

Science and Light Therapy

Medical News & Perspectives - November 11, 1998

Dawn's Early Light to Twilight's Last Gleaming . . . At 8 AM, sun worshippers already lay prostrate on shimmering oceanside beach at Amelia Island, Fla. In a dark, windowless room nearby, practitioners of light therapy at the temple of the sun, myopia, and seasonal affective disorder (SAD) Light Treatment and Biological Rhythms (SLTBR), have convened for rites of the sun. The practitioners, who are in their field.

Timed exposure to daylight-intensity light has become the treatment of choice for seasonal affective disorder (SAD), according to Anja Wirz-Justice, PhD, professor of psychiatry at the University of Basel in Switzerland.

"Light is as effective as anti-depressant medications are, perhaps more so," said Wirz-Justice. She cochaired a roundtable session at the SLTBR's annual meeting, held in conjunction with the Society for Research on Biological Rhythms (SRBR) in May.

Light therapy, she said, also is gaining acceptance as a treatment for circadian sleep disorders and circadian disruptions associated with jet lag and shift work.

On the "up and coming" list of other possible indications, she said, are bulimia nervosa, premenstrual dysphoric disorder, and nonseasonal major depression.

Lighting devices have become more powerful, more portable, and less expensive, Wirz-Justice said, prompting wider use in homes and workplaces. The devices typically use light with an intensity of 2500 to 10,000 lux, simulating outdoor light near dawn or dusk.

Result of Rhythm Research

"Light therapy is one of the most successful and

practical results of basic research in biological rhythms," said Thomas Wehr, MD, chief of the Section on Biological Rhythms of the National Institute of Mental Health (NIMH). He is in Helsinki, Finland, where he is on a sabbatical. Helsinki, Finland, serves bright light therapy from October through March. The menu at the cafe includes Danish pastry, or traditional Finnish coffee, or French breakfasts for about €5.7. A cup of coffee costs about US\$2. Use of one of the cafe's eight light boxes is free. Source: Markku Partinen.

Although the impact of changes in day length on mood is well recognized, Wehr said, "Everyone starts out thinking humans are unique." The demonstration of the human biological response to light occurred in 1980, when Alfred Lewy, MD, with Wehr and other NIMH colleagues, showed that light suppresses secretion of the human pineal hormone melatonin (Science, 1980;210:1267-1269). Lewy is now professor of psychiatry and director of the Sleep and Mood Disorders Laboratory at Oregon Health Sciences University in Portland.

Since the modern "discovery" of SAD came along after psychiatric methods had matured, Wehr said, its researchers from the start have used controlled trials and structured interviews that facilitate comparisons and have examined data with meta-analyses. The current buzz words at the NIMH, Wehr said, are "translational research—bench to bedside," and light therapy "is a classic example of that."

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[The Cafe Engel, in Helsinki, Finland, serves bright light with breakfast from October through March. Popular menu selections include Danish pastry, or traditional English, continental, or French breakfasts for about US\$7. A cup of coffee costs about US\$2. Use of one of the cafe's eight light boxes is free. Source: Markku Partinen]

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interest, popular books, and a cottage industry in light boxes.

Researchers seeking to set standards for treatment formed the SLTBR in 1987. The group's initial priorities, Terman said, included liaison with the US Food and Drug Administration (FDA), consumer groups, lighting manufacturers, and third-party health insurers; development of consensus on the safety of light treatment and on supervised treatment vs self-treatment; and improvement and standardization of rating scales. All have been accomplished, Terman said, and all also remain on the SLTBR's ongoing agenda.

One milestone, he said, was the inclusion of SAD in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (Washington, DC: American Psychiatric Association; 1994). The criteria specify a regular temporal relationship between onset and offset of depression, with episodes occurring most often in winter, but occasionally in summer.

Symptoms of winter SAD, Terman said, include prominent anergy, hypersomnia, overeating, weight gain, and craving for carbohydrates, while summer SAD is characterized by loss of appetite and weight and by insomnia.

SAD is most common in young adult women. Prevalence increases at higher latitudes, with about 1% to 5% of people in middle to northern latitudes reporting winter SAD symptoms.

As much as 15% of the population of some countries report subsyndromal SAD, sometimes characterized as "winter blues." Perhaps only one in 10 persons with SAD has the summer variety, for which treatment remains ill-defined.

Although ophthalmologists have expressed concern about the long-term safety of light treatment, Terman said, no evidence of retinal damage from the therapy has been reported (Am J Ophthalmol. 1995;119:202-210).

The FDA considers light boxes to be Class III medical devices. Such devices may not be commercially distributed without premarket approval or an Investigational Device Exception, a measure that restricts medical claims made in advertising.

A joint task force of the SLTBR and the American Sleep Disorders Association (ASDA) reviewed experimental and clinical evidence for the potential efficacy of light treatment for sleep disorders. The group's recommendations (J Biol Rhythms. 1995;10:105-176), Terman said, are under review by the ASDA. Standards of practice are expected to be issued within the next year.

Around the World

At the SLTBR roundtable session, an international panel of clinicians reviewed light treatment around the world. In Germany, said Wilfried Koehler, MD, PhD, head of the department for addictive diseases at Buergerhospital in Frankfurt, where the general public makes extensive use of herbal remedies and other naturalistic treatments for depression, light therapy found early acceptance.

Every university hospital in Canada has a SAD clinic, said Raymond Lam, MD, chief of the Division of Mood Disorders at the University of British Columbia Faculty of Medicine in Vancouver.

A Canadian consensus meeting on light treatment in May, he said, prompted a major educational initiative for primary care physicians to be launched this winter. It will include a SAD treatment manual and patient information brochures, covering both light and pharmacological therapy.

The prevalence of SAD in Australia is comparable with that reported elsewhere, said Stuart Armstrong, PhD, of the Brain Sciences Institute at Swinburne University of Technology in Hawthorn, Victoria, and Australians perceive SAD symptoms as a serious problem. But unlike in some other countries, he said, few seek treatment.

About 50% of US insurers now reimburse for light

therapy for SAD, although often only after a battle, said Dan Oren, MD, associate professor of psychiatry at Yale University School of Medicine. One insurer told Oren, who is president of SLTBR, that "reimbursement is limited by light therapy's 'Viagra problem' ": Insurers do not want to cover everyone who wants a light box. Some challenge the specificity and reliability of a SAD diagnosis, he said, and "some perceive light therapy as more akin to voodoo than to science."

Switzerland is the only country so far, Wirz-Justice said, to require mandatory medical insurance reimbursement for light therapy for SAD—after the disorder is diagnosed by a physician or psychologist.

More Possible Applications

Speakers also described other potential applications of light therapy:

Circadian rhythm sleep disorders

These are not disorders of sleep per se, but of the timing of sleep, said Scott Campbell, PhD, director of the Laboratory of Human Chronobiology at New York Hospital-Cornell Medical Center. Patients may complain of sleep that starts too late, ends too early, is too fragile, or is irregular.

People with delayed sleep phase syndrome, for example, report trouble falling asleep until 3 AM and trouble getting going before 10 or 11 AM. This disorder, Campbell said, affects 7% of all persons seeking treatment for insomnia at sleep disorders centers. It is most common in adolescents. Light therapy in the early morning, he said, may help such people fall asleep earlier.

Advanced sleep phase syndrome affects mainly the elderly, causing trouble staying awake in the evening and fragile sleep in the second half of the night. Campbell and his colleagues treated older adults with trouble maintaining sleep with exposure to 4000 lux light for 2 hours in the evening, finding they awakened less frequently and slept nearly 1 hour longer (*J Am Geriatr Soc.* 1993;41:829-836).

Other researchers have found that evening light

exposure improves sleep and reduces nighttime wandering, or sundowning, in elderly nursing home residents with dementia.

Several factors, Campbell said, limit the use of light therapy for circadian sleep disorders. Proper timing of light requires circadian rhythm assessment; current techniques to record 24-hour body temperature continuously or to determine the onset of melatonin are not yet practical for general use.

Compliance may be a problem; patients may not have the time or desire to sit in front of a light box for 30 to 120 minutes daily or several times a week.

Bulimia nervosa

About one third of patients with this disorder have SAD, Lam said, and binge and purge more in winter. Physicians, he suggested, should pay attention to seasonality in assessing treatment efficacy. Patients with bulimia, he said, often seek help in January when they are most ill. Their improvement in late spring may be the result of treatment, or it may just be seasonal. Worsening in the fall may be misinterpreted as a relapse caused by discontinuing treatment.

Lam's research shows that light therapy acutely and rapidly improves both mood and eating symptoms in persons with bulimia (*Am J Psychiatry.* 1994;151:744-750).

Premenstrual depression

Lam and colleagues also have found that patients with late luteal phase dysphoric disorder (LLPDD) often show substantial seasonal patterns, with winter worsening of mood and premenstrual symptoms. About one third of women with LLPDD also have SAD, he said, and report increased winter weight gain and need for sleep. While studies of light therapy for LLPDD to date have had inconsistent results, he said, the numbers of patients studied has been small. Light, given in winter, he said, theoretically would be beneficial (*Am J Psychiatry.* 1997;154:1436-1441).

Shift work. Bright light improves sleep and alertness in night-shift workers, facilitating their adaptation to a new schedule, said Charmane Eastman, PhD, director

of the Biological Rhythms Research Laboratory at Rush-Presbyterian-St Luke's Medical Center in Chicago. Light may be presented at home to prepare for a shift change, she said, or in the workplace after the change or in both places.

Eastman's research shows that night workers benefit from protecting themselves from exposure to conflicting cues from sunlight by wearing dark goggles on their way home from work. They also should sleep at consistent times after the night shift, she said, and light-proof their bedrooms for day sleep.

In a recent study of people adhering to these prescripts, Stacia Martin, a student in Eastman's laboratory, and Eastman compared exposure to high-intensity (~5700 lux), medium-intensity (~1200 lux) and low-intensity light (<250 lux) on consecutive night shifts.

They found that high- and medium-intensity light, but not low-intensity light, enhanced circadian adaptation in nearly all subjects. Medium-intensity light, while brighter than most ordinary room light, they said, is less offensive to the eye and causes less glare on computer monitors than high-intensity light (Sleep. 1998;21:154-165).

Nonseasonal depression

Light may produce antidepressant benefits within 1 week, in contrast to psychopharmacological treatments, which typically take several weeks, said Daniel Kripke, MD, director of the Circadian Pacemaker Laboratory at the University of California, San Diego.

In a recent review of clinical trials, Kripke found that bright light therapy for nonseasonal major depression produced statistically significant net reductions in mood symptoms of about 12% to 35% on the Hamilton Depression Rating Scale. These results, he said, are comparable with those obtained in major trials of antidepressant medications.

Light and medications appear to work best in combination, he said, suggesting it would be advantageous to offer depressed patients speedy relief with light therapy while also starting them on

medications that have more extensively verified efficacy. Combined treatment should lower costs, he said, because faster improvement means less disability and morbidity (J Affective Disord. 1998;49:109-117).

Jet lag. Bright light, at least theoretically, can ease jet lag by speeding adaptation to new time zones, according to the SLTBR/ASDA joint task force report. While the few field trials conducted to date are encouraging, the task force concluded, the studies' applicability to the population at large and optimal timing after travel are still unresolved (J Biol Rhythms. 1995;10:

[A dawn-simulating alarm clock wakes travelers gently in the Hilton Hotel chain's "Sleep-Tight" rooms—available at present in fewer than a dozen hotels. Source: Lynne Lamberg]

Some hotels offer lighting devices to jet-lagged guests. In 35 "Sleep-Tight" rooms available in seven Hilton Hotels in the United States, for example, travelers will find a dawn-simulating alarm clock. Its light comes on gradually, starting 30 minutes before a desired wake-up time, allegedly providing a gentle way to start the day. The rooms also contain a standard light box, with a note inviting travelers to use it to "jump-start" their day.

[Basel's soccer team, the Fussball Club Basel, put light boxes in its locker room in hopes of improving player performance. No effect was apparent. Source: Anna Wirz-Justice, PhD]

As often occurs with new treatments that eventually may serve as alternatives or adjuncts to traditional medicine, the public's enthusiasm for light therapy outpaces scientific demonstrations of efficacy.

SLTBR program organizer Wirz-Justice reported that Basel's soccer team, the Fussball Club Basel, put light boxes in its locker room in 1996 in hopes of improving player performance. But light evidently is not a panacea. The team, Wirz-Justice said, fell in league standings.

—by Lynne Lamberg, JAMA contributor

Serious Light Reading

For the rest of my life I will reflect on what light is," Albert Einstein wrote in 1917. Perhaps Einstein might have been attracted to *Seasonal Affective Disorder and Beyond: Light Treatment for SAD and Non-SAD Conditions* (Washington, DC: American Psychiatric Association; 1998).

Additionally, the October 1998 issue of *Archives of General Psychiatry* includes reports of placebo-controlled trials of bright light treatment for winter SAD, morning vs evening light treatment of patients with winter depression, and timed bright light and negative air ionization for the treatment of winter depression.

These studies "provide the best evidence to date that light is an effective antidepressant in SAD," writes Anna Wurz-Justice, PhD, in an accompanying commentary. She said she hopes the studies will help

overcome lingering skepticism by those physicians who regard light therapy as "not molecular enough, a bit too Californian-alternative, a bit too media overexposed, merely a placebo response by mildly neurotic middle-aged women who don't like nasty drugs.

" Light therapy, she notes, is an outpatient treatment, lacks major adverse effects, and is cost-effective. "Whatever its mode of action," she asserts, "it demands inclusion in the antidepressant armamentarium, now.—L. L.

(JAMA. 1998;280:1556-1558) 167-176).