

LED INFRARED HELMET

PROTOCOL BOOK

Treatment guidelines
for home-therapies



Weber Medical

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The standard protocol

The field of transcranial infrared stimulation is still a relatively young scientific field. Beneficial effects on affective disorders (depression, anxiety, and more), brain injuries, addiction, degenerative brain disorders, Autism, ADHD, and general cognitive functions could be demonstrated in several studies but the parameters that have been used in the distinct studies vary with respect to the wavelength of the light, mode of irradiation (frequency of the light beam), output power, time per session, number of sessions, time between sessions, and points of application. The great news is that most of the applied protocols have been shown to be beneficial.

Based on the existing research, we developed a “standard protocol” that is derived from the entirety of studies. We recommend it in all cases as the starting point. It can later, if necessary, be adjusted in consultation with your health care professional or our team.

In our standard protocol, we recommend to use the helmet every day with a continuous light beam (the frequency is set to 0Hz) for 30 minutes on full power.

However, you do not necessarily have to start with these settings at the beginning. If you are a sensitive person, you might want to get used to the therapy first. It is generally free of side-effects but there can be a

feeling of “over-activation” at the beginning. If you use the helmet with a frequency of 40 Hz in the evening, you might have a harder time falling asleep. You can start with 50% of the maximal output power and a shorter session duration of 20 minutes. Build both the power and treatment time up in your own pace by gradually increasing both: The output power first to 75%, then to 100%, and the session duration in steps of 2 minutes, until you reach 30 minutes.

The standard protocol:

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

Some patients report that they feel tired directly after the therapy. This is often a sign that neuro toxins are being eliminated. Make sure you get the rest you need and drink enough water.

Tickling sensations and a pulsating feeling around the head are a sign for increased blood flow and no reason for concern.

On the following pages you will find links to studies related to the respective neurological conditions.

We sincerely hope that the helmet will improve your health, life quality, and cognitive function significantly!

Improvement of cognitive function

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next day.
Sessions in total	ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	40Hz	Suggested by brain waves research.
Sessions / 1	1	If you miss a day, just return to this rhythm next day.
Sessions in total	ongoing	

List of studies

a) Human studies

[2013] Barrett DW, Gonzalez-Lima F.: Transcranial infrared laser stimulation produces beneficial cognitive and emotional effects in humans. In: Neuroscience 2013; 230:13–23.

<https://pubmed.ncbi.nlm.nih.gov/23200785/>

[2016] Jungyun Hwang, Darla M. Castelli, F. Gonzalez-Lima: Cognitive enhancement by transcranial laser stimulation and acute aerobic exercise. In: Lasers in Medical Science volume 31, pages 1151–1160 (2016)

<https://pubmed.ncbi.nlm.nih.gov/27220529/>

[2021] Dougal G, Ennaceur A, Chazot PL. Effect of Transcranial Near-Infrared Light 1068 nm Upon Memory Performance in Aging Healthy Individuals: A Pilot Study. Photobiomodul Photomed Laser Surg. 2021 Oct;39(10):654-660. doi: 10.1089/photob.2020.4956. PMID: 34662523.

<https://pubmed.ncbi.nlm.nih.gov/34662523/>

b) Human studies: Review of partly unpublished studies

[2019] Salehpour, Farzad ; Majdi, Alireza ; Pazhuhi, Mahdiye ; Ghasemi, Faranak ; Khademi, Mahsa ; Pashazadeh, Fariba ; Hamblin, Michael ; Cassano, Paolo: Transcranial Photobiomodulation Improves Cognitive Performance in Young Healthy Adults: A Systematic Review and Meta-Analysis. In: Photobiomodul Photomed Laser Surg. 2019 Oct;37(10):635-643. doi: 10.1089/photob.2019.4673. Epub 2019 Sep 24.

<https://pubmed.ncbi.nlm.nih.gov/31549906/>

Depression

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next day.
Sessions in total	Ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	10Hz	Suggest by ELATED trial (link below).
Sessions / day	1	If you miss a day, just return to this rhythm next day.
Sessions in total	Ongoing	

List of studies

a) Human studies

(2009) Schiffer, F., Johnston, A. L., Ravichandran, C., Polcari, A., Teicher, M. H., Webb, R. H., & Hamblin, M. R. (2009). Psychological benefits 2 and 4 weeks after a single treatment with near infrared light to the forehead: a pilot study of 10 patients with major depression and anxiety. Behavioral and brain functions : BBF, 5, 46. <https://doi.org/10.1186/1744-9081-5-46>

<https://pubmed.ncbi.nlm.nih.gov/19995444/>

(2016) Disner, S. G., Beevers, C. G., & Gonzalez-Lima, F. (2016). Transcranial Laser Stimulation as Neuroenhancement for Attention Bias Modification in Adults with Elevated Depression Symptoms. Brain stimulation, 9(5), 780–787. <https://doi.org/10.1016/j.brs.2016.05.009>

<https://pubmed.ncbi.nlm.nih.gov/27267860/>

(2018) Cassano, P., Petrie, S. R., Mischoulon, D., Cusin, C., Katnani, H., Yeung, A., De Taboada, L., Archibald, A., Bui, E., Baer, L., Chang, T., Chen, J., Pedrelli, P., Fisher, L., Farabaugh, A., Hamblin, M. R., Alpert, J. E., Fava, M., & Iosifescu, D. V. (2018). Transcranial Photobiomodulation for the Treatment of Major Depressive Disorder. The ELATED-2 Pilot Trial. Photomedicine and laser surgery, 36(12), 634–646. <https://doi.org/10.1089/pho.2018.4490>

<https://pubmed.ncbi.nlm.nih.gov/30346890/>

(2020) Kerppers, F. K., Dos Santos, K., Cordeiro, M., da Silva Pereira, M. C., Barbosa, D., Pezzini, A. A., Cunha, L. F., Fonseca, M., Braghholo, K., Salgado, A., & Kerppers, I. I. (2020). Study of transcranial photobiomodulation at 945-nm wavelength: anxiety and depression. Lasers in medical science, 35(9), 1945–1954. <https://doi.org/10.1007/s10103-020-02983-7>

<https://pubmed.ncbi.nlm.nih.gov/32144511/>

Anxiety

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (cw)	
Sessions / day	1	If you miss a day, just return to this rhythm next day.
Sessions in total	Ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	8Hz (continuous wave)	Suggested by brain wave research: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4741268/
Sessions / day	1	If you miss a day, just return to this rhythm next day.
Sessions in total	Ongoing	

List of studies

a) Human studies

(2019): Maiello, M., Losiewicz, O. M., Bui, E., Spera, V., Hamblin, M. R., Marques, L., & Cassano, P.: Transcranial Photobiomodulation with Near-Infrared Light for Generalized Anxiety Disorder: A Pilot Study. *Photobiomodulation, photomedicine, and laser surgery*, 37(10), 644–650.
<https://doi.org/10.1089/photob.2019.4677>

<https://pubmed.ncbi.nlm.nih.gov/31647775/>

(2020) Kerppers, F. K., Dos Santos, K., Cordeiro, M., da Silva Pereira, M. C., Barbosa, D., Pezzini, A. A., Cunha, L. F., Fonseca, M., Braghholo, K., Salgado, A., & Kerppers, I. I. (2020). Study of transcranial photobiomodulation at 945-nm wavelength: anxiety and depression. *Lasers in medical science*, 35(9), 1945–1954. <https://doi.org/10.1007/s10103-020-02983-7>

<https://pubmed.ncbi.nlm.nih.gov/32144511/>

b) Animal studies

Eshaghi, E., Sadigh-Eteghad, S., Mohaddes, G., & Rasta, S. H. (2019). Transcranial photobiomodulation prevents anxiety and depression via changing serotonin and nitric oxide levels in brain of depression model mice: A study of three different doses of 810 nm laser. *Lasers in surgery and medicine*, 51(7), 634–642. <https://doi.org/10.1002/lsm.23082>

<https://pubmed.ncbi.nlm.nih.gov/30883832/>

Alzheimer's and Dementia

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	10Hz	Suggest by Saltmarche et al. (2017; link below)
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

List of studies

a) Human studies

(2017) Saltmarche AE, Naeser MA, Ho KF, Hamblin MR, Lim L. Significant Improvement in Cognition in Mild to Moderately Severe Dementia Cases Treated with Transcranial Plus Intranasal Photobiomodulation: Case Series Report. *Photomed Laser Surg.* 2017;35(8):432-441.

doi:10.1089/pho.2016.4227

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5568598/>

(2019) Chao L. L. Effects of Home Photobiomodulation Treatments on Cognitive and Behavioral Function, Cerebral Perfusion, and Resting-State Functional Connectivity in Patients with Dementia: A Pilot Trial. *Photobiomodulation, photomedicine, and laser surgery*, 37(3), 133–141.

<https://pubmed.ncbi.nlm.nih.gov/31050950/>

(2021) Nizamutdinov, Damir, et al. "Transcranial near infrared light stimulations improve cognition in patients with dementia." *Aging and disease*.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8219492/>

(2021) Maksimovich, I.V.: Stimulation of cerebral angiogenesis and neurogenesis with transcatheter intracerebral laser photobiomodulation therapy during dementia in patients with Alzheimer's and Binswanger's disease. *Alzheimer's Dement.*, 17: e054945. <https://doi.org/10.1002/alz.054945>

<https://alz-journals.onlinelibrary.wiley.com/doi/epdf/10.1002/alz.054945>

b) Animal studies

(2021) Salehpour F, Khademi M, Hamblin MR. Photobiomodulation Therapy for Dementia: A Systematic Review of Pre-Clinical and Clinical Studies. *J Alzheimers Dis.* 2021;83(4):1431-1452. doi: 10.3233/JAD-210029. PMID: 33935090.

Parkinson's

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment

List of studies

a) Human studies

(2019) Hamilton CL, El Khoury H, Hamilton D, Nicklason F, Mitrofanis J. "Buckets": Early Observations on the Use of Red and Infrared Light Helmets in Parkinson's Disease Patients. Photobiomodul Photomed Laser Surg. 2019 Oct;37(10):615-622. doi: 10.1089/photob.2019.4663. Epub 2019 Sep 19. PMID: 31536464.
<https://pubmed.ncbi.nlm.nih.gov/31536464/#:~:text=Results%3A%20We%20found%20that%2055,affect ed%2C%20depending%20on%20the%20patient.>

(2021) Liebert, A., Bicknell, B., Laakso, EL. et al.: Improvements in clinical signs of Parkinson's disease using photobiomodulation: a prospective proof-of-concept study. BMC Neurol 21, 256 (2021).
<https://pubmed.ncbi.nlm.nih.gov/34215216/>

b) Animal studies: Review

(2020) Salehpour F, Hamblin MR.: Photobiomodulation for Parkinson's Disease in Animal Models: A Systematic Review. Biomolecules. 2020;10(4):610. Published 2020 Apr 15. doi:10.3390/biom10040610
<https://pubmed.ncbi.nlm.nih.gov/32326425/>

Addiction

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

Protocol II:

Use for 12 weeks without interruptions after having tested protocol I for 12 weeks.

Parameter	Setting	Comment

List of studies

a) Human studies

(2020) Schiffer, F., Reichmann, W., Flynn, E., Hamblin, M. R., & McCormack, H. (2020). A Novel Treatment of Opioid Cravings With an Effect Size of .73 for Unilateral Transcranial Photobiomodulation Over Sham. *Frontiers in psychiatry*, 11, 827. <https://doi.org/10.3389/fpsy.2020.00827>

<https://pubmed.ncbi.nlm.nih.gov/32973577/>

(2021): Schiffer, F., Khan, A., Bolger, E., Flynn, E., Seltzer, W. P., & Teicher, M. H. (2021). An Effective and Safe Novel Treatment of Opioid Use Disorder: Unilateral Transcranial Photobiomodulation. *Frontiers in psychiatry*, 12, 713686. <https://doi.org/10.3389/fpsy.2021.713686>

<https://pubmed.ncbi.nlm.nih.gov/34447323/>

(2021) Schiffer F. (2021). Unilateral transcranial photobiomodulation for opioid addiction in a clinical practice: A clinical overview and case series. *Journal of psychiatric research*, 133, 134–141. <https://doi.org/10.1016/j.jpsychires.2020.12.004>

<https://pubmed.ncbi.nlm.nih.gov/33340792/>

Traumatic Brain Injuries

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

Protocol II:

Use for 8 weeks without interruptions after having tested protocol I for 8 weeks.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	10Hz	Suggested by: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0026212
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

List of studies

a) Human studies

(2014) Naeser, M. A., Zafonte, R., Krengel, M. H., Martin, P. I., Frazier, J., Hamblin, M. R., Knight, J. A., Meehan, W. P., 3rd, & Baker, E. H. (2014). Significant improvements in cognitive performance post-transcranial, red/near-infrared light-emitting diode treatments in chronic, mild traumatic brain injury: open-protocol study. *Journal of neurotrauma*, 31(11), 1008–1017. <https://doi.org/10.1089/neu.2013.3244>

(2017) Hamblin M. R. (2018). Photobiomodulation for traumatic brain injury and stroke. *Journal of neuroscience research*, 96(4), 731–743. <https://doi.org/10.1002/jnr.24190>

(2018) Hipskind, S. G., Grover, F. L., Jr, Fort, T. R., Helffenstein, D., Burke, T. J., Quint, S. A., Bussiere, G., Stone, M., & Hurtado, T. (2018). Pulsed Transcranial Red/Near-Infrared Light Therapy Using Light-Emitting Diodes Improves Cerebral Blood Flow and Cognitive Function in Veterans with Chronic Traumatic Brain Injury: A Case Series. *Photomedicine and laser surgery*, 10.1089/pho.2018.4489. Advance online publication. <https://doi.org/10.1089/pho.2018.4489>

(2020) Figueiro Longo, M. G., Tan, C. O., Chan, S. T., Welt, J., Avesta, A., Ratai, E., Mercaldo, N. D., Yendiki, A., Namati, J., Chico-Calero, I., Parry, B. A., Drake, L., Anderson, R., Rauch, T., Diaz-Arrastia, R., Lev, M., Lee, J., Hamblin, M., Vakoc, B., & Gupta, R. (2020). Effect of Transcranial Low-Level Light Therapy vs Sham Therapy Among Patients With Moderate Traumatic Brain Injury: A Randomized Clinical Trial. *JAMA network open*, 3(9), e2017337. <https://doi.org/10.1001/jamanetworkopen.2020.17337>

Post-Traumatic Stress Disorder (PTSD)

Protocol I:

Use for 12 weeks without interruptions.

Parameter	Setting	Comment
Power	100%	Reduce to 50% if very young / old / sensitive user
Time	30 minutes	Reduce to 20 min if very young / old / sensitive user
Frequency	0Hz (continuous wave)	
Sessions / day	1	If you miss a day, just return to this rhythm next time
Sessions in total	ongoing	

List of studies

a) Animal studies

(2021): Li, Y., Dong, Y., Yang, L., Tucker, L., Yang, B., Zong, X., Hamblin, M. R., & Zhang, Q. (2021). Transcranial photobiomodulation prevents PTSD-like comorbidities in rats experiencing underwater trauma. *Translational psychiatry*, 11(1), 270. <https://doi.org/10.1038/s41398-021-01389-5>

<https://pubmed.ncbi.nlm.nih.gov/33953158/>

(2021) Li, Y., Dong, Y., Yang, L., Tucker, L., Zong, X., Brann, D., Hamblin, M. R., Vazdarjanova, A., & Zhang, Q. (2021). Photobiomodulation prevents PTSD-like memory impairments in rats. *Molecular psychiatry*, 26(11), 6666–6679. <https://doi.org/10.1038/s41380-021-01088-z>

<https://pubmed.ncbi.nlm.nih.gov/33859360/>

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