INTRACEREBRAL OPTICAL DEVICE

SLOWING DOWN PARKINSON'S DISEASE USING INTRACRANIAL PHOTOBIOMODULATION, IE "LIGHT MEDICINE INTO THE BRAIN"

? WHAT IS NIR?

CEA-Leti's clinical trial aims to slow down neurodegeneration using an intracerebral device which generates an emission of a neuro-protecting light. Current treatments for Parkinson's disease temporarily mitigate symptoms. The therapeutic effects of photobiomodulation have been demonstrated in rodent and non-human primate models of Parkinson's disease. CEA-Leti's clinical trial aims, in particular, to prove the feasibility, safety and their effectiveness in humans.

DEMO @CES 2023

The demonstrator includes a bust and a head reproduced to a scale of 1:1. The NIR medical device is positioned as in the implant surgery, with light emission that is directly visible. Additionally, visitors can view an explanatory video lasting several minutes.

! WHAT'S NEW?

- First therapeutic approach based on intracranial photobiomodulation expected to slow down the evolution of Parkinson's disease. Current treatments are only symptomatic.
- First intracerebral application of light's therapeutic effects for Parkinsons' disease.
- First clinical trial using intracranial light for Parkinsons'disease in the world on 14 patients launched early 2021.
- Development, manufacturing, characterization, and patient implant sentirely performed at CEA-Leti for the optical part.

Publication: 'Near-infrared light is neuroprotective in a monkey model of Parkinson disease', Darlot F, Moro C, El Massri N, Chabrol C, Johnstone D, Reinhart F, Agay D, Torres N, Bekha D, Auboiroux V, Costecalde T, Peoples CL, Anastascio HD, Shaw V, Stone J, Mitrofanis J, Benabid AL. Ann Neurol. 2016 Jan; 79(1):59-75. Ref. clinicaltrial.gov>NCT04261569

APPLICATIONS

- Treatment for Parkinson's disease
- Adaptation to other neurodegenerative pathologies, such as Alzheimer's disease, may be possible

KEY FIGURES

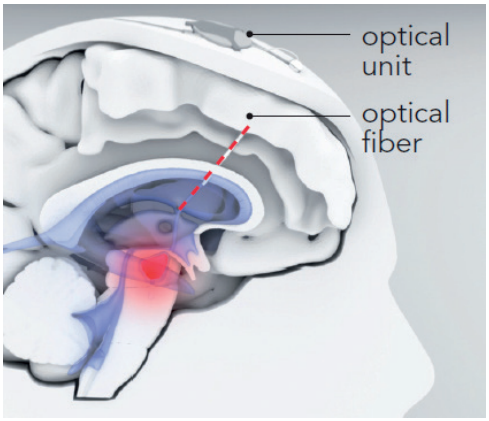
- 10 years of technological development
- 14 patents
- 6.3 million people living with Parkinson's disease worldwide

SCIENCE FOR A BETTER FUTURE

NIR technology has three components:

- **A 2.5 cm-diameter optical unit** containing electronics and a laser, photodiode emitting at 670 nm. This is inserted into the cranial cavity instead of bone material.
- **Fiber optics** that transport light near the brain's substantia nigra (structures that degenerate with Parkinson's disease). For minimally invasive surgery, the fiber is primarily inserted through the ventricles.
- A Boston Scientific **stimulator**, customized by the firm to fit CEA-Leti's optical module specifications, and surgically implanted under the collarbone.

The optical unit was developed by CEA-Leti, then manufactured, assembled, and characterized in its clean rooms. The clinical trial patients (Ev-NIRT, driven by Grenoble University Hospital) were implanted at CLINATEC, the CEA-Leti biomedical research center, equipped with a clinical sector with an operating room.



>> WHAT'S NEXT?

By 2026, end of the first clinical trial (7 implanted patients, 7 control patients), essentially geared toward device safety and the non-toxicity of light. If successful, launch of a multi-center clinical trial, which will be essentially focused on the therapeutic effectiveness of NIR technology.

INTERESTED IN THIS TECHNOLOGY?

Abdelmadjid Hihi
abdelmadjid.hihi@cea.fr
Tel : +33 (0)4 38 78 96 58

Supported by:

UGA Université Grenoble Alpes · CHU Grenoble Alpes · Boston Scientific · Fondation Edmond J. Safra · Carnot Research for industrial innovation