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## The sugar debate and nutrition: obesity and ‘empty calories’

Anne-Thea McGill

There is little doubt that refined high energy food, such as added sugar, contributes to being overweight.<sup>1</sup> This is a problem for more than two-thirds of adult New Zealanders, but also over 20% of children.<sup>2</sup> United Nations (Food and Agriculture Organization) data for our country indicates that, on average, we consume about 147 grams per day (37 teaspoons) of added sugar.<sup>3</sup> However the low quality nutrition or lack of other micronutrients in these foods may be the greatest health risk—the ‘empty’ part of ‘empty calories’ does matter.<sup>4</sup>

We now have new science information on why we eat so much refined high energy food and what the metabolism is behind obesity and associated poor health. By briefly putting the issues together we may be able to see where sugar fits into obesity-related illness.

We, as a society, are still tough on our very overweight members. Embarrassment and distress is very common in those of us who know we can’t control our body weight and shape,<sup>5</sup> and that is most of us. The problem is that the over-appetising, refined high energy food is so irresistible, and sugar is a major player.<sup>6</sup> Why have we ‘not noticed’ how strong the drivers are that make so many of us become obviously overweight and/or unwell.

Those who put on large amounts of weight in peripheral (hip-thigh-buttock),<sup>7</sup> subcutaneous areas have problems with moving around/walking,<sup>8</sup> and psychological concerns about body shape.<sup>5</sup> For others, without the capacity for storage in these lower-body metabolically-safe areas,<sup>7</sup> ‘toxic’ lipids accumulate in organs, such as liver, and as upper body or central obesity.

The risks for type 2 diabetes, cardiovascular disease, and later-life cancers and neurodegenerative disease are serious, but even so, changing away from refined energy rich food patterns is not easy. Whist management of weight loss and/or metabolic improvement are different for both body types,<sup>8</sup> managing the desire for refined high energy food is not.

Sugar addiction has become hard to contest from the extensive literature.<sup>2,5,6</sup> Sugar—especially combined with starchy, fatty and salty food—activates addiction pathways in the brain. Drugs of addiction are similar to neurochemicals in the primordial reward system for acquiring high-energy food.<sup>6</sup>

What’s more, we all really know what these foods are; test question—what foods would you go down to the local food store for, late at night? Answer—sugary drinks, confection including ice cream/blocks and chocolate, salty fatty potato chips, biscuits/crackers with sweet or savoury toppings and other ‘junk food’. Not apples, not plain cooked meat, and not even sweet dried fruit.

Many of us know that sometime or other, for health and wellbeing, we will have to move to a diet without (or with highly controlled allocations of) addictive foods, and we'll need help.

Although there have been a great many studies in the last few decades on what foods cause fat gain, much research did not follow early leads, which in hindsight appear correct.

Sugar addiction and obesity has been mooted since mid-last century.<sup>9</sup> Lawrence wrote in 1941 "...animals build up reserves of fat from carbohydrate [sugars and starch] ... 'Diabetic obesity' is very common ... in the earliest stages and again after insulin treatment".<sup>10</sup>

The switch to believing that dietary fat caused heart disease seems to have come from the Seven Countries study. Although some data appeared in 1995,<sup>11</sup> and methodology shortcomings were critiqued shortly after,<sup>12</sup> the main study was published in 1970.<sup>13</sup> By the early 1980s 'saturated fat caused atherosclerosis'. Many heart health guidelines since then advise low saturated fat diets. Recently, it has been shown that when industrial 'transfats' (and non-free range animal fats) are excluded, saturated fats are not the major contributor to weight gain or metabolic problems,<sup>14</sup> but that sugars are.<sup>1,15</sup>

The upshot was that (refined) carbohydrates were pushed with great haste and vigour into our processed food supply—they were cheap, already deemed 'staple' foods and in mass production. They are highly palatable in combination (starchy food plus fat) or easy to hide in other items to ensure purchase (sugar added to drinks or sauces).

Food staples occur in agricultural societies, and are single or few items that are consumed most days. They are usually easily available, cheap, often storable, and are usually the major energy supply with variable other nutrients. Staples can be fruit (coconut, bananas), seed (pulses, grains), roots/tuber (turnip, potato), oil (olive), and sometimes animals or fish.

We did not evolve with staples, starch or otherwise. Westernised food is probably at least 72% different from most pre-agricultural forager or Palaeolithic diets.<sup>16</sup> Prehistoric foods were typically a mix of myriads of useful nutrients from omnivorous diets. Highly energy-dense food was relatively rare and/or seasonal.

At this point, controversial clinical nutrition points arise that relate to starch. We can ask ourselves the following. Are there issues with:

- (1) Highly bred grain/tuber starch foods becoming staples in our post-agricultural (10,000 years duration) diets.<sup>17</sup>
- (2) Starch, which breaks down into glucose, initially with the salivary enzyme, amylase, for use by mouth bacteria that can cause caries,<sup>18</sup> and rapid absorption from the duodenum into the blood.
- (3) The new bit of science that glucose in overload can flow through the polyol pathway, via fructose and rapidly form liver fat.<sup>15</sup>
- 4) There being so few studies investigating diets controlling for whole grain alone, and that one that has been done showed no benefit of added grain,<sup>19</sup> which is bred mainly for energy not micronutrients, and

##### 5) Addiction, with respect to grain/tuber and other concentrated starch?

There is evidence for the above scattered in a wide literature. Compared to lower-fibre grain-starch foods, higher-fibre grain is associated with fewer heart disease risks.<sup>20</sup> However, somewhere along the line, high fibre became equated with highly studied whole grain fibre.<sup>19,20</sup>

Insoluble (bran) and soluble grain fibres are, of course, carbohydrates, a term that the food industry uses to confuse. High fibre from fruit and vegetable diets also carries many micronutrients, but this effect, as opposed to cholesterol absorption and improved functional bowel health due to purified fibre, is less well differentiated.<sup>21</sup>

The processed food industry has carefully maintained an advertising commentary of 'high carbohydrate diets are good for you' and 'added sugars can be part of a balanced diet'. The sugar industry lobbies the public health bodies, and are currently pressing hard to prevent the World Health Organization (WHO) from changing their advice to 'added sugar should make up <5%, [not <10%], of dietary energy'.<sup>22,23,24</sup>

Meanwhile, the Internet blogs and media reports become a vehicle for 'mixing and matching' all information—research and opinion. Variations of high and low 'carb', fat, protein diets, and variable glycaemic, fat saturation, gluten free, 'Palaeo' and other themed diets, with other camps discussing food addiction are found; all are trying to make each theory work in our current nutrition environment.

There is a risk of relegating the most topical, interesting theories to this forum, which includes a very interested public, and declining to air them in well-known journals. This means that health and medical practitioners, on the ground, will be left trying to decipher which information is useful to help patients lose weight and improve health.

It appears that neither the researchers/clinicians nor food processing companies really want to discuss the idea that any food could be addictive. It is hard to come to the realisation that food, including our refined staples, can be addictive. We thought that dietary (saturated) fats contributed to problem in cardiovascular (CVD) disease, and had much evidence to believe that vegetarian-oriented diet was healthy. The inclusion in all healthy diets of grain/tuber staples (with or without its fibre) was therefore assumed. Often patients say they eat one-third less food after bariatric surgery, so if that one-third of omitted items was addictive refined high-energy food, then the main change to the food supply would be processed food.

All the evidence points to processed food companies understanding and exploiting addiction to all refined high energy foods. The umbrella term of 'carbohydrate', has become a foil for not having to mention sugar and refined starch. Tobacco and alcohol marketing ploys of obfuscation, setting up cues and habit formation are not uncommon.<sup>23-25</sup>

The success of traditional Mediterranean diet studies—epidemiological and prospective—on improving health<sup>26</sup> is unlikely to only be due to polyphenols in olive oil and wine.<sup>27</sup> Studies of basic whole food diets, what were once 'common or garden', and all their nutrients, has been seen as too difficult to pursue. However, there is strong evidence that that human metabolism is particularly geared to use high food micronutrient diets in a very efficient manner, both for cellular upkeep, repair<sup>28</sup> and healthy longevity.<sup>27</sup>

There is now the technology to study thousands of chemicals in the diet, so the ‘thus far omitted’ studies of controlled whole food diets, from any and all traditional ethnic backgrounds, could now proceed.<sup>29</sup>

As health professionals, perhaps we can all now begin put the real ‘common sense’ science together, with evidence from evolution, many epidemiological surveys, thousands of inconclusive studies that did not control for whole food micronutrients, plenty of negative data from supplement studies,<sup>30</sup> a few whole food diet studies<sup>26</sup> and the food processing industry.<sup>23</sup>

We then see non-commercial diets which include natural levels of sugars in fruit, some starch in coloured vegetables, fats and protein in low processed plant and animal food, are still likely to be the main way to manage our chronic diseases.

It is heartening to see local public health scientists presenting topical research<sup>31</sup> to the public recently, which has been picked up by various media.<sup>32</sup> The mood of the community is to demand that the processed food industries’ distribution and marketing of refined, addictive sugary sweetened beverages be decreased through regulation.

However, this may be a distraction to the real health disaster that is upon us. The most pressing problem is the absolute and relative lack of food micronutrients available to and consumed by those of us who are the developing young, the older and the unwell in the community. We must attend to the ‘empty’ in empty calories; the serious gaping hole.

Obesity is usually a micronutrient deficient state, and a marker of serious malnutrition and metabolic problems.<sup>23</sup> Neglect in ensuring that high quality food is available to all, feeds into the perpetration of poverty, and curtails the cognitive, physical and reproductive potential of upcoming generations.

We cannot wait whilst we negotiate our societies’ addiction to calories. Certainly whole foods, even raw nuts and dried fruit, are never going to make the easy profits that processed food companies are used to. Negotiating non-sugar additives in non-nutritious beverages with processed food marketeers is not the answer.

We can now easily test food for quality, and grade items for food micronutrient to macronutrient ratios and content, and add terms for non-nutritive additives/toxins. With such an important issue, is it not timely for processed food producers to be taxed on low quality food, with poor micronutrient content? Accordingly, perhaps only high quality food production should attract direct or indirect public-funded subsidies.<sup>24</sup>

It seems ironic with our hugely sophisticated, technological society that we still need to provide basic nutritious food to our vulnerable and poor; many of whom are children and mothers.

It seems to me that public health organisations and our community must ensure that, against every impediment and apparent cost, it returns to basics. We must feed all children and mothers; at home, at kōhanga reo, at preschool, at school, at work, on the Marae (Māori meeting house), at church, nutrient rich, palatable, healthy food irrespective of the energy content—now.

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