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DITCHING SUGAR/FRUCTOSE TO REVERSE OBESITY & SAVE \$BILLIONS IN HEALTHCARE

**Spectacular errors in the University of Sydney's high-profile exoneration of sugar
(When will over-confident academics correct the public record?)**

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2. INTRODUCTION AND SUMMARY

With obesity and related diseases surging out of control globally and associated health costs soaring, fingers increasingly are being pointed at the role of added sugar – specifically, at fructose, the “sweet poison” half of sugar. (The good half of table sugar is glucose, much less sweet, and a harmless and indispensable source of energy.)

Background: As you know, fructose is “fruit sugar” and nature made fructose relatively scarce - think chasing seasonal fruits and bees for honey. In modern times, however, humans have made it abundant and cheap via the commercial farming of sugar cane, sugar beet and corn (as well as of fruits and honey). Sugar now is big business and fructose almost is ubiquitous, mixed into myriad products across our food supply. A small but growing nucleus of scientists across the globe are concerned that many of us are eating unnaturally high doses of fructose, maybe 10 or more times those available from nature during the millennia over which the human body evolved. The worry is not that we ate too much fructose via ice-cream last night or in our breakfast cereal this morning but that we are eating high doses of fructose day after day, year after year, decade after decade, and that this long-term fructose “overload” is making many of us fat and some of us very sick. The argument is that (i) fructose has uniquely damaging properties; (ii) the human body does not have an “enough” sensor for fructose so it is able to sneak “unseen” past our natural appetite controls; and (iii) fructose is somewhat addictive and promotes food cravings. So hello obesity! In the process of “metabolising” (transforming into energy) all that fructose, our liver quickly converts it into fat for immediate storage, driving “fatty liver disease” and “insulin resistance” on the way to (Type II) diabetes, heart and kidney diseases, and even some cancers. This package of self-inflicted “diseases of affluence” is seen by some as largely a function of society’s ongoing multi-decade party with fructose. Of course, this bleak view is in stark contrast to the conventional wisdom of everyday food scientists and nutritionists, who generally view sugar - including the fructose half – as just another harmless carbohydrate. In general, they consider the new bleak view on fructose to be alarmist and largely “unsupported by evidence”. Yet many now concede that sugary soft-drinks might be bad for our kids. When will they concede that we might be dealing with something a touch more serious? **The evidence is compelling - check out:** <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-8062.2011.00298.x/abstract> ; <http://au.news.yahoo.com/sunday-night/features/article/-/13058226/fitzys-sugar-coating/> ; and <http://www.nytimes.com/2011/04/17/magazine/mag-17Sugar-t.html?pagewanted=all> .

Confession: I’m biased, because last May I stopped eating added fructose and over the next eight months lost 10kg – without extra exercise - from a peak weight of 97kg. For me, simply avoiding fructose - everything sweet – turned out to be an effective “silver bullet” for weight-loss and improved health. What was profound for me was that within a week or two, my long-lost self-discipline returned. In life after sugar, constant food cravings and the desire for larger meal portions collapsed like a busted blimp. Appetite control became - dare I say - a snack. And my body just started deflating gradually without much effort. Removing fructose worked for me, after I had become rather despondent about diet and weight issues in the decade after I stopped running regularly.

Those of us who have reversed of our own long-running trends towards obesity simply by removing added fructose – everything sweet - from our diets naturally find the arguments against excessive sugar/fructose rather convincing. And so we view as both obvious and long overdue the need for increased official efforts to highlight – indeed, to “Red Light”! - the fructose that now is mixed into an extraordinary large range of everyday foodstuffs.

Against this backdrop, the sight of several of Australia’s most high-profile nutrition scientists rushing enthusiastically – and somewhat erroneously (note the post-1980 uptrend in every chart) – to sugar’s defence in the media has struck some observers as rather unseemly, even appalling.

Professor Jennie Brand Miller (JBM) – best known for her work on the *Glycemic Index* and the so-called *Low GI Diet* (http://en.wikipedia.org/wiki/Jennie_Brand-Miller ; <http://www.glycemicindex.com/about.php>) - and her fellow low-GI devotees at the University of Sydney, including Dr Alan Barclay, have worked hard to exonerate sugar in the court of public opinion.

After the prestigious scientific journal *Nature* printed the view that “sugar is toxic beyond its calories”, JBM was quick to declare herself “disgusted”; after the Australian Government declared that we should “limit” our consumption of added sugar, and when David Gillespie was marketing the follow-up to his book *Sweet Poison: Why Sugar Makes Us Fat*, the low-GI crew was quickly into the media to argue that sugar is an innocent scapegoat, that sugar “doesn't actually do any direct harm to the human body”, and that “Australians have been eating less and less sugar” (<http://www.theaustralian.com.au/news/health-science/war-over-sweet-nothings/story-e6frg8y6-1226261140744> ; <http://www.theaustralian.com.au/news/health-science/a-spoonful-of-sugar-is-not-so-bad/story-e6frg8y6-1226090126776> ; <http://www.smh.com.au/lifestyle/diet-and-fitness/how-hard-can-it-be-to-cut-sugar-20100630-zmvt.html>).

The low-GI crew is not quite as ubiquitous as added sugar itself, but it certainly keeps itself busy marketing the view that “Sugar isn't the problem”, that sugar is not “the main game” for obesity control. The interesting question is why it feels the need to defend sugar so enthusiastically, while others long and distinguished in the nutrition space – like, say, Dr Rosemary Stanton – are far more cautious (<http://www.abc.net.au/pm/content/2011/s3117606.htm>). We'll have look at that in Section 2.

In any case, **my concern is that the crucial public debate on sugar, obesity and diabetes in Australia is at risk of being derailed by factually misleading statements from over-confident University of Sydney academics** who actually are much less expert on this topic than they realise. (Check the charts!)

As an economist, my initial interest was in what I regard as the **low-GI crew's unreasonable treatment of the available data on sugar consumption**. Its regular claim - “In Australia sugar consumption has dropped 23 per cent since 1980” - is **woefully misleading**, based as it is on a primary dataset that was abandoned as unreliable by the Australian Bureau of Statistics over a decade ago (ABS, 4306.0).

But the more I read, the more interesting things got. So this piece helps to shine a light on various fascinating – and some disturbing - aspects of the low-GI crew's involvement in the debate about sugar, obesity and diabetes in Australia. Key observations discussed in detail include:

- One of the low-GI crew's highest-profile journal articles is **so dominated by errors that its conclusion of an “Australian Paradox” is invalid on any objective assessment of the available data**. Notably, the low-GI crew sees a 25% surge in per capita **soft-drink consumption** as part of the evidence *supporting* its claim of a downtrend in sugar consumption over the past 30 years (see Figure 5A!).
- The low-GI crew has a **major unstated conflict of interest**: it *needs* sugar/fructose to be “just another carbohydrate”. After all, **fructose has a super-low GI of 19** (GIs of 55 and under are “low”) so if fructose in modern doses is indeed a driver of global obesity and diabetes, the low-GI industry has an existential problem. So there's a strong incentive for aggressive advertising: “Sugar is innocent”.
- The low-GI crew claims that **“There is an absolute consensus that sugar in food does not cause diabetes”** (in at least two-GI flagship books). Maybe scientists can say stuff like that but it strikes me as ridiculous. There's “an absolute consensus”, yet debate rages all around? The statement is false.
- The low-GI crew keeps claiming that evidence against fructose is limited to studies in which giant-sized doses hurt tiny mice and rats, so there is no need for alarm. **It is yet to acknowledge that Rhesus monkeys – whose genomes are a 93% match with those of humans - have become chunky and diabetic within 12 months** of starting to drink only *one* daily human-sized dose of regular Kool Aid.
- Sugar is not a problem yet the low-GI diet requires **manual handbrakes** to limit its consumption?
- Sugar, much more than high-GI plant foods, is a key factor in the **deterioration of Aboriginal health**.

Let's quickly visit the offending journal article, before looking in detail in Section 2 at the low-GI crew's various issues, including its limited understanding of the health effects of elevated fructose consumption.

Notably, Dr Barclay and Professor Brand-Miller last March lifted the status of their "It's not sugar" story, publishing an academic paper claiming an "**Australian Paradox**" in the relationship between sugar consumption (down) and obesity (up). They observed: "This analysis of [i] apparent consumption, [ii] national dietary surveys and [iii] food [soft-drink] industry data indicates a **consistent and substantial decline** in total refined or added sugar consumption by Australians **over the past 30 years**" (my numbering and emphasis; p. 9 of 14 of PDF at <http://www.mdpi.com/2072-6643/3/4/491/>).

My problem with that conclusion is that it is demonstrably false. For starters, the authors – bizarrely – seem unaware that the post-1980 trend for indicators (ii) and (iii) is **up not down** (see Figures 3, 4 and especially 5A). Moreover, they seem oblivious to the fact that the **primary source** of their preferred indicator – (i) "**apparent consumption**" (AC) - **was abandoned as unreliable a decade ago**, after the ABS decided that **measuring total sugar imports (M) was too hard**. Increasingly, the problem was that the sweet stuff arrived in Australia already mixed into many thousands of manufactured food products.

What to do? Well, the ABS discontinued the publication of 4306.0, so there is **no useful gauge** of apparent consumption after 1998-99, if not well before (when the ABS was struggling to count sugar – badly – as the rising tide of manufactured sugary imports washed in). So only the unknowing are downloading a local sugar consumption series from www.fao.org and taking seriously data spanning the past decade or two.

Finally, and disturbingly, Dr Barclay and Professor Brand Miller also **failed to mention the next best thing** to an up-to-date AC measure: timely official information on "**sugar availability**": SA equals production [P] less exports [X]. This SA series is the **dominant component** of any AC calculation: $AC = SA + M$ – "**leakages**" (and imports probably dominate leakages). Moreover, it was there for all to see: David Gillespie had been highlighting a chart that spans the past half a century, showing elevated availability in recent and earlier post-war decades, interrupted by a particular "soft patch" in the mid to late 1980s (see **third chart** or <http://sweetpoison.com.au/wordpress/wp-content/uploads/2010/11/percapita.jpg>).

So, **the authors batted none-for-three**: not one of their three nominated indicators shows a "substantial decline" in consumption over "the past 30 years". Moreover, inexplicably, they **failed to mention the conspicuous "plenty of sugar" result** revealed by the **dominant first leg** of the ABS's abandoned apparent consumption calculation (again, see **third chart**).

Yet facts do not cease to be facts just because they are overlooked or ignored: the available information – including (a) abundant "sugar availability" and rising sugary imports; (b) national dietary surveys and (c) industry data on soft-drink consumption – confirm that there has been plenty of sugar available to fuel Australia's trends towards obesity. (All this is documented in detail in Sections 4 and 5; Jack Nicholson once took a tougher line: <http://www.youtube.com/watch?v=5j2F4VcBmeo>)

All in all, we are left with a clear sense that there is no "Australian Paradox", just an idiosyncratic and unreasonable assessment – and avoidance - of the available sugar data by those who coined the phrase. Sorry, but the range of conspicuous facts demolishes the authors' long-preferred story (charts).

The extent to which critical oversights dominate the paper makes one wonder exactly what is going on at Sydney University and at the journal *Nutrients*. Several questions spring to mind:

- Just how easy is it to publish stuff in the field of nutrition – and in the journal *Nutrients* in particular?
- With 40 or so scientists on its Editorial Board, how come independent "peer review" was so lacking?
- And do eminent scientists take responsibility for correcting their high-profile errors?

One hopes that the authors, the University of Sydney and *Nutrients* together will **do the right thing and correct the public record immediately**. After all, disturbingly, the *Heart Foundation*, *Diabetes Australia*, *Nutrition Australia* and the *Dieticians Association of Australia* all seem to have taken false comfort from the low-GI crew's mistaken conclusion of an "Australian Paradox" (details on request).

2. WHY LOW-GI CREW'S "IT'S NOT SUGAR" STORY LACKS CREDIBILITY – PART A

(a) The low-GI crew has a major unstated conflict of interest

Incentives matter, so it must be noted that the low-GI crew at the University of Sydney has a strong incentive to sound certain that sugar/fructose is not a problem. Just as I'm *biased* because I've just lived the low-fructose path from obesity, it must be noted the low-GI crew *needs* sugar/fructose to be harmless.

"Sugar is not the problem" *must* be the "party line" because the low-GI industry revolves around diets that promote the idea that low-GI foods (GI 55 and under) are good for your health. **Fructose – the sweetest half of sugar - has a super-low GI of 19** – towards the very bottom of the GI scale - so it *must* be fine.

Awkwardly, if fructose turns out not to be "just another carbohydrate" but as harmful as Gillespie and a growing nucleus within the global scientific community believe - that in modern doses it is in fact a slow-acting poison – the low-GI crew will have been completely wrong on the thing that matters most. Someone unkind might then say that the low-GI crew had spent decades seeking to identify "good carbs" and "bad carbs", yet somehow had managed *not* to identify the *one* bad carbohydrate that really matters - fructose.

Naturally, the low-GI industry is a knee-jerk defender of the "low GI is good" and "sugar is just another carbohydrate" views it settled on decades ago. Unsurprisingly, the father of the GI approach to carbohydrates – Professor David Jenkins in Canada – also was quick to complain about the recent "sugar is toxic" piece in *Nature* (<http://www.nature.com/nature/journal/v482/n7386/full/482470e.html>).

So, yes, the low-GI crew is very keen to dismiss David Gillespie's thesis that "fructose is sweet poison", a killer of global proportions. To the low-GI crew, Gillespie is an amateur out of his depth, a formerly fat former lawyer who has written several books that are lightweight on (proper) science. Yet he has a point.

(b) The low-GI crew is yet to acknowledge profound evidence on obesity and diabetes

Let's start with a spectacularly false claim in the low-GI crew's flag-ship *Low GI Diet Handbook* (2011): **"There is an absolute consensus that sugar in food does not cause diabetes"** (p. 73). Exactly the same claim is made in *the diabetes and pre-diabetes handbook* (sic, 2010, p.43). Could either author even say that sentence out loud with a straight face? There's "an absolute consensus", yet debate rages all around?

The low-GI crew wants to dominate the debate, yet it seems to be struggling to keep up. It is yet to acknowledge that serious scientists are producing serious evidence that fructose is indeed a key factor driving obesity and diabetes, the whole metabolic-syndrome "nine yards". Even for an economist, the evidence is not exactly wrapped in mystery: "recent data suggest that fructose consumption in human[sic] results in increased visceral adiposity, lipid dysregulation, and decreased insulin sensitivity, all of which have been associated with **increased risk for cardiovascular disease and type 2 diabetes**. A proposed model for the differential effects of fructose and glucose is presented..." (My emphasis; <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2009.05266.x/abstract>).

Moreover, in *the diabetes and pre-diabetes handbook* the low-GI crew assures readers that "alarmist reports about fructose" involve only **"rats and mice fed excessive quantities"** of fructose: "There is no evidence that fructose has adverse effects in people with diabetes consuming normal quantities, e.g. less

than 100 grams per day” (p.180). Again, things have moved on. The animals shown to suffer from human-sized fructose intakes now are a bit closer to home than teeny-weensy mice and rats.

As highlighted by David Gillespie, **US scientists have produced diabetes in Rhesus monkeys within 6-12 months** simply by letting them drink **75grams of fructose** at their leisure each day via a 15% mix of standard **Kool Aid** in 500ml of water (<http://www.kraftbrands.com/koolaid/> ; <http://onlinelibrary.wiley.com/doi/10.1111/j.1752-8062.2011.00298.x/abstract>).

Actually, I shelled out my US\$35 to confirm that that the Rhesus monkeys did indeed become chunky and (some) diabetic. Yep confirmed: “...within a 6- to 12-month period of time, consumption of a high-fructose diet in monkeys produces many of the features of metabolic syndrome in humans, including central obesity, insulin resistance, inflammation, and dyslipidemia. In a subset of animals, the high-fructose diet also results in overt T2DM [diabetes]. Thus, this rhesus monkey model of diet-induced obesity, insulin resistance, and dyslipidemia is directly translatable to metabolic syndrome in humans” (pp.247).

You do not need to be a scientist of great skill to sense that that’s a profound result. Even a slow-moving economist can understand: after all, monkeys locked in cages - with genomes that are a 93% match with human genomes - find it pretty hard to cheat on their diets (“enforced compliance!”), and don't lie about what they ate in the previous 24 hours! (http://en.wikipedia.org/wiki/Rhesus_macaque#In_science)

My guess is that within a decade or two fructose will be linked to obesity and diabetes in the same way that today the sun is linked to sun cancer, and tobacco is linked to lung cancer.

(c) The low-GI crew doesn’t actually know whether or not fructose causes obesity and diabetes

Unfortunately, whatever her strongly held opinions, and with great respect, it must be said that Professor Jennie Brand Miller (JBM) and her Sydney University colleagues are not really specialists on the issue of whether or not excessive fructose is driving obesity and the diseases that emerge alongside obesity.

Or at least it’s hard to find evidence that JBM or her fellow low-GI devotees have undertaken any systematic investigation into the particular health effects of adding or removing unnaturally large doses of fructose to/from the diets of humans or animals. Indeed, the *Low GI Diet Handbook* doesn’t even bother to describe “Fructose” in its 15-page Glossary, while the word “fructose” has not featured regularly in JBM’s mountain of publications over the years. Understandably, her list is dominated by efforts to measure GI and establish that GI is relevant to health outcomes, especially in the management of existing diabetes (<http://sydney.edu.au/medicine/people/academics/publications/jennieb.php>).

The low-GI crew naturally has not put much effort into investigating the health effects of added fructose, and that’s fine. After all, it was decades ago that JBM decided that low-GI-versus-high-GI matters multiples more than anything as simple as fructose overload. So while JBM is a go-to world expert on accurately measuring GIs for thousands of food items, and has been very active in investigating and promoting the view that GI is important for health outcomes, she’s not an expert on specific health effects that flow from increased or reduced fructose consumption by humans or animals. She simply hasn’t “done the science”.

The bottom line is that JBM is welcome to her high-profile opinion that sugar/fructose is not a problem, but we should not take it as gospel because on this topic she has both a vested interest and limited specialist knowledge. Ditto her low-GI-devotee colleagues at the University of Sydney. (By contrast, those monkeys featured in the previous section know a thing or two about the damaging effects of fructose.)

(d) Sugar's not a problem but "Low GI Diet" says please don't eat it!

Given the low-GI crew's enthusiastic defence of sugar, it is rather striking that the *Low-GI Diet Handbook (LGIDH)* is chock full of **non-GI-based instructions** that minimise the consumption of high-fructose foods such as chocolates, cakes, biscuits, slices, snack bars, ice-cream, breakfast cereals, fruit juice, cordials and soft drinks (pp. 21, 30, 63, 80, 126, 232, 261).

That is, the so-called "Low GI Diet" involves a series of **manual handbrakes** that effectively minimise the consumption of fructose, yet the low-GI crew expresses a strong public view that it's not a problem! **Huh? So which is it: don't eat "high energy" sugary products, or sugar is not a problem?**

To the extent that fructose is indeed a key driver of **obesity** – and the debate is raging - **the profound flaw in the low-GI diet flows from fructose's super-low GI of 19**. That is, adding fructose to the food mix is a recipe for a lower GI reading, ensuring that lots of sweet manufactured foods are "low GI" (55 and lower) and so excellent to eat - if low GI readings were what matters. Yep, check out the tempting low GIs of (say) "Coca Cola", "Snickers Bar" and "Cake" in <http://fmx01dhs.ucc.usyd.edu.au/Sugirs/index.php> .

Offsetting this profound flaw, the low-GI crew has introduced a series of dominating manual handbrakes designed to limit the intake of low-GI sugary junk. That's a good thing but it leads to a **delicious irony**: any health benefits from the low-GI diet may well flow from it being a strikingly low-sugar diet relative to what everyday people are eating as society trends towards obesity (see pp. 144-45 of *TLGIH*).

Notably, a boiled-down core claim in the low-GI crew's marketing - that Aboriginal diet and health deteriorated post-1788 because things like high-GI modern potatoes displaced low-GI traditional yams (see the back cover of *TLGIH*) – stretches credibility. Yep, it was the potatoes! On one view, the GI crew's own finding of an **extremely high level of "satiety"** from eating potatoes makes the "high GI is bad" story somewhat hard to swallow, although less so than the fact that fructose - tasty but probably poisonous when consumed in standard modern doses - has a super-low GI of 19 discredits the "low GI is good" story.

Overall, it seems to me – given the ridiculously high doses of sugar in many popular breakfast cereals, soft-drinks and myriad other everyday food products (see pp. 161-164 of *Sweet Poison*) – that **high-GI or low-GI probably is neither here nor there for obesity issues once added sugar/fructose is removed**.

(e) Aboriginal bush foods, fructose, addiction, obesity, diabetes, etc

In enthusiastically dismissing sugar as the "main game" driving obesity, the low-GI crew fail to address the "elephant in the room": the profound fact that **sugar for many is addictive**. In my case, I was shocked - in a pleasant way – to find that removing fructose quickly downsized my food cravings and suddenly brought my appetite back under my own control (so, now and then I'm even managing leftovers).

Interestingly, JBM's early work on Aboriginal diets – widely marketed as the starting point for profound insights about the power of low-GI foods – contains the striking observation that traditional Aborigines had an **"exceptional 'sweet tooth'** and many early observers commented on the dietary preference for sweet foods. The enthusiastic pursuit of honey was said to be out of proportion to the small quantities obtained" (p. 20, <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=593408>).

Yep, traditional Aborigines "adored sweetness", and they expended an extraordinary amount of time and energy chasing modest amounts of "sugarbag" (bush honey, which is nearly 50% fructose). Like many of the rest of us today, they simply couldn't get enough of the sweet stuff.

Given this striking observation of something akin to "addiction", early explorers might have wondered what could happen to Aboriginal health in a new world where fructose became available in almost

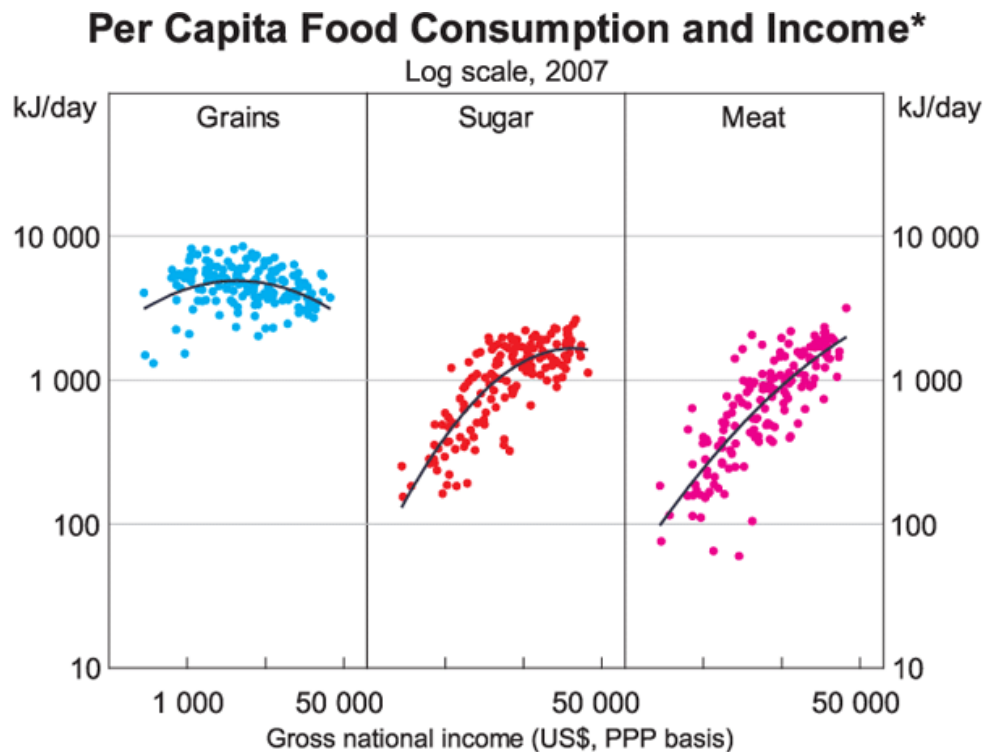
unlimited quantities without much effort at all. That question now seems to have been answered. For example, one study of eating habits in six remote Northern Territory (NT) aboriginal communities - via records from the local (monopoly) community stores - found average sugar consumption in excess of 90kg per annum. That's something like 45kg of fructose a year, massively above the national average!

So is anyone shocked to learn that typical health problems in these communities included outsized rates of **obesity**, diabetes and heart and kidney diseases? The low-GI crew may see room for debate, but eating high-GI plant foods probably was close to the least of these communities' problems (http://www.nt.gov.au/health/healthdev/health_promotion/bushbook/volume2/chap3/food.html).

All of the above is food for thought. Sections 4 and 5 examine in more detail the glaring flaws in the low-GI crew's "Australian Paradox" story. Section 7 concludes the piece with a challenge for researchers. But to put the whole debate into perspective, let's recap why sugar is even a key suspect in obesity investigations.

3. WHY SUGAR/FRUCTOSE IS A PRIME SUSPECT IN OBESITY INVESTIGATIONS

In short, sugar is a prime suspect as a cause of global "**diseases of affluence**" such as obesity, diabetes, and heart and kidney diseases (even cancer) because **eating heaps more sugar and meat is the first thing the global population did as it got richer** (see chart; thanks to the super-slim RBA economists).



* Data are cross-sectional and represent 158 countries in 2007; trend lines are fitted using a quadratic polynomial

Sources: FAO; RBA; World Bank

<http://www.rba.gov.au/speeches/2011/sp-ag-101111.html>

Indeed, in affluent countries, the energy gained by the average human from sugar is right up there with the energy coming from meat! Does that strike anyone else as bizarre: once-hard-to-find fructose – the bad

half of sugar – provides close to half as much energy as meat in affluent societies? How much did you eat yesterday? (Be honest, because 24-hour-recall surveys are where national nutrition data come from.)

Before getting into the detail of his *Sweet Poison* arguments about the role of fructose in the obesity process, it must be noted that some have rubbished the idea of David Gillespie - a lawyer - trying his hand as a scientist. Yet he has, in fact, made a serious attempt to “do the science”.

Gillespie began with a simple question: What is making me fat (120kg)? He then reviewed the scientific literature to seek likely causes. As you know, investigating with an open mind is a key part of the “scientific method. Gillespie began with no particular barrow to push - he just wanted to lose weight.

Moreover, a fresh set of eyes and the ability to think critically – sometimes found in lawyers, sometimes even in economists – can be helpful in science as elsewhere. After all, it’s not as if the current crop of food scientists has society in such great shape health-wise that there is no room for improvement. Unfortunately, not all the world’s many thousands of scientists – or economists, lawyers and journalists for that matter - are aggressive seekers of “the truth”. Some decided what they think many years ago, and nothing will change their minds regardless. Along the way, the global scientific, medical and nutritionist communities may have become part of a giant slow-moving consensus that has promoted very bad health outcomes. For example, check out the first few paragraphs here:
<http://www.nytimes.com/2002/07/07/magazine/what-if-it-s-all-been-a-big-fat-lie.html?pagewanted=all&src=pm> .

Anyway, during his investigation, Gillespie came to suspect fructose as the main culprit behind his obesity, and devised a simple experiment to test his hypothesis. After working hard to identify the myriad places in which fructose is mixed into our food supply (see pp. 147-167 in *Sweet Poison* - a great effort for which he should be congratulated), he stopped eating fructose and watched what happened.

The spectacularly positive results - he lost 40kg, one-third of his body weight over two years - seemed to confirm his suspicion. In his book *Sweet Poison*, he prosecutes the case against fructose. In my opinion, further evidence supporting his story accumulates by the month - **try a “fructose” alert on Google.**

Of profound importance, according to David Gillespie and his fellow travelers – and largely ignored by the low-GI camp - is the fact that the human body “metabolises” (or transforms into energy) the two halves of table sugar - fructose and glucose - in quite different ways.

In the process, glucose is an indispensable and harmless source of energy, whereas fructose - in the unnaturally large doses now consumed by many, decade after decade - is poisonous, driving obesity, diabetes, heart, liver and kidney disease, and even cancer on some accounts. The detailed bio-chemistry involved is complicated and can be found in his book *Sweet Poison*, as well as here:
<http://www.nytimes.com/2011/04/17/magazine/mag-17Sugar-t.html?pagewanted=all> and here:
<http://www.youtube.com/watch?v=dBnniua6-oM> .

In short, Gillespie argues that the human body can deal with pretty well anything you put into it, except large quantities of fructose (and “seed oils” – see *Big Fat Lies*, 2012). Unfortunately, what nature made scarce, humans have made abundant, cheap and to an extent unavoidable, so growing numbers of everyday people everywhere now are eating unnaturally high levels of fructose. During the millennia over which the human body evolved, fructose mainly was available in only modest amounts – as a special treat - via fruits, honey and nectars but now we are eating it daily and by “the truckload”.

Globally, about 170million tonnes of sugar are produced each year, and much of it is mixed into a vast range of processed/manufactured foods that are distributed in packets, bags, boxes, jars, tins and bottles.

Even the ABS – an entity with vast resources and counting expertise – **is unable to accurately quantify the sugar mixed into our food supply.** Indeed, after 1998-99, it stopped even pretending to count.

Our bodies do not have an "enough" sensor for fructose but before modern times it didn't matter because fructose was difficult to procure. Now, fructose is difficult to avoid. The **average human in Australia has gone from struggling to gather much more than a few kilos** of the ultimate "special treat" each year to sucking down maybe 20-30kg a year without even trying. Now, not having an "enough" sensor for fructose is a disaster.

Many of us have been getting fatter every year, on a dead-set loser without really knowing the how or why. Beyond the unnecessary kilojoules (calories), David Gillespie argues that:

- fructose has **uniquely damaging properties** (while its "other half" glucose is harmless);
- the human body **does not have an "enough" sensor for fructose** so it is able to sneak - with its calories "unaccounted" - past our natural appetite controls (he calls it the **"fructose loophole"**);
- fructose is **somewhat addictive**, tending to boost our food cravings and our desire for snacks and larger meal portions (so hello obesity!);
- in the process of "metabolising" all that fructose, **our liver quickly converts it into fat for immediate storage**, driving "fatty liver disease" and "insulin resistance" on the way to diabetes, heart and kidney diseases, and even some cancers. That's all!

It's not hard to imagine that **eating a full tonne or more of sugar** (a truckload?) over two or three decades – as one does - might be driving our personal trends towards obesity, especially when our bodies don't sense the fructose half of sugar's calories, and with the addictive element encouraging us to eat more of everything. If that description of the process is accurate, weight gain would have come easily as the decades passed, as sitting around became the main game and physical work and exercise activity subsided.

Importantly, Gillespie's Sweet Poison story captures all that is necessary to explain obesity, fitting neatly into the scientific consensus that society's trend towards obesity reflects a general increase in caloric intake (relative to what was needed), via increased snacking and excessive meal portions.

The way Gillespie tells it, fructose's ongoing scrambling of our natural appetite controls is the main thing that has been stopping our bodies from self-regulating, from properly aligning today's energy intake with today's generally reduced - and now mostly modest - energy needs.

So simply removing all that fructose - by not eating sweet things – generates a powerful one-two punch for weight-loss and improved health, because (i) it avoids vast amounts of "unseen" energy that otherwise would immediately have been turned into fat and (ii) it makes it easier to eat less of everything else. At least that's how things worked for me.

In Australia, beyond silly claims of "no evidence" and the low-GI crew's unreasonable assessment – and avoidance - of the available facts on sugar consumption (next section), **the main criticism of Gillespie's "sweet poison" diet has been that removing fructose to combat obesity may work in practice but not in theory, and that life without sugar is a bit boring.** Against that, many of us are thrilled to be (almost) trim again, years after having become resigned to forever being fat and getting fatter.

4. THERE IS NO “AUSTRALIAN PARADOX”: LOW-GI CREW IGNORED FACTS FROM ABS AND ABARE

Dr Alan Barclay and Professor Jennie Brand-Miller in March last year lifted the status of their “It’s not sugar” story a couple of notches, publishing an academic paper that highlighted what they claim is an “Australian Paradox” in the relationship between sugar consumption (down) and obesity (up) in Australia.

Unfortunately, the paper – designed in part to blow David Gillespie’s “hypothesis out of the window (sic)” – is surprisingly sub-standard: the range of available information (see the post-1980 uptrends in the next eight charts) **clearly contradicts the conclusion and title: “The Australian Paradox: A Substantial Decline in Sugars Intake over the Same Timeframe that Overweight and Obesity Have Increased”**.

Now before anyone worries that I’m an economist not a scientist, note that what is at issue here is not a question of science but an empirical matter. Look again at the conclusion: “This analysis of [i] apparent consumption, [ii] national dietary surveys and [iii] food industry data indicates a **consistent and substantial decline** in total refined or added sugar consumption by Australians over **the past 30 years**” (My numbering and emphasis; p. 9 of 14 of PDF at <http://www.mdpi.com/2072-6643/3/4/491/>).

Put simply, the critical issue is whether the available *and* reliable sugar-consumption indicators trend up or down “over the past 30 years”. **Obviously, if the post-1980 trends are flat or up rather than down, the whole story is left in tatters. Sorry, but that indeed is the case.** In Section 5, we highlight that fact for indicators (ii) and (iii) - just look at the charts, especially 5A! In this section, we take a tour of the low-GI crew’s apparently limited understanding of the Australian sugar data.

To obtain its **preferred measure – (i) “apparent consumption”** - the low-GI crew simply downloaded a series for Australia from the United Nations’ Food and Agriculture Organization’s website (www.fao.org). That sounds fine, but where did the FAO get the data? One guess: the ABS always is the first stop for reliable data on variables of national significance. So the ABS for decades originated the data while the FAO mostly just collated and distributed that ABS data. (The FAO downloads had to come from somewhere local: the United Nations has better things to do than to count Aussie sugar, when half of Africa is starving.)

Unfortunately for the low-GI crew, **the ABS discontinued its “Apparent consumption of foodstuffs” dataset after 1998-99 because of serious reliability issues.** That was a huge step because that ABS dataset (4306.0) had a history going back to at least 1938-39. Anyone familiar with the ABS would be aware that it is rather unusual for it to stop producing a dataset that already spans 60 years, particularly when the topic was becoming more rather than less relevant. Moreover, it is notable that ABARE (the Australian Bureau of Agricultural and Resource Economics, not the ABS) continued to measure the consumption of easy-to-count foodstuffs such as meat and dairy foods (see table below).

So, sorry, there’s a statistical dead-end for measures of Australian sugar consumption. The low-GI crew either remains oblivious to this data dead-end, or simply chooses not to mention it. Either way, it’s extraordinary that the low-GI crew think the FAO can tell us something useful about “the past 30 years” when the ABS stopped counting a decade ago! **Again, there are no reliable apparent consumption data for sugar since 1998-99 if not well before. End of story.**

Of course, the core difficulty faced by the ABS in trying to quantify sugar consumption back then was broadly the same as that faced by those of us trying to avoid added fructose today: it’s in places you almost wouldn’t think to look. Beyond counting the sugar in purchases of soft drinks, fruit drinks, milk drinks, sports drinks, soups, jams, chocolates, lollies, cakes, biscuits, buns, slices, muffins, ice cream and other desserts, the ABS also would have to be diligent counting the portion of sugar in myriad breads, pizza, muesli and other “health bars”, yoghurts, sauces, salad dressings, mayonnaises, baby/toddler foods, other assorted food products and especially breakfast cereals.

Table 1 Apparent per capita consumption^a of selected foods in Australia

	Unit	Average for 3 years ended during each period						2001-02	2002-03	2003-04
		1948-49	1958-59	1968-69	1978-79	1988-89	1998-99			
Dairy products										
Butter/dairy blends	kg	11.2	12.3	9.8	5.1	3.2	2.8	3.4	3.4	3.6
Margarine (table)	kg	0.4	n/a	1.5	5.4	6.8	4.5	4.3	4.2	4.2
Cheese	kg	2.5 ^c	2.6 ^c	3.5 ^c	5.3 ^c	8.8 ^c	10.7 ^c	11.6 ^a	12.1 ^a	11.5 ^a
Whole milk powder	kg	1.5	1.1	0.8	1.3	0.9	1.0	1.3	1.2	1.1
Skim milk powder ^b	kg	0.3	1.1	4.3	2.7	2.8	2.0	1.3	1.3	1.5
Drinking milk	L	138.7	128.7	128.2	100.5	101.7	103.2	98.5	98.3	99.0
Meat										
Beef and veal	kg	49.5	56.2	40.0	64.8	40.0	38.0	34.5	36.9	37.7
Lamb and mutton	kg	31.9	36.4	39.9	18.0	22.2	16.7	16.7	15.4	13.5
Pig meat	kg	3.2	4.6	6.7	13.3	17.5	18.4	18.8	20.7	22.1
Poultry meat	kg	n/a	n/a	8.3	17.1	24.1	29.4	32.3	35.8	34.6
Cane Sugars										
As refined sugar	kg	31.2	27.0	21.0	14.9	8.8	n/a*	n/a*	n/a*	n/a*
In manufactured foods	kg	23.1	23.6	27.7	34.6	33.9	n/a*	n/a*	n/a*	n/a*
Fresh Fruit (include fruit for fruit juice)										
Citrus	kg	16.9	16.1	22.5	34.5	39.1	49.2	n/a*	n/a*	n/a*
Other	kg	39.5	35.6	40.8	34.6	49.9	54.8	n/a*	n/a*	n/a*
Vegetables										
Potatoes	kg	56.3	51.7	53.7	50.1	61.5	69.5	n/a*	n/a*	n/a*
Other root and bulb vegetables	kg	19.1	15.9	17.1	16.7	19.3	24.0	n/a*	n/a*	n/a*
Leafy and green vegetables	kg	20.5	17.9	21.3	24.3	23.8	20.6	n/a*	n/a*	n/a*

^a Apparent consumption data are expressed as total product amount per year, and per capita consumption is derived by dividing apparent consumption by population.
^{*} n/a= data not available from the ABS statistics. However, further information was available from FAO and is presented later in this report.

Source: Page 5 of http://sydney.edu.au/medicine/public-health/panorg/pdfs/Monit_update_apparentconsumption_161210.pdf ;
(Original ABS data: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4306.0Main+Features11997-98%20and%201998-99?OpenDocument>)

The ABS obviously didn't give up counting sugar after 1998-99 because it couldn't find any. Its problems began when it came time to add imported sugar to domestic "sugar availability" (production less exports). **Recent conversations with the ABS** confirm that it was the rapid growth of manufactured foodstuffs – and an increasingly vast range of products infused with sugar in varied, and variable, portions – that made it increasingly difficult and costly to identify and reliably count the amount of sugar in our food supply.

In particular, the ABS struggled to know how much sugar was contained in **rapidly growing imports** of things like bakery products, confectionary, soft-drinks, cordial and syrup, processed fruit and vegetables, and "other processed foods" (see various charts on p.17 of 189 at http://www.daff.gov.au/_data/assets/pdf_file/0011/1910819/food-stats2009-10.pdf).

Someone smart might be able to guess how much sugar is in those imports. I have no idea. And neither does the low-GI crew or the FAO. Again, the ABS stopped even pretending to count over a decade ago. Most of what we do know is that: (i) all locally produced sugar in 2009-10 – about 60kg per person after exports (next chart) - had a total value of well under \$1 billion at wholesale prices, while (ii) total food imports in 2009-10 had a total cost of \$10b (a combination of wholesale and retail prices?), with imports of sugary items growing pretty strongly. You tell me how much sugar was in those imports? One way of looking at it is to note that \$100m could have bought roughly **10kg per person of sugar** {\$600m = 60kg pp}, which is **only 1% of the cost of that \$10b worth of imported foodstuffs**. All I'm saying is that total sugar imports must be substantial, and have trended up over time in terms of kilos per person. (Note also, for example, that Coca-Cola Amatil Ltd imports the "concentrates and beverage base for Coca-

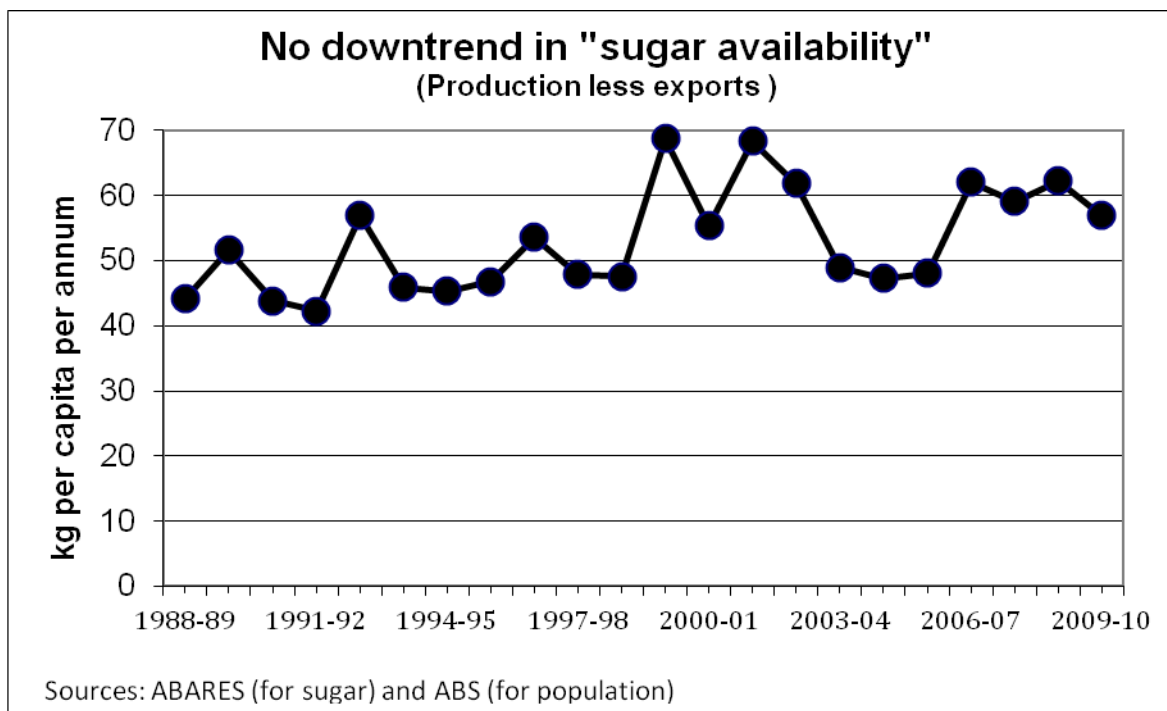
Cola trademarked products” (note 32 and footnote 3 and 4 on page 84 of 96 in <http://ccamatil.com/InvestorRelations/Documents/CCA%202010%20annual%20report.pdf>).

Clearly, any accurate measurement of annual sugar consumption must by its very nature be extremely tedious, time consuming and costly, a bit like measuring the GI of myriad food items, but with product sizes and sugar portions potentially then changing again at the drop of a hat. **The bottom line** is that the ABS came to doubt the reliability of its “apparent consumption” estimates – especially those for sugar - and after an extended assessment of the extra resources that would be required to revamp the counting process to boost estimate reliability, it walked away from the whole thing (and so discontinued 4306.0).

As you may know, **the ABS struggles to reliably measure just the prices of the myriad food items sold to the household sector – to calculate the widely used Consumer Price Index** - so it’s not very surprising that ultimately it baulked at trying to reliably identify and then aggregate all the (imported) sugar mixed into those tens of thousands of food products.

The upshot of all this is that, while the low-GI crew keep insisting that apparent consumption of sugar has fallen substantially “over the past 30 years”, **there are no serious data for the past 12 or so years**. After printing a (low) figure for 1998-99, the ABS gave up even pretending to count sugar imports and thus consumption. For the years since 1998-99, the FAO has kept tacking something onto the abandoned ABS endpoint {“*calc. on 37 kg. per cap. as per last available off. year level (1999)*”}, allowing hapless analysts to keep downloading the dead series and presenting it as fact, oblivious to the issues above.

The next best thing to a timely measure of apparent consumption (AC) is a measure of “sugar availability (SA equals production [P] less exports [X]). After all, the latter - assuming limited leakages, as the ABS did - dominates estimates of the former: **AC = SA + imports (M) – “leakages”**. Happily, ABARES continues to publish timely estimates that allow the simple calculation of “sugar availability” (chart).



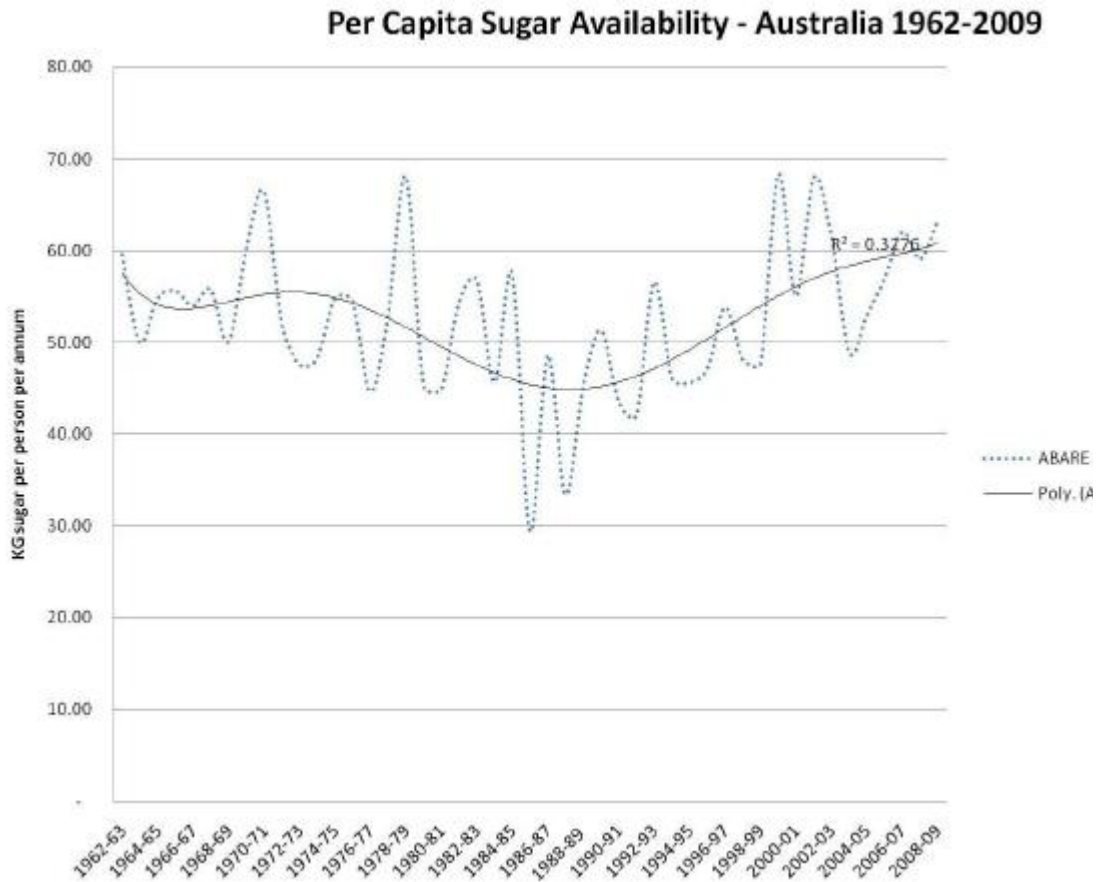
These official data are produced by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES - formerly ABARE - within DAFF: Department of Agriculture, Fisheries and Forestry), widely known among economists (and by a particular former lawyer) as the go-to place for information on

things agricultural. (The exact link for the sugar data is: http://adl.brs.gov.au/data/warehouse/pe_abares99001762/ACS_2010_Sugar_Tables.xls ; population data are June quarter readings from Row 39 at Table 4 of <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202011?OpenDocument>)

The chart shows that **the trend in domestic sugar availability over the past two decades has been up**, from near the bottom of a 40-60kg range to the top of that range; availability” was 22% higher in the second half than in the first. To that, we need to add the apparent uptrend in sugary imports per person.

Local sugar mainly is either exported or eaten, so the variables separating SA and AC are imports and “leakages”. Leakages include the portion wasted, used for the production of alcohol (not wasted!) and various non-food uses. Back in the day, the ABS (a) made simple assumptions about “leakages” (basically steady?) and (b) added in estimates of sugar imports, to get (c) estimates for apparent consumption. But counting imported sugar became extremely difficult, so the ABS walked away. **Note that it was rapidly growing imports that caused big problems for the ABS, not increased leakages. Imports likely have grown faster than leakages. In particular, local ethanol production is not an important user of sugar**: ethanol production here uses mainly wheat or sugar cane’s molasses by-product, after raw sugar already is “in the bag” (see <http://ethanolfacts.com.au/myths> and p10 of 24 at <http://www.accc.gov.au/content/item.phtml?itemId=961783&nodeId=c5006d5e6145ec6c55231148c819855e&fn=ACCC%20Petrol%20Monitoring%20Report%20Chapter%206.pdf>).

Inexplicably, despite the fact this up-to-date “sugar availability” calculation takes us almost all the way to any corresponding apparent consumption measure, it did not rate a mention in the



<http://sweetpoison.com.au/wordpress/wp-content/uploads/2010/11/percapita.jpg> ; <http://www.raisin-hell.com/2011/02/heart-foundation-says-sugar-isnt.html>

“Australian Paradox” paper. That’s surprising because the ABARES data were somewhat familiar to the authors before publication. After all, David Gillespie’s chart (above) - spanning almost all of the past half a century shows elevated availability for extended periods either side of a particular “soft patch” around the mid to late 1980s – had a reasonably high profile in the debate.

In any case, **it is clear that the low-GI crew’s claimed downtrend “over the past 30 years” simply is the result of it missing the bigger picture** Yes, the “plenty of sugar” result from the charts above should indeed have had the low-GI crew **questioning its story** that consumption has fallen “substantially” over “the past 30 years”, and wondering why the ABS stopped publishing “apparent consumption” (again, it couldn’t keep track of all the sugar mixed into rapidly growing imports of sugary manufactured foods).

The good news is that producing that 22-year sugar-availability chart (above) using the links provided takes about five minutes (try it), so there’s still time for the low-GI crew – or *Nutrients* – to revamp the paper and correct the public record.

My summary is that all we really “know for sure” from the ABS “apparent consumption” data – before the dataset was discontinued after 1998-99 - is that by the 1990s we were consuming much less table sugar/sucrose in our tea, coffee and home-cooking than in earlier decades, but consuming much more via the growing range of sugar-infused manufactured foods, including breakfast cereals, soft-drinks, bakery products, confectionary, “health bars”, and myriad other sweet foods and drinks. The sugar mixed into manufactured foods – and the range of those foods - grew so rapidly the ABS couldn’t keep up (see table).

So, what to say? It’s hard to be anything but scathing. The low-GI crew didn’t mention or was unaware that its preferred indicator – apparent consumption – was abandoned by the ABS as unreliable after 1998-99. **With no reliable and affordable way to estimate annual sugar imports,** the ABS stopped counting sugar consumption, and stopped publishing the “Apparent Consumption of Foodstuffs” data (4306.0).

The low-GI crew may still be oblivious to all this, or why it matters, but if the ABS isn’t counting imports, the FAO’s apparent consumption figures used in the “Australian Paradox” paper are not worth a pinch of the proverbial after 1998-99, perhaps long before (that the ABS couldn’t capture all the sugar in fast-growing imported (sugary) foods would have been a long-standing drag on the reliability of the series).

Notably, the authors made **no mention of “sugar availability”**, despite it being the dominant component of any timely measure of apparent consumption, despite it **obviously invalidating their preferred story that sugar consumption had trended down over “the past 30 years”** (see chart), and despite it having a reasonable profile in the debate before the paper’s publication (see links above). How come?

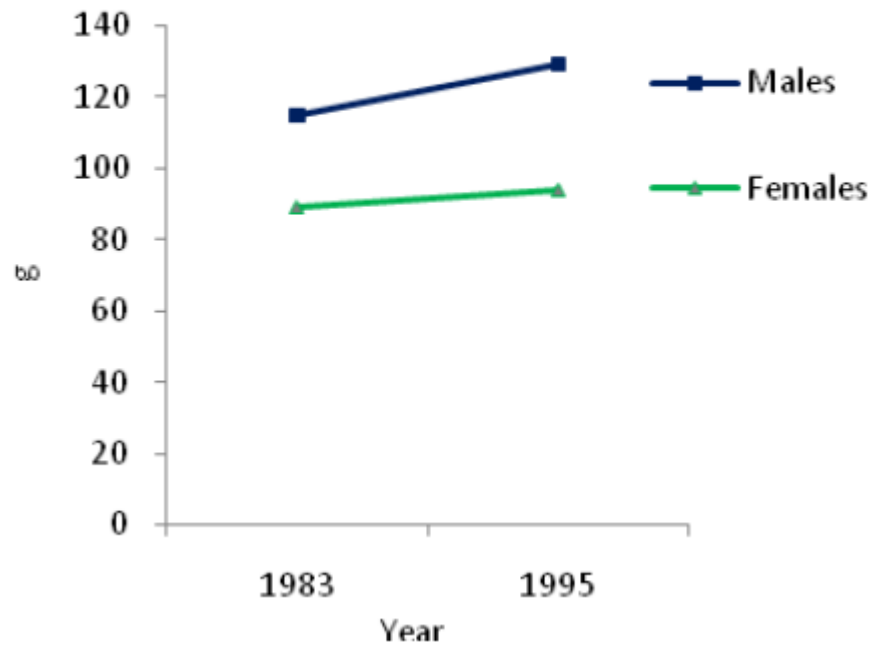
All in all, not mentioning that the ABS had discontinued the preferred series - and then not mentioning the next best thing - “sugar availability” - is not a good look. Indeed, it’s extraordinarily embarrassing, especially when those data demolish both the conclusion and the title of the “Australian Paradox” paper.

5. THERE IS NO “AUSTRALIAN PARADOX”: LOW-GI CREW IGNORED FACTS FROM ITS OWN CHARTS!

Awkwardly, the low-GI crew’s claim of an “Australian Paradox” lies in tatters ever before we consider nominated consumption indicators (ii) and (iii). So far, so bad, and it only gets worse from here! In any case, the next six charts are reproduced directly from the low-GI crew’s “Australian Paradox” paper.

First, consider the data from the various **National Nutrition Surveys**, in 1983, 1985 and 1995 (discontinued), set alongside a separate survey of children in 2007. So, up or down? Yep, contrary to the low-GI crew’s claim of “a consistent and substantial decline”, **the broad post-1980 trends from the various national dietary surveys suggest that consumption of total sugars per capita increased not decreased for both adults (Figure 3) and children (Figure 4).**

Figure 3: Consumption – Adults
TOTAL SUGARS (ADDED & NATURALLY OCCURRING)



Source: p. 7 of 14 at <http://www.mdpi.com/2072-6643/3/4/491/>

Figure 4: Consumption – Children
TOTAL SUGARS (ADDED & NATURALLY OCCURRING)

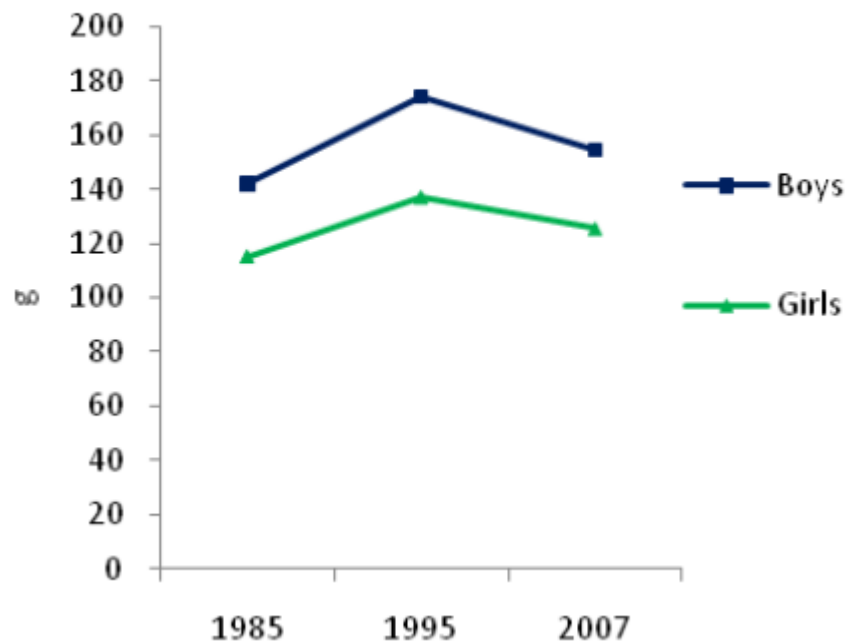
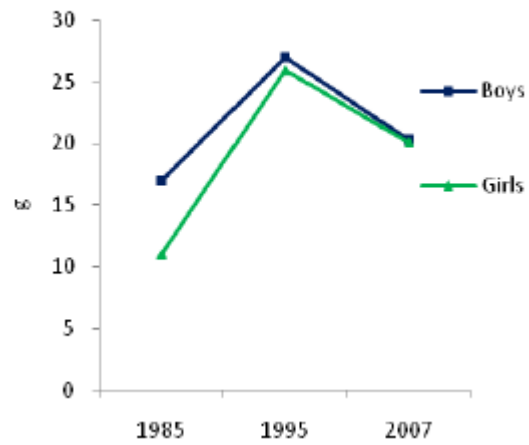
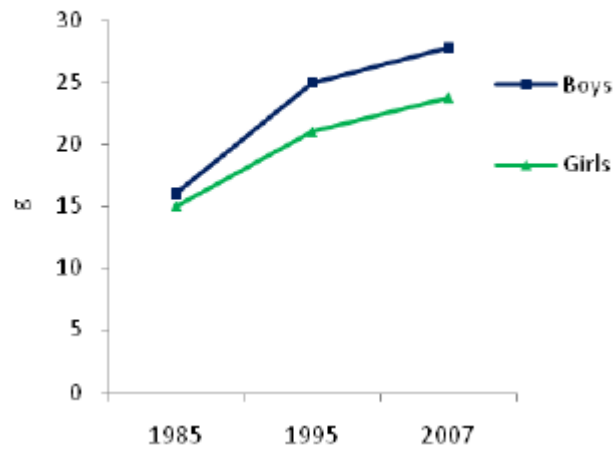


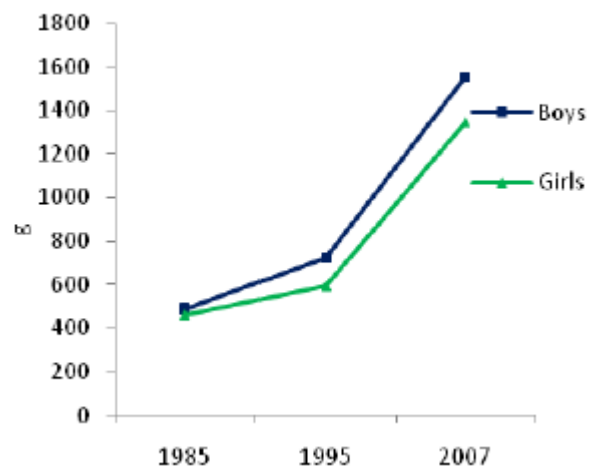
Figure 4 (continued)
SUGARY PRODUCTS



CONFECTIONERY



NON-ALCOHOLIC BEVERAGES



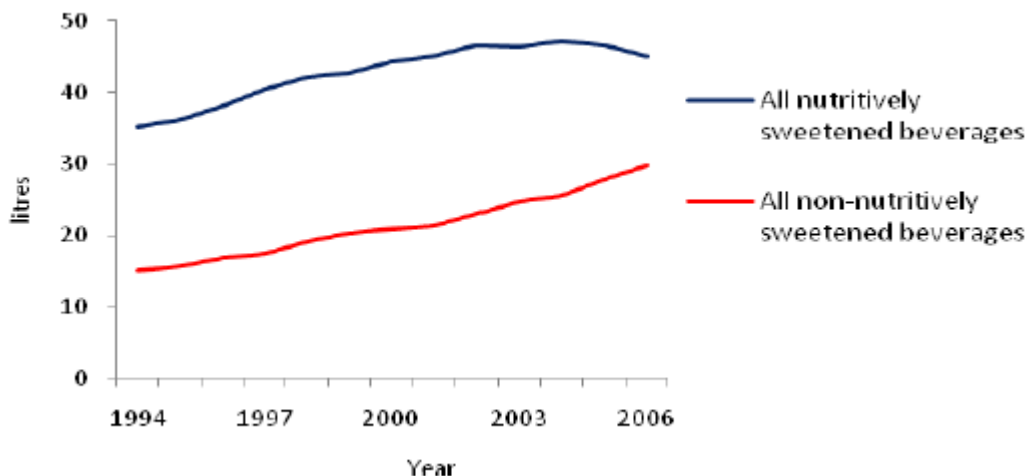
Looking back at the charts, it is clear that **the longer-term trend for children** over the period spanned by the point estimates for 1985 and 2007 is up for “Total sugar”, “Sugary products”, Confectionary and “Non-alcoholic beverages”. **Ignoring that post-1980 trend**, however, the low-GI crew is keen to highlight the **part** reversal of sugars in the second period. But who knows if it is meaningful? (See discussion below.)

At the very least, the data show very clearly an increase in the consumption of total sugars by both adults and children between 1983-85 and 1995, corresponding with the period over which the low-GI crew documents an alarming increase in obesity. What Australian Paradox?

Looking more deeply into the data for adults, it is true that consumption of “Sugar products and dishes” did fall over the decade to 1995 (lower by 4g per head). But that grouping - mainly sugar for tea and coffee, as well as honey and jams - is **only a subset** of the broad range of sugary products in our food supply. Going the other way, the survey recorded big increases over the decade for the consumption of “Cereals and cereal products” and “Cereal-based products and dishes”, which together include sugary breakfast cereals, biscuits, cakes, pizza and breads, etc. Consumption of “Non-alcoholic beverages” - including sugary soft-drinks and fructose-laden fruit juices - also surged, while males consumed more “Milk products and dishes”, which includes ice-cream and added sugar in flavoured milks and yoghurts.

As a footnote, there’s the question of how much faith to put in comparisons of nutrition surveys over time. That’s unclear because the methodology used in 2007 is **somewhat different** from that used for the 1995 survey (worth noting with an asterisk (*) and a footnote on the chart?). For example, in 2007 the children answered questions about what they ate, whereas in 1995 it was adults who answered for the children aged 14 and under. And one wonders *when* respondents found out they were going to be interviewed on what they ate in the previous 24 hours - it would be human nature to have a “good food day” beforehand. Finally, I’m unaware of any **“bridging study”** undertaken to assist valid comparisons between 1995 and 2007, along the lines of the study linking the 1983/1985 and 1995 surveys ([http://mbsonline.gov.au/internet/main/publishing.nsf/Content/6A40E29D690738DECA25725F00810008/\\$File/nutrient.pdf](http://mbsonline.gov.au/internet/main/publishing.nsf/Content/6A40E29D690738DECA25725F00810008/$File/nutrient.pdf)).

Figure 5A: Sugary soft drinks (TOP LINE)
Beverage sales per capita



Finally, there’s **the low-GI crew’s third measure**, showing a 30% increase the sales of **sugary soft drinks** between 1994 and 2006 (Figure 5A: TOP LINE is sugary soft-drinks). **Yet again, awkwardly, the post-1980 trend is up, not down. Again, what Australian Paradox?** The low-GI crew is keen to highlight the modest late-term wiggle (2004-2006) after that huge uptrend, but not so keen as to take the time to update the series for the latest half decade (and again, an asterisk* on the chart to denote the break in series at 2005 would be nice). **Notably, the low-GI crew is heavily focused on the rapid relative growth of diet drinks and bottled water, despite it being irrelevant to the issue at hand.** That is, we

are looking at post-1980 trends in sugar consumption (up or down): all we need to know is in the **top line**. (Of course, the trend towards bottled water and diet drinks will help to limit obesity in coming decades.)

All in all, Dr Barclay and Professor Brand Miller's March 2011 claim of a "consistent and substantial decline" in sugars consumption by Australians "over the past 30 years" lacks credibility to say the least. **Again, they batted none-for three on their nominated indicators: the relevant post-1980 trends clearly are up not down in the previous eight charts.**

The bottom line is that there is no "Australian Paradox", just an idiosyncratic and unreasonable assessment - and avoidance - of the available sugar data by those who coined the term. Dr Barclay and Professor Brand Miller's conclusion obviously was a big winner for the low-GI industry while others took it seriously, yet it stands contradicted by the underlying facts of the matter. Even understanding that the low-GI crew was keen to discredit David Gillespie's "fructose is sweet poison" hypothesis, it's hard to understand exactly how we got here. **There clearly is no "Australian Paradox" yet there it is published via a "Guest Editor" in a "Special Issue" of an E-journal?** (http://www.mdpi.com/journal/nutrients/special_issues/carbohydrates/).

In any case, let's hope the low-GI crew, the University of Sydney and the journal *Nutrients* all do the right thing from here and ensure that the public record is corrected without further delay.

6. FURTHER DISCUSSION: WHAT ARE MR AND MRS SHOPPING-TROLLEY AND THEIR KIDS EATING?

It almost goes without saying that any serious challenge to David Gillespie's *Sweet Poison* story - that fructose in modern doses decade after decade tends to generate obesity and related diseases - would focus on trends in *fructose* consumption.

Fructose is widely known as "fruit sugar", so the low-GI crew might have mentioned that **per-capita consumption of "fruits and fruit product" increased by about 50%** between the three years to 1978-79 and 1998-99, from 91kg to 135kg (before the ABS discontinued 4306.0).

So where are we left? Are Australians on average eating less or more fructose now than in earlier decades? Certainly we are eating less in our tea and coffee and home-cooking, but overall? Probably more but that's still a bit unclear. **One of the low-GI crew's academic competitors might want to investigate and publish something sensible of this topic after having had a long careful look at the range of available information, with a special focus on data limitations.**

As noted above, (a) the uptrends in domestic "sugar availability" and rising sugary food imports, (b) the increased sugars consumption indicated by (dated) national nutrition surveys, and (c) the (dated) surge in the consumption of sugary soft-drinks (as well as sugary milks?) and fruit and fruit products - all taken together - suggest the trend in fructose consumption over recent decades is more likely to have been up than down, let alone down substantially.

After all, does anyone else remember what the insides of our grocery stores, service stations and cafes/convenience stores looked like in the 1960s and 1970s before they were filled with today's extraordinary variety of local and imported foods and drinks infused with heaps of fructose?

In any case, the big problem for the low-GI crew's preferred "It's not sugar" story is that **estimates of per-capita sugar consumption were never going to be the last word** on whether or not sugar is behind the global obesity epidemic. Indeed, even a series showing exact estimates over time of per-capita fructose consumption - pretty well impossible - wouldn't actually answer the question of most interest: **does removing fructose from the diet of fatties put obesity into reverse?** (Ask Peter FitzSimons!)

What matters is not aggregate annual sugar consumption but the **distribution** of that consumption and the **period** over which it occurs. After all, many of us have been eating way more than our fair share for long periods. If a typical Australian is indeed eating (say) 25kg of fructose each year, then there will be plenty of others (like me before) sucking down maybe 30-40kg, while others are eating less (like me now).

Rather than trying to measure national fructose consumption, another approach would simply be to track exactly what fatties and emerging fatties are eating. **You can bet that ageing sugar-hogs who don't exercise like demons are getting fat!** Those caged monkeys getting fat and diabetic while sucking down the sweet stuff are just the tip of a global iceberg! Hello China and India!

Has the low-GI crew ever looked closely at the food choices being made by Mr and Mrs Shopping Trolley and the rest of the "great unwashed"? What I know for sure is that my per-capita fructose consumption was (shall we say) elevated over the decade in which I trended towards **obesity**. Then I got a clue, and the removal of fructose from my diet reversed that trend. That also was the case for David Gillespie, Peter FitzSimons and thousands of Gillespie's followers (<http://au.news.yahoo.com/sunday-night/features/article/-/13058226/fitzys-sugar-coating/>)

These simple results – showing sugar hogs removing fructose from their diets and suddenly reversing their personal trends towards obesity, and monkeys getting fat and diabetic simply from drinking standard (human) serves of Kool Aid - **should be food for thought for those repeatedly rushing into the media to defend sugar.**

Ironically, given the low-GI crew's excessive enthusiasm in claiming a downtrend in sugar consumption - to blow "David Gillespie's hypothesis out of the window" (sic) - Gillespie himself rubbishes their focus on trends in sugar consumption and obesity. After all, he says:

No one is suggesting that sugar consumption today results in instantaneous population-wide obesity. The science says that (one of the ways) fructose makes us fat is by interfering with our appetite control over decades of continuous consumption. The cumulative effect of this is steadily increasing weight and concurrent metabolic dysfunction (which make us prone to Type II Diabetes and Heart Disease)... The increase in obesity statistics we are seeing now is likely to be a result of the appetite disruption [dysfunction?] (caused by sugar) between the Second World War (or even earlier) and now. So comparing today's obesity statistics with today's consumption is a pointless academic folly (even if it were accurate)... (<http://www.raisin-hell.com/2011/02/heart-foundation-says-sugar-isnt.html>)

What seems indisputable is that – with average annual consumption of (say) 20-30kg give or take – typical humans in various affluent countries like Australia, the US and UK are eating maybe 10 times more fructose today - decade after decade - than was typical during the millennia over which the human body evolved. (Do you reckon *you* could find 75g of fructose *every* day wandering around Centennial Park in Sydney?) What nature made scarce, humans have made abundant, cheap and somewhat unavoidable.

The bottom line for David Gillespie is that **fructose in today's unnaturally large doses is scrambling our natural appetite controls and stopping our bodies from self-regulating, from properly aligning our food intake with our energy needs.** And that's left us particularly vulnerable to weight gain as the decades pass, as manual labour becomes less common and exercise levels generally subside as we age. Hello obesity, diabetes, and an elevated risk of much worse.

7. CONCLUSIONS, CORRECTING THE PUBLIC RECORD AND A CHALLENGE FOR RESEARCHERS

As an economist, my main concern initially was with what I regarded as the low-GI crew's unreasonable treatment of the available data on sugar consumption. But the more I read, the more interesting things

got. So this piece helps to shine a light on various fascinating – and some disturbing - aspects of the low-GI crew’s involvement in the debate about sugar, obesity and diabetes in Australia. Key observations include:

- The low-GI crew has a **major unstated conflict of interest**: it *needs* sugar/fructose to be “just another carbohydrate”. After all, **fructose has a super-low GI of 19** (GIs of 55 and under are “low”) so if fructose in modern doses is indeed a driver of global obesity and diabetes, the low-GI industry has an existential problem. Clearly, there’s a strong incentive for aggressive advertising: “Sugar is innocent”!
- The low-GI crew claims that “**There is an absolute consensus that sugar in food does not cause diabetes**” (in at least two GI-flagship books). There’s “an absolute consensus”, yet debate rages all around? The statement is spectacularly false. I understand the need to “dumb down” the science so that economists, lawyers, journalists and other plebs can understand it, but probably it’s not a good idea to introduce disturbing untruths into best-selling nutrition books. Can the authors even say that sentence out loud with a straight face? This clanger should be corrected in coming print runs.
- The low-GI crew keeps claiming that evidence against fructose is limited to studies in which giant-sized doses hurt tiny mice and rats, so there is no need for alarm. **It is yet to acknowledge that Rhesus monkeys – whose genomes are a 93% match with those of humans - have become chunky and diabetic within 12 months** of starting to drink just *one* daily human-sized dose of regular Kool Aid (<http://onlinelibrary.wiley.com/doi/10.1111/j.1752-8062.2011.00298.x/abstract>).
- Sugar is not a problem yet the low-GI diet requires **manual handbrakes** to limit its consumption?
- Sugar, much more than high-GI plant foods, is a key factor in the **deterioration of Aboriginal health**.
- **Finally, as documented, the main problem with the conclusion of the high-profile “Australian Paradox” paper is that it is demonstrably false.**

Indeed, **Dr Barclay and Professor Brand Miller batted none-for-three**: not one of their three nominated indicators shows a “substantial decline” in consumption over “the past 30 years”. Moreover, they **failed to mention** that the ABS abandoned their preferred indicator – “apparent consumption” - as unreliable after 1998-99. Finally, inexplicably, they **failed to mention the conspicuous “plenty of sugar” result that jumps out of a simple calculation using ABARES data** (see charts again).

Yet facts do not cease to be facts just because they are overlooked or ignored: the available information – including (a) abundant “sugar availability” and rising sugary imports; (b) national dietary surveys and (c) industry data on soft-drink consumption – confirm that there has been plenty of sugar available to fuel Australia’s trends towards obesity. (All this is documented in detail in Sections 4 and 5; Jack Nicholson once took a tougher line: <http://www.youtube.com/watch?v=5j2F4VcBmeo>).

All in all, we are left with a clear sense that there is no “Australian Paradox”, just an idiosyncratic and unreasonable assessment – and avoidance - of the available sugar data by those who coined the phrase. The extent to which critical oversights dominate the paper makes one wonder exactly what is going on at Sydney University and at the journal *Nutrients*. Several questions spring to mind:

- Just how easy is it to publish stuff in the field of nutrition – and in the journal *Nutrients* in particular?
- With 40 or so scientists on its Editorial Board, how come independent “peer review” was so lacking?
- And do eminent scientists take responsibility for correcting their high-profile errors?

One hopes that the journal *Nutrients* and the University of Sydney together will do the right thing and correct the public record immediately. After all, disturbingly, the Heart Foundation, Diabetes Australia, Nutrition Australia and the Dieticians Association of Australia all seem to have taken false comfort from the low-GI crew’s mistaken conclusion of an “Australian Paradox” (details on request).

The recent discussion of sugar as “**toxic beyond its calories**” by Dr Robert Lustig *et al* in the prestigious scientific journal *Nature* - that so “disgusted” the low-GI crew - takes us a small step closer to a wider understanding of the damaging effects of the “sweet poison” scourge. In time, the contribution of those Rhesus monkeys sucking down the Kool Aid and getting diabetes in the cause of science also will be seen as profound (<http://onlinelibrary.wiley.com/doi/10.1111/j.1752-8062.2011.00298.x/abstract>).

For what it is worth, my guess is that within a decade or two, across the scientific, medical and nutritionist communities, **fructose will be linked to obesity and diabetes in the same way that today the sun is linked to sun cancer, and tobacco is linked to lung cancer.** It probably *is* that simple.

So, working to reduce the consumption of added fructose across society should be a public-health priority, in my opinion. Actually, the solution for many is straightforward: if everyone with a “sweet tooth” struggling against excess weight were to read David Gillespie's book "Sweet Poison" - <http://sweetpoison.com.au> - and take its compelling advice - eat minimal fructose - **the sudden reversal of today's obesity uptrend might be as spectacular as the exploding giant glutton in Monty Python's famous film, The Meaning of Life** (http://www.youtube.com/watch?v=rXH_12QWWg8).

In the meantime, **scientists should get busy explaining the fact that eating sugar is a major driver of (lack of) appetite control.** Taking advantage of this profound fact – by minimising fructose intake - now is changing many thousands of lives for the better. **Scientists also should step up their studies on the obesity-reversing effect of this removal of fructose from human diets.** I'd be happy to donate \$10,000 to help a health department or a non-conflicted university to study - and thus potentially demonstrate beyond debate - the extent to which "sweet poison" is driving today's global disaster in public health.

For starters, let's assess weight and health changes after a group of (say) 200 overweight volunteers eats little or no fructose for a year, with no change in exercise regime. For comparison, maybe put another 200 fatties on a diet of "low GI" products (again, with an unchanged exercise regime but also without any of the low-GI crew's artificial handbrakes on high-fructose sub-55-GI foodstuffs), and a third group that could be monitored doing nothing new. (One issue is that “enforced compliance” is harder to arrange with humans than with caged monkeys!)

Since a low-fructose diet helped me to lose 10 kilos in less than a year, I would be very surprised if the average weight-loss and general health improvements across the first (**low sugar**) group were not multiples of those in the second (**low GI**) group. And my guess is that the third (**nothing new**) group also would outperform that second group, weighed down as the low-GI group would be by the silly idea that high-fructose low-GI junk-foods are okay. (Check out the tasty low GIs of “Coca Cola”, “Snickers Bar” and “Cake” in <http://fmx01dhs.ucc.usyd.edu.au/Sugirs/index.php>)

The main point of this rather long-winded piece is that if society can gain a better understanding of - and then reduce - the damaging health effects of excess sugar/fructose, then tens of billions of health-care and aged-care dollars could be saved or redirected, every year. Not to mention the much **happier, healthier and longer lives** that would be lived by a slimmer population with greater control over its appetite.

rory robertson

economist and former-fattie 😊

now fairly fructose free!

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