



Tissue Oximeter by Spectros

The contribution of capillary, venous and arterial blood in the oxygen saturation reported by the T-Stat VLS Tissue Oximeter

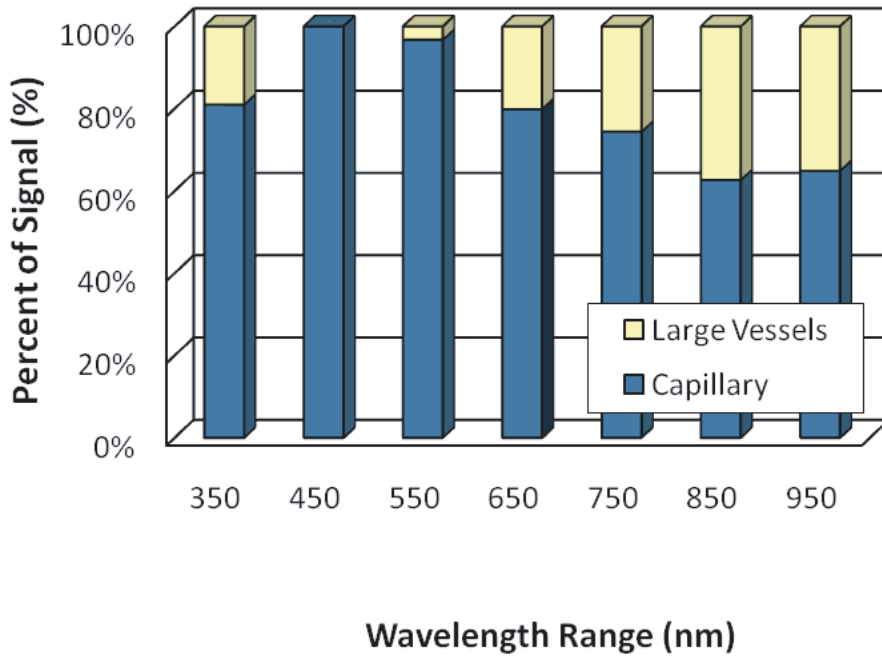
The T-Stat® Microvascular Tissue Oximeter provides a continuous, non-invasive measurement of the microvascular hemoglobin oxygen saturation, sensitive to reduced-flow or no-flow ischemia, as demonstrated in peer-reviewed human clinical studies.

The basis for operation for the T-Stat® is that hemoglobin in its various forms (oxy-, deoxy-, met-, carboxy-) has unique spectroscopic properties that allow StO₂% to be determined based on measurements of the spectral characteristics of the reflectance of light from tissue.

The Spectros T-Stat uses broadband, multi-wavelength illumination and monitoring to determine the relative amount of oxygenated and deoxygenated hemoglobin. StO₂% is then defined as the percentage of hemoglobin in the oxygenated form as compared to the total hemoglobin in both oxygenated and deoxygenated forms.

In the 475 to 600 nm range, the absorbance of hemoglobin is so strong, that light that is scattered into the larger hemoglobin carrying structures (e.g. arteries, veins, arterioles and venules), is nearly fully absorbed within those structures and is not scattered back into the receiving fiber of the sensor. Only the light that passes through the smallest structures (capillaries) makes it back to the receiver for analysis.

The chart below shows the relative power of the reflected light that has passed through capillaries (typically 0.01 mm in diameter) and the reflected light that has passed through larger structures (1 mm or more).



Within the visible light range, 88% of the return light has passed through capillaries and only 12% of the light returned has passed through the larger structures. Due to the spectral tuning of the T-Stat® light source where the peak power is emitted at 550 nm, the return light for the T-Stat® is more than 95% capillary-weighted, with only 5% of the signal coming from the larger structures.

Systems that use near infrared spectroscopy (NIRS) on the other hand, operate in the 750 to 950 nm range. In this range, the return light is only 60% capillary-weighted, and consists of 40% light that has passed through the larger structures such as arteries and veins. The T-Stat® reports a capillary weighted oxygen saturation due to the selection of the range of light emitted by the sensor.

Visible wavelengths include electromagnetic radiation from blue to yellow, namely between 400 nm and 625 microns, and within that range, the T-Stat utilizes green to orange, i.e., between 475 and 600 nm, where the absorbance by hemoglobin is the strongest.

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