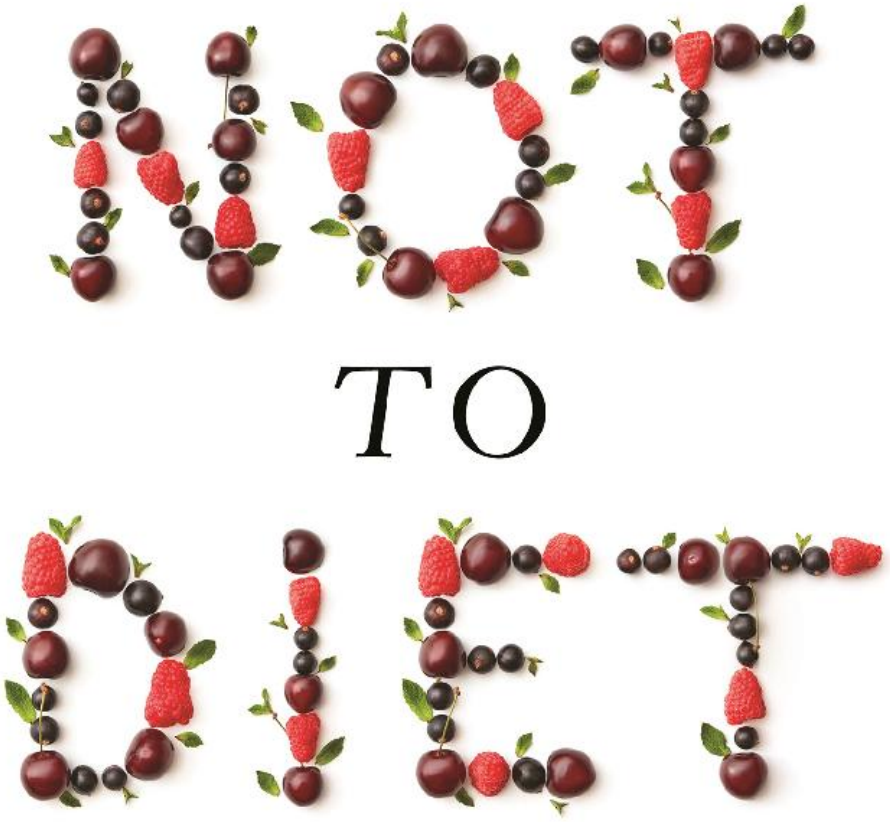
The Groundbreaking Science of Healthy, Permanent Weight Loss

HOW NOT TO DIET



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FEATURING DR. GREGER'S TWENTY-ONE TWEAKS TO ACCELERATE WEIGHT LOSS

HOW NOT TO DIET

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To my mom,

the source of everything good in my life

DOWN THE RABBIT HOLE

Surely, if there were a safe, simple, side effect–free solution to obesity, we would know about it by now, right?

I'm not so sure.

It takes an estimated average of seventeen years before evidence from scientific research is incorporated into day-to-day clinical practice. 1 One example that was particularly poignant for my family: heart disease. Decades ago, Dr. Dean Ornish and colleagues published evidence in one of the most prestigious medical journals in the world that our leading cause of death could be reversed with diet and lifestyle changes alone2—yet this monumental discovery

was effectively ignored at the time.3 Even now, hundreds of thousands of Americans continue to perish every year from what we learned nearly thirty years ago is an arrestable, reversible condition. In fact, I had seen such a reversal with my own eyes.

My dear grandmother was cured of her end-stage heart disease by one of Ornish's contemporaries, Nathan Pritikin, using similar methods. She was sixty-five when she was given her medical death sentence, but—thanks to a healthy diet—was able to live another thirty-one years to age ninety-six, to continue enjoying her six grandkids, including me.

If effectively the cure to the number-one killer of men and women could be ignored and get lost down some rabbit hole, what else might be buried in the medical literature? I've made it my life's mission to find out. That's why I went to medical school in the first place and why I started NutritionFacts.org.

So, like heart disease, might there already be a cure for obesity? That's what I intended to uncover.

Here's the problem: I hate diet books. Furthermore, I hate diet books that *purport* to hate diet books yet relish in all the same absurdities. This book is for those who want facts, not filler, fantasy, or fluff. If you want testimonials and before-and-after pictures, you've come to the wrong place. You don't need anecdotes when you have evidence. A Harvard sociologist of science calls those arguments by anecdotes in diet books "a deliberate attempt at credibility engineering." [4] When you don't have the science to back you up, all you have are "success" stories.

I'm not interested in offering dueling anecdotes, nor am I interested in dietary dogma, beliefs, or opinions. What I am interested in is the science. When it comes to making life-and-death decisions that concern something as important as your own health and that of your family, as far as I'm concerned, there's only one question: *What does the best available balance of evidence say right now?* That's what I've tried to encapsulate in this book.

Often, diet books deal in pseudoscientific twaddle swaddled in the trappings of science. But how is the

untrained reader supposed to know the difference between the two and decide among the competing claims? It's no wonder people tend to flock to their respective gurus to have their minds made up for them. However, no one is born with this knowledge—and you have a right to demand to know where diet book authors got the information they're trying to sell you so you can check the credibility of the source and confirm its veracity. That's why I prefer presenting the science in video format on my website, where I can show the original data and link to downloads of all the primary sources. And here in this book, I've tried to cite each substantive statement of fact.

My goal was to create the oxymoron: an evidence-based diet book.

CAVEAT EATER

No other area of the national health probably is as abused by deception and misinformation as nutrition. Many travesties cheat the public of enormous sums of money, and of good health as well.

—WHITE HOUSE CONFERENCE ON FOOD, NUTRITION, AND HEALTH5

Frustrated by the current political climate of alternative facts and echo chambers? Welcome to my world. The entire diet industry is built upon a foundation of fake news. The nutrition field has been dealing with bald-faced lies since back in the pre-post-truth era, and diet books can be the worst offenders. “Often the loudest, most extreme voices drown out the well informed,” wrote two noted nutrition professors on the subject of diet books. “There is also money to be made.” 6

Lots of money. Every month seems to bring us a trendy new diet or weight-loss fad, and they always sell because they always fail. The diet industry may rake in up to $50 billion a year, and the business model is based on repeat customers. 7 Racked with the guilt and self-hatred of failure, people often line right back up to be fooled again. I hope this book can help break that cycle by cutting through the BS.

Beyond the corrupting influence of commercial interests are the ideological biases. Too often in diet books, the rule is to obfuscate rather than illuminate, cherry-pick facts to

push some pet theory, and ignore the rest to promote your own agenda. It's the opposite of science. In true scholarship, your conclusions follow from the evidence, not the other way around.

Unfortunately, even just sticking to the peer-reviewed scientific literature is not enough. An article in *The New England Journal of Medicine* on obesity myths concluded that "false and scientifically unsupported beliefs about obesity are pervasive" in medical journals as well.[8] In that case, the only way to get at the truth is to dive deep into the primary literature and read all the original studies yourself rather than taking some contemporary reviewer's word for it. But who's got time for that? There are more than half a million scientific papers on the subject of obesity, with a hundred new ones published every day. Even researchers in the field might only be able to keep track of what's going on in their narrow, subspecialized domains. But that's precisely what we do at NutritionFacts.org. We comb through tens of thousands of studies a year so you don't have to.

This is the kind of book I was made for. My research team and I were allowed to really flex our muscles, and the sorer those muscles got, the further we stretched ourselves, the more valuable we realized this contribution would be. Even "simple" questions on weight loss, like whether you should eat breakfast or skip it, or whether it's better to exercise before or after meals, turned into major, thousand-article research projects. If our nose-to-the-grindstone research team had trouble sifting through the stacks, a practicing physician would have no chance and the public would be totally lost.

Whether you're morbidly obese, just overweight like the average American, or at your ideal weight and wanting to keep it that way, our goal was to give you every possible tweak and technique we could find to build the optimal weight-control solution from the ground up.

I went into this project with the goal of creating a distillation of all the best science, but to my delight, I discovered all sorts of exciting new tools and tricks along the way. We did indeed uncover a treasure trove of buried

data, like simple spices proven in randomized, double-blind, placebo-controlled studies to accelerate weight loss for pennies a day. With so little profit potential, it's no wonder those studies never saw the light of day.

And we were even able to traverse beyond the existing evidence base to propose a novel method to eliminate body fat. The proposed technique appears to have a strong theoretical basis but has never been put to the test because apparently no one has ever thought of it before. It can't be monetized either, but the only profiting I care about is your health. That's why I donate to charity 100 percent of the proceeds I get from my DVDs, speaking engagements, and books, including the one you're holding right now. I just want to do for everyone's family what Pritikin did for mine.

Introduction

SOMETIMES BIGGER IS BETTER

My literary agent told me that no one wants a fat diet book. They want it to be as slim as they envision their future selves. Sorry to disappoint, but I couldn't help it. I wanted to document every evidence-based tip, trick, tweak, and hack

to give people every possible advantage—whether you're obese, overweight, or just wanting to maintain your ideal weight.

In *How Not to Diet,* I cover everything from cultivating a healthy microbiome in your gut to manipulating your metabolism through chronobiology, matching meal timing to your circadian rhythms. Every section could have been a book in its own right. We certainly attempted book-length research on each subject and then tried to distill down the most compelling, actionable takeaways from each of the most promising strategies. To that end, this is really more like forty books packed into one. For those of you now wielding a physical copy of the book and thinking, *This is the compact version?* , take comfort in the fact that you can use it to curl for a little extra resistance exercise.

It was important to me to include all the details so you can make as informed a decision about your health as possible, but you can always skip down to the summaries at the end of each section for my take-home suggestions. I wanted to be sure to clearly articulate how I arrived at each

recommendation, because I don't want to be anyone's diet guru. I don't want you to take anything on faith but rather on evidence.

In the References section, I've included a website address and a QR code for the full list of the nearly five thousand citations referenced throughout this book. The advantage of presenting them online for you (beyond trimming five hundred pages and saving a few trees) is that it allowed me to hyperlink each and every citation to take you directly to the source, so you can download the PDFs and access the original research yourself. Here in the ebook you get the best of both worlds, with the full list of citations plus the code to access the primary sources.

Some of my conclusions are scientific slam dunks, but others are more uncertain, and I try to make the distinctions clear. That way, you can make up your own mind when trying to decide whether to incorporate any particular piece of my advice into your life. If you find yourself unconvinced by the data presented to support a particular recommendation, don't do it. The benefit of laying it all out

is that you can decide for yourself. As famed scientist Carl Sagan (who also happened to be my next-door neighbor at Cornell!) put it: “Science by itself cannot advocate courses of human action, but it can certainly illuminate the possible consequences of alternative courses of action.” 9

WHAT ARE YOUR DIGITS?

Before we dive in, what does it really mean to be overweight? Obese? In simple terms, being overweight means you have too much body fat, whereas being obese means you have way too much body fat. In technical terms, obesity is operationally defined as a body mass index (BMI) of 30 or more, while being overweight means you have a BMI of 25 to 29.9. A BMI between 18.5 and 24.9 is considered “ideal weight.”

Calculating your BMI is relatively easy: You can visit one of the scores of online BMI calculators, or you can grab a calculator and calculate it on your own. To do so, multiply your weight in pounds by 703. Then divide that twice by your height in inches. For example, if you weigh 200 pounds and are 71 inches tall (five foot eleven), that would be (200

× 703) ÷ 71 ÷ 71 = 27.9, a BMI indicating that you would be, unfortunately, significantly overweight.

In the medical profession, we used to call a BMI under 25 "normal weight." Sadly, that's no longer normal. Being overweight became the norm by the late 1980s in the United States[10] and appears to have steadily worsened ever since.[11]

ISN'T A CALORIE A CALORIE?

Now that we see where the lines are drawn in the weight spectrum from optimal to obese, let's review some basic assumptions. The notion that a calorie from one source is just as fattening as a calorie from any other source is a trope broadcast by the food industry as a way to absolve itself of culpability. Coca-Cola even put out an ad emphasizing this "one simple commonsense fact."[12] As the chair of Harvard's nutrition department put it, this "central argument" from industry is that the "overconsumption of calories from carrots would be no different from overconsumption of calories from soda."[13] If a calorie is just a calorie, why does it matter what kinds of foods we eat?

Let's take the example of carrots versus Coca-Cola. While it's true that in a tightly controlled laboratory setting, 240 calories of carrots—ten carrots—would have the same effect on calorie balance as the 240 calories in a bottle of Coke, [14] this comparison falls flat on its face out in the real world. You could chug down those liquid calories in less than a minute, but eating 240 calories of carrots could take you more than two and a half hours of constant chewing. (It's been timed.[15]) Not only would your jaw get sore, but 240 calories of carrots is about five cups—you might not even be able to fit them all in your stomach. Like all whole plant foods, carrots have fiber, which adds bulk without adding net calories. What's more, you wouldn't even absorb all the carrot calories. As anyone who's eaten corn can tell you, some bits of vegetable matter can pass right through you, flushing out any calories they contain. A calorie may still be a calorie circling your toilet bowl, but it's not going to end up on your hips.

A more relatable comparison might be something like Cheerios versus Froot Loops. As Kellogg's is practically giddy

to point out, its Froot Loops cereal has about the same number of calories as its rival's health-hallowed Cheerios. So why does Toucan Sam get singled out? (I was deposed as an expert witness in a case against sugary cereal manufacturers, so I heard these arguments firsthand.) Yes, the two cereals may have similar calories, but that doesn't take into account all the appetite-stimulating effects of concentrated sugar. 16 In an experiment in which children were alternately offered high-versus lower-sugar cereals, had they eaten more Cheerios than Froot Loops, they could have gotten more calories, but the opposite happened. On average, the kids poured and ate 77 percent more of the sugary cereal. So even with comparable calorie counts, sugary cereals may end up nearly doubling caloric intake.17

In a lab, a calorie is a calorie, but in life, far from it. Even if you eat and absorb the same number of calories, a calorie may *still* not be a calorie. As you'll learn, the same number of calories eaten at a different time of the day, in a different meal distribution, or after different amounts of sleep can translate into different amounts of body fat.

It's not only what we eat but how and when.

And the same number on the scale can mean different things on different diets or in different contexts. You could be losing weight but actually gaining body fat if your body sheds water and muscle mass. So it's not just about calories in versus calories out, eating less, and moving more. We'll see an illustration of this later, with a famous series of studies on prisoners in Vermont that showed that, depending on what the researchers fed them, it could take up to one hundred thousand more calories to create the same amount of weight gain. So you'll learn how they effectively made one hundred thousand calories disappear.

But I'm getting ahead of myself.

A DETECTIVE STORY IN FOUR PARTS

In part I, the book starts with an outline of our growing problem with obesity—the causes, the consequences, and the solutions tried to date. It answers questions such as: *What led to the explosive increase in obesity starting in the late 1970s? Is being overweight really as bad for your health as "they" say? And what about the safety and efficacy of*

nonlifestyle approaches, such as stomach stapling, diet drugs, and weight-loss supplements?

Then, in my attempt to build the optimal weight-loss strategy from scratch, I spend part II exploring all the key ingredients that might go into creating the ideal recipe for losing body fat. In part III, we see how all the diets out there stack up against this list of criteria, and we piece together the foremost formula for healthy, sustainable weight control. You also get the tools to be able to assess all the newer-than-new diets that haven't even come out yet.

After that come the boosters. In part IV, I unveil all the tricks and tweaks for fast-tracking weight loss that I've found through my years of scouring the medical literature. These are ways in which any diet can be modified to maximize the dissolution of body fat. I arrange the boosters in a simple daily checklist so you can pick and choose a portfolio of techniques that works best for you. I have to warn against skipping to this section and going for the quick fixes while continuing to eat the same crappy foods. Though there are indeed different ways to eat the same foods to

achieve better results, the boosters are strictly meant to be adjuncts to a healthy diet.

In the final section, I lay to rest all the burning questions on burning fat: *What are the best ways to exercise to achieve maximum weight loss? How can you safely boost your metabolism? What is the optimum amount of sleep? What does the science say about ketogenic diets, intermittent fasting, and high-intensity interval training?* I also introduce you to specific foods that double as fat blockers and fat burners, and starch blockers and appetite suppressants. And did you know that the different timing, frequencies, and combinations of foods can also matter? There's even a food that can prevent the metabolic slowing that your body uses to frustrate your weight-loss attempts. Skeptical? You should be! I was too.

I went into this thinking I would just end up railing against all the gimmicky snake oil out there and put out much of the same standard advice on trimming calories and hitting the gym. I imagined what would set this work apart would be its comprehensiveness and strict grounding in science. I figured

this book would distinguish itself—but more as a book of reference than revolution. I certainly never thought I'd stumble across some novel weight-loss strategy. I just didn't realize how many new paths would be opened up by our newfound transformations in understanding of so many fields of human physiology. It's been thrilling to weave together all these cutting-edge threads to design a weight-loss protocol based on the best available evidence.

This has been a mammoth but joyful undertaking. People sometimes ask me why I don't go on vacations or even take a day off. I have to explain that I feel as though my entire life is a holiday. I feel so blessed to be able to dedicate my time to helping people while doing what I love: learning and sharing. I can't imagine doing anything else.

The Weight of the World

Obesity isn't new, but the obesity *epidemic* is. We went from a few corpulent queens and

kings, like Henry VIII and Louis VI (known as Louis le Gros, or "Louis the Fat"),[18] to a

pandemic of obesity, now considered to be perhaps the direst and most poorly contained

public health threat of our time. 19 Today, 71 percent of American adults are overweight and

40 percent of men and women appear to have so much body fat that they can be classified

as obese, and there's no end in sight.20 Earlier reports had suggested the rise in obesity

was at least slowing down, but that doesn't actually appear to be the case. 21 Similarly, we

had thought we were turning the corner on childhood obesity after thirty-five years of

unrelenting bad news, but the bad news marches on. 22 Child and adolescent obesity rates

have continued to rise, now into the fourth decade. 23

Over the last century, obesity appears to have jumped tenfold, from as few as one in

thirty people24 to now one in three, but it wasn't a steady rise. Something seems to have

happened around the late 1970s, and not just in the United States. 25 The obesity pandemic

took off at about the same time in most high-income countries around the globe in the

1970s and 1980s. The fact that the rapid rise appeared almost concurrently across the

industrialized world suggests a common cause.26

What might that trigger have been?

Any potential driver would have had to be global in nature and coincide with the upswing

of the epidemic, so the change would have had to have started about forty years ago and

been able to spread rapidly around the world. 27 So how do the various theories stack up?

Some have blamed changes in our "built environment," for instance, pointing to shifts in

city planning that have made our communities less conducive to walking, biking, and

grocery shopping. 28 But that doesn't meet our criteria for a credible cause because there

was no universal, simultaneous change in global neighborhoods within that time frame.29

If you do a survey of hundreds of policy-makers, most blame the obesity epidemic on

"lack of personal motivation,"30 but that makes little sense. Here in the United States, for

example, obesity shot up across the entire population in the late 1970s. Are you telling me

that every sector of the U.S. population experienced some sort of simultaneous decline in

willpower?31 Each age, sex, and ethnic group, with all their different attitudes and

experiences, coincidentally lost their collective capacity for self-control at the same time?

More plausible than a global change in the nature of our characters would be some

global change in the nature of our lives.[32]

Fast Food vs. Slow Motion

The food industry blames inactivity. "If all consumers exercised," said the CEO of PepsiCo,

"obesity wouldn't exist." [33] Coca-Cola went a step further and spent $1.5 million to create

the Global Energy Balance Network to downplay the role of diet in the obesity epidemic.

Leaked internal documents show the company planned on using the front group to serve as

a "weapon" to "change the conversation" about obesity in its "war" with the public health

community.[34]

This tactic is so common among food and beverage companies it even has a name:

leanwashing. You've likely heard of greenwashing, where companies deceptively pretend to

be environmentally friendly. *Leanwashing* is the term used to describe companies that try

to position themselves as helping to solve the obesity crisis when, instead, they're directly

contributing to it. 35 For example, Nestlé, the largest food company in the world, has

rebranded itself the "world's leading nutrition, health and wellness company." 36 Yes, that

Nestlé, of Nestlé Nesquik fame, makers of Cookie Crisp cereal and more than one hundred

different brands of candy, including Butterfinger, Kit Kat, Goobers, Gobstoppers, Runts, and

Nerds. Another of its slogans is "Good Food, Good Life." Its Raisinets may have some fruit,

but the company seems to me more Willy Wonka than wellness. Let's just say that on its

"What is Nestlé doing about obesity?" web page, the "Read about our Nestlé Healthy Kids

programme" link gave me a Page Not Found error.37

The constant corporate drumbeat of overemphasis on physical inactivity appears to be

working. In response to a Harris poll question ("Which of these do you think are the major

reasons why obesity has increased?"), a large majority (83 percent) chose lack of exercise,

while only 34 percent chose excessive calorie consumption. 38 But blaming couch-potato-

ness has actually been identified as one of the most common misconceptions about

obesity.39 The scientific community has come to a fairly decisive conclusion40 that the

factors governing caloric intake far more powerfully affect overall calorie balance.41

There's even debate in the scientific literature as to whether changes in physical activity

had "any role whatsoever" in the obesity epidemic.42 The increase in caloric intake per

person is more than enough to explain the U.S.43 and global44 epidemics of obesity. In fact,

if anything, the level of physical activity over the last few decades has gone up slightly in

both Europe and North America, rather than declined.45 Ironically, this bump may be a

result of the extra energy it takes to haul around our heavier bodies, making changes in

energy expenditure a consequence of the obesity problem rather than the cause.

Formal exercise is only a small part of our total daily activity, though. Think how much

more physical work people used to do on the job, on the farm, or even in the home. 46 It's

not just the shift in collar color from blue to white. Increasing automation, computerization,

mechanization, motorization, and urbanization have all contributed to increasingly more

sedentary lifestyles over the last century—and therein lies the problem with the theory:

The occupational shifts and advent of labor-saving devices have been gradual and largely

predate the dramatic, recent rise in weight gain the world over. 47 Washing machines,

vacuum cleaners, and the Model T were all invented before 1910. And indeed, when put to

the test using state-of-the-art methods to measure energy in and energy out, it was caloric

intake, not physical activity, that predicted weight gain over time. 48

The common misconception that obesity is due mostly to lack of exercise may not just

be a benign fallacy, as personal theories of causation appear to impact people's weight.

Those who blame insufficient exercise are significantly more likely to be overweight

themselves. Put them in a room with chocolate, for instance, and they can be covertly

observed consuming more candy compared to those who put the onus of obesity on poor

diet.49 But you can't know if such attitudes are playing a role in their weight problem until

you put it to the test. So researchers randomized people to read a fictitious article

implicating inactivity in the rise of obesity and found they indeed went on to eat

significantly more sweets than those who instead were given an article that indicted diet.50

A similar study evidently found that those presented with research blaming genetics

subsequently ate significantly more cookies. The paper was entitled “An Unintended Way in

Which the Fat Gene Might Make You Fat.”51

Do These Genes Make Me Look Fat?

To date, about one hundred genetic markers have been linked to obesity, but when you put

all of them together, they account for less than 3 percent of the difference in body mass

index between people.52 The “fat gene” you may have heard about (called FTO, short for

“FaT mass and Obesity associated”) is the gene most strongly linked to obesity.,53 but it

explains less than 1 percent of the difference between people (a mere 0.34 percent). 54

FTO codes for a brain protein that appears to affect your appetite. 55 Are you one of the

billion people on Earth who carry a full complement of FTO susceptibility genes? 56 It doesn’t

really matter, because this only appears to result in a difference in intake of a few hundred

extra calories *a year,* 57 while what it took to lead to the obesity epidemic is more like a few

hundred calories *a day.* 58 FTO is the gene so far known to have the most effect on

excessive weight gain, 59 but the chances of accurately predicting obesity risk based on FTO

status are only slightly better than flipping a coin.60

When it comes to obesity, the power of your genes is nothing compared to the power of

your fork. Even the small influence the FTO gene does have appears to be weaker among

those who are physically active61 and may be abolished completely in those eating

healthier diets. FTO only appears to affect those eating diets higher in saturated fat

(predominantly found in dairy, meat, and junk food). Those eating more healthfully appear

to be at no greater risk of weight gain even if they inherited the “fat gene” from both their

parents. 62

Physiologically, FTO gene status doesn’t appear to affect your ability to lose weight.63

Psychologically, knowing you’re at increased genetic risk for obesity may motivate some

people to eat and live more healthfully,64 but it may cause others to fatalistically throw

their hands up in the air and resign themselves to thinking it just runs in their families.65

Obesity does tend to run in families, but so do lousy diets.

Comparing the weight of biological versus adopted children can help tease out the

contributions of lifestyles versus genetics. Children growing up with two overweight

biological parents were found to be 27 percent more likely to be overweight themselves,

whereas adopted children placed in a home with two overweight parents were only 21

percent more likely to be overweight. 66 So genetics certainly play a role, but this suggests

that it's more the children's environment than their DNA.

Diet Trumps Genes

One of the most dramatic examples of the power of diet over DNA comes from the Pima Indians of Arizona, who

have among the highest rates of obesity67 and diabetes68 in the world. This has been ascribed to their relatively

fuel-efficient genetic makeup.69 Their propensity to store calories may have served them well in times of periodic

scarcity when they were living off the land, but when the area became "settled," their source of water, the Gila

River, was diverted upstream. Those who survived the ensuing famine70 had to abandon their traditional diet to live

off government food programs, and chronic disease rates skyrocketed. [71] Same genes, but a different diet, leading to

a different result.

In fact, a natural experiment was set up. The Pima living across the border in Mexico come from the same genetic

pool but were able to maintain more of their traditional lifestyle, centered around the food staples known as *the*

three sisters: corn, beans, and squash.[72] Same genes, but about five times less diabetes and obesity.[73]

Genes may load the gun, but diet pulls the trigger.

Survival of the Fattest

It's been said: "Nothing in biology makes sense except in the light of evolution." [74] The

known genetic contribution to obesity may be small, but in a certain sense, you could

argue it's actually all in our genes. That's because the excess consumption of available

calories may be hardwired into our DNA.

We were born to eat. Throughout most of human history and beyond, we existed in

survival mode, in a context of unpredictable scarcity, so we've been programmed with a

powerful drive to eat as much as we can, while we can, and just store the calories we don't

need right away on our bodies for later. Food availability could never be taken for granted,

so those who ate more in the moment and were best able to store more fat for the future

might better survive subsequent shortages to pass along their genes. Generation after

generation, millennia after millennia, those with lesser appetites may have died out, while

those who gorged themselves could have selectively lived long enough to pass along a

genetic predisposition to eat and store more calories. That may be how we evolved into

such voracious, calorie-conserving machines. Now that we're no longer in such lean times,

though, we're no longer so lean.

What I just described is the "thrifty gene" concept, 75 the proposal that obesity is the

result of a mismatch between the modern environment and the environment in which we

evolved. 76 It's as if we're now polar bears in a jungle; fur and fat may provide an edge up in

the Arctic but would be decidedly disadvantageous in the Amazon.77 Similarly, a propensity

to pack on the pounds may have been a plus in prehistoric times but can turn into a liability

when our scarcity-sculpted biology is plopped down into the land of plenty.

So the prime cause for the obesity epidemic is neither gluttony nor sloth. Obesity may

simply be a normal response to an abnormal environment.78

Much of our physiology is finely tuned to stay within a narrow range of upper and lower

limits. If we get too hot, we sweat; if we get too cold, we shiver. Our bodies have

mechanisms to keep us in balance. In contrast, our bodies have had little reason to develop

an upper limit to the accumulation of body fat.79 In the beginning, there may have been

evolutionary pressures to keep lithe and nimble in the face of predation, but thanks in part

to weapons and fire, we haven't had to outrun as many saber-toothed tigers over the last

two million years or so.80 This may have left our genes with the one-sided selection

pressures to binge on every morsel in sight and stockpile as many calories onto our bodies

as possible. 81

What was once adaptive is now a problem, or at least so says the thrifty gene hypothesis

that originated more than a half century ago. 82 The theory has since been refined and

updated, but the basic premise remains largely accepted by the scientific community.83

and the implications are profound.

In 2013, the American Medical Association voted to classify obesity as a disease[84]

against the advice of its own Council on Science and Public Health.[85] Not that it necessarily

matters what we call it—a rose by any other name would cause just as much diabetes—but

disease implies dysfunction. Bariatric drugs and surgery are not fixing some physiological

malfunction. Our bodies are just doing what they were designed to do in the face of excess

calories. [86] Rather than some sort of disorder, weight gain may be largely a normal

response, by normal people, to an abnormal situation. [87] And with more than 70 percent of

Americans now overweight, [88] it's *literally* normal.

Won't Work for Food

The traditional medical view on obesity, as summed up nearly a century ago: "All obese

persons are alike in one fundamental respect—they literally overeat."[89] While this may be

true in a technical sense, it is in reference to overeating calories, not food. Our primitive

urge to overindulge is selective. People don't tend to lust for lettuce. We have a natural,

inborn preference for sweet, starchy, fatty foods, because that's where the calories are

concentrated.

Think about hunting and gathering efficiency. We used to have to work hard for our food.

Prehistorically, it wouldn't have made sense to spend all day collecting types of food that,

on average, don't provide at least a day's worth of calories. You would have been better off

staying back at the cave. So we evolved to crave foods with the biggest caloric bang for

their buck. 90

If you were able to steadily forage a pound of food an hour and it had 250 calories per

pound, it might take you ten hours just to break even on your calories for the day. But if

you were gathering something with 500 calories a pound, you could be done foraging in

five hours and spend the next five focusing on your wall paintings. So the greater the

energy density, the more calories per pound, the more efficient the foraging. We developed

an acute ability to discriminate foods based on calorie density and instinctively desire the

densest. 91

If you study the fruit and vegetable preferences of four- and five-year-old children, what

they like correlates with calorie density. They prefer bananas over berries and carrots over

cucumbers. Isn't that just a preference for sweetness? No, they also prefer potatoes over

peaches and green beans over melon,[92] just like monkeys prefer avocados over bananas.[93]

We appear to have an inborn drive to maximize calories per mouthful.

The researchers in the studies of children only tested whole fruits and vegetables, so all

the foods naturally had fewer than five hundred calories per pound, with bananas topping

the chart at about four hundred. Something funny happens when you start going much

above that: We lose our ability to differentiate between which foods have the highest

caloric density. Over a natural range of calorie densities, we have an uncanny aptitude to

pick out the subtle distinctions. However, once you start heading toward chocolate, cheese,

and bacon territory, which can reach thousands of calories per pound, our perceptions

become relatively numb to the differences. No wonder, since these foods were unknown to

our prehistoric brains. Aberrant behavior explained by an evolutionary mismatch,[94] like sea

turtle hatchlings crawling in the wrong direction toward artificial light rather than the moon

and never reaching the ocean, or dodo birds failing to evolve a fear response because they

had no natural predators—and we all know how that turned out.

Full of CRAP

The food industry exploits our innate biological vulnerabilities by stripping down crops into

almost pure calories—straight sugar, oil (which is pretty much pure fat), and white flour

(which is mostly refined starch). First, they remove the fiber, because it effectively has zero

calories. Run brown rice through a mill to make it white, and you lose about two-thirds of

the fiber. Turn whole-wheat flour into white flour and lose 75 percent of the fiber. Or you

can run crops through animals (to make meat, dairy, and eggs) and remove 100 percent of

the fiber.[95] What you're left with is CRAP, an acronym conceived by one of my favorite

dietitians, Jeff Novick, for *calorie-rich and processed* foods.[96]

Calories are condensed in the same way plants are turned into addictive drugs like

opioids and cocaine: concentration, crystallization, distillation, and extraction. 97 They even

appear to activate the same reward pathways in the brain.98 Put people with "food

addiction" in an MRI scanner and show them a picture of a chocolate milkshake, and the

areas that light up in their brains are the same99 as when cocaine addicts are shown a

video of smoking crack100 or when alcoholics are given a whiff of whiskey.101

Food addiction is a misnomer. People don't suffer out-of-control eating behaviors to food

in general. We don't tend to compulsively crave cabbage. But milkshakes are packed with

sugar and fat, two of the signals to our brains for calorie density. When people are asked to

rate different foods in terms of cravings and loss of control, most incriminated was a load of

CRAP—highly processed foods like donuts, along with cheese and meat.102 Those foods

least related to problematic eating behaviors? Fruits and vegetables. Calorie density may

be the reason people don't get up in the middle of the night and binge on broccoli.

Animals don't tend to get fat eating the foods they were designed to eat. There is a

confirmed report of free-living primates becoming obese, but that was a troop of baboons

who evidently stumbled across some dumpsters at a tourist lodge. The "garbage-feeding

animals" weighed 50 percent more than their wild-feeding counterparts.103 Sadly, we, too,

can suffer the same mismatched fate and become obese by eating garbage. For millions of

years before we learned how to hunt, our biology evolved largely on leaves, roots, shoots,

fruits, and nuts.104 Ironically, even the creationists agree that we started out plant-based in

Eden's garden. 105 Maybe it would help if we went back to the basics and cut the CRAP.

Toxic Food Environment

It is hard to eat healthfully against the headwind of such strong evolutionary forces. No

matter our level of nutrition knowledge, in the face of pepperoni pizza, the ancestral

heritage baked into our genes screams, *Eat it now!* 106 Anyone who doubts the power of

basic biological drives should see how long they can go without blinking or breathing. Any

conscious decision to hold your breath is soon overcome by the compulsion to breathe. In

medicine, shortness of breath is sometimes even referred to as *air hunger.*

The battle of the bulge is a battle against biology, so obesity is not some moral failing. I

can't stress enough that becoming overweight is a normal, natural response to the

abnormal, unnatural ubiquity of calorie-dense, sugary, and fatty foods.

The sea of excess calories in which we are now floating (and in which many of us are

now drowning) has been referred to as a "toxic food environment."[107] This helps direct

focus away from the individual and toward societal forces at work, such as the fact that the

average child may be blasted with ten thousand food commercials a year. Or maybe I

should say *pseudo*-food commercials, as 95 percent of the ads were found to be for candy,

liquid candy (soft drinks), breakfast candy (sugary cereals), and fast food.[108]

Wait a second. If weight gain is just a natural reaction to the easy availability of

mountains of cheap, tasty calories, then why isn't everyone fat? Well, in a certain sense,

most everyone is. It's been estimated that more than 90 percent of American adults are

"overfat," defined as having excess body fat sufficient to impair health.[109] This can occur

even in normal-weight individuals (often due to excess abdominal fat), but even if you just

look at the numbers on the scale, being overweight has become the norm. If you look at

the bell curve, more than 70 percent of us are overweight. A little less than a third are on

one side at normal weight and more than a third are on the other side, so overweight

they're obese. [110]

But if it really is the food, why doesn't *everyone* get fat? That's like asking, "If cigarettes

really are to blame, why don't *all* smokers get lung cancer?" This is where genetic

dispositions and other exposures can weigh in to tip the scales.[111] Different people are born

with a different susceptibility to cancer, but that doesn't mean smoking doesn't play a

critical role in exploding whatever inherent risk we have—and the same goes for obesity

and our toxic food environment. We can try to tip the scales with smoking cessation and a

more healthful diet.

If you lock up two dozen folks in a research study and feed each the exact same number

of excess calories, they all gain weight, but some gain more than others. In one study,

overfeeding the same thousand calories a day, six days a week for one hundred days

caused weight gains ranging from about nine pounds to twenty-nine pounds. Some people

are just more genetically susceptible. The twenty-four people in the study were twelve sets

of identical twins, and the variation in weight gain between each of them was about a third

less than between the unrelated subjects.112 A similar study with weight loss from exercise

found a similar result.113 So, yes, genetics play a role, but that just means some people

have to work harder than others. Ideally, inheriting a predisposition for extra weight gain

shouldn't give reason for resignation but rather motivation to put in the extra effort to

unseal your fate.

Fattening Grandchildren from the Womb

Identical twins don't just share DNA; they shared a uterus too. Might that also help account for some of their

metabolic similarities? Fetal overnutrition, evidenced by an abnormally large birth weight, seems to be a strong

predictor of obesity in childhood and later in life.114 Could it be that you are what your mom ate?

Who do you think most determines the birth weight of a test-tube baby—the donor mom who provided all the

DNA, or the surrogate mom who provided the intrauterine environment? When it was put to the test, the womb won.

Incredibly, a baby born to an obese surrogate mother with a skinny biological mom may harbor a greater risk of

becoming obese than a baby from a big biological mom born to a slim surrogate. The researchers concluded that

“the environment provided by the human mother is more important than her genetic contribution to birth

weight.”115

The most compelling data come from comparing obesity rates in siblings born to the same mother before and

after she had bariatric (weight loss) surgery.116 Compared to their brothers and sisters born after the surgery, those

born when the mom weighed about one hundred pounds more had higher rates of inflammation and metabolic

derangements, and, most critically, three times the risk of severe obesity (affecting 35 percent of those born before

the weight loss, compared to 11 percent born after). The researchers concluded that “these data emphasize how

critical it is to prevent obesity and treat it effectively to prevent further transmission to future generations.”117

But wait. Mom had the same DNA before and after the surgery. She passed down the same genes. How could her

weight during pregnancy affect the weight destiny of her children any differently? We finally figured out the

mechanism by which this can happen: epigenetics.

Epigenetics, which literally means *above genetics,* layers an extra level of information on top of the DNA

sequence that can both be affected by our surroundings and potentially passed on to our children. 118 This is thought

to account for the "developmental programming" 119 (also known as *metabolic imprinting*120) that can occur in the

womb depending on the weight of the mother, or even the grandmother. Since all the eggs in an infant daughter's

ovaries are already preformed before birth, 121 a mother's weight status during pregnancy could potentially affect

the obesity risk of her grandchildren too. 122 Either way, you can imagine how this could result in a vicious

intergenerational cycle where obesity begets obesity.

Is there anything we can do about it? Well, prevention may be the key. Given the epigenetic influence of maternal

weight during pregnancy, a symposium of experts on pediatrics concluded that "planning of pregnancy, including

prior optimization of maternal weight and metabolic condition, offers a safe means to initiate the prevention rather

than treatment of pediatric obesity."123 Easier said than done, but overweight moms-to-be may take comfort in the

fact that even the moms in the study who had given birth to kids with three times lower risk of obesity were still, on

average, obese themselves,124 suggesting that significant weight loss can help even if you're not able to get down

to a normal weight.

What Happened in the 1970s?

The rise in the number of calories provided by the U.S. food supply since the 1970s is more

than sufficient to explain the entire obesity epidemic.[125] Similar spikes in calorie surplus

were noted in developed countries around the world in parallel with,[126] and presumed

primarily responsible for,[127] the expanding waistlines of their populations. By the year 2000,

after taking exports into account, the United States was producing 3,900 calories a day for

every man, woman, and child, nearly twice as much as many people need.[128]

The number of calories in the food supply actually declined over the first half of the

twentieth century, only starting its upward climb to unprecedented heights in the 1970s.[129]

The drop in the first half of the century was attributed to the reduction in hard manual

labor. The population had decreased energy needs, so they ate decreased energy diets.

They didn't need all the extra calories. But then, the so-called energy balance flipping point

occurred. (*Energy balance* is the concept of calories in versus calories out.) Why did the

“move less, stay lean” phase that had existed throughout most of the century turn into the

“eat more, gain weight” phase that plagues us to this day? 130 What changed to bring about

this flipping point?

What happened in the 1970s was a revolution in the food industry. In the 1960s, most

food was prepared and cooked in the home. The average housewife spent hours a day

cooking and cleaning up after meals (the husband averaged nine minutes). 131 But then a

profound transformation took place. Technological advances in food preservation and

packaging enabled manufacturers to mass prepare and distribute food for ready

consumption. The metamorphosis has been compared to what had happened a century

before in the Industrial Revolution with the mass production and supply of manufactured

goods. This time, though, it was the mass production and supply of food. Using new

preservatives, artificial flavors, and techniques such as deep freezing and vacuum packing,

food companies could take advantage of economies of scale132 to mass-produce ready-

made, durable, palatable edibles that offer an enormous commercial advantage over fresh

and perishable foods. 133 And the packaged food sector is now a multi *trillion*-dollar

industry.134

Think ye of the Twinkie. With enough time and effort, any ambitious cook could create

cream-filled cakes in their own kitchen, but today they are available at every turn for less

than a dollar.135 If every time we wanted a Twinkie we had to bake it ourselves, we'd

probably eat far fewer of them.136

Consider the humble potato. We've long been a nation of potato eaters, but they were

largely baked or boiled. Anyone who has made fries from scratch knows what a pain it is,

with all the peeling, cutting, and splattering. But with sophisticated machinations of

mechanization, french fry production became centralized so fries could be shipped at -40°F

to any fast-food deep-fat fryer or supermarket frozen food section in the country to become

America's favorite vegetable. Nearly all the increase in potato consumption in recent

decades has been in the forms of french fries and potato chips.137

Cigarette production offers a compelling parallel. Before the automated rolling machine

was invented, cigarettes had to be rolled by hand. It took fifty workers to produce the same

number of cigarettes a machine could make in a single minute. After automation, cigarette

prices plunged and production leaped into the billions.[138] Cigarette smoking went from

being relatively uncommon to almost everywhere. In the twentieth century, the average

per capita cigarette consumption rose from 54 cigarettes a year to 4,345 by the time of the

1964 Surgeon General's report. [139] The average American went from smoking about 1

cigarette a week to 70. That's a half pack a day.

Tobacco itself was just as addictive before and after mass marketing. What changed was

the much greater opportunity for cheap, easy access. French fries have always been tasty,

but they went from being rare even in restaurants to omnipresent around every corner. You

can probably even find them next to the gas station where you can get your Twinkies and

cigarettes.

The first Twinkie dates back to 1930, though, and Ore-Ida started selling frozen french

fries in the 1950s. 140 So there has to be more to the story than just technological

innovation.

Aiding and Abetting

The rise in calorie surplus sufficient to explain the obesity epidemic was less a change in

food *quantity* than in food *quality,* with an explosion in cheap, high-calorie, low-quality

convenience foods. The federal government very much played a role in making this

happen. U.S. taxpayers unwittingly give billions in subsidies to prop up the likes of the

sugar industry, the corn industry and its high-fructose syrup, and the soybean industry,

which processes about half of its crop into vegetable oil and the other half into cheap

animal feed to help make Dollar Menu meat. 141 When was the last time you sat down to

some sorghum? Exactly. Why then do taxpayers give nearly a quarter billion dollars a year

to the sorghum industry?142 It's almost all fed to livestock.143 We've created a pricing

structure that favors the production of sugars, oils, and animal products.144

The first farm bill started out as an emergency measure during the Great Depression of