

## EXPERT COMMENTS

### BLUEWAVE™ Short Wavelength Effectiveness

“Our results imply that shorter wavelengths may be more effective and energy-efficient compared to higher energy polychromatic white light for phase-shifting the human circadian pacemaker. . .

Exposure to the optimum balance of light wavelengths may also reduce the undesirable side-effects associated with therapeutic use of light exposure such as glare, visual discomfort, headaches and nausea.”

- Steven W. Lockely, MD  
June 2003, J. of Endocrinology & Metabolism

“Short wavelength light therapy appears to be an effective treatment for patients with major depression with a seasonal pattern. This is an important first step towards optimizing light therapy for the treatment of SAD.

- Dr. Gena Glickman,  
April 2004, Chronobiology International

“Perhaps of greater clinical relevance is the question of phase delay induced by these light sources. From only a single light pulse of 2hr duration, we obtained a phase delay of 22 min with the white LEDs and 42 min with the blue/green LEDs. . . This suggests that the human circadian system is most sensitive to monochromatic light in the blue/green wavelength range.”

- Dr. Helen Wright  
November 2001, J. Pineal Res.

“Although [10,000 lux] light levels are therapeutically effective, some patients complain that they produce side effects of visual glare, visual fatigue, photophobia, ocular discomfort, and headache. Determining the action spectrum for

circadian regulation may lead to improvements in light therapy. Total illuminances for treating a given disorder can be reduced as the wavelength emissions of the therapeutic equipment are optimized.

The results identify the 446-477 nm portion of the spectrum as the most potent wavelengths providing circadian input for regulating melatonin secretion.”

- Dr. George C. Brainard  
August 2001, J. of Neuroscience

“In conclusion, the current data demonstrate that a very low intensity short wavelength light pulse (8 lux) is able to phase advance the human circadian system to a similar magnitude as a bright white light pulse (12000 lux) containing 185-fold more photons.

This finding suggests that the human circadian system is particularly sensitive to the phase advancing effects of short wavelength light and that the visual photopic system is not primarily involved. Our finding supports the recent human studies investigating the spectral sensitivity of light induced melatonin suppression.”

- Dr. Victoria L Warman  
February 2003, Neuroscience Letters

“The short-wavelength sensitivity demonstrated in the present study will have a major impact in the design and use of lighting for the treatment of certain types of sleep disorders, seasonal affective disorder, adaptation to shift work, jet lag, improving alertness and performance and reducing sleepiness and accidents during night work with broad applications in, for example, factories, hospitals, old age homes.”

- Dr. Kavita Thapan,  
July 2001, J. of Physiology

## General Comments on Light Therapy

“Given the psychological suffering that depression inflicts..., it is surprising how little notice is taken of these remarkable chronobiological interventions [sleep deprivation and light therapy].

A single night of total or partial sleep deprivation—“wake therapy”—induces rapid and dramatic, albeit usually short lasting, improvement of mood in about 60% of all depressed patients, independent of diagnostic subgroup. A positive response to sleep deprivation predicts and hastens the response to antidepressant medication.

Sleep deprivation can be combined with a variety of drugs to maintain the response attained within hours—theoretically, a perfect combination.

Light therapy is characterized by a fast onset of antidepressant action—within days—and it can prevent the depressive relapse after recovery sleep following sleep deprivation. Furthermore, light and medication can be combined.

– Anna Wirz-Justice, *Science* Vol. 303 23  
– January 2004 467-468.

We demonstrated a significant reduction in depression symptom severity following bright light therapy in seasonal affective disorder and in nonseasonal depression, as well as a significant effect with dawn simulation in seasonal affective disorder. In other words, when the “noise” from unreliable studies is removed, the effects of light therapy are comparable to those found in many antidepressant pharmacotherapy trials.

An additional potential application of light therapy lies in the treatment of depression during pregnancy and in the postpartum period, when safe and effective alternatives to pharmacotherapy without potential toxicity for the fetus or newborn would be clearly desirable

– Robert N. Golden, M.D.  
April 2005, *Am J Psychiatry* 2005

“Light is now recommended as the treatment of choice for SAD.

Light is as effective as drugs, perhaps more so.”

– Anna Wirz-Justice, “Beginning to See the Light.  
October, 1998, *Archives of General Psych.*

“Light therapy is easy to administer in outpatient settings, lacks major side effects, and, importantly is cost-effective. Whatever its mode of action, it demands inclusion in the antidepressant armamentarium, now.”

–Anna Wirz-Justice, “Beginning to See the Light.  
October, 1998, *Archives of General Psych.*

“Light appears to produce faster anti-depressant benefits than psycho-pharmacologic treatment.”

– Daniel Kripke,  
1998 Elsevier Science B.V

“Light may lift moods in persons who are clinically depressed within one week,”

– Michael Smolensky  
*The Body Clock Guide to Better Health*

“Bright light augments the anti-depressant effects of medication and wake therapy”

*Depression and Anxiety* 16:1–3 (2002)

“It appears that bright light combined with wake therapy and medication might produce a much better antidepressant response much more rapidly than our available antidepressant drugs.”

– Daniel Kripke  
*Journal of Affective Disorders*, 1998

“Further, some evidence suggests the amphetamine-like neurochemical dopamine may play a role – evidence certainly consistent with light’s well-known energizing and activating effects.”

- Michael Norden, M.D.  
Beyond Prozac

"Sufficient evidence is now available to offer bright light treatment routinely to patients suffering from major depressions.

- Light treatment for nonseasonal depression  
Journal of Affective Disorders, 1998

"Light therapy is one of the most successful and practical results of basic research in biological rhythms,"

- Thomas Wehr, MD, chief of the Section on  
Biological Rhythms  
National Institute of Mental Health (NIMH).

Sleep deprivation and light therapy. . . can help the patient in a shorter time and with fewer side effects than drugs—and can be easily and successfully combined with medication.

We must include them in the therapeutic armamentarium. For light therapy, an American Psychiatric Association task force recently has concluded the same.

- Anna Wirtz-Justice, Science Vol. 303 23  
- January 2004 467-468.

“We find light therapy is often useful with depression. We use it with people on anti-depressants. But we all have patients who are sensitive to medication or they want to try something else first. We have patients who show improvements on light therapy alone”

- Dr. Carol Tavani, Neuropsychiatrist

"In unipolar (major) depression, several clinical features suggest a chronobiological basis of the mood disturbances."

- Chronobiology International, vol 20,2,2003

"Advanced and delayed sleep phase disorders, and the hypersomnia have been treated successfully by appropriately timed artificial bright light exposure.

Light treatment for sleep disorders:  
Consensus report. IV.  
Sleep phase and duration disturbances.  
J Biological Rhythms 1995 Jun;10(2):135-47

"These results support the concept that the light-dark cycle is the most important synchronizer of the human circadian system. These data indicate that interventions designed to phase shift human circadian rhythms for adjustment to time zone changes or altered work schedules should focus on properly timed light exposure."

Phase-shifting human circadian rhythms: Influence of sleep timing, social contact and light exposure.  
J Physiol 1996 Aug 15;495 ( Pt 1):289-97

"Some people who complain of insomnia may have nothing wrong with their sleep at all. It may be the timing of their sleep that is off, a mismatch between their body clock and the world's clock."

- Michael Smolensky,  
The Body Clock Guide to Better Health

“Light is a promising non-drug intervention for treating Sleep Maintenance Insomnia in the elderly”

- Raymond Lam, MD,  
Seasonal Affective Disorder and Beyond

"Exposure to bright light resulted in substantial changes in sleep quality. Waking time within sleep

was reduced by an hour, and sleep efficiency improved from 77.5% to 90%, without altering time spent in bed. These findings demonstrate the effectiveness of timed exposure to bright light in the treatment of age-related sleep maintenance insomnia. "

Alleviation of sleep maintenance insomnia with timed exposure to bright light.  
J Am Geriatr Soc 1993 Aug;41(8):829-36

"Bright light treatment promises to improve sleep. Particular situations call for more specific timing of light, however. If you have trouble falling asleep, avoid light in the later part of the day because it tends to stimulate...If you have trouble rising, try a strong dose of light early on to rekey your waking problem."

- Michael Norden, MD, Beyond Prozac

"When our body clock is out of sync, it will produce the wrong signals at the wrong time of day. Thus sleeping pills aren't as effective, because our body clock is constantly fighting the medication."

- Vital Times February 2001

"In controlled studies, dawn simulators have been shown to help people feel less groggy on a dreary winter's morning, as well as more energetic and less depressed all day long."

- Norman Rosenthal, MD.  
The Emotional Revolution

Bright light administered in the morning is likely to benefit in the treatment of non-seasonal depression. Most of the studies have used it as an adjunct therapy, and especially people who respond to sleep deprivation might benefit from bright light.

- **A Tuunainen, February 2004,**  
Light therapy for non-seasonal depression (Cochrane Review). In: *The Cochrane Library*

"The Suprachiasmatic nuclei (SCN or Body Clock) have connections with other parts of the brain to control the body's temperature, hormone release, and many other functions. A pathway runs from the eye to the SCN, and light seems to play the largest role in setting the circadian clock."

- Circadian Rhythms; A Wellness Booklet,  
American Sleep Disorders Association

"Environmental light is the primary stimulus for regulating circadian rhythms, seasonal cycles, and neuroendocrine responses in humans. Twenty years of clinical studies have confirmed that light therapy is effective for treating winter depression...circadian sleep disorders, nonseasonal depression, menstrual disturbances, eating disorders, as well as re-entraining circadian physiology relative to the challenges of shift work or intercontinental air travel."

- George C. Brainard MD, John P. Hanifin MD,  
Biological Effects of Light 2001

"Light therapy is one of the most successful and practical results of basic research in biological rhythms,"

- Thomas Wehr, MD  
Chief of the Section on Biological Rhythms  
National Institute of Mental Health (NIMH).

"The National Aeronautics and Space Administration exposed the astronauts to bright lights at night and nearly complete darkness at day to alter their circadian rhythms. Their results: The astronauts easily adapted to their new sleep patterns and their body clocks also shifted with no problems. They could now ensure peak performance."

- NASA turns to lights to change astronauts' sleeping, waking cycles  
The Houston Post