

# Dear Medicine: Diabetes Prevention Is Not Your Battle to Fight

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## Dear Medicine,

You need help. We know that you have been trying to handle chronic diseases, especially diabetes, by yourself; however, there are 422 million adults with diabetes worldwide, and prevalence continues to grow.<sup>1</sup> We are writing to let you know that prevention is not your battle to fight.

While Type 1 Diabetes—an autoimmune disease—has been increasing, Type 2 Diabetes (or T2D) still causes the lion’s share of cases (90 to 95% according to the Centers for Disease Control and Prevention<sup>2</sup>). It is clear that genetics, lack of physical activity, stress, and sleep patterns play a role, but there is a growing consensus that T2D’s principal trigger is the type of food we eat.<sup>3, 4, 5</sup>

This relationship can be conceptualized as a bathtub, as shown in Figure 1. The food that we put in our bodies can be thought of like water flowing into a bathtub; the food we eat must be metabolized at a certain rate in the same way that water must flow out of the tub to avoid overflowing. However, in this case, it is not as simple as “calories in, calories out.” The metabolism rate—or drain capacity—is affected by the amount, type, and glycemic load of the food we eat. Consuming high-glycemic load food causes the secretion of excess insulin, which ends up circulating in the blood, causing fat accumulation and insulin resistance, which over time

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<sup>1</sup> NCD-RisC. (2016). Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants. *The Lancet*, 387(10027), 1513–1530. [https://doi.org/10.1016/S0140-6736\(16\)00618-8](https://doi.org/10.1016/S0140-6736(16)00618-8)

<sup>2</sup> Centers for Disease Control and Prevention. (2017). National Diabetes Statistics Report, 2017 Estimates of Diabetes and Its Burden in the United States (National Diabetes Statistics Report). Retrieved from <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>

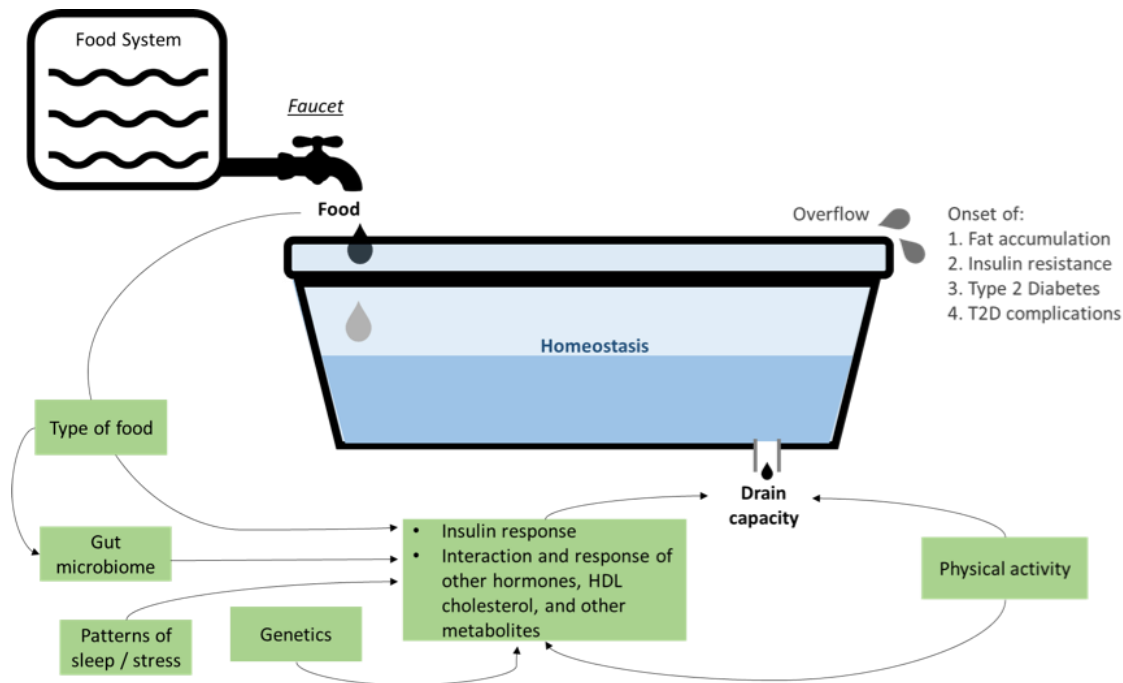
<sup>3</sup> Barazzoni, R., Deutz, N. E. P., Biolo, G., Bischoff, S., Boirie, Y., Cederholm, T., ... Calder, P. C. (2017). Carbohydrates and insulin resistance in clinical nutrition: Recommendations from the ESPEN expert group. *Clinical Nutrition*, 36(2), 355–363. <https://doi.org/10.1016/j.clnu.2016.09.010>

<sup>4</sup> Schulze, M. B., & Hu, F. B. (2004). PRIMARY PREVENTION OF DIABETES: What Can Be Done and How Much Can Be Prevented? *Annual Review of Public Health*, 26(1), 445–467. <https://doi.org/10.1146/annurev.publhealth.26.021304.144532>

<sup>5</sup> Solomon, T. P., Haus, J. M., Kelly, K. R., Cook, M. D., Filion, J., Rocco, M., ... Kirwan, J. P. (2010). A low-glycemic index diet combined with exercise reduces insulin resistance, postprandial hyperinsulinemia, and glucose-dependent insulinotropic polypeptide responses in obese, prediabetic humans. *The American Journal of Clinical Nutrition*, 92(6), 1359–1368. <https://doi.org/10.3945/ajcn.2010.29771>

cause T2D. Independent of genetics or physical activity, the unhealthy food pouring out of this faucet is the principal driver of the T2D epidemic<sup>6,7</sup> So, Medicine, why act as if it is the same to focus on the faucet as on the drain?

**Figure 1: Bathtub Analogy**



In the past, when infectious diseases were the greatest danger to health, diseases were your responsibility. Physicians or public health professionals were responsible for educating the public about a specific risk factor, and the public was then expected to follow those recommendations. Recent T2D prevention strategies use this same approach: give people information on food and assume they will follow it. Putting calorie counts on menus, changing package labeling requirements, and educating the public on the food pyramid/plate have yielded mixed results<sup>8,9</sup> This may be because our environments are built around the very foods that we

<sup>6</sup> Ludwig, D. S. (2000). *The Glycemic Index: Physiological Mechanisms Relating to Obesity, Diabetes, and Cardiovascular Disease*. JAMA, 287(18), 2414–2423.

<sup>7</sup> Ludwig, D. S., & Friedman, M. I. (2014). Increasing adiposity: Consequence or cause of overeating? JAMA, 311(21), 2167–2168. <https://doi.org/10.1001/jama.2014.4133>

<sup>8</sup> Helfer Peter, & Shultz Thomas R. (2014). The effects of nutrition labeling on consumer food choice: a psychological experiment and computational model. *Annals of the New York Academy of Sciences*, 1331(1), 174–185. <https://doi.org/10.1111/nyas.12461>

<sup>9</sup> Kiszko, K. M., Martinez, O. D., Abrams, C., & Elbel, B. (2014). The influence of calorie labeling on food orders and consumption: A review of the literature(). *Journal of Community Health*, 39(6), 1248–1269. <https://doi.org/10.1007/s10900-014-9876-0>

are supposed to be avoiding.<sup>10 11</sup> Instead of being an anomaly, T2D is a natural response, by normal people, to our current abnormal food environments.<sup>12</sup>

Medicine, trying to take T2D on by yourself is hurting the relationships between your physicians and patients. Health providers typically follow clinical guidelines and inform their patients about the importance of decreasing caloric intake and increasing physical activity. However, when patients leave the doctor's office and try to navigate the food choices available to them in this built food environment, it is difficult for them to follow this advice. Patients feel that providers are asking for something impossible and health providers assume their patients do not care about their health. This dissonance damages the patient's trust in their provider and contributes to physician burnout and feelings of futility.<sup>13</sup>

Part of why dietary advice seems so “impossible” is that medical research and advice focuses on what not to eat or drink. Even the strongest-willed of us would have difficulty following all existing dietary restrictions while attempting to live in the current built food environment. The focus on what not to eat has left out what we should eat. In general, medical researchers have stopped short of asking other sectors how to produce and eat more nuts, seeds, legumes, and vegetables. Nor are they asking how to make healthy foods more available, accessible, affordable and convenient. Remember, malaria was controlled, in large part, with effective drainage systems and paving over stagnant pools of water, not by spraying pesticide or treating individual patients with medication. And water fluoridation came about because public health officials focused on what would contribute to generalized oral health instead of treating individual teeth.<sup>14</sup>

Skeptical that food could have that big of an impact? A recent study of a “**Farmacy**” that provided free food as a treatment for T2D throughout 18 months saw a 40% decrease in the risk of death or serious complications, and an average drop of 2.1% in glycated hemoglobin<sup>15</sup>

So, what are we proposing? A dramatic change in strategy<sup>16</sup>

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<sup>10</sup> Kirk, S. F. ., Penney, T. ., & McHugh, T. -L. F. (2010). Characterizing the obesogenic environment: the state of the evidence with directions for future research. *Obesity Reviews*, 11(2), 109–117. <https://doi.org/10.1111/j.1467-789X.2009.00611.x>

<sup>11</sup> Lake, A., & Townshend, T. (2006). Obesogenic environments: exploring the built and food environments. *Journal of the Royal Society for the Promotion of Health*, 126(6), 262–267. <https://doi.org/10.1177/1466424006070487>

<sup>12</sup> Rutter, H. (2011). Where next for obesity? *The Lancet*, 378(9793), 746–747. [https://doi.org/10.1016/S0140-6736\(11\)61272-5](https://doi.org/10.1016/S0140-6736(11)61272-5)

<sup>13</sup> wensen, S., Shanafelt, T., & Seth Mohta, N. (2016, December 8). Leadership Survey: Why Physician Burnout Is Endemic, and How Health Care Must Respond. *NEJM Catalyst*. Retrieved from <https://catalyst.nejm.org/physician-burnout-endemic-healthcare-respond/>

<sup>14</sup> Compton-Phillips, A. (2018). We owe our nation something different. Talk presented at the Care Redesign. Retrieved from <https://tinyurl.com/y83ep5y3>

<sup>15</sup> Feinberg, A. T., Hess, A., Passaretti, M., Coolbaugh, S., & Lee, T. H. (2018, April 10). Prescribing Food as a Specialty Drug. *NEJM Catalyst*. Retrieved from <https://tinyurl.com/yab29fok>

<sup>16</sup> Nishtar, S. (2017). The NCDs Cooperative: a call to action. *The Lancet*, 390(10105), 1820–1821. [https://doi.org/10.1016/S0140-6736\(17\)32481-9](https://doi.org/10.1016/S0140-6736(17)32481-9)

1. Redefine non-communicable diseases (NCDs) as a public policy problem, not a medical issue. Lancet recently published a call to change the language used to describe NCDs: “Calling the number-one cause of death in the world ‘non-communicable’ has created confusion, diminished the urgency, and distracted from systematic interventions”<sup>17</sup> Changing the name of this epidemic could be the first step toward imagining new systemic policy strategies. Although these conditions are described as “non-communicable” social interactions are very much involved<sup>18 19</sup>
2. Move away from the defeatist mindset that T2D is progressive. While T2D is triggered by certain dietary patterns, it can also be prevented by healthy ones<sup>20</sup> T2D is preventable, need not to be progressive, and remission is possible<sup>21 22</sup> Instead of focusing on bad foods, we should focus on how to produce, distribute, process, market, and cook more beans or broccoli. We should focus on comprehensive solutions beyond soda taxes, such as creating value chains for nutrition.<sup>23</sup>
3. Integrate medical and dietary advice with food systems analysis.<sup>24</sup> Even if the health sector were to convince all people to eat their daily five fruits and vegetables, not enough

<sup>17</sup> Allen, L. N., & Feigl, A. B. (2017). What’s in a name? A call to reframe non-communicable diseases. *The Lancet Global Health*, 5(2), e129–e130. [https://doi.org/10.1016/S2214-109X\(17\)30001-3](https://doi.org/10.1016/S2214-109X(17)30001-3)

<sup>18</sup> Christakis, N. A., & Fowler, J. H. (2007). The Spread of Obesity in a Large Social Network over 32 Years. *New England Journal of Medicine*, 357(4), 370–379. <https://doi.org/10.1056/NEJMsa066082>

<sup>19</sup> Leong, A., Rahme, E., & Dasgupta, K. (2014). Spousal diabetes as a diabetes risk factor: A systematic review and meta-analysis. *BMC Medicine*, 12, 12–12. <https://doi.org/10.1186/1741-7015-12-12>

<sup>20</sup> Perreault, L., Kahn, S. E., Christophi, C. A., Knowler, W. C., Hamman, R. F., & the Diabetes Prevention Program Research Group. (2009). Regression From Pre-Diabetes to Normal Glucose Regulation in the Diabetes Prevention Program. *Diabetes Care*, 32(9), 1583–1588. <https://doi.org/10.2337/dc09-0523>

<sup>21</sup> Lean, M. E., Leslie, W. S., Barnes, A. C., Brosnahan, N., Thom, G., McCombie, L., ... Taylor, R. (2018). Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. *The Lancet*, 391(10120), 541–551. [https://doi.org/10.1016/S0140-6736\(17\)33102-1](https://doi.org/10.1016/S0140-6736(17)33102-1)

<sup>22</sup> Lim, E. L., Hollingsworth, K. G., Aribisala, B. S., Chen, M. J., Mathers, J. C., & Taylor, R. (2011). Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol. *Diabetologia*, 54(10), 2506–2514. <https://doi.org/10.1007/s00125-011-2204-7>

<sup>23</sup> Mobilize other sectors to imagine other types of solutions. Dwight Eisenhower supposedly said, “If you cannot solve a problem as it is, enlarge it.” Medicine, enlarge T2D into a food system issue so that preventative actions can be better directed toward improving the food system. Doctors, nutritionists, and public health professionals should design food systems on equal footing with urban planners, agronomists, activists, environmentalists, economists, innovators, and industry leaders. It will be difficult to build bridges between sectors and create new solutions if we continue to say that T2D is a disease and relegate it to medicine’s responsibility.

<sup>24</sup> Change strategies away from restricting bad foods and toward increasing good foods. While we are distracted pressuring the food industry to lower the fat, sodium, or sugar content of their products, changing food labeling, or attempting to increase the healthcare system’s capacity to react, we are losing the focus on good foods. Indeed, the greater the focus on specific nutrients, the less healthful food have become [23. Mozaffarian, D., & Ludwig, D. (2010). Dietary guidelines in the 21st century—a time for food. *JAMA*, 304(6), 681–682. <https://doi.org/10.1001/jama.2010.1116>

is being produced currently to guarantee this consumption<sup>25 26 27</sup> And even if we were able to produce enough fresh produce, with current supply chains much of it might go to waste. As another example, if everyone were to follow the recommended fish intake, we would completely deplete the ocean's supply of fish.<sup>28</sup> Dietary guidelines and the food system must talk to each other. Clinicians, who tend to promote clinical solutions, and nutritionists, who tend to promote dietary solutions, must step back and see the system as a whole.<sup>29</sup>

It can be done. Fortunately, there are voices who are mobilizing other sectors and incorporating a food systems approach to find solutions. The global network INFORMAS is providing guidance to promote healthy food environments.<sup>30</sup> The WHO Independent High-level Commission on NCDs (2018)<sup>31</sup> is asking to “redouble efforts to engage sectors beyond health.” International platforms, such as EAT Forum, are emphasizing collaboration between government, science, and industry to find solutions to food systems issues. The Rockefeller Foundation<sup>32</sup> and the World Economic Forum<sup>33</sup> have independently commissioned reports to uncover innovations that can transform our food systems.

So, Medicine, where should you go from here? Start asking for help. Ask other sectors difficult questions: Will you help my patients access a variety of healthy foods? How can you incentivize the food industry to produce and market healthier products? Will you teach my patients how to

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<sup>25</sup> Hawkes, C., & Ruel, M. T. (n.d.). *Value Chains for Nutrition* (Paper No. 4). New Delhi, India: International Food Policy Research Institute. Retrieved

from <http://www.fao.org/fsnforum/sites/default/files/discussions/contributions/Value-Chains-for-Nutrition.pdf>

<sup>26</sup> Haddad, L., Hawkes, C., Webb, P., Thomas, S., Beddington, J., Waage, J., & Flynn, D. (2016). A new global research agenda for food. *Nature*, 540(7631). Retrieved from [https://www.nature.com/news/a-new-global-research-agenda-for-food-1.21052?WT.feed\\_name=subjects\\_agriculture](https://www.nature.com/news/a-new-global-research-agenda-for-food-1.21052?WT.feed_name=subjects_agriculture)

<sup>27</sup> Krebs-Smith, S. M., Reedy, J., & Bosire, C. (2010). Healthfulness of the U.S. Food Supply: Little Improvement Despite Decades of Dietary Guidance. *American Journal of Preventive Medicine*, 38(5), 472–477. <https://doi.org/10.1016/j.amepre.2010.01.016>

<sup>28</sup> Reedy, J., Krebs-Smith, S. M., Hammond, R. A., & Hennessy, E. (2017). Advancing the Science of Dietary Patterns Research to Leverage a Complex Systems Approach. *Journal of the Academy of Nutrition and Dietetics*, 117(7), 1019–1022. <https://doi.org/10.1016/j.jand.2017.03.008>

<sup>29</sup> Waterlander, W. E., Ni Mhurchu, C., Eyles, H., Vandevijvere, S., Cleghorn, C., Scarborough, P., ... Seidell, J. (2018). Food Futures: Developing effective food systems interventions to improve public health nutrition. *Agricultural Systems*, 160, 124–131. <https://doi.org/10.1016/j.agsy.2017.01.006>

<sup>30</sup> Brunner, E. J., Jones, P. J. S., Friel, S., & Bartley, M. (2009). Fish, human health and marine ecosystem health: policies in collision. *International Journal of Epidemiology*, 38(1), 93–100. <https://doi.org/10.1093/ije/dyn157>

<sup>31</sup> Rutter, H. (2011). Where next for obesity? *The Lancet*, 378(9793), 746–747. [https://doi.org/10.1016/S0140-6736\(11\)61272-5](https://doi.org/10.1016/S0140-6736(11)61272-5)

<sup>32</sup> Swinburn B., Vandevijvere S., Kraak V., Sacks G., Snowdon W., Hawkes C., ... Walker C. (2013). Monitoring and benchmarking government policies and actions to improve the healthiness of food environments: a proposed Government Healthy Food Environment Policy Index. *Obesity Reviews*, 14(S1), 24–37. <https://doi.org/10.1111/obr.12073>

<sup>33</sup> WHO Independent High-level Commission on NCDs. (2018). 19 Bold Recommendations for Heads of State and Government to Accelerate Action on Reaching Target 3.4 on NCDs by 2030. Retrieved from <http://cukiernapoziomie.pl/ncds/governance/high-level-commission/UN-Secretary-General-19-bold-recommendations-for-NCDs.pdf>

buy and prepare fresh food without it going bad? Can we define a low-glycemic food basket that all citizens should have the right to afford?

Please keep running programs to screen and manage at-risk people; hold on to programs aimed at controlling sugar levels in patients and curbing T2D complications. But do not allow national governments to delegate prevention to your sector. Tell national governments to put the burden of prevention under the food system. Support the planning of food systems for health.

Of course, you can always continue with the traditional prevention paradigm if you want, promoting lifestyle changes and putting information and individual choice at the core of the prevention efforts. But by 2050, there will be no amount of increased capacity in healthcare delivery and no imaginable fiscal policy in countries that can handle the aging demographic bulge and increasingly prevalent T2D.

We must ensure that the easiest, most convenient, cheapest, and most delicious food options also are the healthiest. You need help from the entire food system; you cannot do this by yourself.

Sincerely,

A Food System for Health

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<sup>34</sup> Global Knowledge Initiative. (2017). Innovating the Future of Food Systems. Rockefeller Foundation. Retrieved from <http://globalknowledgeinitiative.org/wp-content/uploads/2016/09/GKI-Innovating-the-Future-of-Food-Systems-Report-October-2017.pdf>

<sup>35</sup> World Economic Forum, & McKinsey & Company. (2018). Innovation with a Purpose: The role of technology innovation in accelerating food systems transformation (System Initiative on Shaping the Future of Food Security and Agriculture). World Economic Forum. Retrieved from [http://www3.weforum.org/docs/WEF\\_Innovation\\_with\\_a\\_Purpose\\_VF-reduced.pdf](http://www3.weforum.org/docs/WEF_Innovation_with_a_Purpose_VF-reduced.pdf)