

Chapter 90. Ventilation Perfusion (V/Q) Scan

All PH and disease control participants are required to have data from a V/Q scan. These data will be used in analyses, as well as to classify participants with WHO Class IV PH. It is anticipated that most of the participants will have V/Q scans available, or will be undergoing V/Q scan as part of their regular clinical care.

- All PVDOMICS participants are required to have a ventilation-perfusion lung scan for detection of possible pulmonary emboli. V/Q scans performed within 4 years prior to enrollment can be used provided acceptable results (DICOM images and final report) are made available to the DCC Lung Imaging Core and there has been no change in clinical status of the participant. Note: historical scan can be from either PVDOMICS or non-PVDOMICS sites.
- A V/Q scan is not required if the participant has known parenchymal lung disease or has had a positive CT angiogram in the past year for which the results (DICOM images and final report) are provided to the DCC Lung Imaging Core.
- If the CTA is non-diagnostic or negative, then a V/Q scan is required.

The V/Q scan is comprised of two scintigraphic scans: one for ventilation and another for pulmonary perfusion. The ventilation scan may be performed as an Aerosol Ventilation or Gas Ventilation Scintigraphy. In Aerosol Ventilation, the bronchopulmonary distribution of an inhaled radioactive aerosol [99mTc diethylenetriamine-pentaacetic acid (DTPA)] is evaluated within the lungs. In Gas Ventilation, the pulmonary distribution of radioactive xenon (¹³³Xe) gas is evaluated during breathing maneuvers. Pulmonary Perfusion Scintigraphy uses 99mTc macro-aggregated albumin (MAA) to record the distribution of pulmonary arterial blood flow.

Although the V/Q test uses radiopharmaceuticals, the total amount of radiation exposure to the participant is low. If the scan is done at a PVDOMICS site during the study protocol, the amount of radiopharmaceutical (mCi) administered will be recorded to maintain record of total radioactivity exposure of volunteers. **It is very important to note that any urine or blood products drawn after a V/Q scan will be radioactive. Therefore, the PVDOMICS protocol recommends that V/Q scanning that is performed during the 6-week protocol be done on the day of the participant's last scheduled visit. However, if urine or blood products must be collected and handled after V/Q scan administration of radioactive material, the urine or blood should be collected at the minimum 3 days after the scan.** The radionuclide 99mTc has a half-life of 6 hours. The time to ensure minimal to undetectable radioactivity in the biologic samples is 10 half-lives (or ~60 hours). The ¹³³Xe radionuclide has a half-life of 5.2 days but the biological half-life is a few hours because ¹³³Xe is exhaled (washout) [1, 2]. However, if blood is drawn immediately after a ¹³³Xe scan, the blood sample collected will stay radioactive for weeks based on its physical 5 day half-life (and no elimination by ventilation).

Thus, blood draws after 3 days will also ensure that blood collected from those individuals have XeV/Q that is not radioactive, and likely allowable to mail. **Nevertheless, the site's local radiation safety committee should be made aware if urine or blood will be collected following V/Q in the study, as they may recommend survey of these samples before mailing to the DCC. Given these considerations, it is highly recommended that the V/Q scan be done after completion of all study urine or blood and draws.**

Form 254-Ventilation/Perfusion (V/Q) Report Transmittal Form

The report of the V/Q includes a description and overall assessment of the likelihood of pulmonary embolism based on the scintigraphic findings. This assessment will be recorded on **Form 254** along with the date the final V/Q report was transmitted to the DCC secure portal.

Form 254 is used for V/Q study done for the PVDOMICS as well as to report historical V/Q data.

References:

1. Aitkins HL, Robertson JS, Croft BY et al. Estimates of radiation absorbed doses from radioxenons in lung imaging. J Nucl Med 1980; 21:459-465.
2. Goddard BA, Ackery DM. Xenon-133, 127Xe, and 125Xe for lung function investigations: A dosimetric comparison. J Nucl Med 1975; 16:780-786.