

# High Altitude Medicine & Biology

## *Cyclic Hypobaric Hypoxia Improves Markers of Glucose Metabolism in Middle-Aged Men*

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### ABSTRACT

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Cyclic hypobaric hypoxia improves markers of glucose metabolism in middle-aged men.

*High Alt Med Biol* 14:263–272, 2013.—Chronic hypoxia increases dependence on glucose in men and increases insulin sensitivity in men and women. Cyclic Variations in Altitude Conditioning (CVAC) is a novel technology that provides exposure to rapidly fluctuating cyclic hypobaric hypoxia (CHH).

**Purpose:** To test the hypothesis that markers of glucose metabolism would change with CVAC CHH, two groups of middle-aged men were exposed to 10 weeks (40 min/day, 3 day/week) of either CHH or sham (SH) sessions.

**Methods:** CHH subjects (age:  $48 \pm 6$ , weight:  $86 \pm 12$  kg, BMI:  $27.1 \pm 3$ ,  $n=11$ ) experienced cyclic pressures simulating altitudes ranging from sea level to 3048 m (week 1) and progressing to 6096 m (by week 5 through week 10). SH subjects (age:  $50 \pm 4$ , weight:  $89 \pm 15$  kg, BMI:  $27.5 \pm 3$ ,  $n=10$ ) were exposed to slowly-fluctuating pressures up to 607 m (all subjects blinded to elevation). Physical function and blood markers of glucose metabolism were measured at baseline, 3, 6, and 10 weeks.

**Results:** Two CHH subjects were dropped from analysis for failure to progress past 3048 m (CHH:  $n=9$ ). Weight and physical activity remained stable for both groups. There was a group-by-time interaction in fasting glucose (CHH:  $96 \pm 9$  to  $91 \pm 7$  mg/dL, SH:  $94 \pm 7$  to  $97 \pm 9$  mg/dL,  $p < 0.05$ ). Reduction in plasma glucose response to oral glucose tolerance test [area under the curve] was greater in CHH compared to SH after 10 weeks of exposure ( $p < 0.03$ ). Neither group experienced changes in fasting insulin, insulin response during the OGTT, or changes in a timed walk test.

**Conclusion:** Ten weeks of CVAC CHH exposure improves markers of glucose metabolism in middle-aged men at risk for metabolic syndrome.

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