# Exercise-induced whole-body dehydration does not affect airway responsiveness in athletes but may impair small airway function

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**Aim:**
Exercise-induced bronchoconstriction (EIB) is the transient narrowing of the airways that occurs during or shortly after strenuous exercise. Loss of water from the airway surface, due to the conditioning of large volumes of air during exercise, is the main physiological stimulus for EIB. We proposed that exercise-induced whole-body dehydration would interfere with hydration of the airways and, consequently, increase the risk and/or severity of EIB. We also investigated the effects of whole-body dehydration on resting lung function.

**Methods:**
Ten recreational athletes with respiratory symptoms on exertion completed a randomised, cross-over study that included three experimental conditions: dehydration [prolonged, low intensity exercise in the heat with fluid restriction causing a 2.3 ± 0.8% (SD) reduction in body mass], euhydration (prolonged, low intensity exercise in temperate air, with fluid intake), and control resting state. Visits were separated by 2 to14 days. Lung function was measured before and up to 1 h after each condition *via* spirometry and whole-body plethysmography. Airway responsiveness was assessed 2 h after each condition *via* a 6 min eucapnic voluntary hyperpnoea (EVH) challenge; the maximum % fall in $FEV_1$ was used as an index of airway narrowing. Repeated measures ANOVAs or Friedman tests (as appropriate) were carried out to establish within- and between-conditions differences in airway responsiveness and lung function.

**Results:**
During EVH, participants achieved a mean ventilation of 104 ± 29 $L \cdot min^{-1}$ over the three conditions (p=0.639 across conditions). The median and interquartile range (Q1 – Q3) for maximum reduction in $FEV_1$ post-EVH was 13% (7 – 15%), 11% (9 – 24%) and 12% (7 – 20%) in the dehydrated, euhydrated and control conditions, respectively, with no difference across conditions (p=0.196). Dehydration caused a significant reduction in FVC (300 ± 190 ml, p=0.001), as well as significant increases in RV (260 ± 180 ml, p=0.001) and FRC (260 ± 250 ml, p=0.011).

**Conclusion:**
Exercise-induced whole-body dehydration does not exacerbate airway responsiveness to dry air in symptomatic, recreational athletes, but may affect peripheral airway stability.

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