OCCUPATIONAL AND ENVIRONMENTAL HEALTH AND SAFETY
THE UNIVERSITY OF UTAH

FACT Sheet

Ultraviolet Lamps in Biological Safety Cabinets (BSCs)

The University of Utah Office of Occupational and Environmental Health and Safety (OEHS) strongly discourages the use of Ultraviolet (UV) lamps in Biological Safety Cabinets (BSCs).

National Institutes of Health (NIH), Centers for Disease Control and Prevention (CDC), National Science Foundation/ANSI, and the American Biological Safety Association agree that ultraviolet (UV) lamps are not recommended or necessary for decontamination in BSC's. Surface decontamination with an approved chemical disinfectant must always be used as the primary disinfection process.

If a UV lamp is used in your BSC, follow the procedures below.

Required:

- UV lights must be turned off whenever the room is occupied.
- Post a warning sign on the front of the BSC indicating the presence of UV light hazards.
  - The sign must say CAUTION: Turn off UV light before working.
- Turn the UV light off after 15 minutes. If UV lights will be used overnight or for extended periods of time while staff are not present, the sign should be posted on the outside of the closed door of the room.
- For biological safety cabinets with sashes that close, the light must only be used when the sash is fully closed. Sash alarms or mechanisms ensuring this feature may not be disabled.
- All items to be removed from the BSC and surfaces of the BSC must be decontaminated prior to UV light use.

Be aware of the hazards. Exposure to UV light can cause:

- Painful eye and skin burns
- Prolonged exposure to UV light may cause cancer
- Damaging exposure levels exist well after the output of the lamp bulb has dropped below the biocidal level.
- Deterioration of some plastics, including tubing in a BSC
  - This can be dangerous if you are using a touch-plate microburner (Touch-O-Matic) with natural gas

Be aware of the limitations:

- Never rely on UV irradiation alone to disinfect a contaminated work area. UV is:
  - Not effective on porous materials that are opaque to the light such as wood or foam
  - Ineffective if a microbe is protected by dust, dirt, or organic matter

- Affected by the accumulation of dust and dirt on the bulb surface
- Effective only in direct line of sight

- UV does not work in shadowed areas, penetrate into cracks or through the grill work of a BSC
- The spill area under the work surface of a BSC is a favorite hide out for fungal spore and hardy bacteria.
- Several factors influence the effectiveness of UV lights, including:
  - Humidity – above 70 percent germicidal activity is drastically reduced.
  - Optimum temperature for output is 77-80°F. Temperatures below this optimum temperature result in reduced output of the germicidal wavelength. Moving air tends to cool the lamp below its optimum operating temperature and therefore results in reduced output.
  - Age – effective UV radiation emitted from the lamps decreases with age. The UV lamp bulb remains lit long after the germicidal effectiveness is gone. Ultraviolet light intensity should be checked or replaced annually to ensure the emitted intensity is sufficient for germicidal activity.

Take precautions during work:

- Turn off UV lamps while the lab is occupied. The stainless steel interior of the BSC can reflect potentially hazardous illumination out of the opening of the cabinet.
- Never have the UV lamp on while an operator is working in the cabinet.

After work is complete:

- Decontaminate all work surfaces with an approved disinfectant, such as a freshly prepared 1:10 dilution of bleach.
- Turn the fan off and close the sash, if possible, when the UV lamp is on.

Maintenance:

- Clean UV lamp bulbs weekly by turning off the UV lamp then wiping off the surface of the room temperature lamp bulb with 70% alcohol. This will remove dust and dirt that can block the germicidal effectiveness of the light.
- Before replacing bulbs, clear the BSC of equipment and material, and disinfect it with a freshly prepared 1:10 dilution of bleach (20 minute contact time) and then remove the bleach residue with 70% ethanol.
- Install the bulb with gloved hands to prevent oil build up.
- Disinfect lamp bulbs before disposal. Lamps must be disposed as hazardous waste because they contain mercury. A waste pickup can be arranged through the OEHS LMS.

For more information see:

NIH Office of Science Management statement here.

CDC Biosafety in Microbiological and Biomedical Laboratories Appendix A describes the use of BSCs and appropriate disinfection/decontamination methods.