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Applying energy theory to re-examine the relationship between food/exercise and postprandial plasma glucose (PPG)

Introduction: The author applied his knowledge from mathematics, physics, traditional engineering, and computer science to conduct a big data analytics of food consumption and PPG for type 2 diabetes (T2D) patients.

Methods: The focus on this paper was specifically applying energy theory from physics and engineering. He used both optical physics and signal wave processing to develop his PPG prediction model. He realized weight is merely a physical representation of internal energy exchange in the human body. The energy infusion includes food and others, whereas energy diffusion comprises of exercise/activity and others. The major goal is to avoid having energy imbalance (disequilibrium); otherwise, the excessive (left over) energy will damage a person's internal organs.

Results: The 4,066 food/meals (3,651 meals and 415 snacks) in the selected period of 1,217 days (6/1/2015 - 9/30/2018) indicate the average values for daily glucose as 118.5 mg/dL and daily carbs/sugar intake as 14.8 grams per meal. The food/meal database contains ~8 million, while the patient's metabolism data is ~1.5 million.

By applying both energy theory and wave theory, he found a "preliminary" glucose-energy perturbation range of -7% to 17% resulting from left-over energy. In order to further narrow down the variance, he identified a few practical methods to improve both food intake and exercise in order to "wear-off" the excessive glucose-energy.

Conclusion: The author did not discover any major new findings during this research process. However, he adjusted some methods regarding energy infusion through food intake and energy consumption by walking. As a result, this set of practical tips can guide T2D patients on further improving their PPG conditions.

Speaker Biography

Gerald C Hsu received an honorable PhD in mathematics and majored in engineering at MIT. He attended different universities over 17 years and studied seven academic disciplines. He has spent 20,000 hours in T2D research. First, he studied six metabolic diseases and food nutrition during 2010-2013, then conducted research during 2014-2018. His approach is "math-physics and quantitative medicine" based on mathematics, physics, engineering modelling, signal processing, computer science, big data analytics, statistics, machine learning, and AI. His main focus is on preventive medicine using prediction tools. He believes that the better the prediction, the more control you have.

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