

Interpreting respiratory oscillometry in adults with asthma or COPD: findings from an international Delphi study



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INTRODUCTION

Respiratory oscillometry measures the physiological effort and mechanics of moving air in and out of the lungs during normal breathing. It provides complementary information to spirometry. Uncertainty regarding the interpretation of oscillometry is a barrier to routine use.

AIM

The aim of this study was to aid the interpretation of oscillometry amongst adult patients with asthma or COPD by generating expert consensus statements.

METHODS

- Structured international Delphi study
- Initial brainstorming round followed by three Delphi rounds
- Consensus was sought for statements regarding the clinical use of oscillometry in adults to identify abnormal lung function, bronchodilator response (BDR) and minimal clinically important differences (MCID).
- Consensus predefined as $\geq 70\%$ agreement
- Participants
 - 60 respiratory specialists from 22 countries
 - Male 63.3%, Female 36.7%
 - 72.9% > 10 years as a respiratory specialist
 - 66.1% ≥ 5 years using respiratory oscillometry
 - Median 10 tests/week
 - 55 (91.6%) completed all 3 survey rounds

RESULTS

Clinical utility

Experts agreed that oscillometry is clinically useful for:

- Identifying abnormal lung function
- Grading severity of impairment
- Assessing bronchodilator response
- Assess clinically meaningful changes in lung function between visits

Table 1: Statements that achieved consensus. AX: area under the reactance curve; R₅: resistance at 5 Hz; X₅: reactance at 5 Hz.

% agreement	Recommendation
Defining abnormal lung function	
85%	Use Z-scores to identify an abnormal R ₅
85%	The cutoff for an abnormal R ₅ is a Z-score > 1.64
79%	Use Z-scores to identify an abnormal X ₅
92%	The cutoff for an abnormal X ₅ is a Z-score < -1.64
77%	Use Z-scores to identify an abnormal AX
79%	The cutoff for an abnormal AX is a Z-score > 1.64
78%	Use % predicted to identify an abnormal R ₅
70%	The cutoff for an abnormal R ₅ is a % predicted > 150%
81%	Use Z-scores to grade the severity of abnormal lung function:
Defining a bronchodilator response (BDR)	
72%	The cutoff for a significant BDR for R ₅ is a change in Z-score > 1.4
84%	Use % change in R ₅ to assess a significant bronchodilator response
79%	Use % change in X ₅ to assess a significant bronchodilator response
91%	Use % change in AX to assess a significant bronchodilator response
Defining a minimal clinically important change (MCID)	
71%	Use Z-scores for X ₅ to assess a MCID between visits
77%	Use % change in AX to assess an MCID between visits

Consensus guidance

High levels of expert consensus were achieved on the clinical interpretation of respiratory oscillometry in adults with asthma or COPD. Consensus-based guidance supports use of a limited set of key parameters to assess abnormal lung function, bronchodilator response and clinically relevant change (Figure 1).

CONCLUSIONS

- This international Delphi study provides consensus-based guidance for interpreting respiratory oscillometry in adults with asthma or COPD.
- These recommendations are intended to complement existing lung function assessments in everyday practice.

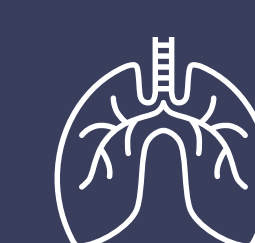
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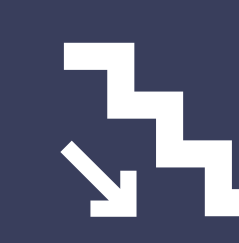
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Focusing on a few key parameters will allow clinicians to become familiar and confident in using respiratory oscillometry in everyday practice to:



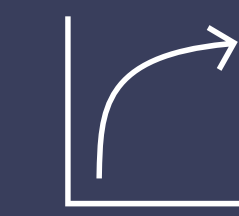
Assess abnormal lung function (small airways dysfunction)



Grade the severity of impairment



Monitor progression over time



Assess bronchodilator response

Use oscillometry to assess abnormal lung function and small airways dysfunction

Parameter	What is abnormal?	What does it mean?
R ₅	Z-score >1.64	Airway disease
X ₅	Z-score <-1.64	Possible small airways dysfunction
AX	Z-score >1.64	Possible small airways dysfunction

Use oscillometry to assess bronchodilator response

Parameter	What is BDR?*	What does it mean?
R ₅	% change > 40 %	Significant bronchodilator response
X ₅	% change > 50 %	Significant bronchodilator response
AX	% change > 80 %	Significant bronchodilator response

* % change vs baseline (pre-bronchodilator). The most commonly used BDR cutoffs were those published in the Technical Standards (1), but all were below the consensus threshold.

Figure 1: Clinical guidance for respiratory oscillometry. Bronchodilator response (BDR) was assessed based on percentage change versus baseline (prebronchodilator). The most commonly used BDR cut-offs were those published in the technical standards [17] but all were below the consensus threshold. AX: area under the reactance curve; R₅: resistance at 5 Hz; X₅: reactance at 5 Hz.