Oscillometry, the missing piece
in asthma management

Asthma is a common, chronic respiratory disease affecting an estimated 300 million individuals worldwide.[1,2] It is characterized by variable respiratory symptoms and expiratory airflow limitation that is reversible either spontaneously or in response to therapy.[1] Despite the availability of effective therapies, diagnosis and ongoing management of the disease are still challenging.

Oscillometry (OS) is a technology that measures lung mechanics during tidal breathing and has been shown recently to be a useful adjunct method to detect and monitor asthma in addition to other airway diseases.[3]

Key measurements using OS:

Key Measurement	Description
R5	Resistance to airflow of the entire airway.
R5-19	Resistance heterogeneity of the airways. *Increased R5-19 signals potential small airway dysfunction.*
X5	Elastance of the respiratory system. *Decreased X5 implies increased tissue elastance.*
AX	Increased AX correlates with airspace de-recruitment, ventilation defects, and increased lung stiffness.

Asthma Diagnosis

Studies demonstrate that asthma is widely misdiagnosed, with an estimated underdiagnosis rate of 19-73%.[4] An accurate asthma diagnosis is important to avoid unnecessary treatment and delay in making an alternative diagnosis, as well as to prevent exacerbations and long-term airway remodeling in underdiagnosed patients.[1,4] Today, spirometry is the gold standard diagnostic test for asthma.[5]

Challenges associated with measuring lung function using spirometry[2]	
Complex maneuver	**Spirometry requires significant patient cooperation and maximal breathing efforts. Thus, making it very challenging for a subset of patients.[3,6]** • *15–45% of preschool children (2-6 years old) cannot successfully perform spirometry maneuvers[7]* • *20% of geriatric patients (65+) cannot perform spirometry according to international guidelines[8]* • *Even among patients who are relatively experienced with spirometry, almost 20% find the spirometry maneuvers difficult to perform[9]*
Poor measure of peripheral/small airway disease	**Small airway plays a major role in asthma.[5,10] However, spirometry mainly evaluates abnormalities in the large and medium sized airways.[11]** • *Obstruction of 75% of small airways is required before significant airflow limitation can be detected by routine pulmonary function test[12]* • *~30% of patients with asthma are not detected by spirometry despite symptomatic presentations[13]*

Find the missing piece for asthma diagnosis

Early diagnosis - OS provides unique insights on small airway function, making it a useful diagnostic tool for early asthma diagnosis.[16]

Diagnosis in challenging patients - OS requires minimal patient cooperation, making it ideal for measuring lung mechanics in challenging patients, such as young children, elderly subjects, or when spirometry related bronchospasm is a concern.[5]

Diagnosis in patients with small airway dysfunction (SAD) - SAD occurs in 50–60% of patients with asthma–particularly in those with more severe disease.[15] OS measurements can identify small airway obstruction, hence can serve as a valuable tool to assist in diagnosis.[11]

> *"Oscillometry may be especially helpful in diagnosing asthma in patients with preserved spirometry as a more sensitive indicator of abnormal airway physiology.[6]"*
>
> *-Kaminsky et al., 2021*

Asthma Treatment Selection and Monitoring

According to GINA guidelines, treatment for asthma should be based on the level of presenting symptoms and risk factors, including lung function. Periodical monitoring is recommended to assess disease control.[1] Measurements of small airway involvement can help with treatment selection and monitoring of disease control in patients with asthma.[5,14]

Find the missing piece for asthma treatment selection and monitoring

Treatment selection - Not all inhaled therapies effectively reach the small airways, possibly contributing to the lack of efficacy, particularly in patients with small airway disease.[10] OS could help identify asthma patients that would benefit from small-particle aerosols, which penetrate more deeply into the peripheral airways.[5,10]

Monitoring - OS is a useful tool to assess therapeutic response, predict asthma control and exacerbations.[5,14] OS measurements highly correlate with asthma control, including patient reported outcomes, such as ACQ scores and can detect peripheral airway impairment even in patients considered well-controlled.[10,17]

> *"...FEV_1 [forced expiratory volume in 1 second] alone is not as good a predictor of uncontrolled asthma and future exacerbations as OS. Adding OS to FEV_1 results in better identification of these poor asthma outcomes than either alone...[17]"*
>
> *– Galant et al., 2023*

Given the newly recognized importance of the small airways in asthma, OS could be key to complement spirometry as part of the routine diagnostic work up and management of patients with asthma.

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