Effects of hyperthyroidism on glucose, glutamine and ketone-body metabolism in the gut of the rat.

Ardawi MS, Khoja SM.

Department of Clinical Biochemistry, College of Medicine and Allied Sciences, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia.

Abstract

1. The metabolism of glucose, glutamine and ketone-bodies was studied in the small intestine of rats after 5 days of hyperthyroidism. 2. Portal-drained visceral bloodflow increased by 20.1% (P < 0.05) in hyperthyroid rats and was accompanied by a decrease in the arteriovenous concentration difference of glutamine (25.7%, P < 0.05), glutamate (22.0%, P < 0.05), alanine (20.9%, P < 0.05) and ammonia (20.6%, P < 0.05) and an increase in that of glucose (27.2%, P < 0.05), lactate (28.9%, P < 0.05) and ketone-bodies (163.2%, P < 0.001). 3. The gut of hyperthyroid rats showed increased rates of extraction of glucose, lactate and ketone-bodies. 4. Enterocytes isolated from hyperthyroid rats showed increased rates of utilization of glucose and ketone-bodies but that of glutamine were decreased. 5. The maximal activities of hexokinase, 6-phosphofructokinase, pyruvate kinase, citrate synthase and oxoglutarate dehydrogenase were increased (by 13.7-36.2%) in intestinal mucosal scrapings of hyperthyroid rats, whereas the activity of glutaminase was decreased (22.1-31.4%). 6. It is concluded that hyperthyroidism increases the rates of utilization of glucose and ketone-bodies but decreases that of glutamine (both in vivo and in vitro) by the epithelial cells of the small intestine.