Imaging the Terra icognita of PAD: The microcirculation.

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Disclosure

Jim Reekers

I have the following potential conflicts of interest to report:

Freelance consultant for:

- Philips medical
Diffusion of Oxygen according to Fick's laws
Direct measuring microcirculatory perfusion

- Video microscopic techniques allow direct measurement of capillary density, perfusion and flow dynamics.

Not applicable in clinical setting
**Indirect** measuring microcirculatory perfusion

Measuring elements of tissue oxygenation

- Near-infrared spectroscopy (NIRS)
  - Regional haemoglobin oxygen saturation.

- Tissue reflectance spectrophotometry

Depth of these technologies 1-2 mm
Oxygen presentation to tissues is dependent on

- **Cardiac output.**
- **Arterial oxygen content.**
  - Oxygen saturation, blood haemoglobin level and Hüfner number (amount of oxygen carried if haemoglobin is fully filled)
- **Amount of blood in the microcirculation.**
Microcirculation.

Arterial 80% Venous

10% 10%
Microcirculation.

Total foot perfusion

PRE- INTERVENTION
Microcirculation.

Total foot perfusion

POST-INTERVENTION
Change in **peak density** (PD)

**Difference in perfusion**
Repeatability variation $< \pm 5\%$
It is NOT a one button technology
To calculate the change in microcirculation perfusion

- **Acquisition parameters pre- and post must be the same.**
  - Projection
  - Magnification
  - Injected contrast volume
  - Contrast density
  - Speed of injection
  - Injection point (catheter tip)
Perfusion = density/V/t

- Volume for pre-and post analysis must have the same ROI.
- Start and Length of acquisition time pre-and post must be the same.
- Only frames with contrast can be analysed.
Conclusion 1

- Perfusion angiography is a parameter for microcirculation perfusion and a proxy-endpoint for tissue oxygenation.
Conclusion 2

• Change in microcirculation perfusion, as quantified with perfusion angiography, can be an objective parameter for outcome.
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