

Clock genes, manic mice, blue light, and amber lenses: How light interacts with circadian rhythm to affect mood

I am investigating new treatments for bipolar disorder, specifically the use of light therapy for bipolar depression. Light therapy, which typically involves sitting in front of a device that emits bright light for 30 to 60 minutes every morning, has been used to treat other forms of depression, like seasonal affective disorder, with good results.

To understand how light can affect mood we need to know something about circadian rhythm, our internal biological clock based on the 24-hour cycle of the Earth's rotation. Light enters the eyes to signal a master clock in the brain that it's morning or night. This master circadian clock then synchronizes clock mechanisms in systems throughout the body, and even in the cells themselves.

Disruption of circadian rhythm has effects on cognitive function and mood. Anyone who has been sleep deprived or suffered jet lag knows this. Even a minor disruption, like the switch to and from Daylight Savings Time, can cause people to experience irritability, problems with concentration, and with memory. For most of us these effects are temporary.

People with bipolar disorder have heightened sensitivity to the effects of circadian rhythm disruption. They often have a harder time establishing regular sleep-wake routines in the first place (even from birth), and are more affected by sleep deprivation or changes to sleep-wake schedules. Major shifts in mood, either to depression or mania/hypomania, may result.

By genetically altering "clock genes," i.e., artificially interfering with the internal clock, animal researchers have bred manic mice, who are hyperactive, sleep less, are more impulsive and show increased reward-seeking behavior. These mice become "normal" when given lithium, a mood-stabilizing medication for bipolar disorder. This research shows that circadian rhythm influences mood and behavior. Light therapy can alter or regulate circadian rhythm.

It appears that the safest forms of light therapy for bipolar patients are those which help to stabilize circadian cycles rather than change them, e.g., bright light therapy in the middle of the day rather than early morning. Limiting artificial light exposure in the evening is also helpful.

A recent discovery is that light on the blue end of the spectrum has the strongest effect on the internal clock. Blue light, of course, is what emanates from our screens – television, computer, tablet, phone – which modern society has become so dependent on. Could our current epidemic of insomnia be the result of the ubiquitous blue-lit screen? Research has shown that restricting all artificial light in the evening ("dark therapy") improves sleep and relieves depression.

But getting people to turn off their screens in the evening isn't easy - in fact it's nearly impossible. What if there was a way to block just the blue light from the screens? One answer was found in amber-tinted safety glasses, which are able to block more than 90% of blue wavelength light, but allow transmission of the rest of the light spectrum, so that people can still read, work on their computers and watch television (though driving is not advised). Initial research is promising for the benefits of this novel treatment on both sleep and mood.

For more information about these studies and treatments, contact me at:

Rebecca Stanwyck, LCSW

www.rebeccastanwyck.com

510-881-2540