|  |
| --- |
| **Lung ventilation via X-ray Velocimetry imaging and PFTs in CF children: case-studies from the ongoing Adelaide pilot and feasibility trial.** |
| *David Parsons,1**,2,3, Matthew Bruorton1,2,, Jessica Phillips1 Nina Eikelis4, Kristopher Nilsen4, Kristin Carson-Chahoud1,2,3, Martin Donnelley**1,2,3, Andrew Tai1,2,3, Tom Goddard1,2,3* |
| *1Department of Respiratory and Sleep Medicine, Women’s and Children’s Hospital, Adelaide, SA* *2* Adelaide Medical School, The University of Adelaide, SA.*3* Robinson Research Institute, The University of Adelaide, SA*4* 4DMedical, Victoria, Australia |
| **Introduction/Aim:** Routine PFTs produce useful global information on lung health. However, regional ventilation information is lacking, and children under 6 years cannot perform most PFTs. Standard X-ray imaging (CXR, or CT) provides static structural information, but radiation doses limit their use in children. XV imaging (4DMedical) uses a low-dose fluoroscopy protocol and proprietary software algorithms to track lung motion in 4D, to derive estimates of regional ventilation throughout the breath cycle. These case studies describe our initial XV and PFT findings in children living with CF. **Method:** Children 6-18 years old, with (n=20) or without (n=20) CF are being recruited, 8 CF children have been studied to date. A Siemens Artis Zee fluoroscope captures thoracic cinescans during resting breathing at 5 angles (0, ±36°, ±60°) via a standardised protocol. Summary reports and custom lung ventilation analyses were provided by 4DMedical. PFTs were performed in the WCH Lung Lab on the same day, after XV acquisition. Non-CF adult and wild-type animal XV example data provides suggest normative XV data for indicative comparison purposes, while awaiting non-CF child recruitment. **Results:** In CF children XV findings included a predominance of low ventilation in lung bases, and lobe-based compensation for diseased regions – ventilation anomalies not identified by PFTs. CF child ventilation distribution patterns typically differed substantially from example non-CF adults without CF (and several wild-type animal species). Summary findings together with images and videos of regional ventilation will be used to illustrate these differences. **Conclusion:** XV child imaging appears feasible and demonstrates abnormal ventilation patterns in some CF children showing normal PFTs. The additional regional lung health information provided by XV has the potential to detect otherwise hidden disease to enable earlier preventative treatment. **Acknowledgements:** 4DMedical, MRFF Frontiers.**Key Words:** Lung function, X-ray Velocimetry, XV, lung ventilation, cystic fibrosis, children, PFTs.**Nomination for New Investigator Award:** No**Grant Support:** MRFF Frontiers, NHMRC.  |