Included are the full-length peer reviewed medical research papers. For your convenience, we have also included short summaries of each article with quotes taken directly from the corresponding research study.

SIMULATED ALTITUDE TRAINING IMPROVES ATHLETIC PERFORMANCE

The Effects of Intermittent Hypoxic Training on Aerobic Capacity and Endurance Performance in Cyclists

Milosz Czuba, Zbigniew Waskiewicz, Adam Zajac, Stanislaw Poprzecki, Jaroslaw Cholewa, Robert Roczniok

Summary: "In summary, the most important findings of this work include a significant increase in VO2max, VO2LT, WRmax and WRLT after three weeks of intermittent hypoxic training with 95% of lactate threshold intensity. Additionally, the intermittent hypoxic training caused significant increase in average power and average speed during the time trial… The results of this study and literature review, allow us to conclude that intermittent hypoxic training with high intensity and medium duration (30-40 minutes) is an effective training means for improving aerobic capacity and endurance performance."

Application of 'Live Low-Train High' for Enhancing Normoxic Exercise Performance in Team Sport Athletes

Blake McLean, Christopher Gore, Justin Kemp

Summary: "The majority of benefits following LLTH interventions appear to be related to high-intensity, anaerobic performance, which may be more beneficial in short-duration, high-intensity athletic events and intermittent team sports."

Significant Molecular and Systemic Adaptations after Repeated Sprint Training in Hypoxia

Raphael Faiss, Bertrand Leger, Jean-Marc Vesin, Pierre-Etienne Fournier, Yan Eggel, Olivier Deriaz, Gregoire Millet

Summary: "This study is the first to observe larger performance improvement after repeated sprint training in hypoxia than the same training in normoxia. Our main novel findings were that repeated sprint training in hypoxia leads to i) increased variations in blood perfusion possibly delaying fatigue during a RSA test and ii) specific molecular adaptations large enough for inducing further improvements in systemic RSA performance. Our results suggest an improved vascular conductance in repeated sprints to exhaustion where fast-twitch fibers are likely better utilized. In parallel to the increased blood perfusion and potentially better waste metabolites removal, modifications at the molecular level support a shift towards improved anaerobic glycolytic activity following RS training in hypoxia only."

Molecular Adaptations in Human Skeletal Muscle to Endurance Training Under Simulated Hypoxic Conditions

M Vogt, A Puntschart, J Geiser, C zuleger, R Billeter, H Hoppeler

Summary: "Changes of HIF-1 alpha and HIF-1 alpha 736 mRNA indicate that training under hypoxic conditions, independent of training intensity, elicits specific effects at the molecular level of human skeletal muscle compared with similar training under normoxic conditions… Overall, the most pronounced adaptations occur after high-intensity training under hypoxic conditions, whereas training at the same percentage of Wmax under normoxic conditions elicited the smallest changes. Our results reveal that high-intensity training in hypoxia elicits molecular and structural adaptations favoring oxygen transport and utilization in human skeletal muscle under oxygen-restricted conditions. Hence, we speculate that high-intensity training in hypoxia may enhance muscle and exercise performance at altitude.

Training High-Living Low: Changes of Aerobic Performance and Muscle Structure with Training at Simulated Altitude

J Geiser, M Vogt, R Billeter, C Zuleger, F Belforti, H Hoppeler

Summary: "In conclusion, untrained subjects living at low altitude and training in hypoxia increase VO2 max and peak power in the VO2max test in

hypoxia more than trained subjects in normoxia. We also found that hypoxia during training enhances training effects on the mitochondrial and capillary density and thus on oxidative mechanisms on the cellular level. Training intensity had no effect on VO2 max, but seemed to influence positively peak power, sustained power and muscle oxidative capacity."

ALTITUDE TRAINING AS AN EFFECTIVE TREATMENT FOR WEIGHT LOSS

High Altitude and Its Potential Application in Patients with Obesity

Ge Rili, Xiujuan Wang, Huihuang Yang, and Yineng Liu

Summary: "It is well known that exposure to high altitude can cause weight loss, which might be used as an alternative way to treat patients with obesity."

"For people going to high altitude from sea level, the percentage of body weight loss at high altitude is positively related with their BMI. The results also suggest that it might be beneficial to people's well-being to establish some fitness or exercise centers at high altitude to accommodate those people with obesity."

Influences of Normobaric Hypoxia Training on Physical Fitness and Metabolic Risk Markers in Overweight to Obese Subjects

Susanne Wiesner, Sven Haufe, Stefan Engeli, Harry Mutschler, Ute Haas, Friedrich Luft, and Jens Jordan

Summary: "We conclude that in obese subjects, training in hypoxia elicits a similar or even better response in terms of physical fitness, metabolic risk markers, and body composition at a lower workload. The fact that workload and, therefore, mechanic strain can be reduced in hypoxia could be particularly beneficial in obese patients with orthopedic comorbidities."