Compact Fluorescents Shine Light on Health Issues

by Kathleen Hemenway, PhD

As the United States transitions to energy-saving bulbs, there will be a dramatic increase in the number of people exposed to compact fluorescent light bulbs (CFLs) for long periods and at short distances. Yet the health effects have received little attention, an oversight that concerns many. A recent report by the European Commission's Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) states that most of the relevant scientific studies haven't been done--and that's a cause for concern in itself. Meanwhile, reports from many individuals and patients' groups indicate that CFLs won't work for people with a variety of illnesses.

When you first heard about the new law that is intended to get us all to switch to compact fluorescent light bulbs, you may have thought about stockpiling incandescents. And that's exactly what many people did recently when a similar transition occurred in the United Kingdom.

To try to get a firmer handle on what our choices are, I did some research on the Internet. And in fact, the lighting section of the Energy Independence and Security Act of 2007 is intended primarily to save energy by ending the era of the common incandescent light bulb. Although the new law doesn't ban them outright, today's incandescents can't meet the requirements for lumens per watt (i.e., light per unit of energy). In effect, over the next five years it will become illegal to manufacture general-purpose incandescents in the US or to import them for sale. First to go will be 100W bulbs in 2012, followed by 75W bulbs in 2013, and 60W and 40W bulbs in 2014. Depending on the energy savings achieved, the Department of Energy may impose further restrictions by 2020.

In moving away from incandescents, the US is in step with many other countries, including the European Union nations, Canada, Australia, Japan, China, Brazil, South Africa, and others.

Unfortunately, there truly are reasons other than nostalgia to mourn the passing of the traditional incandescent light bulb, invented by Thomas Edison in 1879. Compact fluorescents (CFLs) are expected to become the new de facto standard, and they have been associated with a variety of health effects. According to patient groups and other sources, CFLs may aggravate symptoms in people with a variety of medical conditions, including lupus, some kinds of porphyria, migraines, epilepsy, xeroderma pigmentosa, autism, electrical sensitivity, eczema, dermatitis, chronic fatigue syndrome, fibromyalgia, and other illnesses. Also, when used in certain situations, some CFLs can cause symptoms in those with no

relevant pre-existing conditions, including skin problems, headaches, eye strain, changes in color perception, and retinal damage.

Different aspects of CFLs have been implicated, including ultraviolet radiation; light emitted that's in the blue part of the spectrum; radio frequency emissions; flicker; and mercury vapor (released when bulbs break).

Ultraviolet Radiation. Ultraviolet radiation (UV) emitted by CFLs may be harmful for people with lupus, some types of porphyria, and others with photosensitive skin conditions--basically, anybody who needs to be careful about exposure to daylight. This includes people taking many different prescription medications (e.g., some antipsychotics, antibiotics, and anti-cancer agents). And in certain situations, people who don't have predisposing conditions can be affected as well.

These problems were noted in a review by the European Commission's Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) and in a study conducted by the UK's Health Protection Agency (HPA). The problems were officially recognized last October in the UK, when the HPA issued a precautionary advice press release and a fact sheet with warnings for the general public and people with lupus and others who are sensitive to daylight. The US FDA followed with a fact sheet with similar warnings, and Health Canada initiated studies of the health effects of CFLs (looking at both UV and electromagnetic field exposures).

Both fact sheets recommend that no one use "single envelope" CFLs at distances closer than one foot for more than one hour. Higher UV emissions come from the “open” or “single envelope” bulbs (shaped like corkscrews or U-shaped tubes) than from the "encapsulated" or “double envelope” type (shaped like ordinary light bulbs).

According to the FDA, it has authority to establish a control program for the UV emitted from CFLs, but presently such a program is not in place. The FDA does require caution labels if the level of UV exceeds the standard for healthy individuals.

Blue Light. To appear as white light, light bulbs need to emit light from across the visible spectrum (that is, a light bulb must emit light of all different colors to appear to be white). CFLs emit proportionally more blue light than incandescents, and reports from people with many different illnesses indicate that this is a problem. The SCENIHR report says that blue light may aggravate symptoms in people with migraines, dyslexia, retinal disease, and photophobia, but the committee didn't find enough evidence to make a firm determination.

Radio Frequency Emissions. CFLs produce radio frequency emissions directly from fixtures and electrical cords, as well as feeding emissions back onto building wiring. This causes poor power quality or “dirty electricity,” which can cause symptoms in some individuals, including those with electrical sensitivity.

Dirty electricity was recently implicated in a study of cancer among teachers at a California middle school. Authors Milham and Morgan reported that incidence increased with cumulative exposure to high-frequency transients on building wiring. They say that these transients can be caused by CFLs, some halogen lights, electrical transformers, and other electrical devices that interrupt the current flow, as well as by power-line transmission of broadband Internet.

Flicker. The flicker that comes from CFLs might affect some people, although the nature of the effect is unclear. The SCENIHR report states that, generally speaking, flicker can cause problems for people with certain conditions (e.g., migraines, vertigo, epilepsy, dyslexia, and retinal disease), but that there isn't sufficient evidence for the committee to determine whether there are health effects from the types of flicker produced by CFLs.

In contrast to the SCENIHR report, the UK's HPA found flicker in the 100 Hertz range that they say some people will be aware of in the periphery of their vision, while consultant Richard Conrad reports that some CFLs produce subliminal flicker that can cause symptoms.

Providing another perspective, engineer Bruce McCreary writes that "Some people experience a strong visual perception of flicker from the light emitted from some glowing phosphors, such as the phosphors used in CFLs. This phantom flicker is likely due to UV emissions or because of the spectral composition of the visible light."

Mercury Vapor. Because CFLs contain a small amount of mercury, when the bulbs break they release mercury vapor that is harmful to people and the environment. Due to the risk of exposure, the EPA has published detailed instructions for clean-up and recycling. CFLs cannot be disposed of in the trash and instead must be taken to special recycling locations (e.g., at Ikea and Home Depot stores).

If human nature prevails, CFLs will break. They will break when children carry in the groceries, and when they carry out the trash, and CFLs will break when people with impaired dexterity change their light bulbs (e.g., some people with Parkinson's disease and multiple sclerosis). When CFLs are not disposed of properly, they will probably break in the trash or during trash removal. This will release mercury vapor into the air in homes, dumpsters, garbage trucks, landfills, and so forth. Waste management personnel will be exposed to the neurotoxin, as will other adults, infants, children, and pets. While the amount of mercury in each bulb is small (but still

significant), the effects would accumulate in locations where large numbers of bulbs break (e.g., when delivery cartons are dropped, in garbage trucks, and so forth).

Paradoxically, one of the advantages of CFLs is that they use less mercury than incandescents. That is, since CFLs use less energy, they draw less energy from coal-fired power plants, reducing the amount of mercury vapor that's emitted as a pollutant. Note, however, that there's a big difference between vapor that comes from a known and regulated point source, and vapor that accrues when CFLs break unexpectedly in homes, stores, trucks, warehouses, and elsewhere. In fact, in states that don't have many coal-fired power plants (such as California), the use of CFLs will actually increase mercury emissions, according to a study described in Science Daily.

What Are Our Options?

For most of us, the tried-and-true, traditional incandescent light bulbs are the only ones we can be confident about. Among the lights that meet the energy standard, in addition to CFLs, there are some halogens ("advanced incandescents") and in the future there may be some LEDs available. But they might not be healthy alternatives for us. These lights may have unacceptable spectral emissions (e.g., blue light) and/or radio frequency emissions (from power supplies in fixtures). A more promising alternative would be new "high-efficiency incandescents (HEIs)," but recently General Electric's development project--the most well known HEI project--was canceled.

That said, the new law makes exceptions for some kinds of incandescent bulbs that aren't typically used for run-of-the-mill household and business lighting. This includes lights for appliances (e.g., ovens, refrigerators), vibration-resistant bulbs, rough service bulbs (often used outdoors), three-way bulbs, and so forth. For some of these, however, there is a "loophole" section of the law. In effect, it says that if people appear to be using one of these types to circumvent the restrictions, then that type will lose its exemption. The standards are weaker for modified spectrum lights, such as "natural" light bulbs, so it's likely that manufacturers will find it easier to meet the requirements for them, but many of us may find that the blueish light aggravates our conditions.

Energy standards for some other types of lights, such as "65W BR30" bulbs (often used in ceiling canister lights), are effectively untouched by the law, but some of them are affected by a new rulemaking process underway at the Department of Energy.

Will We Be Left in the Dark?

Workarounds notwithstanding, patient organizations in several countries are looking for a better solution. In the UK, for example, Spectrum--an alliance of four patients' groups--has a campaign underway, as does Right to Light. The British Dermatological Association has also officially expressed opposition to CFLs.

During the presidential race, Lupus International got statements from each of the candidates, and reports that Barack Obama "supports legislation phasing out traditional incandescent light bulbs, and would also support an amendment to better protect those who would be medically adversely affected by the elimination of traditional incandescent light bulbs." This is promising and definitely something to pursue.

Meanwhile, both Lupus International and the Migraine Disease and Headache Bloggers Association have petitions you can sign.

As always, check into the issues for yourself before taking action. Thanks to Richard Conrad, Steen Hviid, Susan MacKay, Bruce McCreary, Susan Molloy, and Donna Powers for providing information for this article. This article was originally published in the Arizona Environmental Health Bulletin, Issue 19, February 1, 2009.