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Four Clinical Cases using GH-Method: Math-Physical Medicine to Control Type 2 Diabetes via both Lifestyle Management and Effective Medications

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Introduction

This report is based on four patients residing in three different countries. Their genetic backgrounds, personal data, lifestyles, type 2 diabetes (T2D) conditions, and medication treatment plans are unrelated However, these four cases share the same common ground by applying the same lifestyle management and effective medication treatment together to control their T2D conditions.

Math-physical medicine (MPM) starts with the observation of the human body's physical phenomena (not biological or chemical characteristics), collecting elements of the disease related data (preferring big data), utilizing applicable engineering modeling techniques, developing appropriate mathematical equations (not just statistical analysis), and finally predicting the direction of the development and control mechanism of the disease.

Method

The four patients have been following the guidelines outlined from published findings, conclusions, and recommendations of the GH-Method: math-physical medicine approach (MPM) and its developed AI Glucometer tool to predict and control their T2D conditions.

Results

These four T2D patients are named by their country of residence or US city.

Myanmar Case: female, age 46, takes 1,000mg metformin, health data period from 9/11/2018-3/7/2019; (Hsu Gerald, 2018a).

Fremont Case: male, age 73, takes 1,000mg metformin, health data period from 5/1/2018-3/7/2019 - did not use AI tool, health data is obtained through phone interview and hospital testing results; (Hsu Gerald, 2018b).

Taiwan Case: male, age 74, takes 1,000mg metformin, health data period from 4/21/2018-3/7/2019 (Hsu Gerald, 2018c).

Stanford Case: male, age 72, has not taken any diabetes medication since 2015 (Hsu Gerald, 2018d).

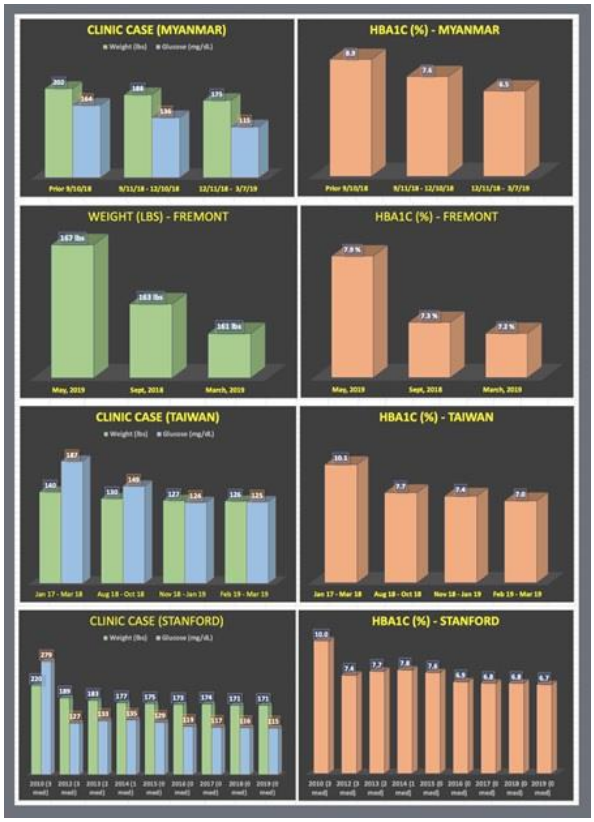

Figure 1: Weight, glucose, and HbA1C of four clinical cases.

As shown in Fig. 1, all of their weights, glucose values, and HbA1C have been improved via disciplined lifestyle management and effective medication treatment plan.

Prediction	Fremont *	Myanmar	Taiwan	Stanford
Carbs/Sugar (g)	18.50	14.41	13.07	14.93
Walking (steps)	3000	1691	1243	4249
Glucose (measured)	130	128	140	118
Glucose (AI)		119	143	118
Accuracy (AI)		93%	102%	100%
Glucose (Formula)	133	133	133	119
Prediction Accuracy	98%	96%	105%	99%

Figure 2: Carbs/sugar intake amount, post-meal walking, measured and predicted glucose of four clinical cases.

As shown in Fig. 2, all cases are adopting "low carbs diet", i.e. carbs/sugar intake per meal is <20 grams (ranging from 13g to 19g). However, their post-meal walking has a wider spread, ranging from 1,300 to 4,300 steps. These two factors are the major influential factors of PPG formation which contributes ~80% of HbA1C.

Utilizing a "linearized" glucose prediction equation to simulate this complicated nonlinear, dynamic, and organic glucose, these four cases have achieved prediction accuracy between 95% to 99%. While utilizing the AI Glucometer has achieved prediction accuracy between 93% to 100%. The larger the data size will result in a higher accuracy rate. The Fremont Case did not use the AI Glucometer as a prediction tool, instead he followed the GH-Method's guidelines closely.

Conclusion

By using the GH-Method: math-physical medicine and its developed AI tool along with following the physician's methodical medication treatment plan, the four T2D patients have achieved significant health improvements on controlling their diabetes conditions.

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