

## Food Insulin Index: Implications for Type 2 Diabetes Mellitus

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The education of diabetic patients about their disease is an integral part of prevention, treatment and care (1). Realistic perceptions about nutrition are important for the control and prevention of complications (2). This letter questions the usefulness of the food insulin index (FII) concept for the management of type 2 diabetes mellitus (T2DM) with overweight. FII has been proposed to quantify postprandial insulin response to a food in comparison with an isoenergetic portion of a reference food such as white bread or glucose (3, 4).

Long-term hyperinsulinaemia is known to contribute to insulin resistance and weight gain. Although carbohydrates are a major stimulus for insulin secretion, it is not the only one. Protein-rich foods also elicit insulin response especially when combined with carbohydrates. Other nutritional and endocrine factors can stimulate insulin secretion: certain amino and fatty acids, glucagon and cholecystokinin, incretins incl. glucagon-like peptide 1 (GLP-1) (3, 5). The high FII and insulin load were associated with the overweight in young people estimated by skin fold thickness measurements (6). In a cross-sectional study of healthy subjects, FII was associated with higher triglycerides and inversely related to high-density lipoprotein cholesterol (HDL-C) levels in obese individuals (4). Several recent studies on this topic have been carried out in Iran, where the diet is comparatively rich in carbohydrates (3, 7-10). In particular, a diet with high FII was related to obesity in women and had a borderline association with insulin resistance (7, 8). Elderly men with high insulin load (estimated by multiplying FII by the energy content of corresponding foods) had elevated fasting blood sugar. There was no association between insulin load, HDL-C and body mass index (10).

In type 1 diabetes, FII-based algorithm improved postprandial hyperglycaemia in comparison with the traditional carbohydrate counting (11). The ranking of foods according to FII in lean, young healthy subjects may not be directly applicable to older patients with T2DM (3, 5). Studies have found no significant association of FII with low density lipoproteins, glycated haemoglobin, C-peptide, cardiovascular risks, obesity and metabolic syndrome (3, 4, 9). Apparently, FII values of various products do not provide clear guidance for dietary recommendations for patients with T2DM and overweight. For example, FII of boiled potatoes is relatively high (121 compared to 100 of white bread) (5) but the necessity of its restriction in T2DM is known. Some papers reported a relatively high FII of milk (90-98) (12), other researchers indicated lower values: ~60 (13) or 33 (5). According to a review, dairy products are favourable or at least neutral in T2DM and metabolic syndrome (14). According to different sources, the level of fasting glucose decreased or remained stable after consumption of dairy products (15). Finally it should be noted that the impact of diets with relatively low glycaemic index (GI) but high FII are partly analogous to that of incretin mimetic drugs such as GLP-1 receptor agonists and dipeptidyl peptidase-4 (DPP-4) inhibitors. The latter inhibit degradation of GLP-1, which increases insulin secretion contributing to the glycaemic control (16). In this regard, a diet with relatively low GI and high FII is not a priori unfavourable for T2DM patients. In the author's opinion, the FII concept does not significantly affect dietary recommendations for T2DM patients with overweight.

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