

# Hyperbaric Oxygen Exposure Improves Blood Glucose Level and Muscle Oxidative Capacity in Rats with Type 2 Diabetes

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## Abstract

**Background:** The effects of exposure to hyperbaric oxygen on blood glucose level and muscle oxidative capacity in rats with type 2 diabetes were investigated.

**Methods:** Five-week-old male Goto-Kakizaki rats were divided into four groups: normobaric (NN; exposed to 21% oxygen at 760mm Hg for 8 weeks), hyperbaric to normobaric (HN; exposed to 36% oxygen at 950mm Hg for 4 weeks, followed by 21% oxygen at 760mm Hg for 4 weeks), normobaric to hyperbaric (NH; exposed to 21% oxygen at 760mm Hg for 4 weeks, followed by 36% oxygen at 950mm Hg for 4 weeks), and hyperbaric (HH; exposed to 36% oxygen at 950mm Hg for 8 weeks).

**Results:** Blood glucose levels were lower in the HN, NH, and HH groups than in the NN group. Up-regulated mRNA expression levels of peroxisome proliferator-activated receptor- $\gamma$ -co-activator-1 $\alpha$  were observed in the soleus muscles of the HN, NH, and HH groups and in the plantaris muscles of the HN and HH groups. The soleus muscles of the NN group contained only type I fibers, whereas those of the HN, NH, and HH groups contained type I, type IIA, and type IIC fibers. An increased percentage of type I fibers and a decreased percentage of type IIB fibers were observed in the plantaris muscles of the NH, HN, and HH groups.

**Conclusions:** Exposure to hyperbaric oxygen reduces high blood glucose levels and improves oxidative capacities in the skeletal muscles of rats with diabetes, and these effects are maintained under normobaric conditions even after exposure to hyperbaric oxygen.