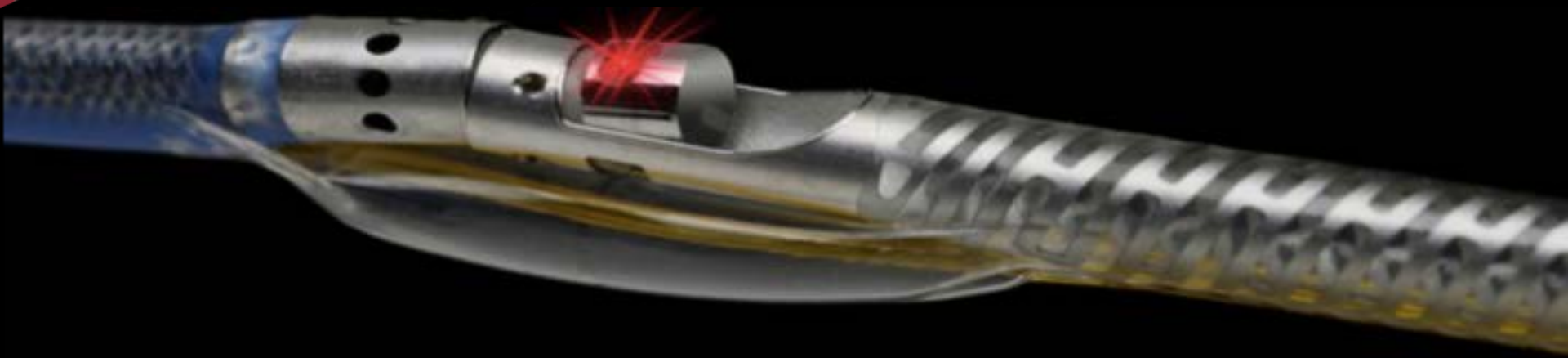


# Atherectomy:

## Laser and Mechanical Devices and Incorporating These Modalities in Practice



Brandon T Garland, MD RPVI



VASCULAR INSTITUTE OF THE ROCKIES

# Atherectomy



# Atherectomy



Trump 🇺🇸 Putin 🇷🇺 Kim 🇰🇵

📍 5.6 Million Likes ✓



**HAS THE WHOLE WORLD GONE CRAZY?**

**AM I THE ONLY ONE AROUND HERE WHO  
GIVES A SHIT ABOUT THE RULE OF LAW?**

# Atherectomy:

Laser and Mechanical Devices and Incorporating These Modalities in Practice



Brandon T Garland, MD RPVI



VASCULAR INSTITUTE OF THE ROCKIES



# Endovascular TODAY

# DEVICE GUIDE

## Atherectomy Devices

Atherectomy Devices

### Company

### Company Name

Atherectomy Devices

Avinger,

Cardiovascular Inc.

### Company Name

Atherectomy Devices

BD Inter

Cardiovascular Inc.

Medtronic

### Company Name

Atherectomy Devices

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Cardiovascular Inc.

Medtronic

Philips

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Cardiovascular Inc.

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Spectranetics company

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Cardiovascular Inc.

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Spectranetics company

Medtronic

Philips

Spectranetics company

Philips

Philips

Spectranetics company

Company Name	Product Name	Minimum Vessel Diameter (mm)	Sheath Compatibility (F)	Crossing Profile (inch)	Working Length (cm)	Ty Length (cm)
Spectranetics, a Philips company	Turbo-Elite Laser Atherectomy 2.5-mm Catheter .035-inch Guidewire	3.8	8	0.101 (2.3 mm)	112	-
Spectranetics, a Philips company	Turbo-Power Laser Atherectomy 2.3-mm Catheter .018-inch Guidewire	3.5	7	0.091 (2.3 mm)	125	-
Spectranetics, a Philips company	Turbo-Tandem Laser Atherectomy 3-F Catheter	5	7	0.160 (4 mm)	110	1.4



## Types of Atherectomy

**Directional:** Medtronic Hawk series, OCT guided Avenger Pantheris

**Orbital:** CSI Diamondback

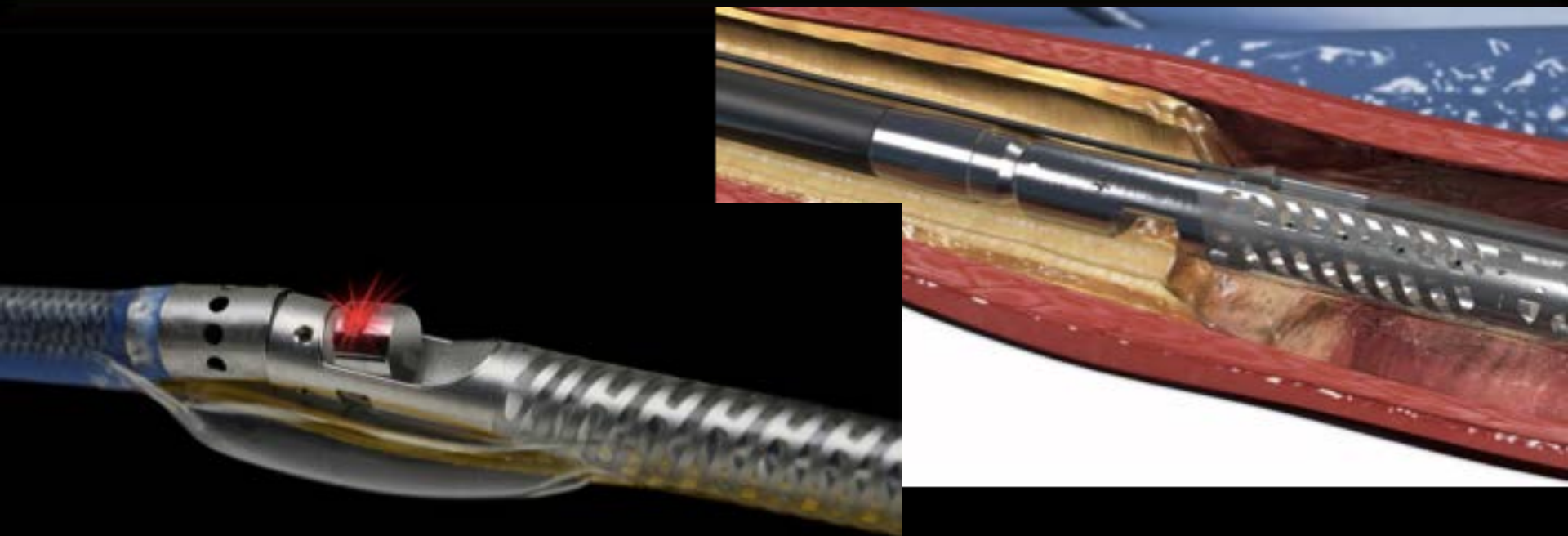
**Excimer Laser:** Philips Spectranetics Turboelite/Turbopower

**Rotational:** Boston Scientific Jetstream and Rotablader, Philips Phoenix





## Directional Atherectomy



Cutting in a controlled, directional fashion collecting tissue in a nosecone. Can control angle and depth of cut with handle.



# Directional Atherectomy



## Medtronic

- SilverHawk: 1 rotating blade
- TurboHawk: 4 rotating blades
- HawkOne: 50% higher cutting speed for mixed morphology lesions



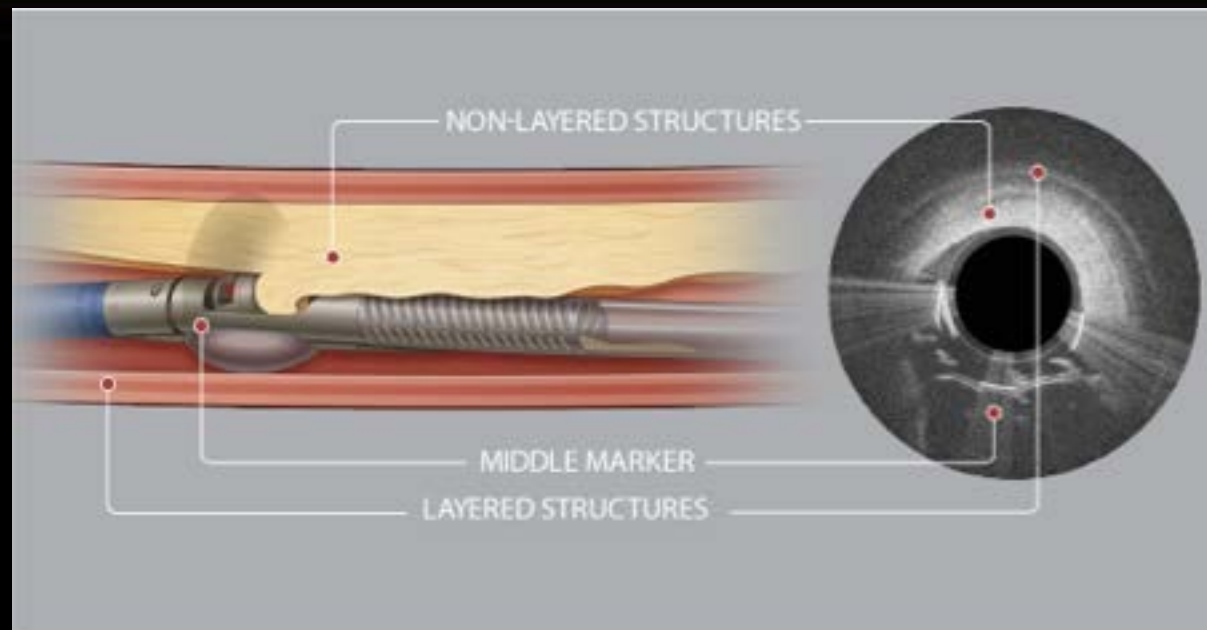
# Directional Atherectomy

## Medtronic SilverHawk

- Talon Registry: SilverHawk with adjunctive angioplasty (26.7%) and stenting (6.3%) **80% primary patency at 1 year**
- DEFINITIVE-LE: Prospective trial, 800 subjects for claudication and CLI
  - Claudication: **78% primary patency at 1 year**
  - CLI: **95% freedom from amputation at 1 year**
- **3% rate of distal embolization**



# Directional Atherectomy



## Avenger Pantheris

- OCT (Optical coherence tomography) guided DA
- Control depth to prevent adventitial injury



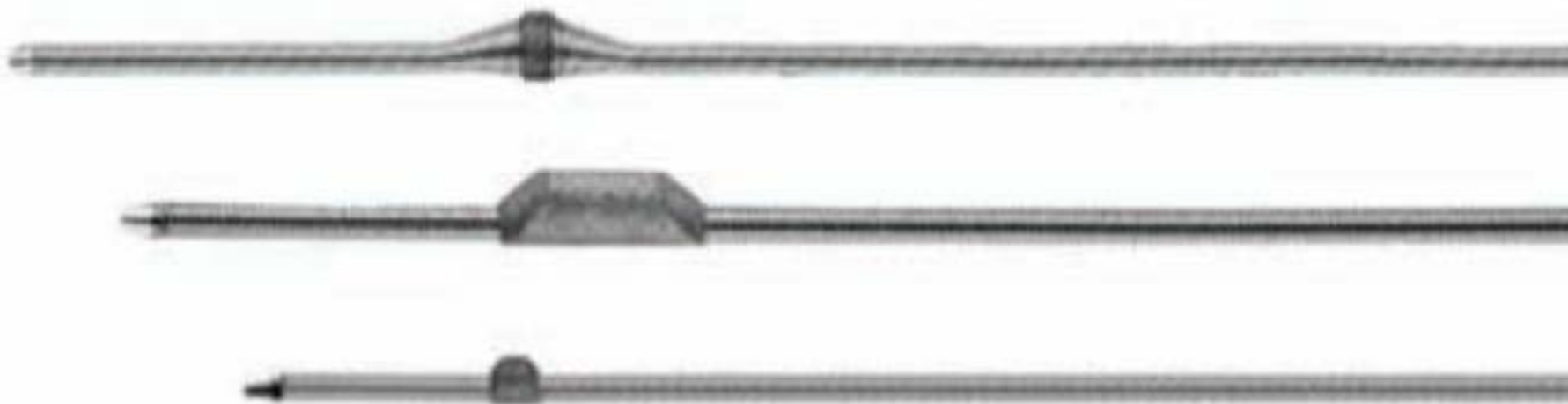
# Directional Atherectomy

## Avenger Pantheris

- Global IDE trial 130 pts (prospective single arm trial)
- MAE 17.6%
- TLR 8%, CV death 3.2%, MI 2.4%, amputation 0%, device related 4%
- Bail out stenting 4.3%



# Orbital Atherectomy



## CSI Diamondback

Diamond coated crown that rotates 360° in an eccentric manner engaging plaque instead of healthy tissue



# Orbital Atherectomy

## CSI Diamondback

- OASIS Pivotal IDE trial 201 lesions low MEA at 10.4%, **SHORT lesion length 3.5cm** and adjunct angioplasty 39.3%
- CONFIRM registry series confirms safety but **high adjunctive treatment (73.3% angioplasty and 5.7% stent)**



# Excimer Laser Atherectomy



  
***Turbo-Power***  
Laser Atherectomy Catheter

Ultraviolet laser to create short bursts 125ns to photo-ablate the atherosclerotic plaque – vapor bubble. Indicated for denovo lesions, restenosis and CTOs which have not been crossed with a wire.





# Orbital Atherectomy

## Philips Spectranetics Turbopower Excimer Laser

- Safety with IDE Pivotal trial
- Multiple indications: Denovo, ISR and CTO
- **Excite-ISR** – mean lesion length **19.6cm +/- 12cm**
- **Primary Patency 71.1%** at one year



# Rotational Atherectomy

**JETSTREAM™** Atherectomy System

**CUT THE CRUD.  
DELIVER THE DRUG.**

An illustration showing a cross-section of a blood vessel. A metallic atherectomy catheter is inserted into the vessel, with its cutting tip positioned against a red, irregular mass representing plaque. The vessel wall is shown in shades of red and pink.A close-up photograph of the Phoenix atherectomy catheter. The catheter has a long, black, corrugated shaft that tapers to a gold-colored handle. The handle has a circular opening at the end, revealing the internal cutting mechanism.

**Phoenix™**  
ATHERECTOMY SYSTEM

Continuous Cut,  
Capture, And Clear Design

- Front Cutting
- Plaque Removal using Archimedes Screw Technology
- Single Insertion

ATHEROMED™

High speed rotating cutting blades that lead to differential cutting of the plaque while preserving the elastic healthy tissue.



# Rotational Atherectomy

## Boston Scientific - Jetstream

- Pathway-PVD – demonstrated safety, and primary patency 61.8% at 12 months, Target Lesion Revascularization 26%
- Jetstream-ISR - TLR 41%
- JET Registry - 77.2% primary patency rate and 81.7% freedom from TLR at 12 months when combined with PTA with average lesion length 16.4cm



# What about DCB?



**Cochrane  
Library**

Cochrane Database of Systematic Reviews

Drug-eluting balloon angioplasty versus uncoated balloon angioplasty for peripheral arterial disease of the lower limbs (Review)

Kayssi A, Al-Atassi T, Oreopoulos G, Roche-Nagle G, Tan KT, Rajan DK

- Clear benefit to DCB over POBA at 12, 24 and 36 months (OR 1.92, 95% CI 1.45 to 2.56 at 12 months) in multiple endpoints
- Limitations? **Calcium!** (50% PP at 12 months)
- Why? Penetration into media?



## What about DCB?

### Stavroulakis et al 2017

- DCB alone vs DAART for isolated lesions of the popliteal artery
- Primary patency 82% vs 65% for isolated popliteal lesions at 12 months



## What about DCB?

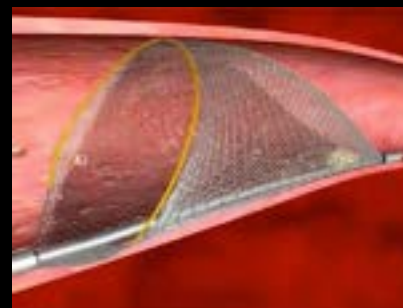
### Shammas et al 2017 – JET-SCE Study

- DCB versus POBA after Jetstream atherectomy
- 81 pts at single center with de novo or restenotic femoropopliteal lesions
- Freedom from TLR 91.1% vs 63.7% (P = .03) at 18 months



# Atherectomy: How I do it

1. Usually use a filter wire
2. Usually follow with DCB



**Highly calcified:** Jetstream, active aspiration

**Mixed morphology/eccentric lesions:** HawkOne

**InStent Restenosis (Intimal hyperplasia):** Laser

**Below the knee (highly calcific):** CSI Diamondback



# Atherectomy: How I do it



## Atherectomy: How I do it





# Atherectomy: How I do it



**10:1**



# Atherectomy: How I do it

**IF YOU CAN'T BEAT IT**



**BUY IT AND SHUT IT DOWN**



## Atherectomy: How I do it

Always do the right thing for the patient!!

...but on a population level:

- Volume drives research and innovation
- Research drives policy and reimbursement



## BEST-CLI

Best Endovascular vs. Best Surgical Therapy  
in Patients with Critical Limb Ischemia



# Atherectomy: How I do it





We're hiring!





# Orbital Atherectomy

Study	Population Characteristics	Lesion Length	Intervention	Adjuvant Therapy	12-Month Results	Major Adverse Events
OASIS <sup>23</sup> [B]	70 ± 10 years n = 124 Rutherford 1-5	3.0 ± 2.6 cm	OA	PTA: 39.3% Stent: 2.5%	N/A	MAE: 10.4%, Death: 2.4%
CONFIRM <sup>24</sup> [A]	71.5 ± 10.5 years n = 3135 Rutherford 1-6	7.3 ± 7.2 cm	OA	PTA: 73.3% Stent: 5.7%	N/A	N/A
CALCIUM 360 <sup>25</sup> [C]	70.7 ± 13.4 years n = 50 Rutherford 4-6	N/A	OA + PTA	PTA: 100%, Stent: 2.9%	TLR: 7.7%	MAE: 0% Death: 0% LL: 0%
COMPLIANCE 360 <sup>26</sup> [C]	68 ± 11 years n = 50 Rutherford 2-4	5.6 ± 5.4 cm	OA	Stent: 5.3%	TLR: 19.8%	N/A





# Excimer Laser Atherectomy

Study	Population Characteristics	Lesion Length	Intervention	Adjuvant Therapy	12-Month Results	Major Adverse Events
PELA <sup>29</sup> [C]	n = 251 Rutherford 2-4	20 cm (total occlusions)	ELA + PTA	Stent: 42%	PP: 49% TLR: 51%	Death: 0% LL: 0%
LACI <sup>30</sup> [C]	72 ± 10 years n = 145 Rutherford 4-6	11 cm (median)	ELA + PTA	PTA: 96%, Stent: 45%	N/A	Death: 10% LL: 8%
CELLO <sup>32</sup> [C]	68 ± 10 years n = 65 Rutherford 1-3	5.6 ± 4.2 cm	ELA + PTA	PTA: 64%, Stent: 23%	PP: 54% TLR: 23.1%	Death: 0%
EXCITE-ISR <sup>33</sup> [C]	68.5 ± 9.8 years n = 250 Rutherford 1-4	19.6 ± 12.0 cm	ELA + PTA	Stent: 4.1%	PP: 71.1% TLR: 20.1%	



# Rotational Atherectomy

Study	Population Characteristics	Lesion Length	Intervention	Adjuvant Therapy	12-Month Results	Major Adverse Events
Pathway PVD <sup>35</sup> [B]	7.2 ± 0.8 years n = 17 Rutherford 1-5	2.7 ± 2.4 cm	RA	PTA: 59%, Stent: 7%	PP: 61.8%, TLR: 26%	Death: 1%
JETSTREAM-ISR <sup>39</sup> [B]	69.9 ± 11.7 years n = 29 Rutherford 1-5	1.7 ± 1.3 cm	RA + PTA	PTA: 100%, Stent: 9%	TLR: 41%	Death: 3% LL: 0%