

PROJECT REVIEW

“The Impact of gender and race on the ergogenic and pharmacokinetic effects of chronic high dose short acting 2-Agonist use”

G. Whyte, J. Dickinson, J. Burniston (Liverpool John Moore University, UK)

In 2002 The International Olympic Committee (IOC) established the requirement for athletes to present evidence of current asthma, exercise induced asthma (EIA), exercise-induced bronchoconstriction (EIB) or airway hyperresponsiveness (AHR) through the therapeutic use exemptions (TUE) process. The World Anti-Doping Agency (WADA) introduced the IOC policy on inhaled short acting 2-agonists in January, 2009. However, they have since abandoned the requirement of an objective airway challenge for inhaled salbutamol and salmeterol since January, 2010. The inclusion of inhaled 2-agonists is based upon health concerns rather than anti-doping concerns however; evidence is only available for the performance enhancing effect of inhaled short acting 2-agonists in endurance sports at low to moderate doses and based on athletes taking a one off dose of inhaled 2-agonists. The vast majority of this work has been undertaken in Caucasian, male athletes with limited knowledge of the ergogenic effect or pharmacokinetics in females or other races. The current research team currently has a WADA grant investigating one-off high doses of short-acting 2-agonists on performance in endurance running and football specific trials across race and gender. At present there are no investigations examining the chronic use of short or long acting inhaled 2-agonists on performance.

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Results and Conclusion

Between 2002 and 2010 The World Anti-Doping Authority (WADA) and The International Olympic Committee (IOC) established the requirement for athletes to present evidence of current asthma, exercise induced bronchoconstriction (EIB) or airway hyper responsiveness (AHR) through the Therapeutic Use Exemption (TUE) process. These regulations, guided by the IOC Medical Commission (IOC-MC), were based on health not doping (performance enhancing) concerns for athletes in light of a marked increase in the notification by athletes for the use of inhaled short acting β_2 -agonist from 3.7% at the Atlanta Olympic Games, 1996, to 5.7% at the Sydney Olympic Games. Our group along with others have demonstrated that the requirement of demonstrable evidence through the TUE process improves the quality of care for athletes and has improved the diagnostic sensitivity and specificity of asthma, EIB or AHR. Whilst there appears to be no ergogenic effect from acute, single-dose inhaled salbutamol, no study has investigated the impact of chronic inhalation of the WADA daily upper limit of 1600 μg (~16 inhalations of a standard salbutamol inhaler) in association with endurance and strength and power performance. Sixteen trained male athletes provided written consent and agreed to take part in the study (mean \pm SD: age 20.1 ± 1.6 years; height 179.9 ± 8.2 cm; weight 74.6 ± 9.1 kg). Participants entered into a 6-week, 4 times per week training study having been assigned to one of two groups in a double blind design. Group 1 (n=8) inhaled 4 x100 μg of placebo, via pocket chamber, 4 times per day for 6 weeks (PLA). Group 2 (n=8) inhaled 4 x100 μg of Salbutamol, via pocket chamber, 4 times per day for 6 weeks (SAL). Pre- and post-training endurance, power and strength and body composition was assessed. Results demonstrated an improvement in $\dot{V}O_{2\text{peak}}$; 3 km running time-trial performance; 1 RM bench press and leg press; and peak extension and flexion torque. Body composition remained unchanged across the study period. Of note, no difference in any endurance; strength and power; or body composition measure was noted between Salbutamol and Placebo groups pre-, during, or post-intervention. In conclusion, there was no improvement in endurance, or strength and power performance following the inhalation of 1600 μg of salbutamol per day for six weeks in non-asthmatic males. This would suggest that the current WADA recommendations, which allow athletes to inhale up to 1600 μg per day is sufficient to avoid an ergogenic impact on endurance and, strength and power performance. Future studies in long term use of inhaled salbutamol focusing on strength and power performance

with a greater training volume may be required. Data from this study will assist WADA in the implementation of regulations on the use of inhaled short acting β_2 -agonist and assist in the resolution of contested doping violations.