TIP SHEET: SAFER XENON USE WITH POSSIBLE INFECTIOUS DISEASE 2.0

OPEN SYSTEM

- A Xenon delivery system is an open system. An open system can be defined as a system which can exchange both matter and/or energy with the surrounding[1]. In the case of ventilation studies, energy would be airflow entering and then exiting the system but matter, being particles, may also exit the system if it is not properly maintained and operated.
- Open systems naturally provide more opportunities for contamination because the process is open to the room environment and handling by operators[2].
- However, the risk of particles exiting the system can be minimized with proper preventative maintenance and enhanced dosing procedures, such as the use of a HEPA filter during patient dosing.
- **Note:** Radioaerosol delivery systems are considered closed systems as particles remain inside an administration kit.



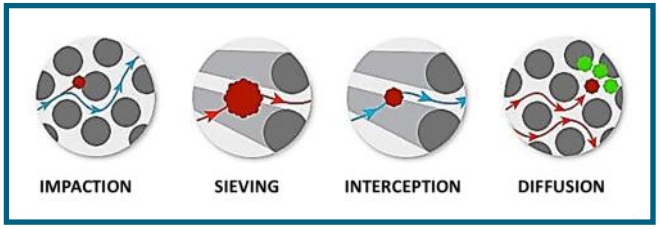
Includes 2 HEPA Filters, Direct Dose Adapter and Air Cushioned Face Mask.

CLEANING / DISINFECTING

- For maximum protection, Xenon delivery systems must be regularly monitored for changes to system components and connections, and items such as charcoal traps, internal bags and absorbent granules, routinely replaced.
- To minimize possible surface contamination, a system's exterior may be wiped down with appropriate cleaning/ disinfecting agents following each patient. However, a system's internal components may not easily be disinfected, if at all.
- To minimize the possibility of system contamination, Medi/Nuclear® recommends the use of its **#MN2700-UFA Xenon Administration Set <u>with double HEPA filters</u>**, a direct dose adapter and an air cushioned face mask.

FILTRATION

- At roughly 0.1 µm, Covid-19 virus particles are very small, but they don't travel alone. Covid-19 particles are exhaled with salivary/mucous droplets starting from approximately 0.5 µm in size[3].
- According to the Centers for Disease Control (CDC), by definition, a High Efficiency Particulate Air (HEPA) filter is **at least 99.97% efficient** at capturing particles 0.3 µm in size. This 0.3 µm particle approximates the most penetrating particle size (MPPS) through the filter. **HEPA filters are even more efficient at capturing particles larger and smaller than the MPPS. Thus, HEPA filters are no less than 99.97% efficient at capturing human-generated viral particles associated with SARS-CoV-2[4].**
- HEPA filters do not simply strain (sieve) particles. They physically remove them from the air stream using a combination of processes (Impaction, Sieving, Interception, Diffusion)[3]. Depending on their size, particles may move rapidly, colliding and sticking to filter fibers, continue on their path using inertia until they stick to the sides of fibers, or bounce off each other, moving in completely random patterns, until they hit and stick to filter fibers. Together, these processes create a 'dynamic collision trap' as particles pass through the network of air channels between fibers at various speeds[3].



MEDI/NUCLEAR'S PROPRIETARY HEPA FILTER

- All of Medi/Nuclear's radioaerosol administration kits, and select Xenon administration kits AND respiratory nebulizing devices, utilize a proprietary viral HEPA filter.
- HEPA filter testing was performed by Nelson Laboratories, which provides a more severe challenge to most filtration devices than would be expected in normal use[5]. As required, results confirmed at least 99.97% trapping efficiency of particles 0.3 microns in size.
- HEPA filter testing performed in Medi/Nuclear's aerosol lab has shown **99.9825% trapping efficiency, under normal patient use**.
- According to research performed by the National Aeronautics and Space Administration (NASA), when used alone, **HEPA-rated media provides superior performance for removing virtually 100% of particulates[6].**
- Those doubting this should keep in mind that very few, if any, particles will pass through a HEPA filter but should they, not every exhaled particle will be virus laden or carry a significant viral load. If desired, a second HEPA filter may be added. HEPA filters are available at 20/case, using model #2890 .

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PATIENT INTERFACE

- When Covid-19 is suspected or unknown, a Xenon administration set with air cushioned face mask **and HEPA filter** is recommended.
- The face mask will cover a patient's face and mouth, allowing any coughs to go into the HEPA filter, thereby reducing the risk of system contamination.
- A HEPA filter will trap most, if not all, exhaled contaminants prior to entering the system. For extra protection, **Medi/Nuclear's #MN2700 Xenon Administration Set** features double HEPA filters, a direct dose adapter and an air cushioned face mask.
- **Merely placing a face mask on a patient's face may not allow the edges to seal securely.** To properly apply a face mask, 1) place it on the bridge of the nose and then 2) carefully roll it down toward the chin.
- A **face mask harness (#MN9676)** is recommended as it will help to secure the face mask, reducing possible contamination from a poorly fitted or loosely held face mask.
- Should a mouthpiece be needed, Medi/Nuclear's scuba style **Safety Shield™ Mouthpiece (#MNMP500)** with protective cap, is suggested. As compared to a straight mouthpiece, the scuba style 1) provides better protection against leakage from the corners of a patient's mouth, 2) is less likely to slip from a patient's mouth, and 3) features bite wings to open the teeth slightly for improved airflow. The cap can be used to catch contaminated saliva during mouthpiece removal and then to cover the mouthpiece for a safer disposal.
- When using a mouthpiece, be sure to properly apply a **nose clip (#MN1050)** to prevent leakage from the nose. To place a nose clip properly, ensure the nose pads are located on the lower part of the nose, keeping nostrils closed tightly. If a patient is placing the nose clip, check to make sure it is located properly. This will enhance safety and speed up dosing.





FINAL REMINDERS

1. Air flows through a Xenon delivery system in one direction. If the charcoal trap is spent, patient exhalation will go through it, possibly contaminating room air. **Be sure to monitor the charcoal trap routinely and replace it as needed**.
2. **Use at least one HEPA filter with each patient to minimize possible system contamination**.
3. Change C02 absorbent granules for each study and absorbent granules when blue color has turned to pink/white. **In addition to patient safety, changing granules routinely will help to preserve the life of the charcoal trap and internal expansion bag**.
4. Have the patient put on a personal face mask following the procedure.
5. **After each patient, clean and disinfect the exterior of a Xenon delivery system and procedure area**, according to hospital protocols, to reduce the possibility of surface contamination.



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