

**FAT CHANCE**, by Dr. Robert H. Lustig, M.D.

Book Report, by David G. Schwartz, M.D.

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Part I

Dr. Lustig reviews the biochemical and hormonal milieu of obesity and “the metabolic syndrome.” He gives dietary recommendations, as well as social, community, and political ideas, for stopping children’s trajectory into illness, disability and premature death, both during childhood and their future into adulthood. This is a sequel to the previous two articles, which focused more on the societal, economic, and political forces driving the obesity epidemic, and the changes needed to stop it. My review of this book focuses now more on the personal aspects, the physiology, biochemistry and endocrinology of the problem. It may sound complicated and I will try to make it as clear as possible. It is important to understand his explanation of this situation, because it is the basis for exploding the myth that “it’s their own fault because they eat too many calories and don’t exercise enough.” On the other hand it actually is an addiction to sugar and fast food, on which children get “hooked” at a very early age, thanks to the food industry, the media, and addicted parents. Dr Lustig explores the various parts of this process in which mainly fructose and other sugars set up hormonal patterns that drive “gluttony and sloth,” and it starts before birth. My review is only a summary, and anyone who shares my concern about this enormous problem that threatens to bankrupt health care systems worldwide is advised to read the whole book.

Every statement in Dr. Lustig’s book is based on scientific study, historical facts and statistics, despite the attempts of the food industry and the federal government to discredit his work. It is a culmination of 6 years of medical research, meetings, discourse in journal clubs, and patient care. He acknowledges the assistance of over 15 organizations and institutions, and over 100 individuals that contributed to his knowledge and ideas to compose this book.

He begins with these statements: “Food is survival...Unfortunately, food now matters even more than it should. Food is beyond a necessity; it’s also a commodity, and it has been reformulated to be an addictive substance.” “We pay with our taxes, our insurance premiums, and our airline fares – nearly every bill we receive in the mail has an obesity surcharge that we underwrite. We pay in misery, worsening school scores, social devolution, and we pay in death...because the current food environment we have created does not match our biochemistry...” He reveals early in this story that the villain is sugar. “Obesity is not a behavioral aberration, a character flaw, or an error of omission.” “Children don’t choose to be obese. They are victims, not perpetrators.” “We have an epidemic of obese 6 month olds.”

Obesity mostly is not the cause of metabolic disease (metabolic syndrome and diabetes), but is a marker for it. The two go together, but they don’t always overlap, because 20% of obese people have normal life spans and are metabolically healthy, and 40% of “normal” weight people have insulin resistance, a beginning of metabolic syndrome. Also, the metabolic syndrome drives obesity. So he says it’s not obesity that

kills, but its fellow traveler, the metabolic syndrome. I would comment that the extremely obese have many disabling health problems and risks aside from the metabolic syndrome, and one recent study showed that the metabolically healthy obese are at increased risk for fatty liver. (American Journal of Gastroenterology 2016; 111:1133-1140.) It could be that the currently metabolically healthy did not remain metabolically healthy, and that Dr. Lustig's premise is still true, that the metabolically healthy obese have normal health risks as long as they remain metabolically healthy. I would warn that many normal weight people do not stay that way. They are at risk to become obese in the future. The same could be true of obese people, that they could become metabolically unhealthy in the future. The reason I explored this is because Dr. Lustig said that mildly overweight people have better longevity than normal or underweight people. I was considering whether it would be good for the normal or underweight to try to gain a little subcutaneous fat, if it could be done without gaining belly fat (the fat that makes metabolic syndrome). I think this would not be advisable because of the risks of actually becoming metabolically unhealthy along with gaining the weight. Some of the studies showing poorer longevity with the normal or underweight could involve people who have previously unrecognized underlying health problems causing weight loss and eventually death. I think there is more to be learned yet about this before recommending normal weight people to gain weight, unless it is the weight of increased muscle mass from working out.

As mentioned in the previous articles, the “calories in, calories out” myth is used to blame overeating or lack of exercise, when it is rather the type of calories. Sugar is more dangerous than its calories. A calorie burned is a calorie burned, but a calorie eaten is not a calorie eaten. Therein lies the key to understanding the obesity epidemic. Even obese people often swallow the lie, that it’s their lack of will power or moral fortitude, just as alcoholics who continue to drink think they can control it with will power, and often shame themselves for not doing so. It is more appealing to think of oneself as being irresponsible rather than hopeless, a perpetrator rather than a victim, being in control. To the contrary, when dealing with any addiction, the powerlessness has to be recognized before recovery can begin, by getting help. I think 12 step programs for sugar addiction would be more helpful than those for “overeaters.”

Nearly all the perpetrators and the profiteers that drive the obesity epidemic, cite the “personal responsibility” position, blaming the individual for “gluttony and sloth.” The other deadly sins of greed, envy, pride, lust, and wrath are extolled in our society by the shows people watch, but gluttony and sloth are not forgiven. Personal responsibility is the cornerstone of the governments’ and insurance companies’ restriction of obesity care delivery, as they consider it to be a lifestyle choice or a behavioral problem, just as years ago they refused to cover alcoholism, not considering it to be a disease. Not only do these profiteers, including the medical profession and the food industry drive the epidemic, but also the fat activists perpetuate the problem by seeking to stifle research on obesity.

The author describes how insulin is the main hormone that drives hunger and weight gain. He gives an example of a 16-year old girl with damage to her hypothalamus in the

brain, caused by a tumor and by radiation. She gained 30 pounds per year. She would stuff herself and still be hungry. The hypothalamus was causing her insulin to spike tremendously every time she would eat, causing incessant hunger. Not until Dr. Lustig (as a pediatric endocrinologist), gave her an experimental drug that lowered that insulin release, did she stop being hungry, and she lost 48 lbs. What we can take from this story is not that drugs can cure the obesity epidemic, but it is a classic example of how hormones affect eating behavior. The girl did not have a moral deficiency or lack of will power that made her fat. She was a victim, not a villain. Now, almost all of childhood obesity is not due to brain tumors, but the principle still holds that, most eating behavior is driven by hormones.

What follows is his description of the hormonal control of hunger. The fat cells produce leptin. When we have had enough food, the leptin tells the hypothalamus, "We are not hungry." The hypothalamus tells the sympathetic nervous system (SNS) to burn energy, which decreases the size of the fat cells. It also tells the vagus nerve to tell the pancreas, "We don't need extra insulin." Less insulin results in less storage of glucose as fat, and also less hunger. That is the way things are supposed to work.

Now, if there is too much sugar intake, this causes excess insulin release, which tells the hypothalamus, "We're hungry." Then the hypothalamus tells the SNS, "We don't need to burn energy, slow down." This leads to 20% less energy, producing less enthusiasm for physical activity (sloth). The hypothalamus also tells the vagus nerve to stimulate more insulin release from the pancreas than would ordinarily be released with each meal. If leptin keeps telling the hypothalamus that there is enough food, but the messages from insulin keeps overriding it and actually blocks leptin's action, soon the hypothalamus doesn't listen to leptin any more. (leptin resistance)

Animals and humans naturally deficient in leptin, when administered leptin, lose weight, but when fat cells are already producing lots of leptin, and the hypothalamus is resistant to it, there is no more brake on the appetite, (gluttony), much like the girl with the hypothalamus damage, but less pronounced of course.

It all started with sugar.

He says, "The lynchpin in this biochemical alteration is the hormone insulin." "The majority of humans, regardless of weight, release double the insulin today than we did 30 years ago for the same amount of glucose (in the blood).

Then Dr. Lustig describes how the addiction happens. Dopamine is the neurotransmitter in the brain that produces a sensation of pleasure, and it is commonly the main mediator of the development of addictions, when we want to seek more and more pleasure. Food intake causes dopamine release. Leptin is supposed to suppress the dopamine release that comes from food, but with leptin resistance, it doesn't happen, so food continues to stimulate pleasure, so why wouldn't a kid want to continue eating nonstop? Insulin also is designed to diminish the dopamine pleasure effect, but with insulin resistance, it can't. The author says, "Starvation and reward conspire to thwart

every obese person.” This is the old carrot and stick analogy: (A carrot for eating more, and a stick for eating less.)

Alcohol is the most analogous substance to fast food, when it comes to addictions. Fast food is high in calories, sugar, salt, and caffeine, has chemical flavor enhancers, is energy dense, and especially designed to be palatable, soft, low in fiber, not requiring much chewing, making it “fast” in terms of release into the bloodstream. (Like intravenous opiates being more addictive than the slower, oral opiates.) The most addictive ingredients are the sugar and the caffeine. Animal studies regarding sugar show all the criteria of addiction. Caffeine addiction in humans is already established in the DSM-IV-TR.

Dr. Ludwig explains, according to the American Psychological Association’s DSM IV- TR, the criteria for a diagnosis of an addiction or a substance dependence. Three of 7 criteria must be present. All 7 are seen in the obese, especially those who eat fast foods.

1. Tolerance: Progressively more and more of the substance is needed for the same effect. As explained above, fast food gives a dopamine rush, but with each meal, the dopamine receptors are down regulated, so that it takes more of that food to give the same reward from the dopamine as before. Leptin is supposed to moderate the dopamine system in the first place, but with leptin resistance, dopamine continues to “call the shots.”
2. Withdrawal: When there is not enough dopamine to activate the receptors when the eating drops off, depression and anxiety occurs, and the only choice to remedy it is to eat another Big Mac. This was exemplified in the movie, “Super-size Me,” when Morgan Spurlock, by day 18, was feeling sick and unhappy. Then each time he started eating, he felt great.
3. Bingeing: This is continuing to eat after satiety, and after feeling uncomfortable. Eating alone due to shame, feeling guilty after overeating.
4. Desire to cut down or quit. Nearly always the overweight are on some kind of special diet or cleansing or fasting, to lose weight and then to gain it back again. Just like alcoholics trying to quit, then going back to it again.
5. Craving or seeking. This is a motivation to seek food, when dopamine signalling facilitates consolidation of memory, so that past experiences are used to inform future decisions. An example is the boy who participated in a 10-day study to eat nutritious food and none of his usual 4 sodas per day. He abstained from sodas but bought one can of soda each day and brought it home and didn’t touch them, but he decided, “When the study is over, I’m drinking them all.” To his mother’s dismay, indeed he did drink all 10 at once on the evening of the last day of the study. His body would have had little or no withdrawal symptoms at that point, but the memory of the previous experiences led to intense craving for that experience. This is like many smokers I have known who quit for a long enough time to have gone long past the withdrawal period, but they later start smoking again because the memory is so strong to seek that experience again. My father did that very thing after his first heart attack.

6. Interference with life. Obesity certainly hampers quality of life, and diabetes can cause limb amputation and dialysis. Morgan Spurlock after 30 days on an all McDonald's diet, had mood swings, sexual dysfunction, fatty liver, and a gain of 24.5 lbs.
7. Use despite negative consequences. The health consequences of obesity are numerous and well known, but the eating patterns continue.

Now, not everyone who eats fast food or is obese is addicted, just as not everyone who drinks alcohol is alcoholic (although many more are alcoholic than would recognize it.), but a large proportion of children are addicted to fast food, maybe because they got hooked on it at a very young age.

The second part of this article will be continued next month, as Dr. Lustig describes how stress, toxins, exercise, epigenetic trans-generational effects, maternal under and over nutrition during pregnancy, all affect obesity. He discusses the difference between being fat and being sick, how fat cells are filled, how insulin resistance becomes metabolic syndrome, and how metabolic syndrome wreaks havoc on the cardiovascular system and the brain. He also describes various dietary measures and which foods are best and which ones to stay away from. He devotes the last part of the book to public health issues, personal and social responsibility, and the role of government, community action, and politics.