

PortaLite MKII

A truly lite & advanced oxygenation monitoring device



Measures local oxy-, deoxy- and total hemoglobin concentration changes and tissue saturation index (TSI)



Truly light and portable, weighing only 236 grams including two sensors



Up to 30 hours of power with fast charging battery



More than 250 hours of data collection & storage, online and offline

www.neurolite.ch

Interested?
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Near Infrared Spectroscopy

NIRS, the technique which the PortaLite MKII is based on, relies mainly on two characteristics of human tissue. The first one is the relative transparency of human tissue for light in the NIR range and secondly, on the oxygenation dependent absorbance of the hemoglobin. These characteristics make it possible to measure brain activity and muscle tissue oxygenation, when the PortaLite MKII is applied to the forehead and muscle respectively.

WHAT CAN NIRS DO FOR ME?

- NIRS is used in many fields of research. NIRS enables measuring the relative changes in the concentration of oxyhemoglobin (O₂Hb), deoxyhemoglobin (HHb) and total hemoglobin (tHb) in biological tissue.
- As absolute measurement, the PortaLite MKII measures / displays tissue saturation index (TSI) in both brain and muscle tissue.

Where light meets **Lite**



L **imitless device range**

The offline measurement feature enables performing measurement outside your Bluetooth range. This perfectly allows for capturing data during physical activity, such as running or cycling, in any terrain, from mountains to forests. The data you have acquired offline can easily and directly be loaded in our software OxySoft for further analysis.

I **nertial Measurement Units**

It is possible to add Inertial Measurement Units (IMUs), also known as motion sensor, in the PortaLite MKII by request. The built-in gyroscope and accelerometer can be used to easily acquire position and orientation movement data in real-time. Within our software OxySoft, movement and NIRS data are synchronized. In addition, using the motion sensor significantly simplifies removal of movement artifacts. Adding the motion data enhances measurement possibilities for your research.

T **wo sensors**

The standard PortaLite MKII package comes with two sensors included. Containing two sensor connection possibilities per control unit, the PortaLite MKII offers the opportunity to use one or two sensors at the same time. This leads to maximum flexibility in choice of application. Both brain sides, different muscles, or brain and muscle simultaneously - measurement possibilities are unlimited!

E **xceptional data quality**

High data quality is crucial to acquire results that can be trusted on. Next to three long channels, the PortaLite MKII contains three built-in short separation channels with decreased receiver-transmitter distance. These short separation channels can be used to improve data quality.



How do short separation channels work?

When measuring with NIRS, light in the near-infrared spectrum will be transmitted and received through brain or muscle tissue. During the measurement, the light not only travels through the tissue, but it also passes the superficial tissue layer twice. The superficial tissue in humans, which includes skin and scalp, is approximately 13 mm thick and highly vascularized. It can convey physiological systematic changes due to activation of autonomic nervous system or changes in blood pressure. These changes can sometimes overshadow neural activity signals measured in brain tissue. Thus, signals measured in superficial tissue can be seen as noise.

Short Separation Channels (SSCs) can be used to remove this noise. Because there is less distance between the transmitter and receiver, they measure only extracerebral signals. These signals include blood pressure waves, Mayer waves, respiration and cardiac cycles. As the signal in the superficial layers is influenced by physiological changes, SSCs can be used to regress this noise from cognitive brain signals. This can lead to improved data quality.



Applications

The flexible sensors of the PortaLite MKII optimally fit onto curved areas, such as the head or rounded muscles. It is highly portable, easy to use and provides almost no set-up time. Due to its light weight, possibility to perform offline measurement and battery longevity, it cannot only be used in the lab, but also on the field performing physical activities. Therefore, the PortaLite offers a huge range of application areas, such as:

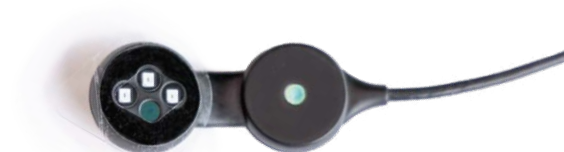
- Sports science
- Functional studies
- Hypoxia studies
- Clinical studies
- Neuroscience studies
- Rehabilitation studies, and more



Custom stickers

The PortaLite MKII comes with a set of 52 custom-made skin stickers. These exclusive double-sided sticky discs are meticulously crafted to perfectly complement the PortaLite MKII sensors, and guarantee an impeccable fit around the sensors' transmitters and receivers.

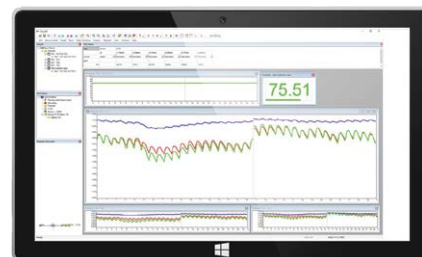
Rest assured, our sticky discs have undergone rigorous testing for biocompatibility, meeting the highest standards set by ISO-10993 for skin irritation, sensitization, and cytotoxicity. With a thickness ranging from 4.8 to 5.2 microns, these stickers strike the perfect balance between durability and flexibility.



Software

All of our devices come bundled with OxySoft, our proprietary NIRS recording and analysis software. This user-friendly software is highly customizable to individual requirements, and provides real-time calculations of oxy-, deoxy-, total hemoglobin and TSI.

With OxySoft, all data is seamlessly synchronized and stored in a single file, which can be analyzed during the recording, or afterward. OxySoft supports exporting the raw data to various formats, and is compatible with a wide range of third party software. Additionally, it enables for real-time streaming of data to e.g. Matlab or Python.



What's in the box?

PortaLite MKII research package



PortaLite MKII control unit with 2 PortaLite MKII sensors

PortaLite MKII starter pack

OxySoft, our proprietary data analysis software

Laptop with pre-installed software

OxySoft license key

USB Bluetooth dongle

Universal micro-USB cable

Battery charger

User Manual & quick start guide

Support in setting up your research

Technical specifications

TECHNOLOGY	Continuous wave Near-InfraRed Spectroscopy (NIRS) using the modified Beer-Lambert law	
RELATIVE MEASURES	Oxy-, deoxy-, and total hemoglobin concentration changes	
ABSOLUTE MEASURES	Tissue saturation index (TSI) using spatially resolved spectroscopy (SRS)	
CHANNELS	6 relative, 1 absolute (per sensor)	
SHORT SEPARATION CHANNELS	7.2 and 8.0 mm	
TEMPLATE & LOCATION	Fixed template for muscle and brain (frontal cortex)	
INTER-OPTODE DISTANCE	29, 35 and 41 mm	
RECEIVERS	2 photodiodes	
TRANSMITTERS	3 LEDs, each with 2 wavelengths	
WAVELENGTHS	Standard 760 and 850 nm	
AMBIENT LIGHT CORRECTION	Proprietary algorithm to filter out ambient light	
DIMENSION	Control Unit: 123 x 57 x 23 mm. Sensor: 72 x 28 x 9 mm. Wire at least 1.4m	
WEIGHT	Control Unit: 120 gram. Sensor: 58 gram.	
ENVIRONMENT	Operating temperature: 10 - 40 °C	
INDICATORS	On/Off, Standby/Measuring, Battery status, Sensor connected/disconnected	
POWER	Up to 30 hours with fast-charging battery	
SAMPLE RATE	100 Hz	
ORIENTATION SENSOR	Optional: Accelerometer and gyroscope	
DATA COLLECTION & STORAGE	Online and offline (> 250 hours)	
DATA ACQUISITION & ANALYSIS SOFTWARE	OxySoft	
OPERATING SYSTEM	Windows 10	
EVENTS	Online, offline or PortaSync	
ELECTROMAGNETIC COMPATIBILITY	No interference with TMS, EEG, EMG, ECG	
HARDWARE SYNC OPTIONS	PortaSync, parallel cable, serial cable, LabStreamer	
SOFTWARE SYNC OPTIONS	ASCII, LSL, DCOM (e.g. Matlab, E-prime, Presentation)	
NIRS + OTHER COMPATIBILITIES	We deliver the following packages: <ul style="list-style-type: none"> PortaLite MKII Control Unit + 2 sensors PortaLite MKII Control Unit + 1 sensor PortaLite MKII Control Unit PortaLite MKII sensor 	

References to portable (f)NIRS

- Panagiotis, P., et al. *The Effects of High-Intensity Interval Exercise on Skeletal Muscle and Cerebral Oxygenation during Cycling and Isokinetic Concentric and Eccentric Exercise*. *J. Funct. Morphol. Kinesiol.* 6(3), 62 (2021).
- McDowell, C., et al. *The Association Between Generalized Anxiety Disorder and Resting-State Prefrontal Cortex Oxygenation Is Modified by Self-Reported Physical Activity: Results From The Irish Longitudinal Study on Ageing*. *J Gerontol A Biol Sci Med Sci* 76, 8, 1391–1397 (2021).
- Maidan, I., et al. *When is Higher Level Cognitive Control Needed for Locomotor Tasks Among Patients with Parkinson's Disease? Brain Topogr.* 30, 531–538 (2017).
- Maidan, I., et al. *The Role of the Frontal Lobe in Complex Walking Among Patients With Parkinson's Disease and Healthy Older Adults: An fNIRS Study*. *Neurorehabil. Neural Repair* 30, 963–971 (2016).
- Mirelman, A., et al. *Increased frontal brain activation during walking while dual tasking: an fNIRS study in healthy young adults*. *J. NeuroEngineering Rehabil.* 11, 85 (2014).
- Shadgan, B., et al. *Wireless near-infrared spectroscopy of skeletal muscle oxygenation and hemodynamics during exercise and ischemia*. *Spectroscopy* 23, 233–241 (2009).

NIRS devices



Brite

A wearable multi-channel NIRS device with enhanced flexibility for brain oxygenation measurement that measures oxy-, deoxy- and total hemoglobin concentration changes from any cortical brain areas.



OctaMon

Completely wearable 8 channel fNIRS optimized for prefrontal measurement that measures oxy-, deoxy- and total hemoglobin in a non-invasive and truly portable way.



OctaMon+

Completely wearable 8 channel fNIRS that measures oxy-, deoxy- and total hemoglobin in a non-invasive and truly portable way. Applicable anywhere on the head, and optimized to measure through hair.



PortaMon

The gold-standard research device for the measurement of muscle oxygenation which measures TSI, as well as oxy-, deoxy- & total hemoglobin.