

## TRANSCRANIAL-INTRANASAL PHOTOBIMODULATION DEVICE

### THE VIELIGHT NEURO



Energy Source	Infrared LEDs
Wavelength	810 nm
Power Density Intranasal Diode	23 mW/cm <sup>2</sup>
Power Density per Transcranial LED	41 mW/cm <sup>2</sup>
Pulse Frequency	10 Hz
Effect	Neurological



The Vielight Neuro is a next generation transcranial-intranasal infrared neural stimulation device.

The Vielight Neuro's powerful, wearable design combines the patented technology of intranasal light therapy with transcranial photobiomodulation for whole-brain stimulation targeting the brain's Default Mode Network's (DMN) hubs.

The DMN is of particular interest because it has been associated with Alzheimer's disease, autism, schizophrenia, depression, chronic pain and other neurologic diseases. Since the discovery of the DMN, there have been many studies suggesting various nodes (or "hubs") where there are high levels of activity and connectivity. So, the health of the whole network is closely dependent on the health of the hubs.

### WEARABILITY, LIGHT ENERGY, THE FUTURE

For more information please visit  
[www.vielight.com](http://www.vielight.com)

Vielight devices have not been examined by the FDA or other regulatory agencies. They are low-risk general wellness products that do not require FDA clearance according to the FDA's draft on "General Wellness: Policy on Low Risk Devices" - dated January 20, 2015.

All Vielight devices have been independently TÜV certified as safe for consumer use.



## INTRANASAL PHOTOBIMODULATION DEVICES

### THE VIELIGHT 633



The Vielight 633's cold light (633 nm) targets the dense network of capillaries in the nasal cavity within a well-researched set of parameters.

Energy Source	Optimized visible red
Wavelength	633 nm
Power Density	7.6 mW/cm <sup>2</sup>
Pulse Frequency	Continuous
Effect	Systemic

### THE VIELIGHT 655



The Vielight 655's low level laser light (655 nm) targets the dense network of capillaries in the nasal cavity within a well-researched set of parameters.

Energy Source	Optimized low level laser
Wavelength	655 nm
Power Density	5 mW/cm <sup>2</sup>
Pulse Frequency	Continuous
Effect	Systemic

### THE VIELIGHT 810



The Vielight 810's near infrared (IR) light (810 nm) targets the underside of the brain. Engineered to pulse at 10 Hz, this frequency is associated with neural oscillation in the alpha state.

Energy Source	Optimized LED
Wavelength	810 nm
Power Density	7.6 mW/cm <sup>2</sup>
Pulse Frequency	10 Hz
Effect	Neurological

# Vielight

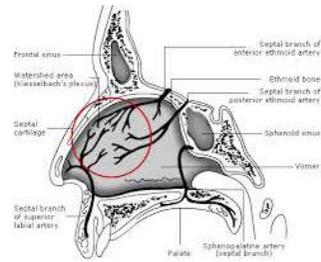


## Why the nose?

Transcranial / intranasal  
light therapy devices

## SATURATED WITH BLOOD CAPILLARIES

### SATURATION



The nasal cavity is rich with blood capillaries - there are more capillaries per cm<sup>2</sup> than most organs of the body. Five arteries connect to the nasal cavity, while the Little's area is a frequent site of nasal bleeding.

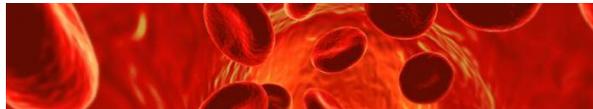
Given the rich supply of blood and the thin, permeable membrane within the nasal cavity, this area is perfect for blood irradiation.

### POSITIVE EFFECTS OF BLOOD IRRADIATION

Anti-inflammatory effects that improve the immunologic activity of the blood.<sup>[1]</sup>

Disaggregation and improved structure of erythrocytes, resulting in an improved oxygen supply.<sup>[2]</sup>

Enhanced nitric oxide synthesis by cytochrome c oxidase through the photobiomodulation process.<sup>[3]</sup>



### INTRANASAL LIGHT THERAPY

THE EVOLUTION OF INTRAVENOUS LOW LEVEL LIGHT THERAPY



Intranasal light therapy channels low level visible red to infrared light (633 - 810 nm) into the capillary-rich nasal cavity, efficiently irradiating blood circulating through the nasal channel. Vielight intranasal light therapy devices have been engineered with well-researched parameters to optimize and maximize the modulating effects of light on the cellular level. Designed for wearability, our patented solid state technology allows you to

use your intranasal devices anywhere, anytime.

- [1] "The treatment of diabetic angiopathies by endo-vascular low intensity laser irradiation"; Stroev E, Larionov V, Grigoreva L, Makarova V, Dubinina I; Probl-Endokrinol-Mosk (1990); 36, 6:23-5
- [2] "Cytokine production after helium-neon laser irradiation in cultures of human peripheral blood mononuclear cells"; Funk J, Kruse A, Kirchner H; Journal Photochem. Photobiol. Biology (1992); 16, 3-4: 347-355
- [3] "Therapeutic photobiomodulation: nitric oxide and a novel function of mitochondrial cytochrome c oxidase"; Poyton RQ, Ball KA

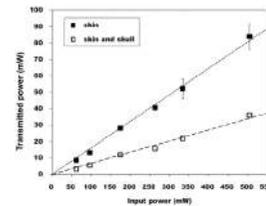
## GATEWAY TO THE BRAIN

### PROXIMITY



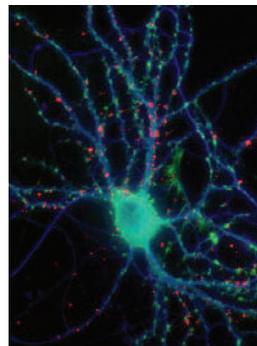
The nasal cavity's proximity to the brain enables infrared light (810 nm) to be focused primarily on the underside of the brain. The underside of the brain contains important structures such as the ventral prefrontal cortex, hippocampus and hypothalamus. The main idea behind our invention was derived from photobiological research showing that neurons react positively when energized by infrared light stimulation.

### DIFFUSION OF 810 NM (IR) LIGHT THROUGH THE SOFT TISSUE AND BONE



Infrared (IR) light is able to diffuse efficiently through soft tissue, bone and brain matter.<sup>[4]</sup>

### BRAIN BIOENERGETICS



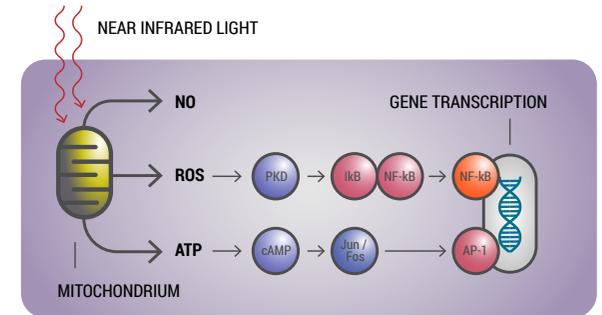
Photobiomodulation augments neural cytochrome c oxidase activity, which enhances neuronal capacity for metabolic energy production that may be used to support cognitive brain function.<sup>[5]</sup>

This is expected to increase neuronal respiration and boost brain energy metabolic capacity, which would constitute an adaptation with major neuroprotective implications.<sup>[6]</sup>

- [4] "Transcranial Red and Near Infrared Light Transmission in a Cadaveric Model"; Jagdeo JR, Adams LE, Brody NI, Siegel DM. (2012)
- [5] "Role of Low-Level Laser Therapy in Neurorehabilitation"; Javad T. Hashmi(MD), Ying-Ying Huang(MD), Bushra Z. Osmani(MD), Sulbha K. Sharma(PhD), Margaret A. Naeser(PhD, Lac), Michael R. Hamblin(PhD) (2010)
- [6] "Neurological and psychological applications of transcranial lasers and LEDs"; Julio C. Rojas, F. Gonzalez-Lima (2013)

## PHOTOBIMODULATION

### CELLULAR MECHANISMS



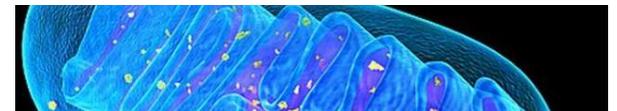
Reference: "Basic Photomedicine", Ying-Ying Huang, Pawel Mroz, and Michael R. Hamblin, Harvard Medical School.

### WHY PHOTOBIMODULATION?

At the cellular level, visible red and near infrared light stimulates cells to generate more energy and undergo self-repair. Each cell has mitochondria, which perform the function of producing cellular energy called "ATP". This production process involves the respiratory chain. A mitochondrial enzyme called cytochrome oxidase accepts photonic energy when functioning below par.

This light energy is converted into ATP for use. In addition, the process creates mild oxidants (ROS) that leads to gene transcription and then to cellular repair and healing. The process also unclogs the chain that has been clogged by nitric oxide (NO).<sup>[7]</sup>

The nitric oxide is then released back into the system. Nitric oxide is a molecule that our body produces to help its 50 trillion cells communicate with each other by transmitting signals throughout the entire body. Additionally, nitric oxide helps to dilate the blood vessels and improve blood circulation.



### PHOTOBIMODULATION RESEARCH

Currently, the science of photobiomodulation and its beneficial, modulative effects are being researched by institutions such as Harvard University, Boston University, US Department of Veteran Affairs, Wellman Center for Photomedicine and Massachusetts General Hospital.

- [7] "Biphasic Dose Response in Low Level Light Therapy"; Sulbha K. Sharma(PhD), Ying-Ying Huang(MD), James Carroll, Michael R. Hamblin(PhD)