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Answer to Question #211 Submitted to "Ask the Experts"

Category: Suntanning

The following question was answered by an expert in the appropriate field:

Q What are the specific long-term and short-term effects of radiation from UVA and UVB rays in tanning beds?

A I am attaching an article that I have written for the Health Physics Society's *Newsletter* that I think should answer your question and also give some additional information on UV radiation. Ultraviolet (UV) radiation is defined as that portion of the electromagnetic spectrum between x rays and visible light, i.e., between 40 and 400 nm (30–3 eV). The UV spectrum is divided into Vacuum UV (40-190 nm), Far UV (190-220 nm), UVC (220-290 nm), UVB (290-320), and UVA (320-400 nm). The sun is our primary natural source of UV radiation. Artificial sources include tanning booths, black lights, curing lamps, germicidal lamps, mercury vapor lamps, halogen lights, high-intensity discharge lamps, fluorescent and incandescent sources, and some types of lasers (excimer lasers, nitrogen lasers, and third harmonic Nd:YAG lasers). Unique hazards apply to the different sources depending on the wavelength range of the emitted UV radiation. UVC is almost never observed in nature because it is absorbed completely in the atmosphere, as are Far UV and Vacuum UV. Germicidal lamps are designed to emit UVC radiation because of its ability to kill bacteria. In humans, UVC is absorbed in the outer dead layers of the epidermis. Accidental overexposure to UVC can cause corneal burns, commonly termed welders' flash, and snow blindness, a severe sunburn to the face. While UVC injury usually clears up in a day or two, it can be extremely painful. UVB is typically the most destructive form of UV radiation because it has enough energy to cause photochemical damage to cellular DNA, yet not enough to be completely absorbed by the atmosphere. UVB effects can include erythema (sunburn), cataracts, and development of skin cancer. Individuals working outdoors are at the greatest risk of UVB effects. Most solar UVB is blocked by ozone in the atmosphere, and there is concern that reductions in atmospheric ozone could increase the prevalence of skin cancer. UVA is the most commonly encountered type of UV light. UVA exposure has an initial pigment-darkening effect (tanning) followed by erythema if the exposure is excessive. Atmospheric ozone absorbs very little of this part of the UV spectrum. UVA is needed by humans for synthesis of vitamin D; however, overexposure to UVA has been associated with toughening of the skin, suppression of the immune system, and cataract formation. UVA light is often called black light. Most phototherapy and tanning booths use UVA lamps. The photochemical effects of UV radiation can be exacerbated by chemical agents including birth control pills, tetracycline, sulphathizole, cyclamates, antidepressants, coal tar distillates found in antidandruff shampoos, lime oil, and some cosmetics. Protection from UV is provided by clothing, polycarbonate, glass, acrylics, and plastic diffusers used in office lighting. Sun-blocking lotions offer limited protection against UV exposure. Accidental UV overexposure can injure unaware victims due to the fact UV is invisible and does not produce an immediate reaction. Labeling on UV sources usually consists of a caution or warning label on the product or the bulb packaging cover or a warning sign on the entryway. Some type of emission indicator as required with laser products is rarely found. Reported UV accident scenarios often involve work near UV sources with protective coverings removed, cracked, or fallen off. Depending on the intensity of the UV source and length of exposure, an accident victim may end up with a lost-time injury even though totally unaware of the hazardous condition. Hazard communication training is especially important to help to prevent accidental exposures in the workplace. Exposure guidelines for UV radiation have been established by the American Conference of Government Industrial Hygienists and by the International Commission on Nonionizing Radiation Protection. Hand-held meters to measure UV radiation are commercially available, but expert advice is recommended to ensure selecting the correct detector and diffuser for the UV wavelengths emitted by the source. In summary, UV radiation has numerous useful applications but increased awareness and control of UV hazards are needed to prevent accidental overexposure. For further information:

1. Sutherland, Betsy M. Ultraviolet radiation hazards to humans. In: Nonionizing

What's New?

- May Newsletter
- Maher Appointed to NAS Committee
- NRC Comment Period on Rulemaking
- Affiliate of American Institute of Physics
- May ORS
- Online Registration for Annual Meeting
- May Journal
- Radiation Research Society Meeting

Upcoming Events

- NRC Meeting Webcasts - Live
  Ongoing
- IRPA Regional Congress
  15-19 April 2013
  Rio de Janeiro, Brazil
- 50th Annual SRP Conference
  Radiation Protection - Spectres from the Past, Visions of the Future
  21-23 May 2013
  HIC Harrogate, UK
- Canadian Radiation Protection Association (CRPA) Annual Conference
  26-30 May 2013
  Sherbrooke, Quebec, Canada
- 58th Annual HPS Meeting
  7-11 July 2013
  Madison, WI
- RITN Workshop
  Mitigation and Treatment of Radiation Damage
  31 Jul - 2 Aug 2012
  Baltimore MD
- Radiation Research Society Meeting
  15-19 Sept 2013
  New Orleans, LA
- 2013 International Radon Symposium
  22-25 Sept 2013
  Springfield, IL

06 May 2013

radiation: An overview of the physics and biology. Eds. Hardy, K.; Meltz, M.; Glickman, R. Medical Physics Publishing, Madison, WI; 1997.

2. FDA
3. International Light Inc.
4. NRPB (UK)
5. NIOSH.

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