INSULIN SENSITIVITY AND RESPONSE TO A PROTEIN LOAD

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Acute protein ingestion stimulates insulin and glucagon secretion and is by accompanied a gradual fall in plasma glucose levels. In long term studies, ingestion of a high protein, low carbohydrate diet causes an adaptive response characterised by increased hepatic glucose production and decreased peripheral glucose utilisation, ie insulin resistance. The present study was designed to determine the relationship between acute responses to ingestion of protein and degree of insulin sensitivity in normal, non-diabetic individuals. We hypothesised that higher insulin sensitivity would be associated with greater falls in plasma glucose after the protein load.

Sixteen healthy Caucasian subjects (six females, 10 males, age 20-38 years, BMI 20-25) were given 75 g glucose and 75 g protein loads in random order on two separate occasions approximately one week apart. On a third occasion within the same month, their insulin sensitivity (M-value) was assessed by the euglycaemic insulin clamp.

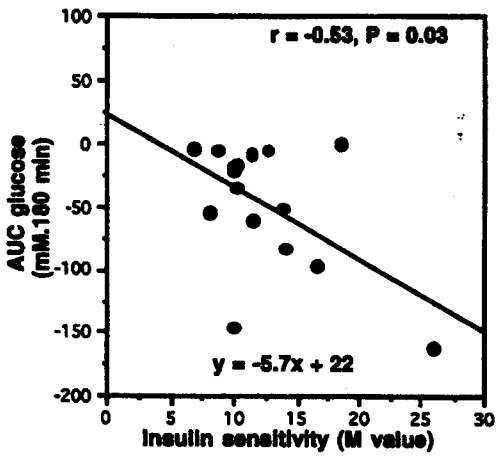

Figure. Insulin sensitivity (M-value) was inversely correlated with the plasma glucose area under the curver after a protein tolerance test (75 g protein as beef steak). Insulin sensitivity was determined by the euglycaemic hyperinsulinaemic clamp. The higher the M-value, the higher the insulin sensitivity.

Insulin sensitivity (M-value) was found to be inversely correlated with plasma glucose response to 75 g protein (AUC)(Figure). The r value (-0.53) was statistically significant (P=0.03). Thus, the more insulin sensitive subjects showed the greatest falls in plasma glucose after protein. The more resistant subjects showed lower falls and in some cases actual rises in plasma glucose after protein. This relationship was not confounded by differences in insulin and glucagon secretion. In contrast to the load protein, there was no correlation between insulin sensitivity and the glycaemic response to the glucose load ie no aspect of the glucose tolerance test predicted insulin sensitivity. Moreover, there was no relationship between insulin sensitivity and insulin responses or glucagon responses to either meal.

Our findings show that insulin sensitivity predicts the extent of decline in plasma glucose after a protein meal in normal individuals. They provide support for the 'carnivore connection' hypothesis ie that insulin resistance may have aided survival on a high-protein, low-carbohydrate diet because it maintained better glucose homeostasis (Brand Miller and Colagiuri 1994). The findings also suggest that a 'protein tolerance test' could be a non-invasive alternative method of measuring insulin sensitivity.

BRAND MILLER, J. and COLAGIURI, S. (1994). Diabetologia 37: 1280.

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