

Using GH-Method: Math-Physical Medicine, Mentality-Personality Modeling, and Segmentation Pattern Analysis to Compare Two Clinic Cases About Linkage Between T2d Patient's Psychological Behavior and Physiological Characteristics

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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?

This paper utilized segmentation pattern analysis to analyze two different clinic cases linking T2D patient's personality traits and psychological behavior with diabetes physiological characteristics.

Method

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 overcome 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 on lifestyle change (psychology issue).
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 4,320 data of carbs, sugar, walking, and finger-piercing PPG for 360 days (5/5/2018 - 4/29/2019) for Case A. The total data size of Case B is 58% of Case A. Patients of both cases are over 70 years old male with more than 20 year's history of type 2 diabetes (T2D). During this collected data period, Case A has not taken any diabetes medication while Case B has taken 1000 mg of metformin daily.

The Author Applied a Segmentation Pattern Analysis to Investigate Individual PPG Behaviors with the Following Different Segments

1. Carbs/Sugar intake amount: 60 grams per day (~15 grams per meal) to separate low-carbs diet and high-carbs diet.
2. Every thousand block of post-meal walking steps to separate walking steps into 5 levels ("level x where x = 1, 2, 3, 4, 5)

3. <120 mg/dL of PPG value as Under-Controlled Diabetes; 120-140 mg/dL as Pre-diabetes; >140 mg/dL as Diabetes.

Results

1. Personality regarding persistence via data completeness percentages

Case A: 100% means he has not missed any data input for monitoring and analysis over 360 days and 1,080 meals.

Case B: 40% on diet and 76% on exercise and 58% on total data completeness means that his persistence is less strong.

2. Resistance against craving for food via diet segmentation

Case A: averaged 14.4 grams of carbs/sugar per meal with 74% low-carbs diet and 26% high-carbs diet.

Case B: averaged 13.1 grams of carbs/sugar per meal with 93% low-carbs diet and 7% high-carbs diet.

This shows that Case B has stronger will power against food seduction.

3. Will-power and Persistence via repetitive post-meal walking

Case A: averaged 4,338 post-meal walking steps (76% at level 5) shows his strong will-power and persistence on exercise to reduce his PPG.

Case B: averaged 1,820 steps (92% at level 3) shows his weaker will-power and persistence on exercise.

4. Diabetes control effectiveness via average PPG values

Case A: 118 mg/dL (under-controlled diabetes via lifestyle management)

Case B: 156 mg/dL (diabetes condition not under well controlled even with medication).

Conclusion

This paper has applied data segmentation analysis and data pattern recognition method to conduct a comparison study between two severe T2D patients. Through this analysis, the personality traits and behavior psychological pattern of individual T2D patient can be revealed instantly and clearly. As a result, a more practical guidance of "progressive behavior modification" can then be provided to specific T2D patient [1-5].

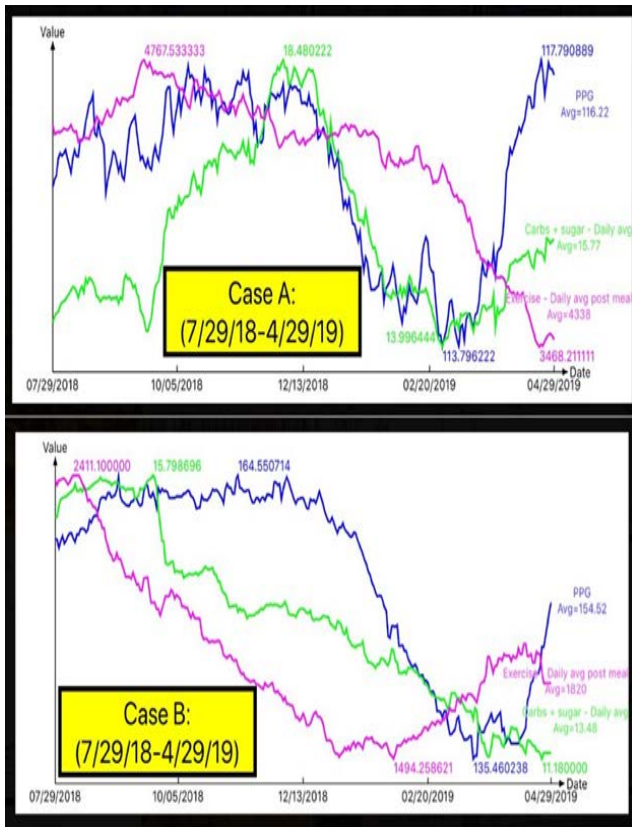


Figure 1: 90-days moving averaged charts of Case A vs. Case B of PPG, Diet, and Exercise

	Data Period	Data Completeness	Data Completeness	Overall Data Completeness	Diet (Carbs & Sugar Intake)	Diet (Carbs & Sugar Intake)	Averaged Carbs & Sugar (g)
	Food Photos	Walking Steps	Food & Walking	Low-Carbs	High-Carbs		
Case A	4 years	100%	100%	100%	74%	26%	14.4
Case B	1 year	40%	76%	58%	93%	7%	13.1

	Data Period	Walking Level (1-2K)	Walking Level (2-3K)	Walking Level (3-4K)	Walking Level (>4K)	Walking Level (<1K)	Averaged PPG (mg/dL)
Case A	4 years	10%	16%	27%	76%	4,214	118
Case B	1 year	7%	47%	45%	1%	1,104	156

Figure 2: Data Comparison of Case A vs. Case B of Data Completeness, Diet, and Exercise

References

- Hsu Gerald C (2018) Using Math-Physical Medicine to Control T2D via Metabolism Monitoring and Glucose Predictions. Journal of Endocrinology and Diabetes 1: 1-6.
- Hsu Gerald C (2018) Using Signal Processing Techniques to Predict PPG for T2D. International Journal of Diabetes & Metabolic Disorders 3: 1-3.
- Hsu Gerald C (2018) Using Math-Physical Medicine and

- Artificial Intelligence Technology to Manage Lifestyle and Control Metabolic Conditions of T2D. International Journal of Diabetes & Its Complications 2: 1-7.
- Hsu Gerald C (2018) Using Math-Physical Medicine to Analyze Metabolism and Improve Health Conditions. Video presented at the meeting of the 3rd International Conference on Endocrinology and Metabolic Syndrome 2018, Amsterdam, Netherlands.
- Hsu Gerald C (2018) Using Math-Physical Medicine to Study the Risk Probability of having a Heart Attack or Stroke Based on Three Approaches, Medical Conditions, Lifestyle Management Details, and Metabolic Index. EC Cardiology 5: 1-9.

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