HAZARDS OF ULTRAVIOLET RADIATION

Although ultraviolet radiation plays a useful role in research and medical applications, there are also harmful affects that can be found in the lab. UV light from equipment such as biological safety cabinets, germicidal lamps, UV-transluminators (UV light boxes), UV-Crosslinkers and Woods Lamps can all cause cellular damage. Ultraviolet radiation has wavelengths of 400 nanometers (nm) and x-rays at 4 nm and below in the electromagnetic spectrum, which has been subdivided into three regions.

Important Wave Lengths
- A: 400nm - 315nm, also known as Near UV, UV-A (Black Light Region or Suntan region)
- B: 315nm - 280nm, also known as Mid UV or UV-B (Erythemal region causes reddening of skin)
- C: 280nm - 100nm, also know as Far UV or UV-C (germicidal region 280nm - 220nm)

Biological Effects
- Repeated sunburn and overexposure has been linked in studies to premature aging, wrinkles and skin cancer
- Serious eye and skin burns result from exposure to direct or indirect rays (skin can heal over time but a severe burn to the cornea can cause scaring and potential loss of vision)
- The cornea of the eye is composed of a thin layer of specialized epithelia cells that can also absorb UV radiation, resulting in tiny lesions (photokeratitis, welders flash or snow blindness) on the cornea that may not be felt for several hours after exposure (sensation is much like having sand in your eye), effects can last up to 48 hours but decrease as the cells of the cornea rebuild
- Molecular changes can occur in the lens as photons bombard proteins and change their configuration, resulting in cataract formation

Other Hazards
- Ordinary window glass is almost completely opaque to natural ultraviolet light, but light generated in a lab contains wavelengths that are not filtered by the atmosphere (potentially harmful if viewed without proper eyewear)
- Regular prescription glasses may allow UV-radiation to penetrate, causing potential eye damage
- Lasers can cause immediate injury from fractions of a second of direct, specular or diffuse reflection

Precautions
- Don’t stare or even look at the light
- Bio-hoods and fume hoods that contain UV lights should be kept closed (shields down) when the light is on (it is best to run lights over night or when staff are not present)
- Hand held UV devices like Woods Lamps (mainly used to detect fluorescence) also have the potential to cause skin and eye injury (a long sleeve shirt and cotton gloves, face shields or safety glasses made of polycarbonate will block most of the UV spectrum)
- Safety glasses that protect from lab generated UV radiation must be stamped with ANSI Z87.1
- Polycarbonate safety glasses will not protect from high radiant energy UV devices (torch cutting, welding or lasers), specialized safety glasses are required for safe operation
- Precautions for ultraviolet lasers are similar to precautions for other UV producing devices
- Check with principal investigator (PI) for information on the particular laser in the lab
- Some foods and medications contain photosensitizing agents (figs, limes, parsnips and celery root), some act only when applied topically, but consumption of celery root could cause some people to be hypersensitive to skin exposure from UV radiation

Visit www.ehs.ucr.edu for additional information or call EH&S at 827-5528 if you have any questions.