

Shining light in the ears may alleviate SAD symptoms

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Light shone in the ears reaches light-sensitive proteins on the brain's surface.
Image credit: Valkee

(Medical Xpress) -- Millions of people experience depression and lower levels of energy in the winter due to seasonal-affective disorder (SAD), or the “winter blues.” Since the disorder is thought to arise due to a shortage of natural light, one common form of treatment is light therapy, in which the person sits in front of a bright, full-spectrum light at certain times of day. But the effectiveness of light therapy has been unclear, and now researchers from Oulu, Finland, think they know why: light-sensitive regions of the brain may actually play a larger role in SAD symptoms than those in the eyes. For this reason, they’ve designed

earphones that shine light through the ear canal to light-sensitive proteins on the brain's surface, with encouraging results.

Juuso Nissilä, a physiologist at Oulu University, designed the device after his research revealed light-sensitive proteins on the surface of animal brains. Investigating further, he discovered that a light-sensitive protein found on the human retina, opsin-3, is also located in 18 separate regions of the human brain. Further, the proteins are abundant in areas involved with the production and storage of the neurotransmitters serotonin, melatonin, and dopamine, which are involved in mood and sleep. Nissilä explains that these proteins in the brain, not those in the eyes, may have the greater impact on mood fluctuations associated with daylight changes. And the [ear canal](#) may be the best way to reach these areas.



The bright light headset contains white LEDs that produce wavelengths close to that of sunlight. Image credit: Valkee

“Shining [light](#) into the brain through the ears is a far better way to

deliver bright [light therapy](#) than staring at a lamp,” Nissilä said. “There’s no evidence that shining light in your eyes has any effect on mood, whereas we now have evidence that these brain-surface proteins are involved. Bone is actually quite a good transmitter of light - put a torch inside a skull and you’ll see the beam very clearly - so I now think that it’s the light reaching your brain surface through your skull which is the important factor.

“There are two good reasons to use the ears,” he added. “The first is that the skull is thin around the ear canal area, and a very good proportion of the light gets through. The second is that there are comparatively few blood vessels on the surface of the brain at that point,” and blood strongly absorbs light.

In order to develop a bright light headset, Nissilä co-founded a company called Valkee. The devices they make contain a white LED in each earphone that produce wavelengths close to that of sunlight, although the company says that the bluer wavelengths have the strongest effect.

Researchers at Valkee have recently published the results from their first clinical trial in the journal *Medical Hypothesis*. In the trial, patients received 8-12 minutes of 6.0-8.5 lumen bright light daily into both ear canals for four weeks. The results showed that 92% of the patients with severe SAD symptoms achieved full remission when measured by a self-rated questionnaire designed for psychological studies, and 77% as measured by a psychiatrist-rated questionnaire. Given the positive results, the researchers plan to further investigate the therapy with randomized placebo-controlled and dose-finding study designs.

The [bright light](#) headset is commercially available in Europe for £185 (\$290), but cannot yet be shipped to the US. On [Valkee’s website](#), the company claims that the headset can treat mood conditions like anxiety, tiredness and reduced cognitive performance due to SAD. The

researchers are also investigating whether the device can be used for jet lag and migraines.

More information: Markku Timonen, et al. “Can transcranial brain-targeted bright light treatment via ear canals be effective in relieving symptoms in seasonal affective disorder? - A pilot study.” *Med Hypotheses* (2012), DOI:[10.1016/j.mehy.2012.01.019](https://doi.org/10.1016/j.mehy.2012.01.019)

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