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Comparing the response to acute and chronic exposure to short wavelength lighting emitted from computer screens

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The use of electronic devices with light-emitting screens has increased exponentially in the last decade. As a result, humans are continuously exposed to unintentional artificial light. We explored the effects of acute and chronic exposure to artificial light at night (ALAN) via screen illumination on sleep, circadian rhythms, and related functional outcomes. Nineteen participants (11 female and 8 males, mean age 28.1 ± 7.2 years) underwent a six-night study with three experimental conditions using a repeated-measures design: baseline (first night, no light exposure), acute ALAN exposure (second night), and chronic ALAN exposure (third to sixth nights). Each light exposure lasted for 2 hours (21:00-23:00). Participants underwent an overnight polysomnography at the end of each condition (nights 1, 2, and 6). We collected urine samples (for melatonin metabolite analysis), while body (oral) temperatures were measured before and after exposure. Each morning, the participants filled out questionnaires and conducted a computerized attention test. Both acute and chronic illumination significantly disrupted sleep continuity and architecture and led to greater self-reported daytime sleepiness, negative emotions, and attention difficulties. Both exposure types also altered circadian rhythms, subduing the normal nocturnal decline in body temperature and dampening nocturnal melatonin secretion. In sum, ALAN exposure from electronic screens has an immediate, detrimental, yet stable effect on sleep, circadian regulation, and next-day functional outcomes. Given the widespread use of electronic devices today, our findings suggest that even one night of screen light exposure may be sufficient to cause adverse effects on health and performance.

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