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| **The feasibility of functional lung imaging using X-ray velocimetry as compared to age-appropriate standard pulmonary function tests** |
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| **Introduction/Aim:** X-ray Velocimetry (XV) is a new functional imaging method that provides an opportunity to assess lung ventilation and function non-invasively Spirometry is the standard pulmonary function test (PFT) for children ≥4 years, although it is commonly used in children >6 years. PFT’s require cooperation, concentration and supervision. In contrast, XV requires the child to remain still during the fluoroscopic test. We assessed the feasibility of using XV imaging to assess lung health compared to PFTs. **Methods:** Children with cystic fibrosis (CF) and Controls, aged 3-18 years, underwent an XV scan along with paired age-appropriate PFTs (spirometry, multiple breath nitrogen washout (MBNW), diffusing capacity, plethysmography). PFT’s were assessed as high quality if they were both repeatable and reproducible (grade A or B) or low quality (grade C or unsuccessful) based on the ATS/ERS guidelines. Data pooled from two studies utilising XV at the Women’s and Children’s Hospital were assessed for PFT quality stratified by previous PFT experience and age, examining preschool children (<5 years) and children to adolescents (≥5 years). Recruitment for both Controls and CF is ongoing. **Results:** To date, 24 children with CF and 4 Control subjects have been recruited.Children >5 years achieved high quality PFT’s (spirometry 84%, diffusing capacity 76%) independent of previous PFT experience. Those who completed high quality PFT’s were more likely to be older and have previous PFT experience. All children enrolled in the study had XV images collected successfully. **Conclusion:** While spirometry is the gold standard lung function measurement, younger children may benefit from functional lung imaging as it is fast and requires no coaching, concentration, or manoeuvres from the child. As younger children are becoming eligible for CFTR modulator therapies XV imaging may provide additional, clinically useful, lung health information than PFT’s alone. **Grant Support:** This work was supported by a grant from 4DMedical.

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| Group | CF <5y | CF ≥5y | Control ≥5y |
| N | 3 | 21 | 4 |
| Age (Years) - mean + SD | 4.3-4.8 | 5.1-18.3 | 6.7-17.8 |
| Genotype - F508 homozygous (%) | 33.3% | 42.9% | N/A |
| No previous spirometry (%) | 100% | 0% | 75% |
| XV Scan - Completed (%) | 100% | 100% | 100% |
| Lung function - Quality Score |
| Spirometry (n, %) | High qualityLow quality or unsuccessful | 03 (100%) | 18 (86%)3 (14%) | 3 (75%)1 (25%) |
| MBNW (n, %) | High qualityLow quality or unsuccessful | 1 (33%)2 (67%) | 11 (52%)10 (48%) | 4 (100%)0  |
| Diffusing Capacity(n, %) | High qualityLow quality or unsuccessful Lung volume <1.5L | 003 (100%) | 16 (76%)4 (19%)1 (5%) | 3 (75%)1 (25%)0 |
| Plethysmo-graphy(n, %) | High qualityLow quality or unsuccessful Too young to attempt | 003 (100%) | 10 (47%)5 (24%)6 (29%) | 4 (100%)00 |

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