IAN BREAKER

BEAT YOUR WEIGHT BEAT YOUR FAT

How To Lose Our Weight with Weight Loss Mastery

Other Books in *The Body & Soul* Series:

Sleep Tight

The Smarter Way To Sleep, Dreams, And Health

(Book 1)

Also by Ian Breaker

Bored Panda, Banished!

5 Ways To Improve Life While At Home

Beat Your Weight Beat Your Fat

How To Lose Our Weight with Weight Loss Mastery

(Body & Soul Series, Book 2)

Ian Breaker

First Published January 2020 as
FAT: A Fix For Some Of Our Problems
Republished January 2020 as
FAT: Get Rid Of It
Republished June 2020 as
Beat Your Weight Beat Your Fat

www.lifegroup.life

The Problems

That environment is the problem, and we'll cover the food environment in this chapter as this is what I see as the main problem. For sure, there are other problems that contribute to gaining fat, such as a much lower energy expenditure for most people these days, and various genetic and biological influences that can help fat accumulate, but our energy expenditure has been getting incrementally lower for hundreds of years and yet our fat problem has come about only over the past few to several decades. New fat gaining genes also haven't swept through the human species recently and we've largely been the same for thousands of generations. This points to and emphasises the main problem being our food and our intake of it, not our genes or our energy expenditure.

Of course, this is not a new idea, and our environment has been touted as obesogenic for a while with our available food being one part of that obesogenic equation. Indeed, there is one particular proposed problem that I want to cover before we move onto what I see as the real problem. Before that though, let's just have a quick primer on the body and eating so we have a conceptual base going forward. We don't need to get into the weeds with this stuff so I'm going to keep it as simple and as concise as I am able.

GETTING FUEL

The body doesn't care what we're actually eating because as far as it's concerned it's all just sugar molecules, amino acids and fats, and what we eat and drink is broken down into these constituent components so our body can absorb and use them. Proteins are the amino acids. Carbohydrates are the sugar molecules. And fats are fats, both good and bad, in various forms.

Vitamins and minerals are used for myriad things to keep the body functioning well. Protein is used for building and maintaining tissue, hormones, and mediating bodily processes, among other things (our bodies are largely built from proteins). Carbohydrates and fats are the primary source of fuel.

The fats, after being freed from the food, eventually get bundled back together into particles so they can travel around the system. They will find their way into the lymphatic system and into tissues and organs. Depending on the organ, the fatty acids will either be used for energy or stored in our fat cells. As an adult, we have a mostly fixed number of fats cells,[1] and we have billions of them all over the body. Some are under the skin (subcutaneous fat), some are in organs, some are in muscles, and some are around the organs of the abdomen (visceral fat).

The carbohydrates are handled differently. Carbohydrates are just sugar molecules linked together in various ways that are broken down into their constituent sugars and absorbed through the small intestine. There's 3 simple sugars: *glucose* (the body's first source of fuel), *fructose* and *galactose*.

The glucose component of the carbohydrate (or about 80% of it) is sent into the blood and begins circulating around the system (the other ~20% goes to or is taken up by the liver). High levels of glucose in the blood is toxic to the body, so in response to glucose our body immediately begins shuttling it off to various places. Some of the glucose is taken up by cells that need the fuel and some more is initially relinked together and stored as *glycogen*, the storage form of carbohydrate in our muscles and liver at about 2000 calories worth (the equivalent storage in a plant is *starch*, although it's a lot more dense than glycogen). If glycogen stores are full then excess glucose can get converted to fat and stored.

[1] …which, as an aside, is why you shouldn't have liposuction performed because liposuction removes fat cells and not just the fat from inside the cells, meaning we'll have fewer cells available for our fat and therefore a lower safe level of fat storage.

This storage process is heavily controlled by *insulin*, and the end result is stable (and controlled) blood sugar levels that our body maintains for the purpose of providing immediate fuel to vital systems and maintaining consciousness.

And that, as they say, is that. I've omitted a bunch of stuff, of course, but that alone gives you the grounding you need to conceptually understand the root (and fix) for various things as we move along.

For now, one key point here is the part about our body's primary objective after eating being to get our blood sugar levels down by releasing insulin to shuttle the glucose to the cells that need it, and any left-over, unused and unneeded glucose gets shuttled into storage as expeditiously as possible, because herein lies a proposed problem that I want to cover first; the *sugar and insulin* problem.

A PROPOSED PROBLEM - SUGAR & INSULIN

This argument is somewhat multi-faceted and both can often be promoted as the cause of our woes. The argument is also said in various ways depending on who is saying it and what angle they decide to come from, but it basically goes like this (fair warning: there's a few technical terms in this section that may be new to you, which I hate doing, but stick with it. You don't have to remember them):

Our bodies mainly run on fat if we allow them to.[2] However, fat is stored as something called *triglycerides*,[3] and the body can't burn fat in the triglyceride state. To be able to burn the fat the body needs to break the triglycerides apart into its fatty acids. For this to happen our insulin levels need to drop because the enzyme that allows the fat to be broken apart[4] is inhibited by insulin. As such, since insulin controls both the storage of fat (by increasing after blood sugar increases and shuttling the glucose into storage) and inhibits the release of that fat for fuel (by inhibiting the enzyme that does it), insulin, and by extension, sugar, is the cause of obesity, and by implication, our health problems.

[2] Eating inhibits CPT-1 (*carnitine palmitoyltransferase*-1), which is an enzyme that allows fatty acids to pass into the part of a cell (mitochondrion) that generates usable energy (*adenosine triphosphate*, ATP). This makes glucose the primary fuel in the fed state (a condition that reverses in the unfed state, thus making fat the prominent fuel during periods of fasting).

[3] 3 fat molecules, known as fatty acids, held together by another molecule, known as *glycerol*, hence *tri*-glycerides.

[4] *Hormone Sensitive Lipase* (HSL).

To some, it's not just sugar that's the problem but carbohydrates in general. We'll cover carbohydrates below when we discuss the actual problem, but since carbs are sugar, carbs are therefore the problem. Depending on what you've read previous to this you might have heard this said before. It's the main message behind the public advocacy of the ketogenic diet, for example.

The argument sounds reasonable, and I was partially sold on it myself for a while, but there's five problems with it.

First, there's a clue in the argument itself… insulin *inhibits* the freeing of fat for burning (known as *lipolysis*). It doesn't prevent it. Biochemists will tell you that the body works with something more akin to dimmer switches, not on/off switches; we can still burn fat in the presence of insulin because other hormones can also be at play that stimulate the freeing of fat, such as cortisol, epinephrine, glucagon, etc. These hormones are active together, so while insulin is inhibiting the freeing of fat, the others are *stimulating* it. Further, while insulin is promoting the storage of fat, other hormones are *inhibiting* the storage of fat (leptin, growth hormone, etc), so nothing is as clear as it first seems. It's worth remembering here that the human body is extremely complicated, so focusing on a single hormone and into a single biochemical pathway and presuming it tells us the full story is somewhat careless.

Second, why is it only sugar that's held up to account when protein can cause an insulin response as well? Some protein sources (e.g. whey protein drinks) are as insulinogenic as sugar itself. If we're going to say that sugar causes obesity due to insulin then we also have to explain why the argument doesn't hold for protein. One hypothesised answer is that protein stimulates the release of *glucagon*, which negates the effect of insulin. That may be the case but, once again, the human body is extremely complicated, and knowing how all of these hormones interact in different ways and at different levels in the presence of different foods taken in different amounts and at different rates is, in a word, *unknown*. Nutrition is not physics, and quantifying all the effects of an isolated nutrient in the human body is almost impossible for us. In a test tube, sure, but not in the body, not when not taken in isolation (which it seldom is), and certainly not for any particular individual since different people respond differently to certain foods; a cake to one person may spike their blood sugar through the roof but yet to another it may not (this is where the idea of

precision nutrition is coming from, but that's likely years away). Since we don't know how all these hormones and metabolic processes act together the explanation proposed by the sugar-insulin model is therefore unreliable.

Third, giving people glucagon-like peptide 1 mimetics (such as liraglutide), which leads to an insulin release in the presence of elevated blood glucose, helps people lose weight and improves their health markers. If sugar causes elevated blood sugar that causes an insulin release that causes obesity, why does the insulin release in the presence of liraglutide do the opposite?

Fourth, eating *excess* carbohydrates stimulates *fibroblast growth factor-21* (FGF-21), which is a protein that improves blood sugar control, speeds up fat burning, slows down carb burning, and decreases appetite. This appears to be at odds to the sugar-insulin argument, because how do we explain it away when we're using the effect of carbs as a premise for obesity? As yet, there appears to be no proposed rebuttals.

Fifth, and that which looks to herald the sugar-insulin argument's departure, is that it basically contradicts *energy balance*.

ENERGY BALANCE

Energy balance is not complicated, but it's implications are all encompassing and it's never been found wanting. Before highlighting how the sugar-insulin argument basically contradicts it, allow me to elucidate a little on energy so you have a good grounding:

We must get the energy we need from that which we consume, and we're all familiar with this energy, we know it as *calorie*. A calorie is basically the energy contained within the chemical bonds of the food that we eat. (Recall above when I romped over how we get our fuel, with the body breaking apart what we eat into its constituent components. Well, that breaking apart of the foodstuffs into their components takes energy.[5] Your body then rearranges things and makes new bonds, which releases energy, and this becomes the calories, which are units of this energy. If the energy released is more than what it takes to break the bonds apart (which it always is), we gain a surplus).

Since our bodies use energy to perform all the tasks that it requires, if we

[5] E.g. glucose is a molecule of carbon, hydrogen, and oxygen atoms bonded together

don't have the energy we can't perform the task. And energy balance can be understood if we consider someone who requires, say, exactly 2000 calories a day to maintain their weight. That is, 2000 calories will neither allow this person to gain weight nor lose it. Now give this same person 1500 calories a day. This person is now in a 500 calorie deficit. This deficit *must* be accommodated for, irrespective of insulin (or other hormones), sugar, blood glucose levels, or any other biochemical term we care to drudge up, because they require 2000 calories and we've only given them 1500. They're missing 500 needed calories. Since we cannot breath in energy out of thin air this deficit of energy will have to be supplied from this person's storage of energy, i.e. their fat.

That, quite literally, is how energy balance works, and it breaks the sugar-insulin obesity argument (more formally known as the carbohydrate-insulin model of obesity, CIM) because if insulin caused obesity then a negative energy balance wouldn't result in fat loss in the presence of insulin, but yet it does, irrespective of the food eaten or the hormones that are present. Fat loss or gain *always* comes back to energy balance, and energy balance, achieved through calories-in calories-out, is actually something that can be manipulated in various ways to help us on our fat loss journey. And we'll be doing it all in what follows.

To be fair, the insulin argument also says that insulin makes you hungrier (due to high carbs/sugar in the diet) by emptying the bloodstream of glucose and fatty acids, thus signaling to your brain to eat, resulting in energy balance (due to the eating of carbs) routinely being tipped towards more calories-in than out. However (and the above argument on FGF-21 notwithstanding), insulin is thought to regulate appetite, not increase it, and the obese do not have lower levels of fatty acids in their bloodstream (sometimes they are even higher than normal), so part of this argument doesn't seem to hold up either. Of course, it's much easier to pick holes in an argument than it is to develop one, but the insulin argument just looks to have a few too many holes.

Regardless, we may think, sugar is bad through and through anyway, and we all know this, right?

SUGAR

Sugar has certainly gotten a bad rap nowadays, and part of the reason for this is that it's reached popular awareness that the sugar industry engaged in

various unscrupulous tactics in order to sell more of their wares, but we need to be careful of the horn effect here; just because big business pushed their agenda for profit proves nothing except that they have a vested interest in pushing information that makes their product look good and their competitors bad. It says nothing about sugar itself, only about the companies that sell it.

However, don't think I'm saying that it's perfectly fine to stuff our faces with refined sugars and carbohydrates. I'm really not. Limiting these can be beneficial for various reasons, such as high sugar diets having been linked to inflammation (but then so have high fat diets as well as any other diet that results in excessive fat gain), and limiting them in a structured manner has been shown that it can help those with type 2 diabetes at reducing their insulin dependence, even to the point of pushing the diabetes into remission with some individuals.

Further, sugar is sweet to us (or at least the fructose molecule is), and humans love sweet stuff. Sweetness also activates the reward centre in the brain, which compels us to seek more of it, resulting in a somewhat reliable route to obesity. We can routinely gorge on as much sweet stuff as we like—and it's pretty much unlimited over the long term because there is theoretically no upper limit to the amount of fat that we can store—and we won't stop doing it because it gives us pleasure and therefore we don't want to.

For the record, I do understand the thoughts and concerns around sugar, and it certainly sounds like a bit of a rotten apple at times, irrespective of the insulin claims, but sugar is not 'bad'. And carbohydrates in general are also not 'bad'—they can actually be good, for various reasons, such as immune and cognitive function, and cortisol, testosterone and thyroid hormones.

If they were inherently bad I'd certainly be in trouble myself as I eat lots of fruit and veg, and I'm not shy with wholegrains either, but I am lean, and yet, as you can see, I subsist on a diet with lots of sugar. The problem with sugar is not sugar itself, but rather the *dosage* and *rate* of it. It's the way we're consuming these carbohydrates in general that can be ill-advised (refined carbs and free sugars), rather than carbohydrates and sugar being bad in general.

Sugar and carbohydrates certainly don't explain *why* it's so easy to get fat

in the first place, nor why most of us are becoming so. For sure, if we couple these refined sugar and carbohydrate foods to the often high and easy calories associated with these foods this is surely partly to blame for our obesity and the difficulty we're facing with getting rid of it. Especially considering that added sugar is everywhere and in most everything and often accompanied by lots of fat as well, so we need to fix it (and we will). But putting a lot (or all) of the blame at the feet of 'carbohydrates' is overly simplistic (and mistaken) as there are other problems with our food. Problems that look, almost inevitably, to lead us to becoming fatter. Carbohydrates have also been eaten for millennia and there's little that's inherently bad (save for tooth decay) or fattening about them.[6]

Our obesity problem is more complicated than this because we have also drastically changed *what* we are eating and drinking. Indeed, the most drastic way that our food environment has changed is by changing the rate at which this sugar enters our system, which can lead to many more calories consumed than we might otherwise would since it's so much easier and more pleasurable to do so. This has been done by the removal of *fibre*, not through the inclusion of sugar and carbohydrates.

THE REAL PROBLEM - FIBRE

It'd be appropriate here to explain *carbohydrates*, and in so doing we'll expose and illuminate the problem.

Carbohydrates are made up of sugar molecules and they've been given

[6] I can imagine that the low and no carb crowd will have a further problem with this. Glucose, they say, has inherent problems of its own and that it will damage you over time and so therefore should be restricted as well. Although it's true that the metabolism of glucose does have some potential issues (high triglycerides and aging of the body's proteins through tissue damage if your body is lacking a sufficient number of enzymes that eliminate free radicals) this is getting rid of the baby because it's got dirt on it, akin to never going swimming because some people drown. Eating lots of glucose that you don't need the energy of is certainly a recipe for fat gain, but the same can be said about any excess calories from any source. Only *after* we're developing a metabolic problem because of our fat does our general glucose consumption become a potential problem as well, just like overall calorie consumption does.

Moreover, carbohydrates appear to be more muscle/protein sparing than fat—that is, we won't lose as much muscle whilst we're losing weight, which is a good thing because we don't want to be losing muscle since it's good for us and aids fat loss directly (being more metabolic active than fat so burns more calories, even just sitting there).

three forms, *sugar*, *starch*, and *fibre*. These three forms are further bundled into two main classifications, *simple* and *complex*.

Simple: Simple carbohydrates refer to the sugar form, and there are many sugars, but only three simple ones (glucose, fructose and galactose). A simple carbohydrate refers to a sugar with a molecular structure of between one and two parts. For example, glucose, fructose or galactose, being singular molecules, are the simplest form of carbohydrate. *Sucrose* (table sugar) is two parts (glucose and fructose) and is therefore a simple carbohydrate. *Maltose* (the stuff that's in beer) is also two parts (both glucose), and so is also a simple carbohydrate. *Lactose* (milk sugar) is again a simple carbohydrate (glucose and galactose). Any more than two parts and the carbohydrate becomes a complex carbohydrate.

Food and drink containing simple carbohydrates are often remarked as containing 'free sugars', and our bodies love free sugars because they require little effort from our body to be absorbed (which makes the energy contained in them readily available). Simple carbs are absorbed rapidly (the quickest being liquid).

Complex: Complex carbohydrates are basically what the simple ones aren't, i.e. those with a molecular structure of more than two parts. As you would guess, the energy in complex carbohydrates isn't as readily available to the body as is the energy in simple carbs (mostly being due fibre content, particle size, and structural integrity).

Under the banner of complex carbohydrate is *starch* and *fibre*.

Starch: Starches are actually just sugar molecules linked together in long chains, but colloquially speaking things such as rice, bread, pasta, etc., are used to refer to a starch. They come in two forms. There's the *refined* form and the *wholegrain* form. Wholegrain is a descriptive term. It refers to cereals that have all of the layers of the grain still intact (the bran, which is high in fibre, the germ, and the centre/endosperm, which contains the fuel, in the form of starch). Wholegrains are, well, whole (save for the outer hull). Refined starches refer to starches that don't have all layers of the grain still intact, and have been refined to remove the outer layers and only keep the middle (the starch/sugar). As before, the simpler it is the more readily available the energy is to us—plus the body can end up excreting more of the wholegrains than the refined grains

(e.g. course flour compared to refined flour), resulting in our bodies getting less overall energy from them in comparison to an equal amount of refined grain.

Fibre: This is the portion of carbohydrates that you cannot digest. It makes up the walls of the cells in the food that you eat (like vegetables and fruit), and the cells are where the sugar resides. Because the sugar molecules are contained within the cells then this, by default, slows down the rate at which the body can get at the energy and absorb it.

There are two basic types of fibre, *soluble* and *insoluble*.

Soluble fibre is so called because it dissolves in the gut, becoming a sticky glue-like substance that coats the walls of the gut and traps foodstuffs, further reducing the rate at which the energy can enter the bloodstream. It also provides nourishment to our good gut bacteria (more in the food appendix), which promotes the health of the host (that's you).

Insoluble fibre does not dissolve in the stomach, it absorbs water and bulks, resulting in a fuller feeling and therefore increased satiation. It aids in digestion and motility.

Reading that I can imagine you've already guessed at the problem I'm going to highlight. The problem is that these days much food is comprised mainly of quasi simple carbohydrates (refined) and fat and protein, with fibre and wholegrains seeming to be something of forgotten components. This is certainly the case with many pre-packaged and 'processed' foods,[7] which has done much to strip out any remnant of the fibre that might remain. Self-prepared food and meals can obviously be different, but even here the fibre seems to have taken a mostly back seat to the refined carbohydrates. This is unfortunate because fibre has several benefits.

As touched on above, when you eat a carbohydrate with fibre, say a price of fruit, the sugar is encased in the fibre and so the body can't get at these sugars quickly. The result, as with wholegrains compared to refined grains, after all work is told, is often a greater production of heat, which is an increase to our calories out. To be explicit, wholefoods can take up to 10%+ more energy to

[7] Although I understand that 'processed' is somewhat ambiguous as the term can refer to nearly anything we do to food (cooking is a process after all), but I'm using it as the term to describe the engineered side of our food. The side of food that most often results in it coming in a packet with a large ingredients list.

process and utilise than do highly processed foods where much of it is simple and has smaller particle sizes. It's akin to the idea of eating a steak as a steak or grinding that steak into a mince—we'll get more calories out of the mince, and at a faster rate, than we will from it still being in the steak form because it's easier for our bodies to process the mince than it is the steak. A lot of our stuff these days doesn't even require much chewing (which takes energy, and therefore also increases our calories out), and we can almost close our mouths around it and swallow and have consistent and rapid calorie absorption.

However, the main problem with removing fibre is that we always end up with non-satiating, rapid, cheap, good tasting and moreish calories. So popular has this approach been to food preparation that it's now more expensive to buy something that hasn't been refined (which probably goes some way to explaining why obesity troubles the poorer members of society more so than the affluent).

Of course, you *could* get fat by eating too much fruit, such as pears and apples and dates and grapes (anything will make you fat if you eat enough of it), but you'll find it a lot more difficult compared to, for example, drinking the juice alone where it's easy to drift into the realm of very high calorie amounts. The same goes for all the other foods and drinks found on our shelves that are either refined and have no fibre and/or contain added sugars and fat.

Further, fibrous food has the effect of speeding up the passing of what you've eaten down into the small intestine, which then sends signals to your brain that you're full, i.e. that you're satiated and so won't want to continue to eat. Conversely, removing the fibre results in less overall satiation from our food because then the food doesn't have the same level of substance to begin with.

Moreover, removing fibre and substituting it with refined grains, free sugars and fat (and salt), which is what always happens, means that these things become very tasty to us, understandably leading to the drive to eat more of it, which makes fat gain reliable. They're quasi addictive and please us greatly. They don't satiate very well in the first place, and the satiation they do provide is gone in short order and so we're compelled to eat again sooner, which leads to us routinely going above our calorie maintenance levels. In effect, refined carbohydrates, no fibre, free sugars and fat makes us eat more by way of tasting good and making us hungry sooner.

The foods that result from all this processing are calorie dense good tasting little chunks of readily available calories. So dense are some of them that we can end up outstripping our calorie maintenance levels with just the addition of a few little goodies to our daily intake. For example, consider a requirement of 2000 calories a day for maintenance (a good enough metric for example). A doughnut containing ~200 calories, and they're tasty so we'll have two. A single can of coke at ~150 calories. A single Mars bar at ~230. This is almost 900 calories, which is 45% our daily calorie allowance to not gain fat, and we haven't even eaten anything yet that we'd actually consider 'food'.

And it's not just the industry manufactured stuff that's like this as we can easily do it ourselves. For example, eating an apple means we're getting a decent amount of sugar, but if we turn that apple into juice then we're looking at around 5 apples to make even 250ml (depending on size of apples, of course, and how much of the pulp we decide to strain). And 250ml is somewhat small by my reckoning, a better quantity would be close to 500ml, which means we're now at 10 apples. Could you eat 10 apples in one sitting (and then still eat your evening meal)? I doubt it. But you'll do this without batting an eye with the juice. Just think of all the additional calories you're getting from this, calories that have next to no satiety value. Yes, a single smoothie a day can be considered one of our five a day, but so what? Just eat the fruit instead and don't drink your calories while pursuing fat loss, at least not regularly. Not being produced by industry doesn't mean it's not calorie dense and fattening.

That, fundamentally, is the problem with our food and the proximate cause of our fat.

THE 4-STEP PROCESS OF OBESITY

So here is the logical order as I see it:

1. Fibre is removed from our food, which exposes us to a food environment of readily available and super abundant calories; i.e. easy to come by, cheap, and with lots of free sugars and fat.
2. We're compelled to eat more than we require, for three reasons:
    - Because it's scrummy (and we all like scrummy things!)

- Our food choices don't adequately satiate us.
- This results in us feeling ravenous more often, compelling us to eat again.

3. …but eating again isn't the actual problem. The problem is that once again we eat our current and readily available food environment, which is small packets of free sugars and fat at high calorie counts.
4. Steps 1–3 begin to repeat and then our problems begin.

THE MAIN TAKE AWAY

The main take away here is the extreme reduction in the amount of fibre encasing the sugars that we're eating. Stripping fibre means that the sugar that we are eating doesn't satiate us like it could. Or, said another way, removing fibre is a good way to make us eat more calories, in both amount with each sitting and more often. A reduction in fibre also brings with it an increase of sugar and fat into our diet and less bulk, which means more calories again. Removing fibre actually results in us getting more calories in general because the calories in our food and drink are so readily available.

• • •

It is often said, and it's true, that losing fat fixes all the health problems associated with obesity (inflammation, insulin resistance, cholesterol, etc.), so people are told to lose the fat to fix their health. But this largely sounds like it's their choice to be fat, and so to fix their health problems they just need to do something else. But being fat isn't a direct choice. Being fat is a *consequence* of interacting with our environment in a certain way.

The fix for this is *satiety*. Being satiated with our food choices means we don't keep eating and fueling the problem, and how we become satiated is by doing what we can to maximise our satiety levels. This isn't a tautology. It's simply pointing to *what we need to do*. Excess fat is basically due to being compelled to consume more energy than what we need because we're not satiated. This leads to more calories in than out. So what's the fix?

References

Much effort has been made to use articles that are open and freely accessible to the public. Inevitably (and sadly), some publicly funded articles are still behind paywalls. In such instances, try *sci-hub.*

THE PROBLEMS

I would like to thank Dr Layne Norton who brought liraglutide to my attention. This made me take a deep dive into sugar and insulin resulting in an extensive overhaul to my original theory of it. Layne Norton's website is www.biolayne.com

"A map of human genome variation from population-scale sequencing" dx.doi.org/10.1038%2Fnature09534

"A global reference for human genetic variation" dx.doi.org/10.1038%2Fnature15393

"Energy balance and obesity: what are the main drivers?" dx.doi.org/10.1007%2Fs10552-017-0869-z

GETTING FUEL

"Biochemical, Physiological, and Molecular Aspects of Human Nutrition, 3rd Edition" - Saunders (2012). Martha Stipanuk, Marie Caudill.

"How Fat Works" - Harvard University Press (2009). Philip A. Wood

A PROPOSED PROBLEM

"How Fat Works" - Harvard University Press (2009). Philip A. Wood

"The Carbohydrate-Insulin Model of Obesity: Beyond 'Calories In, Calories Out'" doi.org/10.1001/jamainternmed.2018.2933

"Regulation of Triglyceride Metabolism. IV. Hormonal regulation of lipolysis in adipose tissue" doi.org/10.1152/ajpgi.00554.2006

"Mechanisms of nutritional and hormonal regulation of lipogenesis" doi.org/10.1093/embo-reports/kve071

"An insulin index of foods: the insulin demand generated by 1000-kJ portions of common foods" doi.org/10.1093/ajcn/66.5.1264

"Insulinotropic Effects of Whey: Mechanisms of Action, Recent Clinical Trials, and Clinical Applications" doi.org/10.1159/000448665

"Liraglutide for weight management: a critical review of the evidence" onlinelibrary.wiley.com/doi/full/10.1002/osp4.84

"Liraglutide With Insulin Improves Glycemic Control in Type 1 Diabetes, Without More Hypoglycemia" tinyurl.com/y5l3unvn

"Liraglutide as an Additional Treatment to Insulin in Patients with Type 1 Diabetes Mellitus—A 52-Week Randomized Double-Blinded Placebo-Controlled Clinical Trial" doi.org/10.2337/db18-3-LB

"A Randomized, Controlled Trial of 3.0 mg of Liraglutide in Weight Management" doi.org/10.1056/nejmoa1411892

"Circulating FGF21 in humans is potently induced by short term overfeeding of carbohydrates" ncbi.nlm.nih.gov/pmc/articles/PMC5220397/

"Fibroblast Growth Factor 21: A Versatile Regulator of Metabolic Homeostasis" ncbi.nlm.nih.gov/pmc/articles/PMC6964258/

"Going Back to the Biology of FGF21: New Insights" doi.org/10.1016/j.tem.2019.05.007

ENERGY BALANCE

"Biochemical, Physiological, and Molecular Aspects of Human Nutrition, 3rd Edition" - Saunders (2012). Martha Stipanuk, Marie Caudill

"Dietary modifications for weight loss and weight loss maintenance" doi.org/10.1016/j.metabol.2019.01.001

"Calorie for Calorie, Dietary Fat Restriction Results in More Body Fat Loss than Carbohydrate Restriction in People with Obesity" doi.org/10.1016/j.cmet.2015.07.021

"Energy expenditure and body composition changes after an isocaloric ketogenic diet in overweight and obese men" doi.org/10.3945/ajcn.116.133561

"Obesity Energetics: Body Weight Regulation and the Effects of Diet Composition" ncbi.nlm.nih.gov/pmc/articles/PMC5568065/

"An 18-mo randomized trial of a low-glycemic-index diet and weight change in Brazilian women" doi.org/10.1093/ajcn/86.3.707

"The Carbohydrate-Insulin Model of Obesity: Beyond 'Calories In, Calories Out'" doi.org/10.1001/jamainternmed.2018.2933

"Pancreatic signals controlling food intake; insulin, glucagon and amylin" doi.org/10.1098/rstb.2006.1858

"Relationship between body fat mass and free fatty acid kinetics in men and women" doi.org/10.1038/oby.2009.224

SUGAR

"The Case Against Sugar" - Portobello Books (2017). Gary Taubes

"Reward, dopamine and the control of food intake: implications for obesity" ncbi.nlm.nih.gov/pmc/articles/PMC3124340/

"Excessive Consumption of Sugar: an Insatiable Drive for Reward" doi.org/10.1007/s13668-019-0270-5

"Frontostriatal and behavioral adaptations to daily sugar-sweetened beverage intake: a randomized controlled trial" doi.org/10.3945/ajcn.116.140145

"The Carbohydrate-Insulin Model of Obesity: Beyond 'Calories In, Calories Out'" doi.org/10.1001/jamainternmed.2018.2933

"Long-term Effects of a Very Low-Carbohydrate Diet and a Low-Fat Diet on Mood and Cognitive Function" doi.org/10.1001/archinternmed.2009.329

"Modification of immune responses to exercise by carbohydrate, glutamine and anti-oxidant supplements" doi.org/10.1111/j.1440-1711.2000.t01-6-.x

"Diet-hormone interactions: protein/carbohydrate ratio alters reciprocally the plasma levels of testosterone and cortisol and their respective binding globulins in man" pubmed.ncbi.nlm.nih.gov/3573976/

"Influence of dietary carbohydrate intake on the free testosterone: cortisol ratio responses to short-term intensive exercise training" link.springer.com/article/10.1007/s00421-009-1220-5

"Dietary-induced alterations in thyroid hormone metabolism during overnutrition" doi.org/10.1172/JCI109590

"Isocaloric carbohydrate deprivation induces protein catabolism despite a low T3-syndrome in healthy men" doi.org/10.1046/j.1365-2265.2001.01158.x

THE REAL PROBLEM

"Carbohydrate bioavailability" doi.org/10.1079/BJN20051457

"Postprandial energy expenditure in whole-food and processed-food meals: implications for daily energy expenditure" doi.org/10.3402/fnr.v54i0.5144

"Substituting whole grains for refined grains in a 6-wk randomized trial favorably affects energy-balance metrics in healthy men and postmenopausal women" doi.org/10.3945/ajcn.116.139683

"Oatmeal particle size alters glycemic index but not as a function of gastric emptying rate" doi.org/10.1152/ajpgi.00005.2017

"Particle size, satiety and the glycaemic response" pubmed.ncbi.nlm.nih.gov/7956991/

"The Thermic Effect of Food: A Review" doi.org/10.1080/07315724.2018.1552544

"Greater Whole-Grain Intake Is Associated with Lower Risk of Type 2 Diabetes, Cardiovascular Disease, and Weight Gain" doi.org/10.3945/jn.111.155325

"Substituting whole grain for refined grain: what is needed to strengthen the scientific evidence for health outcomes?" doi.org/10.3945/ajcn.117.152496

"Weight Gain: An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake" doi.org/10.1016/j.cmet.2019.05.008

"Metabolic effects of dietary fiber consumption and prevention of diabetes" doi.org/10.1093/jn/138.3.439

"Dietary fiber and body weight" doi.org/10.1016/j.nut.2004.08.018

"Dietary Fiber and Metabolic Syndrome: A Meta-Analysis and Review of Related Mechanisms" doi.org/10.3390/nu10010024

"Impact of dietary fiber intake on glycemic control, cardiovascular risk factors and chronic kidney disease in Japanese patients with

type 2 diabetes mellitus: the Fukuoka Diabetes Registry" dx.doi.org/10.1186%2F1475-2891-12-159

"Dietary fibre and whole grains in diabetes management: Systematic review and meta-analyses" doi.org/10.1371/journal.pmed.1003053

"Dietary fibre and incidence of type 2 diabetes in eight European countries" dx.doi.org/10.1007%2Fs00125-015-3585-9

"Fuel not fun: reinterpreting attenuated brain responses to reward in obesity" ncbi.nlm.nih.gov/pmc/articles/PMC4971522/

"Reward, dopamine and the control of food intake: implications for obesity" ncbi.nlm.nih.gov/pmc/articles/PMC3124340/

"Excessive Consumption of Sugar: an Insatiable Drive for Reward" doi.org/10.1007/s13668-019-0270-5

"A Solid High-Protein Meal Evokes Stronger Hunger Suppression Than a Liquefied High-Protein Meal" doi.org/10.1038/oby.2010.258

"Effects of Soft Drink Consumption on Nutrition and Health: A Systematic Review and Meta-Analysis" https://doi.org/10.2105/AJPH.2005.083782

"Factors that determine energy compensation: a systematic review of preload studies" doi.org/10.1111/nure.12048

THE 4-STEP PROCESS OF OBESITY

"Reward, dopamine and the control of food intake: implications for obesity" ncbi.nlm.nih.gov/pmc/articles/PMC3124340/

"Excessive Consumption of Sugar: an Insatiable Drive for Reward" doi.org/10.1007/s13668-019-0270-5

"Frontostriatal and behavioral adaptations to daily sugar-sweetened beverage intake: a randomized controlled trial" doi.org/10.3945/ajcn.116.140145

"Variety and hyperpalatability: are they promoting addictive overeating?" doi.org/10.3945/ajcn.111.020164

"Dietary Energy Density and Weight Regulation" doi.org/10.1111/j.1753-4887.2001.tb05509.x