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## Regional lung volume measures in small animal models from single projection X-ray images

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Regional Lung volume is a key parameter in assessing lung function and health. Computed Tomography (CT) is considered the gold standard for measuring lung volume; however, it requires a relatively high radiation dose and typically has associated lower spatial and temporal resolution than X-ray projection imaging. In this work, we investigate whether regional lung volumes can be determined using 2D X-ray projections. The idea is that as the lung inflates with air, the attenuating tissue is displaced leading to a localised increase in X-ray intensity. We imaged 13 New Zealand white rabbit kittens using high-resolution X-ray imaging and CT at the IMBL at various airway pressures. From the 2D projections, we converted changes in regional X-ray intensity through the lungs to changes in lung air volume using the Beer-Lambert law, under the assumption that the lungs of the animal were comprised of a single material (water). We measured the true air volumes from CT data for comparison. We found that relative changes in regional lung air volume derived from the 2D x-ray projections showed a coefficient of determination ( $R^2$ ) of 0.97 with CT data. This technique, therefore, provides a high speed, low dose method for measuring regional changes in lung volume that we are now using for studying lung aeration at birth in preclinical animal models.

### Level of Expertise

Student

### Presenter Gender

Man

### Pronouns

He/Him

### Which facility did you use for your research

Australian Synchrotron

### Students Only - Are you interested in AINSE student funding

Yes

### Do you wish to take part in the Student Poster Slam

No

### Condition of submission

Yes

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