Decontamination

The purpose of decontamination is to make a hazardous material safe for further handling. A decontamination procedure can range from sterilization to simple cleaning with soap and water. The best general-purpose disinfectant solution is household bleach (5.25% sodium hypochlorite) diluted 1:10 in water. There are many commercially available disinfectants. They should be selected carefully based on their known activity against the agents used in the particular laboratory.

The following includes a description of the four main categories of physical and chemical means of decontamination.

**Liquid Disinfection**

Chemical disinfectants destroy disease-causing agents on inanimate surfaces. Chemicals proven to kill *Mycobacterium tuberculosis* on surfaces, called tuberculocidal disinfectants are considered to be broad spectrum disinfectants. A 10% solution of standard household bleach, 2% Lysol (commercial) and Wescodyne 75ppm (18 ml concentrate/gallon water) are examples of tuberculocidal disinfectants. **Tuberculocidal disinfectants are required in labs using human materials.**

Some materials of human origin and any materials that may contain prions such as Creutzfeldt-Jakob (CJ) infectious agent, require multiple decontamination steps to achieve inactivation. Prions are resistant to common disinfectants.

Ethanol or isopropyl alcohol (70%) have limited effect as disinfectants, and are not generally considered to be disinfectants. These alcohols are effective cleaners or sanitizers and may be used after an appropriate disinfectant.

The following criteria will help in the selection of a disinfectant or sterilant:

- The product must be effective against all organisms present in the laboratory,
- The product must be compatible with surfaces/materials being decontaminated,
- The product must be able to maintain sufficient contact time to inactivate the organisms,
- The product must have sufficient stability in its diluted form to achieve inactivation.

See **Appendix A** for additional information about disinfectants. Contact EHS-Biosafety section with questions about the selection of disinfectants.

**NOTE:** When **bleach** is used for the decontamination, a fresh solution (10% bleach) must be prepared daily. Each solution container must be labeled with either a make-up or an expiration date. However, bleach products with additives that extend the shelf life are available from commercial vendors.

**Heat**

Moist heat is the most dependable method of sterilization. Steam autoclaving is the most convenient method available to the laboratories for decontaminating biological waste and sterilizing glassware and media. Autoclaves provide the most efficient and reliable method of sterilization for most laboratory applications. The critical process factors are temperature, exposure time, and ensuring that materials are packaged to allow the steam to penetrate throughout the load. Sterilization time will vary in relation to the size
of the load and the packing density of the chamber. Typical laboratory autoclaves operate at 121°C. All users must review the operating manual periodically. Instructions should be prominently posted.

- Use heat resistant gloves and face protection, particularly when removing processed material; crack the door slowly and wait a few minutes before fully opening it.
- For dry loads, add 250-500 ml. of water to the load pan to aid in steam generation. Autoclave bags should be closed loosely to allow steam to penetrate; do not tightly cap bottles and test tubes.
- Autoclave tape is not a fail-safe indicator of sterilization; it blackens after only brief exposure to a temperature of 121°C. When used for sterilizing infectious waste, autoclave performance must be periodically confirmed by using *B. stearothermophilus* spore vials. Place a vial in a hard-to-reach area of a mock load and attach a string to facilitate removal after autoclaving. Incubate as directed; a lack of turbidity indicates that the autoclave is achieving sterilizing conditions.
- Some autoclave tapes contain lead, which makes it necessary to dispose of these tapes as Hazardous Waste. Laboratories must use lead-free autoclave tape to eliminate this hazardous waste stream. Information concerning lead-free autoclave tape contact EHS.

**Vapors and Gases**

The use of vapors and gases as decontamination methods usually involve the decontamination of biological safety cabinets, but they can also be used for whole building or room decontaminations. Agents used in this category include ethylene oxide, formaldehyde gas, hydrogen peroxide and peracetic acid. Biological Safety Cabinet decontaminations may not be performed using formaldehyde; rather, hydrogen peroxide must be used. Before arranging for gas decontamination methods, contact EHS.

**Radiation**

Ultraviolet radiation (UV) is sometimes used in biological safety cabinets for surface decontamination, but because of the low penetrating power of UV light, dusty or soiled areas limit its usefulness. UV creates excess amounts of ozone, which can result in symptoms of dry throat and dryness in the eyes. Because UV can cause serious burns to eyes and skin, it must not be used when work areas are occupied. EHS along with the CDC and NIH strongly discourage the use of UV as means of decontamination.