



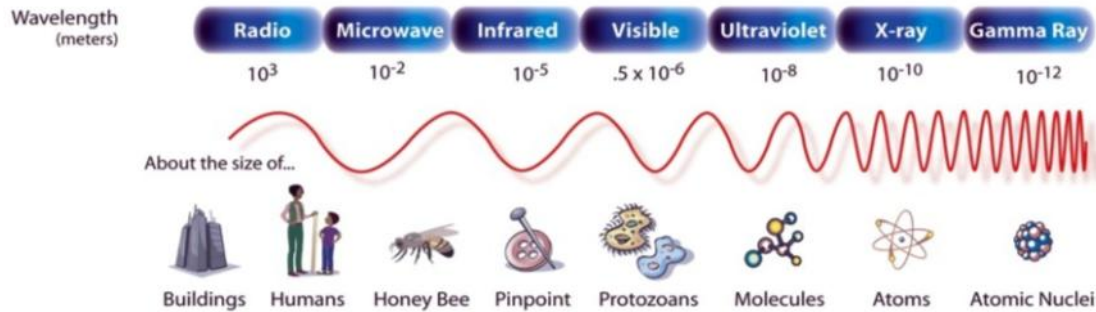
Health Physics Society
Specialists in Radiation Safety

Tanning Salons

General

Tanning is the skin's response to *ultraviolet** (UV) radiation, a type of light exposure. As skin cells are exposed to UV radiation, they produce brown pigment to protect themselves from further UV exposure. This results in a darkening of the skin (tanning), which is the body's natural defense mechanism and attempt to prevent further damage from UV radiation. Sunlight and artificial tanning methods, such as tanning booths or salons, are sources of UV exposure. Sufficient amounts of UV exposure are known to cause adverse health effects in humans and are a public health concern.

Energy Spectrum



Courtesy of NASA and the American Society for Photobiology (<http://www.kumc.edu/POL/ASP/Home/aspkids/aspkids.html>)

Ultraviolet Radiation

The *electromagnetic* spectrum displayed above shows that UV radiation has a short wavelength. It also has a high frequency and relatively high energy. UV radiation is *nonionizing* but sits very close to the *ionizing* forms of radiation (x rays and gamma rays) on the electromagnetic spectrum. There are three types of UV radiation and they are classified by wavelength.

UVA (315-400 nm) – UVA has the longest wavelength as compared to the other types of UV and contributes to a number of health effects such as sunburn, skin aging, eye damage, skin cancer, and suppression of the immune system.

UVB (280-325 nm) – UVB is intermediate in wavelength and is involved in sunburn, snow blindness, immune system suppression, skin cancer, and premature aging.

UVC (180-280 nm) – UVC has the shortest wavelength and is frequently used in germicidal lamps to destroy bacteria and other organisms. It is harmful to the skin because it damages nucleic acid in cells.

Melanin

Melanin is a pigment that darkens the skin to help protect an individual from UV radiation. The more frequent the UV exposure, the more melanin produced in the skin cells, and the darker the skin. People with naturally darker skin have less risk from the harmful effects of UV radiation. Individuals with naturally fair skin are more susceptible to health effects from UV radiation received during tanning. The skin's response to UV light that results in tanning or sunburning is believed to be similar regardless of the source of exposure and may result in adverse health effects.

*Words in italics are defined in the Glossary on page 3.

Biological and Health Effects

Tanning and burning play a role in health effects, including skin cancer. UV radiation damage to DNA in skin cells can result in mutations that promote or cause cancer, and repeated UV exposures may result in photoaging (wrinkles, sagging skin, loss of elasticity, and sun spots). Other short-term effects on skin are sunburns, fragility, and scarring. Cataracts are a known health effect from UV radiation exposure and eye protection is essential when tanning. UVA penetrates deeper than other UV types and may contribute to edema, vascular system damage, and increased skin damage.

Skin cancer risk may be increased due to UV exposure and is a significant concern for individuals exposed to UV radiation. UV exposure at an early age is a significant risk factor for developing melanoma (type of skin cancer) in future years. Tanning bed use increases the risk of developing melanoma of the skin by approximately 75 percent when use starts before the age of 30 (Tranh et al. 2008).

In addition, the International Agency for Research on Cancer (IARC) and World Health Organization (WHO) found a link between tanning bed use and cancer risk for developing melanoma of the eye. Melanoma is responsible for about 5 percent of skin cancers, but causes the vast majority of skin cancer deaths (Snowden 2009).

More information regarding skin cancer from exposure to UV light during tanning is available at <http://www.cancer.org/docroot/home/index.asp>.

Tanning Bed/Booth Risk

Because skin cancer risk from tanning is a significant public health concern, consumers need relevant information to make wise choices regarding tanning. There are more than a million new cases of skin cancer each

year, and the number of new cases will increase as the use of tanning increases. Tanning beds and booths do not provide a “safe” tan. There is risk associated with all forms of tanning and the National Institute of Environmental Health Sciences lists sunlamps as a carcinogen. Any increased exposure to UV radiation or light results in an increased risk of developing cancer.

Skin cancer warning signs:

- 1. Skin abnormality that increases in size and appears multicolored.**
- 2. A mole that changes color, changes texture, grows, or becomes irregular in shape.**
- 3. Spots or growths that continually itch, hurt, scab, or bleed.**
- 4. Any open sore that does not heal in four weeks or heals and reopens.**

IARC and WHO have classified tanning beds as a high-risk activity for developing cancer. Tanning bed risk has been classified as carcinogenic to humans, which is the highest risk category classification. The American Cancer Society (ACS) recommends avoiding the use of tanning beds

altogether (Snowden 2009), as do the Food and Drug Administration, the Centers for Disease Control and Prevention, and the Health Physics Society (HPS 2007).

Fortunately, UV radiation does not penetrate deep into the body and there is little or no risk to internal organs, sperm, or an embryo/fetus. The risk of developing cataracts is significant; therefore, eye protection must be worn when using tanning beds or booths. Tanning beds and booths may emit the same type and amount of UV radiation as the summer sun at noon, and sometimes more. Therefore, tanning beds and booths may provide two to three times the risk for health effects as compared to suntanning under certain conditions.

Some individuals may receive medical recommendations for tanning that should only be in accordance with directives from a medical doctor. There are a number of drugs and cosmetics that may increase skin *photosensitivity*, such as antidepressants, antibiotics, psoralens, antifungals, antidiabetics, birth-control pills, tranquilizers, high blood pressure medications, and certain soaps. Thus, health risks from tanning booths/beds are increased when taking such drugs or using such cosmetics.

The Food and Drug Administration and the World Health Organization recommend that individuals should avoid tanning, especially those who are at higher risk.

Regulations

In the United States, the Food and Drug Administration (FDA) regulates sun bed and booth manufacturers. The FDA requires warning labels regarding skin types and eye protection. Other warning notices may state the following, but are not necessarily part of the FDA Performance Standard for Sunlamp Products:

1. Exposure to UV in a tanning bed may result in skin aging and cancer.
2. Individuals who do not tan (burn rather than tan) should not use a tanning bed.
3. Intentional exposure to sunlight should be avoided for 48 hours after a tanning booth/bed exposure.
4. Eye protection must be worn at all times while receiving a tanning booth exposure.
5. No person under 18 should use a tanning bed or booth.

FDA regulations for sunlamps can be found in 21 CFR 1040.20 (Chapter 21 of the Code of Federal Regulations, Part 1040.20) and at <http://www.fda.gov/cdrh/radhealth>.

Glossary

Electromagnetic

The propagation of energy in the form of electromagnetic waves through space.

Ionizing

Radiation that has enough energy to directly ionize or remove an electron from an atom.

Nonionizing

Radiation that does not have enough energy to directly ionize or remove an electron from an atom.

Photosensitivity

A condition where an individual or material is sensitive to light or radiation.

Ultraviolet

Electromagnetic radiation that has a wavelength shorter than visible light.

Ultraviolet Protection

Eye protection is required at all times for individuals using a tanning bed or booth.

Long exposures should be avoided and the only way to minimize one's risk is to avoid tanning altogether.

Monthly skin self-exams are recommended to detect the warning signs of skin cancer (this recommendation is not part of the FDA Performance Standard for Sunlamp Products).

Individuals wishing to tan should consider their medical history, their skin characteristics, and the drugs or cosmetics they use. If individuals have questions or concerns, a physician should be consulted prior to tanning. Sunscreen and sunblock may be used for UV protection, but individuals must understand the limits of protection and instructions for use. Sunblock is not completely effective at preventing skin cancer or other health effects. Not all sunscreens are equally effective and they may be only partially effective at protecting an individual during an ultraviolet radiation exposure.

More information regarding UV protection is available from the FDA at <http://www.fda.gov/cdrh/radhealth>.

References

Health Physics Society. Ultraviolet radiation and public health. HPS Position Statement. McLean, VA: HPS; 2007. Available at: http://www.hps.org/documents/ultraviolet_ps011-1.pdf. Accessed 29 December 2009.

Snowden RV. Tanning beds pose serious cancer risk, agency says. ACS News Center. 28 July 2009. Available at: <http://www.cancer.org/Cancer/news/tanning-beds-pose-serious-cancer-risk-agency-says>. Accessed 29 December 2009.

Tranh-Nga TT, Schulman J, Fisher, DE. UV and pigmentation: Molecular mechanisms and social controversies. Pigment Cell Melanoma Res. 21:509-516; 2008.

Resources for more information

American Cancer Society. <http://www.cancer.org/docroot/home/index.asp>. Accessed 29 December 2009.

About.com: Women's Health. Indoor tanning booths: Are indoor tanning booths safe? Available at: <http://womenshealth.about.com/cs/azhealthtopics/a/tanboothworthit.htm>. Accessed 29 December 2009.

About.com: Teen Advice. Information sheet on tanning booths: 10 things you need to know about tanning booths. Available at: <http://teenadvice.about.com/bl10thingstanningbooths.htm?once=true&>. Accessed 29 December 2009.

Chissler P. Tanning beds are not without drawbacks. FDA Consumer. January 1984. Available at: http://findarticles.com/p/articles/mi_m1370/is_v17/ai_3074222. Accessed 29 December 2009.

Code of Federal Regulations. Performance standards for light-emitting products. 21 CFR 1040.20. 1 April 2009. Available at: <http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?FR=1040.20>. Accessed 29 December 2009.

Federal Trade Commission. FTC Consumer Alert: Indoor tanning. Available at: <http://www.ftc.gov/bcp/edu/pubs/consumer/alerts/alt174.shtm>. Accessed 29 December 2009.

Health Physics Society. Answer to question #676 submitted to "Ask the Experts." Available at: <http://www.hps.org/publicinformation/ate/q676.html>. Accessed 29 December 2009.

Health Physics Society. Suntanning and tanning booths. Available at: <http://www.hps.org/publicinformation/ate/faqs/tanningbooths.html>. Accessed 29 December 2009.

Lim HW, Gilchrest BA, Cooper KD, Bischoff-Ferrari HA, Rigel DS, Cyr WH, Miller S, DeLeo VA, Le TK, Demko CA, Weinstock MA, Young A, Edwards LS, Johnson TM, Stone SP. Sunlight, tanning booths, and vitamin D. J Am Acad Dermatol 52(5):868-876; 2005.

Skin Cancer Foundation. The dangers of tanning. Available at: <http://www.skincancer.org/tanning/the-dangers-of-tanning.html>. Accessed 29 December 2009.

United States Environmental Protection Agency. UV tanning equipment. Available at: <http://www.epa.gov/radtown/tanning-equipment.html>. Accessed 29 December 2009.

University of Tennessee Medical Center. Why tanning beds might be hurting you. Available at: <http://www.utmedicalcenter.org/NewsDetails.asp?ID=1692>. Accessed 29 December 2009.

World Health Organization. Artificial tanning sunbeds: Risk and Guidance. Available at: <http://www.who.int/uv/publications/en/sunbeds.pdf>. Accessed 29 December 2009.

The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Formed in 1956, the Society has approximately 5,500 scientists, physicians, engineers, lawyers, and other professionals. Activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.