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Using progressive lifestyle modifications via alternative medicine to control both body weight and glucose (GH-Method: math-physical medicine No. 309)

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ABSTRACT

In this article, the author used 10-years' worth of data of glucoses and prominent lifestyle details such as diet and exercise to address his glucose trend pattern analysis and progressive lifestyle behavior modifications. This progressive lifestyle behavior modification is closely related to behavior psychology. The research methodology used is the GH-Method: math-physical medicine (MPM) approach which has been developed by the author over the past decade. This "*Progressive Behavior Modification*" concept is also a part of his Mentality-Personality Modeling (MPM). He addresses the quantitative linkage between the physiological phenomena for diabetes and obesity along with the behavior psychological influences of a patient with chronic diseases. Food and exercise are important elements of *alternative medicine* that serve as the major influential factors in controlling glucose and weight, not medications.

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He has created a geometric presentation model with carbs/sugar intake amount and meal portion percentage as the x-axis, post-meal and daily total walking steps as the y-axis. He then select the daily glucose and daily body weight as the z-axis (Figure 1). He decided to "fold over" the z-axis and superimpose it with the x-y planar space in a form of "radio wave" format. Under his created 3D presentation on a 2D space, the glucose and weight trend patterns become ultra-clear. These x-axis and y-axis values are a representation of his progressive lifestyle behavior modifications over the past 10 years, while the z-axis values are a presentation of his obesity and diabetes physiological outcomes (using his GH-Method: math-physical medicine).

This case report has demonstrated the patient's strong determination, willpower, and persistence along with his continuous struggle with maintaining his levels of diet and exercise over the past 10 years. The only driving force behind him is that he wants to have a long, healthy life and not suffer from the dreadful chronic diseases and their complications.

In summary, for diabetes, his glucose moving path is a 30-degree downward angle to the left and then straight downward to the bottom. His annualized average daily glucoses have been reduced from the starting point of 250 mg/dL in 2010 through the "reflection point" of 135 mg/dL in 2014, and then straight down to the ending point of 110 mg/dL in 2020. The triangular relationship among diet, exercise, and daily glucose can be easily observed on this "glucose trend pattern" diagram (top diagram of Figure 1).

In regard to obesity, his body weight moving path is a 45-degree downward angle to the left and then goes straight downward to the bottom. His annualized average daily weight have been reduced from the starting point of 220 lbs. in 2010 through the "reflection point" of 183 lbs. in 2013, and then straight down to the ending point of 171-173 lbs. in 2018-2020. The triangular relationship among diet, exercise, and daily weight can be easily observed on this "weight trend pattern" diagram (bottom diagram of Figure 1).

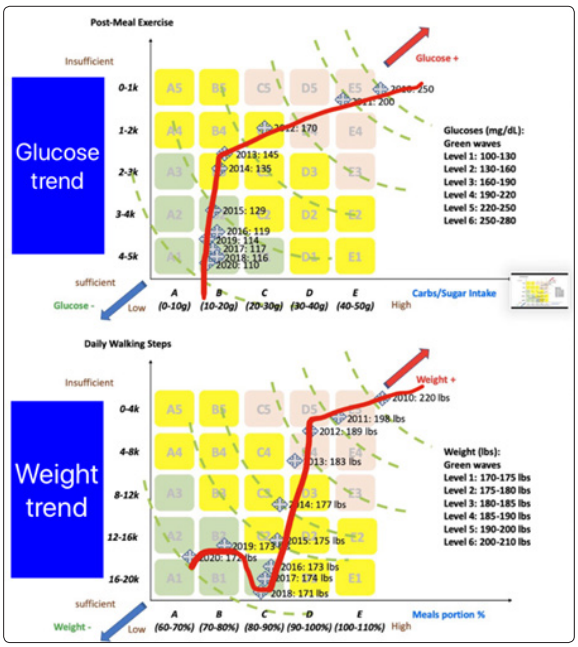

Figure 1: Glucose and Weight trend pattern diagrams

Through analyzing those distinctive daily trend patterns, the personality traits and behavior psychological characteristics of this T2D patient can be revealed instantly and clearly. As a result, a more practical guidance of "*progressive behavior modification*"

can be provided to other T2D patients in order to improve their medical conditions for chronic diseases.

This article has also demonstrated the effectiveness of alternative medicine and its close relationship with behavior psychology.

Introduction

In this article, the author used 10-years' worth of data of glucoses and prominent lifestyle details such as diet and exercise to address his glucose trend pattern analysis and progressive lifestyle behavior modifications. This progressive lifestyle behavior modification is closely related to behavior psychology. The research methodology used is the GH-Method: math-physical medicine (MPM) approach which has been developed by the author over the past decade. This "*Progressive Behavior Modification*" concept is also a part of his Mentality-Personality Modeling (MPM). He addresses the quantitative linkage between the physiological phenomena for diabetes and obesity along with the behavior psychological influences of a patient with chronic diseases. Food and exercise are important elements of *alternative medicine* that serve as the major influential factors in controlling glucose and weight, not medications.

Method

Obesity and Diabetes Research

The author has learned the following biomedical relationships between cause/reason and consequence/result (from top to bottom):

- Poor Lifestyle management
- Metabolic disorder
- Obesity
- Chronic diseases
- Complications
- Weak Immunity
- Various diseases lead to death

His first priority was to focus on learning both lifestyle and metabolism before dealing with his obesity and diabetes issues. Then, ten years later, he was able to concentrate on obesity along with his parallel research on diabetes.

The author immigrated to the United States as a young student with a body weight of 145 lbs. or BMI of 20.8. By 2010, weighing 220 lbs. (BMI 32.5), he was diagnosed with severe type 2 diabetes (T2D) for over 15 years and developed many serious complications that became life-threatening. Therefore, he has spent the next decade to self-study and research obesity, diabetes, metabolism, and endocrinology in order to save his own life.

He spent his first four years, from 2010 to 2013, to self-study 6 chronic diseases, such as obesity, diabetes, hypertension, hyperlipidemia, cardiovascular diseases, stroke, as well as food nutrition. Food is a specifically important element in alternative medicine. It is also probably the most significant and complicated input element to influence the chronic diseases mentioned previously. After his first 4-years of self-learning, he then spent the entire year of 2014 to develop a complex mathematical model of metabolism. This model contains 4 biomarkers of medical conditions (body weight, glucose, blood pressure, and lipids) along with 6 lifestyle details (food portion quantity & nutritional quality balance, water intake, appropriate exercise, sleep amount & quality, stress reduction, and daily life routine regularity). He applied the concept of topology from mathematics and the modeling technique of finite element method from engineering to develop this metabolism model which became the cornerstone of his future medical research work. As a result, his overall health conditions started to improve.

Starting from 2015, he spent three consecutive years, from 2015 to 2017, to discover the characteristics and behaviors of this complex "wild beast" of glucose. His major objective is to truly understand the "inner characteristics" of the glucose, not just using the medication's chemical power to control the disease's "external biological symptoms". His research work is similar to a horseman trying to tame a horse by understanding its temperament first, not just giving a tranquilizer to calm it down. As a result, during this period of 3-years, he developed 4 prediction models, which include Weight, PPG, FPG, and HbA1C with extremely high prediction accuracy (95% to 99%) to reach to his purpose of "*understanding glucoses*".

The author estimated and proved that PPG contributes approximately 75% to 80% towards HbA1C formation. Therefore, he tried to unravel the mystery of PPG first. Through his diabetes research, he has identified at least 19 influential factors associated with PPG formation. Among those influential factors, diet (carbs/sugar intake amount) would provide ~38% and exercise (post-meal walking) would contribute ~41%. Combining these two primary influential factors, it gives ~80% of the PPG formation. Among the rest of the 17 secondary factors, a high weather temperature contributes ~5%, whereas stress and illness only make noticeable contributions when they occur.

For most T2D patients who take medications, its biochemical effect would become the most significant influential factor. However, as we know, medication cannot cure obesity and diabetes and only control their symptoms. Therefore, the author decided to focus on controlling both obesity and diabetes at the most fundamental level by investigating their root cause. Previously, he has taken high doses of three prescribed diabetes medications for 18 years since 1997; however, in 2013, he started to reduce the number of prescriptions and dosages of his daily medications. By 12/8/2015, he finally ceased taking any diabetes medications [1].

From 2016 to 2017, he discovered a solid statistical connection between his FPG and his body weight with a >90% correlation coefficient. In addition, similar to his PPG research, he also recognized that there are about 5 influential factors of FPG formation with body weight alone contributing >85% and cold weather temperature influencing ~5%.

Since July 2019, he also launched a special investigation on the degree of damage to his pancreatic beta cells. During the past 12-months of research work, he noticed that both of his FPG and PPG have been decreased in the past 6 to 8 years at an annual rate of 2.2% to 3.2%. In other words, his pancreatic beta cells have been self-regenerating or self-repairing about 13% to 26% over these 6-8 years. He then thought about FPG as being a good indicator on how healthy his pancreatic beta cells are since there are no food intake and exercise while sleeping. Besides, during the last 5 years, his body weight has been maintained around 172 lbs. (As mentioned above, weight and FPG are closely related.) Besides, his body has been medication-free over the past 5-years as well. It makes sense that FPG carries a significant and clear message about his health status of pancreatic beta cells; therefore, it can be served as the baseline of his overall glucose predications.

The detailed explanation of his weight and glucose research is provided because they are interwoven together and are based on lifestyle management, which leads to metabolism balance. Lifestyle and metabolism are also the two primary techniques of causes and outcomes of alternative medicine.

Glucose and Weight Trend Pattern Diagram
A typical T2D patient faces three major challenges:

1. Availability of accurate and precise 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 (a ***knowledge*** issue).
2. Awareness of his disease's specific status and overcome self-denial in order to take effective actions. The most difficult barrier to overcome is having determination, willpower, and persistence on lifestyle change (a ***behavior*** issues).
3. A non-invasive, effective, and ease of use technology-based tool to accurately predict biomedical outcomes and to guide patients (a ***technology*** issue).

The MPM methodology and its related diabetes research work covers the scope of this first issue, knowledge. The third issue, technology, has also been discussed in his previously published papers [2]. This investigation report addresses the second issue, behavior, specifically a patient's lifestyle behavior on his diet control and exercise. Beyond acquiring accurate and sufficient knowledge of diabetes, the resistance of food temptation and diligence on post-meal exercise occur with every patient at a frequency of three times a day. These lifestyle behaviors require strong determination, willpower, and persistence to achieve the goal of diabetes control. These concerns are related to a patient's personality traits [3,4].

The author has collected a total of two million data of his medical conditions and lifestyle details for the past ten years from 2010 to 2020. In this study, he only utilized 3 subsets from his collected and stored big data, such as (1) body weight and finger-piercing measured glucoses; (2) carbs/sugar intake amount and meal portion percentage; and (3) post-meal walking steps and daily walking steps.

As he described in his obesity and diabetes research section, his learned knowledge and research results of metabolism model's implementation are progressively introduced and included into his data collection software as the data become available. In short, he studied both chronic diseases and food nutrition from 2010 to 2013, then started collecting his weight data since 2011, daily walking steps since 2013, PPG data since 2014, carbs/sugar and post-meal walking data since 2015, and FPG data and meal portion percentage since 2016. Before accumulating the additional datasets, he has collected some partial data every year, not on a daily basis, in an organized fashion similar to the periods after the starting years. However, his best guesstimated annualized data, prior to those starting years, are still able to provide an accurate annualized information [6-8]. Therefore, in the data table, the red-colored data are his guesstimated annual data based on partial collected data, while the black-colored data are collected real data based on each meal and each day within an entire year (Figure 2).

In order to demonstrate the results of his "***trend pattern analysis***", he created a modified two-dimensional (2D) planar space which can describe a three-dimensional (3D) data information. Initially, he set his x-coordinate as his carbs/sugar intake amount and his meal portion percentage from low scale to high scale with the following 5 segments:

Segment A: 0-10 grams / 60-70 %
Segment B: 10-20 grams / 70-80 %
Segment C: 20-30 grams / 80-90 %
Segment D: 30-40 grams / 90-100 %
Segment E: 40-50 grams / 100-110 %

Secondly, he set his y-coordinate as his post-meal walking steps and daily walking steps from high scale to low scale with the following 5 segments:

Segment 1: 4-5k / 16-20k steps
Segment 2: 3-4k / 12-16k steps
Segment 3: 2-3k / 8-12k steps
Segment 4: 1-2k / 4-8k steps
Segment 5: 0-1k / 0-4K steps

Therefore, this x- and y-axes constitute a 2D planar space with a total of 25 sub-regions inside, such as A1 through E5.

Thirdly, he set his "pseudo" z-coordinate" as his daily glucose and daily weight levels from low scale (lower left corner) to high scale (upper right corner) in a "radio-wave" format with the following 6 segments:

Segment 1:
100-130 mg/dL / 170-175 lbs.
Segment 2:
130-160 mg/dL / 175-180 lbs.
Segment 3:
160-190 mg/dL / 180-185 lbs.
Segment 4:
190-220 mg/dL / 185-190 lbs.
Segment 5:
220-250 mg/dL / 190-200 lbs.
Segment 6:
250-280 mg/dL / 200-21- lbs.

However, for a better view, he "superimposes" his z-axis on his 2D planar x-y space with a "radio-wave" format to show their different levels of glucoses (Figure 2). In this created presentation, the reader of this article can easily observe the glucose and weight trend pattern from 2010 to 2020 and their respective relationship with food and exercise [9].

	Daily Glucose	FPG	PPG	Carbs/Sugar (g)	PM Walk (/100)
Y2010	250	160	280	68	4
Y2011	200	150	220	41	8
Y2012	170	140	180	25	12
Y2013	145	135	148	16	30
Y2014	135	127	137	15	34
Y2015	129	124	130	14	37
Y2016	119	117	120	15	41
Y2017	117	120	117	14	44
Y2018	116	114	117	15	45
Y2019	114	115	114	13	40
Y2020	110	107	110	13	44

	Weight	Meal Portion %	Daily Walk (/100)
Y2010	220	114	12
Y2011	198	100	30
Y2012	189	95	40
Y2013	183	93	76
Y2014	177	90	118
Y2015	175	89	150
Y2016	173	88	170
Y2017	174	85	179
Y2018	171	84	185
Y2019	173	76	157
Y2020	172	68	162

Figure 2: Background data tables of both glucose and weight control

From observing this weight trend pattern diagram, patients can modify their behavior one step at a time, by taking little steps on a smaller scale. This is what the author defined as a "*progressive behavior modification*".

Behavior Psychology

On August 28th, 2018, Dr. Bryn Farnsworth stated that "*Behavioral psychology is the study of how our behaviors relate to our mind – it looks at our behavior through the lens of psychology and draws a link between the two*."

FPM is an editorially independent, peer-reviewed journal published by the American Academy of family physicians. Here is an excerpt from the March-April 2018 edition, "Using these brief interventions, you can help your patients make healthy behavior changes" [10].

"*Effectively encouraging patients to change their health behavior is a critical skill for primary care physicians. Modifiable health behaviors contribute to an estimated 40 percent of deaths in the United States. Tobacco use, poor diet, physical inactivity, poor sleep, poor adherence to medication, and similar behaviors are prevalent and can diminish the quality and length of patients' lives. Research has found an inverse relationship between the risk of all-cause mortality and the number of healthy lifestyle behaviors a patient follows*.

KEY POINTS (See Figure 2):
(1) *Modifiable health behaviors, such as poor diet or smoking, are significant contributors to poor outcomes*.
(2) *Family physicians can use brief, evidence-based techniques to encourage patients to change their unhealthy behaviors*.
(3) *Working with patients to develop health goals, eliminate barriers, and track their own behavior can be beneficial*.
(4) *Interventions that target specific behaviors, such as prescribing physical activity for patients who don't get enough exercise or providing patient education for better medication adherence, can help patients to improve their health*."

From the articles, we can see the close relationship between health and lifestyle behavior psychology [10-13].

The author believes that the behavior psychological factor is also important for patients who want to practice alternative medicine.

Alternative Medicine

The following content is from [14].

The nearly crushing cost of modern health care is the most visible problem. It has been estimated that one third of all medical interventions are unnecessary. When it comes to medical intervention, we should start with the least expensive, least invasive approach. Instead, we too often do the opposite. Alternative medicine is an "addition', not a "substitute'. The use of behavioral therapies, reach of social support, food cure, making friends, enjoying nature, etc. are now being given the stamp of research approvals as paths to improved health and well-being. There are three important things in alternative medicine, natural healing, achieving balance, and food cure.

Results

In Figure 2, it shows the background data table for glucoses and weights that contain 5 values for glucose control such as daily glucose, FPG, PPG, carbs/sugar intake amount in grams, and post-meal walking exercise per 100 steps along with 3 values for weight control such as daily weight, meal portion percentage, and daily walking steps. Figure 3 depicts line chart for glucoses and weights over the past 10 years.

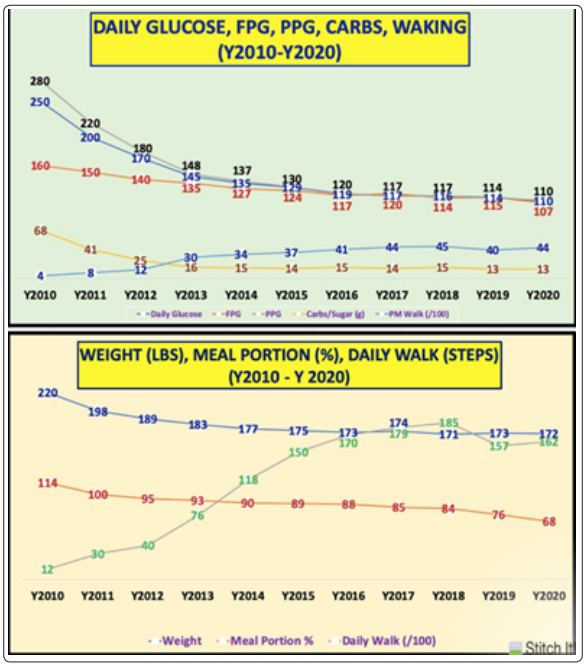

Figure 3: Line charts of both glucose and weight control

Glucose Reduction

The author started with his daily glucose at 250 mg/dL (PPG at 280 mg/dL) in 2010, moving forward to a lower daily glucose at 129 mg/dL in 2015 (PPG at 130 mg/dL), and finally reached 110 mg/dL in 2020 (PPG at 110 mg/dL). The bottom two curves of "decreasing" carbs/sugar and "increasing" post-meal walking steps demonstrate their significant influences on his daily glucose and PPG. He decreased his carbs/sugar intake amount from 68 grams per meal in 2010 down to 13 grams per meal in 2020. During the same 10-year period, he increased his post-meal walking exercise from 400 steps per meal in 2010 up to 4,400 steps per meal in 2020.

Weight Reduction

His body weight and meal portion percentage move in unison with a positive correlation coefficient (+88%), while body weight and daily walking steps move in opposite directions with a negative correlation coefficient (-89%). The author started with his weight at 220 lbs. in 2010, moving forward to a lower daily glucose at 175 lbs. in 2015, and finally reached 172 lbs. in 2020. At the same time, he reduced his meal portion percentage from 114% per meal in 2010 down to 68% per meal in 2020. In addition, he increased his daily walking exercise from 1,200 steps per day in 2010 up to 18,500 steps per day starting in 2018.

Glucose and Weight Trend Pattern Diagrams

In Figure 4, it shows his created presentation diagram of 3D "radio-wave" data format on a 2D planar space. This diagram actually depicts his *glucose and weight trend pattern analysis* with his lifestyle behavior modifications together.

His daily glucoses, represented with the gray star symbols on the pseudo z-axis data, starts from the upper right corner of 250 mg/dL at 2010, moving toward the lower left direction with a ~30 degree downhill slope, after acquiring correct knowledge and being persistent with his diet and exercise regimen. Despite his medication reduction process over this time frame of three years

(2013-2015), his daily glucoses are further decreased from 145 mg/dL in 2013 to 129 mg/dL in 2015. From 2015 to 2019, he mainly focused on increasing his post-meal walking exercise from ~3,300 steps to 4,400 steps. As a result, his daily glucoses dropped "straight downward" to the lower left corner of this planar space like a free-falling object. Finally, he reached 110 mg/dL level in 2020 with an average glucose from 1/1/2020 to 8/6/2020.

His daily body weight, represented with the gray star symbols on the pseudo z-axis data, starts from the upper right corner of 220 lbs. at 2010 (subregion E5), moving toward the lower left direction with a ~45 degree downhill slope until 2013 (subregion D4), and then dropping "straight downward" like a free-falling object until his weight reached 171 lbs. in 2018 (subregion A3).

Both of his glucose and weight reduction in this trend pattern analyses have demonstrated what he has said previously that "***controlling your diabetes and obesity start from the most fundamental core level via food and exercise***".

All of these accomplishments occurred after acquiring correct knowledge and being persistent with his diet and exercise regimen. It is not an easy task to ***reduce*** one's carbs/sugar intake below 15 grams, decrease food intake portion to 68% along with ***maintaining*** post-meal walking exercise of ~4,300 steps at a frequency of three times a day and daily walking above 16,000 steps (11 km or 7 miles per day) for many years. It requires extraordinarily strong determination, willpower, and persistence for an individual to maintain this behavior for 8-years.

The author has implemented these alternative medicine techniques successfully. In the process, he saved his own life from the life-threatening complications of diabetes, such as experiencing five cardiovascular episodes and renal difficulties. In Figure 4, we can see clearly that these lifestyle behavior modification finally paid off in the long run. ***There is nothing better than living a healthier and longer life***.

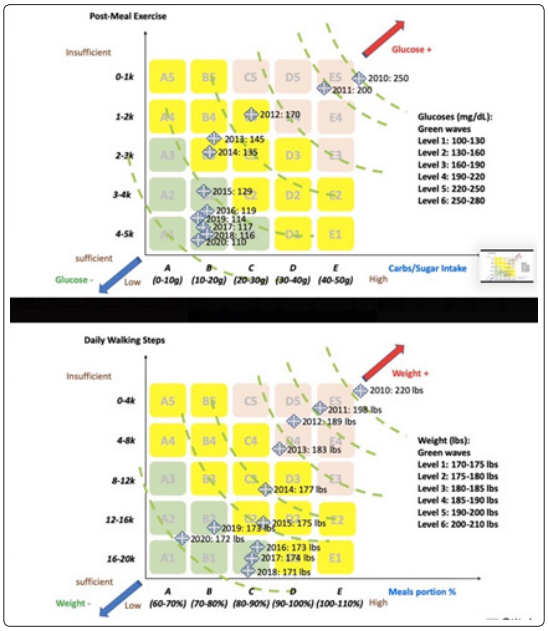

Figure 4: Trend pattern diagrams of both glucose and weight control

Conclusion

This case report has demonstrated the patient's strong determination, willpower, and persistence along with his continuous struggle with maintaining his levels of diet and exercise over the past 10 years. The only driving force behind him is that he wants to have a long, healthy life and not suffer from the dreadful chronic diseases and their complications.

In summary, for diabetes, his glucose moving path is a 30-degree downward angle to the left and then straight downward to the bottom. His annualized average daily glucoses have been reduced from the starting point of 250 mg/dL in 2010 through the "reflection point" of 135 mg/dL in 2014, and then straight down to the ending point of 110 mg/dL in 2020. The triangular relationship among diet, exercise, and daily glucose can be easily observed on this "glucose trend pattern" diagram (top diagram of Figure 4).

In regard to obesity, his body weight moving path is a 45-degree downward angle to the left and then goes straight downward to the bottom. His annualized average daily weight have been reduced from the starting point of 220 lbs. in 2010 through the "reflection point" of 183 lbs. in 2013, and then straight down to the ending point of 171-173 lbs. in 2018-2020. The triangular relationship among diet, exercise, and daily weight can be easily observed on this "weight trend pattern" diagram (bottom diagram of Figure 4).

Through analyzing those distinctive daily trend patterns, the personality traits and behavior psychological characteristics of this T2D patient can be revealed instantly and clearly. As a result, a more practical guidance of "***progressive behavior modification***" can be provided to other T2D patients in order to improve their medical conditions for chronic diseases.

This article has also demonstrated the effectiveness of alternative medicine and its close relationship with behavior psychology.

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