

The GH-Method

Trending Pattern Analysis and Progressive Behavior Modification of Two Clinic Cases of Correlation between Patient Psychological Behavior and Physiological Characteristics of T2D Using GH-Method: Math-Physical Medicine & Mentality-Personality Modeling (No. 053)

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Abbreviations: T2D: type 2 diabetes; PPG: postprandial plasma glucose

1. INTRODUCTION

The author has contemplated a specific question:

Why do some type 2 diabetes (T2D) patients choose to face serious complications, including death, rather than change their lifestyle in order to control their diabetic conditions?

He discusses two different clinic cases linking patient's personality traits and psychological behavior with diabetes physiological characteristics. He named this attempted approach "Progressive Behavior Modification" which is a part of the "Mentality-Personality Modeling".

2. METHODS

T2D patients have faced three major challenges:

(1) Availability of accurate disease information with either physical evidence or quantitative proof, not just some general qualitative descriptions that may include false or commercial-driven news over the internet (knowledge issue).

(2) Awareness of disease status and overcoming self-denial by moving to "psychological acceptance" in order to take

effective action. The most difficult barrier to overcome is to have willpower, determination, and persistence in lifestyle change (psychology issues).

(3) A non-invasive, effective, and ease of use technology-based tool to accurately predict outcomes and also guide patients (technology issue).

The author collected 17,046 glucose data for 241 days and generated 723 postprandial plasma glucose (PPG) waveforms. He decomposed them first and then further re-integrated them into three distinctive waveforms, i.e. Himalaya, Twin Peak, and Grand Canyon⁽¹⁾.

In summary, peak glucose values of these three patterns are determined by the patient's knowledge and willpower for diet control on carbs/sugar intake amount. But, the dropping speeds of PPG value are depending on the patient's knowledge and willpower for post-meal exercise. The Himalaya pattern is created via physical inactivity. Twin Peak is created via the wrong exercise pattern (knowledge) and insufficient post-meal exercise (willpower on exercise), while Grand Canyon is created via the correct exercise style (knowledge) and sufficient amount of exercise (willpower on exercise).

By analyzing the percentage of three distinctive patterns and comparing them against PPG time-series data of diet and exercise, each patient's personality traits and behavior psychology will be revealed clearly and the trend of the glucose movement can also be predicted, then re-directed, and even possibly modified as well. The patients indeed can modify their behavior one step at a time, i.e. taking a little step on a smaller scale. This is what the author defined as a "progressive" behavior modification.

3. RESULTS

Patient A started with his PPG at 280 mg/dL in 2010 and moving toward lower left direction (lower PPG) via acquiring correct knowledge and being persistent with his diet and exercise regimen. He then identified the effectiveness of post-meal walking in 2015 but still fought with his craving for carbs & sugar. This combination effect of exercise's knowledge & practice and persistent fighting against his carbs/sugar craving created a zig-zag path toward his ultimate end point at lower left corner of glucose wave. Finally, he reached to 116 mg/dL level after 2017. Case A demonstrated the patient's strong willpower/persistence and also struggling with control of his diet and exercise.

Patient B started using an AI-based tool to monitor and predict his PPG since 4/21/2018. He started from his glucose value at 230 mg/dL. Initially, he followed the tool's built-in scientific guidance on controlling his diet and did some exercise after each meal. He quickly brought his PPG level down to 149 mg/dL; however, he was not persistent with his exercise routine and reduced his post-meal walking by one-third to one-half, resulting in his PPG level going up again to 170 mg/dL. Case B showed his psychological weakness in lacking exercise willpower (Figure 1).

4. CONCLUSION

This paper is more of a forward-thinking article. The author believes that big glucose data will be easily collected for T2D patients down the line with the availability of non-invasive and easy-of-use glucose monitoring

devices. Therefore, he is trying to lay the necessary groundwork for a future endeavor. Through analyzing those distinctive PPG waveforms, the personality traits and behavior psychological patterns of individual T2D patient can be revealed instantly and clearly. As a result, more practical guidance on "progressive behavior modification" can be provided to some of T2D patients. There will be a lesser need to collect and analyze detailed data on food and exercise for this purpose.

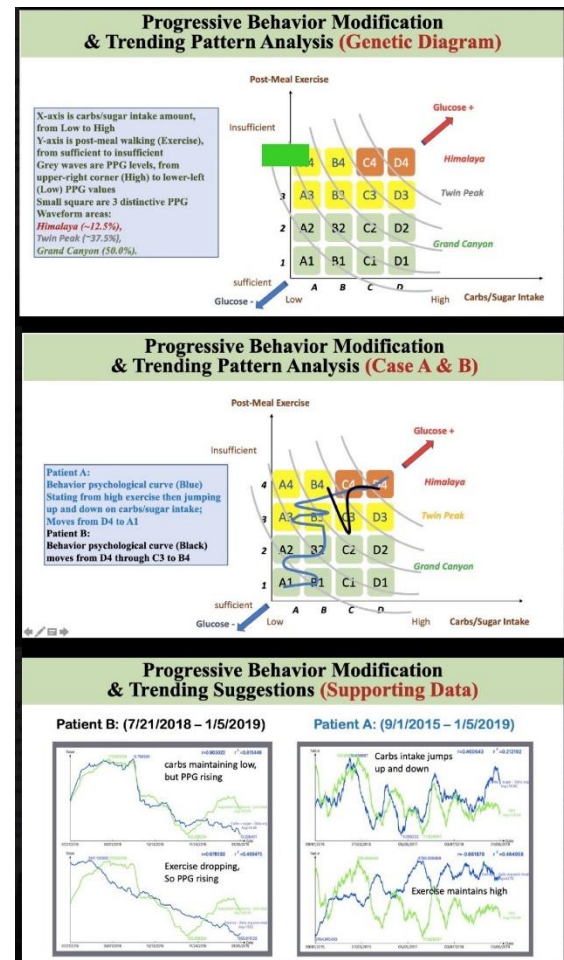


Figure 1: Comparison of 2 glucose movement patterns due to different behavior psychology of two T2D patients.

5. REFERENCES

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