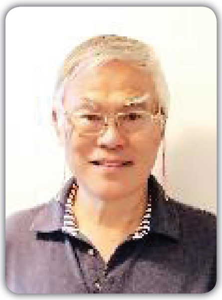

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From a public health's viewpoint to address type 2 diabetes patient's glucose control issue (GH-Method: Math-Physical Medicine)

Introduction: This paper discusses type 2 diabetes (T2D) patient's glucose control guidelines from a public health's viewpoint. It is based on 1.5 million data of chronic diseases and lifestyle details. Furthermore, mathematics, physics, engineering modeling, and computer science were used to develop the needed models.

Method: T2D is a serious worldwide epidemic increasing at an alarming rate. Its complications, especially cardiovascular disease (CVD) and stroke, take many human lives each year. The author was diagnosed with severe T2D 25 years ago and suffered five cardiac episodes. He has spent more than 20,000 hours during the past 8.5 years to conduct a series of research work on glucose control by using his own developed math-physical medicine approach. He believes in "prediction" and has developed five models, including metabolism index, weight, fasting plasma glucose (FPG), postprandial plasma glucose (PPG) and hemoglobin A1C. All prediction models have reached to 95% to 99% accuracy. His focus is on preventive medicine, especially on diabetes control via lifestyle management.

T2D patients have faced four major challenges:

(1) Awareness of disease and overcome "self-denial" (attitude issue).

(2) Availability of correct disease information with physical evidence or numerical proof (knowledge issue).

(3) Determination and persistence on lifestyle change (behavior psychology issues).

(4) A non-invasive, effective, and ease of use tool to correctly predict glucose values (technology issue).

Results: Let us put "psychological factors" aside for the time being and just focus on practical methods first. Any public health and healthcare professional can apply the following techniques and tools to assist T2D patients to put their glucose values under control. Most of T2D patients can observe their improvement on their glucose control within 90 to 180 days. Based on meal quantity (including snacks and/or fruits) and bowel movement, body weight can be estimated by an APP tool, and therefore, FPG can also be predicted consequently based on weight (FPG's major factor). The author developed this APP using optical physics, wave theory, signal processing, energy theory, big data analytics, and artificial intelligence (AI). It contains the above mentioned five prediction models, including the most sophisticated metabolism index model for the overall health condition.

This App provides around 95% to 99% prediction accuracy. A patient takes the meal photo before first-bite of food and store it inside of this APP to get a predicted PPG value instantly. If the predicted PPG is too high, he/she can change, delete or vary the quantity of certain meal portions in order to obtain a reduced PPG value from the same meal. Using "machine learning" technology, the system can auto-learn and auto-correct carbs/sugar contents of various food in order to customize for each different patient. In summary, this APP has proven to reach to 99.57% PPG prediction accuracy based on a big food bank with 4,474 meals and 8 million food nutrition data. Quantity of post-meal exercise is also included in this PPG prediction. T2D patients need to walk 1,000 to 4,000 steps within two hours after first-bite of meal, depending on their diabetes severity. Once patients' weight, FPG, and PPG is under control, their A1C and overall metabolic conditions will also be improved significantly.

Conclusion: Public health personnel can easily use these proven techniques and available AI technology tool to educate and guide T2D patients to improve their glucose control.

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 to 2013, then conducted his own diabetes research during 2014 to 2018. His approach is "quantitative medicine" based on mathematics, physics, optical and electronics physics, engineering modeling, signal processing, computer science, big data analytics, statistics, machine learning, and artificial intelligence. 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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