Pancreatectomy Abolishes the Renal Hemodynamic Response to a Meat Meal in Man

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Dear Sir,

According to Brenner et al. [1], the hyperfiltration response which follows intravenous amino acid administration [2–4] of ingestion of a meat meal [5, 6] may be due to a circulating hormone or some other intermediate effector among which glucagon may be a good candidate.

We report on the absence of the hyperfiltration response to a meat meal in man after total pancreatectomy. This finding points to the role of a factor of pancreatic origin in the genesis of the renal hemodynamic response to protein load.

We studied a 45-year-old man, weighing 72 kg, who, because of severe acute pancreatitis, had undergone total pancreatectomy 4 years earlier. After surgery he had strictly adhered to an appropriate protocol of insulin administration and to a dietary regimen providing 40 g of protein and 2,000 cal/day. Protein intake was controlled before the study on 3 consecutive days by means of urea generation rates. At the time of the study, plasma creatinine was 0.99 mg/dl, creatinine clearance 84 ml/min $\times$ 1.73 m², blood urea 48 mg/dl, and fasting blood glucose 1.55 g/l. Microalbuminuria was absent.

The patient was studied before (3 clearance studies (C1–C3) and after a meat meal MM 5 clearance studies (C4–C8) at 30, 60, 90, 120 and 180 min). Each clearance lasted 30 min with the exception of C8 lasting 60 min. The meat meal provided 2 g of protein/kg body weight in the form of cooked red meat. All data measured in C1–C3

Table 1. Effects of a meat meal in a pancreatectomized man

Amino acids, μ M/l 3600 3819 4200 4500 4906 6421

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were averaged and the data considered as baseline values prior to 3 protein load. During the study, the patient received 1.5 U/h of regular insulin. We measured glomerular filtration rate (GFR) by inulin, renal plasma flow (RPF) by 125 I-aminohippurate, the delivery 4 of tubular fluid from the proximal straight tubules by lithium clearance (CL_{Li}), sodium and potassium clearance ($C_{Na} < .ii, C_{K}$), absolute and fractional Na and K excretion ($U_{Na} \cdot V, U_{K} \cdot V, C_{Na}/GFR \cdot 100, C_{K}/5 GFR \cdot 100$), hematocrit (Ht), plasma concentrations of C peptide, glucagon, renin, aldosterone, glucose, and total amino acids. We calculated the absolute rate of proximal reabsorption of isotonic 6 fluid ($GFR - CL_{Li}$) by CL_{Li} derived formulae, the proximal fraction reabsorption ($1 - CL_{Li}/GFR$), the fractional clearance of lithium (CL_{Li}/GFR), the absolute ($(CL_{Li} - C_{Na}) \cdot P_{Na}$) and fractional $(CL_{Li} - C_{Na})/CL_{Li}$ distal sodium reabsorption and the renal vascular resistance (RVR) according to the formula $MAP - (1 - Ht)/RPF$, where MAP is the 7 mean arterial blood pressure.

The results of this study are summarized in table 1 and show that: (1) GFR and RPF following a meat meal did not exceed baseline values; (2) inhibition of proximal isotonic reabsorption took place; (3) stimulation of distal sodium reabsorption occurred; (4) plasma amino acid 9 concentration increased over time, and (5) glucagone of gastric/pancreatic origin (7) was not affected by the meat meal.

The data also indicate that after pancreatectomy no hyperfiltration response follows a meat meal in subjects on low-protein alimentation, which points to the lack of a circulating hormone/effector of pancreatic origin [8]; the initial depression of GFR and RPF which followed the meat meal is supported by data obtained in adults and children with diabetes mellitus [9,10].

References