

# Respiratory Protection & Biological Aerosols

## Surgical Masks vs. Respirators

Many activities in research and clinical labs (e.g. centrifugation, sonication, pipetting, syringe loading, etc) may produce aerosols. World-wide, there are many documented cases of laboratory-acquired infections resulting from the production and inhalation of infectious aerosols. Engineering controls such as ventilation containment equipment (biosafety cabinets, fume hoods), safety centrifuge cups and others are specially designed in order to prevent this type of exposure. Sometimes, however, the use of Personal Protective Equipment (PPE) such as a respirator is also necessary.

Because certain disposable respirators are similar in appearance to many surgical/procedure masks, their differences are not always well understood. The biggest difference between a respirator and a surgical mask is the intended use.

**Surgical masks** do not have either adequate filtering or fitting attributes to provide respiratory protection for the wearer. They are designed to help prevent contamination of the work environment or sterile field from large particles generated by the wearer (e.g. spit, mucous) as well as to reduce the risk of splashes or sprays of blood, bodily fluids, secretions and excretions from reaching the wearer's mouth and nose.

**Respirators**, on the other hand, help to reduce the wearer's respiratory exposure to airborne contaminants such as particles less than 100 microns ( $\mu\text{m}$ ) in size. This includes airborne particles that may contain biological material, such as mold, allergens, bacteria and viruses.

One of the most common respirators used in health care and research facilities is the type N95 disposable respirator. N95 filters belong to a group of air purifying particulate filters. The "95" in N95 refers to the filter efficiency. There are three levels of filter efficiencies - 95% (N95), 99% (N99), and 99.97% (N100 or HEPA filter) tested against aerosol (fine mist) of 0.3 microns in diameter.

The National Institute for Occupational Health (NIOSH) is the agency responsible for the testing and certifying of respirators. Only NIOSH certified respirators should be worn. Certification may be verified by looking at the packaging information, and certification number stamped onto the respirator.

Respirators are designed to fit tightly to the face and create a seal between the face and the respirator. This helps ensure that most of the inhaled air is drawn through the filter media rather than through leaks between the respirator and the wearer's face.



*Surgical masks do not provide respiratory protection.*

To determine proper fit, wearers must be fit tested to make sure they have selected the appropriate model and size. The wearer must also perform a "user seal check" each time the respirator is worn prior to entering the contaminated environment to check the respirator-to-face seal.

OSHA requires that every employee who wears a respirator receive an initial fit-test prior to using that respirator (followed by annual tests), have a written program for the specific work location and be trained in the proper use of respirators. Also, as an OSHA requirement, prior to the fit-test, employees must receive an initial medical evaluation which consists of a medical questionnaire and a physical evaluation. For details on the Respiratory Protection Program go to [EH&S – Advisory 11](#).

To discuss the need of respiratory protection against biological aerosols, please contact the Biosafety Office at 513-558-6182 or [inbiocom@ucmail.uc.edu](mailto:inbiocom@ucmail.uc.edu)



*N95 respirators must have NIOSH certification.*