

Blue-enriched white light to wake you up in the morning

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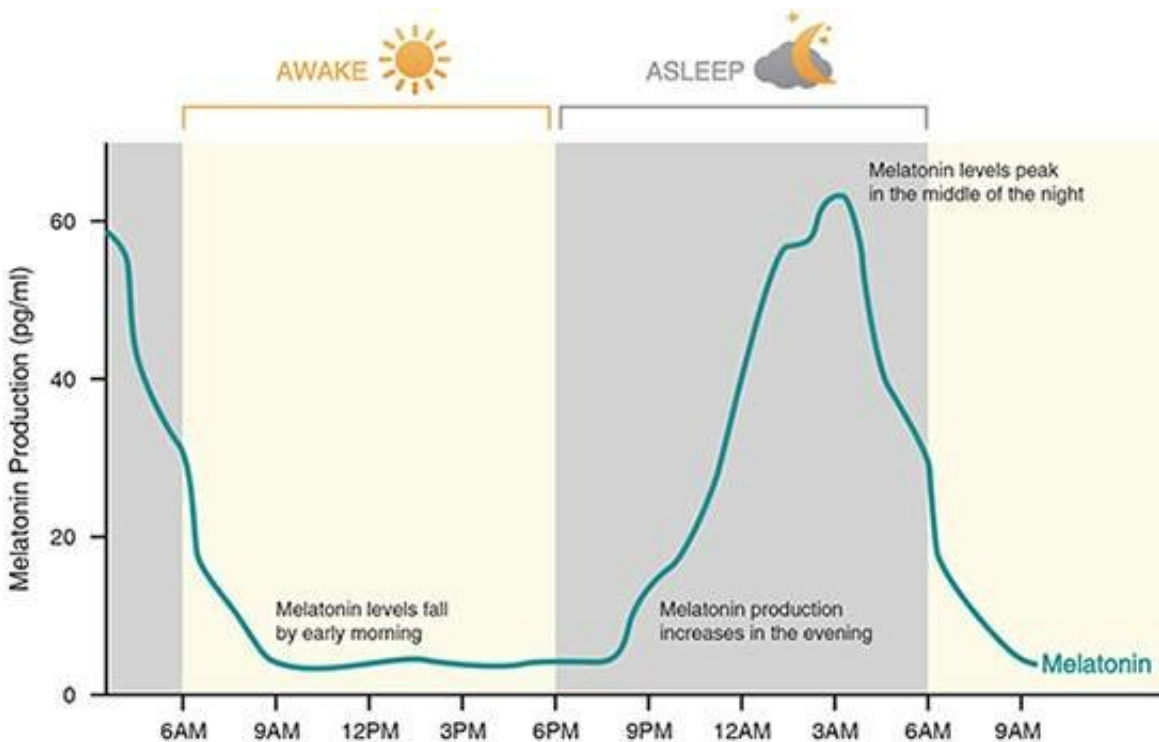


Figure 1. Changes in melatonin secretion during day and night time. Credit: The Korea Advanced Institute of Science and Technology (KAIST)

Here is good news for those who have difficulty with morning alertness. A KAIST research team has proposed that a blue-enriched LED light can effectively help people overcome morning drowsiness. This study will provide the basis for major changes in future lighting strategies and thereby help create better indoor environments.

Considerable research has been devoted to unmasking circadian rhythms. The 2017 Nobel Prize in Physiology or Medicine went to Jeffrey C. Hall, Michael Rosbash, and Michael W. Young for unveiling the molecular mechanisms that control circadian rhythms. In particular, the relationship between light and its physiological effects has been investigated since the discovery of a novel, third type of [photoreceptor](#) in the human retina in the early 2000s. Rods and cones regulate [visual effects](#), while the third type, photosensitive retinal ganglion cells, regulate a large variety of biological and behavioral processes including melatonin and cortisol secretion, alertness, and functional magnetic resonance imaging (fMRI).

Initial studies on light sources have shown that blue monochromatic, fully saturated lights are effective for stimulating physiological responses, but the relative effectiveness of commercially available white light sources is less well understood. Moreover, the research was more focused on the negative effects of blue light; for instance, when people are exposed to [blue light](#) at night, they have trouble achieving deep sleep because the light restrains melatonin secretion.

However, Professor Hyeon-Jeong Suk and Professor Kyungah Choi from the Department of Industrial Design and their team argue that the effects of blue-enriched morning light on physiological responses are time dependent, and that it has positive effects on melatonin levels and the subjective perception of alertness, mood, and visual comfort compared with warm white light.

The team conducted an experiment with 15 university students. They investigated whether an hour of morning light exposure with different chromaticity would affect their physiological and subjective responses differently. The decline of melatonin levels was significantly greater after the exposure to blue-enriched white light in comparison with warm white light.

Professor Suk said, "Light takes a huge part of our lives since we spend most of our time indoors. Light is one of the most powerful tools to affect changes in how we perceive and experience the environment around us."

Professor Choi added, "When we investigate all of the psychological and [physiological effects](#) of light, we see there is much more to [light](#) than just efficient quantities. I believe that human-centric lighting strategies could be applied to a variety of environments, including residential areas, learning environments, and working spaces to improve our everyday lives."

More information: Kyungah Choi et al. Awakening effects of blue-enriched morning light exposure on university students' physiological and subjective responses, *Scientific Reports* (2019). [DOI: 10.1038/s41598-018-36791-5](#)

Provided by The Korea Advanced Institute of Science and Technology (KAIST)

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