

Medical research and development is detrimental to health

Martin Sereno

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As a scientist, sometimes funded by the National Institutes of Health, I have always been fascinated by the natural world, from physics to chemistry to molecular biology to neuroscience, and remain so. I also think it remains worthwhile to fund scientific research as a way of increasing human knowledge. I start with these two statements because I would now like to argue that most research and development into how to improve human health has degenerated into almost complete uselessness for its stated purpose, and may actually be making human health worse on average.

It is scientifically and medically uncontroversial that the great majority of Americans are unhealthy (over 70% are now overweight or obese, with outright obesity inexorably increasing at 0.5% per year), and that most eat an unhealthy diet that is too high in animal protein, oil, and manufactured 'food', and far too low in starchy vegetables and grains, beans, fruits, and green vegetables. This unhealthy style of eating and the attendant negative effects on human health has now rapidly spread (N.B.: past tense!) to the rest of the world (China, India). For example, the chance of a getting a stroke after age 25 in China has now reached a staggering 40% (vs. 'only' 25% in the US). The decline in the quality of 'fourth quarter life' (now progressing to the third and second quarters) has generated a huge industry of well-meaning chemists, biologists, psychologists, and legislators, as well as profit-driven corporations, who are researching ways to try to fix this.

For the relatively small proportion of people in the medical system with rare genetic diseases or traumatic injuries, medical research has had extremely positive effects. But for the great majority with chronic 'diseases', the combined activities of research, policy-making, and profit-making is actually making the situation worse. The situation has many similarities to the problem of too much atmospheric CO₂. Despite increasing amounts of research and understanding of the resulting climate change, and increasing research, understanding, and construction of alternative 'greener', and more efficient use of energy sources, the level of CO₂ in the atmosphere has inexorably increased (about 0.5% per year for the past four decades, like obesity). In fact, the rate of increase in CO₂ appears to itself be increasing. The climate situation is in part an example of Jevons' paradox. Jevons originally studied the effects of increased efficiency of the Watt steam engine on the usage of coal. The paradox was that the more efficient engine caused a huge increase in coal usage, completely overwhelming the gains from the increased efficiency of the Watt steam engine.

The situation with human health research and its commercialization is a bit analogous to Jevons' paradox. An obvious 'good' like better understanding of human disease (cf. increased energy efficiency) paradoxically causes a worse outcome as human health declines even though ever increasing amounts of knowledge-based treatments are deployed (cf. overall increased energy use). I will argue that current research into understanding and treating human chronic disease is now actually harming people's health.

How could we have come to this dire conclusion, given the

well-meaning intentions of most of the people involved in research and industry (well at least the lower echelons)? I think that it is the unavoidable outcome of the dynamics of industrial civilization.

There is only one primary 'disease'

There is only *one* primary 'disease' in older modern humans, despite the fact that it is confusingly called by hundreds of different names. This 'disease' is not really a disease, but simply the effects of bad (overly calorie-dense, overly meat-dense, overly oil-dense) diet. The majority of modern health care and health research has utterly failed to fix this 'disease' by using vaccines, drugs, and surgery, and by completely ignoring diet. Again, this is not to downplay the great advances made in treating the unlucky few with a major genetic defect or a traumatic injury.

This one bad diet 'disease' amazingly includes *all* of the following: heart disease (the biggest killer), atrial fibrillation, artery disease (atherosclerosis in the coronary, carotid, lower back, erectile, not to mention miles of other lesser arteries), failure of nitric-oxide mediated arterial dilation (also everywhere), high blood pressure, heart attack, aortic and brain aneurysms, type II diabetes (insulin insensitivity from intramyocellular lipids), kidney failure, kidney stones, macular degeneration, retinal bleeds, Alzheimer's disease, vascular dementia, Parkinson's disease, strokes from clots, strokes from bleeds, deep vein thrombosis, pulmonary embolism, gallstones, breast cancer, endometrial cancer, uterine fibroids, prostate cancer, colon cancer, hemorrhoids, colitis, leaky gut, osteoarthritis, rheumatoid arthritis, acid reflux, esophageal cancer, erectile dysfunction, lower back degeneration and pain, multiple sclerosis, psoriasis, lupus, Type I diabetes (autoimmune pancreas damage from leaky gut combined with islet cell mimicry by dairy proteins). *All* of these 'diseases' were basically unheard of among young and old people eating starchy, plant-based, low oil, low calorie-density diets. Dennis Burkitt knew most of this by 1950, by comparing old Ugandans to old Britons.

These 'diseases' are intimately interrelated. For example, as arterial function begins to fail (atherosclerosis, failure of nitric-oxide mediated arterial dilation), the body sensibly increases blood pressure to ensure adequate perfusion. This can then cause an aneurysm or rupture retinal vessels or increase the chance of a stroke, or if controlled by blood pressure medications, cause underperfusion and oxygen deprivation of the body, bones, and brain.

Or consider the various forms of dementia including Parkinson's disease. To me, they all look like a bunch of different forms of 'inability to take out the garbage', whether the garbage be amyloid, or tau protein, or alpha-synuclein, or the latest new waste-product-of-the-day. There is nothing intrinsically wrong with the naturally occurring waste products. They're just not being cleaned out. Genetics can affect these diseases. For example, those with the ApoE4 allele have a 'genetic risk' for Alzheimer's. But even people with *two* copies of the ApoE4 allele living in Nigeria, where they are still eating a real 'poor people diet', rarely get Alzheimer's in their old age.

The main modern cause of ill health in old age is diet, the particular composition of the more than *half a ton* of solid food that each person eats per year. But why is *medical research* not helping?

Commercial science

The first problem is what Jeff Nelson calls 'commercial science'. Industrial food, supplement, and pharma companies have figured out that the best way to spend their advertising budget is to fund 'science' rather than direct advertising. This 'science' is often performed by taking large populations (or meta analyses) of people who are all eating bad diets (low variance, but large 'n', allowing detection of small, irrelevant effects), performing 'corrections' (e.g., eliminate people with existing heart disease when attempting to see if dairy causes heart disease), exploit correlations (e.g., nut-eaters tend to exercise more, which will guarantee that nut-eating is 'healthy'). The result is complete nonsense: 'butter is back', 'eat chocolate to lose weight', 'bacon is a health food', 'beans are poisonous', 'nuts cure heart disease', 'carbs make you fat', 'avoid nightshades', 'eat fish for heart health', 'olive oil is heart healthy', 'take DHA supplements else you will get dementia', and so on. This nonsense is then spread at zero cost to the food, supplement, and drug companies by social media.

This has resulted in utter confusion and mental fog surrounding diet, with people randomly avoiding carbs or gluten, eating even more meat and fish (N.B.: fish is meat) and more eggs, avoiding fruit or some random vegetable, thinking they are protein-deficient (they're eating 2-3x too much protein), and taking giant piles of daily drugs and supplements. They think carbs like potatoes make them fat, but somehow never get around to googling the simple fact that french fries are *five* times as calorie dense as potatoes (hint: it's not the carbs). Diet fads debunked decades ago (e.g., consider Atkins, the original 'paleo/keto' idiot, who died overweight, at 72, of heart disease, after a previous heart attack) repeatedly surge back into fashion. 'Commercial science' studies generate one random, misleading headline after another, each of which fades, but each of which fails to report facts known for many decades that a low oil, plant based diet is the *only* thing that has been shown to actually *reverse* heart disease, diabetes, retinal damage, and many other diet-induced 'diseases' (Dennis Burkitt, Walter Kempner, Lester M. Morrison, T. Colin Campbell, John McDougall, Caldwell Esselstyn). We already knew this answer scientifically by 1950! The reality is that there was really no need for any further research - at least from the standpoint of trying to improve human health.

Doctors ignore and denigrate diet

The second problem, which is related to the first, is that most doctors ignore diet - the roughly one *ton* of solid food we all eat each year. They massively underplay the significance of diet for health, and often eat bad diets themselves (cf. more than 50% of doctors smoked in 1950). They also assume that patients won't be able to make any significant change in their diets. The stark reality of the situation is so stupefying, that it is hard to believe it is actually true. Dietary-induced *reversal* of heart and retinal disease and diabetes in a cohort of 18,000 patients was *already published* by 1950 (Kempner). For a more recent study, look at the stunning data table in Esselstyn's 2014 study [PDF here](#). By contrast, the best contemporary high-tech treatments (blood pressure meds, statins, stents and other devices, surgery) developed with increasingly higher tech methods over

the past *70* years of research at the cost trillions of dollars, can, at best, stop heart disease from getting rapidly worse. *No* modern medical treatment can reverse heart disease (e.g., stents have zero effect on all cause mortality). Yet these basic research facts are almost completely unknown by both patients and doctors. And when patients bring it to the attention of doctors - even when they are physically demonstrating the good effects of having improved their diet on their own body, they are often ridiculed.

Most doctors have not even heard of Walter Kempner. Most have literally zero training in nutrition. Virtually no doctors will tell their patients that a dietary change can actually *reverse* their heart disease. They then prescribe meds and procedures that at best keep it from getting worse. There are many things that doctors can legally bill for. Amazingly, advice about diet - perhaps the single largest effect on health - is not one of them. This situation borders on criminality.

The food/restaurant business will *always* serve hyper-attractive food

The third problem is that it is structurally impossible for the industrial food and restaurant businesses to give up making hyperattractive, overly calorie-dense food. Although there will always be niche markets and niche menu items, any company trying to market uniformly less attractive food will fail. The attractiveness of food is fundamentally determined by its calorie density together with its saltiness. It is no accident that all restaurant food contains massive amounts of fat, sugar, and salt. It is no accident that this kind of calorie-dense food has always been the food of the nobility. It will be more attractive to humans forever. Any food or restaurant business ignoring this will go out of business.

When I (very occasionally) go to the airport and see all the middle-aged man-breasts with a 7 months pregnant-looking belly below, and a secondary, below-the-belt belly, barely able to walk down the hallway, I think, 'seize the day, man'. But that catastrophic epidemic wasn't caused by a day of overindulgence. Instead, it was caused by relatively *tiny*, but reliable, daily overindulgences. A weight gain of a few pounds a year results from eating merely 20 or 40 extra calories per day, every day. This is an 'overindulgence' that is almost undetectable on a daily basis. But the end result over decades is a catastrophic 100 or 200 pound weight gain, which results in hundreds of modern 'diseases' (note that this ignores the extra calories you have to eat just to maintain the extra 100 or 200 pounds without gaining additional weight).

It is stunningly obvious what has caused this health catastrophe. Each modern human has to run a daily gauntlet of hyperattractive, hyper calorie-dense foods with 2 or even 3 times the 'right' calorie density of about 700 calories per pound. With junk food, not only is it 2-3x too calorie dense, but then it has been further 'weaponized' (e.g., Doritos) by careful research into which precise complex and unobstrusive spice combinations work the best to prevent satiety. Bad food is in your face 24/7 (grocery store, restaurant, teevee, cell phone, double bacon grilled cheese burger pizza with oil sauce). Douglas J. Lisle has very clearly described all this 15 years ago as 'the pleasure trap'.

But as long as people are not constrained by low salary (living on a few dollars a day) or by being locked into a feeding ward (e.g., Kempner :-}), any business without hyper attractive,

hyper calorie-dense food fare on offer for the unconscious human limbic system will fail, period.

An excellent recent illustration of this is the rise of what could be called 'corporate veganism'. Despite all diet chaff, people *have* begun to become unconsciously more and more aware of the dire consequences of eating meat, cheese, eggs, and oil for human health, the environment, and animal experience. Corporations have, of course, picked up on this. The solution is 'corporate veganism'. Enormous flows of venture capital have resulted in the engineering of 'vegan' foods with the calorie-densities similar to hamburgers, fries, and shakes. An example is Beyond Meat (pea protein based vegan hamburgers), which just had its best-ever quarter, a tiny \$40 million in sales, which generated \$6.6 million in losses; but its stock price values the company at \$12 billion dollars - one quarter of a Tesla and almost half a Twitter. It will be *no problem* growing 450 pound 'vegans' using this approach. It won't have the slightest effect on the inexorable decline in health. In fact, it could actually make it *worse*, since people will feel protected because they will think they are eating 'better' (cf. vaping). It will be difficult to legislate: you can live without smoking, but you can't live without eating, and if you tried, you would quickly end up with a black market for hamburgers and fries.

It is only practical to research/develop/patent 'single point-of-contact' drugs

Fourth, a basic problem is that the main kinds of drugs and procedures that can be researched (e.g., that a researcher can get a grant to study), developed (e.g., that can be studied to determine efficacy in a population), and patented (this is what drives everything) are what I call single point-of-contact drugs and devices. This also applies to the supplement industry, which is just another arm of the pharmaceutical industry.

There is a tremendous and justified tendency toward using reductionistic research strategies because these have been shown to work spectacularly well over the history of science. These rely on focusing on a single chemical or nutrient by controlling other inputs as carefully as possible, and make the underlying assumption that the world is essentially linear (effects simply add). However, just because the strategy works doesn't mean that it doesn't have biases. It is critical to regularly zoom out to the bigger picture, especially when studying biology where complex interacting (cyclic) networks abound, in order to see what Bill Wimsatt (my PhD thesis advisor) has called 'reductionistic research biases'.

The apparent specificity of a single-point-of-contact drug is especially misleading. It is true that the initial effect of a drug might be specific (e.g., irinotecan chemotherapy blocking the action of one particular topoisomerase [DNA twisting] enzyme, which causes the DNA to sometimes snap, which kills dividing cells). But the problem is this one targetted reaction catalyzed by a target enzyme or receptor is embedded in a cyclic network of reactions.

The first effect of blocking a node (usually by modulating the link between two nodes) is invariably an 'attempt' by the network to undo the effect through homeostatic feedback control. For example, alcoholic brains with increased action of inhibitory GABA-A receptors as a result of omnipresent alcohol compensate by increasing excitatory mechanisms (e.g., glutamate-based) to cancel the extra inhibition to get excitability back to normal.

However, virtually every node branches, so there are invariable multiple downstream effects. The end result is often 'side effects', which aren't really side effects, but main effects. We only call them 'side' because we try not to look off to the side. For example, there are [27 steps](#) between the node that statins block (HMG-CoA reductase) and cholesterol; many of the intermediate steps have branches.

To give another example of the complexity of highly-optimized biological meshworks, consider amino-acyl tRNA synthetases, which are enzymes that load particular amino acids onto particular transfer RNA's. These enzymes are essentially where the genetic code (mapping between RNA triples and amino acids) literally resides, since in the absence of these enzymes, it is possible to attach any amino acid to any transfer RNA.

Recently it was discovered that amino acyl tRNA synthetases are involved in pathways promoting vascularization (!). Vascularization is critically involved in the growth of cancer tumors. So these enzymes will be targetted by anti-cancer drugs. As you can imagine, there might be 'side effects' of literally targetting the genetic code. This is an excellent example of gene 'pleiotropy'. It is true that single genes (almost always) code for single proteins. But the mapping between genes and macroscopic traits is complex; there are few genes that cleanly map to a macroscopic trait. In this case, a gene for an amino acyl tRNA synthetase maps to defining the amino acid meaning of one word in the genetic code *and* to causing blood vessels to form!

As I have written before, it is, in theory, possible to research, develop, patent, and market complex combinations of chemicals. But, the explosion of different possible drug combinations and doses of each chemical limits practical tests of combinations to at most 2 or 3 chemicals or nutrients. There aren't enough people on Earth to objectively test all combinations and levels of even 20 drugs on real groups of people. And 20 drugs is a teeny tiny fraction of the millions of natural compounds we routinely ingest in natural food (natural chemotherapy!). All of this shows that single-point-of-contact drugs *or* supplements can never be a replacement for the hundreds of millions of different chemicals in a whole food plant based diet. It is important to also realize that touching a few nodes in the network with a few single-point-of-contact drugs is never going to be able to compensate for the network-wide failures induced by eating an overly rich diet.

Changing (e.g., cholesterol, blood pressure) by drug does *not* equal changing it by diet

For a concrete example of how a reductionist mindset leads to an error in reasoning, consider the obviously incorrect conclusion that changing the level of some compound (e.g., cholesterol) by a drug that specifically targets one point in the metabolic network (in the case of cholesterol, blocking one enzyme in the mevalonate pathway) is equivalent to changing the circulating level of that compound by diet changes. A statin drug touches a single node while a diet change involves changes in millions of ingested chemicals, which simultaneously affect a very large number of nodes. The chance that the effects of lowering cholesterol by statins vs. lowering cholesterol by diet change are 'the same' is essentially zero.

This has been shown by comparing large feeding trials to large drug trials. Already by 1950, it was known that a low fat

plant based diet was capable of drastically lowering blood lipids to the same levels as large statin doses do today (e.g., Kempner, 1948, article still shamefully behind a paywall [here](#)). However, unlike statins, low fat whole food plant-based diets actually **reverse** heart disease (confirmed using modern techniques by Caldwell Esselstyn [here](#)), lower blood pressure, reverse retinal disease, reverse diabetes (among other things), reverse arthritis, and so on. Statins, by contrast, have been associated with **increases** in diabetes, perhaps via 'side' effects on the gut.

There is an analogous contrast between drugs and diet in the case of blood pressure. Lowering blood pressure with drugs does **not** equal lowering blood pressure with diet. Lowering it with diet also reduces diabetes and arthritis; the reduced arthritis leads to more activity, the same blood-pressure-lowering diet also reduces blood lipids, improving arterial function, and many other things. The reason blood pressure is high in the first place is because the body is trying to provide enough oxygen to tissues through damaged arteries. The body is not stupid. Merely lowering blood pressure doesn't fix any of those other things, and in fact probably deprives tissues all over the body of adequate oxygen, which causes other problems.

Changing (e.g., a carotenoid) by taking supplements does **not equal changing them by diet**

A closely related reductionistic reasoning mistake is assuming that if a compound is found at high levels in healthy people, that ingesting that compound in the form of a concentrated pill will help less healthy people.

There are many examples of how this reductionist thinking has failed. This mistake in reasoning applies not just to big pharma drugs, but also to 'natural' drugs. Carotenoids (a large group of related compounds) tend to be found at higher levels in the blood of healthy people, or people who have survived cancer. Using reductionist thinking, large clinical trials were performed by feeding unhealthy people high levels of a single carotenoid. The result was no effect or in some cases, a clinically significant **reduction** of health in the carotenoid arm (e.g., **increase** in lung cancer). The effect was bad enough to suspend some of the trials.

There was a similar result with vitamin E, stimulated by the finding that it is also higher in healthy people. Feeding high levels of one of the vitamin E's to less healthy people had a deleterious effect on heart health. This doesn't mean there is anything wrong with carotenoids or the vitamin E's or resveratrol, but it does mean you shouldn't eat one purified carotenoid and or one vitamin E or resveratrol! (sorry, supplement guys). You simply **have** to eat a whole food plant based diet which includes not only real green vegetables, but also legumes, fruits and grains.

The social implications of eating a **real poor person diet will never go away**

Fifth, there are negative social implications of eating a good diet. The most healthy human diet is a starchy, green-y, vegetable-y, bean-y, low meat, low fish, low oil diet, which is critically a low-calorie-density diet. This is the diet that poor, rural people of the 'third world' ate 50 years ago (fewer and fewer still do). Of course, that is not the diet that poor people **now** eat in the US or Europe or even China. Poor people in those countries now actually eat a diet of similar composition to the diet of the rich nobility of old. The problem with recommending a 'true poor person' diet is that it means one must firmly

and finally turn one's back on European cuisine and its imitators, the diet of rich nobility, whether in Europe or Thailand or ancient Egypt (mummies - i.e., rich people - had body-wide atherosclerosis and gall bladder disease).

This is a hard (=impossible) sell, whether to Americans long used to eating high meat, high oil, high cheese high-calorie-density diets, or to Chinese and Indians, only recently pulled up by their own bootstraps to daily meat and increasingly dairy consumption, or even to some 2-dollar-a-day poor rural person actually currently eating well, but seeing how the rest of us eat on their smart phone. In all cases, doing the right thing seems like a social step down. It will never **not** seem like a social step down. It **is** a social step down. The diet of the rich **is** more attractive. Most people in the world now regard eating calorie-dense chicken and fish and pizza as a basic human right, along with access to health care, most of which is now being used to try to fix the results of eating too much chicken, fish, cheese pizza (the original pizza had no cheese!), french fries, and ice cream.

Just look at wikipedia, the mouth of big brother. It describes the healthy, starchy, low calorie-density diet of John McDougall - the diet of millions of formerly fit older rural Chinese and Indians and Africans before they adopted hyper calorie-dense, meaty diets similar to the standard American diet - as a "fad diet", "poor advice", and as "extreme and out of keeping with nutritional reality". To be fair, it is true that a healthy diet **is** 'out of keeping' with our current, disastrous 'nutritional reality'...

More medical research can't fix this!

Sixth, the realization that the cure to 75% of middle and old age disease is simply to eat a starchy, low-calorie-density, 'real poor person' diet doesn't require any more medical research. It's not that I'm not interested in the latest microperimetry machine (which can image the retinal at the same time as the retina is precisely stimulated to find which parts are still viable). Those machines are amazingly cool. But looked at from a larger perspective, it is absolutely useless to make tools for imaging diet-induced retinal damage at finer and finer scales. This kind of research and development distracts from the real cure. The fix isn't more research but rather, just going back to a whole foods plant-based, low oil, low calorie density diet. Having all the fancy machines and drugs tends to obscure that simple fact, and unconsciously implies that there will be some latest drug to fix diet-induced retinal damage. At best these drugs are like statins. They can sometimes stop things from getting worse so fast, or at best keep things the same. But as a single-point-of-contact, patentable drugs, they all have side effects, and many have to be repeatedly injected into your eyeballs with needles.

There is simply no possibility that there will be a pill or an injection or a supplement to fix the myriad bad effects of a bad diet. It would have to contain tens of thousands of chemicals; there would be hundreds of thousands of side effects. No amount of 'deep learning' can fix this. The only answer is to eat a better diet.

And even if the magic pill approach were in fact possible, it would **still** make health worse, by a Jevons'-like effect. Already now, if people go on a statin or get intestinal bypass surgery, they often gain weight (it takes a few years in the case of bypass surgery). This is partly because people feel protected, and so actually eat an even worse, even more calorie-dense diet. It is

similar to the observed effect of automobile air bags; because people know they are more protected, they have adapted by driving more dangerously, and have cancelled out the substantial gains (if driving style had been held constant) in life-saving from air bags.

Research into genetic differences is equally useless. People are not 'born fat' - China and India didn't get unhealthy 'because genes'. It's simply because they have changed over to overly calorie-dense, hyperattractive food. Their genetics might make them somewhat more susceptible to 'bad diet disease'. But that's really besides the point. They are getting more and more unhealthy, just like Americans, because of how they are eating. Genes are *irrelevant* to fixing this.

Unfortunately, there is probably no way out of this pickle

The good news is that the solution to the great majority of the 'medical' problems experienced by older people, and now, increasingly young people (e.g., Type II diabetes and fatty liver disease now appearing in teenagers) has been scientifically known for 70 years, and more generally known for thousands of years. However, the bad news is that the dynamics of late stage, worldwide, corporate industrial civilization will likely continue to make the problem worse for at least the next decade.

For example, over just the past few years (2014-2017), millennials have experienced double-digit increases in diet related diseases like type II diabetes, this despite more and more of them being 'vegan'. Over the past decade, rates of colorectal cancer have gone up the fastest amongst the youngest cohorts, along with other [obesity-related cancers](#). Note that it is trivially easy to eat an enormously unhealthy, high oil diet that is 'vegan'; and this is likely to get even easier with the recent onslaught of 'corporate veganism'.

When experimenters feed rats the standard American diet, the rats get morbidly obese within a month. If the experimenters put them back on standard healthy rat chow, the rats will actually fast for more than a week, hoping that the experimenters will take pity and bring back the 'good stuff'. The basic brain mechanisms here are no different than an addiction to nicotine or cocaine, but with one key difference. You can live without nicotine or cocaine, but you can't live without eating.

This makes it tremendously difficult to get over the trap of unhealthy high calorie-density, ultra-pleasureable foods. Just like a cocaine addiction, your nervous system will become adapted to hyperattractive, hyper-calorie-dense foods so that correct calorie-density foods (average of 700 calories per pound) will taste lifeless. If you are already overweight, you have to not only eat less attractive food, but you have to forever eat less total calories - that is, the extra calories that are currently required just to *maintain* your extra weight. The inexorable increase in obesity worldwide as a result of the 'diet disease' shows that this will likely never occur by choice.

One way to get over the hump is a week long water fast. This can quickly restore the pleasure of less calorie-dense foods. But note that this doesn't require knowing anything about dopamine or the nucleus accumbens. People have known about the positive effects of water fasting for thousands of years. Similarly, there is a reason that gluttony (also pronounced 'meat-o-ny') has always been one of the deadly sins. People understood the main principles here long before there was any research into the limbic system. Medical research hasn't really added much to our basic un-

derstanding of the problem.

Because the amount of excess calories needed for several pounds weight gain per year is so small (20 to 40 calories a day), even a slight daily disturbance caused by hyper-attractive overly-calorie-dense food is all that is needed to explain our health catastrophe when spread out over 30 years.

It should embarrass us humans that no other animals (well, aside from the animals closely associated with humans like dogs and cats, and industrially-farmed animals like the obese chickens we eat) get fat and unhealthy in the wild. This shows that *all* animals have the ability to regulate their caloric intake incredibly precisely - on average deviating by *less than 1%* from the appropriate number of calories eaten, which is what is required in the long term to maintain a steady body weight. Humans have all of the same mechanisms that animals have for doing this. The fact that so many of us are fat and unhealthy as a result of diet suggests that our *food environment* is the main problem (waaay too much hyper attractive overly-calorie-dense, overly meat-and-dairy-dense food), not our genes, or stress, or over-protective mothers and distant fathers, or lack of health care.

The only way to fix the problem is for individuals to take personal responsibility for fixing their diets. This problem can't be fixed by surrendering personal responsibility to an app, or a dystopian, intelligent, locking refrigerator. It can't be fixed by surrendering personal responsibility to more regulation. For more regulation to work, it would have to be stronger than the business interests involved in big food production, restaurants (including 'corporate vegan'), big pharma, big surgery, big hospitals, and big medical research, which it isn't. And even then, for regulation to work without personal responsibility, it would have to be totalitarian, like the dystopian social credit system currently being constructed in China, but further supercharged by internet access to your refrigerator lock ('I'm afraid I can't let you have that salami, Dave'). Though anything is possible, it seems unlikely to me that there will be large changes in the exercise of personal responsibility over diet over the next decade.

Conclusion

More medical research will never be able to fix 'bad diet disease'! In fact, it will continue to have a Jevons'-paradox-like effect: people will feel protected by the latest biotech, and will give up more and more personal responsibility for controlling their diet, so that any positive effects of the tech will be cancelled (and more!) by them gaining weight at a faster clip by eating even more unhealthy food, including 'corporate vegan' food. The paradoxical conclusion is that continuing medical research and development simply cannot improve the average health of humans; in fact, it will probably make it slightly worse overall.

The solution to the majority of developed nations disease load is to change to a lower calorie-density diet containing a lot less meat, dairy, and eggs, and much higher amounts of starchy vegetables and grains, legumes, fruits, and green vegetables.

However, this obvious solution will not be adopted, because it is not a viable business model in any non-totalitarian situation where the consumer's limbic systems are given a choice. Instead, the worldwide obesity crisis will continue to get worse over the next decade until it finally runs into the brick wall of declining net energy. *That* will eventually 'fix the problem', but in an unruly, chaotic way.