



melagen®

light + biology

LIGHT YEARS AHEAD



Versalux

# EVOLUTION & REVOLUTION

**MelaGen™ is a cutting-edge lighting innovation engineered to support human health and wellbeing by intelligently managing blue light exposure within built environments. Developed in Australia by Versalux Lighting Systems, and underpinned by extensive research from Monash University and the Cooperative Research Centre for Alertness, Safety and Productivity. MelaGen™ works in harmony with natural circadian rhythms, our internal 24-hour biological clock.**

While the daily cycle of daylight is obvious to us, the quality of that light is critical to how our bodies function. Sunlight is rich in blue wavelengths from late morning through to late afternoon, which help regulate our sleep-wake cycles through a hormone called melatonin. This hormone, produced by the pineal gland, begins rising in the evening to signal biological night, preparing the body for sleep. Conversely, light rich in blue wavelengths suppresses melatonin, enhancing alertness and mental clarity.

For thousands of years, humans were limited by natural light. First we extended our days with fire, then with incandescent lighting, and more recently, with highly efficient electric light sources. But today's artificial lighting tends to emit disproportionate amounts of blue light compared to natural light, particularly at night. The most recent of these light sources are typically laden with a relatively high level of blue spectrum wavelengths.

Our biological connection with light is undeniable; blue-rich light can have an 'alerting' effect on the brain, and we now know that relatively low levels of blue light can suppress the release of the sleep-inducing hormone melatonin, causing delays to the onset of sleep and reducing the quality of the rest achieved. While these technologies are energy-efficient, they can interfere with the body's internal clock. These disruptions have measurable impacts on mental, emotional, and physical health. Armed with this information, the challenge now is to artificially illuminate our environments in a pleasing and efficient manner, with minimal distortion to our health and natural circadian cycles.

## **"But can't we do that with tuneable white systems now?"**

Many modern lighting systems offer tunable white features, adjusting colour temperature from warm to cool throughout the day. While this can create a visually dynamic environment and an emotional response, it does not guarantee biologically meaningful results. Without specifically managing the blue spectral content, such systems can fall short of supporting circadian health. The research from Monash University and the Alertness CRC suggests that the actual Melanopic/Photopic ratio (M/P ratio), not just colour temperature, drives melatonin suppression and circadian alignment. MelaGen™ products are purpose-built with this scientific foundation, delivering high and low melanopic lux precisely when it is needed. The science is in and the measure of blue light in a light source is the driving factor in suppressing or allowing the release of melatonin from the pineal gland.

## **What is Melanopic Lux?**

Traditional lighting is measured in terms of Photopic Lux, which is the amount of light registered on the image-forming Cone receptors of our retinas. The retina also registers light on special, non-image forming cells called 'intrinsically photosensitive retinal ganglion cells' (ipRGCs), and Melanopic Lux is a term used to describe the portion of the illumination that the ipRGCs 'see'. Melanopic/Photopic ratio, or M/P ratio, is a description of the amount of blue light stimulus present in the normal Photopic illumination. The M/P ratio quantifies how much of the visible light impacts circadian regulation. High M/P ratios stimulate alertness; low ratios encourage rest.



## The Theory in Practice

Falls among elderly residents in care homes are a significant health concern, often leading to long-term complications. Given that lighting influences visual acuity, alertness and sleep quality, researchers set out to assess whether an optimised lighting system could reduce fall rates in long-term care residents.

A comprehensive observational study was conducted over 24 months across four care home sites, with two serving as experimental sites and the other two as controls. At the two experimental sites, the study implemented: daytime blue-enriched light (6am–6pm) and nighttime blue-depleted light (6pm–6am) resulting in 43% reduction in fall rates at experimental sites. By enhancing visibility during waking hours, and promoting better sleep quality at night, this lighting approach contributed to the overall safety and well-being of elderly residents. The influence of light on human health extends beyond physical safety. It also plays a profound role in mental well-being. Disruptions in the circadian rhythm have been linked to an increased risk of mental health disorders, including depression and anxiety. Exposure to bright light at night, for example, disrupts the body's ability to regulate sleep. This disruption contributes to mood disturbances, heightened stress levels and cognitive impairments.

Modern lifestyles often lead to chronic sleep restriction, particularly among students and working professionals. Recognising the widespread effects of sleep deprivation on mental performance, a recent study investigated whether indoor lighting, specifically blue light, could help reduce these effects.

In another study, college-aged adults who had slept less than seven hours per night for a week were exposed to different types of white light during the day. All lights looked equally bright, but some contained more blue light ("blue-enriched" or high melanopic light).

Researchers then tested participants on tasks that measured thinking speed, accuracy, learning, and sleepiness. The results showed clear benefits from blue-enriched lighting. Participants exposed to it, experienced:

- Significantly less sleepiness
- Better working memory, processing speed and procedural learning
- Performance speed on a PC learning task was 3.2 times faster

Blue-enriched light made a noticeable difference in tasks that rely on quick thinking and coordination. These findings suggest that using blue-enriched lighting during the day can help improve mental performance and reduce sleepiness, especially for those who are sleep-deprived.

A UK study conducted in 2013, shed light on this relationship by analysing data from 85,000 participants. Each participant wore a light sensor for seven days, monitoring their exposure to varying levels of light throughout the period. They were also surveyed on their mental health, allowing researchers to assess correlations between light exposure and psychological well-being.

The results revealed a clear trend that individuals exposed to bright light at night were more likely to experience mental health issues. In contrast, those who received sufficient bright light exposure during the day reported improved mood stability and reduced probability of depression. These findings reinforce the importance of strategic lighting in mental healthcare settings. MelaGen™ technology offers a practical solution for mental healthcare environments, helping to stabilise sleep cycles and reduce the risk of behavioural disturbances linked to circadian misalignment.



The most recent Alertness CRC and Monash University research shows that blue light can significantly suppress melatonin. Exposure to blue light can in some individuals, cause the rise of melatonin to occur up to 2 hours later and reduce the amount of slow-wave activity during sleep by 20%.

As we continue to uncover the links between light exposure, hormonal balance, and cognitive function, the case for circadian-optimised lighting becomes undeniable. MelaGen™ represents a synthesis of biological science and lighting innovation, designed to address not just what we see but how we feel, think, and sleep. By integrating seamlessly into existing infrastructure, MelaGen™ is a future-proof investment in circadian lighting design. It meets today's needs and prepares us for a healthier, better-lit tomorrow.

MelaGen™ products have been specifically developed to produce high blue-enriched light at commercially embraced 4200K and blue-depleted light at the warmer end of the spectrum, all the while maintaining excellent colour rendering properties. Using MelaGen™ enabled products empowers the user to access and deliver on the latest developments in science, while exceeding all the "lighting design" metrics that our industry applies, and that good lighting practice expects.

MelaGen™ enabled products integrate with a choice of existing control system protocols such as DALI or easy to install, standalone BLE (Bluetooth Low Energy) systems, with simple to use controls. Imagine the benefits that can be generated by illuminating permanently occupied spaces such as within mental healthcare, hospitals, and prisons via science-based lighting solutions, where the residents can benefit from restored and maintained wake/sleep cycles and all of the documented benefits of a healthy circadian cycle. MelaGen™ ReGen delivers these benefits, through a combination of blue-enriched and blue-depleted light sources that can be programmed to transition in alignment of our circadian rhythms.

## **The measure of blue in a light source is the driving factor in suppressing or allowing the release of melatonin from the pineal gland.**

MelaGen™ is a world leading technology with products that use actual science. It promotes wellbeing through increased alertness, mood and sleep.

MelaGen™ products are not just about circadian health. MelaGen™ Blue is a blue-enriched source that has an alerting benefit for all lighting applications. The blue enriched light of MelaGen™ Blue can be used to suppress the release of Melatonin and can be applied in areas where productivity is required, or for the occupants to benefit from an increase in alertness. MelaGen™ ReFresh products feature high colour rendering, blue-depleted illumination, delivering a warm appearance and a low M/P ratio that is highly useful for dedicated illumination in preparation for rest, allowing for improved length and quality of restorative sleep.

### **Please consider:**

- Suppressing melatonin has an alerting effect
- The rise of melatonin signals the beginning of biological night, as the body readies itself for sleep
- Slow-wave sleep is the principal marker of sleep depth and the restorative value of sleep
- Blue-enriched light, before bed, decreases the amount of slow-wave activity
- Blue-depleted light featuring a low M/P ratio, combined with lower light levels before bed, will reduce the suppression of melatonin and not disrupt our natural circadian rhythms

#### Study sources:

[https://www.jamda.com/article/S1525-8610\(22\)00471-6/fulltext](https://www.jamda.com/article/S1525-8610(22)00471-6/fulltext)

<https://www.frontiersin.org/articles/10.3389/fneur.2021.624217/full#main-content>

<https://www.medrxiv.org/content/10.1101/2022.10.16.22280934v2>

**MelaGen™ isn't just lighting. It's lighting evolved for wellbeing, performance and life.**



Blue-enriched technology, with excellent colour characteristics of 4200K. Stimulates alertness and cognitive performance. CRI 92.4 with peak melanopsin activation to suppress melatonin and enhance focus and alertness. This spectrum mimics a blue sky and delivers powerful biological stimulation. Ideal for situations where alertness and concentration are critical.



Blue-depleted technology boasting CRI92 and colour temperature of 2200K. Mimics candlelight feel with low melanopsin ratio to encourage sleep time, signalling the release of melatonin to prepare the body for rest. This spectrum is reminiscent of candlelight and is designed for nighttime use. It maintains colour fidelity while reducing blue wavelengths that interfere with the release of melatonin.

## Products



### Lucca range

MelaGen™ is available in the Lucca range. Low-profile circular LED luminaires for general purpose illumination. Designed for mental health facilities, prisons, and secure care settings, these luminaires address both emotional wellbeing and physical safety.



### Como range

Como Downlight MelaGen™ range is a premium range of LED downlights specifically designed for interior applications where high luminaire efficiency and reduced glare are required. Available in three different sizes using the same interchangeable components.

**Contact us to discuss installing a MelaGen system  
01787 881191 or visit [lightyearsahead.co.uk](http://lightyearsahead.co.uk)**

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