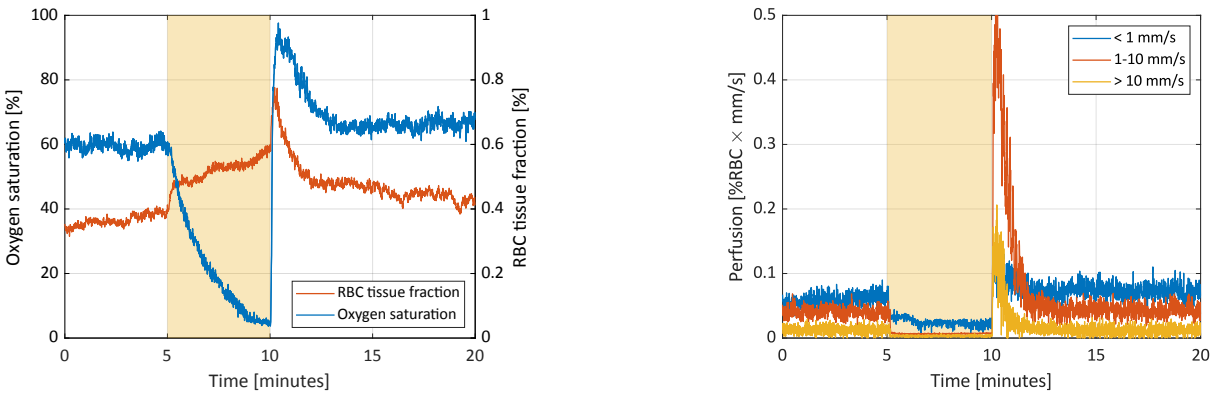
PERIMED

ENHANCED PERFUSION AND OXYGEN SATURATION (EPOS)

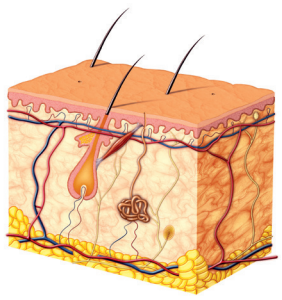
QUANTITATIVE SPEED-RESOLVED PERFUSION AND OXYGEN SATURATION

The principal advantage of this unique technology is that it presents blood perfusion in absolute units, not only qualitatively as when using a standard laser Doppler. Furthermore, it distinguishes different speeds within the blood flow – speed-resolved perfusion. For example, it enables the ability to differentiate slow **nutritive** flow, essential for all living cells in the body, from faster flow that only has the purpose of transportation. In addition, it is possible to study the correlation between blood flow and red blood cell (RBC) oxygen saturation, revealing information about oxygen delivery and uptake into the surrounding tissue. This enables unexplored possibilities to study and understand complex disease progressions such as severe diabetes and other physiological events involving blood flow and oxygenation. To estimate the microcirculatory parameters, a unique model-based analysis of multimodal measurements is employed. The following quantitative parameters are obtained from the measurement point in real time:

- RBC oxygen saturation (%)
- RBC tissue fraction: gram RBC / 100 gram tissue (%)
- Speed-resolved perfusion: gram RBC / 100 gram tissue × mm/seconds (% RBC x mm/second). Three different speed regions: < 1 mm/second, 1 to 10 mm/second, and > 10 mm/second
- Measurement depth (mm)



Results from a post-occlusive reactive hyperemia test on human forearm skin. Brachial occlusion (250 mmHg) between 5 and 10 minutes

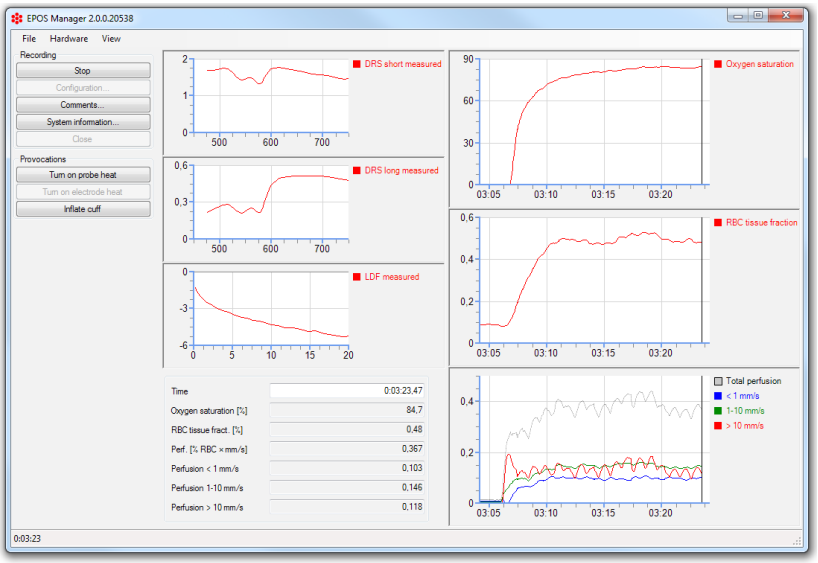


Microcirculation

The microcirculation is the blood flow through the smallest vessels in the circulatory system: high speed arterioles, medium speed shunts and venules, and low speed capillaries. One of its primary functions is to deliver oxygen to the surrounding tissue, which is primarily done in the low speed capillaries – the nutritive flow. Important parameters required to assess the microcirculation are blood flow and the level of oxygenation.

System information

In the PeriFlux 6000 EPOS System, laser Doppler flowmetry (LDF) and diffuse reflectance spectroscopy (DRS) have been successfully integrated, enabling accurate measurements of blood flow and oxygen saturation in the microcirculation. The system consists of a main unit (PF 6001 Main Unit) equipped with a spectroscopy unit (PF 6060 Spectroscopy Unit) and a laser Doppler monitoring unit combined with temperature control (PF 6010 LDPM/Temp Unit). In addition, a dedicated fiber-optic probe that integrates the DRS and LDF modalities is required. The probe includes heating functionality. Furthermore, a pressure unit (PF 6050 Pressure Unit) can optionally be added to accurately study post-occlusive hyperemia responses, and a tcpO_2 unit (PF 6040 tcpO_2 Unit) can be added for simultaneous transcutaneous oxygen pressure recordings. A dedicated software (EPOS Manager) is available for operation and data evaluation.



Please note that this instrument is intended for research purposes in USA and China. PF 6000 EPOS is planned for launch in Europe in 2020.

References:

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