



F.A.T

The science of why we get fat explained in a unique
and effective way.

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Recently, a college of mine, Kenton Dechant P.Eng, shared a story he wrote. Kenton is someone I share many commonalities, especially as it relates to health and well being. For example, we both follow a LCHF (Low Carb Healthy Fat) diet and believe strongly in the many related health benefits.

One of the areas where Kenton excels, is in expanding his comprehension and learning by creating an understanding of the science in a way that is explainable. That is no easy task when it comes to food metabolism.

The story below, through an analogy relating our digestive system to a business, Kenton explains the science of how we manage, store and metabolize food, with all the cross impacts we experience whether trying to run a business, or maintain our own bodies.

I hope you find the article as interesting as I did. It's a challenging read but for those of you that like to dig deep into the science, you will find the F.A.T. Co. story creates excellent understanding.



F.A.T. Co. Big boss Talmus is in a bit of a predicament. His inventory controller recently left the position, so he needed to find a replacement. Talmus had heard of a guy that was extremely honest and obedient. This guy was so appropriate for the position that he leapt right into it. Because of this, he got the nickname Leptin.

Leptin had only one task. He had to send one memo every day with a total inventory count of what was in the warehouses. Just one number. Big boss Talmus hoped for very good inventory control. Ideally, this inventory number would be between 10 and 90 units, but he never told Leptin of his ideals. Each of the two warehouses could hold very much more than 90 units (even up to 10,000), and he didn't want his ideals to influence Leptin's memos. It didn't matter anyways, because Leptin was known for honesty.

[Leptin hormone is produced by the fat cells in the body. Low fat content results in low leptin signals. High fat content results in high leptin signals. These leptin signals go to the hypothalamus in the brain. You will learn later that the leptin hormone also has a significant influence on hunger, through influence on the dopamine production levels.]

There were two warehouses at F.A.T. Co. The front warehouse (Visceral) was reserved for storage of production that may be needed right away. The back warehouse (subcutaneous) is where the product goes for long term storage. They're both very big warehouses, and can each handle a lot of product. Curtis (Cortisol) decides which warehouse to put the product. He's a pretty high-strung guy. Whenever Curtis is there, everyone else gets stressed out too, and he repeatedly insists that product is going to be used right away, and therefore that it must all be stored it all in the Visceral front warehouse. When Curtis is off at the gym or taking it easy on vacation, then the product is stored in the Subcutaneous back warehouse, where it should be stored. The warehouse work gets done whether Curtis is there or not, and everyone relaxes when he's not there.

[Subcutaneous fat is the general storage area for fat on the body. Visceral fat (belly fat) is stored around the waist and around the organs. When stress hormone Cortisol is high, the fat will be stored viscally. High cortisol levels are the result of stress, insufficient sleep, screen time, high-intensity exercise, smoking, etc. Cortisol is reduced by low-intensity exercise and relaxation techniques.]

Snoozy (SNS) was generally hardworking and loyal to the instructions from Talmus. Snoozy was a very good salesman, and he loved to sell the product from either warehouse. When the company started out, and Talmus gave the daily instruction to not sell anything, Snoozy obliged. He felt bored and tired, so he would take naps and generally act lethargic around the office (that's how he got his nickname). Whenever Talmus gave a daily instruction to sell some product from the warehouse, Snoozy would jump to attention, full of enthusiasm and invigorated. He really loved to sell, and it was obvious in his daily emotions.

[When the leptin signal is high to the hypothalamus, the signal through the Sympathetic Nervous System (SNS) is to release fat from storage and convert it to energy. This makes the person feel invigorated and desire activity. When the leptin signal is low to the hypothalamus, the signal through the SNS is to conserve energy through lethargic behaviour. Regular lethargy can result in depression.]

The Purchasing Manager acts a bit goofy/dopey, so he got the nickname Dopey (dopamine). Big Boss gets pleasure from watching Dopey at his work. When Big Boss

gets a low Leptin Memo, and therefore a need to produce product, there is a corresponding need to purchase some raw materials (eat food). Big Boss calls Dopey with the instruction, and Dopey gets to work right away, hunting for good raw materials and gathering them toward the F.A.T. Co. production facility. This gives Big Boss so much pleasure to see him work. Unfortunately, when Dopey finds a raw material that he really likes, he often buys much more than he needs, and each order of raw material gets larger and larger.

[When the leptin signal is high to the hypothalamus, the production of dopamine is low, resulting in low reward (feeling of pleasure) from food – low hunger. When the leptin signal is low to the hypothalamus, the production of dopamine is high, resulting in high reward (lots of pleasure) from eating food – high hunger. Unfortunately, when we eat sweet foods (sugar), the dopamine pathways get damaged, so we need to eat more and more sugar to achieve the same feeling of pleasure from eating. This is addiction. Prior to the industrialization of food supply, we only had access to sugar at the fruit harvest season. We could indulge as much as we desired, because a week later, the rotten fruit would be unappetizing. The few pounds we gained would prepare us for winter starvation. The human body is well designed. It still works as it is supposed to... the difference is that there is continual availability of sugar in our food supply.]

The Receiving Manager likes to have his docks full of incoming raw materials. When the docks are empty for too long, he gets a bit growly, so he got the nickname Growly (Ghrelin). When the docks are empty, Dopey can hear him growling about it, and Dopey will order some raw materials. Growly also doesn't like his workspace to be too cluttered. When the docks are filling up, Growly sends messages to Big Boss, who then tells Dopey to back off the purchasing.

[When the stomach is empty, the Ghrelin hormone production by the stomach cells increases, which signals to the hypothalamus that we are no longer hungry. The hypothalamus then reduces the dopamine production, which reduces the reward of eating more food (lower feeling of pleasure).]

A long way down the hallway, on the way to the production shop, sits the worrywart. She's always watching for any raw material that moves past her office. Her real name is

Pepper, but everyone in the office calls her Peppy YY, because when the raw material starts to come past her office and build up in the hallway outside her office, she calls up Big Boss and yells “Why, Why, Why are you still bringing in raw materials? We are full! Get ahold of Dopey right away and tell him to stop!”.

[Twenty-two feet down the small intestine is another hormone feedback mechanism. When food moves past this spot in the intestine, a hormone called peptide-YY (PYY) is released into the bloodstream. When the hypothalamus sees the PYY, it interprets the signal as “being satisfied”, and it reduces dopamine production, which reduces the reward of eating more food (lower feeling of pleasure). Fibre in your meal will allow the food to move faster through the small intestine and trigger the PYY hormone earlier, which generally reduces overall calorie consumption.]

Even though these staff don’t talk often, and they never see where each other worked, they each understood their roles. Talmus rewards them with continued employment.

[This system does work well, and it is necessary for survival. During times of intense growth (birth, puberty and pregnancy), these hormones increase appetite to properly feed the growth processes. Also, in times of food shortage or seasonality, these hormones regulate the energy availability for survival. In times of normal subsistence, the feedback loops of leptin, ghrelin and PYY to the dopamine together regulate how much we eat and what we find desirable to eat.]

The production manager Pancreas, however, was not so sure of his job security. He really understood the big boss’s ideal inventory levels, and he knew that there were severe repercussions if inventory levels ever dropped to zero. He was rewarded by how much he could produce, so Big Boss’s ideal inventory levels came second to his personal gain. This insolent behavior gave the production manager a bad reputation, so he was considered a bit of an ass (pancre-ass).

[Zero fat on the body results in death, so the fat storage mechanisms are well tuned for survival. Whenever you eat carbohydrates, your blood sugar rises. The pancreas senses the high blood sugar and always responds by creating insulin, which results in the blood sugar being converted to LDL-B

fat (aka "bad cholesterol") in the blood and elevated triglyceride (TG), and its eventual storage into the body fat cells. This is the body's response to store the energy from carbohydrates for the future.]

In the beginning, there were ample opportunities for Pancreas to make product. Dopey was bringing in a lot of raw materials, and Pancreas was well rewarded for the hard work of his production team. Soon the inventory levels were rising faster than Snoozy could sell them. And they were getting up near the high end of Big Boss's inventory ideals. The instructions from Big boss began to change... Snoozy was so happy! "Sell! Sell! Sell!" - was the focus of Talmus' daily instructions to Snoozy. But Pancreas was told to "Hold off on production".

[When consumption of food and fat storage exceeds energy output, you will gain weight. When you have a healthy amount of fat storage, you will feel energetic. The weight and energy will find a healthy balance. A quick test of a healthy amount of fat storage is your abdomen circumference divided by your waist size. For men this should be less than 1.00. For women, this should be less than 0.85.

When we are at healthy levels of fat storage, the hypothalamus will respond to high leptin levels by encouraging the SNS to burn fat, making surges of energy available to the body. The same high leptin levels will reduce dopamine production, reducing appetite for food, lowering food intake, which decreases the necessary insulin production by the pancreas.]

But, Pancreas wanted to make more product. He had the staff for it. Dopey had found some raw materials that he really liked, so he was bringing in large quantities of raw materials (still trying to please Big Boss). And the warehouses were certainly large enough to hold more product. He had seen the warehouses, and he knew that Talmus never goes back there. So, he devised a plan. Whenever the memo from Leptin would arrive on his desk. He would change the numbers a bit before the memo goes to Talmus. Just lower the number a little.

[We really can store a lot fat on the human body. The amount of leptin hormone can get suppressed by the insulin. This is called leptin resistance.

These manipulated lower leptin levels send our bodies out of the normal feedback loop, and we begin to store unhealthy fat levels.]

Soon, Talmus was giving instructions to make product again. Unfortunately for Snoozy, his instructions were to hold off on the sales – of course Snoozy felt a bit sad about that – he was doing so well. As far as Talmus was informed, there was not much in the warehouse to sell. The instructions from Leptin kept coming in high to Pancreas, but the insolent (insulin) behaviour continued. The higher the insolent behaviour, the more manipulated Leptin's memos were.

[When the insulin suppresses the leptin hormone, the hypothalamus is tricked into thinking that there is not enough fat on the body – that there is risk to the survival of the body. The hypothalamus sends SNS signals to conserve energy, and we feel lethargic. The hypothalamus sends more signals to the pancreas to create more insulin to store more fat.]

Nobody noticed what was going on, so Pancreas got bolder and bolder. The inventory levels were certainly higher than desirable, but Talmus was now being led to believe that the warehouses were empty. Dopey was being told to find more and more raw materials. Pancreas was being told to produce more and more. Snoozy was again snoozing around the office. Lethargic and starting to feel depressed about never having anything to do.

[As you gain more and more body fat, the leptin hormone is suppressed further, and the pancreas is signalled to create more and more insulin. The insulin is supposed to clear the dopamine from the dopamine receptors, thereby reducing the pleasure from eating more food (lowering hunger). When the insulin no longer properly flushes out the dopamine, we overeat. This is called insulin resistance. Therefore, there is an escalating spiral between low leptin and high insulin, resulting in more and more overeating, fat storage and mental depression.]

F.A.T. Co. is not going to survive. How can Dopey be constantly sourcing raw materials, Pancreas is always making product, but Leptin says there's "never anything to sell in the warehouses", so Snoozy is so depressed from lack of sales, and Curtis is around all the time acting so stressed out?

[The human body is working precisely as it was designed, but with any addictive food supply, it cannot survive in the long run. How can dopamine constantly be causing us to seek out more food? When we eat so much, the blood sugar spikes again. The pancreas is forced to make insulin and store the fat. Our energy levels are so low, and we are depressed. Stress hormone Cortisol is always high. We can't seem to get out of this endless cycle.]

One day, Dopey was walking the halls of F.A.T. Co. and saw pictures of the good old days. F.A.T. Co. used to be mostly a retailer of products and manufacturer of only a few. Based on some external consultant's recommendations, they were told that they could manufacture products that were just as good as those procured from others, so they had focussed exclusively on manufacturing. Nobody predicted back then how Dopey and Pancreas would respond to this change, and that the quality of the manufactured product would be inferior to the retail products.

Dopey took it upon himself to make a few changes. He decided to source some finished products and stock the shelves with it, retailing like they used to do. Pancreas didn't need to know about it. There was no insolent behaviour. The warehouses still had lots of product in it, so Leptin's memo was high. Since Pancreas had no insolent behaviour, Leptin's high memo went straight to Big Boss, who learned of the high inventory. Immediately, there were instructions to Snoozy to "sell!" and instructions to Dopey to "back off the purchases". There was no instruction to Pancreas to make more product.

[Whenever you eat carbohydrates, your blood sugar rises. The pancreas senses the high blood sugar and responds by creating insulin, which results in the blood sugar being converted to LDL-B fat in the blood, and its eventual storage into the body fat cells. This is the body's response to store the energy for the future. LDL-B fat is bad for you, as it is responsible for clogging of arteries.

In the good old days (before industrial sugar production and heavy consumption of carbohydrates), the human diet would have been mostly protein and fat from external sources – other animals, fish, nuts along with

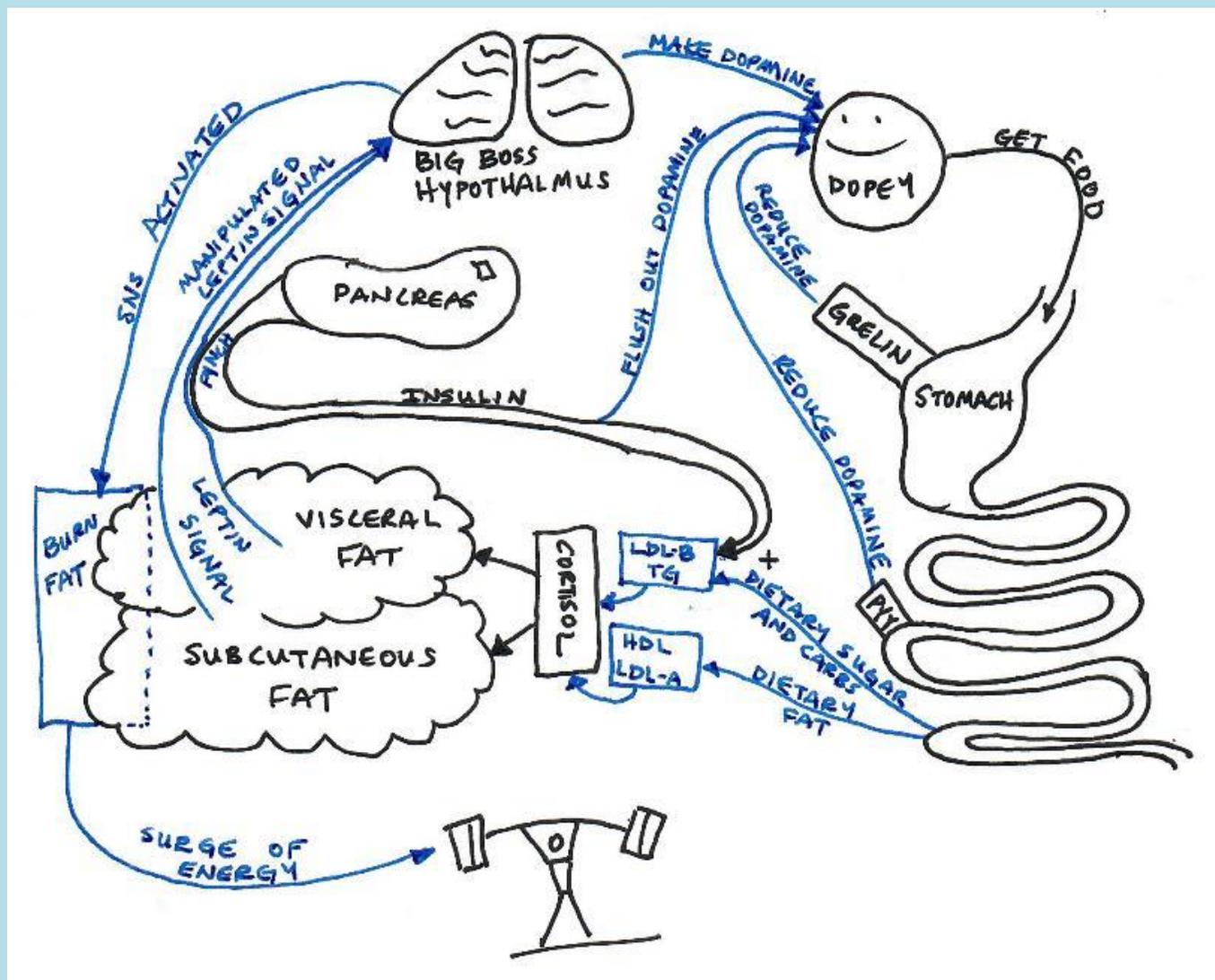
minor amounts of rough carbohydrates from high-fibre plants. Only occasionally was there access to ripe fruits or honey. In the 1950/1960/1970's, there was heavy pressure to reduce fat consumption and increase carbohydrate consumption (including sugars and refined carbs). Nobody predicted the uncontrollable response due to dopamine's addiction to sugar, the stress on the pancreas in response to this change in the diet, nor did we understand the implications on the types of fat within the body – that fat manufactured by the body from dietary carbohydrates is completely different (bad) for us compared to fat that is consumed. A calorie is *not* a calorie.

When you eat fats, there is no insulin response, and either LDL-A (thankfully too big to clog your arteries) or HDL (the efficient garbage man that tries to scrape away the clogging by LDL-B) are created by the body and circulated in the blood. Eating carbohydrates causes bad fat in your blood. Eating dietary fat does not cause bad fat in your blood. Eating fat and restricting carb intake will cause you to lose weight if you are too heavy already.]

As long as Dopey did not buy raw materials that needed to be processed by pancreas, the insolent behaviours stayed low and under control. Leptin's high numbers continued to be delivered accurately to Big Boss, who gave instructions to Snoozy to sell and only moderate instruction to Dopey for procurement. Inventory levels continued to drop. Snoozy was so invigorated and happy! This was contagious, and Curtis started to spend more time relaxing, so the front warehouse levels were dropping fast. Finally, the company was on the path to healthy success!

[So long as carbohydrate consumption is restricted, the insulin levels will remain low. Leptin hormone levels will be accurately interpreted by the hypothalamus, which will consistently tell the SNS to release fat from storage and make energy available to the body. The high leptin levels will keep dopamine production low, so only a healthy amount of healthy fatty food will be sought out and consumed. When fats are consumed and found to be satisfying, dopamine channels are re-established to desire and seek out fatty food consumption (but fat is not addictive like sugar, so we do not

overeat). Both visceral and subcutaneous fat storage levels will drop consistently. More energy release by the SNS will result in a more energetic lifestyle, causing cortisol levels to drop, resulting in release of the visceral fat. Finally, we are on the path to healthy success!]



Written by Kenton Dechant. Edmonton Canada 2018 November.

Note that I am not a doctor. I am a distance runner and a manufacturing engineer. I wanted to understand this for myself, so I made a manufacturing business analogy. Two years ago, I was pre-diabetic, low-fat eating, carb-dependent, skinny fat, always hungry and often hangry, fog-brained, afraid of bonking on long runs, freight train headed for a cliff. In early 2017, I heard an Art of Manliness podcast with Mark Sisson. That was the

first ray of light for me. I'm now LCHF fat adapted... sometimes Keto. Running marathon distances with no food. More energetic than ever.

Big Boss Thalmus, Leptin, Dopey, Snoozy, Curtis (sorry to my big brother with the same name 😊), Growly, Peppy YY, Pancre-Ass. It's easier to think of them personified; doing their jobs, just like they were trained to. No analogy is perfect. The mechanisms that actually occur in the body are very complex, but what is presented here should empower you to begin to reign in Dopey and Pancre-Ass and the insolent behavior that is going on everyday in your body.

Credit to the book Fat Chance by D. Robert Lustig (and multiple other LCHF resources). There are many doctors and experts (like Dr. Lustig) who understand this stuff extremely well, who see overweight and depressed patients daily, who have unsuccessfully tried to press back against big \$\$\$ lobbying and politics, and who are passionately trying to help every human on the planet break off their shackles. Yudkin, Lustig, Noakes, Fette, Perlmutter, Feinman, Sisson, Kearns, Shanahan, Davis, Taubes, Hyman, Mercola, Gedgaudas, Masley,... – THANK YOU! These men and women are my new heros.

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