

FAT CHANCE, by Dr. Robert H. Lustig, M. D.,  
A Book Report By Dr. David G. Schwartz, M.D., Part 2

Last month's article covered Dr. Lustig's explanations of how sugar contributes to the obesity epidemic, metabolic syndrome, and diabetes, the hormone-driven appetite, and how sugar is addictive. Part 2 presents the author's description of other factors affecting obesity, how metabolic syndrome causes problems, food choices that help, and social, cultural, and political factors.

Toxic stress releases the stress hormone, cortisol, which contributes to abdominal fat accumulation. Stress also increases appetite for "comfort foods." This belly fat is mobilized quickly for energy more so than subcutaneous fat, as in (very occasionally) running away from a lion. So intra abdominal fat had appropriate survival value in primeval times, in contrast to modern civilization. We now experience more frequent chronic stresses, from work pressure, dysfunctional families and relationships, and other social and cultural stresses. These situations occur much more frequently than the basic survival stressors in ancient times. This frequent release of cortisol builds more and more belly fat for use in physical survival circumstances that rarely occur. So this is one of many ways in which our basic biochemistry and physiology is not adapted to modern life. To handle this situation we need to manage our stress better. See my article on "The Upside of Stress."

So then, three main brain pathways promote abdominal obesity and metabolic syndrome: stress, hunger (from insulin's blocking of leptin signaling), and reward (from deregulation of the hedonic pathway, also the result of insulin inhibiting leptin). The hunger and reward pathways were explained in Part 1.

Dr. Lustig describes how the number and size of fat cells are programmed. Genetics play a small role. About 9% of obesity comes from inherited DNA. The rest is from epigenetics, the effect of food, lifestyle, and other environmental influences on the expression of the genes. Some of the epigenetic programming may have come from a previous generation, and it can be passed on to the next generation, but most of the pre-birth effects start during pregnancy.

Small for Gestational Age (SGA) infants, having suffered lack of nutrition during pregnancy, are programmed to put on fat. Maternal stress, under-nutrition, and over-nutrition all can create a hostile intrauterine environment. To the offspring, this signals mechanisms for survival, not for longevity. SGA infants are deficient in leptin. This programs the hypothalamus to sense hunger. After birth, they show rapid catch-up growth and high insulin levels, and they tend to develop metabolic syndrome already in childhood. Likewise premature infants also develop insulin resistance.

The converse is also true. Large for gestational age (LGA) babies, from gestational diabetes in the mother, grow an excess of fat cells from too much glucose and insulin from the mother. They end up with risk of obesity and diabetes due to their leptin being blocked by too much insulin. LGA babies, whose mothers did not have gestational

diabetes, also have risk of insulin resistance and metabolic syndrome because of other epigenetic programming explained above, probably from stressors that made a hostile intrauterine environment.

Artificial chemical toxins from food, water, and air, have also been shown to promote obesity, metabolic syndrome, and diabetes (even in thin individuals). I will interject here that Dr. Walter Crinnion, a foremost detoxification specialist, has many case studies showing reversal of diabetes and obesity with detoxification programs. I surmise that fat-soluble pollutants that remain in the body fat for decades, (without a special detoxification program), induce the fatty tissue to respond by making more fat in order to dilute the poisonous effect.

Dr. Lustig distinguishes between being “fat” and being “sick.” There are 4 main components of body weight: bone, muscle, subcutaneous fat, and visceral fat (intra-abdominal fat). It is the visceral fat that is the consistent culprit for causing sickness, not the subcutaneous fat. It is hard to measure the visceral fat without an MRI, but a general measure is the waist circumference (belt size). A waist-to-hip ratio greater than 0.8 for females and greater than 1.0 for males, or 35 inches for males and 40 inches for females in waist circumference, denotes excess visceral fat. He states that 20% of “morbidly” obese individuals have normal metabolism and normal longevity, probably because they do not have an excess of visceral fat (although they may not necessarily have an optimal quality of life – my comment). There are some studies that show subcutaneous fat correlating with increased longevity. Also, 20-50% of people with normal BMI’s have visceral obesity.

So he makes the point that it is more effective to put energy into reducing the visceral fat than general weight loss. The visceral fat is easiest and quickest to lose. This usually amounts to about 10 lbs, or 5% of body weight. That may be why often we read of studies demonstrating significant improvement of blood pressure and blood sugar control with just 10 lbs of weight loss, which is probably the visceral fat. He recommends working on the metabolic fat (visceral and liver fat) by reducing refined carbohydrates and reducing toxic stress (the source of elevated cortisol). He says that, in general, weight loss is the wrong approach with the wrong outcome. Trying to reduce the subcutaneous fat may have only cosmetic effect, if successful. Putting too much effort into losing subcutaneous fat or total body fat may only lead to frustration. It usually leads to loss of muscle mass, and no improved % of body fat. The subcutaneous fat produces leptin, so that if that fat is lost, with less leptin, the brain senses starvation and sets up that cascade of autonomic nervous system effects, the vagus nerve and increased insulin, described in Part 1, and there we go again with hormone – driven hunger, which is an almost insurmountable force. I might add that rapid weight loss often reduces metabolic rate, inducing a form of functional hypothyroidism. This leads to a “plateau” in the dropping of body weight. Also, if the subcutaneous fat is storing many toxins, the reduced fat causes release of toxins into the circulation, resulting in headache, malaise, and generally feeling ill. This also leads to frustration on the part of the person trying to lose weight.

I would like to add that there were some studies this year revealing that metabolically “healthy” obesity was correlated with fatty liver ([Am. J. Gastroenterol.](#) 2016; 111:1133-1140), and was associated with diabetes even without fatty liver ([Obesity](#) 30 July 2016). This shows that we have more to learn about this issue. I think this means we should not encourage people to gain subcutaneous fat if they are not underweight. The best approach is prevention. Stop the gaining of fat, starting with pregnancy and infancy, and on into childhood and adulthood. Once obesity has established itself, focus mostly on avoiding further fat gain, regular exercise, losing the visceral fat, detoxification, eating whole foods, and especially avoiding added sugar, sweet drinks, and processed foods.

The author goes into detail about how insulin resistance becomes metabolic syndrome, and the consequences that follow.

1. With overload of fructose, and glucose from refined carbohydrates (sugar, junk food, etc.), energy is stored in visceral fat and in the liver in the form of glycogen. When glycogen is beyond capacity, energy is stored as fat in liver cells. Fructose ends up in fat in liver cells without going to glycogen first. The liver becomes insulin resistant, which starts a cascade of events.
2. To overcome the insulin resistance, the islet cells of the pancreas have to put out more insulin to try to force the liver to take care of the glucose. This increased insulin causes glucose to be transformed into fat and deposited in fat cells, including subcutaneous fat.
3. The liver tries to export the liver fat to subcutaneous fat via triglycerides in the blood. This leads to the lipid problems we associate with cardiovascular disease. (My comment – The high triglycerides lead to the dyslipidemias of small LDL particles, oxidized LDLs, and low HDLs. These are the most damaging lipid problems, and this is where most attention should be placed, addressing the cause of these lipid abnormalities, the carbohydrate overload, not on lowering total and LDL cholesterol with low fat diets and lipid lowering drugs.)
4. Elevated insulin acts on artery walls, promoting smooth muscle in the walls to proliferate. This tightens artery walls and causes high blood pressure.
5. The insulin resistance, dyslipidemias, and hypertension can result in heart attacks and strokes.
6. Liver fat promotes inflammation, more insulin resistance, and cirrhosis. When excess energy has to be burned by the liver, the reactive oxygen species or free radicals damage liver cells and cause more inflammation.
7. Elevated insulin in women can drive the ovaries to increase testosterone, to cause Polycystic Ovary Syndrome, infertility, and excess body hair, and more visceral fat.
8. As insulin resistance grows, the pancreatic islet cells finally get exhausted and can't put out enough insulin to keep the blood glucose in control, and diabetes is the result.
9. Insulin promotes cell division, and hyper-insulinemia is associated with various forms of cancer.
10. Insulin resistance in the brain leads to dementia. (See my article on “Alzheimers Breakthrough, and see Dr. David Perlmutter’s book, [Grain Brain](#)”)

Dr. Lustig presents “The Four Foodstuffs of the Apocalypse.” The metabolic syndrome is 10% genetic, and 90% environmental (mainly foods and exercise level, and I would add environmental toxins).

1. Trans fats. These are artificially hydrogenated oils common in processed and restaurant food for many decades, now starting to be phased out. They cannot be broken down by mitochondria. They contribute to atherosclerosis, and I would add that they have given saturated fats a “bad rap”.
2. Branched-Chain Amino Acids. These are in high concentration in corn and in corn-fed animal meat, like the common hamburger, low quality protein. If not used for building muscle, the excess has to be burned in the liver, promoting reactive oxygen species and fatty liver. People with metabolic syndrome have higher levels of these amino acids in their bloodstream.
3. Alcohol goes directly to the liver mitochondria to be burned, and excessively consumed, is implicated in the metabolic syndrome.
4. Fructose. This is the single item that is top on the hit list. This is the sweet molecule in table sugar. If it’s sweet and caloric, it’s fructose. The causation has been proven. It is the one foodstuff that has increased in worldwide consumption with reckless abandon, and which children consume voluminously. This is where the action is.

I would add a 5<sup>th</sup> category of processed foods and refined starches that are adulterated to remove fiber (whose function would slow absorption of sugars. This he has mentioned previously.

Dr. Lustig discusses high fat and low fat diets, which have been in public discourse and controversy for decades. If either diet is eaten in whole food form, from plants or animals raised in a natural way, as with the hunters (high fat) or the gatherers (high carbohydrates), either is healthful. It is the processed food-like substances that mix high fat and high carbohydrate together without fiber, that are more difficult for the liver to metabolize. One meal may not be a problem, but ten thousand meals over years will be. The Ornish diet (low fat), and the Atkins diet (low carbs), each one is successful because each restricts sugar. The traditional Japanese diet and the Mediterranean diet, also successful, both have carbohydrates and fats, but they restrict sugar.

All caloric sweeteners contain fructose, not just HFC’s (high fructose corn syrup), which has received its share of notoriety. All sugars, white sugar, cane crystals, beet sugar, fruit syrup, fruit juices, table sugar, brown sugar, maple syrup, honey, agave nectar, brown rice syrup, sucanat, molasses, all contain fructose. Many processed foods are advertised or labeled as “no sugar added,” but they may have any of these fructose-containing substances mentioned above, and you won’t know it unless you see it in the ingredients list, and then the deception becomes evident.

Glucose in excess coming from processed starches can cause fat accumulation, including visceral fat, insulin resistance, dyslipidemia, diabetes, and cardiovascular

disease, but it takes longer than fructose does. Alcohol and fructose are each more damaging to the liver, and for the same number of calories each is more likely than glucose to cause disease. For glucose, 20% is metabolized by the liver, and 80% is used by other organs for energy. Of the 20%, it goes to glycogen for storage first, then the excess can be turned into triglycerides, and a small amount burned for energy in the mitochondria. With alcohol, 80% of it goes to the liver, straight to the mitochondria, to be burned or turned into fat, leading to liver insulin resistance and inflammation, and to triglycerides. Now, for fructose, 100% goes straight to the liver, and of that, like alcohol, it goes directly to the mitochondria, overwhelms and damages the mitochondria, and makes fat and triglycerides, causes liver insulin resistance and inflammation like alcohol, depletes ATP (energy molecules), and produces uric acid as a waste product, which can cause gout and hypertension.

When sucrose (table sugar) is consumed, the liver has to process both the fructose and the glucose from the sugar, and can more easily overload the mitochondria. Likewise when alcohol is consumed with fructose, the liver gets a double hit.

A little fructose and a little alcohol can be beneficial, but more than 50 grams (about 2 oz) per day of either is toxic. Half the adult population is over that threshold for fructose. When eating whole fruit, the fiber slows the release of fructose to avoid overloading the liver. When you grind fruit up in a smoothie, you lose the moderating effect of the fiber. When we say whole fruit or any other whole food, we mean eating it whole, and that means for grains, eating the grains whole, sprouted or cracked, cooked, but not ground into flour.

He says, “Fructose can fry your liver and cause all the same diseases as does alcohol. It is not the only cause of obesity, but it is the primary cause of chronic metabolic disease.” Fructose does not produce satiety, but increases the dopamine reward system and stimulates excessive consumption by tricking the brain into wanting more.

Sugar is the major player in the global diabetes pandemic. Caloric intake increase did not correlate with the worldwide increase in diabetes prevalence. The correlation between increase in calories in the form of sugar and the increase in diabetes was robust in a study of worldwide food supply. Every additional 150 calories/person/day barely raised diabetes prevalence, but if the 150 calories were in a can of soda, the increase in diabetes rose 7-fold. “A calorie eaten is not a calorie eaten.” I would add that a study in [Circulation](#) 07/01/2015 by Singh, G.M., et al estimated worldwide 184,000 deaths/year were attributable to sugar sweetened beverage consumption.

Some major factors that moderate the effect of sugar are fiber and exercise. Fiber from whole foods creates satiety, slows the rate of absorption of fructose, and promotes the growth of a diverse microbiome of bacteria in the gut. These bacteria affect weight gain or loss. Exercise increases muscle and decreases visceral fat, improves insulin sensitivity and leptin signaling, increases sympathetic tone and resting energy expenditure, helps the liver burn energy cleaner, and decreases the toxic effects of stress.

The author devotes a whole chapter to toxic chemicals, which I have emphasized earlier, including xeno-estrogens, obesogens, endocrine disrupters, phthalates, atrazine, organochlorines, fungicides, smoking, air pollution, etc. All these promote the obesity epidemic.

The author devotes a chapter to altering one's personal food environment, and he discusses navigation through the food labels, and he lists several foods to eat more and less often, or not at all.

The last part of the book covers the public health issues, personal and social responsibility, and the role of government, politics, and community action. He reviews the opposition and tactics of the food industry to avoid decreasing sugar consumption. Much of this has been covered in the previous article on the documentary, "Fed Up."

I recommend that the reader get the book and read more thoroughly the issues raised in this article. It is a must read for people responsible for planning and preparing food for children, and for all parents. The obesity epidemic gets its momentum during childhood, when the little people are the victims of the "food" industry.

The reason I devoted 4 articles in a row to this issue is because I consider it to be one of the biggest major worldwide health issues threatening to sicken large portions of the population and bankrupt health care systems world wide, and it demands both personal and public attention. Many major financial interests oppose what needs to be done to stop this epidemic that is killing our children. Individuals, communities, schools, and nations need to wake up and take action. The public policy actions need to be especially focused on the marketing of the addictive substance, sugar, to children, the public school lunches providing junk food, and the federal agricultural subsidies going to grains that end up in fructose and junk food, instead of promoting healthful foods like organic vegetables. Many communities, families and groups are innovating methods to radically transform our food culture and agriculture, including community gardens, rooftop gardens, container gardens, front yard gardens, food pantries connecting with community gardens, school gardens, children cooking school lunches, farmers markets, etc. Some organizations and businesses are The Farm School training young farmers, Relay Foods transporting organic produce to the city, Everytable, providing low cost healthful meals to urban areas, and many more. This is a small start, but the movement is growing, and we can transform our food economy with public support. Worldwide, we can support NGO's that train farmers in sustainable agriculture and support public policy that gives their property that has been confiscated, back to the farmers so they can have enough land to feed themselves. Anthony Flaccavento's book Building a Healthy Economy From the Bottom Up discusses the possible transformation that can result in more healthful eating and more satisfied food growers.