



BIOLOGY | HEALTH

Take Light, Not Drugs

How light therapy can treat disorders from depression to Alzheimer's disease.

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MARCH 20, 2014

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For Ryan Sherman*, a 34-year-old lawyer, something changed eight years ago when he moved from Texas to Europe and then to Boston and New York City: The shorter winter days of the more northern latitudes were like a dead weight on his emotions. “I’d get these depressions,” he says. His sleep schedule changed, too, with his bedtime slipping progressively later and early morning wakeups becoming increasingly difficult.

He tried medication to improve his mood—“a Xanax type of thing”—but it didn’t make him feel better. Then, while searching online, he discovered the Center for Light Treatment and Biological Rhythms at Columbia University Medical Center, in Manhattan. After undergoing a psychiatric consultation and filling out a questionnaire, he was prescribed a light box.

Between October and March, he wakes up at 6:15 a.m. and, so as not to disturb his partner, immediately heads to his living room, where he spends 30 minutes basking in the box’s glow. His mood lifted within a week when he started the treatment about two years ago. “It was an overwhelming sense of going from being a pessimist to being an optimist,” he says. It’s a steady commitment, but a worthwhile one. He can feel the effects when he falls off the light box wagon, as he did recently during a particularly busy time at work. “I felt my mood significantly go downhill,” he says. Within three days of returning to his regular doses of light, in combination with a little bit of exercise, he says he felt “a significant transformation.”

Light therapy has become standard for treating seasonal depression like Sherman’s. The idea that light has a benevolent influence on mood during the dark days of winter instinctively makes sense: As hazardous as sunbathing is, it certainly feels good. Now, research into the circadian underpinnings of chronic depression, bipolar disorder, Alzheimer’s disease, and fatigue suggests

that light could help these patients readjust too.



Researchers have known for decades that light influences animal behaviors; exposing a rodent to light during its usual nighttime, for example, stops its brain's pineal gland from producing melatonin, disturbing its sleep. And in 1980, a psychiatrist named Alfred Lewy, then at the National Institute of Mental Health, published a report in *Science* showing that humans were similarly vulnerable to a bright light's effects.¹

Months before the paper was submitted, Lewy was contacted by Herb Kern, an engineer who had meticulously recorded his severe mood swings for years. Kern noticed that his depressions peaked during the short winter days and then retreated as the days grew longer. He had combed through studies on light and melatonin and wondered if it had any bearing on his sadness.

Lewy and his colleagues asked Kern to sit by a bright light in the winter mornings and evenings to mimic the longer days of spring. Kern responded quickly, his description of light's effects sounding much like Ryan Sherman's. "I began to be bubbly again," he later reflected in a *Science* article. Kern's experience, followed by further research, sparked the first scientific description of seasonal affective disorder, or SAD.²

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As research into light treatment for SAD continued, it became clear that it wasn't necessary to stretch the day at both ends. "You could get as quick and as effective a response by presenting light in the early morning only and keeping [lighting] dim later on," says Michael Terman, the Columbia University psychologist who treated Sherman and co-author of *Reset Your Inner Clock*, a book about treatments targeting circadian rhythms.

Exactly how light works isn't known, but many researchers suspect that bright lights help SAD sufferers by regulating their sluggish circadian clocks. Those clocks involve the suprachiasmatic nucleus, or SCN, which is a small area of the brain's hypothalamus that dictates the rhythms of a host of bodily functions, including waking, sleeping, body temperature, and alertness. Absent external cues, those rhythms circulate for slightly longer than 24 hours for most people. (They stabilized at 24:30 for a man who lived in a dark cave for two months.) But normally these rhythms are harmonized with the external 24-hour day/night cycle when light hits a cluster of special retinal cells that are sensitive to sunlight but not always involved with vision.

People with SAD may have problems syncing their internal clocks in the winter, such that darker mornings allow their body's natural rhythms to drift later. Exposure to an artificial bright light in the morning usually improves their moods, says Lewy, presumably by changing the ebb and flow of the stress hormone cortisol or other bodily processes orchestrated by the SCN.

However, circadian rhythms appear to be disturbed in non-seasonal maladies too, which means there is a potential for light therapy beyond SAD, says Anna Wirz-Justice, professor emeritus at the Psychiatric Hospital of the University of Basel. She adds that light therapy has appeal for good reason. When it works, it does so quickly—usually within a week or two. Also, the side effects appear to be mild: Some patients have headaches or a slight nausea at the beginning of treatment, and some report

agitation. For researchers like Wirz-Justice, the choice to use light rather than drugs for depression and other mood disorders when possible is obvious. “Light is an active pharmacological agent hitting the brain,” she says. But does it work?

According to a handful of studies cited by the American Psychiatric Association’s (APA) practice guidelines for non-seasonal depression, it may. One of those trials, from 1992, exposed two dozen veterans with major depressive disorder or bipolar depression to bright light treatment ranging from 2,000 to 3,000 lux, and another two dozen to a dim, red light placebo. Those treated with bright light showed declines in three measures of depression during treatment; those exposed to the placebo did not. “In general, bright light therapy is a low-risk and low-cost option for treatment,” the APA concludes. They add that it may speed up patients’ responses to antidepressants.





However, the trials on light therapy for nonseasonal depression have been small and generally short-term, the APA notes. And some studies, particularly early ones, had methodological limitations, such as a lack of consensus over the best placebo to use. (For example, if you use dim light as a placebo, patients may not expect as much improvement as they would with a brighter light.) The lack of proof may in part explain why so few psychiatrists recommend light boxes for anything beyond SAD. Plus, light therapy might get lost in the grab bag of options for depression, such as drugs, psychotherapy, and deep brain stimulation, says David Neubauer, a psychiatrist at Johns Hopkins Medicine in Baltimore, Md.

Then there's the inconvenience of adding anything new. Doctors might not have heard about light therapy in medical school, so it doesn't pop to mind, and some patients accustomed to pills may not be open to the time and logistics involved in sitting beside a light box early each morning.

Light therapy researchers say it's tough to do big, lengthy studies, because they lack money for research. In contrast, the pharmaceutical industry has the financial backing to pay for large trials and then get the results in front of physicians' eyes.

A lack of capital may also account for why no light box companies can claim that the boxes treat a disease. For that, they need a stamp of approval from the U.S. Food and Drug Administration (FDA), which requires large studies and application fees for filing paperwork. Therefore, people are left to venture out on their own, and they're confronted with an unregulated heap of options ranging in price from less than \$100 to \$700. However, a Canadian light box manufacturer, The Litebook Company, is seeking FDA approval for a portable device.

69 percent of pregnant women treated with light therapy achieved remission from depression after a month, compared to 36 percent in the placebo arm.

Psychiatrists might eagerly turn to light therapy if there were more evidence to back it—particularly when faced with patients who want to avoid antidepressants. With this segment of the population in mind, several studies have kicked off in recent years. In one, published in 2011, researchers treated clinically depressed, elderly participants with an hour of 7,500 lux pale blue light, or a placebo, dim red light, every morning for three weeks.³ Not only did the group exposed to the blue light report better sleep and a shift in their dour mood, the effects continued after the therapy ended. According to the study authors, the elderly might be particularly susceptible to the benefits of light therapy because their light perception declines with age, which might be throwing their internal clocks out of sync. Plus, antidepressants aren't always an option for them because the drugs may interfere with some of the medications commonly prescribed to seniors.

Likewise, depressed women often wish to avoid drugs when they're pregnant. A small placebo-controlled trial found that 69 percent of pregnant women treated with light therapy achieved remission from depression after a month, compared to 36 percent in the placebo arm.⁴ And researchers at the University of Pittsburgh are now analyzing data from a recently completed trial testing the efficacy of light therapy on bipolar depression, which can be difficult to treat with drugs. Light is unlikely to be a silver bullet for complex psychiatric disorders, Terman says, but it may work in combination with other treatments.



cientists like Mariana Figueiro have started to wonder whether light therapy might heal ailments beyond depression by resetting circadian rhythms. Figueiro, a photobiologist, has shown that older adults with Alzheimer's disease have disruptions in these rhythms, caused or compounded by the fact that they tend to get outside less often than healthy adults. She's developed light therapy catered to Alzheimer's patients: a "light table" built from a 70-inch flat-screen TV that patients can sit at during the day.

In other ongoing studies, scientists explore whether light therapy might reduce fatigue in patients who have recently completed cancer treatment, and in people with Parkinson's disease, who may also have disrupted circadian rhythms.

To Terman, these studies test what he already believes to be true at some level: Light has been woven into human physiology since the beginning. In our artificially lit buildings, we tend to forget that humans once lived under the glowing moon, stars, and sun. Ironically, artificial light may now revive those ancient rhythms from the comfort of our living rooms.

*Ryan Sherman requested that his real name be concealed.

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