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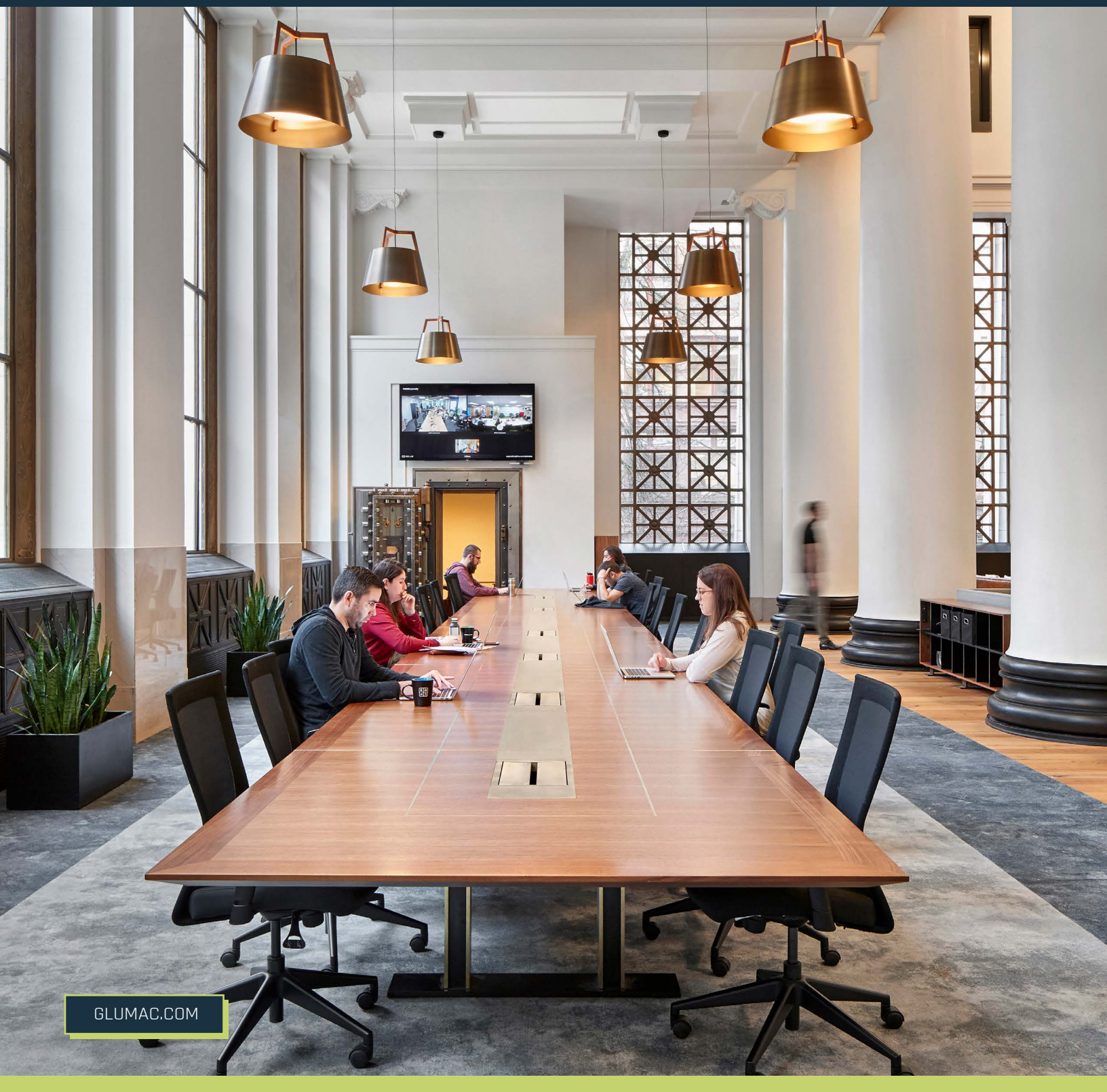
Lighting at the Edge of Wellness: An Introduction to Understanding Blue and Red Light in Design



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Lighting at the Edge of Wellness: An Introduction to Understanding Blue and Red Light in Design

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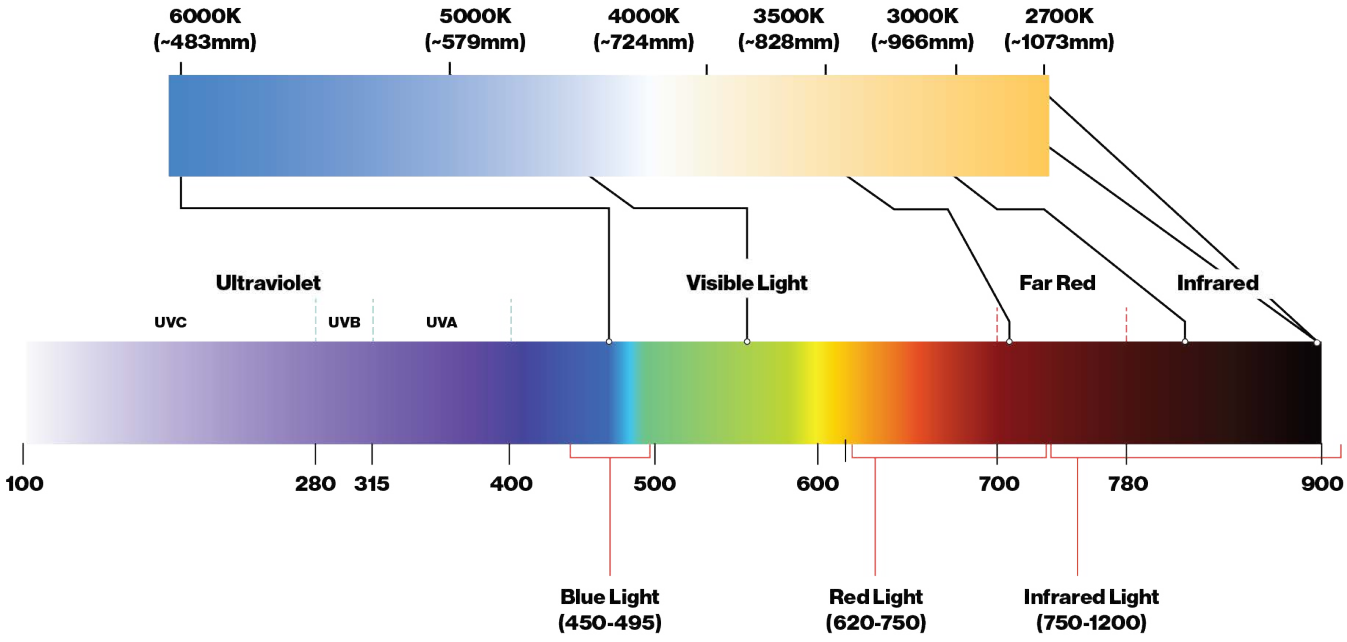
As a lighting designer, “quality of light” extends beyond simple illumination. It combines aesthetics, emotional tone, performance, and the biological impact on the human body. Light is not only what allows us to see our world, but it also affects how we feel, heal, and age. This quick read explores how blue, red, and infrared wavelengths of light affect human health, cell regeneration, and eye function, and how these scientific insights can inform better lighting design.



BLUE LIGHT REFERENCES

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3. BrightFocus Foundation. (n.d.). New research links blue light to macular degeneration risk: Antioxidants may offer hope. BrightFocus Foundation. www.brightfocus.org/news/new-research-links-blue-light-to-macular-degeneration-risk-antioxidants-may-offer-hope

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2. UCLA Health. (2023, March 2). 5 health benefits of red light therapy. UCLA Health. www.uclahealth.org/news/article/5-health-benefits-red-light-therapy

INFRARED LIGHT REFERENCES

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Blue light, with wavelengths ranging from approximately 450 to 495 nanometers, plays a complex and dualistic role in human health. On the beneficial side, exposure to blue light during daytime hours is critical for regulating the circadian rhythm. It enhances alertness, cognitive function, and mood by influencing the body's melatonin production and sleep-wake cycle. In lighting design, blue-enriched light can be strategically used in morning and afternoon settings, such as offices, classrooms, and commercial spaces, to boost productivity and maintain circadian alignment.

However, these same stimulating properties become problematic during evening hours. Excessive exposure to blue light at night, particularly from screens and LED lighting, disrupts melatonin release, delaying sleep onset and reducing sleep quality. Research suggests that chronic exposure may contribute to retinal stress and increase the risk of age-related macular degeneration (AMD). As lighting designers, we must carefully modulate blue light output, employing systems that adjust based on time of day, and reduce blue-rich lighting in environments intended for rest or relaxation. This can be accomplished by utilizing tunable white lighting, dimming features, scene management, and adaptable control systems and programming.

Red light, typically ranging from 620 to 750 nanometers, offers compelling therapeutic potential, particularly in the realm of skin health and superficial tissue repair. It stimulates collagen production, improves blood circulation, and can reduce inflammation at the epidermal level. From a lighting design perspective, incorporating red wavelengths into ambient or task lighting in spaces like spas, wellness centers, or recovery zones can promote relaxation and tissue renewal.

Infrared light, extending beyond the visible spectrum from approximately 750 nanometers to 1200 nanometers, penetrates deeper into muscle and connective tissues. This deeper action is essential for muscle recovery, chronic pain relief, and inflammation control. Infrared saunas and therapeutic panels illustrate this approach. While not typically visible or used for general illumination, infrared light can be embedded into architectural elements to provide passive health benefits, aligning the environment with emerging trends in biophilic and wellness design. Red light coves or backlit panels in spas and meditation rooms encourage relaxation, while infrared panels in the ceilings or floors of recovery spaces can improve muscle repair and circulation. These design elements enhance the lighting from visual to therapeutic.

While red and infrared light share therapeutic properties, their distinctions lie in the depth of tissue interaction and clinical outcomes. In researching the integration of health and lighting, lighting designers can consider how layering visible red light and invisible infrared technologies can elevate both visual and physiological well-being.

Light is a powerful tool. It shapes perception, regulates physiology, and can even restore tissue. As our understanding of its biological effects deepens, so must our responsibility as designers. By combining aesthetics with wellness science, architectural lighting design can move into a future where quality of light truly means quality of life by affecting circadian rhythms, hormone production, and cellular behavior. A truly high-quality lighting design must consider not just visual comfort, but biological harmony. This not only transforms architectural beauty but also enriches the human experience through our lighting designs and integrations.

To learn more, reach out to Caitlin McMullen and our Lighting Studio at cmcmullen@glumac.com.

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