

## Evaluation of a New Strategy to Predict Exercise-Induced Asthma

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**Rationale:** Physical effort plays a critical role in conditioning the life quality of subjects affected with asthma. The Asthma-related airway obstruction that occurred during exercise goes under the name of Exercise-induced Asthma (EIA). To find predictors for the development of EIA, we evaluated the functional parameters at rest and during the exercise of 20 subjects with a diagnosis of mild asthma. **Methods:** 20 subjects, aged  $27 \pm 5$  with mild asthma in stable conditions, who reported respiratory symptoms on exertion in the past, have been enrolled in a two-day protocol. On the first day of our study, we took measurements of functional respiratory parameters, and we assessed their airways responsiveness with a methacholine challenge after an adequate pharmacological washout. On the second day, we conducted a maximal, symptom-limited incremental cardiopulmonary exercise test (CPExT). To diagnose EIA, we monitored the FEV<sub>1</sub> change at 1, 3, 5, 7, 10, and 15 minutes, after the CPExT, with repeated maneuvers of maximal full forced expiration. **Results:** 19 of the 20 enrolled subjects completed the two-day protocol. We then split the subjects into two groups, according to the presence (12 subjects) or absence (7 subjects) of EIA after the CPExT. Despite 12 subjects showed EIA, no functional parameters both at rest and during the effort were useful to predict it. However, we documented that, unlike the asthmatics without EIA, in those with EIA, the mean Inspiratory Capacity (IC) did not increase with the raising of ventilatory requirements during CPExT. Interestingly 6 of the EIA subjects (50%) displayed dynamic pulmonary hyperinflation (DH) throughout the exercise, as documented by the progressive increase of end-expiratory lung volume. This subgroup of asthmatics with EIA, who in turn showed earlier and greater post-exercise FEV<sub>1</sub> fall, had significantly lower FEF<sub>25-75%</sub> (% pred.) at rest ( $p < 0.05$ ) and higher airways responsiveness, expressed as PD<sub>20</sub>FEV<sub>1</sub> ( $p < 0.05$ ). **Conclusions:** No routine functional respiratory parameters measured at rest or during effort can predict EIA in mild asthmatics, even after the maximal exercise test. Interestingly, in a subgroup of asthmatics with EIA, we documented the development of DH during exercise, and this was associated with reduced forced expiratory flow-rates at lower lung volumes and higher airway hyperresponsiveness, suggesting a prominent small airways impairment. This information will certainly be useful to explain why some asthmatics with EIA start developing typical symptoms like wheezing, chest tightness, dry cough, and dyspnea during effort and not only after stopping it.

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