Supplementary Material

## Supplementary Figures and Tables

**Table S1.** Dosing and measurements of image quality

|  |  |
| --- | --- |
|  | **All participants**  **(n=41)** |
| **Technegas SPECT** |  |
| ***Dose*** |  |
| Activity of 99mTc sodium pertechnetate loaded into crucible (MBq) | 581 [400-815] |
| Number of breaths | 6 [2-15] |
| ***Image quality*** |  |
| Count rate from lungs on γ-camera, posterior (counts/second)† | 2300 [930-4350] |
| Count rate from lungs on γ-camera, anterior (counts/second)† | 2500 [720-4520] |
| **129Xe MRI** |  |
| ***Dose*** |  |
| Volume of 129Xe delivered (mL) | 600 [500-730] |
| Polarization (%) | 10 [9-34] |
| Dose equivalent volume (mL)‡ | 54 [46-146] |
| ***Image quality*** |  |
| Signal-to-noise ratio\* | 37 [14-92] |

Values median [minimum-maximum].

†A lower limit of 1500 counts/second is recommended.

‡A lower limit of 50mL is recommended.

\*Signal-to-noise ratio (SNR) for 129Xe MRI was calculated as the mean voxel value within four representative regions of interest (ROI) within the ventilated lung divided by the standard deviation of the voxel values for noise inside four representative ROIs of the same size outside of the thoracic cavity (i.e., background).

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**Figure S1.** **Comparison of ipsilateral and contralateral lung ventilation defect percent (VDP) assessed by Technegas SPECT and 129Xe MRI.**

**(A)** Technegas SPECT VDPT of the ipsilateral (19% [12-65%]) and contralateral (18% [9-91%]) lung was not different (p=0.93).

**(B)** 129Xe MRI VDPT of the ipsilateral (20% [11-32%]) and contralateral (20% [11-33%]) lung was not different (p=0.80).

**(C)** Technegas SPECT VDPK of the ipsilateral (6% [2-30%]) and contralateral (7% [2-73%]) lung was not different (p=0.13).

**(D)** 129Xe MRI VDPK of the ipsilateral (4% [1-50%]) and contralateral (4% 1-66%]) lung was not different (p=0.59).

VDPT=VDP determined by thresholding method; VDPK=VDP determined by k-means method. Bars represent median with paired ipsilateral and contralateral lung values for all participants superimposed on the plot. Difference between ipsilateral and contralateral lung VDP was determined using paired t-test (parametric data) or Wilcoxon test (non-parametric data)

**Table S2.** Ventilation defect percent by tumor stage and tumor size as per TNM-staging 8th edition.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Tumor Stage**† | | | |  | **Tumor Size**† | | | |
|  | I  (n=25) | II  (n=7) | III&IV  (n=5) | p-  value\* |  | T1  (n=19) | T2  (n=11) | T3&T4  (n=7) | p-value\* |
| **Technegas SPECT** | | | | | | | | | |
| VDPT | 19  [12-62] | 17  [14-35] | 18  [11-84] | 0.76 |  | 22  [14-62] | 16  [12-24] | 18  [11-84] | 0.19 |
| VDPK | 6  [3-39] | 6  [4-16] | 8  [3-52] | 0.91 |  | 6  [3-39] | 5  [3-11] | 11  [3-52] | 0.20 |
| **129Xe MRI** | | | | | | | | | |
| VDPT | 21  [14-30] | 18  [13-24] | 22  [16-37] | 0.16 |  | 21  [14-30] | 20  [15-23] | 23  [13-37] | 0.35 |
| VDPK | 4  [1-42] | 4  [2-20] | 6  [1-48] | 0.91 |  | 5  [1-42] | 2  [1-6] | 6  [1-48] | 0.05 |

Values are median [minimum-maximum]. VDPT=VDP determined by thresholding method; VDPK=VDP determined by k-means method. †As per TNM-staging 8th edition. \*Significance of difference between groups was determined using Kruskal Wallis with Dunn’s multiple comparisons test.