[FS-11] Update in Cerebral Function Monitoring

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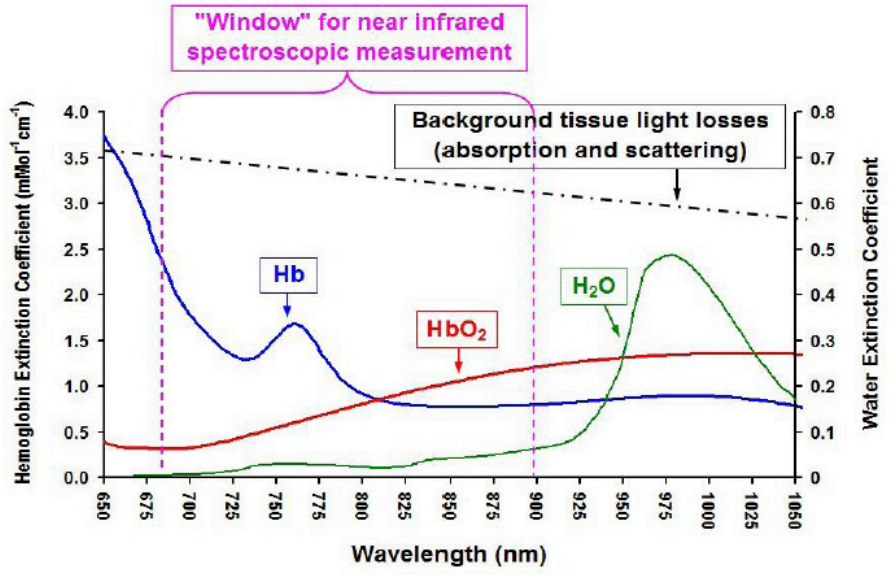
Cerebral Oximetry

Near-infrared light possesses the ability to pass through biological tissue readily. Cerebral oximetry is based on near-infrared spectroscopy (NIRS) technology that detects oxygenation changes in tissue mainly at the microcirculation level (capillary, arterioles, and venules). The principle of NIRS relies on the different absorption characteristics of the chromophores oxyhemoglobin (HbO_2) and deoxyhemoglobin (Hb) in the near-infrared spectrum. A “biological spectroscopic window” exists at the wavelength range 660 - 940 nm because only a few chromophores like Hb and HbO_2 strongly absorb light in this spectra range, allowing light to penetrate tissue at a greater distance **(Image 1)**. In this wavelength range, absorption of light due to other biological compounds and tissues such as water, lipids, skin, and bone are lower in magnitude and generally spectrally flat when compared to Hb, HbO_2, and cytochrome aa_3 ($cytaa_3$).

Image 1



Cerebral oximetry provides information on the availability of oxygen in brain tissue at risk during numerous pathological conditions. Cerebral oxygenation can be measured noninvasively and continuously. It is expressed as a mixed oxygen saturation parameter between arterial (SaO_2) and jugular venous oxygen saturation (SjvO2) under normal physiological conditions (SaO_2 > $SctO_2$ > $SjvO_2$).

Over the last few years data has emerged linking decreased perioperative $SctO_2$ values with poorer patient outcomes, especially in the high risk population of cardiothoracic surgery.

This lecture will provide the participant with insight into the recent advances in the field of cerebral oximetry.