Summary of published, peer-reviewed findings
Valkee Oy

Research efforts at Valkee follow a two-fold focus: Showing clinical effectiveness of the treatment while at the same time investigating the underlying mechanism of action of transcranial bright light.

The following results have been published in peer-reviewed journals:


   Summary:
   In this initial pilot study, 13 SAD patients were subjected to a daily dose of 8-12 min. of transcranial bright light therapy for 3 weeks. Depressive and anxiety symptoms were measured using standard questionnaires such as the 17-item Hamilton Depression Rating Scale (HAM-D-17), the Beck Depression Inventory-21 (BDI), and the 14-item Hamilton Anxiety Rating Scale (HAMA) prior to the 4 week trial and afterwards. When comparing the depression and anxiety score between week zero (baseline) and week 4 (study endpoint), results showed a significant reduction in reported symptoms on all three measures. The findings suggest that transcranial bright light therapy might be an alternative to the traditional light therapy and should be explored in more depth.

2. Stimulating brain tissue with bright light alters functional connectivity in brain at the resting state.

   Summary:
   50 healthy subjects were randomized into two groups (N=24 experimental group, N=26 control group) and either received 12 min of transcranial bright light therapy or sham, i.e. no light, while being subjected to Functional Magnetic Resonance Imaging (fMRI). The results of the fMRI showed a clear increase in neural connectivity of the visual cortex and senso-motoric areas of the cortex under the transcranial light compared to the sham group. This suggests the brain to be light perceptive. In addition, these were the same brain areas that showed increased connectivity in the studies by Abou-Elseoud et al. (2011; 2014), summarized below.


Summary:
Resting state functional brain activity provides a method to detect an existing neurobiological substrate for various disorders, including Seasonal Affective Disorder (SAD). For this purpose, a total of 90 subjects (45 SAD patients; 45 healthy controls) underwent an fMRI to determine functional connectivity of various brain areas in the resting state. A total of 47 resting state networks (RSNs) were investigated. The results showed a clear difference in functional connectivity between SAD patients and healthy, age, gender and ethnicity-matched controls in 11 out of the 47 tested RSNs. The SAD patients showed increased functional connectivity in attentional, visual, and sensomotoric RSNs. These findings support previous findings of psychomotor, attentional, and cognitive impairments seen in SAD patients. Interestingly enough, the same brain areas showed increased activity in healthy controls when exposed to TBL in the previous study.


Summary:
90 subjects (45 SAD patients; 45 healthy controls) underwent a fMRI to determine functional connectivity of brain areas. Results from the fMRI scans were analyzed with different mathematical models. In addition to increased neuronal connectivity within the visual and senso-motoric cortex of the SAD patients, results showed that depending on the model order and analysis, the sensitivity towards disease detection can be significantly improved and resting state brain activity might prove to be a very useful tool to detect the underlying neurobiological substrates of diseases.

5. Encephalopsin (OPN3) protein abundance in the adult mouse brain.

Autoren: Nissilä J, Mänttäri S, Särkioja T, Tuominen H, Takala T, Timonen M, Saarela S.

Summary:
The presence of light-sensitive opsins in the retina has been shown successfully in various studies. The present study investigates the expression encephalopsin (OPN3) proteins in brain and peripheral tissue of mice. Tissue samples of 10 mice were analysed using Western blotting and immunohistochemistry. Results showed the OPN3 protein expression could be shown in almost all brain areas as well as in the peripheral tissue analyzed. This suggests that
OPN3 might be involved in the mechanism of transcranial bright light.