



Comité Européen  
des Fabricants de Sucre

# A Propos Sugar

Sucrose ■ Saccharose

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## Editorial

The Editorial Board of Apropos Sugar would like to offer you its best wishes for the New Year.

This first number of the year tackles the question of “**Diet and cancer**”, a subject in the news following publication of the results of the latest review by the **World Cancer Research Fund**, which has just brought the subject to the forefront. In this edition, an article entitled “Does sugar consumption influence the risk of cancer?” opens the debate and already provides us with something of an answer.

Apropos Sugar also proposes a focus on **reformulation**, addressing the three main questions that arise. These are: what is reformulation, how to change the nutrient composition of foods, and what are the nutritional implications for energy balance and for body weight in the long-term?

**Nutrient Profiles** is a topical question related to the intense analysis and reflection being carried out in Europe at present in connection with the development of a method for determining which foods should be restricted from making nutrition and health claims.

## ■ Does sugar consumption influence the risk of cancer?

It is just over thirty years since diet was first seriously put in the spotlight as a possible cause of cancer. Since the early 1980s, when confidence in the “chemical” theory of general cancer causation ceased to be widely accepted, nutritional scientists have been seeking evidence to confirm the hypothesis<sup>1</sup> put forward by Armstrong and Doll in 1975 that an appreciable proportion of cancers might be caused by some aspect of our diet. To date, the outcome has been disappointing, but work goes on. Research methodology is steadily improving. Less reliable approaches are being replaced with those more immune to bias, and larger numbers of people are being studied, at heroic cost, in the hope of identifying small effects.

None the less, results remain inconsistent and unconvincing. This may be because there are a number of intractable obstacles in the way of such research. Alternatively, it may be that the hypothesis, based as it was on the highly unreliable “ecological” approach, might simply have been wrong. Ecological epidemiology involves the examination of differences between large population groups, usually nations, in the hope of attributing differences, say in cancer incidence or mortality, to known differences between these population groups. The method is unreliable because it presupposes that all relevant differences between the groups being compared have been identified and included in the analysis. This may not be the case, as was found in studies of childhood leukaemia around nuclear power station sites<sup>2</sup>.

Several studies had found that children born to workers building nuclear power installations had a higher incidence of leukaemia than comparable groups of children elsewhere. This led to fevered speculation as to the mechanism causing the “harm” attributed to the mere proximity of a nuclear plant. Since most of the workers were men, mutations to sperm DNA were postulated, but never confirmed. Later, a more perceptive piece of research observed

that the same increase in risk was seen in the children of workers constructing large projects of a non-nuclear nature, such as the Channel Tunnel. Thus the likely explanation of the leukaemia risk is not radiation damage but old-fashioned infection, brought to a susceptible community by a cosmopolitan influx of strangers.

So what of sugar? Here, there are further difficulties in interpretation of the evidence, caused by the gratuitous confusion in many researchers’ minds between the dietary contribution of the commodity sugar and that of sucrose, and other simple sugars, from fruits and vegetables.

Any consideration of the possibility that particular dietary constituents might affect the risk of cancer also needs to take account of some fundamental unknowns. Importantly, we do not know at what stage of life we should be looking at people’s diets. It might be that diet in early childhood influences risk many decades later. Animal studies suggest this is a real possibility. If so, studies would need to be both of long duration and involve large numbers of subjects. They would also need to be sure that measurements of diet throughout the study were reliable. To date, our methods of assessing people’s diets are hardly adequate to the task, nor is the substantial research funding required generally available.

Against this background, it is difficult, if not impossible to draw conclusions from the research that has been published. Where associations between some dietary constituent and the risk of cancer have been reported the “effect size” has almost invariably been small<sup>2</sup>. This implies that, even if people could be persuaded, or coerced, into adopting the identified dietary change, the resulting reduction in cancer risk would be small. Furthermore, a small error in the mathematical correction of these associations, necessary to offset the large influences of other, non-dietary factors,

such as smoking, could easily invalidate the conclusions completely.

So what of sugar? Here, there are further difficulties in interpretation of the evidence, caused by the gratuitous confusion in many researchers’ minds between the dietary contribution of the commodity sugar and that of sucrose, and other simple sugars, from fruits and vegetables. Different research reports categorize sugars differently and make measurements that are therefore incomparable with other reports. The result is an Aegean stable of conflicting, and in many cases worthless studies, using flawed methodology to measure imprecisely defined variables unreliably. It is hardly surprising that all major reviews of this evidence have drawn the same conclusion, namely that no firm deductions are possible<sup>3</sup>.

Failing any direct evidence, some reviewers have sought to implicate sugar indirectly by attributing to it some special role in inducing obesity, since obesity is associated with the risk of cancer at several sites. Particular attention has been given to sugar in drinks. Serious examination of the limited evidence in these areas also fails to find convincing evidence, forcing some to make recommendations to the public prematurely on the basis that the evidence is, to the receptive mind, “suggestive”<sup>3</sup>. Cooler heads might wisely observe that our current methods do not allow us to measure what people eat with sufficient precision to identify any excessive contribution from individual dietary components to weight gain among those destined to become obese. Once again the only same conclusion is that we simply do not yet know which, if any, constituents of the diet really influence cancer risk, or how. It is to be hoped that the next thirty years will answer these questions, one way or another.

R. C.

1. Armstrong B and Doll R (1975) Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary patterns. *International Journal of Cancer* 15: 617-631.

2. Sir Richard Doll (1999) The Seascale cluster: a probable explanation. *British Journal of Cancer* 81:3-5.

3. World Cancer Research Fund/American Institute of Cancer Research (2007) Food, nutrition, physical activity and the prevention of cancer: a global perspective. AICR. Washington DC.

## ■ Reformulated foods and beverages – Challenges and barriers

Public health and nutrition policy in the EU consider the reformulation of foods and beverages as an important contribution to counteract the increasing prevalence of overweight and obesity and its related diseases<sup>1</sup>. Reformulation in this context means changing the food composition by e.g. reducing the levels of salt, saturated fat, trans fatty acids, sugars and of energy density.

### Changing the nutrient composition of foods: challenges and barriers to reformulation

The food and drink industry has a long tradition and great expertise in the formulation and reformulation of food and drink products and in the creation of innovative products. However, success or failure in the market depend on the decisions made by the consumers. The decisive question is, do the products fulfill the taste expectations of the consumers? Do they accept and are they willing to purchase products which differ in their sensory properties from the original product version due to a lower fat or a lower sugar or a lower salt or a lower energy content? The food industry has always reacted to the consumer demands and offers them a wide choice of traditional and alternative products. Whereas sugar can be reduced or replaced by intense sweeteners in beverages leading to lower calorie

or non-caloric alternatives, a reduction of the sugar content of solid foods does not automatically result in lower calorie-versions. Reducing the sugar content of a fat-based product can even lead to an increased caloric density of the reformulated product. Reducing the sugar content of a carbohydrate based food, e.g. of breakfast cereals, is not accompanied with a lower energy density as the sugars are replaced by carbohydrates of the same caloric value. Sugar has traditionally been used as preservative by reducing the availability of water and thereby the growth of bacteria associated with food spoilage and food poisoning. This function of sugar has to be replaced as well in the reformulation of foods by the use of additional food additives. As sugar also provides bulk, the replacement of sugar also needs a bulking agent, which provides the volume. Such sugar substitutes, for example polyols and polydextrose, can have unpleasant gastro-intestinal side-effects at high intakes.

### Nutritional implications of reformulated foods?

What are the nutritional implications of reformulated products for the nutrient intake, for the energy balance and for the body weight on the long-term? This question was addressed in a 10 week intervention trial in adults<sup>2</sup>. This trial is one of the very few prospective

studies published so far, that have assessed the effect of fat and sugar replacement on freely selected diets<sup>2</sup>. The effect of an extended use of reformulated foods – either modified in fat or in sugar content – on nutrient and energy intakes and body weight was

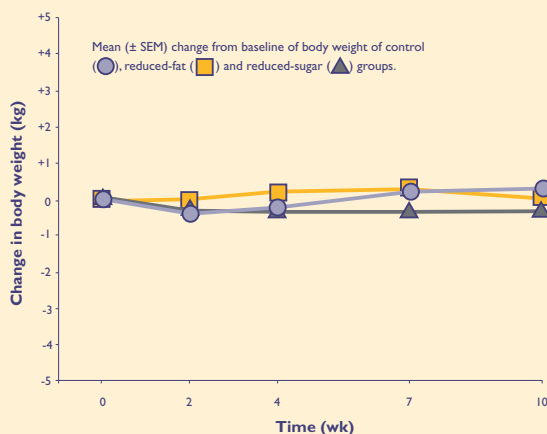
tested. The volunteers were instructed to use fat-reduced products instead of full-fat versions, or to consume reduced-sugar versions instead of full-sugar versions whereas the control group did not receive specific dietary instructions.

The study found that those individuals who were asked to use the commercial reduced fat foods over 10 weeks in their normal environment had reduced their fat intakes. But they had compensated the reduced fat intake by increased intakes of carbohydrates and proteins. The use of sugar reduced foods in this study lead to reductions in sucrose intake, but not in the intake of total sugars. The lower sugar intake was however compensated by higher fat and protein intakes. Therefore neither approach (reduced-fat vs reduced-sugar) led to changes in body weight (see Figure). These results of a long-term prospective study indicate that the use of fat- or sugar-substituted foods by consumers under normal eating conditions can influence the macronutrient composition of the diet, but has little net effect on total energy intake or body weight status. The study also provided some evidence that the replacement of sugars with intense sweeteners led to a higher proportion of dietary energy being derived from fat in those individuals which initially had a low fat intake and a high sugar intake.

In conclusion, this long-term study does not support the hypothesis that the consumption of reformulated foods per se contributes to lower energy intakes or plays a major role for weight loss. Consumers tend to compensate for most or all of the energy-reduction in reformulated foods<sup>3</sup>. These aspects of consumer behaviour have to be considered as another barrier in the context of food reformulation.

S. Z.

Figure 1 No effect of reformulated foods on body weight during the 10 week intervention<sup>2</sup>



1. EU White Paper „A strategy for Europe on nutrition, overweight and obesity related health issues“ (2007)

2. Gatenby S. et al.: Extended use of foods modified in fat and sugar content: nutritional implications in a free-living female population *Am J Clin Nutr*. 1997; 65: 1867-1873

3. Mela DJ.: Fat and sugar substitutes: implications for dietary intakes and energy balance. *Proceedings of the Nutrition Society* 1997; 56: 827-840

## Nutrient Profiles

### What are nutrient profiles?

The Nutrition and Health Claims Regulation entered into force on 1<sup>st</sup> July 2007. This new EU legislation aims at establishing a level playing field for the food industry while ensuring that consumers are not misled by undue messages that highlight some nutritional properties or imply a positive effect on health of a given food. Furthermore, considering that not all foods should be allowed to bear claims (which have proven to affect the consumer's buying decision), the European legislator introduced the concept of "nutrient profiles". As defined in the Claims Regulation, nutrient profiles are meant to avoid a situation where nutrition or health claims mask the overall nutritional status of a food product; in other words, they aim at distinguishing between foods that should or should not be allowed to bear claims, based on their nutritional composition. The Claims Regulation provides for nutrient profiles to be established by January 2009.

### From concept to practice...

Although apparently straightforward, nutrient profiles are difficult to put into practice. The overall nutritional quality of food products is not simple to assess as they are no "good" or "bad" foods. Should nutrient profiles be established across the board or for individual food categories? Which nutrients should be taken into account? How should nutrient profiles work (i.e. threshold vs. scoring system)? These are only a few examples of the numerous questions that need to be addressed before a workable system can be established. There is hardly any consensus on any of them. Thus, more than 20 different systems have already been developed by scientific agencies, food manufacturers or regulatory authorities.

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As far as the general approach is concerned, there seems to be some acknowledgement that nutrient profiles should be defined for specific food categories. This would avoid that some entire food categories are "banned" from making claims and would also better reflect the principle that any food can be part of a varied and balanced diet. Nevertheless, the limiting factor in this approach might be the definition of food categories, which encompasses subjective elements. With respect to the calculation method used to measure the nutritional quality, scoring systems are an evaluation of both the

The overall nutritional quality of food products is not simple to assess as they are no "good" or "bad" foods".

weaknesses and the benefits of a given food, to which an overall nutritional score is assigned. The profiling scheme created by the UK Food Standard Agency to restrict television advertising of certain foods to children is based on such a scoring system. The threshold approach consists in the definition of "targets" or "levels" for each nutrient being part of the profiling scheme, which results in classes of nutrient content (e.g. good/intermediate/bad). Whilst simpler, the threshold approach can actually be very restrictive if one considers that only foods meeting all criteria simultaneously (i.e. foods deemed as "good" for each nutrient considered in the profiling scheme) should be eligible for making claims. However, this seems to be the method favoured by food manufacturers (e.g. Unilever, Kraft).

### Keep it simple!

The choice of the nutrients to be considered as profiling criteria is even more controversial. Some would like profiles to cover "positive" nutrients (e.g. fibre), whereas others argue that only nutrients that are said to be "of public (health) concern" should be taken into account. Article 4 of the EU Claims Regulation suggests that fat, saturated fatty acids, trans-fatty acids, sugars and salt/sodium may be looked at, whilst also requesting the scientific opinion of the European Food Safety Authority (EFSA) on this issue. A Colloquium on nutrient profiles hosted by EFSA recently took place (11-12 October). It was notably suggested to start with a simple system consisting in two criteria: sodium and energy density, the latter covering the calorie contribution of total fat and total sugars. Although this option did not bring consensus, there was at least some agreement that any profiling system will have to be easy to use in practice for both food operators and control authorities.

C. P.

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Trichterborn J and Harzer G. An industry perspective on nutrition profiling in the European environment of public health and nutrition. *British Nutrition Foundation Nutrition Bulletin.* 2007; 32: 295-302.

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