

Brief Report

# Effects of co-ingestion of glucose with high-protein, high-fat milk products after exercise on glucose-dependent insulintropic polypeptide and insulin secretions in collegiate students

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## ABSTRACT

### **【Aim】**

Because insulin promotes muscle glycogen and protein synthesis, post-exercise nutritional strategies designed to augment insulin secretion might be effective for athletes. We previously reported that co-ingestion of glucose and milk stimulates insulin secretion after exercise, possibly through enhancement of the secretion of glucose-dependent insulintropic polypeptide (GIP) by the protein and fat intake. In this study, we examined whether co-ingestion of glucose and high protein and fat-containing milk products can further increase the secretions of GIP and insulin.

### **【Methods】**

Eight collegiate students completed a 30-min cycle ergometer exercise on 3 separate occasions. Immediately after each exercise, they ingested either 1) a glucose solution, 2) glucose + high-fat milk, or 3) a high-protein, high-fat milk jelly containing glucose, water, whole-fat milk powder, fresh cream and gelatin. Blood samples were collected before and after intake of these supplements to determine the plasma GIP and insulin levels.

### **【Results】**

While the areas under the curve for plasma GIP were significantly higher after the ingestion of glucose + high-fat milk and glucose + high-protein, high-fat milk jelly as compared with that after ingestion of glucose solution, no significant differences in the plasma insulin levels were observed among the trials.

### **【Conclusion】**

These results suggest that co-ingestion of glucose and high protein and fat-containing milk products can induce further increase in the plasma GIP level, but not insulin, in healthy collegiate students.

**Keywords:** milk, insulin, GIP, human