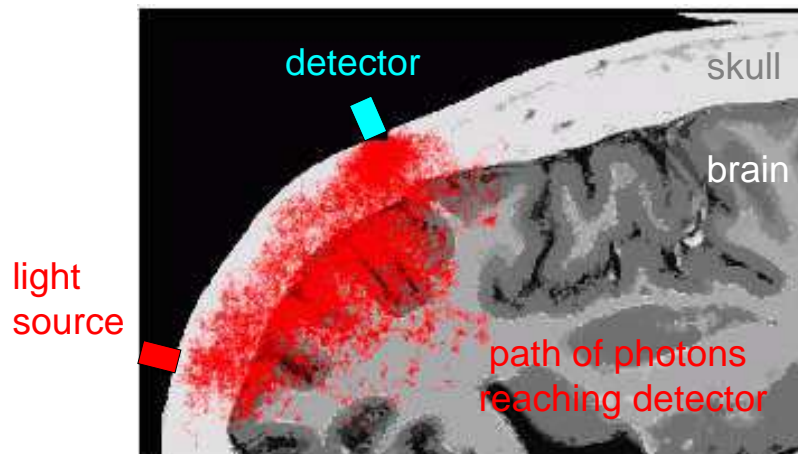


■ Do UMTS Electromagnetic Fields (EMF) Affect the Blood Circulation of the Human Brain? A Near-Infrared Imaging Study

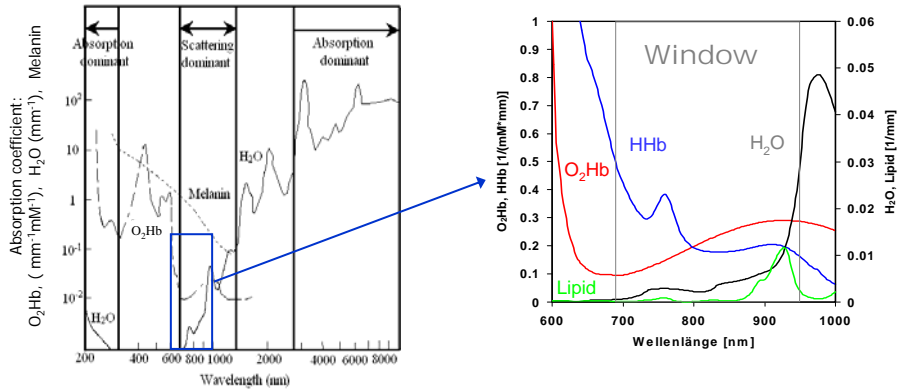
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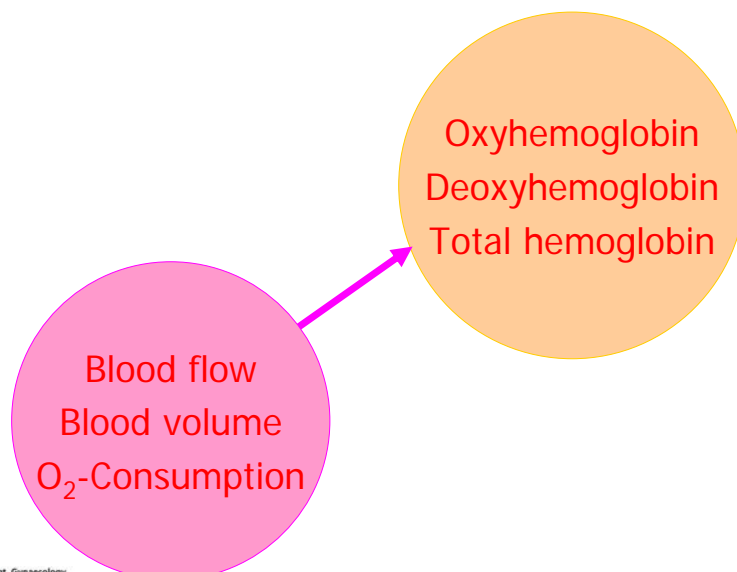
1. Non-invasive near infrared imaging (NIRI)



Absorption spectrum



What can be measured?



Limitations and advantages of NIRI



- In adults limited to outer cortex
- Limited spatial resolution
- Usually no anatomical information

- Influence of extracerebral tissue (not true for multidistance)
- Motion artifacts
- Hair needs to be brushed away



- + Non-invasive, painless
- + Non-ionizing radiation
- + Functional studies of e.g. developing brain possible
- + Continuous monitoring at high time resolution
- + Bedside applicable
- + No tracers necessary
- + Multimodal imaging with fMRI, PET, EEG & MEG
- + **Not sensitive to EMF**



Objectives: Study potential effects of UMTS-EMF on blood circulation in human subjects

- **Modification NIRI**
 - Inertness to EMF
- **Exploratory study**
- **Confirmatory study**
 - Short-term effects <80s
 - Mid-term effects ~25min
 - Dose effect relation



Materials: Optical system

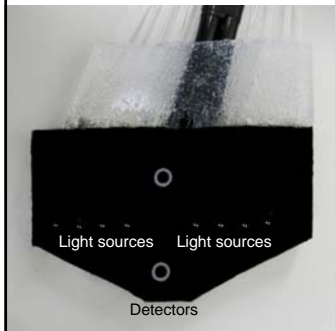


Fig. 4: self-made optical sensor

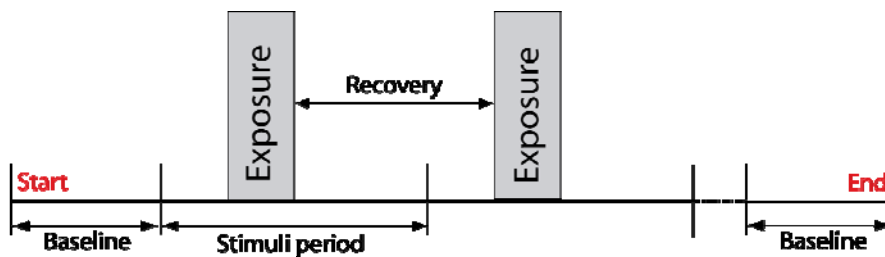
- 8 source positions (8x690 nm, 8x830 nm) and 2 detectors
→ 16 source-detector combinations
- NIRI placed outside of the exposure chamber

→ No interference between optical and exposure setup

Dimensions: 50x81x7 mm³
Distances: 1.6 – 3.3 cm



Methods: Exposure Sequence



Stimuli period: 80s
Exposure period: 20 s
Recovery period: 60s
Repetitions: 15 (EP), 16 (CP)

→ 26 (31) min measurement duration (with baseline recording)



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