APPLICATION OF THE GLYCAEMIC INDEX DURING INTENSIVE INSULIN THERAPY: EVIDENCE-BASED THEORETICAL CONSIDERATIONS.

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Background: Anticipation of the hyperglycaemic effect of a meal is a precondition for optimal tayloring of the meal-related insulin dosage during intensive insulin therapy. Insulin requirement is linearly related to the amount of carbohydrates (CHO) ingested, in healthy (Waldhäusl 1979) and in type-1 diabetic subjects(Slama 1981): 1-2 units of insulin per 10 g of pure glucose is required for maintaining postprandial (pp) euglycaemia. The glycaemic index (GI) of CHO foods should provide additional information; however, GI data have been critisised to be inconsistent, and without practical value.
Aims: to select sound GI data, to assess their variability and overlap, as a basis for meal-related insulin dosage.
Methods: selection criteria were: type-2 diabetics, or type-1 diabetics on constant insulinaemia; fasting blood glucose < 180 mg/dl; no medication affecting gastrointestinal function (e.g. metformin, acarbose); single foods (≤ 50 g CHO) and reference substance being studied in every subject; indication of nutrition composition, and food preparation. Coefficients of variation (CV) and ranges (mean +/- 2 standard deviation) were calculated for a total of 44 studies on 21 CHO-foods, 31 with glucose, and 13 with white bread as reference; all GI data are reported on basis of glucose reference.
Results: CV of GI was greater 15% in only 3 studies. Two significantly different clusters emerged of GIs without overlap of ranges: a **high GI cluster** (mean GI 100-70: glucose, cornflakes, white bread,oat meal, black bread,ice-cream,with ranges from 130-70 to 91-49), versus a **low GI cluster** (mean GI 40-10: noodles, apples, pears,whole milk,chick-peas, fructose with ranges from 28-52 to 7-13). The intermediate goup of GIs (saccharose, honey, potato, rice, maize, rye-bread, vollkorn-brot, oranges, and grapes) had some overlap to the high and the low GI clusters.
Summary and conclusions: Two distictly different GI clusters, a high and a low GI cluster (with approx. 1/2 the GI of the high GI cluster), suggest that the meal-related insulin requirement may also differ significantly. As the insulin requirement for low GI group may be substantially less than that for the high GI group (Capani 1991), respective adaptations of premeal insulin dosages should be useful to optimise pp glycaemia in intensive insulin therapy.
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