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Lab Health and Safety

Gowning Around

Recommended procedures for donning and doffing PPE for cleanrooms and containment labs

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Biosafety level-rated research labs are becoming more prevalent in a world focused on genetic and cancer research, pharmaceutical production, and disease treatment. These specialized containment spaces are found in a diverse array of clinical, diagnostic, production, and research facilities. And they are becoming increasingly sophisticated as rapid changes in research equipment, handling protocols, and technology force facility designs to adapt.

As safety guys working at a large public university that includes a medical school, a dental school, a veterinary school, animal research colonies, biomedical and cancer research facilities, and a nanotechnology research facility, we are presented with many opportunities to encounter every type of containment laboratory and cleanroom. One thing they all have in common is the need to properly gown up prior to entry and to de-gown before exiting. The exact personal protective equipment required is strictly dependent on the type of containment area and the research work that is ongoing. Rather than discuss specific protocols for the different types of containment areas, we want to provide a generic procedure that can be tailored to fit almost any containment lab or cleanroom, both sterile and non-sterile.

GENERAL SETUP OF CONTAINMENT LABS

Containment laboratories are constructed so that the room itself is a secondary containment barrier.¹ That is, the lab ventilation is kept at a slightly negative pressure relative to the adjacent areas. In other words, an inward directional airflow is established by exhausting more air than is supplied. This prevents any contaminants from spills or releases from migrating into surrounding rooms. The laboratory exhaust should be vented directly to the outside air, with no recirculation. Depending on the research and materials in use, many times the

exhaust air must also be filtered, usually with high efficiency particulate air (HEPA) filters.¹

Ideally, separate areas are provided for entry and gowning- in verses de-gowning and exit, although many facilities use a single access for entry and exit. In any event, the ingress/egress point(s) should be part of a two-stage process: a pre-gowning area where the process is started, followed by the gowning or PPE donning room. In an ideal facility, exit is via a separate de-gowning room, then to a final clearance and exit. Air flow is strictly controlled in these areas to fully contain any contaminants.

A FEW PRE-GOWNING PRECAUTIONS

The following actions and items should receive consideration prior to beginning the process of entering or using a cleanroom or containment lab.

- ▶ Minimize the use of makeup, hair gel, body lotions, and personal skin care products, as these can potentially introduce contaminants.
- ▶ Users should not smoke within forty-five minutes of entering, especially cleanrooms, as it is well documented that smokers shed particulates for much longer than thirty minutes after smoking.
- ▶ Remove extraneous street clothing such as sunglasses, hat, jacket, etc., before entering the antechamber in order to simplify the process and minimize actions.
- ▶ Plan out the work in advance so all materials, tools, solutions, etc., are on hand and ready to minimize traffic and the number of entries/exits.

A RECOMMENDED GOWNING PROCEDURE

The following procedure is meant to provide a generic order for donning PPE items for a basic-level containment lab or cleanroom. The recommended sequence is designed to help control contamination when donning and removing

standard containment/cleanroom PPE. Not every apparel item is needed in all cases. Check your facility's procedures. If you are dealing with highly infectious or toxic agents or working in a highly sterile lab (pharmaceutical preparations, an FDA-regulated lab, etc.), then additional steps and much stricter protocols will be necessary.²

COVERING UP

- ▶ Don bouffant cap and beard cover and make sure all hair is covered.
- ▶ Don shoe covers, tucking in all laces, tassels, etc.
- ▶ Select, inspect, clean, and then don safety glasses.
- ▶ Don gowning gloves (usually required for sterile environs).
- ▶ Don face mask (N95, N100, etc.), and bend nosepiece to fit snugly on bridge of nose.
- ▶ Don hood (if separate and required, usually a part of a coverall gown) and secure face and neck seals.
- ▶ Don coverall gown. Make sure gown does not touch the floor by gathering leg and arm cuffs first and releasing one at a time. See the Sterile Preparations Manual for a good description of this process.² If a separate hood is used, tuck shoulder panels inside and under the gown before zipping up.
- ▶ Don boot/shoe covers and pull over outside of gown legs.
- ▶ Don the second pair of gloves and stretch them over gown sleeve cuffs.

You are now ready to enter the cleanroom or containment lab. Upon completion of your work, exiting the containment area is generally the reverse of the above steps. However, there are a few things to consider and remember, so we will list the steps in full.

DE-GOWNING AND EXITING

- ▶ Remove boot/shoe covers and, if wearing two pairs of gloves, discard the outer pair of gloves. If only one pair of gloves is worn, it should be removed last. If boot covers will be reused, store in a separate proper container.
- ▶ Remove the coverall gown. If the gown will be reused, hang in approved and controlled area; otherwise, discard.
- ▶ Remove eyewear and place it in proper storage container.
- ▶ Remove hood and follow same steps as for the gown if it is to be reused.
- ▶ Exit gowning room and enter antechamber.
- ▶ Remove and discard face mask.
- ▶ Remove and discard bouffant cap.
- ▶ Remove and discard shoe covers.
- ▶ Remove and discard inner pair of gloves (if applicable).

FINAL WORDS

Work in containment labs and cleanrooms is very serious business. Failure to follow protocols could potentially put you, your coworkers, and others in danger or at risk. Contamination could cause loss of many hours of research and possibly ruin the product, incurring huge financial losses. The PPE requirements are used for good reason. Be patient and properly gown in and out every time you enter a containment area. And remember—safety first!

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