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| **Defining a bronchodilator response using intra-breath oscillometry in healthy preschoolers.** |
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| **Introduction/Aim:** Intra-breath oscillometry (IB-OSC) has shown potential to detect acute airway obstruction and those with recurrent wheezing in the preschool age range. However, normative data on bronchodilator response (BDR) is lacking. We aimed to define IB-OSC BDR in healthy preschool-aged children.**Methods:** Healthy 3-7-year-old children with no history of wheezing were recruited from the community. IB-OSC testing was conducted in triplicate before and 15 minutes after salbutamol (4x100mcg via spacer) and placebo at separate visits. IB-OSC variables included resistance at end-expiration (ReE) and at end-inspiration (ReI) and reactance at end-expiration (XeE) and at end-inspiration (XeI). The coefficient of variation (CV) and repeatability of data were calculated for each variable. Bland-Altman limits of agreement (BA-LoA) were used to define thresholds for an absolute BDR from placebo and bronchodilator testing. A relative BDR was taken from the 5th percentile and 95th percentile for resistance and reactance variables, respectively.**Results:** Sixty-one children (56% female) completed BDR testing. Thirty-four children (48.5% female) completed placebo response testing a median of 9 weeks later. The mean difference of the absolute change following bronchodilator and placebo differed for ReE, ReI, XeE, and XeI(all p<0.05). Bland-Altman plots for absolute BDR demonstrated heteroscedasticity for all IB-OSC variables. IB-OSC BDR thresholds for healthy children are summarised in Table 1.Table 1. Coefficient of variation (CV), relative BDR, and absolute BDR thresholds

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|  | ReE | ReI | XeE | XeI |
| PreBD CV (%) \* | 14.6 (11.9, 19.0) | 15.9 (12.9, 19.2) | 59.6 (43.9, 81.6) | 47.0 (36.6, 60.8) |
| Relative BDR † | -34.6% | -34.0% | n/a | n/a |
| Placebo testing threshold (hPa∙s∙L-1) ‡ | -1.25 | -0.89 | +0.92 | +0.63 |
| Bronchodilator testing threshold (hPa∙s∙L-1) ‡ | -3.88 | -3.41 | +1.20 | +1.31 |

*\* Median (quartile-1, quartile-3); † using the <5th percentile;‡ threshold based on BA-LoA; n/a, not applicable as preBD values were near zero; preBD, pre-bronchodilator measurement.***Conclusion:** Based on our data, reporting a relative BDR is more appropriate, with a positive BDR being -35% for either ReE or ReI. A relative BDR was not useful for XeE or XeI, as the pre-bronchodilator values were close to zero in healthy children. The clinical utility of IB-OSC BDR will be explored in future work.**Grant Support:** Thrasher Research Fund; Queensland Health Innovation, Investment and Research Office; The University of Queensland Faculty of Medicine.**Key Words:** bronchodilator response, children, intra-breath, oscillometry, preschool. |