# Lung Ventilation - Xenon

<table>
<thead>
<tr>
<th>Special Instructions</th>
<th>Patients with severe dyspnea may not be able to tolerate this examination.</th>
</tr>
</thead>
</table>

**To be performed only at UNMH.**

**Radiopharmaceutical:** Xe-133 gas

**Dose (Adult/Pediatric):** Refer to Nuclear Medicine Dose Chart

**Route of Administration:** Inhalation from a Xe-133 gas delivery system.

**Patient Preparation:** None.

**Equipment Setup:**
- **Gamma Camera:** ZOOM as appropriate for small children
- **Collimator:**
  - **Orbiter:** LEAP
  - **SPECT-CT/ECAM/Evo/Symbia E:** High resolution
- **Computer setup:**
  - Static acquisition
  - 128 x 128 matrix
  - **Zoom 1.0** (greater for small children)—ensure that the lungs fill a significant portion of the detector for small patients
  - 10 sec/image for inspiration
  - 30 sec/image for all other images

**Patient Positioning:**
- **Orbiter:** Seated upright on a stool (preferred) with the detector posterior to the patient. Supine if necessary
- **All others:** Supine

**Procedure:**
- If the patient is able to sit upright on a stool for the examination, perform the ventilation portion of the examination on the Orbiter if available.
- Before beginning the study, explain the breathing maneuvers required; the patient should rehearse these maneuvers.
- Place the mask on the patient and ensure that it fits snugly.
  - **Inspiration (Single-breath) Image:**
    - Instruct the patient to exhale completely and then to take a deep breath as the Xe-133 gas flows in.
    - The patient should hold his/her breath for 10 sec (if possible) while posterior (and anterior if on a dual-headed camera) imaging is performed.
Lung Ventilation - Xenon (continued)

- **Equilibrium (Rebreathing/Wash-in) Images:**
  - The patient should then breathe normally for 3 images (90 seconds).
  - For a seated patient, the images should be acquired in this order: RPO, LPO, Posterior.
  - For a supine patient, all images should be posterior (and anterior if on a dual-headed camera).
  - If the patient’s arms are in the field of view on the RPO/LPO images, this should be notated on the images or in the tech comments.

- **Wash-out Images:**
  - The patient should then breathe normally, as the gas delivery system valves are changed so that the patient breathes in room air and exhales the Xe-133.
  - Obtain 5 posterior (and anterior if on a dual-headed camera) images (30 seconds each).

**Processing:**

**Orbiter:**
- Display under 9 view.
- Label images with the time (30 sec/image), upright or supine, and phase (Inspiration, Equilibrium, and Washout).
- May need to merge ventilation images in order to display as 9 view.

**SPECT-CT/ECAM/Evo/Symbia E:**
- Follow automatic processing workflow.
- Label images with the time (30 sec/image), upright or supine, and phase (Inspiration, Equilibrium, and Washout).
- If the patient’s arms are in the field of view on the RPO/LPO images, this should be notated on the images or in the tech comments.

- If quantitative lung ventilation is requested, also process under planar processing (lung distribution).
- Use the first (inspiration/single-breath) posterior image.
- Determine the counts in each lung by drawing equal-size boxes around each lung; the percent in each lung is calculated automatically.
Items Required For Complete Study:

Raw data of all images to PACS

- Lightbox/savescreens of all ventilation images (separate lightboxes/savescreens for anterior and posterior images if both were obtained)
- If the patient’s arms are in the field of view on the RPO/LPO images, this should be notated on the images or in the tech comments.
- Transfer all digital images to PACS
- Complete the examination in RIS