Driving demands complex psychomotor skills, good spatial awareness, rapid information processing, vigilance and satisfactory judgement. Driving can be impaired by fatigue, drowsiness, drugs and alcohol. All these well-known factors have been implicated in causing road traffic accidents.

The effect of a too low glucose level in blood on driving ability is less known by the public, but is documented in the scientific press. An abnormally low blood glucose level is called hypoglycaemia. Hypoglycaemia occurs often among diabetics, but also among healthy people. It can be controlled with adapted diet and lifestyles.

Glucose is the main energy source for the brain. Various hormones ensure that its blood level is maintained within tight limits. However, in some circumstances, blood glucose level could be forced outside these limits. This is particularly serious if it results in hypoglycaemia (low blood glucose). Among the symptoms of hypoglycaemia, are cognitive disturbances and mood changes. Functions that are most affected include rapid decision making, sustained attention, analysis of complex visual stimuli, speed of processing of visual information, contrast sensitivity (important in poor visibility), memory of recent learned information and hand-eye coordination. These cognitive dysfunctions generated by hypoglycaemia can be responsible for impaired driving skills. Moreover, hypoglycaemia induces mood changes, including increased irritability and anger, which may be relevant to driving performance.

Studies on driving simulators with diabetics showed that driving skills were impaired even during modest hypoglycaemia. The observed abnormalities included inappropriate braking in the open road, driving too fast and driving across the midline or off the road. Subjects were aware of their impaired driving, but did not take corrective actions (drinking a sugary drink or discontinuing driving)!

Consequently, prevention of hypoglycaemia is essential. The body has to receive glucose through carbohydrate (starchy and sugary) foods in sufficient amounts. Non diabetic people who do not eat enough foods or who omit meals can also experience hypoglycaemia. In case of hypoglycaemia, it is necessary to take an easily available carbohydrate source such as a sugar cube, some sugary confectionery or a sugared drink.

References:

Symptoms of hypoglycaemia
Hunger, drowsiness and sensation of fatigue, excessive perspiration, trembling, cardiac palpitations, giddiness, headache, cognitive dysfunctions.

Sugar improves driving performance

Significant reduction of driving errors over a distance of 120 km with sucrose. Healthy volunteers received either 30 g sucrose or a placebo 15 minutes before the start, after 40 km and 80 km on the course. Sugar influenced the driving performance especially by a combination of various factors: increase in glycaemia and insulin, slight augmentation of the heart rate and blood pressure.

Sufficient amounts. Non diabetic people who do not eat enough foods or who omit meals can also experience hypoglycaemia. In case of hypoglycaemia, it is necessary to take an easily available carbohydrate source such as a sugar cube, some sugary confectionery or a sugared drink.

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Numerous recent discoveries concerning the role of carbohydrates in our diet have altered scientists’ ideas on carbohydrates. The myths surrounding sugar are falling apart one by one. The FAO and WHO report on carbohydrates in the human diet published in 1998 constitutes a serious reassessment of many popular beliefs as to the influence of carbohydrates, including sugar, on health and nutrition. The report concludes that there is nothing to prove any direct link between sucrose, other sugars and starch in the aetiology of diseases related to lifestyle. In spite of these advances, however, it is a pity that some myths concerning sugar and health are still firmly embedded in the minds of health professionals who are responsible for educating the public on health and nutrition. This issue of Apropos Sugar addresses three common misconceptions namely that sugar consumption is too high, that sugar causes insulin resistance and that sugar containing confectionery and soft drinks are not compatible with a healthy balanced diet.

Carbohydrate consumption in France

A NATIONAL STUDY

The ASPCC survey (Association Sucre Produits sucrés Consommation Communication) is one of the most recent national survey conducted in France which allowed data to be collected on the individual food consumption of a representative sample of the French population (1161 people, of whom 271 children from 2 to 17 years of age and 890 adults between 18 and 85).

Based on the principle of weekly eating diaries, the analysis was focused in particular on total carbohydrates, with a distinction between complex carbohydrates (mainly starch) and simple carbohydrates (glucose, fructose, sucrose, lactose and maltose). The sources of the different carbohydrates in each food category and their distribution in daily intakes were also detailed.

In This Issue

- Carbohydrate consumption in France
- Insulin resistance
- Low blood glucose and driving performance
- Forthcoming events
CARBOHYDRATE INTAKE LOWER THAN RECOMMENDED

- The average intake of total carbohydrates is about 206 g/day, i.e. an average of 40.5 ± 7.8% of daily energy intakes. This value is lower than the 50 – 55% recommended by the FAO/WHO committee of experts and the recommended nutritional intakes for the French population.

It should be noted that:
- The proportion of energy intake as total carbohydrates is always higher among men than women, whatever their age.
- Maximum carbohydrate consumption is among 13 – 17 year-olds of both sexes.

- For the population as a whole, average consumption of simple carbohydrates is 69 ± 33 g/day, i.e. 13.8 ± 5.4% of energy intakes.

- Unlike the case with total carbohydrates, the proportion of simple carbohydrates in total energy intakes is always lower among men than women. Maximum consumption is in the 13 – 17 year-old group among boys and the 7 – 12 year-old group among girls.

- The simple carbohydrates/total carbohydrates ratio is 33.9 ± 10.9% on average and tends to fall with age.

- Consumption of sucrose and lactose also falls with age. It represents 12.9% of total energy intakes among 2 – 6 year-olds and 5.6% among adults.

- Sucrose consumption is 39.4 ± 24.5 g/day, i.e. 7.8% of total energy intakes.

DISTRIBUTION OF CARBOHYDRATE CONSUMPTION DURING THE COURSE OF THE DAY

- Among the under-18s, snacks account for about 15% of simple carbohydrates, almost equal to breakfast, lunch and dinner.

- Among adults, breakfast, lunch and dinner provide between 20% and 23% of simple carbohydrates, with snacks representing 5 – 7%.

CONCLUSION

This survey provides a useful indication of dietary intake in France. It is noteworthy that the consumption of sugar was found to be much lower than previously suspected and indeed is below the recommendation of WHO Europe.

M.-S. B.
Insulin Resistance

In muscles and fat tissues, insulin increases the uptake of glucose and its utilisation either for energy or storage in the form of glycogen (see figure 1). Insulin also acts on the liver, where it reduces the production of glucose from other sources.

INSULIN RESISTANCE: FROM OBESITY TO DIABETES

A common feature of obesity and non-insulin-dependent or type 2 diabetes, a pathology affecting millions of people on our planet, is the presence of insulin resistance. What does insulin resistance mean? It is when insulin becomes less effective as a hormone. This arises either because the number of insulin receptors is reduced or the relays between these receptors and the mechanisms allowing glucose to enter cells are impaired. Some of these defects can be inherited, whilst others can be caused by the metabolic environment (for example an increase of fat level in the blood). The defects can be permanent or reversible.

Possible defects responsible for a diminution of the action of insulin at the level of the muscle cells.

What does glycaemic index mean?

The glycaemic index measures changes in the blood glucose brought about by the ingestion of a carbohydrate. The increase in the blood glucose level is compared to that caused by a reference carbohydrate, pure glucose or white bread.

The length of the molecule does not come into it. The only factors that count are the rate of digestion and absorption and the types of monosaccharides of which the carbohydrates are composed. Cooking processes can modify glycaemic index of starchy foods. Glucose, taken as the reference carbohydrate, has a glycaemic index of 100, whilst fructose has a glycaemic index of 20.

Foods with a high glycaemic index include potatoes and bread, those with an average glycaemic index table sugar (because it is composed of glucose and fructose in equal quantities) and carbohydrates with a low glycaemic index include lentils, beans and pasta.

References:

How can the development of insulin resistance be explained?

A theory based on the concept of the "thrift phenotype" offers an attractive answer. A phenotype is an expression of genes determined by environmental factors. According to this theory, the history of the animal kingdom and the human race has led to the natural selection of genes favouring the survival of the species, i.e. the selection of genes allowing calories to be saved during periods of famine. Unfortunately, the same genes result in the expression of a deleterious phenotype (obesity, insulin resistance, diabetes) during periods when food is abundant.

What happens when obesity turns into diabetes?

At the stage of obesity without diabetes, insulin resistance caused by excess abdominal fat is offset by a higher production of insulin. This higher production of insulin allows the blood glucose level to be kept within normal limits. When the secretion of insulin can no longer compensate for the resistance to its action, the blood glucose level rises, leading to intolerance to glucose and to diabetes.

Apart from taking medicines, how can one improve insulin resistance?

As insulin resistance is linked to excess abdominal fat, loss of weight improves the action of insulin. Physical activity, even of low intensity, also plays a very important role in preventing and improving sensitivity to insulin and diabetes.