

# Stent Selection for Peripheral Procedures- Drug Eluting, Standard Nitinol, or Woven Nitinol?

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PNEC

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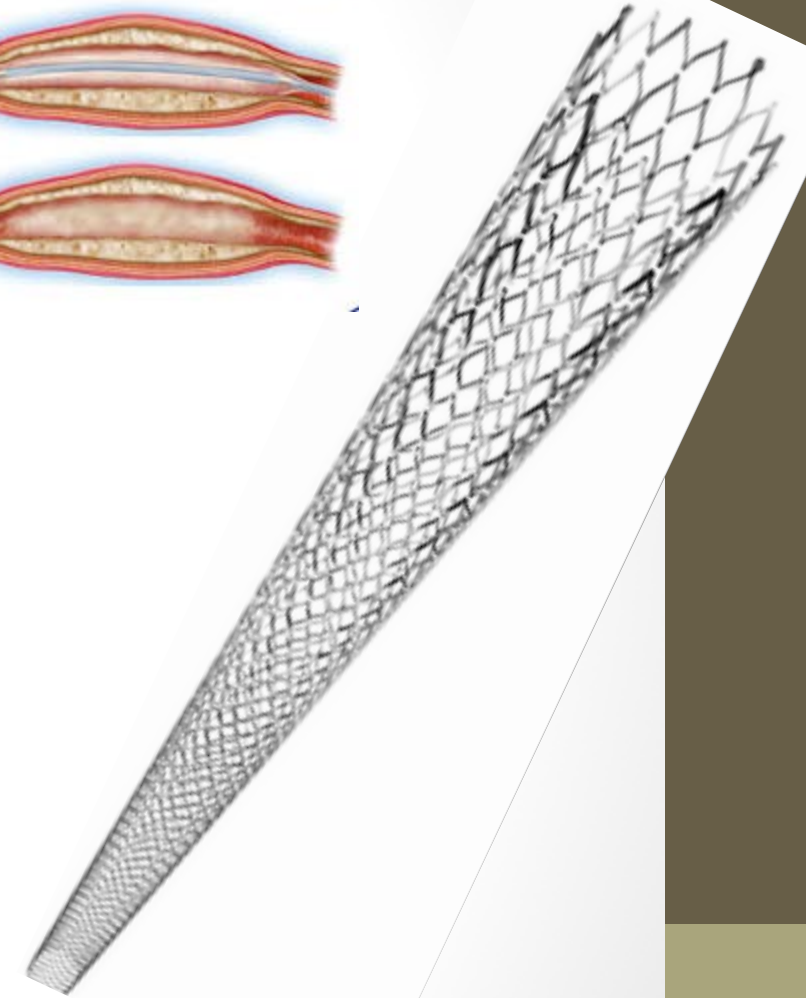
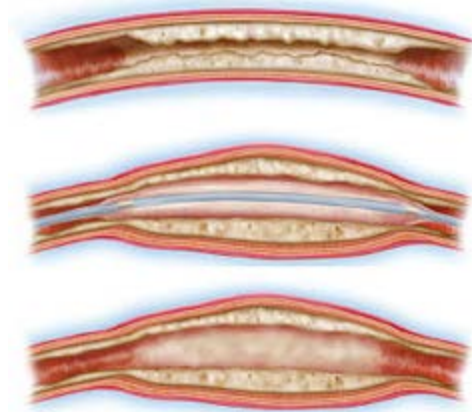
# Disclosures

- Clinical Consultant:
  - Endologix, Cook
- Educational Grants:
  - Cook

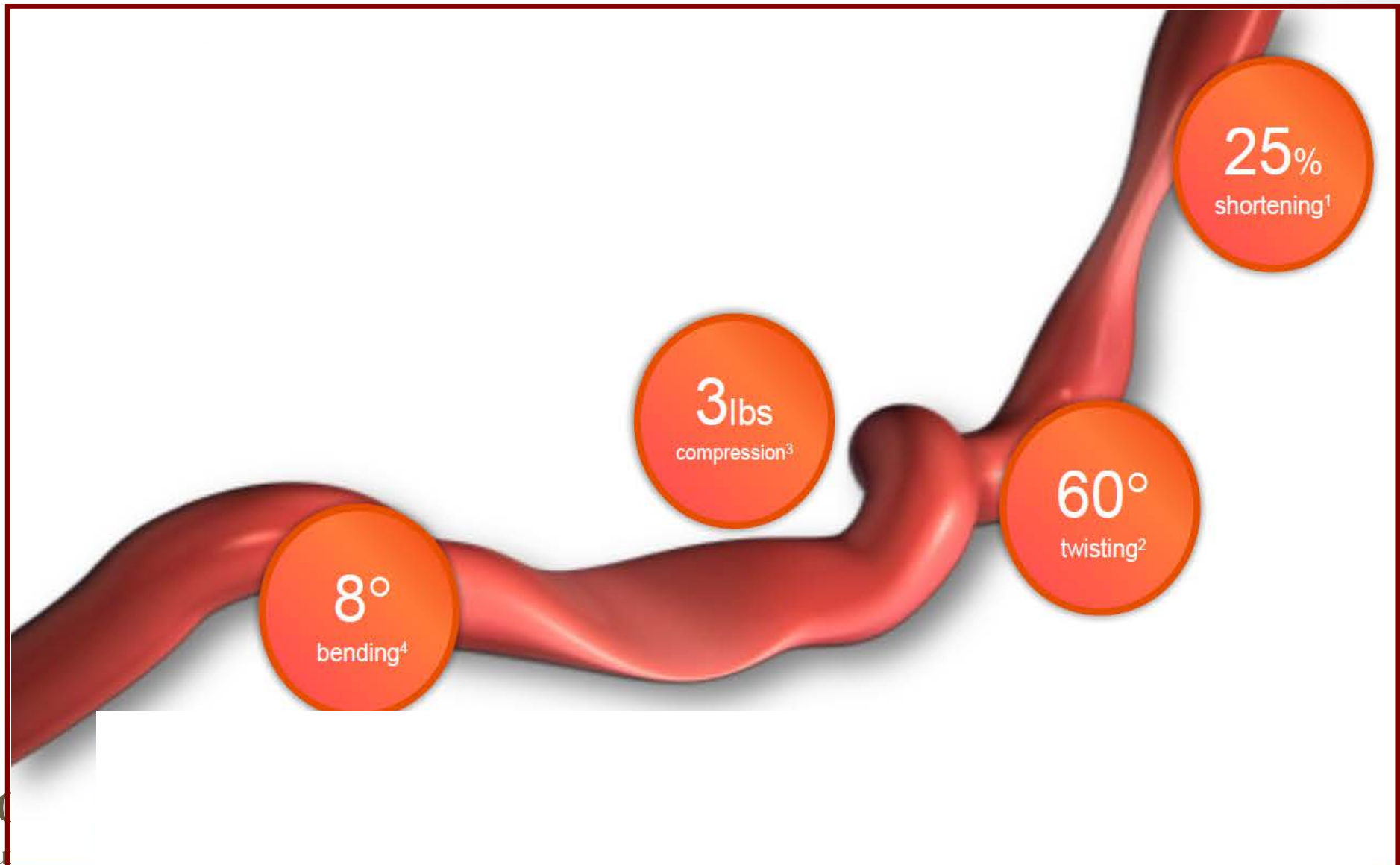


# Why stents?

- Balloon-only angioplasty is fraught with:
  - Elastic recoil
  - Flow-limiting dissection
  - Constrictive remodeling
  - Neointimal hyperplasia
- Stents may address these issues



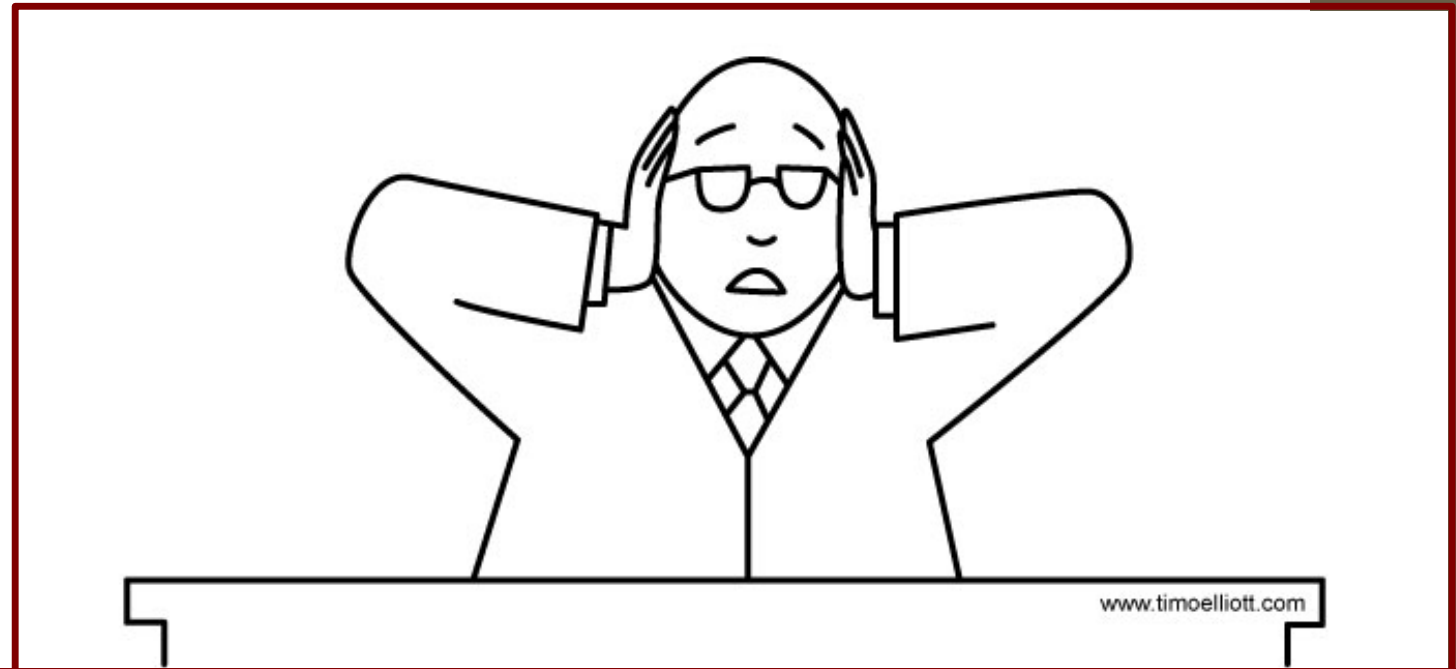
# Stresses/Forces on Femoropopliteal Vessels



FO  
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# Available Stent Platforms

- Self Expanding
  - Nitinol
  - Interwoven Nitinol
  - Drug Eluting Nitinol
  - Dual Component Design
- Stent grafts
- Balloon Expandable
- Bio-absorbable

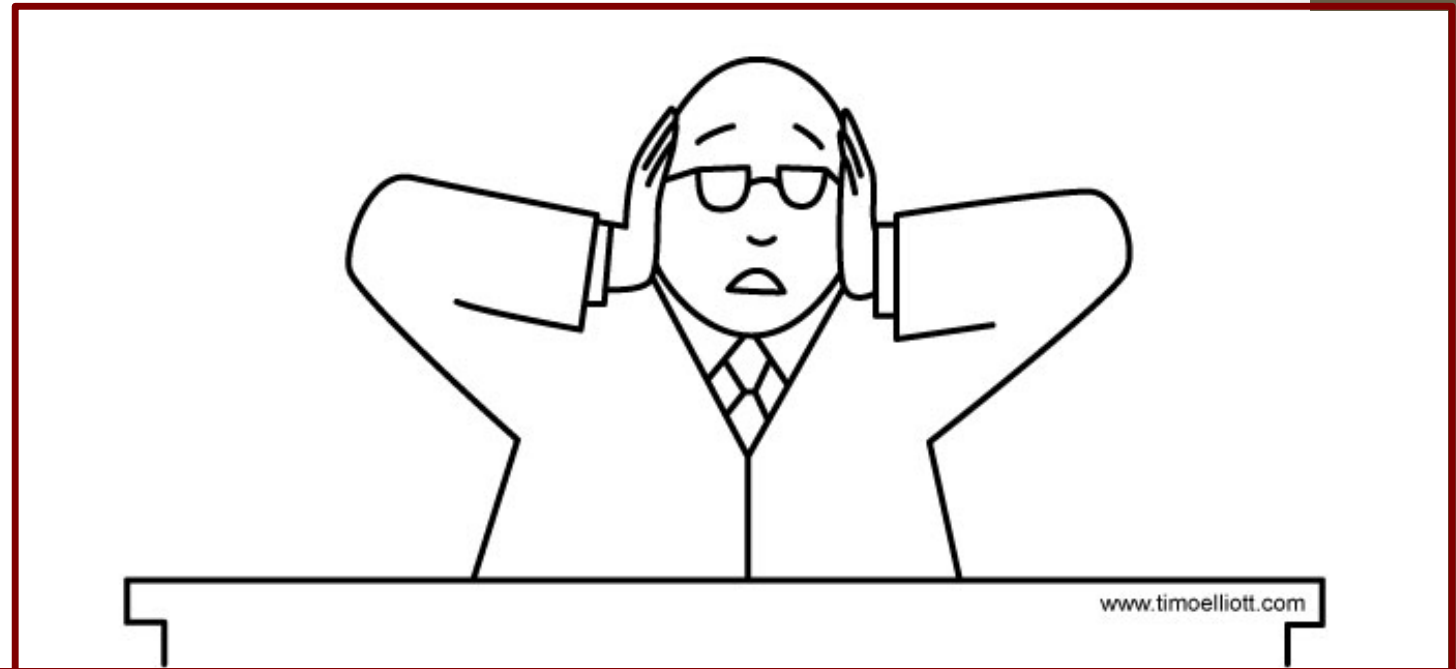


*“I’m making a decision! Stop confusing me with facts!”*



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# Explosion of Data

stent AND (femoropopliteal OR femoral OR popliteal) ✕ 🔍

**Lane +** **Clinical** **Images** **Clinical Textbooks** **Bioresearch** **Bassett Anatomy**

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**Flexions of the popliteal artery: technical considerations of femoropopliteal stenting.**  
Tamashiro GA, Tamashiro A, Villegas MO, Dini AE, Mollón AP, Zelaya DA, Soledispa-Suarez CI, Díaz JA.  
J Invasive Cardiol. 2011 Oct;23(10):431-3.  
**Article** [Preview Abstract](#) PMID: 21972163 [Source: PubMed](#)

**The pitfalls of femoropopliteal stenting trials.**  
Mwipatayi BP, Leong BD, Hockley J, Vijayan V.  
J Endovasc Ther. 2012 Oct;19(5):596-8.  
**Article** PMID: 23046323 [Source: PubMed](#)

**Viabahn for femoropopliteal in-stent restenosis.**  
Al Shammeri O, Bitar F, Ghitelman J, Soukas PA.  
Ann Saudi Med. 2012 Nov-Dec;32(6):572-82.  
**Article** [Preview Abstract](#) PMID: 23396019 [Source: PubMed](#)



# Standard Nitinol Stents (SNS)

- Laser cut Nitinol Tubes with open cell geometry
- Traditionally has been most commonly used stent in SFA



Smart Stent (Cordis)

Luminexx (Bard)

Xpert (Abbott)

Protégé Everflex (Ev3)

Absolute (Abbott)

Misago (Terumo)

LifeStent (Bard)

Complete (Medtronic)

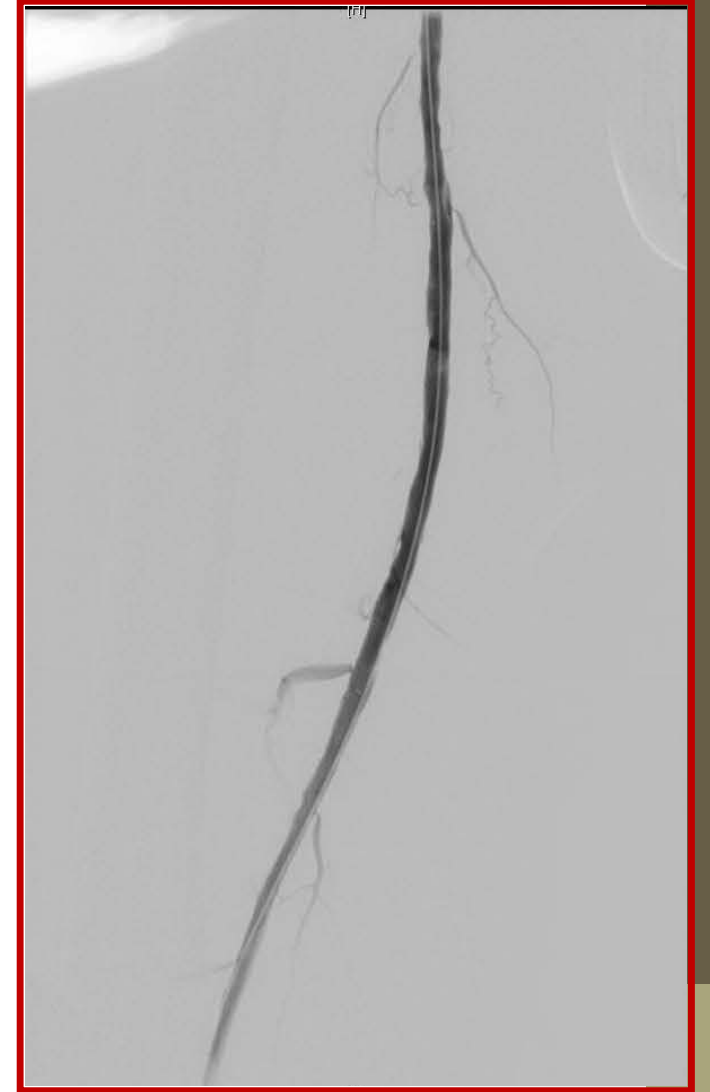


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# SNS - Advantages

- Relatively simple deployment
- Relatively inexpensive
- Come in long lengths



# SNS - Disadvantages

- Limited flexibility, thus prone to kinking/fracture
- Chronic outward force on vessel though to irritate
- **Restenosis**



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

Martin Schellinger, M.D., Schia Saberi, M.D., Christian Lawe, M.D., Peter  
Wolfgang Mlekusch, M.D., Oliver Schöler, M.D., Manfred Cayn, M.D., et al.

### ABSTRACT

#### BACKGROUND

Because stent implantation for disease of the superficial femoral artery is associated with high rates of late clinical failure, percutaneous transluminal angioplasty is preferred for endovascular treatment, and stenting is recommended only in the event of suboptimal technical results. We evaluated whether primary implantation of a self-expanding nitinol (nickel-titanium) stent yielded anatomical and clinical benefits superior to those afforded by percutaneous transluminal angioplasty with optional secondary stenting.

#### METHODS

We randomly assigned 104 patients who had severe claudication or chronic limb ischemia due to stenosis or occlusion of the superficial femoral artery to undergo primary stent implantation (51 patients) or angioplasty (53 patients). Restenosis and clinical outcomes were assessed at 6 and 12 months.

#### RESULTS

The mean (±SD) length of the treated segment was 132(±7) mm in the stent group and 127(±5) mm in the angioplasty group. Secondary stenting was performed in 17 of 53 patients (32 percent) in the angioplasty group, in most cases because of a sub-

## Results not Sustained Long Term \*

- One of several RCTs
- Mean 13 cm lesions

- 33% restenosis on duplex (p=0.05)

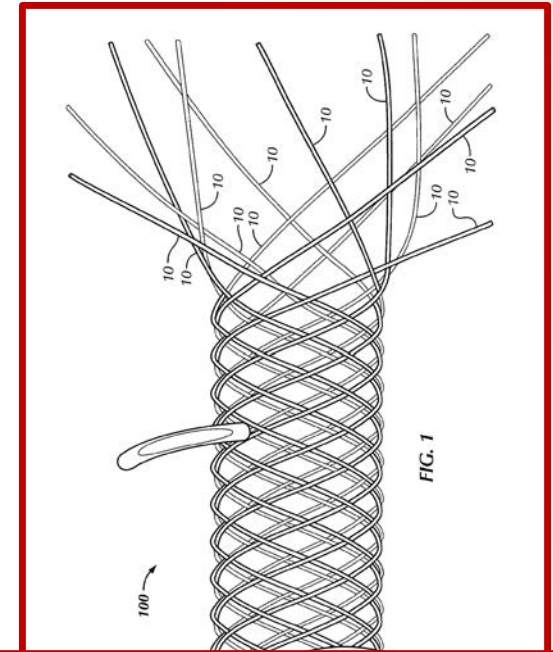
12 months:

- 37% vs. 64% restenosis on duplex (p=0.01)
- Significantly farther walking distance



# Interwoven Nitinol

- 6 pairs of super-elastic nitinol wires interwoven in a helical pattern with a closed cell geometry
- Allows for increased flexibility, and compression resistance
  - “vascular-mimetic”



Supera (Abbott)



# Interwoven Stent- Advantages

- High radial strength (>4X SNS)
- Kink and crush resistant
- Fracture resistant
- Lower chronic outward force



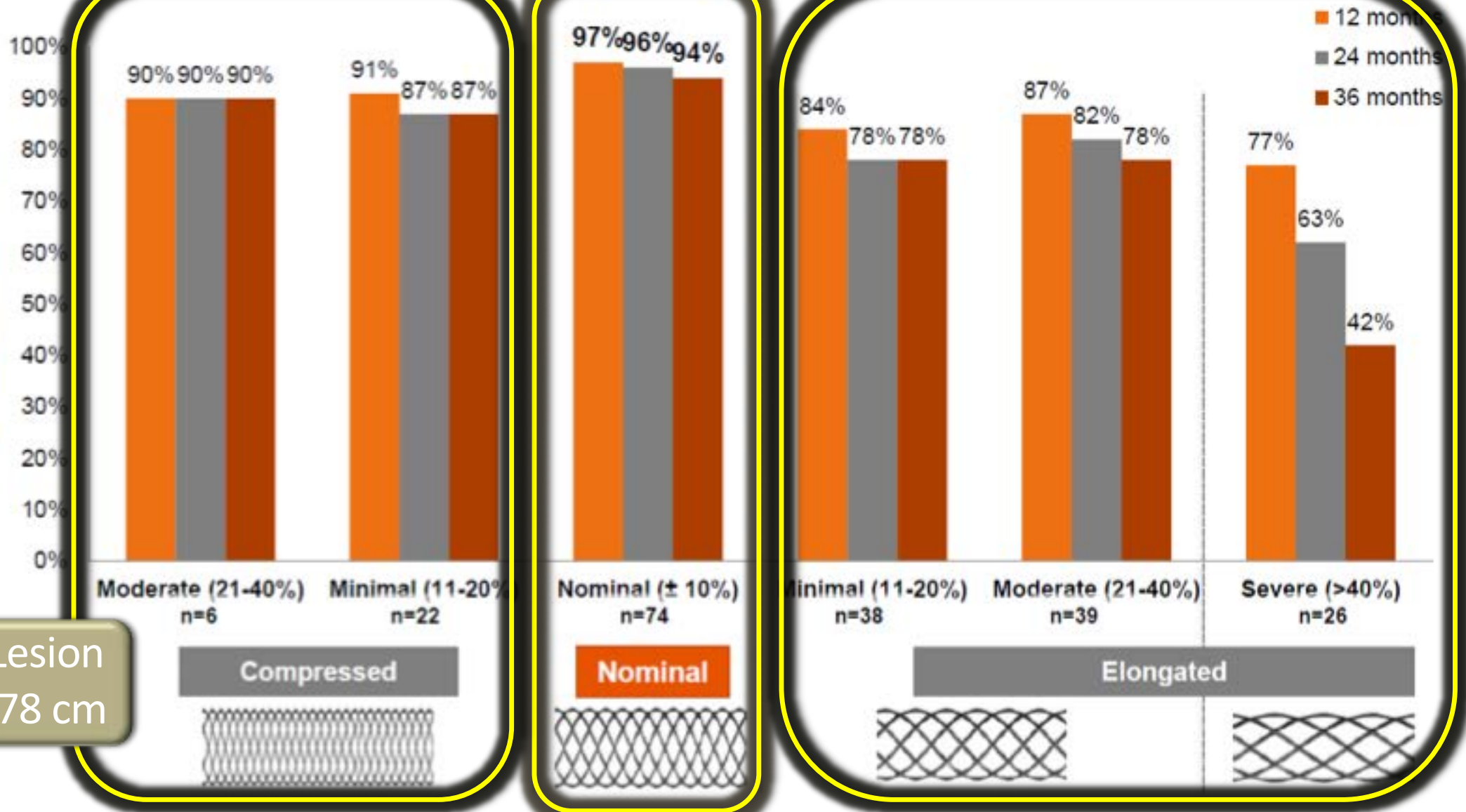
# Interwoven Stent- Disadvantages

- Significant length variability depending on how compressed/elongated
  - More difficult to deliver accurately
- Cost





Freedom from TLR (K-M)  
by Percent Compression / Elongation  
at 12, 24, and 36 months



Average Lesion Length 6.78 cm



# Drug Eluting Stents

- Standard nitinol stent coated with an antiproliferative drug
  - Paclitaxel, Sirolimus, Everolimus
- Zilver
  - Paclitaxel coating
    - Lipophilic avidly binds to intracellular target proteins
    - Inhibits smooth muscle migration and proliferation

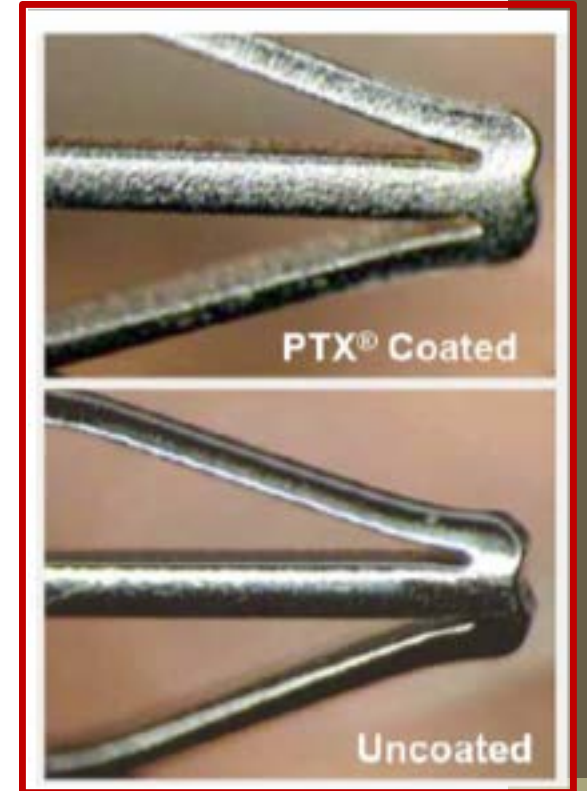


Zilver PTX, Cook



# Drug Eluting Stents- Advantages

- Impact of drug decreases intimal hyperplasia and thus decreases restenosis
- Simple accurate deployment



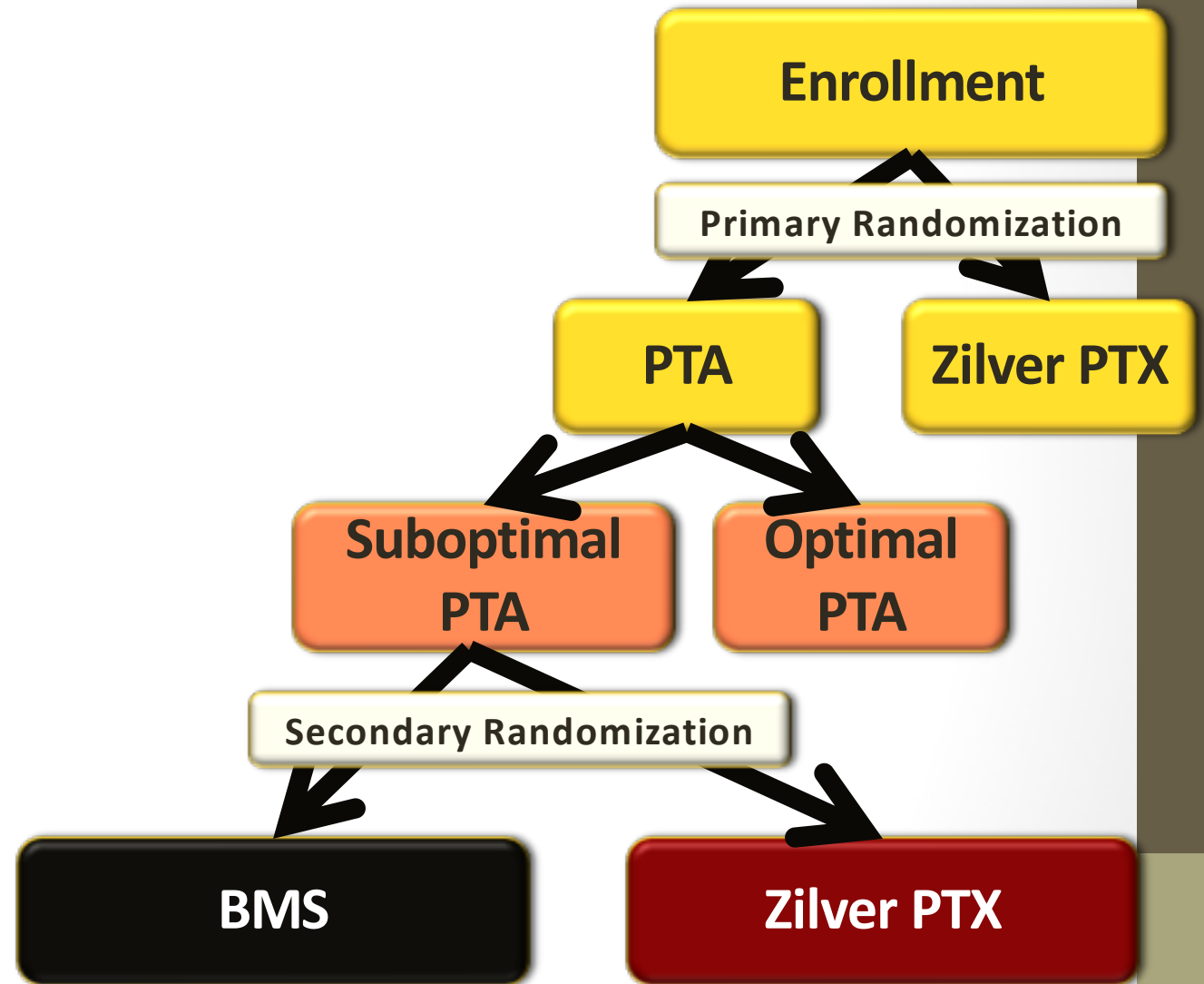
# Drug Eluting Stents-Disadvantages

- Cost
- Shorter shelf life (<1 year)
- Can fracture (although flex design is supposed to decreased this)
  - 1year rates of 0-1.6%
- Chronic outward force on artery

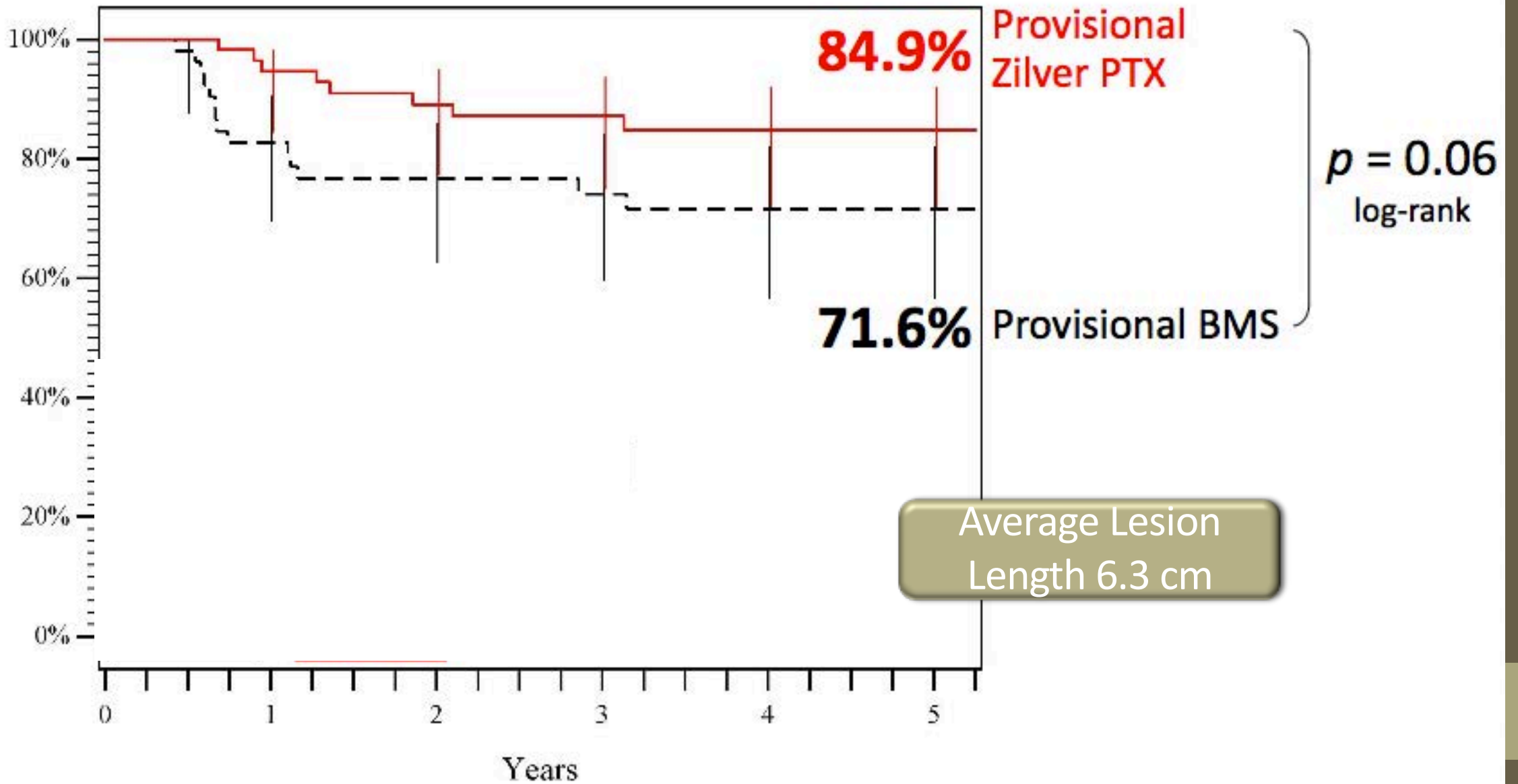


# DES Data

- Previous trials of drug-eluting stents (Sirolimus and Everolimus)
  - No more effective long term than BMS
- Zilver PTX pivotal trial
  - Average lesion length: 6.3cm



Freedom from TLR





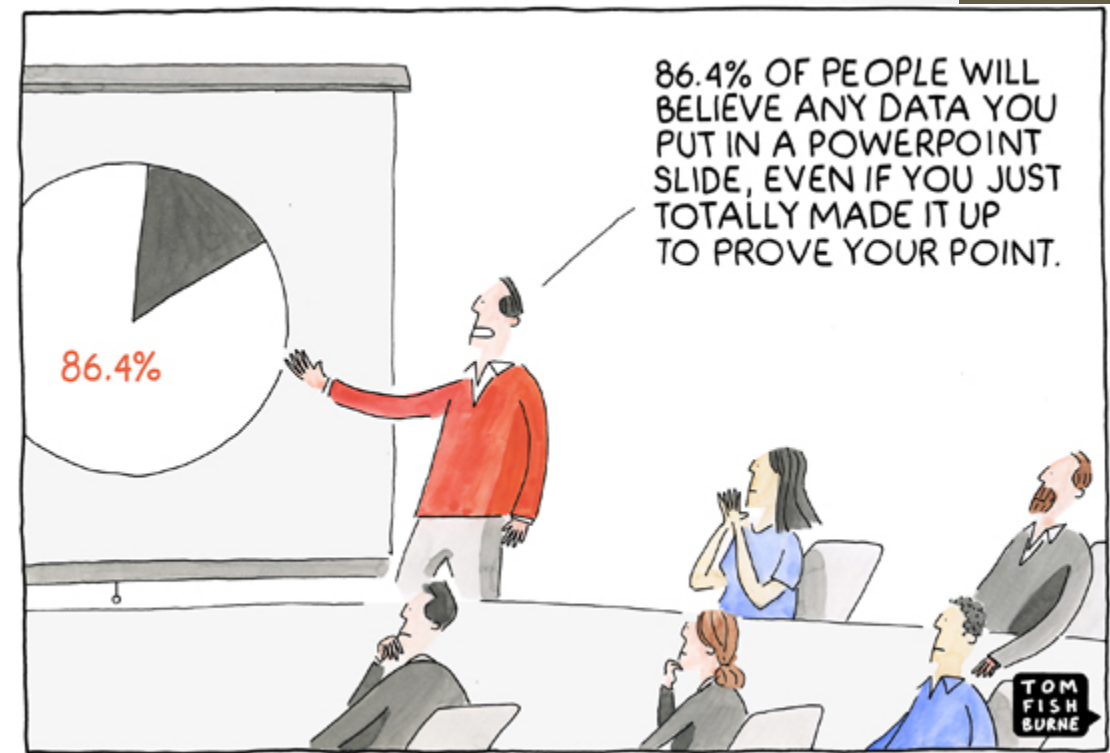
# In Conclusion

- In general self-expanding stents:
  - Improved acute success compared to PTA
  - Effective treatment for femoropopliteal disease
- Individualized approach matching unique characteristics and proper deployment of different stents to vessel anatomy, and physician experience needed to optimize clinical outcomes



# Some Suggestions/Advice

- Try to stay current on data, and understand what is unique about various stents
- Long lesions/CTOs:
  - Viabahn, Supera or DES > STNS
- Adductor canal/popliteal lesions
  - Supera/Viabahn or DCB
- In stent restenosis:
  - DES/DCB or Viabahn



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A wide-angle, high-angle photograph of the Stanford University campus. In the foreground, a paved road with white and yellow lane markings leads towards a large green lawn. The lawn is flanked by rows of tall palm trees. In the middle ground, several large, multi-story buildings with red-tiled roofs and arched windows surround the lawn. In the background, rolling hills and mountains are visible under a clear blue sky. A large, white, circular structure, possibly a water tower or observation tower, is visible on a hill in the distance.

**Thank You!**

[vascular.stanford.edu](http://vascular.stanford.edu)