74.4%)*	32 *(72.7%)*	0.853
Female *(%)*	10 *(25.6%)*	12 *(27.3%)*	
Age *(min – max; ±SD)*	67.69 *(49 – 86; 9.77)*	68.98 *(48 – 86; 9.71)*	0.791
Rutherford categorization			
Claudication (R 2-3) *(%)*	34 *(87.2%)*	36 *(81.8%)*	0.508
Critical Limb Ischemia (R 4-5) *(%)*	5 *(12.8%)*	8 *(18.2%)*	
Rutherford 2 *(%)*	12 *(30.8%)*	5 *(11.4%)*	0.065
Rutherford 3 *(%)*	22 *(56.4%)*	30 *(68.2%)*	
Rutherford 4 *(%)*	4 *(10.3%)*	3 *(6.8%)*	
Rutherford 5 *(%)*	1 *(2.6%)*	6 *(13.6%)*	

The RELINE Trial: Patient demographics

Characteristic		VIABAHN ISR N=39	PTA N=44	p-value
Medical history				
Nicotine abuse	Never	13 *(33.3%)*	12 *(27.3%)*	
	Current	16 *(41.0%)*	16 *(36.4%)*	0.569
	Previous	10 *(25.6%)*	16 *(36.4%)*	
Hypertension	No	12 *(30.8%)*	16 *(36.4%)*	
	Yes, medically treated	26 *(66.7%)*	27 *(61.4%)*	0.865
	Yes, not medically treated	1 *(2.6%)*	1 *(2.3%)*	
Diabetes Mellitus	No	26 *(66.7%)*	28 *(63.6%)*	
	Yes, insulin dependent	6 *(15.4%)*	7 *(15.9%)*	0.951
	Yes, non-insulin dependent	7 *(17.9%)*	9 *(20.5%)*	
Renal insufficiency	No	37 *(94.9%)*	41 *(93.2%)*	0.889
	Yes	2 *(5.1%)*	3 *(6.8%)*	
Hypercholesterolemia	No	22 *(56.4%)*	15 *(34.1%)*	0.069
	Yes	17 *(43.6%)*	29 *(65.9%)*	
Obesity	No	28 *(71.8%)*	33 *(75.0%)*	0.935
	Yes	11 *(28.2%)*	11 *(25.0%)*	

The RELINE Trial: Lesion characteristics

PTA (N=44)	
Avg lesion length	190 (30-270)*
stenosis (pre)	75.0 %
chronic occlusion	25.0 %
acute occlusion	0.0 %
Calcified lesion	25.0 %**



9 bail-out procedures after failed PTA

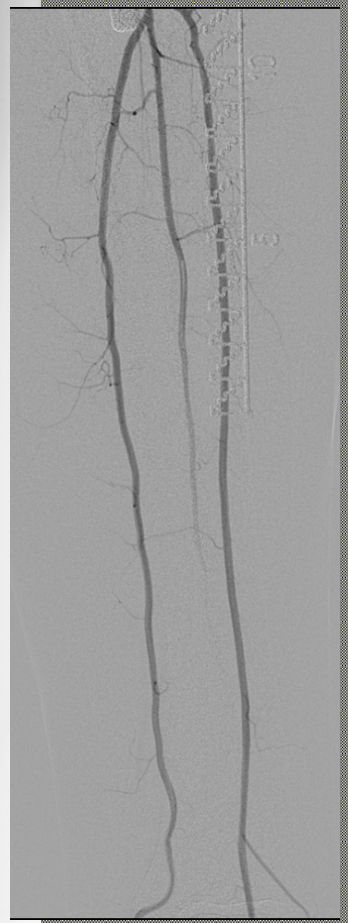
Viabahn (N=39)	
Avg lesion length	173 (30-330)
stenosis (pre)	76.9 %
chronic occlusion	20.5 %
acute occlusion	2.6 %
Calcified lesion	33.3%

* Missing data of 3 patients
** Missing data of 1 patient

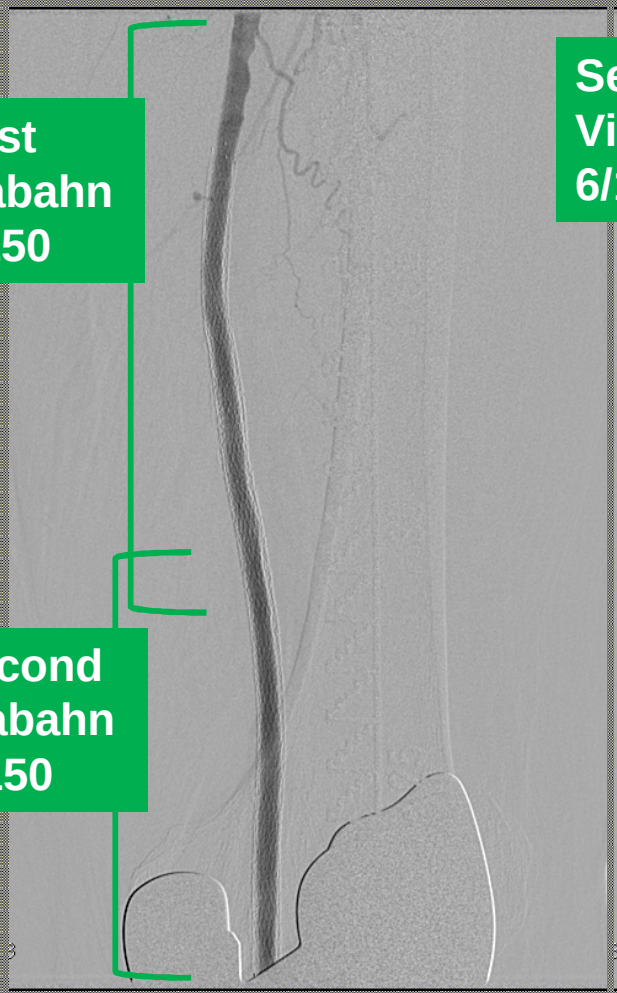
Viabahn: pre-op

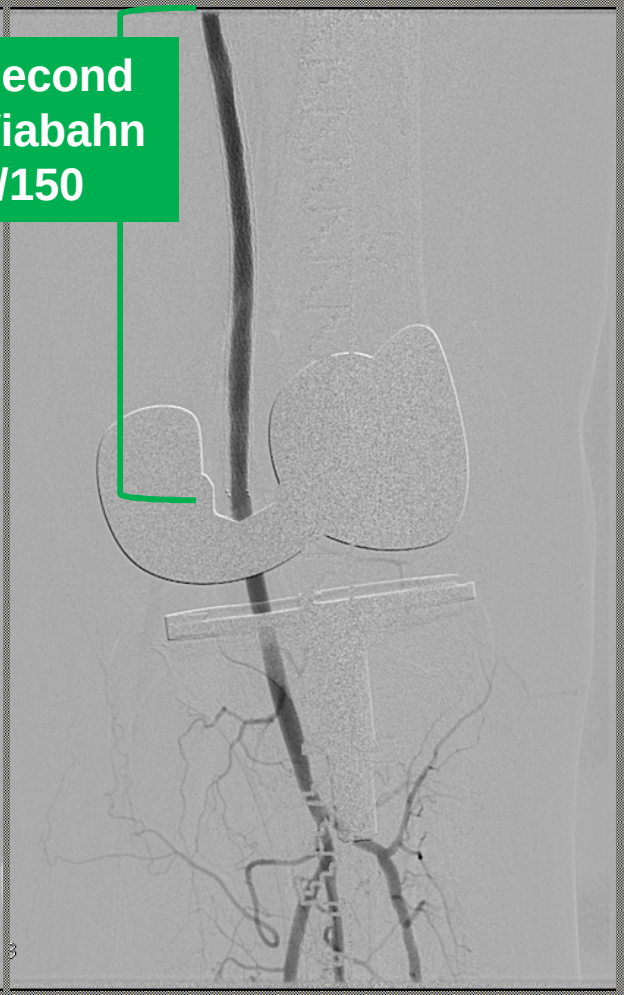
90% in-stent restenosis of 180mm

outflow



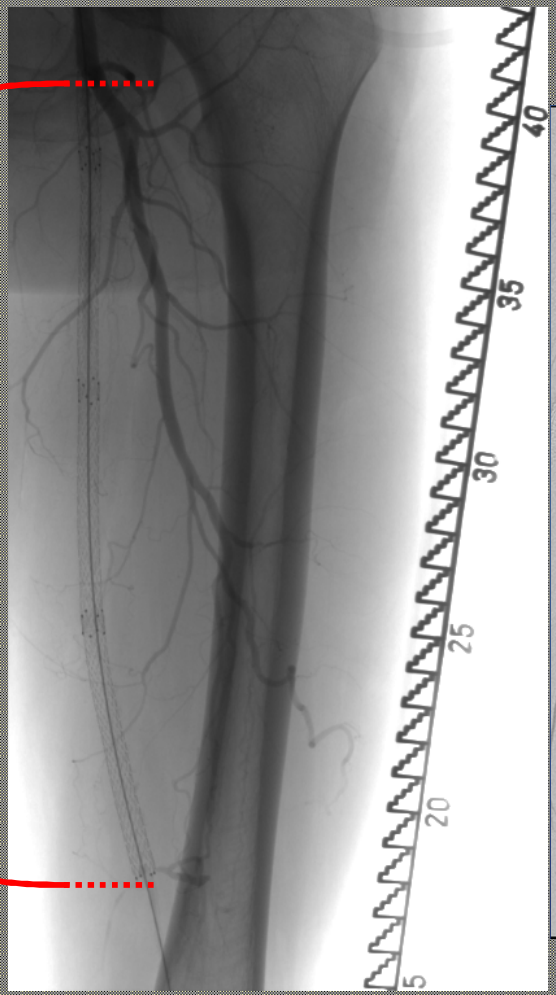
Viabahn: post-op





PTA: pre-op

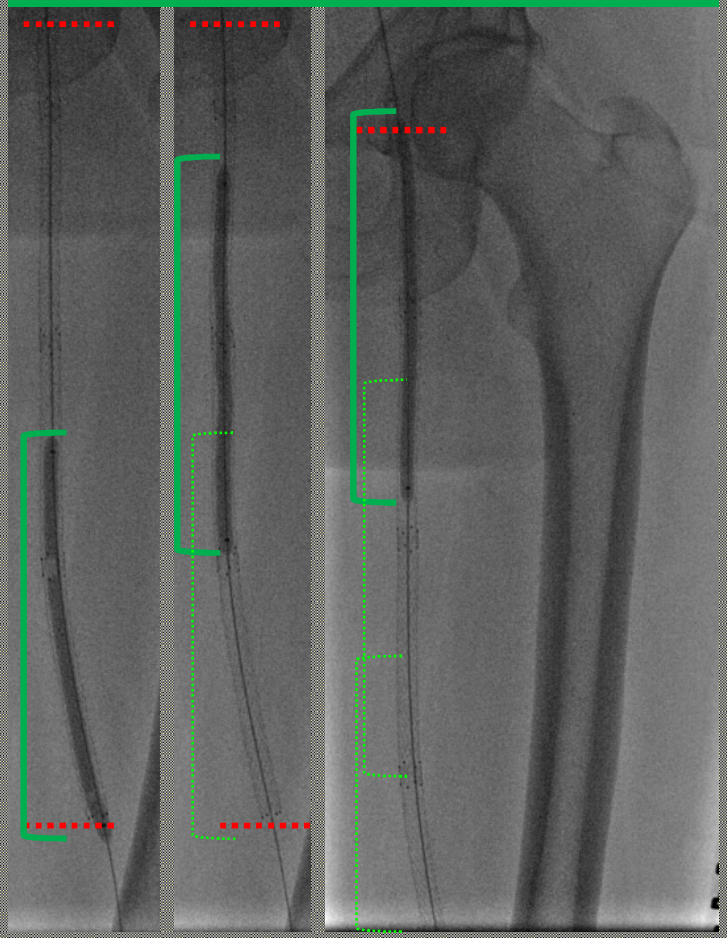
100% in-stent restenosis of 220mm



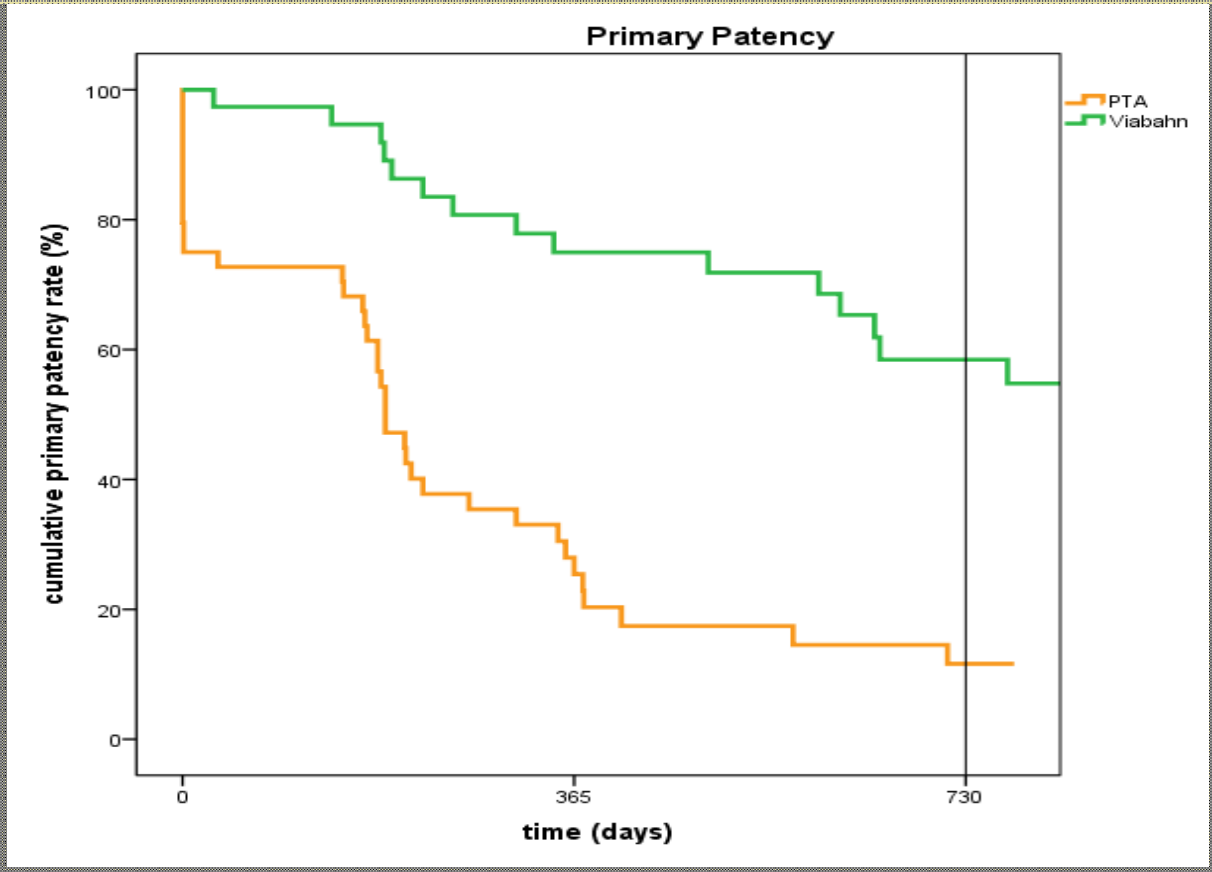
outflow

PTA: dilation & post-op

3 inflations with a 5.0/102 FoxCross balloon



The RELINE trial:
24M Primary Patency: VIABAHN vs. PTA



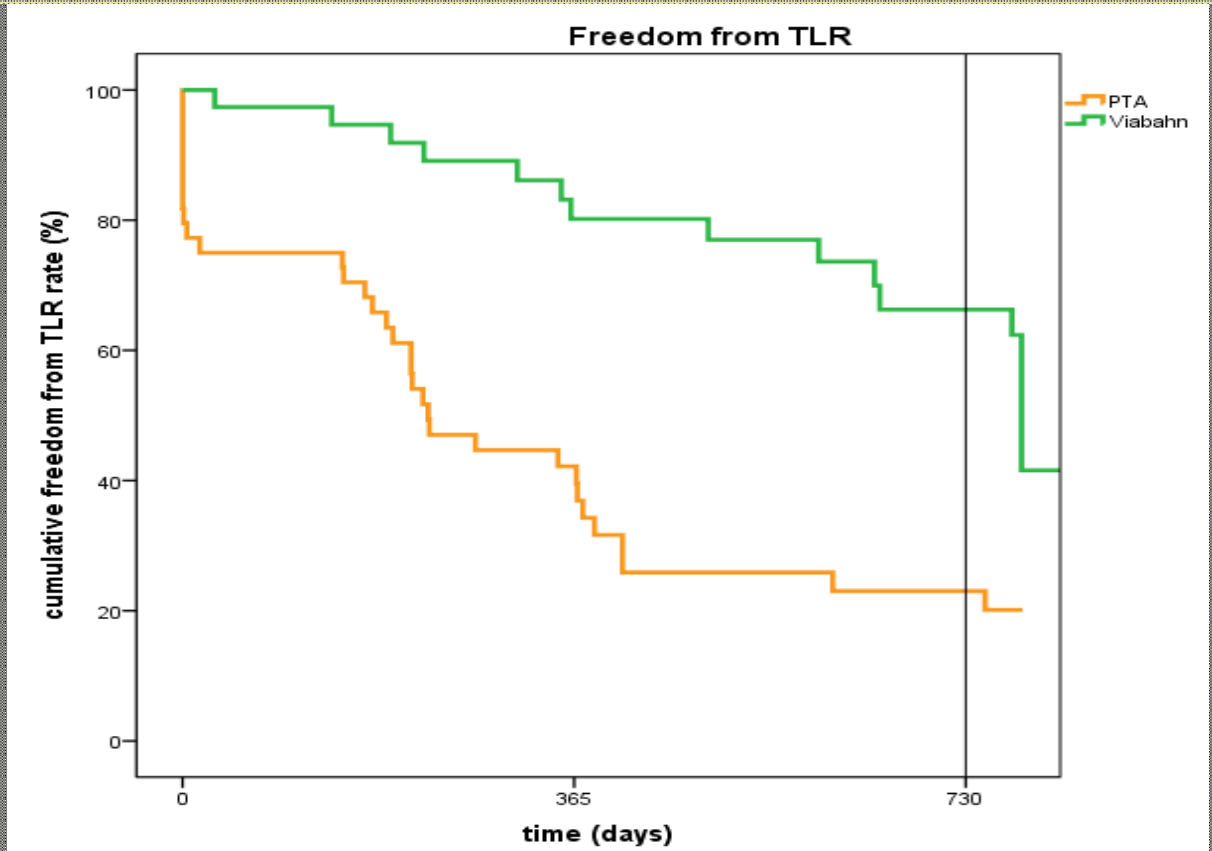
58.4 %

11.6 %

p<0.001

Number at risk	baseline	1MFU	6MFU	12MFU	24MFU
PTA	44	33	26	11	4
Viabahn	39	37	35	26	16

The RELINE trial:
24M Freedom from TLR: VIABAHN *vs.* PTA



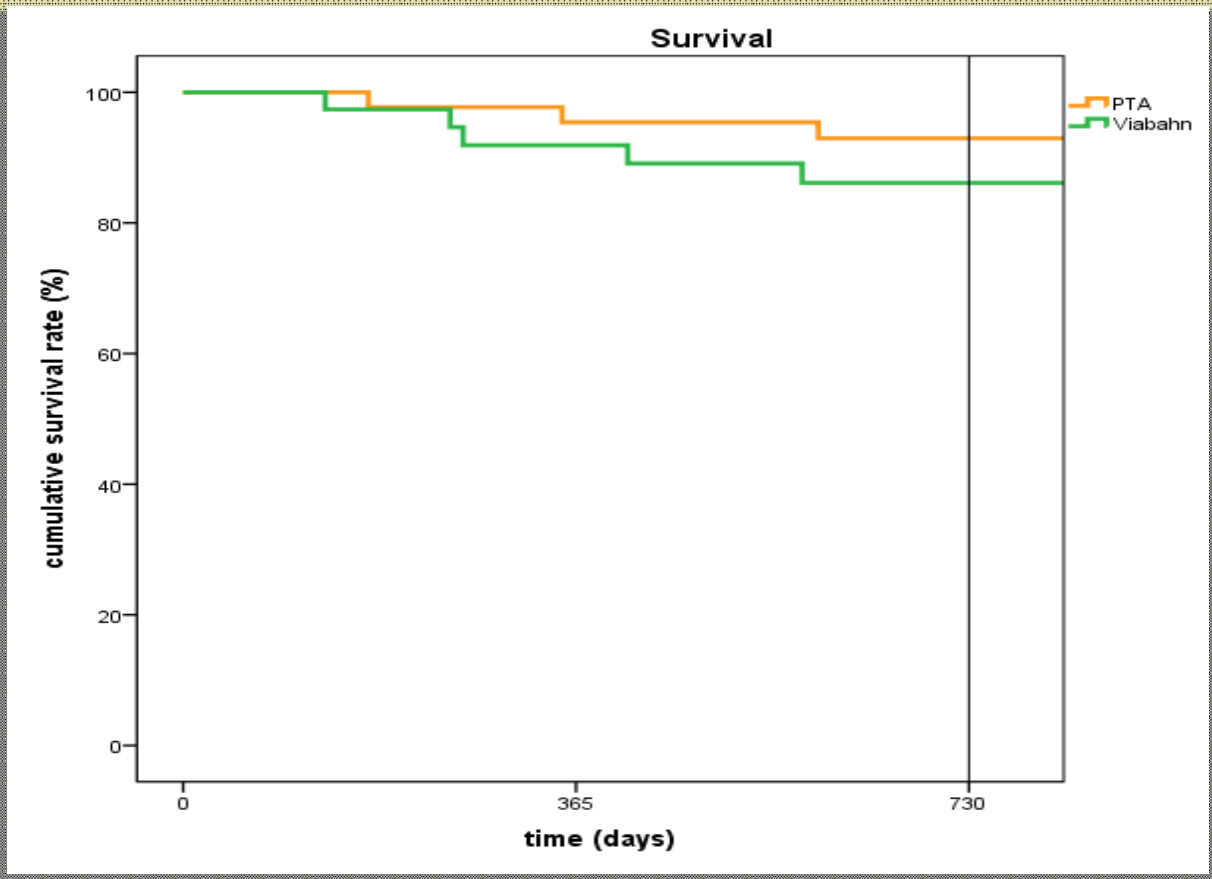
66.3 %

23.0 %

p<0.001

Number at risk	baseline	1MFU	6MFU	12MFU	24MFU
PTA	44	33	28	16	8
Viabahn	39	38	35	27	17

The RELINE trial:
24M Survival: VIABAHN vs. PTA



93.0 %

86.1 %

p=0.316

Number at risk	baseline	1MFU	6MFU	12MFU	24MFU
PTA	44	44	43	41	36
Viabahn	39	38	37	33	25

CONCLUSION

- ISR is the Achilles heel of the current SFA treatment.
- There is some evidence that chemical solutions are valuable in the battle against ISR.
- The RELINE results prove that a mechanical barrier (like the Viabahn stentgraft) against tissue ingrowth is also a promising tool for treatment of in-stent restenosis.