A New Light Therapy Approach May Improve Alzheimer's Symptoms

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As one of the most common neurological diseases around the world, Alzheimer's disease symptoms are subtle, progressive, and irreversible. Memory loss and impaired cognition are some of the first markers of disease. Individuals living with Alzheimer's disease often report other non-cognitive symptoms, such as reduced sleep, increased agitation, and mood changes. These symptoms are challenging to treat and can significantly disrupt one's quality of life. Not to mention, Alzheimer's medications marketed toward memory and learning impairments may have side effects that induce insomnia and reduce sleep quality, which further exacerbates non-cognitive symptoms.

Now, emerging studies have found that photobiomodulation, or light therapy, may reduce non-cognitive Alzheimer's symptoms. Photobiomodulation therapy involves exposing

photosensitive retinal cells to low-intensity LED lights. The light absorbed by these cells in the back of the eye is then converted to electrical signals that can be transmitted to the brain's visual centers. In a recently published meta-analysis study, Zang et al. found that across the 15 studies they reviewed, light therapy led to considerable improvements in sleep and psychobehavioral symptoms. Given the inherently few side effects, light therapy seems promising as a potential treatment option for alleviating the non-cognitive symptoms of Alzheimer's disease and improving overall quality of life.

In the early stages of Alzheimer's disease, over 70% of individuals experience sleep disruptions. Sleep is a critical period when the brain refreshes itself. Memories are consolidated, and toxic debris built up during the day is cleared. When you consistently do not get enough sleep, brain health suffers. Studies have shown that people, particularly those above the age of 50, who have poor, fragmented sleep are at higher risk of developing dementia. In Alzheimer's disease, poor sleep patterns may not only be a symptom but also a driver of disease.

Sleep is regulated by the brain's hypothalamus in a region called the suprachiasmatic nucleus (SCN). Receiving light-dark signals from the visual centers of the brain, cells in the suprachiasmatic nucleus establish our circadian rhythms.

This biological clock not only controls sleep-wake patterns but also influences our hormones, appetite, and mood. Neurodegeneration caused by Alzheimer's disease seems to reduce light sensitivity, which destabilizes one's circadian rhythm. Other factors, such as reduced exposure to outdoor light and age-related eye deficits, may also interfere with light transmission. By using photobiomodulation light therapy to stimulate the suprachiasmatic nucleus, it may be possible to recalibrate the circadian rhythm and improve sleep quality.

In recent years, increasing studies have employed light therapy at varying intensities to treat a variety of neurodegenerative diseases, including Alzheimer's disease. By synchronizing the body's circadian rhythm with external light stimuli, going to and staying asleep becomes easier.

Studies show that those exposed to ambient light therapy also exhibit less neural damage and inflammation, suggesting this therapy may slow the progression of disease. As a result, individuals with Alzheimer's disease experience increased quality of life and caregivers report reduced burden.

Light has a dual effect in regulating the secretion of melatonin and serotonin. As a result, light therapy also has been found to enhance mood. For anyone who has ever experienced seasonal affective disorder, reduced exposure

to sunlight in the colder months can trigger depressive symptoms. It is well known that light has an anti-depressive effect. Among those with Alzheimer's disease, Zang et. al observed a considerable reduction in depression following light therapy, albeit it is not clear how disease severity factors in.

Lastly, light therapy seems to reduce agitated behavior commonly reported by those caring for individuals with Alzheimer's disease. As one of the most pervasive behavioral symptoms of Alzheimer's, agitation may manifest as increased irritability, abnormal vocalization, and erratic movements, which may put the safety of others at risk. When one's circadian rhythm is well-regulated and sleep patterns are consistent, it is not surprising that overall mood is balanced, as well.

Although light therapy certainly is not a cure for Alzheimer's disease, it offers a non-invasive, low-risk therapeutic option for treating symptoms that contribute to reduced quality of life. While this research is still in its early stages, researchers are hopeful that daily exposure to light therapy may improve sleep and mood for millions of people around the world living with Alzheimer's disease and other age-related neurological conditions.