**Patient Flow:**

**Excluded (n = 9, 47%)**

* Patient had surgery 5 (46%)
* Patient declined 4 (44%)

Approached for Enrolment

(n = 19)

**Enrolled**

**(n = 10, 53%)**

**Completed Assessment and Data analysed**

* Xenon MRI scan 10 (100%)
* Laser Gas Analyser 10 (100%)

**Baseline Characteristics**:

**Table 1**

|  |  |  |
| --- | --- | --- |
| **Variable** | **Statistic** | **Participant** |
| TotalAge (years)GenderEthnicityBody Mass Index (kg/m2)Smoking statusPrevious pneumothoraxFamily history of pneumothorax | nMedian (IQR)MaleFemaleWhiteMedian (IQR)Current smokerEx-smokerNever smokernn | 1028.6 (9.9)80% (8/10)20% (2/10)100% (10/10)20.0 (3.9)40% (4/10)10% (1/10)50% (5/10)30% (3/10)0% (0/10) |

**Outcome Measures**

*Xenon MRI*

**Table 2** Percentage 129Xe MRI ventilation by lobe

|  |  |
| --- | --- |
|  | **% Ventilation with 129Xe MRI by lobe** |
| **Participant** | **Right Upper** | **Middle lobe** | **Right Lower** | **Left Upper** | **Left Lower** |  | **Mean (Whole Lung)** | **SD (Whole Lung)** |
|  |  |  |  |  |  |  |  |  |
| **1** | 92.4% | 82.4% | 88.3% | 88.1% | 91.2% |   | 88.5% | 3.9% |
| **2** | 98.0% | 83.5% | 85.2% | 98.2% | 83.3% |   | 89.6% | 7.7% |
| **3** | 96.5% | 82.9% | 94.8% | 82.6% | 92.1% |   | 89.8% | 6.6% |
| **4** | 95.9% | 96.2% | 89.1% | 93.1% | 91.6% |   | 93.2% | 3.0% |
| **5** | 77.1% | 96.4% | 73.3% | 87.9% | 74.4% |   | 81.8% | 10.0% |
| **6** | 99.4% | 93.9% | 86.6% | 97.3% | 92.0% |   | 93.8% | 5.0% |
| **7** | 86.6% | 89.5% | 70.0% | 80.8% | 70.7% |   | 79.5% | 8.9% |
| **8** | 80.0% | 90.8% | 85.9% | 82.2% | 86.2% |   | 85.0% | 4.1% |
| **9** | 81.4% | 95.1% | 83.1% | 86.8% | 88.1% |  | 86.9% | 5.3% |
| **10** | 79.3% | 94.5% | 95.5% | 94.5% | 97.1% |  | 92.2% | 7.3% |
|  |  |  |  |  |  |  |  |  |
| **Mean** | **88.7%** | **90.5%** | **85.2%** | **89.2%** | **86.7%** |  | **88.0%** |  |
| SD | 8.7% | 5.7% | 8.2% | 6.3% | 8.4% |  | 4.8% |  |

**Table 3** Mean ADC (cm2/s) for pneumothorax patients by lobe

|  |  |
| --- | --- |
|  | **ADC (mean) cm2/s** |
| **Participant** | **Whole Lung** |  | **Right Upper** | **Middle lobe** | **Right Lower** | **Left Upper** | **Left Lower** |
|  |  |  |  |  |  |  |  |
| **Number with data available (n=7)** |  |  |  |
| **4** | 0.051 |   | 0.044 | 0.052 | 0.055 | 0.050 | 0.044 |
| **5** | 0.039 |   | 0.040 | 0.036 | 0.044 | 0.039 | 0.034 |
| **6** | 0.045 |   | 0.050 | 0.042 | 0.051 | 0.046 | 0.037 |
| **7** | 0.033 |   | 0.033 | 0.030 | 0.041 | 0.033 | 0.031 |
| **8** | 0.047 |   | 0.055 | 0.049 | 0.051 | 0.044 | 0.038 |
| **9** | 0.030 |   | 0.035 | 0.028 | 0.032 | 0.033 | 0.025 |
| **10** | 0.032 |   | 0.037 | 0.035 | 0.034 | 0.032 | 0.026 |
|  |  |  |  |  |  |  |  |
| **Mean** | **0.040** |  | **0.042** | **0.039** | **0.044** | **0.040** | **0.034** |
| SD | 0.008 |  | 0.008 | 0.009 | 0.009 | 0.007 | 0.007 |

*Laser Gas Analyser (LGA)*

**Table 4**: Primary model parameters of pneumothorax patients comparing ex- and current- smokers to never smokers, with p value of difference

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Compliance distribution** | **Alveolar Volume (L)†** | **Deadspace distribution (L)†** |
| **Pneumothorax** |  | Mean | SD | n\* | Mean | SD | n\* | Mean | SD | n\* |
|  |  |  |  |  |  |  |  |  |  |  |
| Non-smoker |  | 0.41 | 0.04 | 5 | 2.97 | 0.50 | 5 | 0.020 | 0.000 | 5 |
| Smoker |  | 0.54 | 0.08 | 5 | 3.46 | 0.59 | 5 | 0.018 | 0.004 | 5 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Difference** |  | **-0.12** | **0.04** | **10** | **-0.49** | **0.35** | **10** | **0.002** | **0.002** | **10** |
| **p value\*\*** |  | 0.013 |  |  | 0.199 |  |  | 0.347 |  |  |

\*n = number of participants, \*\* p value = between groups ANOVA.

*Pulmonary Function Testing (PFTs)*

**Table 5**: Difference in PFTs between smokers and non-smokers

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **FEV1 (% predicted)** | **DLCO (mmol/(min\*kPa))** | **kCO (mmol/(min\*kPa\*L))** |
| **Pneumothorax** |  | Mean | SD | n\* | Mean | SD | n\* | Mean | SD | n\* |
|  |  |  |  |  |  |  |  |  |  |  |
| Non-smoker |  | 104.2 | 18.1 | 5 | 9.0 | 1.8 | 5 | 1.4 | 0.3 | 5 |
| Smoker |  | 84.4 | 16.0 | 5 | 10.6 | 1.6 | 5 | 1.7 | 0.2 | 5 |
|  |  |  |  |  |  |  |  |  |  |  |
| **Difference** |  | **-19.78** | **10.80** | **10** | **1.55** | **1.08** | **10** | **0.22** | **0.15** | **10** |
| **p value\*\*** |  | 0.10 |  |  | 0.19 |  |  | 0.19 |  |  |

\*n = number of participants, \*\* p value = between groups ANOVA

FEV1=Forced expiratory volume in 1 second, DLCO = Diffusing capacity for carbon monoxide, kCO= Diffusing capacity for carbon monoxide (DLCO) normalised for lung volume, SD = standard deviation

**Adverse Events**

There were no adverse events associated with this trial