PBM or LED Therapy for TBI

LED THERAPY

Light emitting diode (LED) therapy is a non-invasive treatment modality that can be used in the office setting and at home (when indicated). LED is a painless, non-thermal photobiomodulation (PBM) treatment that directly targets the cellular functioning of injured brain cells.

CLINICAL APPLICATION

LED TBI Home Treatment Program

The **LED TBI Clinic** at the VA Boston Healthcare System at JP Campus is offering the LED treatment to Veterans with traumatic brain injury (TBI). The LED TBI Treatment Program is sponsored by the VHA CCI. Dr. Yelena Bogdanova, PhD, the LED Clinic Lead, directs the LED Home Treatment Program development and implementation.

LED RESEARCH

LED TBI Clinical Trial:

LED treatment to improve cognition and promote recovery in blast TBI. The VA Rehabilitation Research &

Development (RR&D) – sponsored pilot randomized clinical trial. Principal Investigator: Yelena Bogdanova, PhD, PhD.
Visit us at: https://clinicaltrials.gov/ct2/show/NCT02404402

Selected PBM / LED Abstracts and Publications:

Naeser MA, Martin PI, Ho MD, Krengel MH, Bogdanova Y, et al. (2023). Transcranial Photobiomodulation Treatment: Significant Improvements in four Ex-Football Players with Possible Chronic Traumatic Encephalopathy. *Journal of Alzheimer's Disease Reports*, 7(1), 77–105. DOI: 10.3233/ADR-220022 View Publication

Bogdanova, Y. (2022) Telemedicine and brain injury neurorehabilitation: Expanding access to care in COVID-19 pandemic and beyond. Symposium Paper. Annual meeting of the *American Congress of Rehabilitation Medicine*.

Naeser, M., Martin, P., Ho, M., Krengel, M., Bogdanova, Y., et al. (2021). Transcranial PBM for chronic TBI, and four Ex-Football Players possibly developing CTE. *North American Association for Photobiomodulation Therapy & World Association for Photobiomodulation Therapy, Virtual Summit*. *WALT PBM Book of Abstracts*, *1*, 67.

Bogdanova, Y., Sokol, O.E., Gilbert, K. (2021). Home-based Photobiomodulation Treatment for Cognitive and Neuropsychiatric Symptoms in TBI. Abstract. *Archives of*

Physical Medicine and Rehabilitation, *102*(10), E81-82. https://doi.org/10.1016/j.apmr.2021.07.715

Bogdanova, Y., Sokol, O.E., Gilbert, K. (2021). LED Treatment Improves Depression and PTSD Symptoms in Traumatic Brain Injury. Abstract. *Presented at the WPA World Congress of Psychiatry*.

Bogdanova, Y., Langenbahn, D., Trexler, L., Bergquist, T., Bachus, S. (2020). Multidisciplinary Cognitive Rehabilitation in Brain Injury: Integrated Approach. Symposium Paper, Annual meeting of the *American Congress of Rehabilitation Medicine*.

Bogdanova, Y., Gilbert, K., Baird, L. (2021). Virtual Care and Home-Based Treatment for TBI During COVID-19 Pandemic.*Archives of Physical Medicine and Rehabilitation*, *102(4)*, e19. PMCID: PMC8849178 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8849178/

Bogdanova, Y. & Eickhoff, C. (2019). At-Home Light Emitting Diode Therapy for TBI. *VHA Innovation Experience*, Washington, DC.

Bogdanova, Y., Gilbert, K., Baird, L., Naeser, M.A. (2019). LED Home Treatment Program for Chronic TBI and PTSD: Clinical Program Evaluation. Abstract. *Archives of Physical Medicine and Rehabilitation*, Volume 100, Issue 12, e187-188.

https://doi.org/10.1016/j.apmr.2019.10.077

Naeser, M., Martin, P., Ho, M., Krengel, M., Bogdanova, Y., Knight, J., Fedoruk, A., Hamblin, M., Koo, B.B. (2019). Transcranial, near-infrared photobiomodulation to improve cognition in two retired professional football players possibly developing CTE. *World Congress on Brain Injury*, Toronto, Canada.

Naeser MA, Martin PK, Ho MD, Krengel MH, Bogdanova Y, Knight JA, Fedoruk AE, Hamblin MR, Koo BB. (2019). Transcranial, red/near-infrared light-emitting diode therapy for chronic traumatic brain injury and poststroke aphasia: clinical studies. In *Photobiomodulation in the Brain: Low-Level Laser (Light) Therapy in Neurology and Neuroscience*. Michael R. Hamblin, Ying-Ying Huang (Eds), Academic Press, Elsevier. Chapter 25: 309-332.

Martin PI, Ho MD, Bogdanova Y, Krengel M, Knight J, Hamblin M, Koo B, Naeser MA. (2018). LED therapy improves functional connectivity
and cognition in professional football player with chronic TBI: Case study. *American Congress of Rehabilitation Medicine*.

Naeser, M., Martin, P., Ho, M., Krengel, M., Bogdanova, Y., Knight, J., Fedoruk, A., Hamblin, M., Koo, B.B. (2018). Transcranial PBM to improve cognition in chronic TBI, and in a 65 Yr. Retired, Professional Football Player with possible

CTE. *North American Association for Photobiomodulation Therapy (NAALT) Conference*.

Naeser, M., Martin, P., Ho, M., Krengel, M., Bogdanova, Y., et al. (2018). At-Home, LED Treatment Results after Scalp Application of Near-Infrared Light in a Retired Professional Football Player: Improvements in Emotional Outbursts, Depression, and Cognition. 3rd Annual *Chronic Traumatic Encephalopathy Conference*.

Bogdanova, Y., Ho, V.T., Martin, P.I., Ho, M.D., Yee, M.K., Hamblin, M.R., Naeser, M.A (2017). Transcranial LED Treatment for Cognitive Dysfunction and Sleep in Chronic TBI: Randomized Controlled Pilot Trial. *Archives of Physical Medicine and Rehabilitation*, *98(10)*, e122 -123.

Martin PI, Ho MD, Krengel MH, Bogdanova Y, Knight JA, Hamblin MR, Koo BB, Naeser MA. (2017). Significant improvements in cognition, mood and fMRI scans in a retired, professional football player after intervention with photobiomodulation LED therapy to the brain: Case report. *2nd Annual Chronic Traumatic Encephalopathy (CTE) Conference*.

Naeser, MA, Martin, PI, Ho, MD, Krengel, MH, Bogdanova, Y, Knight, JA, Yee, MK, Zafonte, R, Frazier, JA, Hamblin, MR, Koo, BB (2016). Transcranial, Red/near-infrared light-emitting diode (LED) therapy for chronic, traumatic brain

injury. *Photobiomodulation in Neuroscience, for Photmedicine and Laser Surgery, 34(12),* 610-626.

Naeser, M.A., Martin, P.I., Ho, M.D., Krengel, M.H., Bogdanova, Y., et al. (2017). Low Level Light Therapy for rehabilitation in traumatic brain injury and stroke, including chronic aphasia. Chapter 39, 761-808. In *Handbook of Low-level Laser Therapy.* Eds: MR Hamblin, MVP de Sousa, & T Agrawal. Pan Stanford.

Bogdanova, Y., Martin, P.I., Ho, M.D., Yee, M.K., Ho, V.T., Krengel, M.H., Knight, J.A., Hamblin, M.R., Naeser, M.A. (2015). Improved sleep and cognition post transcranial or intranasal, red/near-infrared LED treatments in chronic TBI: Pilot case series. *Journal of Head Trauma Rehabilitation, 30(3), e101–102.*

Naeser, MA, Martin, PI, Ho, MD, Krengel, MH, Bogdanova, Y, Knight, JA, Yee, MK, Zafonte, R, Frazier, JA, Hamblin, MR, Koo, BB. (2015). Red/Near-Infrared Light-Emitting Diode Therapy for Traumatic Brain Injury. *SPIE 9467, Micro- and Nanotechnology Sensors, Systems, and Applications VII,* 94670M.

Bogdanova, Y., Martin, P.I., Ho, M.D., Krengel, M.H., Ho, V.T., Yee, M.K., Knight, J.A., Hamblin, M.R., Naeser, M.A. (2014). LED therapy improves sleep and cognition in chronic moderate TBI: pilot studies. *Archives of Physical Medicine*

and Rehabilitation, 95(10), e77.