

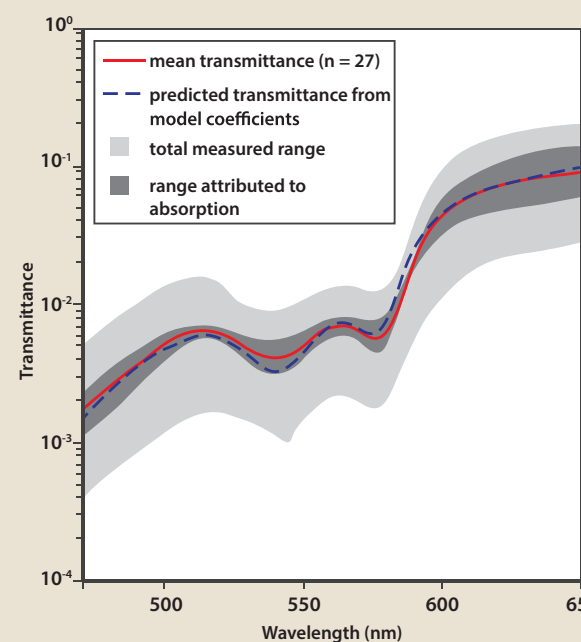
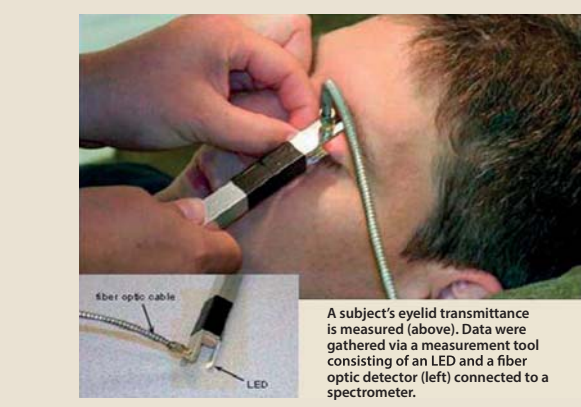
# PREFRONTAL AND OCCIPITAL NEUROIMAGING BY fNIRS DURING SLEEP INDUCTION THROUGH TRANSPALPEBRAL NIGHT VISION

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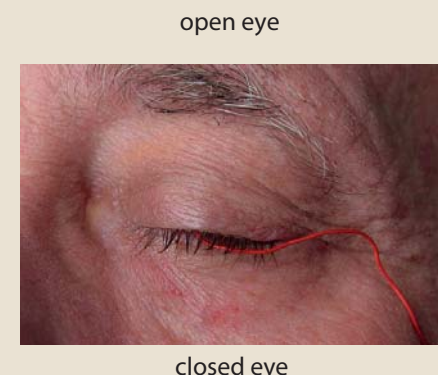
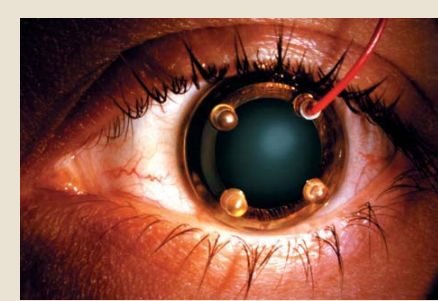
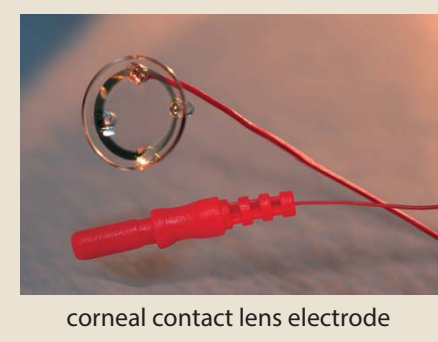
## INTRODUCTION

Functional Near Infrared Spectroscopy fNIRS is a non-invasive surface technique measuring and illustrating the hemodynamic parameters of tissues which is more and more often used in the cerebral neurological imaging. This preliminary study shows that it is possible to follow superficial prefrontal cortical vascularisation modified by a simple mental task, in this case, the attentive observation of a red glow.

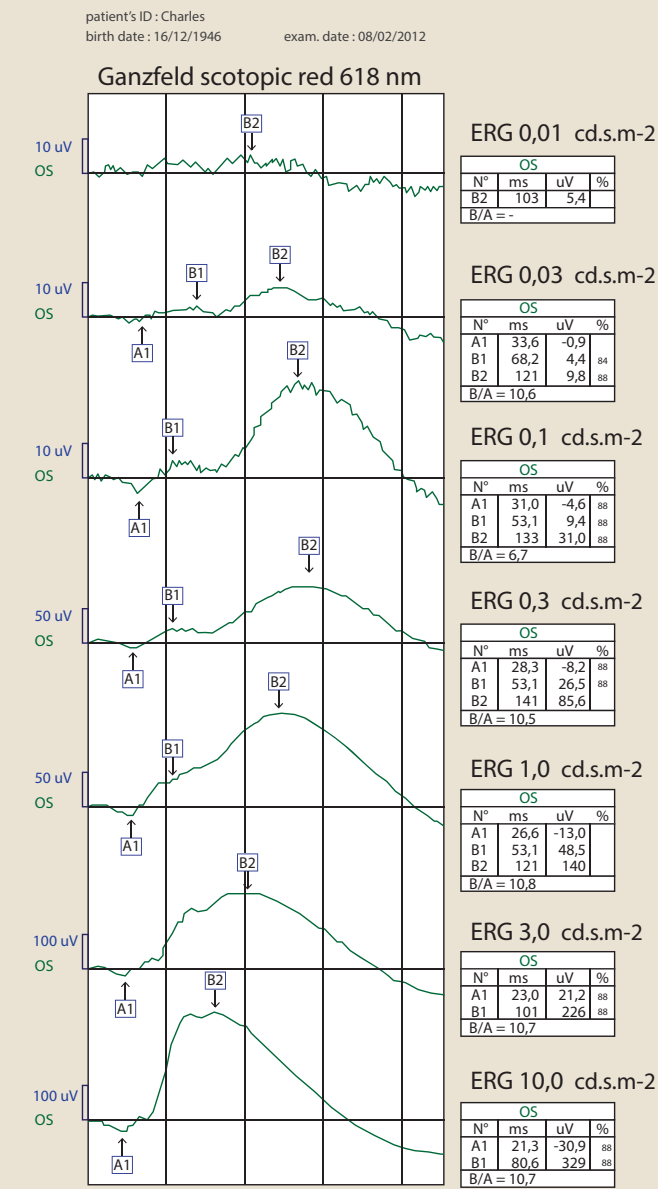
## OBJECTIVE DATA THROUGH PALPEBRAL AND OCULAR EXPLORATIONS



The colour red passes through the eyelids more easily, which allows the use of a very weak light intensity with no melatonin interference.

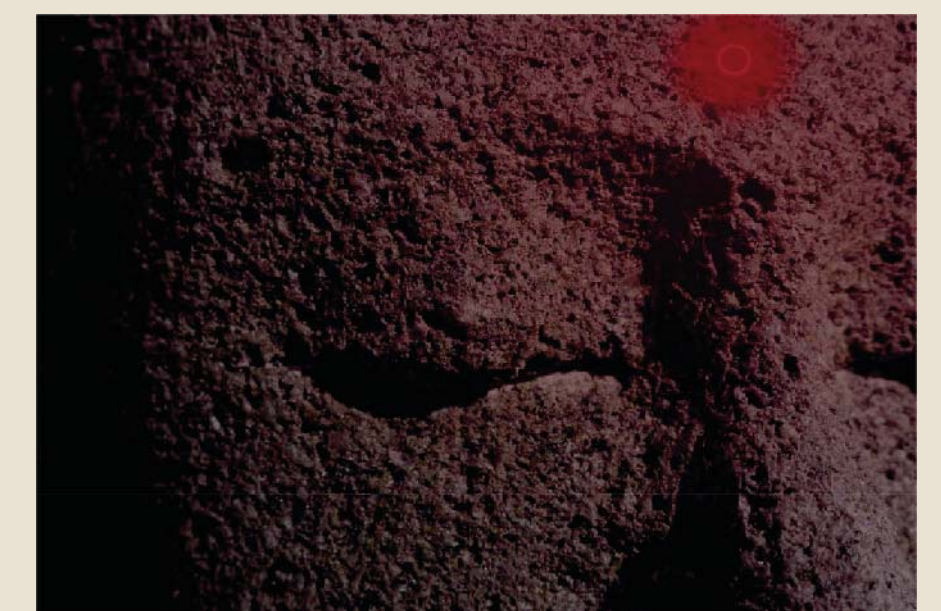


ERG is the only way of proving the retina nocturnal activity



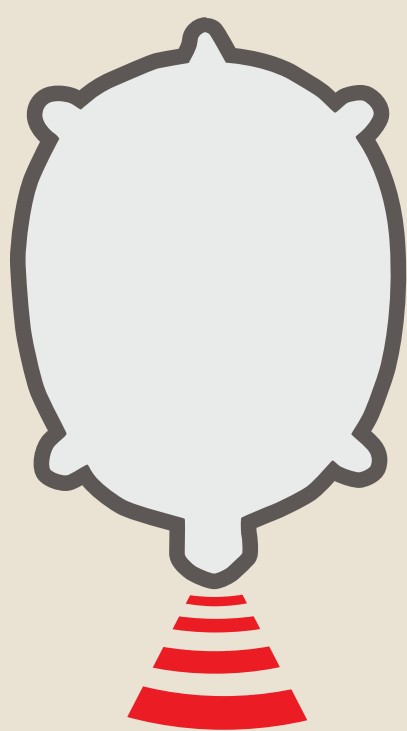
These recordings show that retina remains 'active' at night.

## SUBJECTIVE DATA THROUGH VISUAL PSYCHOPHYSIC

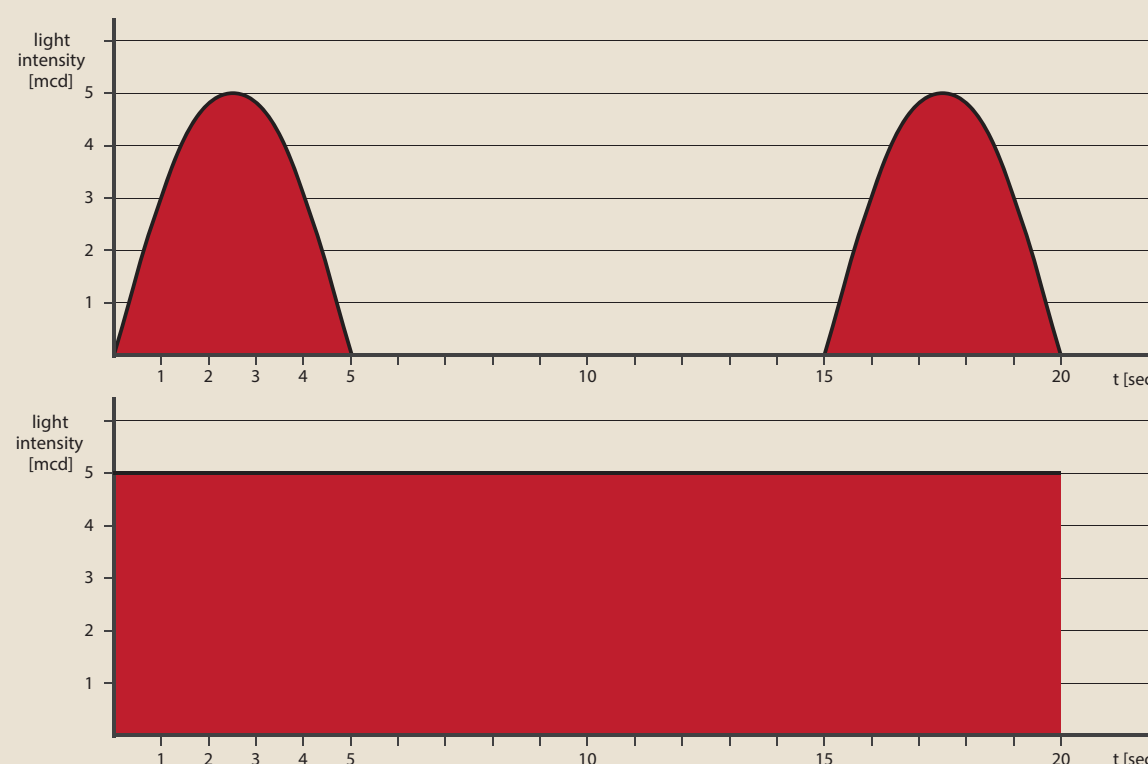


The nocturnal observation, through closed eyes, of a glow, coloured or not, is possible even with a very weak light intensity. By rhythmically changing the light intensity, this liminal perception becomes a support allowing the mental circle which maintains insomnia to be broken. Slow, deep breathing enhances the effects, while the voluntary reduction of muscle tone in the lower limbs increases the efficacy. Daily somnogen visual training SVT demands and benefits brain plasticity.

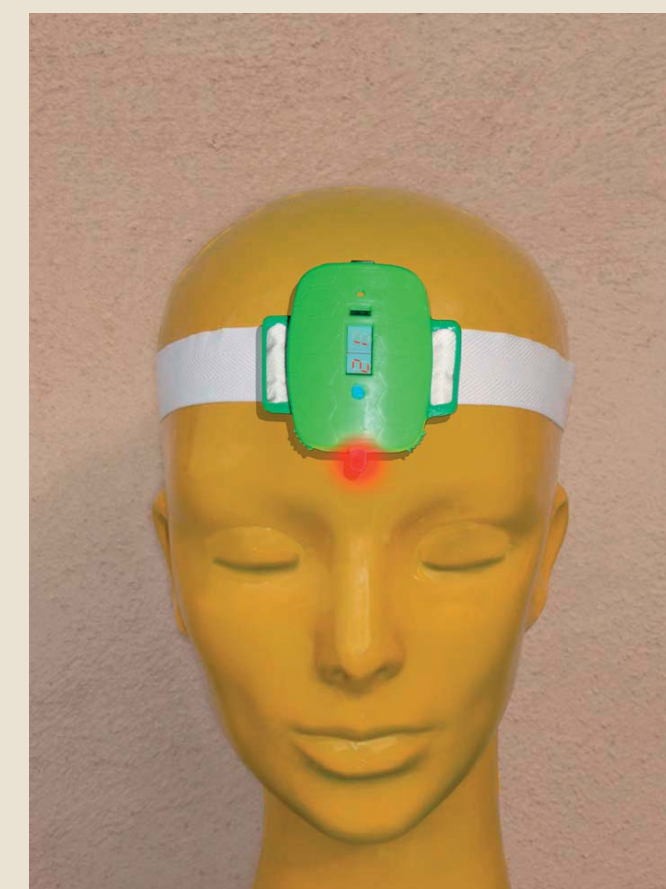
## MATERIAL AND METHOD



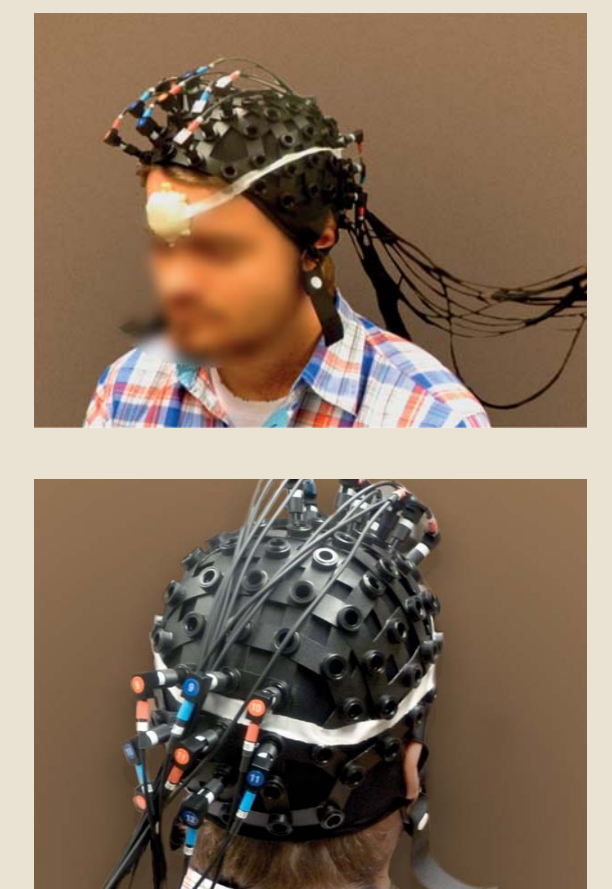
A red LED light, 605nm and 5mcd is emitted in continuous or discontinuous mode



In discontinuous mode (high), the variation is predetermined, whereas in continuous mode (low), the light variation is due to voluntary eye movements

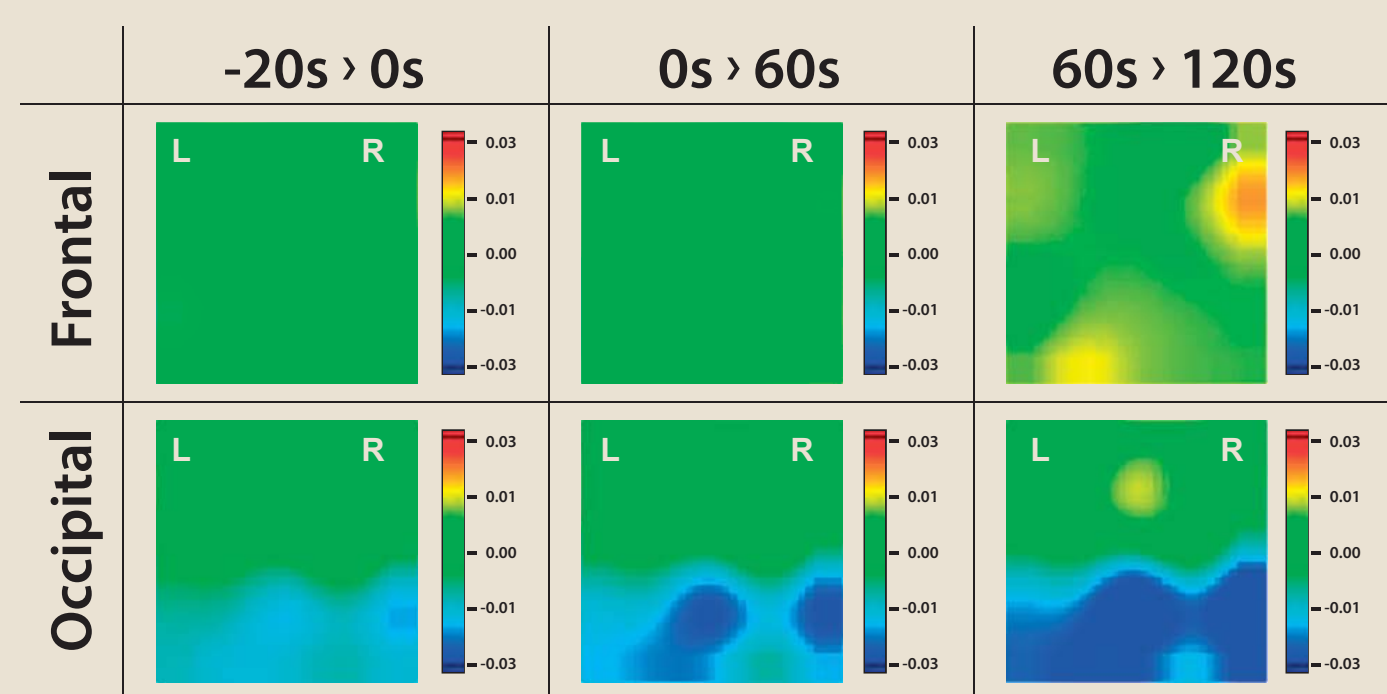


S3IR is placed between the closed eyes



F-3000 spectroscopy 12 frontal optodes 12 cortical optodes

## PRELIMINARY RESULTS



Before stimulation, no hemodynamic variation is recordable

After 2 minutes stimulation, the hemodynamic precortical variations are strong and asymmetric and the cortical variations weaker

## CONCLUSIONS

Cerebral neuroimaging by fNIRS is a non-invasive, sensitive and specific means, within the limits of the method, to understand the hemodynamic variations of the neocortex in numerous corporal and mental tasks, such as sleep induction. Our results are a further step in cognitive behavioral therapy CBT in insomnia's field.

In the domain of insomnia, the liminal perception of a pink glow facilitates somnogen visual training SVT in the fight against insomnia, subject to subsequent, statistically documented evidence.

In addition, synchronization between S3IR and respiratory inductive plethysmography\* could become a complementary means of facilitating the apprenticeship and practice of SVT.

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## ABBREVIATIONS

- fNIRS functional near infra-red spectroscopy
- ERG electroretinogram
- F-3000 FOIRE-3000 Shimadzu Japan
- SLEAPI Sleeping Light Emission Awakening Provider Instrument
- S3IR version 3 of S2 fitted with an infrared captor
- SVT somnogen visual training
- CBT cognitive behavioral therapy

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