

Safetygram

NCI-Frederick

ISM-147

Laboratory Personnel

February 2013

Exercise Caution in the presence of Ultraviolet Radiation

Various sources of ultraviolet (UV) radiation are used at the Frederick National Lab. Germicidal lamps, black lights, and equipment such as transilluminators, spectrophotometers, and spectrofluorometers use ultraviolet radiation. Transilluminators and germicidal lamps have caused eye burns to laboratory personnel. UV eye burns are often OSHA recordable cases and have resulted in time lost from work.

Transilluminators, which are used to view electrophoresis gels, require special safety precautions because they generate high intensity UV radiation. Some short wave units have a surface intensity of as much as $8\text{mw}/\text{cm}^2$ at a peak wavelength of 254 nm. Eye and full body protection must be worn when operating this equipment. A full face shield specifically manufactured for UV protection must be worn to protect the eyes and face from radiation. UV protective face shields are available from laboratory supply outlets; they should reduce UV radiation to 10^5 of incident levels in the wavelength interval of 200 to 320 nm. The same level of protection can be achieved by enclosing the transilluminator within a Plexiglas shield designed to absorb the UV radiation given in the specification above. Skin protection (full length lab coat and rubber gloves) should also be worn when working in front of transilluminators. Latex rubber surgeons' gloves or nitrile gloves will give adequate hand protection from UV radiation; transparent vinyl gloves will not.

Historically, low pressure mercury germicidal lamps have been used in laboratories, biological safety cabinets, and airlocks; however, the effectiveness of these lamps in reducing microbial contamination is dubious. In addition, there is risk of hazardous employee exposure and the use of these lamps is discouraged by EHS. Such lamps emit about 95% of their radiant energy at a wavelength of 254 nm. This wavelength is invisible to the eye, but is very near the optimal germicidal wavelength. Germicidal radiant energy has very poor penetrating power through glass and many plastics. Skin exposure, unless prolonged, will produce a transient erythema without burning; however, the eyes are quite sensitive to 254 nm radiant energy. Sufficient exposure will produce a painful conjunctivitis which usually appears after a latent period of 4 to 8 hours. A very painful foreign body sensation develops with lid edema and inflammation. Symptoms usually disappear after several hours, although prolonged exposure

may cause them to persist for a day or two. Permanent eye damage has not been reported from exposure to 254 nm UV radiation.

Protection from Ultraviolet Radiation

1. When laboratories are equipped with UV lamps (to be used only during periods of non occupancy) the on/off switches shall be located outside the room near the entrance door. (Note: Equipping labs with UV lamping is discouraged by EHS)
2. An interlock switch tied into the room lighting is recommended by EHS; however, in the absence of an interlock switch, an on/off switch, which incorporates a cobalt blue indicator light, shall be mounted near the switch to serve as a reminder that the UV lamps are on.
3. Warning signs must be posted at every UV installation.
4. Goggles or face shields should be worn whenever one is working in the presence of UV. Although ordinary spectacles will prevent the passage of 254 nm UV, the radiation can readily reach the eyes through the open sides of standard eyeglasses.
5. Skin protection should be used if one is working in the presence of UV for more than a few minutes. A face shield, surgical cap, and disposable gloves should be used to protect the skin.
6. If you do receive a UV burn, report to Occupational Health Services.

Note: These guidelines apply to 254 nm germicidal UV only, and not to far more hazardous pieces of equipment which use high pressure mercury vapor lamps, high intensity room sterilizers and lasers.