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Glutamine and ketone-body metabolism in the gut of streptozotocin-diabetic rats.

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Abstract

1. In short- and long-term diabetic rats there is a marked increase in size of both the small intestine and colon, which was accompanied by marked decreases (P less than 0.001) and increases (P less than 0.001) in the arterial concentrations of glutamine and ketone bodies respectively. 2. Portal-drained viscera blood flow increased by approx. 14-37% when expressed as ml/100 g body wt., but was approximately unchanged when expressed as ml/g of small intestine of diabetic rats. 3. Arteriovenous-difference measurements for ketone bodies across the gut were markedly increased in diabetic rats, and the gut extracted ketone bodies at approx. 7 and 60 nmol/min per g of small intestine in control and 42-day-diabetic rats respectively. 4. Glutamine was extracted by the gut of control rats at a rate of 49 nmol/min per g of small intestine, which was diminished by 45, 76 and 86% in 7-, 21- and 42-day-diabetic rats respectively. 5. Colonocytes isolated from 7- or 42-day-diabetic rats showed increased and decreased rates of ketone-body and glutamine metabolism respectively, whereas enterocytes of the same animals showed no apparent differences in the rates of acetoacetate utilization as compared with control animals. 6. Prolonged diabetes had no effects on the maximal activities of either glutaminase or ketone-body-utilizing enzymes of colonic tissue preparations. 7. It is concluded that, although the epithelial cells of the small intestine and the colon during streptozotocin-induced diabetes exhibit decreased rates of metabolism of glutamine, such decreases were partially compensated for by enhanced ketone-body utilization by the gut mucosa of diabetic rats.