UNIVERSITA' CATTOLICA DEL SACRO CUORE
FACOLTA' DI AGRARIA - PIACENZA

ISTITUTO DI
SCIENZE DEGLI ALIMENTI E DELLA NUTRIZIONE

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In vitro evaluation of glycemic index in raw FiberPasta flour.

Introduction

Diabetes is one of the most important illness in Western Countries, but its importance is growing in Developing Countries also. Insulin resistance is a common feature of diabetes and obesity, a disease widespread all over the World and very often diabetes subjects are overweight or obese too.

Insulin secretion is the response to glucose appearance in the blood stream, high glycemic level determine high insulin secretion that can result in an increased food intake. Furthermore the exposure to persistent high levels of blood insulin can lead to the development of insulin resistance, that is a risk- factor for the onset of diabetes.

Glycemic index (GI) is a parameter describing the capacity of a food to increase blood glucose level and can be used for food characterization and for the formulation of diet designed to reduce glycemic response in diabetic, overweight of health-conscious people. The *in vivo* determination of GI is an expensive and time-consuming technique and is affected by a strong individual effect. The *in vitro* methods are less expensive and more standardized, therefore *in vitro* results can have a lower inter-experiment variability than *in vivo* ones.

Material and methods

Using an *in vitro* multi-enzymatic method the glycemic index of several types of raw cereal flours has been determined. The FiberPast flour has been compared with:

29100 PIACENZA - VIA EMILIA PARMENSE, 84 - TEL. (0523) 599258 - TELEFAX 599259

- refined soft wheat flour (*Triticum aestivum*);
- refined durum wheat flour (*Triticum durum*);
- whole durum wheat flour (*Triticum durum*);

while white bred was used as reference standard (pGI = 100).

Results and discussion

The patterns of released glucose in the tested samples are reported in figure 1 and table 1. Starch hydrolysis showed to be lower in FiberPasta than in other products and consequently the calculated *in vitro* glycemic index (pGI) and glycemic load (GL) of FiberPasta were very low (29.4 and 19.8 respectively).

The particular manufacturing process of FiberPasta determines a very high content of resistant starch (46.3 %, Table 1), that can explain the reduction in pGI and GL. The resistant starch is a fraction of total food starch, characterized by a low digestibility in the small intestine and a high fermentescibilty in the gross intestine. The fermentation of resistant starch by large bowel microbes yields short chain fatty acid, particularly butyrate, that promote colonic function.

There is a growing evidence that resistant starch can play and important role in the maintenance of a good gut health due to its preferential fermentation to butyric acid by colonic microflora. Butyrate is a fuel substrate for colonocyte and furthermore its production can lowering the pH of gross intestine, contributing to the prevention of colo-rectal cancer.

Conclusions

According to our data, the FiberPasta raw flour can be considered a low glycemic index product and the high resistant starch level could make FiberPasta-based product a health-promoting food.

The responsible for the experiment

Dott. Filippo Rossi

The Director of the Institute

Prof. Francesco Masoero

TABLE 1: predicted glycemic index (pGI), glycemic load (GL) and resistant starch (RS) content estimated through an *in vitro* multi-enzymatic digestion.

Item	pGI°	GL§	RS$
Raw samples			
FiberPasta flour	29,4	19,8	46,3
Commercial white wheat flour	51,0	43,9	27,4
Commercial durum wheat flour	62,8	48,9	27,2
Commecial whole wheat fluor (Fiber content > 9%)	38,2	29,4	47,4

° calculated by using white bread as reference (pGI = 100) corrected for estimated gastric emptying.
§ calculated on a 100 g portion size.
$ Resistant starch, starch not hydrolyzed, % of starch.

FIGURE 1: Time course of *in vitro* starch degradation.