Use of biological safety cabinets

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1. PURPOSE:

The purpose of this GLP is to set out the good techniques for use of biological safety cabinets.

2. INTRODUCTION:

Biological safety cabinets (BSCs) are designed to protect the operator, working environment and work materials from exposure to infectious aerosols and splashes that may be generated when manipulating materials containing potentially infectious agents. Aerosol particles are created by any activity that imparts energy.

3. SCOPE:

3-1-All of the cleanroom user

4. GOOD TECHNIQUES:

4-1-Use of biological safety cabinets (BSC):

- The operator should not disturb the airflow by repeated removal and re-introduction of his or her arms. Move arms slowly in and out and perpendicular to the face while opening the cabinet.
- Avoid extra movement and traffic near the face of the cabinet as much as possible and also traffic behind the operator should be minimized. Personnel activities in the room (e.g., rapid movements near the face of the cabinet, walking traffic, room fans, open/closing room doors, etc.) may also disrupt the cabinet air barrier.
- Before beginning work, the BSC user should adjust the stool height so that his/her face is above the front opening.
- Do not block the cabinet grilles. When the user's arms rest flatly across the front grille, the arms may occlude the grille opening, and room air laden with particles may flow directly into the work area rather than being drawn down through the front grille. Raising the arms slightly will alleviate this problem.
- The front grille must not be blocked by towels, research notes, discarded plastic wrappers, pipetting devices, etc. Paperwork should never be placed inside biological safety cabinets.
- All operations should be performed on the work surface at least 8 Cm from the front grille. All work must be carried out in the middle or rear part of the working surface and be visible through the viewing panel.
- If there is a drain valve under the work surface, it should be closed prior to beginning work in the BSC.
- Only the materials and equipment required for immediate work should be placed in the BSC. Extra supplies (e.g., additional gloves, culture plates or flasks, culture media) should be stored outside the cabinet.

- Apparatus and materials in the cabinet must be kept to a minimum. Air circulation at the rear plenum must not be blocked.
- The work flow should be from "clean to dirty". Materials and supplies should be placed in the cabinet in such a way as to limit the movement of "dirty" items over "clean" ones.
- Investigators working with petri dishes and tissue culture plates should hold the lid above the open sterile surface to minimize direct impaction of downward air.
- Items (e.g., bottles and petri dishes) should be recapped or covered as soon as possible.
- Open flames are definitely banned in the BCS. Bunsen burners must not be used in the cabinet. The heat produced will distort the airflow and may damage the filters.
- Never leave exothermic appliances (e.g., hot plate) in cabinets on.
- The glass viewing panel must not be opened when the cabinet is in use.
- The cabinet must not be used unless it is working properly.
- The surface of the biological safety cabinet should be wiped using an appropriate disinfectant after work is completed and at the end of the day.
- The cabinet fan should be run for at least 5 min before beginning work and after completion of work in the cabinet.

4-2-Purge and Decontamination:

- If the cabinet has been shut down, the blowers should be operated at least 5 minutes before beginning work to allow the cabinet to "purge. This purge will remove any suspended particulates in the cabinet.
- The work surface, the interior walls (except the supply filter diffuser), and the interior surface of the window should be wiped with 70% IPA or 0.05% sodium hypochlorite (When bleach is used, a second wiping with sterile water is needed to remove the residual chlorine, which may eventually corrode stainless steel surfaces).
- Wiping with nonsterile water may re-contaminate cabinet surfaces, a critical issue when sterility is essential.
- Similarly, the surfaces of all materials and containers placed into the cabinet should be wiped with 70% IPA to reduce the introduction of contaminants to the cabinet environment.
- With the cabinet blower running, all containers and equipment should be surface decontaminated and removed from the cabinet when work is completed.

- At the end of the workday, the final surface decontamination with 70% IPA of the cabinet should include a wipe-down of the work surface, the cabinet's sides and back, and the interior of the glass.
- Small spills within the operating BSC can be handled immediately by removing the contaminated absorbent paper towel and placing it into the biohazard bag or receptacle.
- Any splatter onto items within the cabinet, as well as the cabinet interior, should be immediately cleaned up with a towel dampened with an appropriate decontaminating solution.
- Gloves should be changed after the work surface is decontaminated.
- Spills large enough to result in liquids flowing through the front or rear grilles require more extensive decontamination. All items within the cabinet should be surface decontaminated and removed. After ensuring that the drain valve is closed, decontaminating solution can be poured onto the work surface and through the grille(s) into the drain pan.
- The spilled fluid and disinfectant solution on the work surface should be absorbed with paper towels and discarded into a biohazard bag.
- Twenty to 30 minutes is generally considered an appropriate contact time for decontamination, but this varies with the disinfectant (Manufacturer's directions should be followed).
- The drain pan should be emptied into a collection vessel containing disinfectant.
- A hose barb and flexible tube should be attached to the drain valve and be of sufficient length to allow the open end to be submerged in the disinfectant within the collection vessel. This procedure serves to minimize aerosol generation. The drain pan should be flushed with water and the drain tube removed.
- Periodic removal of the cabinet work surface and/or grilles after the completion of drain pan decontamination may be justified because of dirty drain pan surfaces and grilles, which ultimately could occlude the drain valve or block airflow. However, extreme caution should be observed while wiping these surfaces to avoid injury from broken glass and sharp metal edges. Always use disposable paper towels and avoid applying harsh force. Wipe dirty surfaces gently. Never leave paper towels on the drain pan because the paper could block the drain valve or the air passages in the cabinet.
- BSCs that have been used for work involving infectious materials must be decontaminated before HEPA filters are changed or internal repair work is done. Before a BSC is relocated, a risk assessment considering the agents manipulated within the BSC must be performed to determine the need and method for decontamination. The most common decontamination method uses formaldehyde gas, although more recently, hydrogen peroxide vapor and chlorine dioxide gas have been used successfully.

5. REFERENCES:

5-1- Biosafety Manual. IBC-approved version (May 18, 2010).

5-2- Laboratory biosafety manual. – 3rd ed. World Health Organization.

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