**Method**

**Patient Preparation**

Acclimatise at an ambient temperature of 25 ± 1°C during body heating with a thermal blanket and foot warming until the apex of the hallux and the dorsum of the foot proximal to the first and second metatarsal heads achieve a temperature above 30°C maintained for 5 minutes. This usually takes 10 to 20 minutes.

**Test Protocol**

With the foot removed from the foot warmer, the scan-head of the moorLDI2 is then aligned to be perpendicular to the dorsum of the foot at a fixed distance of 30cm and a baseline image of study site on the foot covering an area of 5.5cm x 5.5cm is taken.

Immediately following the baseline scan the dorsal skin, just proximal to the heads of the first and second metatarsals, is heated using the VHP1 heater probe skin heater probe. The heater is held firmly but lightly in contact with the skin surface using a Micropore™ tape, ensuring that there is total contact over the whole of the interface. The skin is then heated sequentially to 44°C for 2 minutes, 46°C for 1 minute and finally 47°C for 3 minutes; a total of 6 minutes heating. The VHP1 skin heater probe is then removed from the skin and a second moorLDI2 scan is made.

Normally it is advised to avoid scanning with the beam perpendicular to the skin surface, because of the potential LD flux distortion from excess laser reflection, but, for dry feet, this is less likely. When using the advised angle of 15°, scale the flare area by 1/cos15° (add ~ 3.4%).

**Set-up summary**

1. Turn on and pre-set the Skin heater to 44°C.
2. Turn on moorLDI2.
3. Pre-set the moorLDI2 scan distance to 30cm and area to 158 x 158 pixels for area 5.5cm x 5.5cm.

**Method Summary:**

4. Warm the patient and their feet;
5. Scan the foot (baseline scan to check for any hyperaemia due to tight shoes etc);
6. Turn on the skin heater, pre-set to 44°C, and wait until it reaches 44°C;
7. Attach skin heater, just proximal to the heads of the first and second metatarsals, with micropore tape (put the tape to the edges of the foot to avoid the skin immediately surrounding the heater. Start timing**.
8. Heat at 44°C for 2 minutes;
9. Change set temperature to 46°C
10. Heat at 46°C for 1 minute;
11. Change set temperature to 47°C
12. Heat at 47°C for 3 minutes;
13. Turn off and remove skin heater;
14. Re-position scan-head over foot and scan; save image and patient details.

Remove moorLDI2 and continue with any other investigations.

**Note that the heater protocol can be run automatically if the moorVMS-HEAT-HT is controlled with moorVMS-PC software by using a pre-set protocol.
### Method

#### Patient Preparation

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#### Test Protocol

With the foot removed from the foot warmer, the scan-head of the moorLDI2 is then aligned to be perpendicular* to the dorsum of the foot at a fixed distance of 30cm and a baseline image of study site on the foot covering an area of 5.5cm x 5.5cm is taken.

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13. Turn off and remove skin heater;
14. Re-position scan-head over foot and scan; save image and patient details.

Remove moorLDI2 and continue with any other investigations.
Analysis

15. Review image with moorLDI2 software version 5.x;
16. Image Processing, Smooth, Flux Image;
17. Image Processing, Threshold/Cut: set Lower Blood flow Threshold to 300PU (upper = 5000PU);
18. Use the Polygon ROI function to roughly outline the area of flare (avoid any artefacts);
19. Analysis, Statistics: calculate Valid% x Area / 100 = LDI-Flare area.

Example

Figure 1: Foot with skin heater attached with tape, probe exerting light pressure on skin and tape not in contact with skin immediately surrounding heated site.

Figure 2: moorLDI2 Images of a 5.5cm square on a healthy foot: Baseline, LDI Flare after Ipswich protocol, processed image with cut below 300PU and with ROI to remove extraneous areas.

Figure 3: Statistics table for the ROI with Valid% and Area circled

Calculation

Flare area = 72.9 x 8.78 / 100 = 6.4cm².

LDI-Flare = 6.4cm².

Publications


Further Reading

moorLDI2 and moorVMS-HEAT-HT user manuals for instrument operation.
www.moor.co.uk - further information about the moorLDI2, moorVMS-HEAT-HT and other Moor Instruments products.
Please feel free to consult sales@moor.co.uk for further advice or support with issues not covered in this application note and details of other application notes using the moorLDI2 and moorVMS-HEAT-HT.

Important Disclaimer: This information is provided to further clinical research into diagnostic capabilities of laser Doppler. The moorLDI2 and moorVMS-HEAT-HT is CE marked for human. Equipment with a current service record should only be used.

Notes

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Innovation in microvascular assessment
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