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## **TITLE: ACTN3 R577X Polymorphism Impacts Glucose Consumption at Simulated High Altitude**

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### **ABSTRACT (upto 300 words)**

**Introduction:** High altitude acclimatization is a process that involve several physiological adjustments, which may increase glucose metabolism because of acute hypoxic exposure. Native highlanders like Tibetans show an increased anaerobic glucose metabolism and a higher proportion of type I muscle fiber than lowlanders. Actin filaments are anchored to the Z line of the sarcomere by a protein called alpha-actinin that exist in two isoforms in the muscle (ACTN2 and ACTN3), however ACTN3 is present only in type II fibers, especially in type Iix. Homozygous individuals for a 577X polymorphism in the ACTN3 gene do not express ACTN3 and seem to be more type I muscle fiber than homozygous individuals 577R. The aim of this study was to compare the glucose consumption response of individuals with different ACTN3 genotypes at simulated 4,500 m altitude. **Materials & Methods:** Twenty-three volunteers spent four hours exposed to a simulated altitude of 4,500 m inside a normobaric hypoxia chamber. Lactate and glucose concentrations, SpO2 and heart rate were analyzed immediately before entering the chamber and at each hour during the exposure. **Results:** Glucose after four hours of exposure to hypoxia was different between groups, with RX ( $68.1 \pm 11.7$  mg/dl) and RR ( $71.7 \pm 14.4$  mg/dl) showing a decreased blood glucose compared to XX ( $88.7 \pm 14.1$  mg/dl), indicating an increased dependence on glucose metabolism in individuals with at least one R allele after exposure at 4,500 m simulated altitude. **Conclusions:** We concluded that individuals with at least one R allele of the ACTN3 R577X gene polymorphism consume more glucose than the ones with XX genotype.

### **BIOGRAPHY (up to 200 words)**

Ricardo Bottura has completed his MSc at the age of 38 years from UNIFESP, Brazil. He is the owner of Academy - Health, Science and Performance and works as a sports consultant for genetic reports in partnership with the company DGLab. He published his first paper in 2019 with 8 citations and an h-index of 1, according to Research Gate. In addition, he works as a university professor in his research area.

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