|  |
| --- |
| **Feasibility study of X-ray Velocimetry imaging in children with cystic fibrosis** |
| Matthew Bruorton1,2, Kristin Carson-Chahhoud1,3,4, Martin Donnelley1,5, Thomas Goddard1,2, Antonia O’Connor6,7, David Parsons1,2,5, Jessica Phillips2,5 and Andrew Tai1,2,5 |
| 1. *Adelaide Medical School, The University of Adelaide, Adelaide, SA, Australia* 2. *Respiratory and Sleep Medicine, Women’s and Children’s Hospital, North Adelaide, SA, Australia* 3. *Translational Medicine and Technology Group, Australian Centre for Precision Health, University of South Australia, Adelaide, Australia* 4. *South Australian Health and Medical Research Institute, Adelaide, Australia* 5. *Robinson Research Institute, The University of Adelaide, Adelaide, SA, Australia* 6. *Sleep Department, Sydney Children’s Hospital, Randwick, NSW, Australia* 7. *Faculty of Medicine and Health, University of New South Wales, Sydney, NSW, Australia* |
| **Introduction/Aim:**  X-ray Velocimetry (XV) is a novel form of X-ray imaging that can collect lung ventilation data through the breathing cycle. It has been assessed in early-phase clinical trials in adult human subjects, however there is a paucity of data in the paediatric cohort, including in cystic fibrosis (CF). The aim of this study is to demonstrate the appropriateness of XV in these cohorts and proceeding with further studies.  **Methods:**  This is a prospective, single-centre cohort study. It will recruit children aged 3 to 18 years with CF (n=20) and controls (n=20) to have paired XV imaging and pulmonary function testing (including spirometry, plethysmography and nitrogen multiple breath washout). The primary outcome will be the feasibility of recruiting and performing XV testing. Secondary outcomes will include comparisons between XV and current assessments of pulmonary function.  **Results:**  To date 9 CF patients have completed XV and PFT’s. 3 patients have XV data available. The age range is 6-18 years old. 5 patients are F508del homozygous and 3 F508del heterozygous. The mean FEV1 was 91.78% predicted (range 67-108%). 8 patients were able to complete nitrogen multiple breath washout (MBW). The mean lung clearance index (LCI) was 6.9 (range 5.87-9.36). XV indices showed mean inspiratory ventilation heterogeneity (VH) of 102.14% (range 75.19-143.85%) and mean inspiratory ventilation defect percentage (VDP) of 27.04% (range 21.96-34.48%). Data collection is ongoing.  **Conclusion:**  X-ray Velocimetry is a novel form of functional lung imaging, however is yet to have published data in a paediatric or cystic fibrosis cohort. Our preliminary results indicate that XV is feasible in children. In our cohort of children with cystic fibrosis who have normal spirometry and lung clearance index, XV may provide early evidence of ventilation heterogeneity.  **Grant Support:** This study is supported by a seed grant from 4DMedical |