



Lighting and health

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Executive summary

This report reviews the ways in which lighting can affect the health of people in buildings. It is important for designers and building owners and occupiers to be aware of these issues. A substantial amount of research has been recently carried out in this area, and this report reviews this work.

Adequate lighting and lighting controls, including the provision of emergency lighting, are essential to enable people to work and move around a building or external site safely. Poor lighting, particularly lighting that causes glare, can give visual discomfort which may result in sore eyes, headaches, and aches and pains associated with poor body posture. These issues can be avoided by careful lighting design that meets the recommendations of codes and standards.

Fluorescent lighting with magnetic ballasts and some Light-Emitting Diodes (LEDs) can exhibit mains flicker, which can cause headaches, eyestrain or epileptic seizures in some people and exacerbate the symptoms of autism and agoraphobia. Switching to high frequency fluorescent lighting, or different types of LED driver, avoids these problems.

Exposure to light during the day enables synchronisation of the body clock, promoting alertness during the day and sleep at night time. Conversely light at night can alter the body clock, keeping you awake at night and making you sleepier during the day. Any type of lighting can do this if it is bright enough, but sources rich in blue light, such as daylight, LEDs and some fluorescent lamps, are the most effective at altering the body clock. Frequent changes to the body clock, eg in variable shift schedules or time zone changes, are associated with a range of health issues including some cancers.

Seasonal Affective Disorder (SAD) is an illness which causes depression in winter at high latitudes when there is less daylight. Exposure to bright light can alleviate the symptoms of SAD. It can also help those suffering from dementia to maintain their body clocks and sleep better at night.

Very bright light can damage the eyes. Most conventional lighting, including fluorescent lighting, is not bright enough to cause eye damage. However some very bright LEDs, particularly blue LEDs, may cause retinal damage if viewed directly. They should be screened from direct view while in use.

Exposure to ultra violet (UV) radiation can cause skin cancer. Compared to sunlight, fluorescent light contains little UV radiation. However, an unprotected lamp, particularly a Compact Fluorescent Lamp (CFL) with a faulty phosphor coating, may emit some UV radiation. To be on the safe side, desk lamps which might be close to a user for a long period should either have a protective transparent cover to the lamp, or use LED lamps which emit little or no UV radiation.

UV radiation does have a health benefit in that it allows the synthesis of Vitamin D in the body. Sunlight exposure outdoors is necessary for this to happen, because window glass blocks nearly all UV radiation. Vitamin D is essential for healthy bones, and may have a beneficial effect on the cardiovascular system and on mood and depression.

Daylight provision in general has been linked to health benefits in a number of studies. Providing daylight in buildings is often a convenient way to achieve the benefits of daytime light in regulating circadian rhythms, resulting in improved health and mood. In principle bright artificial light could give similar benefits. However, daylight provision also provides some contact with the outside, which can additionally improve health and mood.

Full spectrum lighting is sometimes claimed to have special health benefits because its spectrum is similar to daylight. However, such benefits have not been proved. Full spectrum lighting contains a lot of blue light, and exposure during the day may help people reset their body clocks, but exposure in the evening or at night might be counterproductive.

Conventional lighting does not appear to generate electric or magnetic fields that can damage human health.

Fluorescent lamps and other gas discharge lamps contain mercury. Intact lamps do not release mercury but health risks to consumers can arise from accidental lamp breakage. It is important that broken lamps are disposed of safely, and lamps are processed at the end of life to recover the mercury. LED lamps currently available on the market should not contain chemicals above human toxicity levels.

The report concludes with guidance for lighting designers and building occupiers and their managers, to maximise the health benefits of lighting and minimise health risks.

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