

IN VITRO MEASUREMENT OF GLYCEMIC INDEX

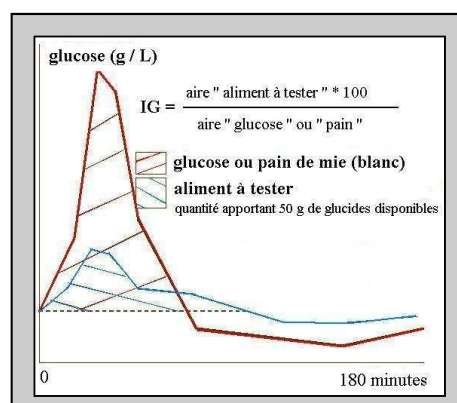
Carbohydrates occupy a major place in our nutrition since they are expected to represent 50 to 55% of the total energetic intake.

Apart to these quantitative recommendations, one must also look at a qualitative aspect. The most common distinction used in the last decades was to separate them into simple carbohydrates (or sugars) and complex ones according to their biochemical structure.

The glycemic index concept represents an evaluation of the physiological behavior of these carbohydrates based on their becoming in the body.

The glycemic index (GI) is the expression mode for the behaviour of a nutriment serving containing 50 grams of carbon hydrates compared to a reference nutriment (white bread or glucose) also containing 50 grams of carbon hydrates.

The GI allows to classify foods according to their ability to enhance the glucose concentration of blood.



The classic *in vivo* measurement of GI is done with the determination of the evolution of the serum glucose concentration after the ingestion of the studied food. Such a method is time-consuming and expensive, but an *in vitro* alternative method exists. It is based on the chromatographic assay of the glucose liberated after enzymatic digestion.

The *in vitro* measurement of GI is done after an enzymatic digestion step similar to the small intestine digestion (pepsin, pancreatin, amyloglucosidase and invertase). After the enzymatic reactions, the fast assimilated sugars are quantified with an ionic chromatographic assay. The result is compared to an experimental standard curve build by using some of the products contained in the Forster-Powell *et al* table (International table of glycemic index and glycemic load values. K. Foster-Powell, S. H.A. Holt and J. C. Brand-Miller, Am. J. Clin. Nutr. 2002 ; 76 : 5-56).

Products	Glycemic Index
Glucose	100
White bread	70
Spaghetti	44
French fries	75
Green lentils	30

This approach do not attempt to determine a precise GI value but aims at giving a qualitative evaluation.

The final goal has two aspects :

- the first one is to give an evaluation of the glycemic effect of a nutrient during its development and thus to predict its future GI classification : high GI (>70), medium GI (between 55 and 70) or low GI (<55).

- the second one is to allow a screening between new processes or products before to realize an *in vivo* measurement.

Exemples of *in vivo* GI measurements (Foster-Powell *et al.*, 2002)

The *in vitro* measurement of glycemic index gives the advantage to evaluate rapidly the consequences of a process or a new formulation on the GI of a product. Thus it allows to increase the number of tests during the development step and to limit the increase of the length and the cost of the analytical controls.