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Take Control of Your Health

Light at Night Boosts Obesity, Diabetes, High Blood Pressure

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STORY AT-A-GLANCE

- Exposure to any amount of light at night has detrimental effects on the health of older adults, increasing the risk of obesity, high blood pressure and diabetes
- Even one night of sleep with moderate light exposure increased nighttime heart rate, decreased heart rate variability and increased next-morning insulin resistance in a separate study
- A 2019 study found that exposure to artificial light at night while sleeping was significantly associated with an increased risk of weight gain and obesity
- Nighttime exposure to light inhibits the secretion of melatonin, which can cause circadian disruptions that play a role in cancer
- If your bedroom is affected by light pollution, be sure to use blackout shades to keep light out or wear an eye mask when you go to sleep; also remove all sources of light from your bedroom, including a digital alarm clock or cellphone

Ensuring your bedroom is pitch black at night — without light exposure from a television, window, cellphone or even your alarm clock — is a simple way to reduce your risk of chronic diseases. It was only about 130 years ago that electric light was invented,[1] bringing with it drastic changes in the way humans function on a daily basis.

Now that we're able to work, eat and play well after the sun sets, artificial lighting has had immense benefits for us, but our endogenous circadian clocks haven't fully

adjusted. The fact is, exposure to unnatural electric light, including light at night (LAN), disrupts sleep and many other biological processes.

The full effects of exposure to light at night are only beginning to be understood, but a powerful study has demonstrated that exposure to any amount of light at night has detrimental effects on the health of older adults, increasing the risk of obesity, high blood pressure and diabetes.[2]

Exposure to Light at Night Raises Risk of Chronic Disease

Since the beginning of time, humans were exposed to light from sunlight during the day and near complete darkness at night, except for light from the moon, stars and fire. Now, it's difficult for humans to avoid light exposure at night, which comes from television, computers, cellphones, light pollution and a multitude of other sources.

"Whether it be from one's smartphone, leaving a TV on overnight or light pollution in a big city, we live among an abundant number of artificial sources of light that are available 24 hours of a day," said Dr. Minjee Kim, assistant professor of neurology at Northwestern University Feinberg School of Medicine and a Northwestern Medicine physician.[3]

Kim and colleagues conducted a real-world study involving 552 men and women between the ages of 63 and 84. They wanted to determine if exposure to light at night increased risk factors for cardiovascular disease, so they measured light exposure using wrist-worn devices over a seven-day period.

Compared to adults who were not exposed to light at night, those who did experience light exposure at night were significantly more likely to be obese or have high blood pressure or diabetes. Specifically:[4]

- 40.7% of those exposed to LAN were obese, compared to 26.7% of those not exposed

- 17.8% of those exposed to LAN had diabetes, compared to 9.8% of those not exposed
- 73% of those exposed to LAN had high blood pressure, compared to 59.2% of those not exposed

Those exposed to light at night were also more likely to wake after falling asleep, and the researchers suggested more studies should be conducted to understand the long-term effects of light exposure at night on cardiometabolic risks.[5]

Why You Should Turn Off the TV Before Sleeping

Past research has also highlighted the health risks of not sleeping in complete darkness. In March 2022, a study of 20 healthy young adults revealed that even one night of sleep with moderate light exposure increased nighttime heart rate, decreased heart rate variability and increased next-morning insulin resistance.[6]

"These results demonstrate that a single night of exposure to room light during sleep can impair glucose homeostasis, potentially via increased SNS [sympathetic nervous system] activation," the researchers noted.[7] A 2019 study, involving 43,722 women, also found that exposure to artificial light at night while sleeping was significantly associated with an increased risk of weight gain and obesity.[8]

The link was particularly strong for women who slept with the television or a light on in their bedroom, and the researchers suggested incorporating strategies to reduce nighttime light exposure in public health recommendations for obesity:[9]

> *"Given the association found between exposure to ALAN [artificial light at night] while sleeping and subsequent weight gain and obesity in our study and the cross-sectional evidence from other studies, public health strategies to decrease obesity might consider interventions aimed at reducing ALAN while sleeping."*

Compared with women who had no exposure to artificial light at night, sleeping with a television or light on in the room was associated with a greater risk of gaining about 11 pounds (5 kilograms) or more, a body mass index (BMI) increase of 10% or more, incident overweight and incident obesity over the course of the follow-up period.

There were notable differences in weight gain depending on the type of light exposure. While sleeping with a small nightlight was not associated with weight gain, sleeping in a room with light coming from outside the room was associated with a modest weight increase. However, women who slept with a light or television on were 17% more likely to have gained about 11 pounds or more.

Study co-author Chandra Jackson, Ph.D., head of the National Institute of Environmental Health Sciences (NIEHS) Social and Environmental Determinants of Health Equity Group, explained that the study could have implications for people living in urban areas, where source of artificial light like streetlights and neon signs could interfere with the sleep hormone melatonin.

"Humans are genetically adapted to a natural environment consisting of sunlight during the day and darkness at night," she said. "Exposure to artificial light at night may alter hormones and other biological processes in ways that raise the risk of health conditions like obesity."[10]

Studies Highlight the Detrimental Effects of LAN

Disrupted sleep may partly explain why LAN increases obesity risk, and previous studies have also linked sleep disruptions to obesity and diabetes. In a study of 2,003 men and women followed for a mean of six years, irregular sleep patterns increased the risk of metabolic syndrome by 23% for each one hour of sleep difference; chronic one-hour loss increased the risk by 27%.[11]

The research revealed that irregular sleep, including day-to-day variability in sleep duration and timing, is associated with metabolic abnormalities. Not sleeping enough has also been linked to similar health risks:[12]

"Modern environment and lifestyle, such as increased light exposure and activities during night and widespread use of electronic media and mobile devices, not only deprive humans of sufficient sleep but also considerably disturb the regularity of sleep behaviors.

An adequate amount of sleep, which is essential for global rejuvenation of the human body, plays a central role in normal functioning of metabolism and energy homeostasis. As a result, reduced quantity of sleep has been associated with higher risk of obesity, metabolic syndrome, and diabetes in numerous previous studies."

Light at Night Increases Cancer Risk

Exposure to light leads to advances or delays in your circadian rhythm, known as phase shifts. Typically, exposure to light early in the morning causes a phase advance, which leads to earlier waking. Light exposure at bedtime will lead to a phase delay, or later wakening.

Nighttime exposure to light inhibits the secretion of melatonin, which can cause circadian disruptions that play a role in cancer.[13] In fact, it's previously been shown that higher exposure to outdoor light at night may increase the risk of postmenopausal breast cancer,[14] and evidence suggests light at night may increase thyroid cancer risk, too,[15] as thyroid function is regulated by circadian rhythm.

One study followed 464,371 participants in the National Institutes of Health-American Association of Retired Persons Diet and Health Study for an average of 12.8 years. Satellite data was used to estimate nighttime light exposure, which was then linked to residential addresses, while thyroid cancer cases were followed via state cancer registries.

A positive association was found between light exposure at night and thyroid cancer risk, with those in the highest quintile of nighttime light exposure having a 55% increased risk of thyroid cancer compared to those in the lowest quintile. Aside from

helping you sleep, melatonin may help prevent cancer, acting as a "full-service anti-cancer agent," inhibiting the initiation, progression and metastasis of cancer.[16]

The suppression of melatonin that occurs during exposure to light at night is one explanation for LAN's detrimental effects. According to researchers from the National Institute of Environmental Health Sciences:[17]

> *"Potential adverse health effects from light-induced circadian disruption are mediated in part by melatonin suppression. Light at night of sufficient level and duration, appropriate wavelength, and appropriate timing can shift the timing and/or reduce the amplitude of the nighttime melatonin signal, as may happen in night-shift workers.*
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> *This may contribute to sleep changes and circadian disruption, which in turn affect a host of cellular mechanisms (such as metabolism and cell cycling) and neurobehavioral processes (such as mood regulation and cognitive outcomes). These disturbances may potentially lead to adverse health outcomes."*

Because it involves exposure to artificial light at night, shift work has been categorized as a probable carcinogen that induces circadian disorganization, which in turn is linked to elevated rates of cancer, diabetes, cardiovascular risks, obesity, mood disorders and age-related macular degeneration.[18]

Even Dim Light at Night Should Be Avoided

Making a conscious effort to eliminate light in your bedroom can go a long way toward protecting your health. If your bedroom is affected by light pollution, be sure to use blackout shades to keep light out or wear an eye mask when you go to sleep. Remove all sources of light from your bedroom, including a digital alarm clock or cellphone.

You should also swap out LED lights with incandescent bulbs, which are less efficient at suppressing melatonin, particularly in areas where you spend most of your time during the day and evening, such as your kitchen, bathroom and bedroom. Leave the LEDs for

areas such as hallways, closets, garage and porch, where your exposure to them is minimal.

When it gets to be late afternoon and evening, wear amber-colored glasses that block blue light, and turn off electronics — or at least be sure to wear the glasses while you're using them. You can also install blue light-blocking software like Iris on your computer, cellphone and tablet.[19]

In addition to sleeping in pitch blackness, you can further optimize your circadian rhythm by getting exposure to bright natural light during the day. Ideally, strive for at least 15 minutes of sunlight exposure in the morning hours to help to regulate the production of melatonin, dropping it to normal daytime levels, so you feel awake during the day and sleep better at night.

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