Asthma

Functional Respiratory Imaging can help to better diagnose and phenotype Asthma patients, as it provides visual and quantified information on:

- Underlying mechanisms of the disease
- Early detection of therapy effects
- Deposition patterns of inhaled compounds

Broncholab is the online gateway towards Functional Respiratory Imaging (FRI) for healthcare professionals in the clinical practice. The platform has a wealth of imaging information related to several pulmonary diseases.

- Go through several clinical cases that describe the added value of FRI, when used in addition to conventional lung function tests
- Request and visualize the results of an FRI analysis for your patients
FRI biomarkers for Asthma

The Functional Respiratory Imaging (FRI) technology is a novel image based diagnostic that combines High-Resolution CT scans (HRCT) and some flow simulations (Computational Fluid Dynamics - CFD). Thanks to this combination, a 3D visualization and quantification of the patient’s lung structure and the lung function can be provided. To obtain this data about a patient, only two low dose CT scans taken during inspiration (TLC) and expiration (FRC) are needed.

**Lung and Lobar Volume (iV\text{\text{l}\text{\_}\text{\_}\text{\_}}) and iV\text{\text{l}\text{\_}\text{\_}\text{\_}})**

FRI allows to quantify lung hyperinflation and the internal airflow distribution and redistribution at a regional level. Together with regional perfusion measures such as blood vessel density, a ventilation perfusion assessment can be performed.

**Internal Airflow Distribution**

**Airway Volume (iV\text{\_aw})**

Changes in airway volume provide useful information on asthmatic airway inflammation and overall disease progression or mode of action of drug interventions.

**Airway Resistance (iR\text{\_aw})**

The increased airway resistance in Asthma patients is determined using CFD.

**Air Trapping**

As a consequence of airway collapse, expiratory air trapping is quantified in the different lobes.

**Airway Wall Volume (iV\text{\_aw\_w})**

The thickening of the airway walls due to inflammation, can be visualized and quantified.

**Aerosol Deposition**

Using CFD, this parameter simulates the particle flow and particle behavior for these patients as a function of the patient specific inhalation profile, geometry of the airways and the drug particle size.

© 2017 FLUIDDA. All rights reserved. For investigational use only
Defining the disease state for an apparent well-controlled severe asthma patient, followed by the assessment of the effect of a new drug intervention

- 46 years old male
- Asthma state apparently well controlled under conventional therapy of ICS/LABA and LAMA
- Although there was a stable FEV1, the patient complained about recurring symptoms

An FRI analysis was conducted to detect the underlying mechanisms. Based on the disease state, the physician realized that the patient was uncontrolled which went undetected by the FEV1. FRI showed that some regions of the lungs probably were undertreated by the current therapy. Therefore, he proposed to change the therapy by ICS/LABA which had a different particle size. To follow up, an analysis was performed acutely after the administration and after 6 months of treatment. The patient showed a strong acute reversibility of its lung function which was confirmed by a large bronchodilation as seen by FRI. After 6 months of this new treatment an increase in pre-bronchodilator FEV1 was observed and FRI demonstrated that the airway dimension did increase more than 15% as compared to baseline.

Airway Volume at TLC ($iV_{aw}$)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>After acute treatment</th>
<th>After chronic treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total: 78.09 % Predicted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total: 93.71 % Predicted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After acute treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total: 83.15 % Predicted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After chronic treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Air Trapping

Baseline After acute treatment After chronic treatment

© 2017 FLUIDDA. All rights reserved. For investigational use only
To obtain more information about how FRI can assist you in the clinical decision making process in Asthma patients, please register at:

www.broncholab.com

FLUIDDA is the world leader in the field of Functional Respiratory Imaging research and development. With over 10 years of experience in clinical trials and drug development, FLUIDDA is now taking FRI towards the clinical practice. The benefits of FLUIDDA’s proprietary FRI technology have been validated in over 25 clinical trials involving more than 10,000 scans performed in collaboration with various academic and medical research centers.

Clinical centers that have used FRI:

Publications:


Visit www.fluidda.com for a complete list of publications.