

## Diabetes: the sweet irony of modern technology

Type 2 diabetes has often been described as a “disease of civilization”. In this *Bulletin* interview Dr Chris Feudtner argues that, for the more than 90% of diabetes cases that are diabetes Type 2, we are dealing with a condition that is a product of modern technology.

*Q: Why has diabetes become a major threat to global health?*

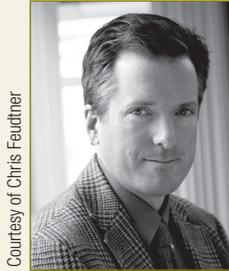
A: People with Type 2 diabetes produce an abundance of insulin in response to an environment that allows them to ingest more calories than ever before without many physical demands, such as walking, cycling and physical work, while leading a rather sedentary lifestyle sitting at a desk. This combination of excessive amounts of calories coming in and a paucity of calories going out leads people to gain weight and become obese. We have seen this imbalance in the developed world since the 1930s, leading to the rapid rise of Type 2 diabetes in the 1980s and 1990s. But now also in the developing world the amount of high caloric food that some people eat far exceeds their requirements and so the epidemic is spreading.

*Q: In what sense is Type 2 diabetes a product of technology and our lifestyle?*

A: Technologies such as those involved in food production, farming and food processing, allow people to ingest more calorically-dense food than ever before in far greater amounts. We are talking about food stuffs that didn't even exist until recently. In contrast, it is actually hard to overeat traditional foods such as rice. Then there are transportation technologies, which enable people to avoid walking, and also the shift from manual labour to machines. These technologies have shifted the amount of energy that people expend in doing their daily business. In sum, technology has given us this surfeit of calories and dearth of energy expenditure. I am not suggesting that we should be Luddites and go back to subsistence farming and walking everywhere, but we have to deal with the consequences of pushing our metabolism beyond what it is capable of handling.

*Q: What about the positive advancements of technology?*

A: When people consume an excess of calories they wind up needing another set of technologies that can identify whether they have diabetes. While this technology is wonderful, it is ironic.



Courtesy of Chris Feudtner

Dr Chris Feudtner is assistant professor of paediatrics at the University of Pennsylvania School of Medicine in the United States of America. As a researcher he has focused on understanding the epidemiology and health-care experience of children with complex chronic conditions, with a particular emphasis on palliative, end-of-life and bereavement care, as well as hospital in-patient care. He received his Doctor of Medicine and Doctor of Philosophy in the history of medicine from the University of Pennsylvania in 1995, and completed his residency in paediatrics at the University of Washington in 1998. He has published dozens of articles, as well as the book, *Bittersweet: diabetes, insulin and the transformation of illness* in 2003.

Screening technologies allow us to very quickly identify people who are at risk of diabetes but haven't yet manifested symptoms. We can then treat those patients with diet modification recommendations and oral drugs.

*Q: But shouldn't we be focusing more on prevention and not just on treatment once the condition has developed?*

A: Most drugs are to manage diabetes once people have developed it. We don't have the array of drugs we would like to have to prevent mild metabolic derangement from progressing to diabetes.

“It is actually hard to overeat traditional foods such as rice.”

*Q: Why? Is there no incentive to produce drugs for prevention for companies already producing treatment drugs?*

A: Several business incentives do indeed depend on people having diabetes, on treatment rather than prevention, but this may change. The story of the diabetes epidemic and our social response to it is one of how technologies have pushed people into a diabetic state: technology has wrought more technology. Is this

really the way we want to use the tremendous potential of medical science? Yet jumping off this seemingly endless regress of technology dependence is not easy: I doubt that you can tell people to live simply. The real solution will lie in technological countermeasures and policies that may be in direct competition with the technologies that have pushed our metabolism too far, in technologies that lower food caloric density and that facilitate enjoyable caloric expenditure, technologies that will encourage companies to gear their business model towards prevention.

*Q: Are you suggesting that we need different food products or taxes on current ones, such as foods with high sugar content?*

A: Yes, we should support agriculture and farming, by reworking our current tax and subsidy policies, in ways that de-emphasize the production of highly processed grain and corn products, and incentivize the greater production and marketing of foods for which the caloric density is less and the amount of satiety produced by eating an equivalent amount of calories is greater. Additionally, we need to incentivize the development and marketing of technologies that will, metaphorically speaking, get people off the couch. This needs to be done in both public and private settings. Have you noticed, in public buildings, how easy it is to find the escalator or elevators and how

hard it is to find the staircase? At home, television and the sedentary lifestyle are fairly ingrained, but there are some counter measures. I am not saying that we are going to put a “stand up and dance” video game in every home (although that would be a step in the right direction), but we need to incentivize people to go back to low levels of activity that over weeks, months and years tip their caloric expenditure balance back into stable metabolic control. Accomplishing this will take all the creativity and technological smarts that we can muster.

*Q: How else can you create the right incentives?*

A: We also have to make it easier to adhere to some of the long-term treatments by providing more behavioural incentives. Much of what we expect people to do in chronic care is to embark on a fairly tedious, dreary path of self care. If people see it in their best interests, then they can wrap their hands around it and become empowered, but not everybody does. We need to create ways for people to adhere to diet, exercise and medication recommendations with almost equal pleasure as to the things they do spontaneously, like sitting on the couch and snacking while watching television. Undoubtedly, this is a tall order – but I see this as the real challenge we need to confront and overcome.

*Q: Can you give us examples of what you call “disease transmutation” and put that in the context of diabetes?*

“I doubt that you can tell people to live simply. The real solution will lie in technological countermeasures and policies.”

A: Diabetes is an example of how modern medicine takes many patients with a wide variety of diseases and, while not curing them, dramatically changes the way that the disease progresses or affects the patients, converting it from an acute illness to a chronic condition. Much of cancer treatment has been re-cast in this way; HIV is another. For transmuted diseases [such as diabetes], the sequela of treatment start to become as problematic as the underlying disease. For example, if you look at the drugs people take for Type 2 diabetes, certain drugs have recently been linked to increased risk of heart attack. We don't want to discount the many truly wonderful benefits of medications and medical technology but,

at the same time, we have to remain aware and prepared for the potentially ironic consequences of technology in our lives.

*Q: When did we first begin to understand the disease?*

A: Diabetes was recognized more than two millennia ago, when prodigious production of urine and wasting of the body were first noted by Greek physician Aretaeus. There are even older descriptions of an illness marked by rapid emaciation that may have been diabetes. In the early 19th century diabetes mellitus was clearly described, the “sweet” type with sugar in the urine. Two age groups appeared to be affected, people in their middle age and children. Only in the 20th century did we realize these were two very different problems: so-called insulin dependent which came to be known as Type 1 (which is absence or severe lack of insulin) and Type 2 (which occurs when the body fails to respond to the signal that insulin is sending). These became even more important after insulin was discovered in 1921. With remarkable speed, insulin was used to treat humans in 1922 and mass-produced as a drug by 1923.

*Chris Feudtner was interviewed as a guest speaker of the World Health Organization's global health history seminar series. Access the seminars online at: [http://www.who.int/globalhealth\\_histories/seminars/en/](http://www.who.int/globalhealth_histories/seminars/en/)*

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