

WARNING!



UNSHIELDED LED LIGHTING

**CAN DAMAGE THE RETINA
(and cause many other health problems)**

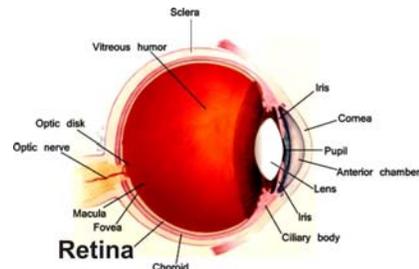
In the May 13, 2013 edition of *Live Science*, Assistant Editor Marc Lallanilla reported on the research of Dr. Celia Sánchez-Ramos of Complutense University (Madrid, Spain) regarding potential dangers of directly viewing unshielded LED lighting. Simply put, the intense concentrated light of LEDs can permanently damage the retina, causing blind spots and color de-sensitivity. As the installed base of LEDs rapidly expands, more and more emphasis is being placed upon health risks associated with directly viewing LEDs. In fact, the problem has become sufficiently serious for CREE, one of the largest LED lighting manufacturers, to issue its own warning white paper.



Facility managers are increasingly faced with the tradeoff between installing energy efficient LED fixtures and potential liability associated with eye-damage claims. There is concern that children may fixate on outdoor LED lighting like street lamps, causing serious permanent retinal damage. The most serious problem stems from high intensity ultraviolet and near-ultraviolet light as well as the small footprint of individual LED components. The uneducated public may have a propensity to admire an LED fixture. In the process, eye damage can occur.

The Retinal Damage Dilemma –

In an effort to become more energy efficient and save on electrical overheads, owners, contractors, city planners, and facility managers have rapidly embraced new LED fixtures. Unfortunately, little or no consideration may be given to the extensive health hazards associated with these highly popular lighting alternatives. To be sure, LED technologies offer greater efficiencies and design flexibility. However, the problem of retinal damage and unbalanced spectral output persists. *Exposure to lawsuits is expanding.*

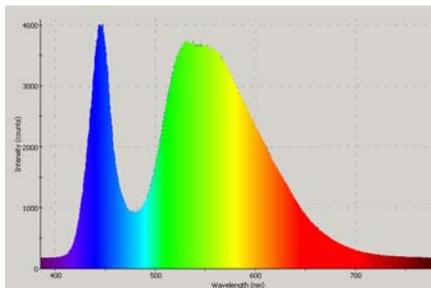


Ophthalmologists offer impractical solutions that include frequent blinking while working under LED lighting, using UV sunglasses, and placing UV filters directly onto fixtures. Homeopathic approaches include increasing vitamin A supplementation. Obviously, motor vehicle operators are not going to wear sunglasses while driving at night, nor are workers prone to using eye protection while in an office environment.

School environments present additional challenges. For kindergarten through middle school, exposed and unshielded LEDs are dangerous. Children have a particular fascination for LEDs and have been known to stare at them for the intrigue of the after spotting that occurs. This phenomenon is the very condition associated with retinal damage. Children are unaware of the dangers associated with looking directly into LED lights. For this reason, many LED flashlight manufacturers are packaging their products with warnings about directly shining their lights into the eye.

Unquestionably, the LED sector is going to have to quickly address issues associated with potential eye damage before the problem leads to broad public awareness and legal exposures.

Light-Related Disorders –



Problems associated with LEDs go well beyond retinal damage. Since the LED spectrum carries such a heavy ultraviolet and near-ultraviolet bias, visual acuity can be adversely affected. This means that tasks like reading or viewing a computer screen may become more difficult, resulting in eye strain and associated symptoms. Excessive blue spectral bias can cause headaches, nausea, lethargy, irritability, and lost concentration.

For indoor applications, LEDs have been linked to a wide range of light-related disorders including Seasonal Affective Disorder (SAD), depression, enhanced attention deficit disorder (ADD), delayed sleep phase disorder, and mood swings. Although some lighting manufacturers use UV filtering lenses, the application can decrease lumen output, adversely impacting performance.

Undoubtedly, work is being done to create more balanced LED lighting. However, those LEDs that are more spectrally balanced suffer from performance issues and are appreciably more

expensive to produce. A phenomenon known as “droop” makes it difficult to maintain balanced spectral output at higher power levels, limiting overall efficiency and lifecycle.

Another inherent performance problem is high frequency flicker that occurs in high brightness LEDs. Unlike fluorescent bulbs, LEDs do not use conventional ballasts. Instead, LEDs are controlled by a “driver” power module that delivers regulated electricity to the diode circuit. Almost all LED drivers introduce low frequency “flicker” at twice the electrical frequency. At 60Hz power frequency, the driver will induce 120Hz flicker. At 120Hz, the flicker will be 240Hz. Although the human eye visualizes at approximately 20 frames per second, the eye/brain mechanism can perceive flicker (harmonics) as high as 250Hz. We know that what you can’t perceive can still hurt you when it comes to artificial lighting.

High frequency flicker is associated with significant health hazards that include strobe epilepsy, migraine headaches, nausea, impaired visual acuity, poor concentration, sleep disorders, mood swings, eye strain, and a lack of eye/hand coordination. The problem is serious enough for the IEEE Standards Working Group, IEEE PAR1789 to take up “Recommending practices for modulating current in High Brightness LEDs for mitigating health risks to viewers.” This process has been put in place to advise the lighting industry, ANSI/NEMA, IEC, EnergyStar and other standards groups about the emerging concern over flicker in LED lighting. The objective is to develop electronics and associated standards that can either eliminate the flicker or mitigate biological impacts by raising the frequency to levels that are imperceptible to the brain.

For outdoor applications such as street and highway lighting, LEDs present different challenges. Most notably, the intense light and spectral composition has been associated with hypnotic effects that can cause drowsiness and lapses in attention. In fact, the hypnotic power of LEDs is so powerful, the internet is crowded with LED devices specifically designed to hypnotize subjects. In particular, the rhythmic passing of street and highway lighting mimics the patterns used by professional hypnotists to place subjects into a trance. When combined with high frequency flicker, the adverse influence on driver performance can reach unacceptable levels. Risk managers are already concerned about the potential link between LED roadway fixtures and accidents.

Since new LED street and highway lighting uses very high intensity modules, the blue bias can be substantially stronger than typical indoor LED fixtures. This changes everything from depth perception to color rendering. Naturally, the LED industry spends billion of dollars in marketing and advertising to extol the virtues of this exciting technology. Already, municipalities and state departments of transportation have committed billions of dollars to LED retrofit projects. In virtually all request for bids on public projects, the dangers of using LED lighting are conspicuously missing. It is disturbing to note that the majority of lighting consultants, designers, and engineers are either unaware of the myriad of problems associated with LEDs or chooses to ignore them.



Legal Risks and Exposures –

The lighting industry is clearly on notice of the significant health hazards associated with LEDs. In the legal world, the most common element of any complaint is that the defendant “knew or should have known” about the risks and consequences. There is no escape from liability through ignorance. This is more the case when considering warnings issued by LED manufacturers like CREE and standards organizations like the IEEE. Any reasonably responsible lighting designer, engineer, purchasing manager, or facilities manager must weigh the risk of adverse health consequences when considering LED deployment.

While many LED health hazards are likely to be addressed with advancing technology, adopters of current LED lighting must decide if they should go forward with their decision, or seek alternative lighting solutions. This is because the culpability chain *begins with the facility* and advances up the chain to the LED manufacturer.

What is healthy vision worth in the eyes of a jury? We have all read about the sizes of jury awards in personal injury law suits. The financial exposure could be devastating.

Avoiding Risks with Magnetic Induction Lighting (MIL) –

In 1891, the famous inventor Nikola Tesla filed a patent for magnetic induction lighting. This technology initially competed with Edison’s incandescent bulb, but failed as a business model because Tesla’s lamps could virtually last forever... not a good way to generate repeat business.

Ultra-Tech™ Lighting has developed a proprietary line of magnetic induction lighting (MIL) that addresses the inherent problems of LED and fluorescent lighting. These flicker-free fixtures deliver in excess of 85 lumens per watt, are environmentally friendly, have an extraordinary 100,000 hour lifecycle, and can be spectrally tuned to deliver a well balanced healthful light without excessive UV output.

Ideal for outdoor and indoor applications, Ultra-Tech™ has created lighting that can actually improve visual acuity and enhance human performance. Many spectral attributes of Ultra-Tech’s unique Health-Bright™ lighting are actually “good for you.” The full diffusion light source combined with high-efficiency nano-reflector technology produces a more uniform and natural light that is ideal for indoor applications and extraordinarily well suited for outdoor installations like sports arenas, fields, stadiums and even ski slopes. Magnetic induction street lighting can meet the needs of a wide range of conditions in a cost-effective manner.

Ultra-Tech™ lighting can save up to 70% in power consumption and 600% in maintenance over conventional lighting. Magnetic induction fixtures can deliver the same electricity and carbon footprint reductions as LEDs for less than half the cost, and deliver from 100% to 500% less maintenance cycles. Learn more!

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