

Original Article

# Potential role of milk fat in glucose-milk mixture-induced higher muscle glycogen recovery after exercise in mice

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## ABSTRACT

### **【Aim】**

We previously reported that the ingestion of a glucose-milk mixture stimulates glucose-dependent insulinotropic polypeptide (GIP) and insulin secretion and promotes muscle glycogen resynthesis after exercise in mice. To examine the hypothesis that milk fat plays key roles in glucose-milk mixture-induced higher insulin secretion and enhanced muscle glycogen recovery, we evaluated the effects of glucose ingestion combined with fat-free or fat-containing milk.

### **【Methods】**

In Experiment 1, non-exercised male C57BL/6J mice were orally administered either a glucose solution (CHO group), a glucose and fat-free milk solution (CHO+Non-Fat Milk group), or a glucose and milk containing 4.45% fat solution (CHO+Fat Milk group). Blood samples were collected from the tail vein, and the levels of plasma insulin and GIP were determined. In Experiment 2, mice performed an acute bout of exercise (30 min of running) and were then orally administered one of the three solutions used in Experiment 1. After a 60-min recovery period, the muscle glycogen concentration in the tibialis anterior muscle was measured.

### **【Results】**

The CHO+Fat Milk group had significantly higher plasma GIP and insulin levels, compared with the other groups. Furthermore, in Experiment 2, the muscle glycogen concentration after the recovery period was significantly higher in the CHO+Fat Milk group than in the CHO group, while no significant difference in muscle glycogen concentration was seen between the CHO+Non-Fat Milk and CHO groups.

### **【Conclusion】**

These results suggest that milk fat plays a key role in the enhanced post-exercise muscle glycogen recovery that is observed after the ingestion of a glucose-milk mixture in mice.

**Keywords:** milk fat, GIP, insulin, muscle glycogen, mouse