Insulin scores for single foods and their application to mixed meals

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A growing body of research suggests that the long-term consumption of a diet with a high glycaemic impact increases the risk of developing diabetes, heart disease and certain cancers. The insulin demand generated by high glycaemic index foods may contribute to the disease process, but postprandial insulin responses have received little systematic study. Since both fat and protein, as well as carbohydrate, influence insulin demand, comparisons of the insulinogenic effects of foods need to be based on equal-energy rather than equal-carbohydrate portions (as is the case of the glycaemic index). The aims of this study were to: 1) compare the insulin responses to 1000-kJ portions of common North American foods; and 2) determine whether these results could predict the insulin response produced by a mixed meal.

Twelve healthy subjects consumed 1000 kJ portions of nine foods in random order after an overnight fast: white bread (reference food), breakfast cereals (Special K, Raisin Bran, Grape Nuts), full-fat cow's milk, 100% apple juice, Coca Cola®, corn chips and pizza. Finger-prick blood samples were collected before eating, and 15, 30, 45, 60, 90 and 120 min after eating commenced. For each subject, an insulin score was calculated for each food by dividing the area under the 120-min plasma insulin response curve (AUC) by the AUC for white bread and multiplying by 100. The mean insulin scores for the single foods ranged from 33–151%.

In the second part of the study, 10 healthy fasting subjects consumed 2000 kJ portions of white bread (reference food: insulin score = 100%) and seven mixed meals in random order: All-Bran cereal with reduced-fat milk and 100% apple juice; poached egg with wholemeal bread; fillet steak and boiled potatoes; pasta and lentils in a tomato sauce; banana milkshake; ice cream and choc chip cookies; pizza and Coca Cola. The insulin scores for the foods in the mixed meals which were not tested in the first study had been measured previously (1). Insulin scores for the mixed meals ranged from 42% for the All-Bran meal to 88% for the steak meal. The predicted insulin scores for the mixed meals correlated significantly with the observed insulin scores (r = 0.74, n = 8, P<0.04). However, the predicted glycaemic scores for the meals did not correlate with the observed glycaemic scores (r = 0.58, n = 8, P<0.13).

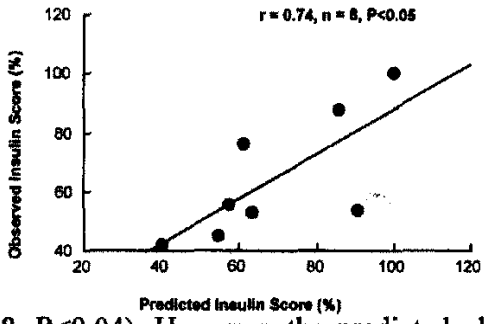

Figure 1: Correlation between the predicted and observed insulin scores for the mixed meals (mean scores, n = 8).

These findings suggest that a systematic comparison of insulin responses to foods and mixed meals may be useful in determining relationships between different types of diets and disease risk.

1. Holt S, Brand-Miller J, Petocz P. An insulin index of foods: the insulin demand generated by 1000-kJ portions of common foods. Am J Clin Nutr 1997;66:1264-76.