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Area	Laboratory-Safety
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Laboratory Ultraviolet (UV) Radiation Safety

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

A. This procedure is to provide a policy to protect laboratory employees from the dangers of UV radiation.

II. GENERAL INFORMATION:

A. Ultraviolet (UV) is a form of non-ionizing radiation. Non-ionizing radiation includes the spectrum of ultra-violet, visible light (400-700 nm), infrared, microwave, and radio frequency (radio waves). Non-ionizing radiation is found in several laboratory settings, and may pose a health risk if not used correctly. Some of the shorter wavelengths (higher energy) of UV radiation may contain enough energy to do harm to the eyes or skin. Therefore, it is important to exercise caution whenever a risk of exposure to UV radiation exists. Avoid exposure of skin and eyes to any source of UV radiation.

B. UV radiation varies in wavelengths from 10 nm to almost 400 nm. The smaller the wavelength (300-350 nm and smaller), the more energy, and the more potential for harm. The longer the wavelength (300-350 nm and longer), the less energy, and the lower potential for harm.

C. Damage from UV radiation can include:

1. Skin damage
    a. Vary from reddening of the skin to more severe tissue destruction such as occurs with severe sunburn.
    b. Acute High doses -– sunburn
    c. Chronic Low doses – genetic changes, such as increased aging of skin, increased risk of skin cancer

2. Eye damage
    a. Vary from irritation, to inflammation of the cornea and conjunctiva, to burns and destruction of the retina.
    b. Acute High doses – clouding of cornea
    c. Chronic Low doses – possible cataract

III. DEFINITIONS:

A. **UV** = Ultraviolet = energy wavelength not visible to the eye (10-400 nm)

B. **Non-ionizing radiation** = longer wavelengths of radiation energy, that includes ultraviolet, visible radiation wavelengths (violet, blue, green, yellow, orange, red), and infrared, which do not have enough energy to produce ionization.

C. **Ionizing radiation** = form of energy that can overcome the binding energy of electrons in their orbits radiation and produce ions, which can cause DNA changes and possibly cancer.

IV. POTENTIAL SOURCES OF UV RADIATION IN THE WORKPLACE:

A. Hand-held UV lamps

B. UV sources used in instruments or microscopes

C. Mercury vapor lamps

D. Xenon lamps

E. Sterilizing UV sources (including dead air work boxes, biological hoods and cryostats)

F. UV lights to interpret molecular pathology gels with fluorescent dyes

G. UV lights to cure some gels or plastic resins

H. Water purification (deionized/distilled water) to remove microorganisms

V. PROCEDURE:

A. **Eye Protection**

1. Avoid looking directly at any source of UV radiation.
2. Wear eye protection such as UV absorbing glasses, UV rated goggles or UV rated full face shields or equipment shield if it is necessary to look into a UV source (which also protects the face and neck).
3. Consider if need to protect against high and/or low UV radiation. May need different UV eye protection
4. Wear UV absorbing full-face shields to protect the skin of the face.

B. **Skin Protection**

1. Wearing gloves and lab coats or other clothing to protect the hands and arms.

2. Wear UV absorbing full-face shields to protect the skin of the face.

C. **Warnings/Safety Precautions**

1. On equipment with UV radiation where exposure is possible (e.g., biological hoods, hand-held UV devices):
2. Do not put head inside instruments when UV light is turned on
3. Keep sash in the full down position
4. Do not direct lamps/lights towards self or another person
5. Warning label to be placed on equipment, to the effect that:
    a. Caution: This device produces potentially harmful UV (ultraviolet) radiation
    b. Protect eyes and skin from exposure
6. Can provide examples of how to protect
    a. Turn off UV light before use of equipment (for example, on a biological hood)

D. **Action**

1. **Employee**: To minimize possibility of exposure to UV radiation, employee shall be responsible to:
    a. Maintain and properly use equipment and supplies to minimize exposure to UV radiation
    b. Turn off UV light when no longer needed
    c. Upon concern of accidental UV radiation exposure, the employee is to immediately report any symptoms and/or concerns to their manager or supervisor.
2. **Management**
    a. Upon receiving an UV radiation exposure concern, the manager or supervisor will send the employee immediately for emergency medical evaluation and/or care for skin and eye exposure.

VI. REFERENCES:

A. OSHA – “Laboratory Safety Guidance” 3404-11r, 2011

B. OSHA - 29 CFR 1910.97 – Non-ionizing Radiation (radiofrequency, microwave radiation) HHS (NIOSH) Publication No. 73-11009

Approval Signatures

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