Light Therapy for Depressive Disorders

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Although light therapy is an old treatment, new therapeutic uses are being researched. What is the optimal time and strength of light treatment to best help patients with depressive disorders?

Light therapy, in one form or another, has been used as a treatment for a number of conditions since ancient times. Nearly 2,000 years ago, Greco-Roman physicians were treating depression and lethargy with sunlight directed toward the eyes. During his Arctic expeditions in the 1890s, Frederick Cook, M.D., noticing the profound influences of light on the voyagers and Alaskan natives, described a syndrome characterized by depressed mood, fatigue, and loss of energy and sexual desire. In 1946, H. Marx reported the use of bright artificial light to treat four men who had become depressed during an Arctic winter.

Contemporary light therapy involves daily scheduled exposure to bright artificial light (Lam et al., 1999b; Partonen, 2001; Rosenthal and Matthews, 1999). The term light therapy is used to differentiate light therapy for psychiatric disorders from phototherapy for other conditions, such as hyperbilirubinemia or psoriasis. Seasonal Depression

Since the first study of light therapy in winter seasonal affective disorder (SAD) (Rosenthal et al., 1984), a syndrome in which depression developed during fall or winter and remitted the following spring or summer for at least two successive years, numerous studies have concluded that bright light therapy is an effective treatment for SAD (Lam et al., 1999b; Magnusson and Boivin, 2003; Oren and Rosenthal, 1992; Partonen, 2001).

Light therapy is commonly administered by means of a light box--a metal structure containing fluorescent tubes behind a plastic diffusing screen (Lam et al., 1999b; Partonen, 2001; Rosenthal and Matthews, 1999). The dose of light exposure can be measured with the intensity and duration of the exposure. Efficacy is dose dependent to some extent, with both duration and intensity being important. Many studies used 2,500 lux light that was usually administered for two to six hours per day (Lam et al., 1999b; Partonen, 2001). Studies of 10,000 lux fluorescent light yielded similar results to studies using 2,500 lux for two hours (Magnusson and Kristbjarnarson, 1991; Partonen, 2001; Terman et al., 1990). To some degree, there is an inverse relationship between the intensity used and the duration required. Thus, 30 minutes of exposure to 10,000 lux may be as good as two hours of exposure to 2,500 lux, although such a linear relationship does not necessarily apply (Rosenthal and Matthews, 1999). The 10,000 lux fluorescent light box is usually used in clinical practice (Lam et al., 1999b).

A number of studies have found that morning light exposure was superior to evening light exposure (Eastman et al., 1998; Lam et al., 1999b; Lewy et al., 1998; Terman et al., 1998). It is important to note that evening light exposure was still significantly superior to placebo (Eastman et al., 1998; Terman et al., 1998). It is reasonable to start light therapy with morning exposure. Light treatment should not be administered late in the evening because it may cause insomnia. Studies suggest that younger age and atypical symptoms such as hypersomnia, increased appetite, weight gain and increased carbohydrate consumption are associated with good response to light therapy (Lam et al., 1999b). The early response to light therapy partially predicts long-term response (Sher et al., 2001). If replicated, this observation may provide a simple test that will allow clinicians to predict which patient will respond best to light therapy.

Before starting light therapy, an ophthalmologic consultation is recommended for patients with a pre-existing retinal or eye disease (e.g., retinal detachment, retinitis pigmentosa, glaucoma, previous cataract surgery and lens removal) or a systemic illness that affects the retina (e.g., diabetes mellitus) (Lam et al., 1999b; Partonen, 2001). Side effects of light therapy include headaches, eyestrain, fatigue and insomnia (Lam et al., 1999b; Partonen, 2001; Rosenthal and Matthews, 1999). Most of these side effects respond to dose reduction. Hypomania and mania are uncommon, but serious, side effects. If a patient has prior history of mania, the risk of switch into
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Light treatment is best prescribed by psychiatrists who have experience in its use and can appropriately evaluate the indication for light therapy and monitor the response to treatment. Some individuals buy light boxes using the Internet or from stores and carry out the treatment without prior consultation and adequate supervision. Patients should be discouraged from treating themselves without medical supervision. However, patients can be encouraged to participate in establishing an optimal light protocol. For patients with SAD, light therapy should be regarded as the first-line treatment, but other treatments including antidepressants, stress management, exercise, and psychotherapy may also be useful (Lam et al., 1999b).

The biological mechanisms of SAD and light therapy are not clear. Various studies suggested the involvement of serotonergic, dopaminergic and noradrenergic pathways; the hypothalamic-pituitary-adrenal and hypothalamic-pituitary-thyroid axes; and changes in circadian rhythm and melatonin secretion in the neurobiology of seasonal changes in mood and behavior and effects of light therapy (Enns et al., 1999; Magnusson and Boivin, 2003; Oren and Rosenthal, 1992; Rosenthal and Matthews, 1999). For example, Lambert et al. (2002) reported that the rate of production of serotonin by the brain was directly related to the prevailing duration of bright sunlight and rose rapidly with increased luminosity.

A psychobiological response to seasonal changes is a result of interacting environmental and genetic factors (Lam et al., 1999b; Sher, 2001). Genetic factors can interact with environmental factors in different ways, and two such mechanisms have been described: genetic control of sensitivity to the environment and genetic control of exposure to the environment (Kendler, 1998). Genetic control of sensitivity to the environment suggests that genes, in part, render individuals relatively vulnerable to the effects of seasonal and lighting conditions. For example, the effect of light deprivation may be substantially greater in those at high genetic risk for seasonal changes in mood and behavior (Sher, 2003). Genetic control of exposure to the environment suggests that genetic factors influence the probability that individuals will select themselves into certain environments. For example, the genetic risk factors for seasonality may express themselves by influencing the probability that individuals will spend more time indoors (Sher, 2003).

Nonseasonal Depression

Use of light treatment for nonseasonal depressive disorders is growing (Kripke, 1998; Lam et al., 1999a, 1997; Tuunainen et al., 2004). There may be a role for light therapy in treating nonseasonal depression, especially in cases where antidepressants are not tolerated or where the patient preference is for nonpharmacological treatment. A recent Cochrane report suggested that bright light therapy offers a modest, though promising, antidepressant effect (Tuunainen et al., 2004). Treatment is particularly effective when administered in the morning during the first week and as an adjunct to sleep deprivation. Light therapy may be useful as an augmentation strategy for antidepressant nonresponders (Levitt et al., 1991).

A recent study found that there were seasonal influences on morning cortisol levels in patients with major depression (Sher et al., 2004). It is interesting to speculate that the hypothalamic-pituitary-adrenal system is involved in the biological mechanisms of light therapy in nonseasonal depression.

Recent reports suggest that bright light therapy has an antidepressant effect on patients with antepartum depression (Epperson et al., 2004; Oren et al., 2002). Evening bright light for two premenstrual weeks decreases depression and tension in patients with premenstrual dysphoric disorder (Lam et al., 1999a). Light treatment appears to decrease depressive symptoms in patients with nonseasonal bipolar disorder (Bauer, 1993).

Light and Healthy People

Exposure to bright light is important for psychological well-being of healthy people (Bauer et al., 1994; Lambert et al., 2002; Partonen et al., 1998). In the modern industrial world, many people spend a lot of time indoors. They are light-deprived and have a sedentary lifestyle. Combined exposure to bright light and physical exercise can be especially effective for improving mood- and health-related quality of life (Partonen et al., 1998). Various outdoor activities may provide opportunities to improve psychological and physical health.

Conclusion

The increased clinical and research interest in light treatment appears well justified. There is sufficient research evidence to support the efficacy of light therapy in SAD. Light therapy has a promising potential role in the treatment of nonseasonal depressive disorders. We are in the early chapters of our understanding of how light affects humans.

I would like to conclude with advice from A. Cornelius Celsus, a Roman medical writer: "Live in rooms full of light. Avoid heavy food. Be moderate in the drinking of wine. Take massage, baths, exercise, and gymnastics."
References

26. Sher L, Oquendo MA, Galfalvy HC et al. (2004), A study of seasonal effects on cortisol and
prolactin levels in patients with major depression and healthy volunteers. Biol Psychiatry 55(8 suppl 1):86S.


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