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# Explaining Obesity: Implications for Treatment and Prevention

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## Abstract

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Complex Diseases: Evolutionary Models, Systems, and Explanations

Once upon a time, the explanation for obesity was the Energy Balance Equation (EBE), a simple equation rooted in thermodynamic principles:  $\Delta E = E_{in} - E_{out}$  where  $E$  is energy measured in kilocalories/day. Obesity is explained as a positive energy imbalance to be treated and prevented via recommendations of a combination of increases in  $E_{out}$  and decreases in  $E_{in}$ . But treatment and prevention of obesity guided by the EBE has failed.

Presently, obesity is understood as a complex system: Explaining obesity requires articulating multiple, heterogeneous causes at multiple levels, nonlinear causal interactions, interdependence between causal factors, feedback within causal mechanisms, and so on. While understanding obesity as a complex system is an improvement over the EBE, I argue that it unnecessarily complicates treatment and prevention: Precisely where to intervene in the system is problematic and controversial.

I suggest understanding obesity as an evolutionary mismatch between humans and their environment: Briefly and very roughly, the contemporary environment, rich in sugar and fat, is maladaptive for a species adapted to an environment scarce in sugar and fat and the consequence is obesity and the diseases associated with it. Now, the idea that there is an evolutionary explanation for our current corpulence is not new. However, not only has evolutionary mismatch not been sufficiently explicated for obesity, its implications for treatment and prevention are not well understood. The purpose of this talk is to improve that situation.

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