Increase in DPP-IV in the intestine, liver and kidney of the rat treated with high fat diet and streptozotocin

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Abstract

High fat diet or insulin deficiency is commonly seen in Type II diabetes, while the mechanism remains unclear. To test our hypothesis that DPP-IV contributes to Type II diabetes, we examined the expression and activity of DPP-IV in rats ($n = 8$ to each group) treated for 12 weeks with 3 separate diets: a) normal control; b) a high fat diet; and c) a high fat diet plus streptozotocin, a chemical for induction of insulin-deficient diabetes. Compared to rats on the normal diet, the rats with a high fat diet significantly increased DPP-IV's expression and activity about 142–152\% in the intestine ($P < 0.05$) and 153–240\% in kidneys ($P < 0.05$), but there was no change in the liver. Administration of streptozotocin to the rats treated with the high fat diet
showed an insufficient insulin secretion and higher blood glucose in response to glucose/insulin tolerance test, and an increase in expression of DPP-IV and activity by 188–242% in the intestine ($P < 0.01$); 191–225% in liver ($P < 0.01$); and 211–321% in the kidneys ($P < 0.01$). Immunohistochemistry studies confirmed the above results, showing increased DPP-IV immunostaining localized primarily in intestinal epithelium, hepatocytes and renal tubular cells. This study, for the first time reports an increase in DPP-IV associated with a high fat diet, as well as in the combination of a high fat diet with an insulin deficiency. Since both high fat diet and insulin deficiency are closely linked with etiology of Type II diabetes, the evidence in this study suggests a role of DPP-IV in development of Type II diabetes.