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Citation:

Jackson, A and Allen, H and Hull, J and Backhouse, SH and Hopker, J and Price, OJ and Dickinson, J (2019) Over or under-detection? A comparison of exercise and eucapnic voluntary hyperpnoea challenges in the evaluation of exercise-induced bronchoconstriction. In: European Academic of Allergy and Clinical Immunology, 01 June 2019 - 05 June 2019, Lisbon.

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Document Version:

Conference or Workshop Item (Accepted Version)

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This is the peer reviewed version of the following article: Jackson, A. et al. (2019) Over or under-detection? A comparison of exercise and eucapnic voluntary hyperpnoea in the evaluation of exercise-induced bronchoconstriction, *Allergy*, 74 (s106), which has been published in final form at <https://doi.org/10.1111/all.13961>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Use of Self-Archived Versions.

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OVER OR UNDER-DETECTION? A COMPARISON OF EXERCISE AND EUCAPNIC VOLUNTARY HYPERPNOEA  
CHALLENGES IN THE EVALUATION OF EXERCISE-INDUCED BRONCHOCONSTRICTION

Anna Jackson<sup>1,2\*</sup>, Hayden Allen<sup>3\*</sup>, James H. Hull<sup>4</sup>, Susan H. Backhouse<sup>3</sup>, James Hopker<sup>1</sup>, Oliver J. Price<sup>3†</sup>,  
John Dickinson<sup>1†</sup>

\*Co-first authors; †Senior author contribution.

<sup>1</sup>School of Sport and Exercise Sciences, University of Kent, United Kingdom (UK); <sup>2</sup>English Institute of Sport, London, UK; <sup>3</sup>Carnegie School of Sport, Leeds Beckett University, Leeds, UK; <sup>4</sup>Department of Respiratory Medicine, Royal Brompton Hospital, London, UK

**Background:** The most appropriate objective bronchoprovocation challenge in the evaluation of exercise-induced bronchoconstriction (EIB) remains debated. Standardising minute ventilation and environmental conditions during an exercise challenge test (EX) is challenging, whereas it has recently been proposed that eucapnic voluntary hyperpnoea (EVH) may be overly sensitive. The primary aim of this study was therefore to compare the airway response to EX in a dry environment (25% RH) and EVH. An evaluation of current and revised diagnostic thresholds was undertaken to determine the impact of any proposed modification to EIB screening outcome.

**Methods:** In randomised order, sixty-three recreational athletes (male:  $n = 47$ ) (training  $9 \pm 4$  hrs/week) attended the laboratory on two separate occasions to complete either an EX challenge (6-min high-intensity cycling exercise at  $>80\%$  max heart rate) in an environmental chamber ( $16^{\circ}\text{C}$ , 25% relative humidity), and a EVH challenge (6-min maximal ventilation of a dry compressed gas mixture: 21%  $\text{O}_2$ , 5%  $\text{CO}_2$ ,  $\text{N}_2$  balanced). Spirometry was performed at baseline and 3, 5, 7, 10 and 15 minutes post challenge test in accordance with international guidelines. A positive diagnosis was defined by  $\geq 10\%$  fall in  $\text{FEV}_1$  at two consecutive time-points for both EX and EVH and  $\geq 15\%$  fall in  $\text{FEV}_1$  at one time-point for EVH.

**Results:** The mean fall in lung function following EVH ( $-7.9 \pm 6.9\%$ ) was greater in comparison to EX ( $-1.9 \pm 7.1$ ;  $P < 0.01$ ). A moderate positive correlation was observed between tests ( $\rho = 0.46$ ,  $P < 0.01$ ), however the mean bias was 6.1% and the data exhibited wide limits of agreement (+5.3 to -17.5%). Thirteen (21%) participants had a  $\geq 10\%$  fall in  $\text{FEV}_1$  following EVH, of which five were positive to EX. Nine (14%) participants had a  $\geq 15\%$   $\text{FEV}_1$  fall following EVH, of which four were positive to EX.

**Conclusion:** Our findings indicate that EVH consistently induces a greater fall in  $\text{FEV}_1$  in comparison to EX. Applying a 10% fall in  $\text{FEV}_1$  cut-off for EVH results in greater diagnostic sensitivity, whereas a 15% fall in  $\text{FEV}_1$  cut-off improves diagnostic specificity. Future population-based research evaluating the normative response to indirect bronchoprovocation in athletes remains a priority.