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BIOGRAPHY

Gerald C Hsu has completed his PhD in Mathematics and has been majored in Engineering at MIT. He has 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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GH METHOD: METHODOLOGY OF MATH-PHYSICAL MEDICINE

Introduction: This paper describes the math-physical medicine approach (MPM) of medical research utilizing mathematics, physics, engineering models and computer science, instead of the current biochemical medicine approach (BCM) that mainly utilizes biology and chemistry.

Methodology of MPM: Initially, the author spent four years of self-studying six chronic diseases and food nutrition to gain in depth medical domain knowledge. During 2014, he defined metabolism as a nonlinear, dynamic and organic mathematical system having 10 categories with ~500 elements. He then applied topology concept with partial differential equation and nonlinear algebra to construct a metabolism equation. Further author defined and calculated two variables, metabolism index and general health status unit. During the past 8.5 years, he has collected and processed 1.5 million data. Since 2015, he developed prediction models, i.e. equations, for both postprandial plasma glucose (PPG) and fasting plasma glucose (FPG). He identified 19 influential factors for PPG and five factors for FPG. Each factor has a different contribution margin to the glucose formation. He developed PPG model using optical physics and signal processing. Furthermore, by using both wave and energy theories, he extended his research into the risk probability of heart attack or stroke. In this risk assessment, he applied structural mechanics concepts, including elasticity, dynamic plastic and fracture mechanics, to simulate artery rupture and applied fluid dynamics concepts to simulate artery blockage. He further decomposed 12,000 glucose waveforms with 21,000 data and then re-integrated them into three distinctive PPG waveform types which revealed different personality traits and psychological behaviours of type 2 diabetes patients. For single time-stamped variables, he used traditional time-series analysis. For interactions between two variables, he used spatial analysis. Furthermore, he also applied

Fourier Transform to conduct frequency domain analyses to discover some hidden characteristics of glucose waves. Then he developed an AI Glucometer tool for patients to predict their weight, FPG, PPG and A1C. It uses various computer science tools, including big data analytics, machine learning (self-learning, correction and simplification) and artificial intelligence to achieve very high accuracy (95% to 99%).

Results: In 2010, his average glucose was 280mg/dL and A1C was >10%. Now, his glucose value is 116mg/dL and A1C is 6.5%. Since his health condition is stable, no longer he suffers from repetitive cardiovascular episodes.

Conclusion: Instead of utilizing traditional biology, chemistry and statistics, the methodology of GH-Method: math-physical medicine uses advanced mathematics, physics concept, engineering modelling and computer science tools (Big data analytics, artificial intelligence) which can be applied to other branches of medical research in order to achieve a higher precision and deeper insight.