

Cerebral neuro-imaging by fNIRS during sleep induction by transpalpebral night vision.

P.-A. Grounauer, MD ophthalmologist, University Eye Clinic Lausanne
B. Métraux, 3th year medical student, CHUV, Lausanne

Aims

The **aims** of this applied research are to show that night vision through closed eyes can contribute to fighting insomnia and to record by fNIRS the hemodynamic modifications of the prefrontal and occipital cortices simultaneously with visual perception.

Means

The **means** used are a low intensity 650nm 5mcd red LED placed on the forehead between the eyes. Simultaneously, near infra-red light beams, differently absorbed by oxygenated and deoxygenated hemoglobin, are emitted by 24 optic fibres placed on the forehead (12) and the occiput (12). This difference of absorption is considered as proof of cerebral hemodynamic variations captured by the Shimadzu FOIRE-3000 imaging system.

Method

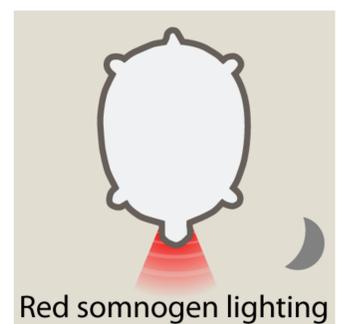
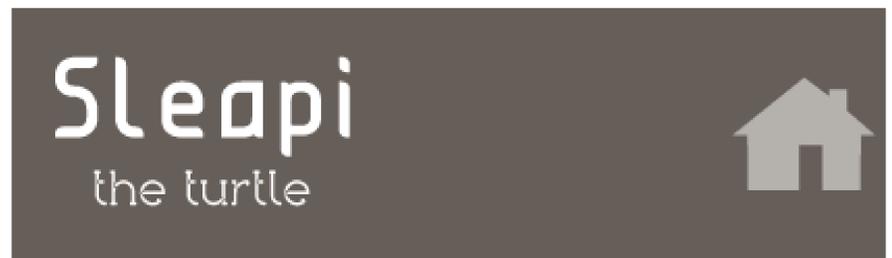
The **method** consists of the subject – in this case a 22-year-old right-handed man with no pathology – sitting next to the instrument in a dark, silent room and then varying the intensity of the LED rhythmically during 6 minutes.

Results

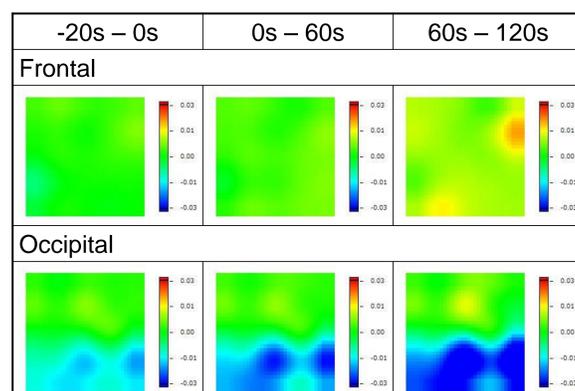
The **mean results** from the different light-dark sequences show a notable difference between the frontal lobes, the right being activated more than the left, while the occipital visual cortices are not hemodynamically modified.

Conclusion

In **conclusion**, and subject to validated statistical confirmation, night vision through closed eyes could become a useful cognitive-behavioural therapy for sleep rehabilitation and fighting insomnia.



Averaged data of 3 trials (Total-Hb map)



Bibliography

Gruzelier John, Contemporary Hypnosis 23(1) 15-32, 2006
Birbaumer Niels, Physiologie des Menschen, Springer, 202-222, 2007
Münch M. and col Am. J. Physiol, 290,1421-1428, 2006
Kawasaki A, J Neuro-opht. 27,3, 2007
Smaga D and col Rev Méd Suisse, 6, 330-333, 2010
Cajochen C and col, Sleep med. Rev. 11, 453-464, 2007
Rauchs G and col J of Neuroscience 31,7, 2563, 2011

www.somnogenvt.ch

www.sleapi.com