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392009672_LED_lighting_undermines_visual_performance

LED lighting undermines visual performance

Abstract and Figures

Life evolved under broad spectrum sunlight, from ultraviolent to infrared (300-2500nm). This spectrally balanced light sculpted life's physiology and metabolism. But modern lighting has recently become dominated by restricted spectrum light emitting diodes (350-650nm LEDs). Absence of longer wavelengths in LEDs and their short wavelength dominance impacts physiologically, undermining normal mitochondrial respiration that regulates metabolism, disease and ageing. Mitochondria are light sensitive. The 420-450nm dominant in LEDs suppresses respiration while deep red/infrared (670-900nm) increase respiration in aging and some diseases including in blood sugar regulation. The retina is mitochondrial rich with high metabolic demand and rapid aging. When those working exclusively under blue dominant LEDs are supplemented with a sunlight spectrum for 2 weeks, their colour perception improves significantly across the blue-yellow and red visual axes. Hence, LEDs suppress normal colour vision. Importantly, mitochondria communicate across the body with systemic impacts following regional light exposure. This likely involves shifting patterns of serum cytokine expression, raising the possibility of wider negative impacts of LEDs on human health particularly, in the elderly or in the clinical environment where individuals are debilitated. Changing the lighting in these environments could be a highly economic route to improved public health.