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Research Article

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A Clinic Case of Read (Remission of Type 2 Diabetes) And Rewind (Reducing Weight with Intensive Dietary Support) Using One T2d Patient's Historical Data Over Past 8 Years and Applying Viscoplastic Medicine Energy Model of Gh- Method: Math-Physical Medicine

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Abstract

In 2010, the author faced significant health challenges, including five cardiovascular incidents, kidney and bladder issues, neuropathy, and retinopathy. This prompted him to embark on a journey of self- education in internal medicine and nutrition. He initiated a health recovery plan that combined medications with lifestyle changes. Over time, he systematically reduced his reliance on medications, focusing more on lifestyle management.

Remarkably, ***by December 8, 2015, he had completely stopped taking three different kinds of diabetes medication. From April 1, 2016 onwards, he achieved a state of "diabetes remission".*** *Over the eight years period from 2016 to 2023, his average HbA1C levels stabilized at around 6.5%, with minor variations. The enclosed diagram illustrates his progress and HbA1C levels over the past period of 14 years. In this article, the author adopted the space-domain viscoplastic medicine energy method (SD-VMT) to calculate the hidden dynamic relationships (i.e. energies) between his HbA1c and its change rate of time with five influential factors, insulin resistance via FPG, carbohydrate and sugar intake, exercise via walking steps, sleep score, and stress score.*

In summary, *the energy calculation results using SD-VMT research method over the past 8 years in the context of READ (Remission of Type 2 Diabetes) have examined the relationship between the author's HbA1C levels and his five influential factors similar to the REWIND program (Reducing Weight with Intensive Dietary Support) are:*

- ***Insulin resistance via FPG: 25% (with a 99% correlation)***
- ***Carbs & sugar amount: 30% (with a 76% correlation)***
- ***Exercise of Walking steps: 21% (with a 65% correlation)***
- ***Sleep score: 13% (with an 88% correlation)***
- ***Stress score: 11% (with a 49% correlation)***

Key Message

The analysis of the author's personal data, in the context of managing type 2 diabetes through lifestyle changes, highlights two primary influential factors on his A1C control. Firstly, his FPG value in the early morning, accounting for 25% of the total energy, not only indicates his insulin resistance status but also sets the baseline for his daily PPG levels. Secondly, his carbohydrate and sugar intake amount, contributing 30% of the total energy, significantly affects his PPG levels. Walking exercise, as a secondary factor, impacts both PPG and A1C levels, constituting 21% of the total influence. ***Notably, the diet- to-exercise ratio stands at 1.43 (30% zo 21%).*** Lastly, his sleep scores and stress scores are tertiary factors, contributing 13% and 11% respectively to the overall energy impact on his HbA1C values (T2D status).

Introduction

In 2010, the author faced significant health challenges, including five cardiovascular incidents, kidney and bladder issues, neuropathy, and retinopathy. This prompted him to embark on a journey of self- education in internal medicine and nutrition. He initiated a health recovery plan that combined medications with lifestyle changes. Over time, he systematically reduced his reliance on medications, focusing more on lifestyle management. Remarkably, ***by December 8, 2015, he had completely stopped taking three different kinds of diabetes medication. From April 1, 2016 onwards, he achieved a state of "diabetes remission"***. Over the eight years period from 2016 to 2023, his average HbA1C levels stabilized at around 6.5%, with minor variations. The enclosed diagram illustrates his progress and HbA1C levels over the past period of 14 years.

Biomedical Information

The following sections contain excerpts and concise information drawn from multiple medicalarticles, which have been meticulously reviewed by the author of this paper. The author has adopted this approach as an alternative to including a conventional reference list at the end of this document, with the intention of optimizing his valuable research time. It is essential to clarify that these sections do not constitute part of the author's original contribution but have been included to aid the author in his future reviews and offer valuable insights to other readers with an interest in these subjects.

Consensus Report: Definition and Interpretation of Remission in Type 2 Diabetes

By: Matthew C Riddle et al. Diabetes Care. 2021. © 2021 by the American Diabetes Association Improvement of glucose levels into the normal range can occur in some people living with diabetes, either spontaneously or after medical interventions, and in some cases can persist after withdrawal of glucose- lowering pharmacotherapy. Such sustained improvement may now be occurring more often due to newer forms of treatment. However, terminology for describing this process and objective measures for defining it are not well established, and the long-term risks versus benefits of its attainment are not well understood.

To update prior discussions of this issue, an international expert group was convened by the American Diabetes Association to propose nomenclature and principles for data collection and analysis, with the goal of establishing a base of information to support future clinical guidance. This group proposed ***"remission" as the most appropriate descriptive term, and HbA1c <6.5% (48 mmol/mol) measured at least 3 months after cessation of glucose-lowering pharmacotherapy as the usual diagnostic criterion.*** The group also made suggestions for active observation of individuals experiencing a remission and discussed further questions and unmet needs regarding predictors and outcomes of remission.

What is READ (Remission of type 2 diabetes) and how to achieve this diabetic remission goal?

Remission of type 2 diabetes, often referred to as "diabetes remission," involves achieving and maintaining ***blood sugar levels within a non- diabetic range without the use of diabetes medication.*** It is a significant goal for individuals with type 2 diabetes as it can lead to improved health outcomes, reduced medication dependence, and a lower risk of diabetes-related complications. ***Diabetes remission can be achieved through various lifestyle and medical interventions.***

1. Weight Management: Achieving and maintaining a healthy weight through a combination of diet and physical activity is a key factor in achieving diabetes remission. This often involves losing a certain percentage of initial body weight, typically around 15-20%.

2. Dietary Changes: Adopting a balanced and healthy diet can help control blood sugar levels and support weight loss. This may involve reducing the intake of processed and high-sugar foods, and focusing on whole foods, fruits, vegetables, lean proteins, and healthy fats.

3. Physical Activity: Regular exercise, including aerobic activities and strength training, can help improve insulin sensitivity and lower blood sugar levels. Aim for at least 150 minutes of moderate-intensity exercise per week, along with strength training at least two days per week.

4. Medication Management: Some individuals may benefit from medication adjustments, including reducing or discontinuing diabetes medications as their blood sugar levels improve through lifestyle changes.

5. Medical Monitoring: Regular monitoring of blood sugar levels, along with other health indicators such as blood pressure and cholesterol, is essential for gauging progress and adjusting treatment plans as needed.

6. Support and Education: Working with healthcare professionals, including dietitians, diabetes educators, and doctors, can provide valuable support and guidance in making lifestyle changes and managing diabetes.

It is important to note that ***while achieving diabetes remission is a significant goal, it does not imply a cure for diabetes.*** Long-term maintenance of healthy lifestyle habits is crucial to sustain remission and minimize the risk of diabetes relapse. Individualized care and ongoing support from healthcare professionals can play a critical role in supporting those pursuing diabetes remission.

What is REWIND (Reducing body Weight with Intensive Dietary Support) for diabetes remission?

REWIND (Reducing body Weight with Intensive Dietary Support) is a research-based approach that focuses on utilizing intensive dietary support to achieve diabetes remission among individuals with type 2 diabetes. It involves a structured, evidence-based program aimed at promoting significant weight loss through dietary interventions, often in collaboration with healthcare professionals. The focus of REWIND is to support individuals in achieving and maintaining substantial weight loss, often around 15-20% of initial body weight, which has been shown to significantly improve blood sugar control and potentially lead to diabetes remission. *This may involve a combination of dietary*

changes, physical activity, behavioral support, and medical monitoring.

Intensive dietary support in the context of REWIND may include personalized meal planning, nutritional counseling, and ongoing guidance to help individuals make sustainable lifestyle changes. Additionally, ongoing support from healthcare professionals, such as dietitians, nutritionists, and diabetes educators, is a crucial aspect of the program. *The REWIND approach is based on the premise that achieving substantial weight loss and improving dietary habits can have a profound impact on blood sugar levels, insulin sensitivity, and overall metabolic health.* Research studies, such as the DiRECT trial and other initiatives, have explored the effectiveness of intensive dietary support programs, including those based on the REWIND model, in achieving diabetes remission.

It is important to note that while REWIND and similar programs hold promise for achieving diabetes remission, individual results may vary, and success is dependent on a combination of factors, including an ***individual's commitment to lifestyle changes,*** ongoing support, and medical considerations. As with any healthcare initiative, it is essential to seek guidance from healthcare professionals when considering intensive dietary interventions for diabetes management and weight loss.

An Example of REWIND

A Remotely-Delivered Community Action Project to Promote A Diabetes Lifestyle Intervention Programme In Northwest London: Basis, Process and Outcomes

Sharan J Kapadia et al. Health Promot Perspect. 2021

Background

The prevalence of type 2 diabetes mellitus (T2DM) in London is rising, obesity being a major driver. As part of a primary care placement, the authors (two medical students and a lead general practitioner) directly promoted the Reducing Weight with Intensive Dietary Support (REWIND) programme to patients in Northwest London and collected feedback on the promotion.

Methods

The team developed and delivered three remote interventions: a redesigned patient-facing information leaflet, phone calls and text messages, and a live, interactive webinar, to directly engage patients and raise awareness about REWIND. Feedback was collected pre and post- webinar using an anonymized, online survey (essentially functioning as a 'teaching' evaluation).

Results

Mean interest in REWIND had increased from 2.7 (pre-promotion) to 4.7 (post-promotion), knowledge about REWIND had increased from 2.1 to 4, and self-reported likelihood of enrolling had increased from 2.6 to 4.2 ($P<0.01$ in all cases). The reported usefulness of the leaflet and webinar was scored 3.7 and 4.4 respectively. Within two weeks of the webinar, two of these patients had joined *REWIND*.

Conclusion

Feedback from the patients and GP revealed that the project successfully raised awareness, improved knowledge, and increased the likelihood of enrolment in REWIND. Diabetes programmes and organisations are encouraged to adapt the methods of this project to their own contexts, especially in light of COVID-19 where remote interventions will remain essential.

MPM Background

To learn more about his developed GH-Method: math-physical medicine (MPM) methodology, readers can read the following three papers selected from his published 760+ papers. The first paper, No. 386 (Reference 1) describes his MPM methodology in a general conceptual format. The second paper, No. 387 (Reference 2) outlines the history of his personalized diabetes research, various application tools, and the differences between biochemical medicine (BCM) approach versus the MPM approach. The third paper, No. 397 (Reference 3) depicts a general flow diagram containing ~10 key MPM research methods and different tools.

The Author's Diabetes History

The author was a severe T2D patient since 1995. He weighed 220 lb. (100 kg) at that time. By 2010, he still weighed 198 lb. with an average daily glucose of 250 mg/dL (HbA1C at 10%). During that year, his triglycerides reached 1161 (high risk for CVD and stroke) and his albumin-creatinine ratio (ACR) at 116 (high risk for chronic kidney disease). He also suffered from five cardiac episodes within a decade. In 2010, three independent physicians warned him regarding the need for kidney dialysis treatment and the future high risk of dying from his severe diabetic complications.

In 2010, he decided to self-study endocrinology with an emphasis on diabetes and food nutrition. He spent the entire year of 2014 to develop a metabolism index (MI) mathematical model. During 2015 and 2016, he developed four mathematical prediction models related to diabetes conditions: weight, PPG, fasting plasma glucose (FPG), and HbA1C (A1C). Through using his developed mathematical metabolism index (MI) model and the other four glucose prediction tools, by the end of 2016, his weight was reduced from 220 lbs. (100 kg) to 176 lbs. (89 kg), waistline from 44 inches (112 cm) to 33 inches (84 cm), average finger- piercing glucose from 250 mg/dL to 120 mg/dL, and A1C from 10% to ~6.5%. One of his major accomplishments is that he no longer takes any diabetes-related medications since 12/8/2015.

In 2017, he achieved excellent results on all fronts, especially his glucose control. However, ring the pre- COVID period, including both 2018 and 2019, he traveled to ~50 international cities to attend 65+ medical conferences and made ~120 oral presentations. This hectic schedule inflicted damage to his diabetes control caused by stress, dining out frequently, post-meal exercise disruption, and jet lag, along with the overall negative metabolic impact from the irregular life patterns; therefore, his glucose control was somewhat affected during the two-year traveling period of 2018-2019.

He started his COVID-19 self- quarantined life on 1/19/2020. By 10/16/2022, his weight was further reduced to ~164 lbs. (BMI 24.22) and his A1C was at 6.0% without any medication intervention or insulin injection. In fact, with the special COVID-19 quarantine lifestyle since early 2020, not only has he written and published ~500 new research articles in various medical and engineering journals, but he has also achieved his best health conditions for the past 27 years. These achievements have resulted from his non-traveling, low-stress, and regular daily life routines. Of course, his in- depth knowledge of chronic diseases, sufficient practical lifestyle management experiences, and his own developed high-tech tools have also contributed to his excellent health improvements.

On 5/5/2018, he applied a continuous glucose monitoring (CGM) sensor device on his upper arm and checks his glucose measurements every 5 minutes for a total of 288 times each day. Furthermore, he extracted the 5- minute intervals from every 15-minute interval for a total of 96 glucose data each day stored in his computer software. Through the author's medical research work over 40,000 hours and read over 4,000 published medical papers online in the past 13 years, he discovered and became convinced that good life habits of not smoking, moderate or no alcohol intake, avoiding illicit drugs; along with eating the right food with well- balanced nutrition, persistent exercise, having a sufficient and good quality of sleep, reducing all kinds of unnecessary stress, maintaining a regular daily life routine contribute to the risk reduction of having many diseases, including CVD, stroke, kidney problems, micro blood vessels issues, peripheral nervous system problems, and even cancers and dementia. In addition, a long-term healthy lifestyle can even "repair" some damaged internal organs, with different required time-length depending on the particular organ's cell lifespan. For example, he has "self-repaired" about 35% of his damaged pancreatic beta cells during the past 10 years.

Energy Theory

The human body and organs have around 37 trillion live cells which are composed of different organic cells that require energy infusion from glucose carried by red blood cells; and energy consumption from labor- work or exercise. When the residual energy (resulting from the plastic glucose scenario) is stored inside our bodies, it will cause different degrees of damage or influence to many of our internal organs.

According to physics, energies associated with the glucose waves are proportional to the square of the glucose amplitude. The residual energies from elevated glucoses are circulating inside the body via blood vessels which then impact all of the internal organs to cause different degrees of damage or influence, e.g. diabetic complications. Elevated glucose (hyperglycemia) causes damage to the structural integrity of blood vessels. When it combines with both hypertension (rupture of arteries) and hyperlipidemia (blockage of arteries), CVD or Stroke happens. Similarly, many other deadly diseases could result from these excessive energies which would finally shorten our lifespan. For an example, the combination of hyperglycemia and hypertension would cause micro-blood vessel's leakage in kidney systems which is one of the major causes of CKD.

The author then applied Fast Fourier Transform (FFT) operations toconvert the input wave from a time domain into a frequency domain. The y-axis amplitude values in the frequency domain indicate the proportional energy levels associated with each different frequency component of input occurrence.

Both output symptom value (i.e. strain amplitude in the time domain) and output symptom fluctuation rate (i.e. the strain rate and strain frequency) are influencing the energy level (i.e. the Y-amplitude in the frequency domain).

Currently, many people live a sedentary lifestyle and lack sufficient exercise to burn off the energy influx which causes them to become overweight or obese. Being overweight and having obesity leads to a variety of chronic diseases, particularly diabetes. In addition, many types of processed food add unnecessary ingredients and harmful chemicals that are toxic to the bodies, which lead to the development of many other deadly diseases, such as cancers. For example, ~85% of worldwide diabetes patients are overweight, and ~75% of patients with cardiac illnesses or surgeries have diabetes conditions. In engineering analysis, when the load is applied to the structure, it bends or twists, i.e. deform; however, when the load is removed, it will either be restored to its original shape (i.e, elastic case) or remain in a deformed shape (i.e. plastic case). In a biomedical system, the glucose level will increase after eating carbohydrates or sugar from food; therefore, the carbohydrates and sugar function as the energy supply.

After having labor work or exercise, the glucose level will decrease. As a result, the exercise burns off the energy, which is similar to load removal in the engineering case. In the biomedical case, both processes of energy influx and energy dissipation take some time which is not as simple and quick as the structural load removal in the engineering case. Therefore, the age difference and 3 input behaviors are "dynamic" in nature, i.e. time- dependent. *This time-dependent nature leads to a "viscoelastic or viscoplastic" situation.* ***For the author's case, it is "viscoplastic" since most of his biomarkers are continuously improved during the past 13-year time window.***

*Time-Dependent Output Strain and Stress of (viscous input*output rate)*

Hooke's law of linear elasticity is expressed as:

Strain (ε: epsilon)
= Stress (σ: sigma) / Young's modulus (E)

For biomedical glucose application, his developed linear elastic glucose theory (LEGT) is expressed as:

PPG (strain) = carbs/sugar (stress)
**** GH.p-Modulus (a positive number) + post-meal walking k-steps * GH.w-Modulus (a negative number)***

Where GH.p-Modulus is reciprocal of Young's modulus E. However, in viscoelasticity or viscoplasticity theory, the stress

is expressed as:

Stress
= viscosity factor (η: eta) * strain rate (dε/dt)

Where strain is expressed as Greek epsilon or ε. In this article, in order to construct an "ellipse-like" diagram in a stress- strain space domain (e.g. "hysteresis loop") covering both the positive side and negative side of space, he has modified the definition of strain as follows:

Strain
= (body weight at certain specific time instant)

He also calculates his strain rate using the following formula:

Strain rate
= (body weight at next time instant)
- (body weight at present time instant)

The risk probability % of developing into CVD, CKD, Cancer is calculated based on his developed metabolism index model (MI) in 2014. His MI value is calculated using inputs of 4 chronic conditions, i.e. weight, glucose, blood pressure, and lipids; and 6 lifestyle details, i.e. diet, drinking water, exercise, sleep, stress, and daily routines. These 10 metabolism categories further contain ~500 elements with millions of input data collected and processed since 2010. For individual deadly disease risk probability %, his mathematical model contains certain specific weighting factors for simulating certain risk percentages associated with different deadly diseases, such as metabolic disorder- induced CVD, stroke, kidney failure, cancers, dementia; artery damage in heart and brain, micro-vessel damage in kidney, and immunity-related infectious diseases, such as COVID death.

Some of explored deadly diseases and longevity characteristics using the ***viscoplastic medicine theory (VMT)*** include stress relaxation, creep, hysteresis loop, and material stiffness, damping effect ***based on time-dependent stress and strain*** which are different from his previous research findings ***using linear elastic glucose theory (LEGT)*** and ***nonlinear plastic glucose theory (NPGT).***

Results

Figure 1 shows data of key years and HbA1C curves of 8 years.

	lbs	mg/dL	mg/dL	mg/dL	%	gram	%	%	%
	Weight	eAG	FPG	PPG	HbA1C	Carbs	Steps	Sleep	Stress
Y2010	220	278	220	297	11.0	104	1.50	1.07	1.00
Y2013	183	138	137	140	8.0	80	1.25	0.98	0.90
Y2016	173	119	117	120	7.2	16	0.62	0.64	0.70
Y2023	168	100	89	104	6.1	13	0.75	0.47	0.50

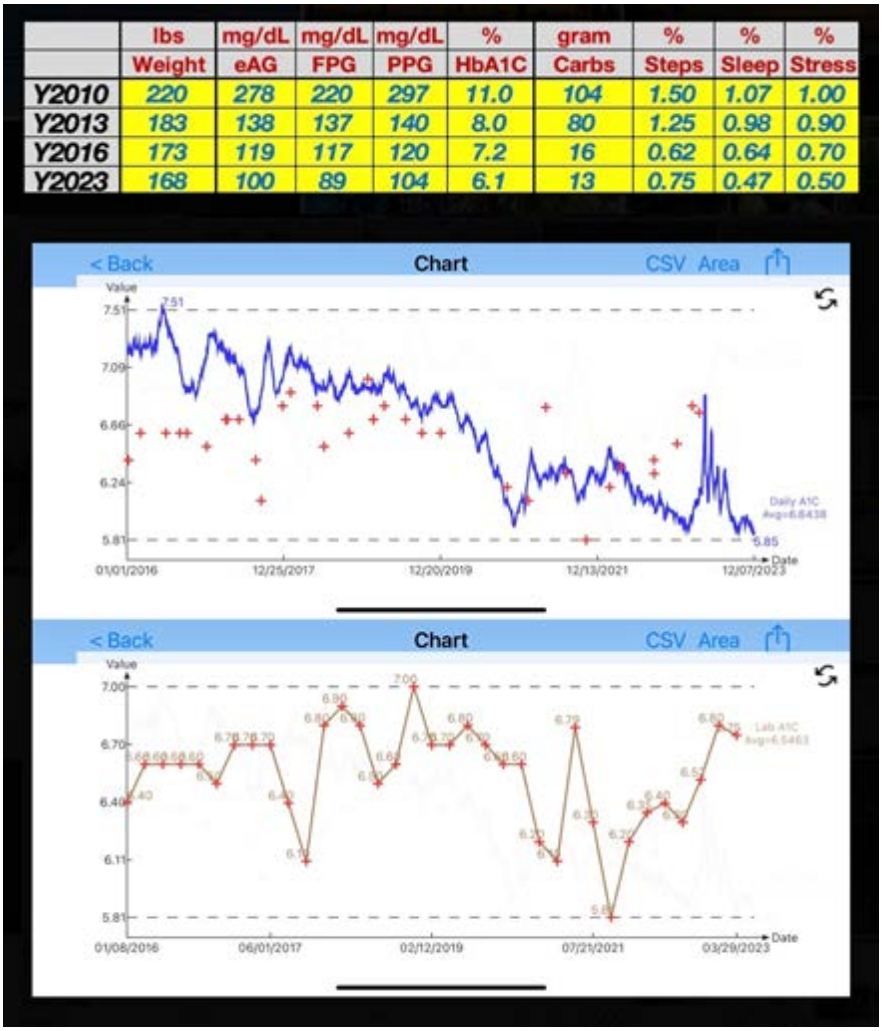

Figure 1: Data of key years and HbA1C curves of 8 years

Figure 2 shows data table and input/ output diagrams.

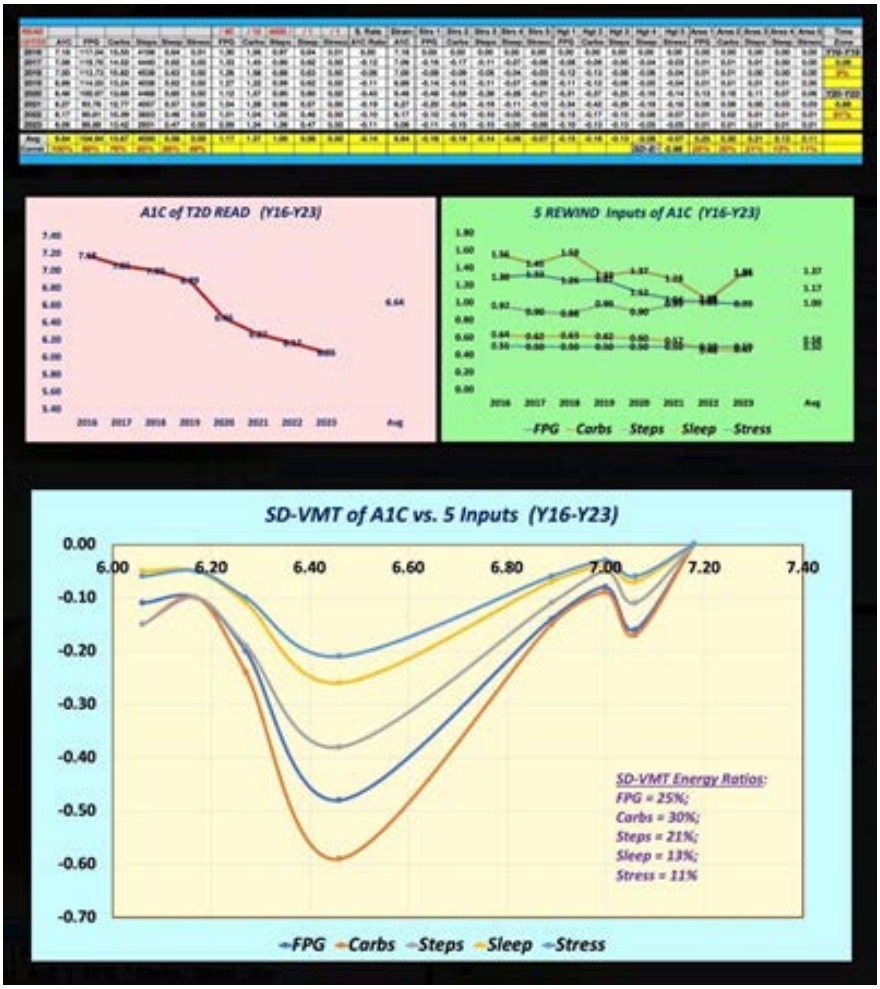

Figure 2: Data table and input/ output diagrams

Conclusions

In summary, the energy calculation results using SD-VMT research method over the past 8 years in the context of READ (Remission of Type 2 Diabetes) have examined the relationship between the author's HbA1C levels and his five influential factors similar to the REWIND program (Reducing Weight with Intensive Dietary Support) are:

- ***Insulin resistance via FPG: 25% (with a 99% correlation)***
- ***Carbs & sugar amount: 30% (with a 76% correlation)***
- ***Exercise of Walking steps: 21% (with a 65% correlation)***
- ***Sleep score: 13% (with an 88% correlation)***
- ***Stress score: 11% (with a 49% correlation)***

Key Insights:

The analysis of the author's personal data, in the context of managing type 2 diabetes through lifestyle changes, highlights two primary influential factors on his A1C control. Firstly, his FPG value in the early morning, accounting for 25% of the total energy, not only indicates his insulin resistance status but also sets the baseline for his daily PPG levels. Secondly, his carbohydrate and sugar intake amount, contributing 30% of the total energy, significantly affects his PPG levels. Walking exercise, as a secondary factor, impacts both PPG and A1C levels, constituting 21% of the total influence. ***Notably, the diet-to-exercise ratio stands at 1.43 (30% to 21%).*** Lastly, his sleep scores and stress scores are tertiary factors, contributing 13% and 11% respectively to the overall energy impact on his HbA1C values (T2D status).

References

For editing purposes, majority of the references in this paper, which are self-references, have been removed for this article. Only references from other authors' published sources remain. The bibliography of the author's original self-references can be viewed at www.eclairemd.com.

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