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

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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