The right diet—‘sweet as’?

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When it comes to medical treatment of any condition we are well used to the adage ‘above all do no harm’ but perhaps we should make sure that we ‘really do good’. The complicated, expanding fields of obesity prevention and management are doing less well than those of tobacco management.

Giving an (artificial) agent that does no overt or immediate harm, but no good either, is not adequate. On further examination, there appear to be a range of concerns with agents generally assumed to help weight loss and obesity related disease. These include food additives designed to enhance qualities such as sweetness. These additives are variably tested for toxicity, efficacy yet extensively for industrial application. Also problematic are modified food extracts (nutraceuticals), alternative therapies, supplements (vitamin, mineral and other) and drugs. Some of these agents may not even be harmless or stop weight gain, and some have noticeable adverse effects.

The problem may be the widely held assumption that obesity is the result of a simple energy equation; ‘if energy in is greater than energy out then fat gain results’. The presumption is that energy in food, as conventionally measured by calimetry, is ‘burned’ uniformly and predictably by complex organisms such as humans, irrespective of overall nutrition.

It is also presumed that body fat per se is one of the major risks for Type 2 diabetes mellitus [TIIDM] cardiovascular disease [CVD] and cancers. But are we sure about the ‘energy in/energy out’ equation? Can Western food-type low-energy ‘diets’ or weight management programmes be confidently associated with sustained weight loss, reduced weight gain, and/or health improvement?

In the carbohydrate domain alone, low energy diets, especially those advised for TIIDM patients in the community, usually include sugar replacements (artificial sweeteners or non-nutritive sweeteners [NNS]). Arguably, they contribute to generally lower energy intakes results. These novel chemicals (and there are more in the production pipeline) are much cheaper to insert into food and beverages, and worth $US 147bn to the global NNS market.

There is pressure (and controversy) involved in formulation, extraction and marketing of ever greater volumes, and types of NNS. Aspartame (a methyl ester of a phenylalanine/aspartic acid dipeptide)—discussed in this issue of the *Journal* by Dr Magnuson—is one of 17 sweeteners permitted in New Zealand, and is widely reported as present in 6000 American food/beverage items.

Aspartame is often added in combination with other NNS, although the amounts in each item are not required to be revealed on packet labels or to the Federal Drug Agency (FDA). Along with many ‘convenience’ food additives this agent has a long history of controversial studies, (of which some concerned with cancer are covered in...
Aspartame should not be heated as it decomposes and loses its sweetness. Maillard reactions with asparagine (derived from aspartic acid) have been shown to produce carcinogens such as acrylamide. Even in stored powder/fluid beverage mixes, aspartame can degrade over time, form Maillard products and requires chemical and pH buffering. Although a few studies show ingestion of Maillard reaction products in food increased serum antioxidant activity, many are associated with oxidative stress and related degenerative disease including TIIDM, CVD and Alzheimer’s disease. In TIIDM patients, where in vivo high levels of advanced glycation (Maillard) end-products [AGEs] form due to hyperglycaemia, foods low in these products are advised.

Weight loss has been shown with aspartame use in controlled energy decreased diet studies, as reviewed in one paper, and critiqued as not including certain studies. Concerns about whether NNS are associated with weight gain date back at least to 1986, when an epidemiological study showed weight gain in users, and recently another prospective study showed similar results. Furthermore, diet sodas have been associated with incident metabolic syndrome and TIIDM.

In reviewing the mechanisms of action of NNS, research on artificial sweetening of foods in a series of studies in rats indicates that sensory experiences of NNS do not predict energy intake consequences and can alter the ability to control food intake. Unfortunately, body weight in various studies not only does not decrease or remain the same but the interference with energy intake prediction appears to result in body weight gain. This has been shown with a number of sweeteners (sucralose and AME-k), and can blunt or underestimate future energy prediction when sweetness is associated with energy take.

Furthermore, adverse gut flora changes are recorded. Well-known clinical nutrition researchers on taste and sugar effects in nutrition discuss the many studies of efficacy and possible mechanisms of NNS in a wide-ranging overview. They and others query whether the increase in sugar and sweet drinks consumption may be enhanced since the widespread use of NNS, especially when NNS are consumed without an energy controlled diet.

Thus much dietary advice for both fat loss and reducing CVD is about just reducing energy, although which is the most efficacious macronutrient (carbohydrate or fat) for weight loss remains unresolved. We do know that people who eat diets high in fruit, vegetable and fibre as advised by various CVD (NCEP Therapeutic Lifestyle Changes, Dietary Approaches to Stop Hypertension (DASH) and cancer societies, and low in man-made chemicals do better at decreasing degenerative disease and risk factors, and improving their health overall.

The fact that they also lose weight (or maintain lower weights) is put down to energy dilution, as fruit and vegetables have higher percentages of fibre and water. However, the most studied, healthy dietary pattern, the traditional Mediterranean diet, is proportionately high in energy from fat (approximately 38%, equivalent to a typical
Western diet\textsuperscript{42} but this is almost all oil from cold pressed olives. In addition, there are
large quantities of vegetables, fruit, variable levels of dairy and fish and, of course, nutrient-containing fibre.\textsuperscript{42-49}

The ‘energy in: energy out’ equation itself may have to be re-examined. We now have
better scientific evidence of the longest running experiment at our doorstep - that of
human diets through evolution and history.\textsuperscript{50} Since the advent of controlled clinical
trials none, to my knowledge, has tested the effect on weight and health of people
who are allowed to eat as much whole food as they want, although some are getting
closer to this type of eating pattern.\textsuperscript{51} (Whole food is minimally-processed animal
protein, nuts, fruits, vegetables, and a little raw honey—and they can be preserved:
cooked, frozen, tinned, dried, fermented and pickled.)

The catch is that highly bred and/or processed food stuffs that are intrinsically highly
energy dense, palatable (and often made chemically more so with NNS and other
additives), would need to be nearly totally excluded. Starch or sugar products, refined
and processed from grain, tuber and similar plant sources, often combined with
industrialised fats/oils, would be returned to ‘two or three festive occasions a year-
type’ foods.

Confectionary, biscuits and refined breads are not staple energy foods. A modest
intake of whole grain or thick skinned, old fashioned, potato starches may be required
for the young, slim and active. In simple terms, the re-introduction of any type of
micronutrient-dense whole food/traditional diets with greatly increased proportions of
many cofactors, vitamins and minerals would allow food energy, and body fat, to be
mobilised.

Such high volume diets are filling (satiating), generally self-limiting and difficult to
over-consume, and interestingly, not incompatible with the major parts of dietary
recommendations.\textsuperscript{52} Any ‘excess’ energy combined with plenty of plant (with fibre)
and free-range animal derived nutrients, would contribute to tissue repair, reducing
degenerative disease.\textsuperscript{53,54} To re-normalise this micronutrient dense pattern of eating,
with its complex tastes, flies in the face of processed food industries that market over-
palatable, damaged food.

Our first sweetener producers (bees) also pollinate approximately one-third of our
food plants, and are seriously threatened by industrial farming practices.\textsuperscript{54} However,
demand is already spurring on the budding, environmentally and technologically
smart, rather than factory, farming industry.\textsuperscript{54,56,57}

Importantly, even now (anecdotally) very overweight people and TIIDM patients
whose glycaemia is out of control, with some help (counselling, medication) in
controlling urges to eat processed energy-dense food, are making this realistic,
although difficult, choice. They know, once told about evolution, that they are really
following common prudent dietary advice and that they: lose weight, are more
healthy, are more inclined to be physically active, are not hungry and they can have
plenty of sweet (and dried) fruit.

There is now little need to consume artificial sweeteners, to ‘portion control’ or to
‘count calories’—in or out.
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