

The Sugar Conspiracy

Ian Leslie from The Guardian

Robert Lustig is a paediatric endocrinologist at the University of California who specialises in the treatment of childhood obesity. A 90-minute talk he gave in 2009, titled *Sugar: The Bitter Truth*, has now been viewed more than six million times on YouTube. In it, Lustig argues forcefully that fructose, a form of sugar ubiquitous in modern diets, is a “poison” culpable for America’s obesity epidemic.

A year or so before the video was posted, Lustig gave a similar talk to a conference of biochemists in Adelaide, Australia. Afterwards, a scientist in the audience approached him. Surely, the man said, you’ve read Yudkin. Lustig shook his head. John Yudkin, said the scientist, was a British professor of nutrition who had sounded the alarm on sugar back in 1972, in a book called *Pure, White, and Deadly*.

“If only a small fraction of what we know about the effects of sugar were to be revealed in relation to any other material used as a food additive,” wrote Yudkin, “that material would promptly be banned.” The book did well, but Yudkin paid a high price for it. Prominent nutritionists combined with the food industry to destroy his reputation, and his career never recovered. He died, in 1995, a disappointed, largely forgotten man.

Perhaps the Australian scientist intended a friendly warning. Lustig was certainly putting his academic reputation at risk when he embarked on a high-profile campaign against sugar. But, unlike Yudkin, Lustig is backed by a prevailing wind. We read almost every week of new research into the deleterious effects of sugar on our bodies. In the US, the latest edition of the government’s official dietary guidelines includes a cap on sugar consumption. In the UK, the chancellor George Osborne has announced a new tax on sugary drinks. Sugar has become dietary enemy number one.

This represents a dramatic shift in priority. For at least the last three decades, the dietary arch-villain has been saturated fat. When Yudkin was conducting his research into the effects of sugar, in the 1960s, a new nutritional orthodoxy was in the process of asserting itself. Its central tenet was that a healthy diet is a low-fat diet. Yudkin led a diminishing band of dissenters who believed that sugar, not fat, was the more likely cause of maladies such as obesity, heart disease and diabetes. But by the time he wrote his book, the commanding heights of the field had been seized by proponents of the fat hypothesis. Yudkin found himself fighting a rearguard action, and he was defeated.

Not just defeated, in fact, but buried. When Lustig returned to California, he searched for *Pure, White and Deadly* in bookstores and online, to no avail. Eventually, he tracked down a copy after submitting a request to his university library. On reading Yudkin’s introduction, he felt a shock of recognition.

“Holy crap,” Lustig thought. “This guy got there 35 years before me.”

In 1980, after long consultation with some of America’s most senior nutrition scientists, the US government issued its first Dietary Guidelines. The guidelines shaped the diets of hundreds of millions of people. Doctors base their advice on them, food companies

develop products to comply with them. Their influence extends beyond the US. In 1983, the UK government issued advice that closely followed the American example.

The most prominent recommendation of both governments was to cut back on saturated fats and cholesterol (this was the first time that the public had been advised to eat less of something, rather than enough of everything). Consumers dutifully obeyed. We replaced steak and sausages with pasta and rice, butter with margarine and vegetable oils, eggs with muesli, and milk with low-fat milk or orange juice. But instead of becoming healthier, we grew fatter and sicker.

Look at a graph of postwar obesity rates and it becomes clear that something changed after 1980. In the US, the line rises very gradually until, in the early 1980s, it takes off like an aeroplane. Just 12% of Americans were obese in 1950, 15% in 1980, 35% by 2000. In the UK, the line is flat for decades until the mid-1980s, at which point it also turns towards the sky. Only 6% of Britons were obese in 1980. In the next 20 years that figure more than trebled. Today, two thirds of Britons are either obese or overweight, making this the fattest country in the EU. Type 2 diabetes, closely related to obesity, has risen in tandem in both countries.

At best, we can conclude that the official guidelines did not achieve their objective; at worst, they led to a decades-long health catastrophe. Naturally, then, a search for culprits has ensued. Scientists are conventionally apolitical figures, but these days, nutrition researchers write editorials and books that resemble liberal activist tracts, fizzing with righteous denunciations of “big sugar” and fast food. Nobody could have predicted, it is said, how the food manufacturers would respond to the injunction against fat – selling us low-fat yoghurts bulked up with sugar, and cakes infused with liver-corroding trans fats.

Nutrition scientists are angry with the press for distorting their findings, politicians for failing to heed them, and the rest of us for overeating and under-exercising. In short, everyone – business, media, politicians, consumers – is to blame. Everyone, that is, except scientists.

But it was not impossible to foresee that the vilification of fat might be an error. Energy from food comes to us in three forms: fat, carbohydrate, and protein. Since the proportion of energy we get from protein tends to stay stable, whatever our diet, a low-fat diet effectively means a high-carbohydrate diet. The most versatile and palatable carbohydrate is sugar, which John Yudkin had already circled in red. In 1974, the UK medical journal, the *Lancet*, sounded a warning about the possible consequences of recommending reductions in dietary fat: “The cure should not be worse than the disease.”

Still, it would be reasonable to assume that Yudkin lost this argument simply because, by 1980, more evidence had accumulated against fat than against sugar.

After all, that’s how science works, isn’t it?

If, as seems increasingly likely, the nutritional advice on which we have relied for 40 years was profoundly flawed, this is not a mistake that can be laid at the door of corporate ogres. Nor can it be passed off as innocuous scientific error. What happened to John Yudkin belies that interpretation. It suggests instead that this is something the scientists did to themselves – and, consequently, to us.

We tend to think of heretics as contrarians, individuals with a compulsion to flout conventional wisdom. But sometimes a heretic is simply a mainstream thinker who stays facing the same way while everyone around him turns 180 degrees. When, in 1957, John Yudkin first floated his hypothesis that sugar was a hazard to public health, it was taken seriously, as was its proponent. By the time Yudkin retired, 14 years later, both theory and author had been marginalised and derided. Only now is Yudkin's work being returned, posthumously, to the scientific mainstream.

These sharp fluctuations in Yudkin's stock have had little to do with the scientific method, and a lot to do with the unscientific way in which the field of nutrition has conducted itself over the years. This story, which has begun to emerge in the past decade, has been brought to public attention largely by sceptical outsiders rather than eminent nutritionists. In her painstakingly researched book, *The Big Fat Surprise*, the journalist Nina Teicholz traces the history of the proposition that saturated fats cause heart disease, and reveals the remarkable extent to which its progress from controversial theory to accepted truth was driven, not by new evidence, but by the influence of a few powerful personalities, one in particular.

Teicholz's book also describes how an establishment of senior nutrition scientists, at once insecure about its medical authority and vigilant for threats to it, consistently exaggerated the case for low-fat diets, while turning its guns on those who offered evidence or argument to the contrary. John Yudkin was only its first and most eminent victim.

Today, as nutritionists struggle to comprehend a health disaster they did not predict and may have precipitated, the field is undergoing a painful period of re-evaluation. It is edging away from prohibitions on cholesterol and fat, and hardening its warnings on sugar, without going so far as to perform a reverse turn. But its senior members still retain a collective instinct to malign those who challenge its tattered conventional wisdom too loudly, as Teicholz is now discovering.

To understand how we arrived at this point, we need to go back almost to the beginning of modern nutrition science.

On 23 September, 1955, US President Dwight Eisenhower suffered a heart attack. Rather than pretend it hadn't happened, Eisenhower insisted on making details of his illness public. The next day, his chief physician, Dr Paul Dudley White, gave a press conference at which he instructed Americans on how to avoid heart disease: stop smoking, and cut down on fat and cholesterol. In a follow-up article, White cited the research of a nutritionist at the University of Minnesota, Ancel Keys.

Heart disease, which had been a relative rarity in the 1920s, was now felling middle-aged men at a frightening rate, and Americans were casting around for cause and cure. Ancel Keys provided an answer: the "diet-heart hypothesis" (for simplicity's sake, I am calling it the "fat hypothesis"). This is the idea, now familiar, that an excess of saturated fats in the diet, from red meat, cheese, butter, and eggs, raises cholesterol, which congeals on the inside of coronary arteries, causing them to harden and narrow, until the flow of blood is staunched and the heart seizes up.

Ancel Keys was brilliant, charismatic, and combative. A friendly colleague at the University of Minnesota described him as, "direct to the point of bluntness, critical to the

point of skewering”; others were less charitable. He exuded conviction at a time when confidence was most welcome. The president, the physician and the scientist formed a reassuring chain of male authority, and the notion that fatty foods were unhealthy started to take hold with doctors, and the public. (Eisenhower himself cut saturated fats and cholesterol from his diet altogether, right up until his death, in 1969, from heart disease.)

Many scientists, especially British ones, remained sceptical. The most prominent doubter was John Yudkin, then the UK’s leading nutritionist. When Yudkin looked at the data on heart disease, he was struck by its correlation with the consumption of sugar, not fat. He carried out a series of laboratory experiments on animals and humans, and observed, as others had before him, that sugar is processed in the liver, where it turns to fat, before entering the bloodstream.

He noted, too, that while humans have always been carnivorous, carbohydrates only became a major component of their diet 10,000 years ago, with the advent of mass agriculture. Sugar – a pure carbohydrate, with all fibre and nutrition stripped out – has been part of western diets for just 300 years; in evolutionary terms, it is as if we have, just this second, taken our first dose of it. Saturated fats, by contrast, are so intimately bound up with our evolution that they are abundantly present in breast milk. To Yudkin’s thinking, it seemed more likely to be the recent innovation, rather than the prehistoric staple, making us sick.

John Yudkin was born in 1910, in the East End of London. His parents were Russian Jews who settled in England after fleeing the pogroms of 1905. Yudkin’s father died when he was six, and his mother brought up her five sons in poverty. By way of a scholarship to a local grammar school in Hackney, Yudkin made it to Cambridge. He studied biochemistry and physiology, before taking up medicine. After serving in the Royal Army Medical Corps during the second world war, Yudkin was made a professor at Queen Elizabeth College in London, where he built a department of nutrition science with an international reputation.

Ancel Keys was intensely aware that Yudkin’s sugar hypothesis posed an alternative to his own. If Yudkin published a paper, Keys would excoriate it, and him. He called Yudkin’s theory “a mountain of nonsense”, and accused him of issuing “propaganda” for the meat and dairy industries. “Yudkin and his commercial backers are not deterred by the facts,” he said. “They continue to sing the same discredited tune.” Yudkin never responded in kind. He was a mild-mannered man, unskilled in the art of political combat.

That made him vulnerable to attack, and not just from Keys. The British Sugar Bureau dismissed Yudkin’s claims about sugar as “emotional assertions”; the World Sugar Research Organisation called his book “science fiction”. In his prose, Yudkin is fastidiously precise and undemonstrative, as he was in person. Only occasionally does he hint at how it must have felt to have his life’s work besmirched, as when he asks the reader, “Can you wonder that one sometimes becomes quite despondent about whether it is worthwhile trying to do scientific research in matters of health?”

Throughout the 1960s, Keys accumulated institutional power. He secured places for himself and his allies on the boards of the most influential bodies in American healthcare, including the American Heart Association and the National Institutes of

Health. From these strongholds, they directed funds to like-minded researchers, and issued authoritative advice to the nation. “People should know the facts,” Keys told Time magazine. “Then if they want to eat themselves to death, let them.”

This apparent certainty was unwarranted: even some supporters of the fat hypothesis admitted that the evidence for it was still inconclusive. But Keys held a trump card. From 1958 to 1964, he and his fellow researchers gathered data on the diets, lifestyles and health of 12,770 middle-aged men, in Italy, Greece, Yugoslavia, Finland, Netherlands, Japan and the United States. The Seven Countries Study was finally published as a 211-page monograph in 1970. It showed a correlation between intake of saturated fats and deaths from heart disease, just as Keys had predicted. The scientific debate swung decisively behind the fat hypothesis.

Keys was the original big data guy (a contemporary remarked: “Every time you question this man Keys, he says, ‘I’ve got 5,000 cases. How many do you have?’). Despite its monumental stature, however, the Seven Countries Study, which was the basis for a cascade of subsequent papers by its original authors, was a rickety construction. There was no objective basis for the countries chosen by Keys, and it is hard to avoid the conclusion that he picked only those he suspected would support his hypothesis. After all, it is quite something to choose seven nations in Europe and leave out France and what was then West Germany, but then, Keys already knew that the French and Germans had relatively low rates of heart disease, despite living on a diet rich in saturated fats.

The study’s biggest limitation was inherent to its method. Epidemiological research involves the collection of data on people’s behaviour and health, and a search for patterns. Originally developed to study infection, Keys and his successors adapted it to the study of chronic diseases, which, unlike most infections, take decades to develop, and are entangled with hundreds of dietary and lifestyle factors, effectively impossible to separate.

To reliably identify causes, as opposed to correlations, a higher standard of evidence is required: the controlled trial. In its simplest form: recruit a group of subjects, and assign half of them a diet for, say, 15 years. At the end of the trial, assess the health of those in the intervention group, versus the control group. This method is also problematic: it is virtually impossible to closely supervise the diets of large groups of people. But a properly conducted trial is the only way to conclude with any confidence that X is responsible for Y.

Although Keys had shown a correlation between heart disease and saturated fat, he had not excluded the possibility that heart disease was being caused by something else. Years later, the Seven Countries study’s lead Italian researcher, Alessandro Menotti, went back to the data, and found that the food that correlated most closely with deaths from heart disease was not saturated fat, but sugar.

By then it was too late. The Seven Countries study had become canonical, and the fat hypothesis was enshrined in official advice. The congressional committee responsible for the original Dietary Guidelines was chaired by Senator George McGovern. It took most of its evidence from America’s nutritional elite: men from a handful of prestigious universities, most of whom knew or worked with each other, all of whom agreed that fat

was the problem – an assumption that McGovern and his fellow senators never seriously questioned. Only occasionally were they asked to reconsider. In 1973, John Yudkin was called from London to testify before the committee, and presented his alternative theory of heart disease.

A bemused McGovern asked Yudkin if he was really suggesting that a high fat intake was not a problem, and that cholesterol presented no danger.

“I believe both those things,” replied Yudkin.

“That is exactly the opposite of what my doctor told me,” said McGovern.

In a 2015 paper titled *Does Science Advance One Funeral at a Time?*, a team of scholars at the National Bureau of Economic Research sought an empirical basis for a remark made by the physicist Max Planck: “A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”

The researchers identified more than 12,000 “elite” scientists from different fields. The criteria for elite status included funding, number of publications, and whether they were members of the National Academies of Science or the Institute of Medicine. Searching obituaries, the team found 452 who had died before retirement. They then looked to see what happened to the fields from which these celebrated scientists had unexpectedly departed, by analysing publishing patterns.

What they found confirmed the truth of Planck’s maxim. Junior researchers who had worked closely with the elite scientists, authoring papers with them, published less. At the same time, there was a marked increase in papers by newcomers to the field, who were less likely to cite the work of the deceased eminence. The articles by these newcomers were substantive and influential, attracting a high number of citations. They moved the whole field along.

A scientist is part of what the Polish philosopher of science Ludwik Fleck called a “thought collective”: a group of people exchanging ideas in a mutually comprehensible idiom. The group, suggested Fleck, inevitably develops a mind of its own, as the individuals in it converge on a way of communicating, thinking and feeling.

This makes scientific inquiry prone to the eternal rules of human social life: deference to the charismatic, herding towards majority opinion, punishment for deviance, and intense discomfort with admitting to error. Of course, such tendencies are precisely what the scientific method was invented to correct for, and over the long run, it does a good job of it. In the long run, however, we’re all dead, quite possibly sooner than we would be if we hadn’t been following a diet based on poor advice.

In a series of densely argued articles and books, including *Why We Get Fat* (2010), the science writer Gary Taubes has assembled a critique of contemporary nutrition science, powerful enough to compel the field to listen. One of his contributions has been to uncover a body of research conducted by German and Austrian scientists before the second world war, which had been overlooked by the Americans who reinvented the field in the 1950s. The Europeans were practising physicians and experts in the metabolic system. The Americans were more likely to be epidemiologists, labouring in

relative ignorance of biochemistry and endocrinology (the study of hormones). This led to some of the foundational mistakes of modern nutrition.

The rise and slow fall of cholesterol's infamy is a case in point. After it was discovered inside the arteries of men who had suffered heart attacks, public health officials, advised by scientists, put eggs, whose yolks are rich in cholesterol, on the danger list. But it is a biological error to confuse what a person puts in their mouth with what it becomes after it is swallowed. The human body, far from being a passive vessel for whatever we choose to fill it with, is a busy chemical plant, transforming and redistributing the energy it receives. Its governing principle is homeostasis, or the maintenance of energy equilibrium (when exercise heats us up, sweat cools us down). Cholesterol, present in all of our cells, is created by the liver. Biochemists had long known that the more cholesterol you eat, the less your liver produces.

Unsurprisingly, then, repeated attempts to prove a correlation between dietary cholesterol and blood cholesterol failed. For the vast majority of people, eating two or three, or 25 eggs a day, does not significantly raise cholesterol levels. One of the most nutrient-dense, versatile and delicious foods we have was needlessly stigmatised. The health authorities have spent the last few years slowly backing away from this mistake, presumably in the hope that if no sudden movements are made, nobody will notice. In a sense, they have succeeded: a survey carried out in 2014 by Credit Suisse found that 54% of US doctors believe that dietary cholesterol raises blood cholesterol.

To his credit, Ancel Keys realised early on that dietary cholesterol was not a problem. But in order to sustain his assertion that cholesterol causes heart attacks, he needed to identify an agent that raises its levels in the blood – he landed on saturated fats. In the 30 years after Eisenhower's heart attack, trial after trial failed to conclusively bear out the association he claimed to have identified in the Seven Countries study.

The nutritional establishment wasn't greatly discomfited by the absence of definitive proof, but by 1993 it found that it couldn't evade another criticism: while a low-fat diet had been recommended to women, it had never been tested on them (a fact that is astonishing only if you are not a nutrition scientist). The National Heart, Lung and Blood Institute decided to go all in, commissioning the largest controlled trial of diets ever undertaken. As well as addressing the other half of the population, the Women's Health Initiative was expected to obliterate any lingering doubts about the ill-effects of fat.

It did nothing of the sort. At the end of the trial, it was found that women on the low-fat diet were no less likely than the control group to contract cancer or heart disease. This caused much consternation. The study's principal researcher, unwilling to accept the implications of his own findings, remarked: "We are scratching our heads over some of these results." A consensus quickly formed that the study – meticulously planned, lavishly funded, overseen by impressively credentialed researchers – must have been so flawed as to be meaningless. The field moved on, or rather did not.

In 2008, researchers from Oxford University undertook a Europe-wide study of the causes of heart disease. Its data shows an inverse correlation between saturated fat and heart disease, across the continent. France, the country with the highest intake of saturated fat, has the lowest rate of heart disease; Ukraine, the country with the lowest intake of saturated fat, has the highest. When the British obesity researcher Zoë

Harcombe performed an analysis of the data on cholesterol levels for 192 countries around the world, she found that lower cholesterol correlated with higher rates of death from heart disease.

In the last 10 years, a theory that had somehow held up unsupported for nearly half a century has been rejected by several comprehensive evidence reviews, even as it staggers on, zombie-like, in our dietary guidelines and medical advice.

The UN's Food and Agriculture Organisation, in a 2008 analysis of all studies of the low-fat diet, found "no probable or convincing evidence" that a high level of dietary fat causes heart disease or cancer. Another landmark review, published in 2010, in the American Society for Nutrition, and authored by, among others, Ronald Krauss, a highly respected researcher and physician at the University of California, stated "there is no significant evidence for concluding that dietary saturated fat is associated with an increased risk of CHD or CVD [coronary heart disease and cardiovascular disease]".

Many nutritionists refused to accept these conclusions. The journal that published Krauss's review, wary of outrage among its readers, prefaced it with a rebuttal by a former right-hand man of Ancel Keys, which implied that since Krauss's findings contradicted every national and international dietary recommendation, they must be flawed. The circular logic is symptomatic of a field with an unusually high propensity for ignoring evidence that does not fit its conventional wisdom.

Gary Taubes is a physicist by background. "In physics," he told me, "You look for the anomalous result. Then you have something to explain. In nutrition, the game is to confirm what you and your predecessors have always believed." As one nutritionist explained to Nina Teicholz, with delicate understatement: "Scientists believe that saturated fat is bad for you, and there is a good deal of reluctance toward accepting evidence to the contrary."

When obesity started to become recognised as a problem in western societies, it too was blamed on saturated fats. It was not difficult to persuade the public that if we eat fat, we will be fat (this is a trick of the language: we call an overweight person "fat"; we don't describe a person with a muscular body as "proteiny"). The scientific rationale was also pleasingly simple: a gramme of fat has twice as many calories as a gramme of protein or carbohydrate, and we can all grasp the idea that if a person takes in more calories than she expends in physical activity, the surplus ends up as fat.

Simple does not mean right, of course. It's difficult to square this theory with the dramatic rise in obesity since 1980, or with much other evidence. In America, average calorific intake increased by just a sixth over that period. In the UK, it actually fell. There has been no commensurate decline in physical activity, in either country – in the UK, exercise levels have increased over the last 20 years. Obesity is a problem in some of the poorest parts of the world, even among communities in which food is scarce. Controlled trials have repeatedly failed to show that people lose weight on low-fat or low-calorie diets, over the long-term.

Those prewar European researchers would have regarded the idea that obesity results from "excess calories" as laughably simplistic. Biochemists and endocrinologists are more likely to think of obesity as a hormonal disorder, triggered by the kinds of foods we started eating a lot more of when we cut back on fat: easily digestible starches and

sugars. In his new book, *Always Hungry*, David Ludwig, an endocrinologist and professor of pediatrics at Harvard Medical School, calls this the “Insulin-Carbohydrate” model of obesity. According to this model, an excess of refined carbohydrates interferes with the self-balancing equilibrium of the metabolic system.

Far from being an inert dumping ground for excess calories, fat tissue operates as a reserve energy supply for the body. Its calories are called upon when glucose is running low – that is, between meals, or during fasts and famines. Fat takes instruction from insulin, the hormone responsible for regulating blood sugar. Refined carbohydrates break down at speed into glucose in the blood, prompting the pancreas to produce insulin. When insulin levels rise, fat tissue gets a signal to suck energy out of the blood, and to stop releasing it. So when insulin stays high for unnaturally long, a person gains weight, gets hungrier, and feels fatigued. Then we blame them for it. But, as Gary Taubes puts it, obese people are not fat because they are overeating and sedentary – they are overeating and sedentary because they are fat, or getting fatter.

Ludwig makes clear, as Taubes does, that this is not a new theory – John Yudkin would have recognised it – but an old one that has been galvanised by new evidence. What he does not mention is the role that supporters of the fat hypothesis have played, historically, in demolishing the credibility of those who proposed it.

In 1972, the same year Yudkin published *Pure, White and Deadly*, a Cornell-trained cardiologist called Robert Atkins published *Dr Atkins’ Diet Revolution*. Their arguments shared a premise – that carbohydrates are more dangerous to our health than fat – though they differed in particulars. Yudkin focused on the evils of one carbohydrate in particular, and didn’t explicitly recommend a high-fat diet. Atkins argued that a high-fat, low-carbohydrate diet was the only viable route to weight loss.

Perhaps the most important difference between the two books was tone. Yudkin’s was cool, polite and reasonable, which reflected his temperament, and the fact that he saw himself as a scientist first and a clinician second. Atkins, resolutely a practitioner rather than an academic, was unbound by gentlemanly conventions. He declared himself furious that he had been “duped” by medical scientists. Unsurprisingly, this attack enraged the nutritional establishment, which hit back hard. Atkins was labelled a fraud, and his diet a “fad”. It was a successful campaign: even today, Atkins’s name brings with it the odour of quackery.

A “fad” implies something new-fangled. But low-carbohydrate, high-fat diets had been popular for well over a century before Atkins, and were, until the 1960s, a method of weight loss endorsed by mainstream science. By the start of the 1970s, that had changed. Researchers interested in the effects of sugar and complex carbohydrates on obesity only had to look at what had happened to the most senior nutritionist in the UK to see that pursuing such a line of inquiry was a terrible career move.

John Yudkin’s scientific reputation had been all but sunk. He found himself uninvited from international conferences on nutrition. Research journals refused his papers. He was talked about by fellow scientists as an eccentric, a lone obsessive. Eventually, he became a scare story. Sheldon Reiser, one of the few researchers to continue working on the effects of refined carbohydrates and sugar through the 1970s, told Gary Taubes

in 2011: “Yudkin was so discredited. He was ridiculed in a way. And anybody else who said something bad about sucrose [sugar], they’d say, ‘He’s just like Yudkin.’”

If Yudkin was ridiculed, Atkins was a hate figure. Only in the last few years has it become acceptable to study the effects of Atkins-type diets. In 2014, in a trial funded by the US National Institutes of Health, 150 men and women were assigned a diet for one year which limited either the amount of fat or carbs they could eat, but not the calories. By the end of the year, the people on the low carbohydrate, high fat diet had lost about 8lb more on average than the low-fat group. They were also more likely to lose weight from fat tissue; the low-fat group lost some weight too, but it came from the muscles. The NIH study is the latest of more than 50 similar studies, which together suggest that low-carbohydrate diets are better than low-fat diets for achieving weight loss and controlling type 2 diabetes. As a body of evidence, it is far from conclusive, but it is as consistent as any in the literature.

The 2015 edition of the US Dietary Guidelines (they are revised every five years) makes no reference to any of this new research, because the scientists who advised the committee – the most eminent and well-connected nutritionists in the country – neglected to include a discussion of it in their report. It is a gaping omission, inexplicable in scientific terms, but entirely explicable in terms of the politics of nutrition science. If you are seeking to protect your authority, why draw attention to evidence that seems to contradict the assertions on which that authority is founded? Allow a thread like that to be pulled, and a great unravelling might begin.

It may already have done. Last December, the scientists responsible for the report received a humiliating rebuke from Congress, which passed a measure proposing a review of the way the advice informing the guidelines is compiled. It referred to “questions ... about the scientific integrity of the process”. The scientists reacted angrily, accusing the politicians of being in thrall to the meat and dairy industries (given how many of the scientists depend on research funding from food and pharmaceutical companies, this might be characterised as audacious).

Some scientists agree with the politicians. David McCarron, a research associate at the Department of Nutrition at the University of California-Davis, told the Washington Post: “There’s a lot of stuff in the guidelines that was right 40 years ago but that has been disproved. Unfortunately, sometimes, the scientific community doesn’t like to backtrack.” Steven Nissen, chairman of cardiovascular medicine at the Cleveland Clinic, was blunter, calling the new guidelines “an evidence-free zone”.

The congressional review has come about partly because of Nina Teicholz. Since her book was published, in 2014, Teicholz has become an advocate for better dietary guidelines. She is on the board of the Nutrition Coalition, a body funded by the philanthropists John and Laura Arnold, the stated purpose of which is to help ensure that nutrition policy is grounded in good science.

In September last year she wrote an article for the BMJ (formerly the British Medical Journal), which makes the case for the inadequacy of the scientific advice that underpins the Dietary Guidelines. The response of the nutrition establishment was ferocious: 173 scientists – some of whom were on the advisory panel, and many of

whose work had been critiqued in Teicholz's book – signed a letter to the BMJ, demanding it retract the piece.

Publishing a rejoinder to an article is one thing; requesting its erasure is another, conventionally reserved for cases involving fraudulent data. As a consultant oncologist for the NHS, Santhanam Sundar, pointed out in a response to the letter on the BMJ website: "Scientific discussion helps to advance science. Calls for retraction, particularly from those in eminent positions, are unscientific and frankly disturbing."

The letter lists "11 errors", which on close reading turn out to range from the trivial to the entirely specious. I spoke to several of the scientists who signed the letter. They were happy to condemn the article in general terms, but when I asked them to name just one of the supposed errors in it, not one of them was able to. One admitted he had not read it. Another told me she had signed the letter because the BMJ should not have published an article that was not peer reviewed (it was peer reviewed). Meir Stampfer, a Harvard epidemiologist, asserted that Teicholz's work is "riddled with errors", while declining to discuss them with me.

Reticent as they were to discuss the substance of the piece, the scientists were noticeably keener to comment on its author. I was frequently and insistently reminded that Teicholz is a journalist, and not a scientist, and that she had a book to sell, as if this settled the argument. David Katz, of Yale, one of the members of the advisory panel, and an indefatigable defender of the orthodoxies, told me that Teicholz's work "reeks of conflict of interest" without specifying what those conflicts were. (Dr Katz is the author of four diet books.)

Dr Katz does not pretend that his field has been right on everything – he admitted to changing his own mind, for example, on dietary cholesterol. But he returned again and again to the subject of Teicholz's character. "Nina is shockingly unprofessional ... I have been in rooms filled with the who's who of nutrition and I have never seen such unanimous revulsion as when Miss Teicholz's name comes up. She is an animal unlike anything I've ever seen before." Despite requests, he cited no examples of her unprofessional behaviour. (The vitriol poured over Teicholz is rarely dispensed to Gary Taubes, though they make fundamentally similar arguments.)

In March this year, Teicholz was invited to participate in a panel discussion on nutrition science at the National Food Policy conference, in Washington DC, only to be promptly disinvited, after her fellow panelists made it clear that they would not share a platform with her. The organisers replaced her with the CEO of the Alliance for Potato Research and Education.

One of the scientists who called for the retraction of Nina Teicholz's BMJ article, who requested that our conversation be off the record, complained that the rise of social media has created a "problem of authority" for nutrition science. "Any voice, however mad, can gain ground," he told me.

It is a familiar complaint. By opening the gates of publishing to all, the internet has flattened hierarchies everywhere they exist. We no longer live in a world in which elites of accredited experts are able to dominate conversations about complex or contested matters. Politicians cannot rely on the aura of office to persuade, newspapers struggle to assert the superior integrity of their stories. It is not clear that this change is, overall, a

boon for the public realm. But in areas where experts have a track record of getting it wrong, it is hard to see how it could be worse. If ever there was a case that an information democracy, even a very messy one, is preferable to an information oligarchy, then the history of nutrition advice is it.

In the past, we only had two sources of nutritional authority: our doctor and government officials. It was a system that worked well as long as the doctors and officials were informed by good science. But what happens if that cannot be relied on?

The nutritional establishment has proved itself, over the years, skilled at ad hominem takedowns, but it is harder for them to do to Robert Lustig or Nina Teicholz what they once did to John Yudkin. Harder, too, to deflect or smother the charge that the promotion of low-fat diets was a 40-year fad, with disastrous outcomes, conceived of, authorised, and policed by nutritionists.

Professor John Yudkin retired from his post at Queen Elizabeth College in 1971, to write *Pure, White and Deadly*. The college reneged on a promise to allow him to continue to use its research facilities. It had hired a fully committed supporter of the fat hypothesis to replace him, and it was no longer deemed politic to have a prominent opponent of it on the premises. The man who had built the college's nutrition department from scratch was forced to ask a solicitor to intervene. Eventually, a small room in a separate building was found for Yudkin.

When I asked Lustig why he was the first researcher in years to focus on the dangers of sugar, he answered: "John Yudkin. They took him down so severely – so severely – that nobody wanted to attempt it on their own."