Understanding the mechanism of thermoablation using different lasers and RFA on the vein wall using immunohistochemistry, and optimising the LEED for each device.

What is your evidence that it translates clinically?

Mark S Whiteley
Disclosure

Speaker name:

.............................................Mark S Whiteley..................................................

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

☐ Consulting

☐ Employment in industry

☐ Shareholder in a healthcare company

☐ Owner of a healthcare company

☐ Other(s)

☒ I do not have any potential conflict of interest
Endovenous Thermal Ablation

• 1999:
  – “Closure” = 70°C
  • Thermocouple
  • BUT Inside Vein!!!
  – “Collagen Contraction”
  – Physical denaturation of veins
Transmural Death

• 2004:
  – Transmural death of vein wall
  – Ie: Death of Cells AND Collagen Contraction

Porcine Liver Model
RFiT - as in IFU

18W at 1 sec / cm
RFiTT – as Whiteley Protocol

6W at 6 sec per 0.5cm - Interrupted
Results

20w 3s/cm = 60J/cm
Catheter sticking
“Coagulum”

18W 1 s/cm = 18 J/cm
? Inadequate
Results

20W 5 s/cm = 100 J/cm
Charcol – Sticking +++

6W 6sec per 0.5 cm
Interrupted
= 72 J/cm
Ex-vivo GSV

Control GSV

LEED 72 J/cm
6 W 12 Sec/cm

LEED 72 J/cm
18 W 4 Sec/cm

Whiteley MS etc al - Unpublished
# Histology v Porcine Liver

<table>
<thead>
<tr>
<th>LEED (J/cm)</th>
<th>GSV Histology</th>
<th>Thermal Spread (mm)</th>
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<td>Vein Wall Layer</td>
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In-vivo

- 63 patients treated with RFiTT new protocol
- 35 returned 1 year (mean 16.3 months)
  - 54.8y mean
  - 48 legs (25R 23 L)
- All examined with DUS
  - Blinded Vascular Scientist (unaware of study)
In Vivo

**CEAP at Presentation**

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### In Vivo

<table>
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<tr>
<td>SSV</td>
<td>15</td>
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<tr>
<td>AASV</td>
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GSV- great saphenous vein; SSV- small saphenous vein; AASV- anterior accessory saphenous vein
Operation Notes

- 6 W Interrupted Pull-Back
  - 6 sec per 0.5cm
- No Sticking
- No withdrawal for cleaning
- No re-doing sections
Results

- 100% closure of each target vein

- Compared with published results with IFU:
  - 18W
  - On 92% when “inexperienced” surgeons removed
  - Sticking / Removal for cleaning
Conclusion

- Good correlation between thermal spread, cell death and clinical results.

- New work:
  - Necrosis
  - Apoptosis
  - Sub-total vein wall death

810 nm
60 J/cm

1470 nm
60 J/cm