



An extracranial medical device for photobiomodulation

Extra-cranial infrared photoillumination offers hope for Alzheimer's disease

What is it?

It is a flexible support system that fits an adult's head. It integrates an embedded battery and about sixty infrared LEDs emitting at 810 nm, whose illumination sequences can be programmed in terms of duration and frequency.

It complies with the specifications of the IEC 60601 standard and can be used for clinical trials to evaluate the impact of extra-cranial infrared illumination for neurodegenerative pathologies, including Alzheimer's disease.

The trials are performed in a medical setting. The fact that the system does not require an external power supply strongly limits the discomfort for patients, both day and night.

Applications

Clinical trials for various pathologies or areas of research:

- Alzheimer's disease
- Lewy body disease
- San Filippo disease
- Cranial trauma: to identify new markers that can help track the severity or evolution of a situation
- Cognitive disorders: depression, bipolarity, obsessive-compulsive disorders (OCD)

What's new?

- The system complies with IEC 60601 standard specifications and is currently being validated for integration into clinical trials
- Developed in collaboration with hospital care teams to ensure proper daily use in trials
- Flexible mounting system with an autonomous power supply, minimizing patient discomfort
- Infrared LEDs positioned at a certain distance from the skin to prevent overheating

How does it work?

Infrared light acts on cells, notably by boosting their energy. Applied to neurological pathologies, it can be used to fight neuron degeneration, to help cells fight oxidative stress and to reduce inflammation.

During a pre-clinical trial with an intracranial implant, Clineattec has demonstrated that infrared light slows the progression of Parkinson's disease. A clinical trial is currently underway. For Alzheimer's disease, which is located in peripheral areas of the brain, research is focusing on extra-cranial illumination.

What's next?

- In 2023, a one-year clinical trial (Grenoble University Hospital, Clineattec Endowment Fund) with 60 healthy subjects will be launched at Clineattec. It will provide a database to calibrate the protocol for subsequent clinical trials on patients with the disease.
- A clinical trial project for patients with Lewy body disease is being prepared with the Strasbourg University Hospital.
- The flexible device can be adapted to other parts of the body, such as the torso. Discussions are underway with cardiologists at the University Hospital of Grenoble to evaluate possible healing benefits following a heart attack.

Publications

- M. Dole, V. Auboiron, L. Langar, J. Mitrofanis. "A systematic review of the effects of transcranial photobiomodulation on brain activity in humans". *Rev Neurosci*. 2023 Mar 17. doi: 10.1515/revneuro-2023-0003. Epub ahead of print. PMID: 36927734.
- K. Xie, H. El Khoury, J. Mitrofanis, P.J. Austin (2022) "A systematic review of the effect of photobiomodulation on the neuroinflammatory response in animal models of neurodegenerative diseases". *Reviews in Neurosciences* doi: 10.1515/revneuro-2022-0109. PMID: 36302150.

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