



Capillary & AVA Flow Measured Separately

APPLICATION

Basic research in human circulation

Site: finger

Species: human

Duration: acute

PROBE

type: S (straight)

modification: special fiber spacings
(1 each, 0.3 mm & 0.7 mm)

Type S (Straight) (ABLPHS)

titanium tip
diameter, 6 mm; length, 6 mm



The probe may be used with rubber holders taped to the skin.

This probe may also be used with a balance arm on tissue preparations that exhibit slow rhythmic motions.

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References

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- ²Nagasaka, T., Hirata, K., Nunomura, T., "Contribution of Arteriovenous Anastomoses to Vasoconstriction Induced by Local Heating of the Human Finger," *Japanese Journal of Physiology*, Vol. 37, p. 425-433, 1987.
- ³Hirata, K., Nagasaka, T., Noda, Y., "Partitional Measurement of Capillary and Arteriovenous Anastomotic Blood Flow in the Human Finger by Laser-Doppler-Flowmeter," *European Journal of Applied Physiology*, Vol. 57, p. 616-621, 1988.

SURGICAL APPROACH

The finger contains both nutritive capillaries and arteriovenous anastomoses (AVAs) for body temperature regulation. While the laser Doppler technique can be readily applied to the human finger for clinical studies, this application note will describe a more rigorous approach needed for basic research.

Use a climactic chamber to control temperature and relative humidity. Have the subjects fast for 8-10 hours prior to the experiment. Set the climactic chamber for 20°C. Have the subject sit in a reclining chair with forearms suspended at shoulder level.

In order to fix the laser-Doppler probe to the finger, attach a rubber probe holder to the palmar surface of the finger with an adhesive disk. Insert the probe into the holder, taking special care to support the fiber optic cable and to keep the arms and hands stationary.

In this study, the probe with 0.3 mm fiber spacing was affixed to the index finger while the probe with 0.7 mm fiber spacing was affixed to the ring finger. Venous occlusion plethysmography (SGP) was done with a strain gauge applied to the middle finger.

Continuously record the perfusion results via a chart recorder or computer.

Immerse the hand with the probes attached in a water bath at 25°C (at time = 0). At time = 10 minutes, raise the water temperature 0.75°C•min⁻¹ to 35°C. Keep the bath at 35°C for the balance of the 120 minute procedure. At time = 50 minutes, raise the ambient temperature to 35°C.

FLOW RANGES OBSERVED

BLOOD FLOW SYSTEM	FLOW: room @ 20°C Hand: @ 25°C	FLOW: room @20°C Hand: @ 35°C	FLOW: room @35°C Hand: @ 35°C
LDF _{0.3}	3.0 TPU	17.5 TPU	17.5 TPU
LDF _{0.7}	10.0 TPU	20.0 TPU	40.0 TPU
SGP	3 ml•100ml ⁻¹ •min ⁻¹	7 ml•100ml ⁻¹ •min ⁻¹	20 ml•100ml ⁻¹ •min ⁻¹