# Into Air: A Novel Strategy to Improve Clinical Outcomes and Support Weight Loss?

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## Editorial

Despite well-intentioned health policy and research the obesity crisis continues to plague modern society. While multiple factors have been implicated, the source of this problem remains hotly debated, and one which is likely to continue for the foreseeable future. According to the World Health Organization, the majority of annual deaths among the populous are attributable to non-communicable chronic diseases (e.g., type 2 diabetes, cancer) [1], known to be intimately linked to excess adiposity and poor cardiorespiratory [2]. It is generally felt that an overabundant caloric load coupled with physical activity is responsible. To this end, energy restriction and increased physical activity are recommended to support weight loss; however, long-term adherence is and met with limited success. As many have discovered, feelings of hunger and lethargy commonly arise during dieting which in some cases are exacerbated with concurrent exercise. Excluding surgical techniques, the ideal strategy to promote expeditious weight loss is through the collective of appetite suppression and increased energy expenditure. In the absence of disease, appetite suppression and increased energy expenditure are natural, adaptive responses to higher altitude (i.e., hypoxia). As of late, there is a growing interest in the therapeutic utility of exercise in hypoxic conditions for the purpose of improving a variety of clinical outcomes [3-5].

Travel to mountainous regions can be prohibitively expensive and may not be readily feasible for most. As such, high altitude can be simulated (i.e., normobaric hypoxia) by supplying a lower fraction of inspired oxygen ($FiO_2$) to a space. It is important to note that irrespective of altitude, our terrestrial atmosphere is ≈21% oxygen. For this reason, a $FiO_2$ of 15% at sea level is comparable to an altitude of ≈2,500 m. In hypoxic conditions, the resultant decrease in arterial oxygen saturation upregulates the cardiovascular system to maintain appropriate tissue perfusion and ensure oxygen delivery matches oxygen demands. Regarding therapeutic potential, the working premise is that exercise combined with intermittent normobaric hypoxia will stimulate a range of physiological adaptations, notably decreased ghrelin and increased energy expenditure, to aid weight loss. Since, hypoxia-inducible factor transactivates genes to enable adaptive responses to low oxygen conditions [6] the ensuing changes may translate to improved cardiovascular and metabolic health [7].

Of interest, Bailey and colleagues [8] investigated high-intensity interval exercise vs. moderate-intensity continuous exercise in normobaric hypoxia and normoxia (i.e., control) on markers of appetite. results indicated that acute exercise in hypoxia led to

8. Bailey DP, Smith LR, Chrismas BC, Taylor L, Stensel DJ, et al. (2015) Appetite and gut hormone responses to moderate-intensity continuous exercise versus high-intensity interval exercise, in normoxic and hypoxic conditions. Appetite 89: 237-245.
9. Gatterer H, Haacke S, Burtscher M, Faulhaber M, Melmer A, et al. (2015) Normobaric Intermittent Hypoxia over 8 Months Does Not Reduce Body Weight and Metabolic Risk Factors--a Randomized, Single Blind, Placebo-Controlled Study in Normobaric Hypoxia and Normobaric Sham Hypoxia. Obes Facts 8: 200-209.