

CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY

JANUARY 19-21 2017

MARRIOTT RIVE GAUCHE & CONFERENCE CENTER

PARIS, FRANCE



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:

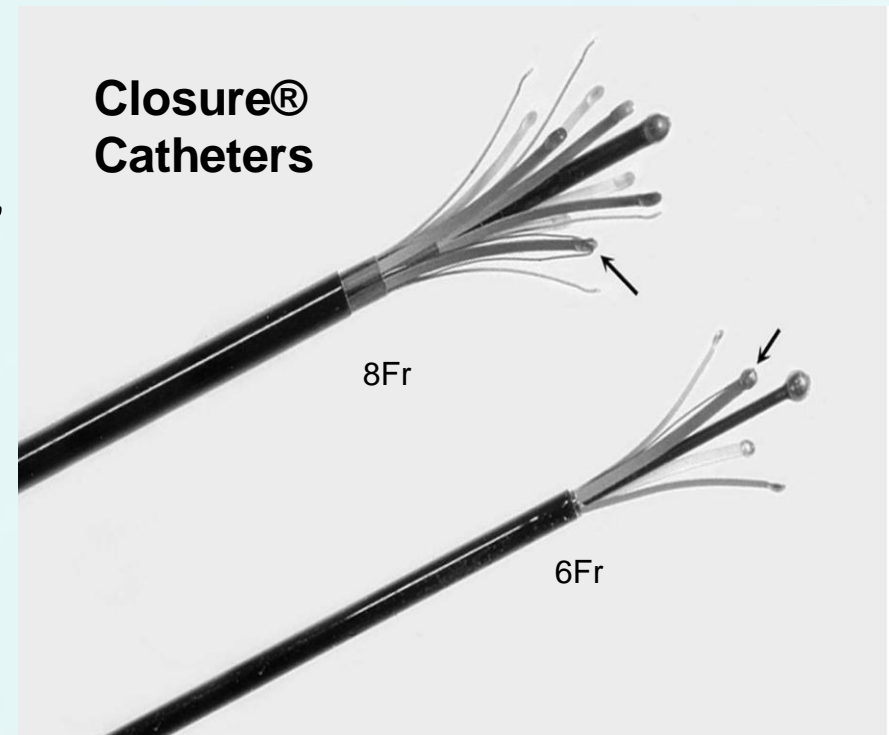
.....Mark S Whiteley.....

- 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

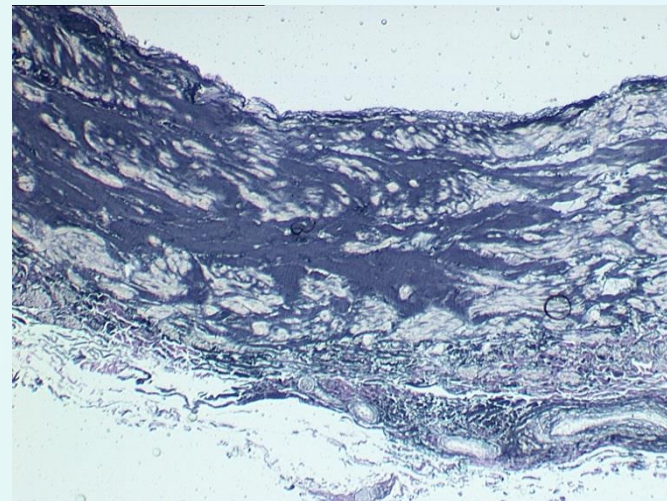
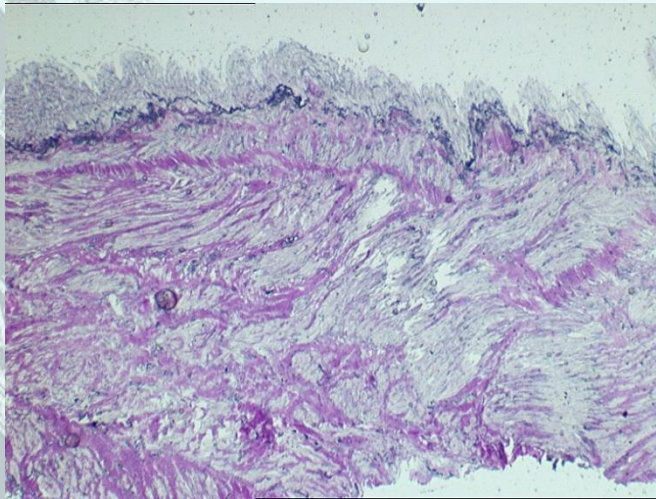
- 1999:
 - “Closure” = 70⁰C
 - Thermocouple
 - BUT Inside Vein!!!
 - “Collagen Contraction”
 - Physical denaturation of veins





Transmural Death

- 2004:
 - Transmural death of vein wall
 - Ie: Death of Cells AND Collagen Contraction
- EVG Stain

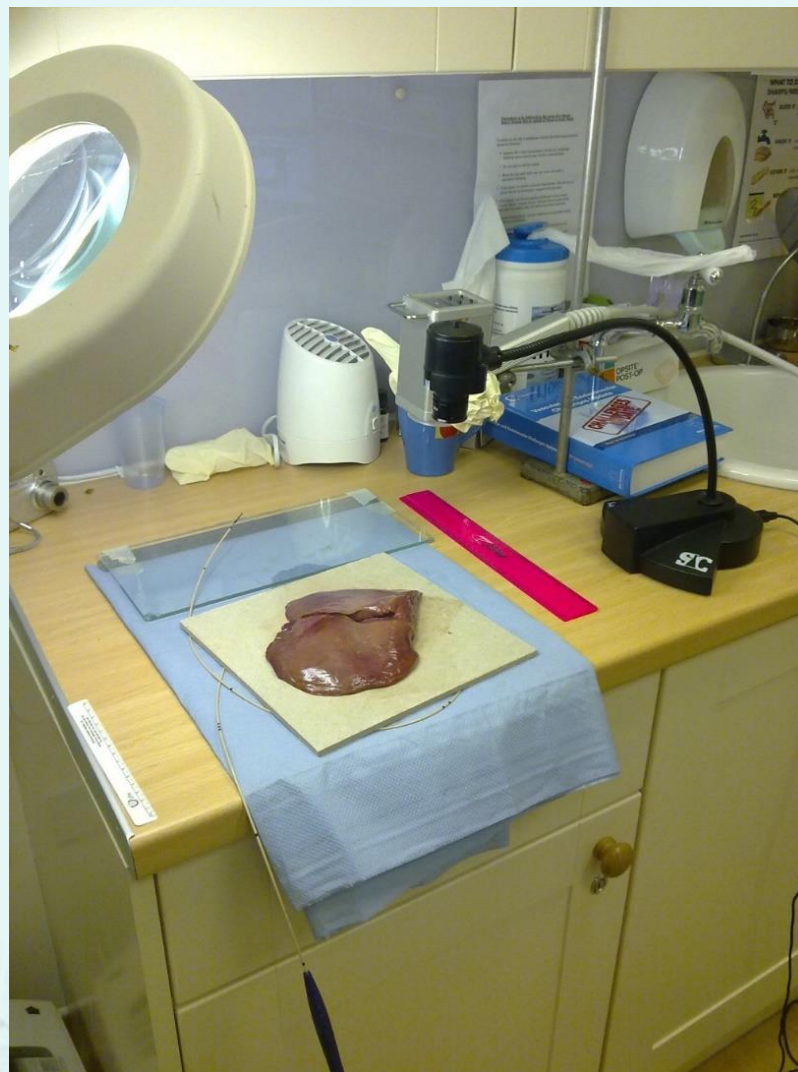


Porcine Liver Model

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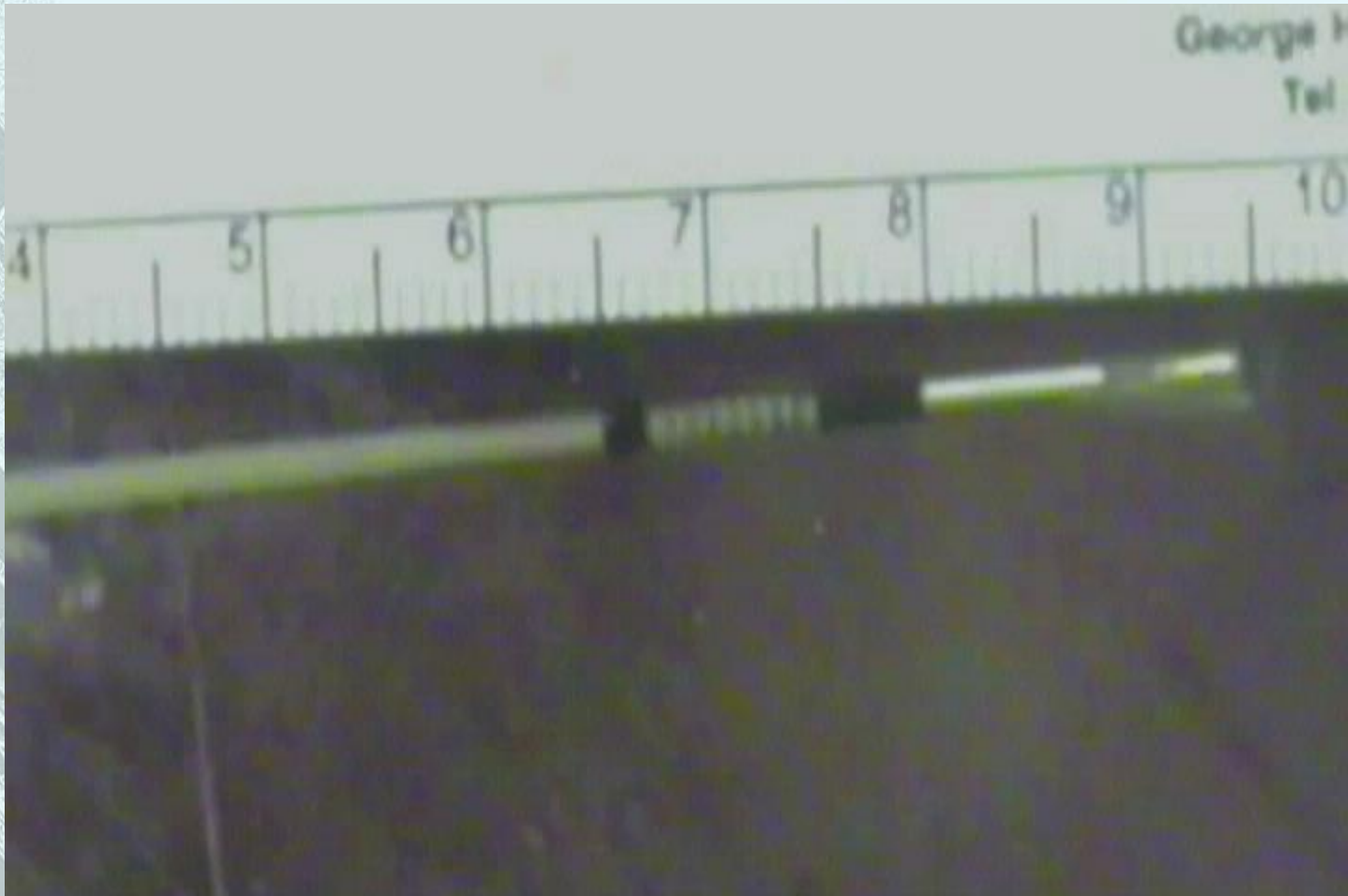
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RFiTT - as in IFU

18W at 1 sec / cm





RFiTT – as Whiteley Protocol

6W at 6 sec per 0.5cm - Interrupted



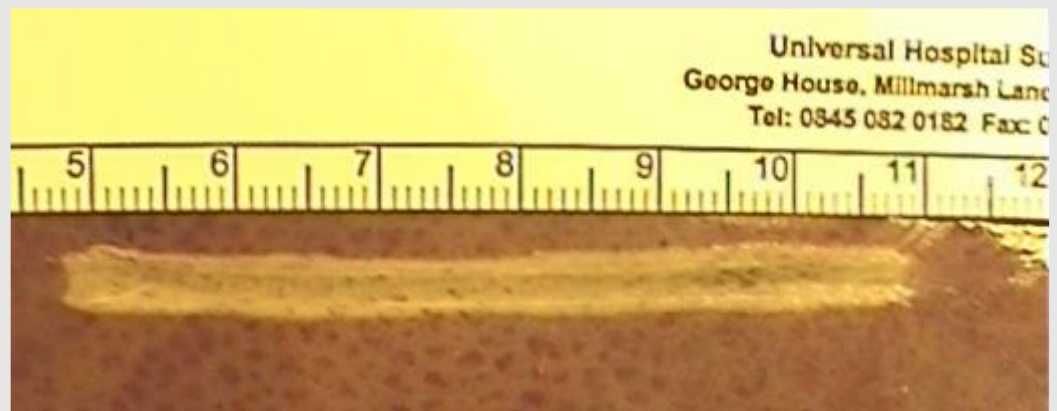


Results



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

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



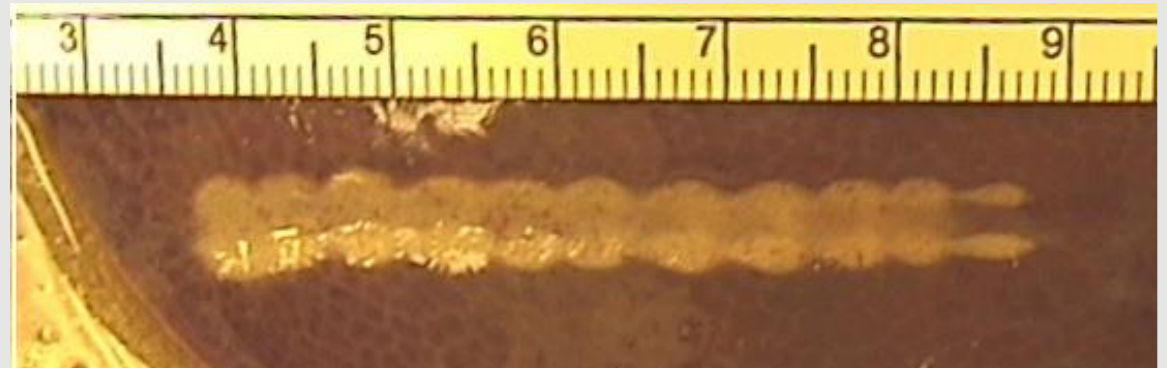


Results



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

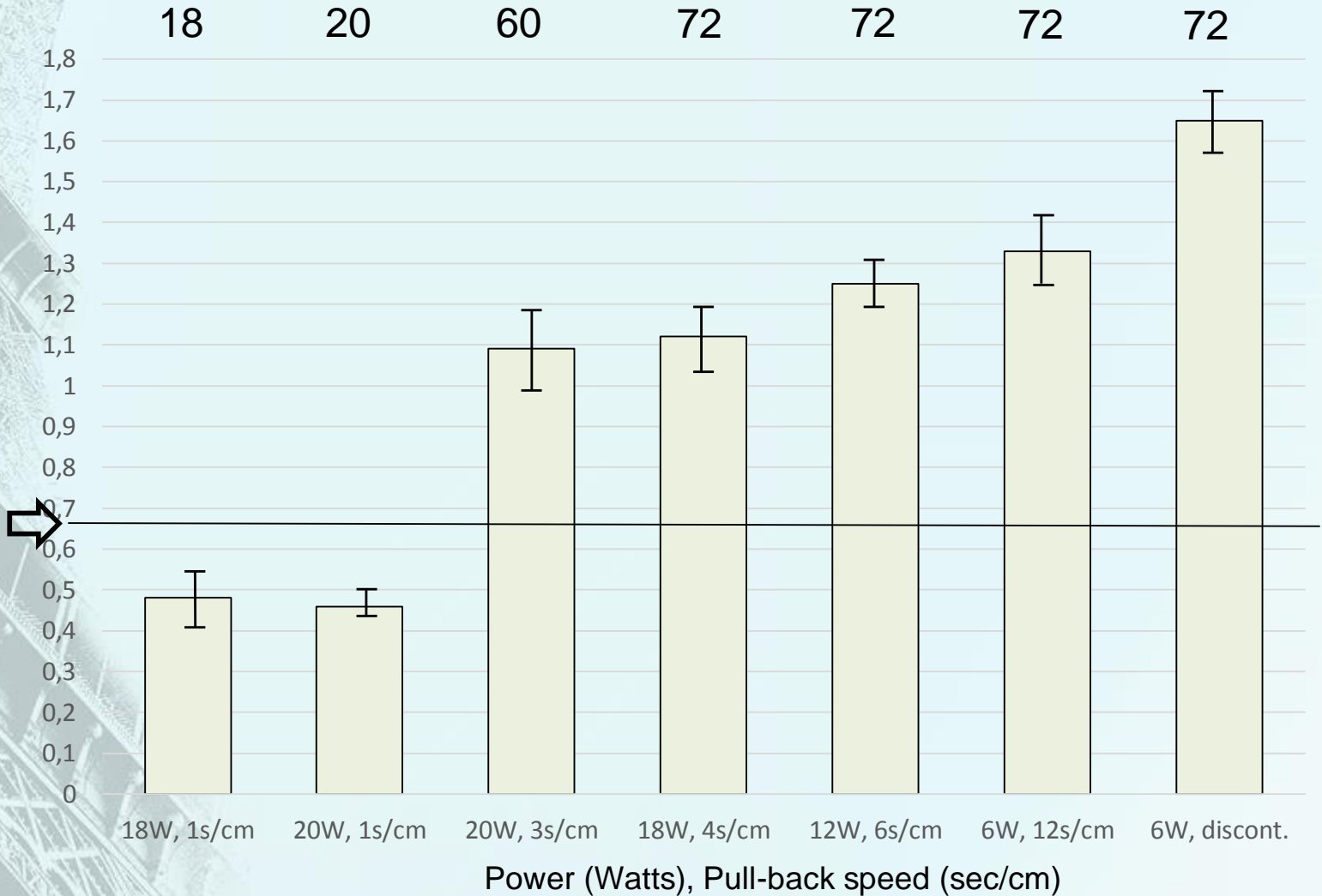
6W 6sec per 0.5 cm
Interrupted
= 72 J/cm





LEED

Thermal
spread
from device
(mm)





Ex-vivo GSV



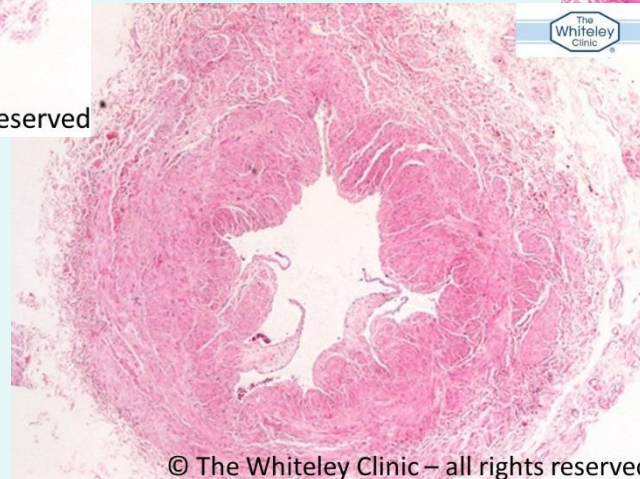
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Control GSV



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LEED 72 J/cm
6 W 12 Sec/cm



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LEED 72 J/cm
18 W 4 Sec/cm



Histology v Porcine Liver

| LEED (J/cm) | GSV Histology | | | | Thermal Spread (mm) |
|-------------|-----------------|---------------------|--------------------------|----------------------------|---------------------|
| | Vein Wall Layer | Thermal Penetration | Degree of Thermal Damage | Thermal Effect/Coagulation | |
| 18 | Intima | Yes | +++ | Whole thickness | 0.46 |
| | Media | Yes | + | Focal | |
| | Adventitia | No | - | No effect | |
| 20 | Intima | Yes | + / ++ | Focal | 0.47 |
| | Media | Yes | - / + | Very focal | |
| | Adventitia | No | - | No effect | |
| 54 | Intima | Yes | +++ | Whole thickness | 1.09 |
| | Media | Yes | ++ | Whole thickness | |
| | Adventitia | Yes | + / ++ | Inner half | |
| 72 | Intima | Yes | +++ | Whole thickness | 1.65 |
| | Media | Yes | +++ | Whole thickness | |
| | Adventitia | Yes | +++ | Whole thickness | |



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

| CEAP Clinical Score | Number of Limbs |
|---------------------|-----------------|
| 0 | 0 |
| 1 | 3 |
| 2 | 34 |
| 3 | 5 |
| 4 | 6 |
| 5 | 0 |
| 6 | 0 |

In Vivo



| Vein | Number of Veins |
|------|-----------------|
| GSV | 34 |
| SSV | 15 |
| AASV | 15 |

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

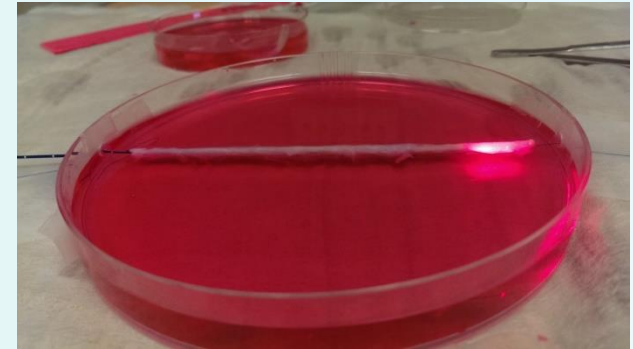


Conclusion

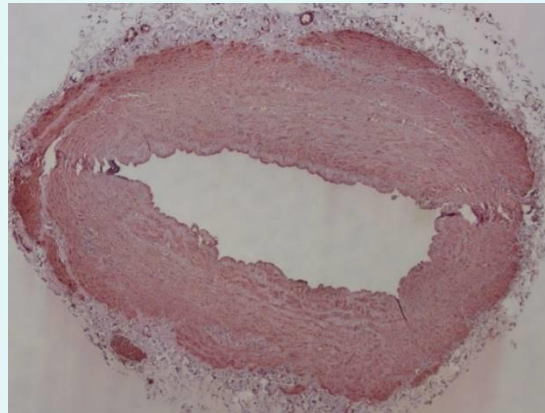
- Good correlation between thermal spread, cell death and clinical results.

- New work:

- Necrosis
- Apoptosis
- Sub-total vein wall death



810 nm
60 J/cm



1470 nm
60 J/cm

