Monitoring lung mechanics during tidal breathing

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**Background**

Respiratory disease is a major public health problem. Globally more than 1 billion people suffer from acute or chronic respiratory conditions. Spirometry is the current gold standard for assessing lung function in outpatient care. It analyses peak breathing effort.

Limitations:
- Needs full cooperation (elderly and young children often excluded)
- Labour intensive for clinician
- Repeatability

Research goal:
Develop a method to measure lung function during normal, quiet breathing

**Clinical application**

A specialised mask or mouthpiece will record airflow

Lung mechanics will be calculated from the airflow data. Results will stored to be analysed by a clinician

Patients with lung mechanics suggesting deteriorating lung health can be referred for further testing*

**Model**

A very simple lung model, the Single Compartment Lung model, separates the lung into 2 components: a resistive airway and an elastic lung

Changes in these lung mechanics reflect changes in lung health.

Abnormal elastance indicates restrictive disease
Abnormal resistance indicates obstructive disease

My research aims to measure lung mechanics during quiet breathing by applying this model to airflow measured using a mask or mouthpiece

**Early Results**

Lumped lung mechanics for healthy individuals able to be extracted from airflow data
Lung mechanics shown to be separable from lumped value to within 5% of real value in artificial lung

**Implications**

- This test is low effort, allowing uncooperative subjects to participate
- This test would not require intensive coaching.
- Measurements could be made at home, allowing clinicians to observe trends.
- Lung mechanics measurements indicate disease type (restrictive/obstructive).

**References**
