



Energy-Saving Lamps & Health

Source document:
SCENIHR (2008)
Summary & Details:
GreenFacts (2009)

Context - Currently, conventional incandescent lamps are in the process of being replaced with more energy-efficient lamps, mainly compact fluorescent lamps (CFLs). Fluorescent light has been used for many years in overhead fluorescent tubes without causing any problems. Nevertheless, certain "light sensitive" citizens' associations have voiced concerns about compact fluorescent lamps.

Do these energy-saving lamps aggravate the symptoms in patients with certain diseases?

An assessment by the European Commission Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR)

1. Introduction - What is light?.....3
2. How does light, infrared and UV radiation interact with skin and eyes?.....3
3. How do fluorescent lamps work?.....3
4. Can fluorescent lamps worsen health conditions not related to the skin?.....4
5. Can fluorescent lamps affect people with skin conditions?5
6. Do energy-saving lamps pose a risk to some groups of patients in the EU?.....5
7. Conclusions6

The answers to these questions are a faithful summary of the scientific opinion produced in 2008 by the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR):
"Light Sensitivity"

The full publication is available at: <http://copublications.greenfacts.org/en/energy-saving-lamps/>
and at: <http://ec.europa.eu/health/opinions/en/energy-saving-lamps/>



This PDF Document is the Level 1 of a GreenFacts Co-Publication. GreenFacts Co-Publications are published in several languages as questions and answers, in a copyrighted user-friendly Three-Level Structure of increasing detail:

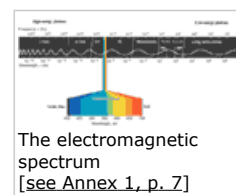
- Each question is answered in Level 1 with a short summary.
- These answers are developed in more detail in Level 2.
- Level 3 consists of the Source document, the internationally recognised scientific opinion which is faithfully summarised in Level 2 and further in Level 1.

*All GreenFacts Co-Publications are available at: <http://copublications.greenfacts.org/>
and at: http://ec.europa.eu/health/ph_risk/popularizing/popularizing_results_en.htm*

1. Introduction - What is light?

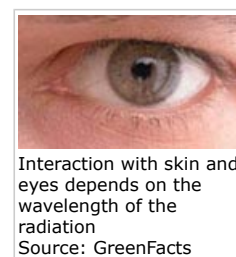
Light consists of electromagnetic waves that can be seen by the human eye

Besides visible light, the sun also emits infrared (IR) and ultraviolet (UV) radiation. Ultraviolet radiation carries more energy and infrared radiation less energy than visible light. Most high-energy UV radiation is filtered out by the atmosphere before reaching the Earth's surface.



2. How does light, infrared and UV radiation interact with skin and eyes?

Light is essential to life on Earth and affects humans and other living organisms in various ways. For instance, the interaction of light with our skin and eyes influences our perception of warmth and cold. It also helps the body regulate processes that lead to wakefulness and rest during the cycle of day and night, and across the different seasons.



When radiation reaches the skin or the eyes, it can be reflected or it can penetrate the tissue and be absorbed or scattered in various directions. This interaction depends on the wavelength of the radiation.

- Most **ultraviolet radiation** does not penetrate further than the upper layers of the skin. Although it has some beneficial effects such as helping production of vitamin D, in general it is considered to be harmful as it can damage proteins and DNA in the skin and eyes, especially ultraviolet radiation with short wavelengths (UVCs). Some people are particularly susceptible to UV radiation and become sunburned even after extremely low exposures or show abnormal allergy-like skin reactions.
- Radiation of longer wavelengths, including **visible light** and **infrared radiation**, is usually harmless although it can warm up exposed tissue. The interaction of visible light with the light-sensitive cells in the eye allows us to see colours.

3. How do fluorescent lamps work?

Fluorescent lamps are made of a glass tube containing a low pressure mixture of gases including mercury. The tubes are coated with fluorescent chemicals. When the current is switched on, the starting mechanisms at each end of the lamp produce electrons that excite the gases inside the tube and make them release ultraviolet (UV) radiation. This UV radiation hits the fluorescent coating, which produces light. The colour of the light produced depends on the chemical composition of the coating. Some fluorescent lamps emit more blue light than conventional incandescent lamps and therefore simulate daylight better.



Fluorescent lamps have a glass envelope which filters out ultraviolet radiation but, in some cases, some UV radiation can get through. Using double glass envelopes dramatically reduces the amount of UV radiation emitted.

Compact fluorescent lamps (CFLs) emit light and some UV radiation, but their electronic circuitry – like any electronic or electric device – also generates some electromagnetic fields.

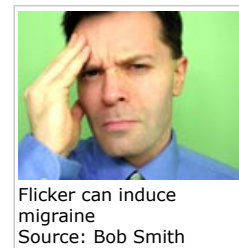
The magnitude of these fields, at typical operating distances, remains well below what is tolerable and typical for household appliances.

In contrast to conventional incandescent lamps that only generate low frequency electric and magnetic fields, compact fluorescent lamps generate both low and intermediate frequency fields. The exact frequency range depends on the type of lamp.

Any lamp's intensity may oscillate or 'flicker' when powered by alternating current. While older technology of fluorescent lamps showed considerable flickering, due to the electronic circuitry needed for operation, this problem has been reduced considerably with current technology, to such an extent that CFLs are called "flicker-free".

4. Can fluorescent lamps worsen health conditions not related to the skin?

Some people suffering from various health conditions not related to the skin claim that the use of fluorescent lamps aggravates their symptoms. Such a link is not supported by scientific evidence. There is a need for additional studies before final conclusions can be drawn regarding several conditions. The concerns have been attributed to different characteristics of energy-saving compact fluorescent lamps (CFLs), namely flicker, the ultraviolet radiation and blue light they produce, and electromagnetic fields.



Flicker can induce migraine
Source: Bob Smith

Flicker in general can induce **migraine** and even seizures in some **epileptic** patients, but no such effects have been reported with properly working CFLs.

There is some evidence that blue light in general can aggravate **retinal diseases** in susceptible patients.

It cannot be excluded that **photophobia**, an abnormal sensitivity to light, is induced or aggravated by different light conditions.

There is no evidence that fluorescent light has negative effects on people with **autism**, but an influence cannot be excluded.

There is sufficient evidence indicating that the use of compact fluorescent lamps does not aggravate **dyslexia** and **Irlen Meares** – learning disabilities that result in difficulties with reading and spelling.

There have not been any reported effects of compact fluorescent lamps on individuals with **chronic fatigue syndrome, fibromyalgia, dyspraxia, or HIV**.

It is extremely unlikely that fluorescent lamps used for room illumination can cause **snow blindness** or **cataracts**.

There does not seem to be any link between electromagnetic fields generated by compact or other fluorescent lamps and **electromagnetic hypersensitivity**.

5. Can fluorescent lamps affect people with skin conditions?

Exposure to certain types of compact fluorescent lamps (CFLs) with a single glass envelope may induce problems in patients who are extremely sensitive to sunlight, in particular to its UVA and UVB components. This is particularly the case when the source is close to the skin (i.e. 20 cm or less). Extremely sensitive patients include people with inherited skin diseases brought on by light, as well as people with some skin diseases which have no known causes. Unfiltered UV light from such compact fluorescent lamps could also cause skin reactions in people with lupus.



Lamps used close to the skin could cause problems for people who are extremely light-sensitive
Source: Simon Cataudo

Several drugs cause skin problems when used in combination with exposure to light. Compact fluorescent lamps are unlikely to be a problem. In the treatment of some cancers, several drugs are used that are activated by exposure to light and that can cause skin problems in some patients. Patients receiving such treatment could potentially show a marginally greater reaction when exposed to light from compact fluorescent lamps compared with light from incandescent lamps. These adverse reactions are expected to affect only a relatively small number of people and could be avoided by using double-envelope CFLs which are better at filtering out ultraviolet radiation.

For these diseases, more research is needed to establish whether compact fluorescent lamps constitute a higher risk than incandescent lamps.

The UV doses from compact fluorescent lamps are estimated to be too small to contribute to skin cancer.

6. Do energy-saving lamps pose a risk to some groups of patients in the EU?

Some patient groups are concerned that using compact fluorescent lamps instead of conventional incandescent lamps would aggravate certain diseases. The main causes for concern are flickering and the ultraviolet radiation, electromagnetic fields and blue light that these lamps produce.



See also our publication on EMF [see <http://ec.europa.eu/health/opinions2/en/electromagnetic-fields/index.htm>]

Flickering lights can aggravate the symptoms of certain diseases such as epilepsy and migraines. There is, however, no evidence that the use of traditional fluorescent tubes or compact fluorescent lamps have the same effects.

There is no evidence that **electromagnetic fields** from compact fluorescent lamps cause or aggravate existing symptoms in patients with certain diseases.

UVC and blue light radiation could potentially aggravate the symptoms in some patients with diseases that make them abnormally sensitive to light. In the worst case scenario, this would roughly concern some 250 000 people across the EU. The risk from compact fluorescent lamps is negligible for the general public. However, using some single-envelope compact fluorescent lamps for long periods of time near the body (less than 20 cm away), may lead to ultraviolet exposures approaching the current workplace limit set to protect workers from skin and retinal damage. Using double-envelope energy-saving lamps would largely or entirely mitigate the risks for both the general population and light-sensitive individuals.

7. Conclusions

The SCENIHR examined the characteristics of energy-saving compact fluorescent lamps (CFLs) in order to assess health risks related to their use. Based on this analysis, the Committee concluded that:

- There is no evidence showing that flicker and electromagnetic fields from compact fluorescent lamps pose a risk to sensitive individuals.
- The only property of compact fluorescent lamps that could pose an added risk is the ultraviolet and blue light radiation emitted by such devices. In the worst case, this radiation could aggravate symptoms in roughly 250 000 people across the EU, who suffer rare skin conditions that make them exceptionally sensitive to light.
- The general population could receive significant amounts of ultraviolet radiation if they are exposed to the light produced by some single-envelope compact fluorescent lamps for long periods of time at distances of less than 20 cm.
- The use of double-envelope energy-saving lamps or similar technology would mitigate risks both for the general population and for light-sensitive patients.



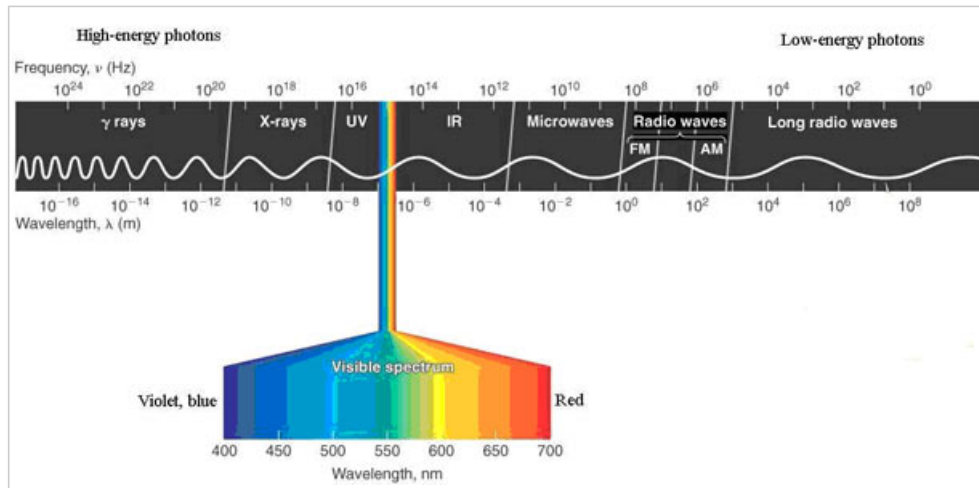
Double-envelope lamps would mitigate risks for light-sensitive patients and others
Source: GreenFacts

Annex

Annex 1:

The electromagnetic spectrum

showing the visible spectrum as well as ultraviolet (UV) and infrared (IR) radiation.



Source: Scientific Committee on Emerging and Newly Identified Health Risks, *Light Sensitivity* (2008) [see http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_019.pdf],
3. Scientific Rationale, p. 10

The Three-Level Structure used to communicate this SCENIHR Opinion is copyrighted by GreenFacts asbl/vzw [see <http://www.greenfacts.org/>].