

Q. What is light therapy?

A. Light therapy, also known as bright light therapy or phototherapy, has been proposed as a treatment for major depressive disorder (MDD) with a seasonal pattern (formerly seasonal affective disorder [SAD]), and also non-seasonal MDD. Light therapy involves exposure to artificial bright light using a fluorescent light box. Light boxes are much brighter than regular lamps, emitting up to 10,000 lux (this is brighter than normal indoor light, but less bright than direct sunlight). Procedures vary between different light boxes, but common protocols involve exposure to bright white light at 2,500 lux for two hours per day or 10,000 lux for 30 minutes per day (Tam, Lam, & Levitt, 1995).

Q. What are the potential mechanisms of action underlying light therapy for the treatment of MDD?

A. Light therapy was first proposed as a treatment for SAD, now known as MDD with a seasonal pattern, in the early 1980s (Rosenthal et al., 1984). It has been hypothesized that patients with MDD with a seasonal pattern become depressed in the winter due to the later dawn, which causes a delay in their circadian rhythms with respect to the sleep/wake cycle (Lewy, Sack, Miller, & Hoban, 1987). Duration of melatonin secretion, a natural hormone that regulates the sleep/wake cycle, is longest in the winter when the photoperiod (day length) is the shortest (Lewy, 1983). Light therapy was proposed to extend the photoperiod during the winter months, thus suppressing melatonin production and improving circadian rhythms of patients with MDD with a seasonal pattern. Although it is known that light is responsible for phase-shifting of circadian rhythms and changes in melatonin secretion and metabolism, the exact mechanism of action by which light therapy affects depression is not yet completely understood (Oldham & Ciraulo, 2014; Pail et al., 2011; Tuunainen, Kripke, & Endo, 2004).

Q. Is light therapy recommended as a treatment for MDD in the Military Health System (MHS)?

A. **Yes.** The 2016 VA/DoD *Clinical Practice Guideline for the Management of Major Depressive Disorder* suggests offering light therapy for adult patients with mild to moderate MDD with a seasonal pattern, with a “Weak For” strength of recommendation.

The MHS relies on the VA/DoD clinical practice guidelines (CPGs) to inform best clinical practices. The CPGs are developed under the purview of clinical experts and are derived through a transparent and systematic approach that includes, but is not limited to, systematic reviews of the literature on a given topic and development of recommendations using a graded system that takes into account the overall quality of the evidence and the magnitude of the net benefit of the recommendation. A further description of this process and CPGs on specific topics can be found on the VA clinical practice guidelines website.

Q. Do other authoritative reviews recommend light therapy as a treatment for MDD?

A. **No.** Other authoritative reviews have not substantiated the use of light therapy for MDD. No reviews were identified that evaluated the use of light therapy for MDD with a seasonal pattern.

Several other recognized organizations conduct systematic reviews and evidence syntheses on psychological health topics using similar grading systems as the VA/DoD CPGs. These include the Agency for Healthcare Research Quality (AHRQ) and Cochrane.

- AHRQ: No reviews of treatments for depression include light therapy.
- Cochrane: A 2004 review of light therapy for non-seasonal depression concluded that the benefit of light therapy is “modest though promising” for non-seasonal depression (Tuunainen, Kripke, & Endo, 2004). Overall, treatment response was better in the bright light group than in the control treatment group, but this difference was not statistically significant.

Q. Is there any recent research on light therapy as a treatment for MDD?

A. A February 2021 literature search identified several systematic reviews and meta-analyses of light therapy as a treatment for MDD that have been published after the earlier literature search was conducted for the *2016 VA/DoD Clinical Practice Guideline for the Management of Major Depressive Disorder*. Three meta-analyses of light therapy for non-seasonal depression were identified. A 2016 systematic review and meta-analysis of light therapy for non-seasonal depression included 20 randomized controlled trials (RCTs), with a total of 881 participants, and found a beneficial effect of light therapy in non-seasonal depression (Perera et al., 2016). Another 2016 meta-analysis of light therapy for non-seasonal depression included nine RCTs, with a total of 219 participants, and found that there was a significant reduction of depressive symptoms after bright light therapy compared to controls (Al-Karawi & Jubair, 2016). A 2016 systematic review and meta-analysis found evidence for the efficacy of light therapy as augmentation of pharmacotherapy for treatment of non-seasonal depression (Penders et al., 2016). Each of these reviews notes that heterogeneity of the included trials and high risk of bias (in particular, the blinding of study participants was not adequate) limits interpretation of the results.

A 2019 systematic review and meta-analysis of light therapy versus antidepressants, as well as their combination, included seven studies with a total of 397 participants diagnosed with a major depressive episode (both seasonal and non-seasonal depression; Geoffroy, Schroder, Reynaud, & Bourgin, 2019). Meta-analyses found neither light therapy nor antidepressants to be superior compared to the other, and that the combination of the two was superior to antidepressants alone, for both seasonal and non-seasonal depressive episodes. These results should be interpreted with caution due to the small number and size of the included studies, as well as considerable variation between studies in terms of the interventions and outcome measures used.

Q. What conclusions can be drawn about the use of light therapy as a treatment for MDD in the MHS?

A. Based on the current evidence base, light therapy is not recommended as a front-line treatment for non-seasonal MDD in the MHS. However, the *2016 VA/DoD Clinical Practice Guideline for the Management of Major Depressive Disorder* suggests offering light therapy to patients with mild to moderate MDD with a seasonal pattern. Evidence has emerged supporting the use of light therapy as a treatment for non-seasonal depression with some notable methodological issues. While the emerging evidence is promising, future studies examining the efficacy of light therapy for MDD should be more standardized in their design, including agreement on the use of an adequate placebo control and optimal duration, timing, and intensity of treatment.

References

- Al-Karawi, D., & Jubair, L. (2016). Bright light therapy for nonseasonal depression: Meta-analysis of clinical trials. *Journal of Affective Disorders, 198*, 64–71.
- Department of Veterans Affairs/Department of Defense. (2016). *VA/DoD clinical practice guideline for management of major depressive disorder. Version 3.0*. Washington, DC: Department of Veterans Affairs/Department of Defense.
- Geoffroy, P. A., Schroder, C. M., Reynaud, E., & Bourgin, P. (2019). Efficacy of light therapy versus antidepressant drugs, and of the combination versus monotherapy, in major depressive episodes: A systematic review and meta-analysis. *Sleep Medicine Reviews, 48*, 101213.
- Lewy, A. J. (1983). Biochemistry and regulation of mammalian melatonin production. In R. Reiter (Ed.), *The pineal gland* (pp. 77–128). New York: Elsevier North Holland Inc.
- Lewy, A. J., Sack, R. L., Miller, L. S., & Hoban, T. M. (1987). Antidepressant and circadian phase-shifting effects of light. *Science, 235*(4786), 352–354.
- Lewy, A. J., Wehr, T. A., Goodwin, F. K., Newsome, D. A., & Markey, S. P. (1980). Light suppresses melatonin secretion in humans. *Science, 210*(4475), 1267–1269.
- Oldham, M. A., & Ciraulo, D. A. (2014). Bright light therapy for depression: A review of its effects on chronobiology and the autonomic nervous system. *Chronobiology International, 31*(1), 305–319.
- Pail, G., Huf, W., Pjrek, E., Winkler, D., Willeit, M., Praschak-Rieder, N., & Kasper, S. (2011). Bright-light therapy in the treatment of mood disorders. *Neuropsychobiology, 64*(3), 152–162.
- Penders, T. M., Stanciu, C. N., Schoemann, A. M., Ninan, P. T., Bloch, R., & Saeed, S. A. (2016). Bright light therapy as augmentation of pharmacotherapy for treatment of depression: A systematic review and meta-analysis. *The Primary Care Companion for CNS Disorders, 18*(5), 1–7.
- Perera, S., Eisen, R., Bhatt, M., Bhatnagar, N., de Souza, R., Thabane, L., & Samaan, Z. (2016). Light therapy for non-seasonal depression: systematic review and meta-analysis. *BJPsych Open, 2*(2), 116–126.
- Rosenthal, N. E., Sack, D. A., Gillin, J. C., Lewy, A. J., Goodwin, F. K., Davenport, Y., ... Wehr, T. A. (1984). Seasonal affective disorder: A description of the syndrome and preliminary findings with light therapy. *Archives of General Psychiatry, 41*(1), 72–80.
- Tam, E. M., Lam, R. W., & Levitt, A. J. (1995). Treatment of seasonal affective disorder: A review. *Canadian Journal of Psychiatry, 40*(8), 457–466.
- Tuunainen, A., Kripke, D. F., & Endo, T. (2004). Light therapy for non-seasonal depression. *Cochrane Database of Systematic Reviews, 2*, CD004050.

