



National Toxicology Program
U.S. Department of Health and Human Services

NTP Cancer Hazard Assessment Report on Night Shift Work and Light at Night

April 2021



NTP Report Excerpts and Notes
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Twenty years ago, the first reports^{1 2} emerged of a 60% increase in breast cancer risk in nurses working the night shift. Since then, hundreds of peer reviewed studies³ have replicated, and elucidated the effects of extended exposure to light at night and circadian disruption on cancer risk.

In April 2021, the NIH National Toxicology Program confirmed that Night Shift Work and Light at Night that disrupts circadian rhythms are carcinogenic based on a 7-year review of 660 peer-reviewed studies³.

This summary of the NTP Cancer Hazard Assessment Conclusions, and practical recommendations for effective mitigation using circadian lighting, was prepared by Dr Martin Moore-Ede, a former professor at Harvard Medical School, CEO of Circadian ZirLight, and leading expert on light and circadian disruption, to educate the nursing profession and its leadership on effective lighting solutions.

¹ Hansen J. (2001) Increased breast cancer risk among women who work predominantly at night. *Epidemiology* 12: 74-77

² Schernhammer E.S., et al (2001) Rotating night shifts and the risk of breast cancer in women participating in the nurses health study. *J Natl Cancer Inst* 93: 1563-1568

³ National Toxicology Program Cancer Hazard Assessment Report on Night Shift Work and Light at Night, DHHS, April 2021.

National Toxicology Program Cancer Hazard

Assessment Report on Night Shift Work and Light at Night

Released April 2021

Cancer Hazard Assessment Conclusions

1. “There is high confidence for a causal relationship between human cancer and persistent night shift work — i.e., frequent and long-term night shift work, especially beginning in early adulthood — that causes circadian disruption. This conclusion is based on sufficient evidence of carcinogenicity from the collective body of cancer epidemiological and mechanistic studies in humans and mechanistic studies in experimental animals.”

Notes:

- ~60% increased breast cancer risk in nurses working nights first reported in 2001
- ~12,000 new breast cancer cases/year in US pre-menopausal women working nights

2. “There is moderate confidence for a causal relationship between human cancer and certain lighting conditions- i.e., excessive Light at Night (LAN) exposure combined with insufficient daylight exposure — that cause circadian disruption. This conclusion is based on strong evidence that LAN acts through mechanisms that are likely to cause cancer in humans.”

Notes:

- Light at Night suppresses melatonin levels and causes circadian disruption
- Suppressed melatonin and circadian disruption significantly increase breast cancer risk
- Light at Night is also associated with increased prostate cancer risk in men

3. “The characteristics related to electric light that are most likely to cause circadian disruption include a combination of shorter wavelengths (e.g., blue light), longer exposure duration, higher light intensity or levels, and exposure to electric light during the biological night. The exact conditions leading to circadian disruption (e.g., duration) depend on the combination of these metrics. In addition to exposure to electric LAN, total light exposure (i.e., having insufficient exposure to daylight) is also important in circadian regulation and thus is part of certain lighting conditions.”

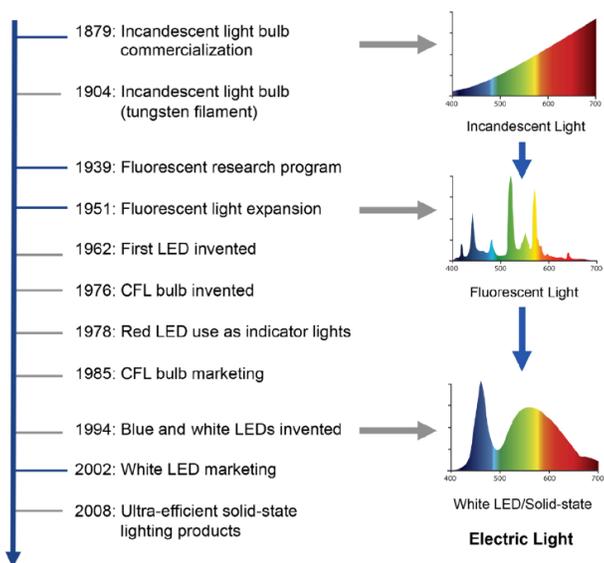
Notes:

- Most Fluorescent and LED lights are rich in blue content and cause circadian disruption
- Bright Lighting in Nurses Stations, Treatment Rooms, ER, and Laboratories is a hazard for breast cancer in pre-menopausal women and for prostate cancer in men

Mitigating the Risks of Hospital Lighting at Night

1. Replace fluorescent and LED lights in locations where nurses and other premenopausal women spend significant night shift hours (nursing stations, treatment rooms, ER, labs etc.)
2. Install circadian lighting that has less than 2% blue content at night and more than 20% blue content during daytime to protect staff from melatonin suppression and circadian disruption
3. Educate staff at risk on managing personal light exposure and benefits of daylight exposure and avoidance of blue rich light during evening and night (sunset to sunrise)

Cancer Risk is associated with Blue Rich LED & Fluorescent Lighting



Before 1950 all artificial lighting was low in blue content and the risks of blue light at night exposure were minimal.

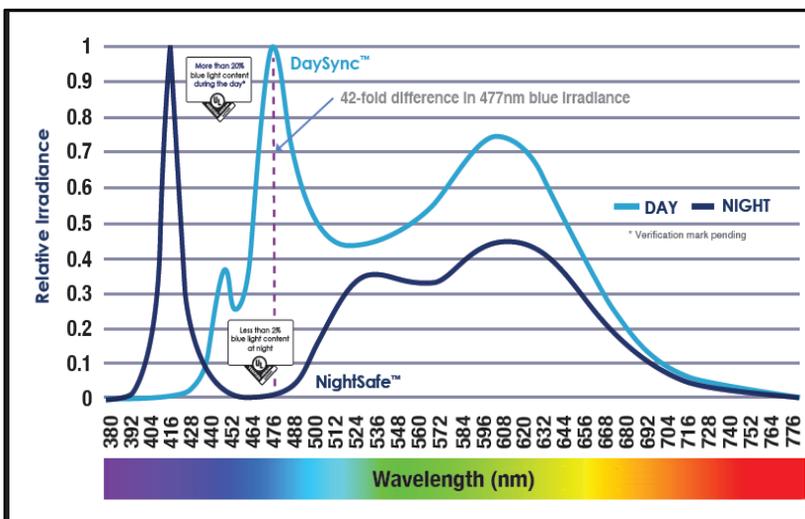
As more energy efficient light sources were developed (Fluorescents and more recently LEDs), the blue content greatly increased, and the excess risk of breast and prostate cancers was significantly elevated.

Conventional LED and fluorescent lighting needs to be replaced in locations where people work at night

Tips on Selecting Safe and Effective Circadian Lighting

Healthy circadian lighting removes the harmful blue wavelengths from the light spectrum during the night hours (NightSafe™) and provides blue-rich light during daytime hours (DaySync™) to synchronize circadian rhythms and boost human performance.

Look for UL verified lights with <2% blue content at night & >20% daytime blue content.



Circadian lighting fixtures

Circadian lighting fixtures which automatically control day and night blue light levels while providing high quality white light day and night are available in multiple standard form factors such as troffers, linears and downlights.

These lighting fixtures preserve the energy efficiency of LED lighting (125-145 lumens/watt) without the hazardous health effects of conventional blue-rich LED lights.

For more information visit

www.circadianlight.com

