Sugar: the bitter truth

Chances are that if you're reading this you're already pretty aware that processed sugar isn't great for you. But how about honey or orange juice? Not so good either according to Dr Robert Lustig.

Dr Lustig is a paediatric endocrinologist whose book *Fat Chance: the bitter truth about sugar* unravels the last thirty years of nutritional advice and puts the increasing global obesity down to out of control sugar consumption.

" *Our risk for illness is increasing faster than the increase in obesity. Indeed, the cluster of chronic metabolic diseases termed metabolic syndrome - which includes obesity, type 2 diabetes, hypertension (high blood pressure), lipid disorders, and cardiovascular disease - is snowballing by leaps and bounds. And then there the other obesity-associated metabolic diseases, such as non-alcoholic fatty liver disease, kidney disease, and polycystic ovarian syndrome. Add to that the other comorbidities (related medical conditions) associated with obesity, such as orthopaedic problems, sleep apnoea, gallstones, and depression, and the medical devastation associated with the obesity pandemic is staggering.* " (Lustig, p.4)

This isn't just an American problem:

Fig. 1 Percentage of obese adults in each country[1]

" *At the moment there are 30% more obese than undernourished people on the planet.*" (Lustig, p. 256)

In 2011 a quarter of adults in the UK were classed as obese and a further 37% overweight[2]. During 2011-12 there were over 11,000 hospital admissions due to obesity, which is over 11 times higher than the ten years earlier[3].

What's terrifying are the statistics about children. The greatest rate of increase in obesity over the last decade is the two-to-five year olds.

Fig. 2 Trends in childhood obesity prevalence[4]

Let's take a look at the science. It is all about a balance between leptin and insulin, the ying and yang of the digestive system. Leptin is a protein made and released by your fat cells, especially those in the subcutaneous fat, which is the visible fat that sits comfortably on hips, thighs and bottoms. Leptin tells the brain's hypothalamus that you've got enough energy stored in your fat and to stop eating.

So what happens if the message never makes it to the hypothalamus? The balance is thrown out right? Your brain interprets starvation, signals the vagus nerve to store more energy and the pancreas to make more insulin. "*The more insulin there is, the more energy goes to fat.* " (Lustig, p.44)

Hunger - food - insulin - leptin - satiated

Insulin can also block leptin from signalling the hypothalamus and so you still feel hungry and keep eating. This may seem counterintuitive, but there are at least two times in life - puberty and pregnancy - when you need to gain weight gain and so it makes sense that insulin has this double duty.

Ok, so we know that there needs to be this balance between leptin and insulin so that we eat the right amount. But often it's tempting to have another slice of cake or something right? And that feeling of pleasure that eating gives is regulated by both leptin and insulin too.

Eating results in the brain releasing dopamine, which gives a feeling of pleasure and reward. Once you've eaten enough, leptin signals the brain to lower the dopamine levels, thus food is less a reward. Insulin performs the same function in another part of the brain, so there should be two mechanism in place to stop over-eating. So why is that second slice of cake so tempting?

Part of the answer is stress. When we are stressed the body produces cortisol; the fight or flight hormone. In short bursts, like shimmying up a tree to escape a lion, cortisol is absolutely vital. When it floods the bloodstream, cortisol raises the blood pressure, increases the glucose levels and increases the heart rate. Research shows that this specifically drives a taste for 'comfort food', like chocolate cake, with its high sugar levels.

But it isn't a moment on the lips, lifetime on the hips: cortisol specifically increases the visceral fat. When escaping the lion, it made sense that the fat should be deposited where it could be most quickly accessed by the liver and converted into energy. Luckily for most of us lions aren't really a problem any longer.

" Either chronic stress or heightened responses to stress due to ineffective coping strategies will unleash a long-term cortisol cascade" (Lustig, p. 67). When cortisol goes up, insulin does too, to turn the energy into fat. So although insulin makes you eat and therefore gain fat, it is cortisol that tells the body where to store it. Visceral fat is the killer, sitting on the abdomen around the liver and other organs. Whereas the 'unsightly' subcutaneous fat is actually defended by the body as a leptin producer.

Stress - cortisol - comfort food - insulin - blocks leptin - hunger - excess food - visceral fat - illness and disease

'*Stress, like art, is in the eye of the beholder*'. (Lustig, p. 68)

Ok, so even if you're not being chased by a lion or the bank manager, why is your leptin signal not working properly? The simple answer is insulin resistance. This means that your body is producing insulin but not using it effectively, and it's always over-producing it to allow your muscles and organs to absorb the glucose they need from the bloodstream.

When your insulin and blood glucose levels are up all the time, you're more likely to develop metabolic syndrome (also called insulin resistance sydrome). The chances of developing diabetes, nonalcoholic fatty liver disease, chronic kidney disease and becoming obese are much higher. A large waist circumferance is a good general indicator of metabolic syndrom; from 1993 to 2011, the proportion of adults with a raised waist circumference increased amongst men from 20% to 24% and women 26% to 47%[5].

We come back to the importance of balance between the ying and yang: leptin and insulin. So how can we achieve this in our daily lives?

" *The majority of humans, regardless of weight, release double the insulin today that we did thirty years ago for the same amount of glucose. Now we're left with the $147 billion (the annual financial cost of obesity) question: If insulin is the bad guy and we're all hyperinsulinemic as never before in the history of humankind, where did all this extra insulin come from? And how do we reverse it?* " (Lustig, p. 47)

Cortisol is not the only factor to consider. It is also important to remember that decreased leptin induces feelings of lethargy, unhappiness and tiredness. This is your sympathetic nervous system putting your body into conservation mode and therefore the vagus nerve goes into overdrive, making you hungry and the cycle starts again. Even during the first twelve hours of fasting leptin levels drop faster than fat stores and your brain thinks you're starving. Crash dieting is not the answer.

" *Approximately 80% of the 600,000 consumer packaged foods in the United States have added caloric sweeteners.* " (Lustig, p. 257)

The 'American diet' has been exported globally, and children are particularly suspectable, especially in poorer areas. Fast food, soda and TV culture has invaded. In the UK, the government recommends 8% of the 'eatwell plate' can be in 'food & drinks high in fat and/or sugar', but household purchases were three times that. What's more there was 28% too little fruit and vegetables. [6] And this is only what the government recommends, which at 8% sugar per meal is extraordinarily high!

'*Every successful diet in history restricts sugar*' (Lustig, p. 117). In the past the low-fat diet was hailed as healthy, but dietary fat was replaced with sugar for palatability. Slightly more recently the low-carb diet, Japanese diet, Mediterranean diet and Palaeolithic diet have had their popular moments; some rely on fats for their energy, others on carbohydrates, and some on both. Absolutely crucially they are all low in sugar and high in fibre. This is the key.

Let's take fruit as an example. In the last five years smoothies and health juices have taken off, claiming to combat everything from hangovers to cancer. With very few exceptions, the fruit is loaded into a juicer, pressed or chopped and the juice alone flows out, and possibly sits on a fridge shelf for a while. So what you have is a glass of fructose. A glass of sugar. What makes

fruit good for us is its fibre, and what makes it palatable is the fructose. The fibre allows the liver to keep pace and mitigate many of the effects of the fructose (Lustig, p. 119).

" *High-fibre foods tend to be less 'energy dense', so you are consuming fewer calories for the same quantity of food. Also they often require more time to chew, giving your body more time to receive its satiety signal and they move through the intestine faster, generating the satiety signal sooner*. " (Lustig, p. 137)

The four principles to shop and eat by are:
1. Low sugar
2. High fibre
3. Low omega-6 fats
4. Low trans fats

At the moment only 16%-20% of five to fifteen years olds in England eat their '5 a day'[7].

Foods to eat 'ad-lib' include: whole grains, such as amaranth, quinoa, rye, barley, brown and wild rice, fresh herbs and spices, houmous, mustard, yogurt, olive and rapeseed oils, eggs, nuts, seeds, cheese, free-range meat (and grass-fed beef), beans, fruit and vegetables.

Learning to handle your ingredients sympathetically is as key as putting the right things in your shopping basket. There's no point loading up with kale at the market only to boil all the nutrients out of it at home, or smothering it with ketchup to make the kids eat it.

Finally a word on exercise: "*When you're building bone and muscle, you are providing a method for burning energy rather than storing it, which leads to improving your health regardless of your weight*" (Lustig, p. 87). Children in the US watch an average of three to four hours of television every day (Lustig, p.29). We know that exercise, especially outside, whether it is running, swimming or walking the dog helps to lower stress levels, build muscle and maintain a sense of well being.

Eat real, whole food to maintain the body's balance, to keep a healthy body and mind and prevent the disease processes from developing.

Watch Dr. Lustig http://www.youtube.com/watch?v=dBnniua6-oM

http://www.youtube.com/watch?v=ceFyF9px20Y

And check out his credentials http://profiles.ucsf.edu/robert.lustig

Call your local independent bookshop to order a copy. If you live near the Clinic, it's probably Barnes Bookshop.

http://www.theguardian.com/society/2014/jan/09/obesity-campaign-cut-sugar-processed-foodshttp://www.theguardian.com/society/2014/jan/09/obesity-campaign-cut-sugar-processed-foods

http://www.theguardian.com/science/2014/jan/12/remove-fruit-juice-sugar-five-a-guidance-government-health-adviser

11.6% of household income in the UK was spent on food in 2012.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265245/familyfood-2012statsnotice-12dec13.pdf

In 1970, food and non-alcoholic drinks took up 21% of household expenditure. By 2008, this was down to 9%.
http://news.bbc.co.uk/2/hi/business/8609250.stm

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[1] http://www.noo.org.uk/NOO_about_obesity/trends
[2] Food Statistics Pocketbook 2012, p. 67
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/183302/foodpocketbook-2012edition-09apr2013.pdf
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[5] Statistics on Obesity, Physical Activity and Diet: England 2013, p. 6
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