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Research Article

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A Comparison Study of Measured and Predicted Body Weights and VMT Energy Analysis of These Two Body Weights Versus Four Identical Influential Factors, food portion, sleeping hours, bowel movement, and water drinking using space-domain viscoplastic medicine theory based on GH-Method: math-physical medicine (No. 1050)

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Abstract

The author improved his previous paper No.846 (written on May 15, 2023). He aimed to reevaluate his enhanced body weight prediction equation with an additional year of data and compare actual BW (BW) to predicted BW (Pred. BW). He retained those four influential factors: food portion size (Food P.), daytime water consumption (H2O), daily bowel movement volume (Bowel), and nighttime sleep hours (Sleep H.).

Below is his enhanced equation for predicted his body weight in the early morning:

Predicted BW in the early morning
= Yesterday's BW in early morning
+ Yesterday's food quantity (m9a)
+ Yesterday's H2O drinking (m6)
- Yesterday's bowel movement / 4
- Last night's sleeping hours / 6

This article evaluates the prediction accuracy of his predicted body weight results from a software product he developed, using data collected over nine years period (2015-2024). Furthermore, he reassessed the energies of these two body weights (actual BW and predicted BW) using the space-domain viscoplastic medicine theory method (SD-VMT).

For standardization, the author's food portion is set at 0.5 or 50% of the maximum portion, which is 100%. The daily water intake (H2O) is normalized at 0.8 or 80%, equating to 2,400 cc out of a total 3,000 cc. Bowel movement volume is normalized on a scale of 5, representing 100% (total emptiness). His target sleep duration is normalized to 7 hours per night.

***In summary,** this analysis yielded four main findings:*

Firstly, food portion shows a very high correlation (R) with both BW and predicted BW, ranging from 92% to 94%. Bowel movement has a low correlation (around -30%), while water drinking and sleep duration exhibit a high negative correlation, ranging from -66% to -79%. ***Using 90- days moving averaged data, BW and Pred. BW have a 98.5% correlation,***

Secondly, in terms of SD-VMT energies, ***both actual BW and predicted BW display identical energy ratios, which are as follows:***

Food portion = 35% (highest)
Sleep hours = 26% (second highest)
H2O drinking = 20% (lower)

Bowel movement = 19% (lowest)

This suggests that ***reducing food portions and ensuring quality and quantity of daily sleep are the primary strategies for weight loss.*** *Water loss and bowel movements are natural function of human body which cause some degree of daily fluctuations in body weight.*

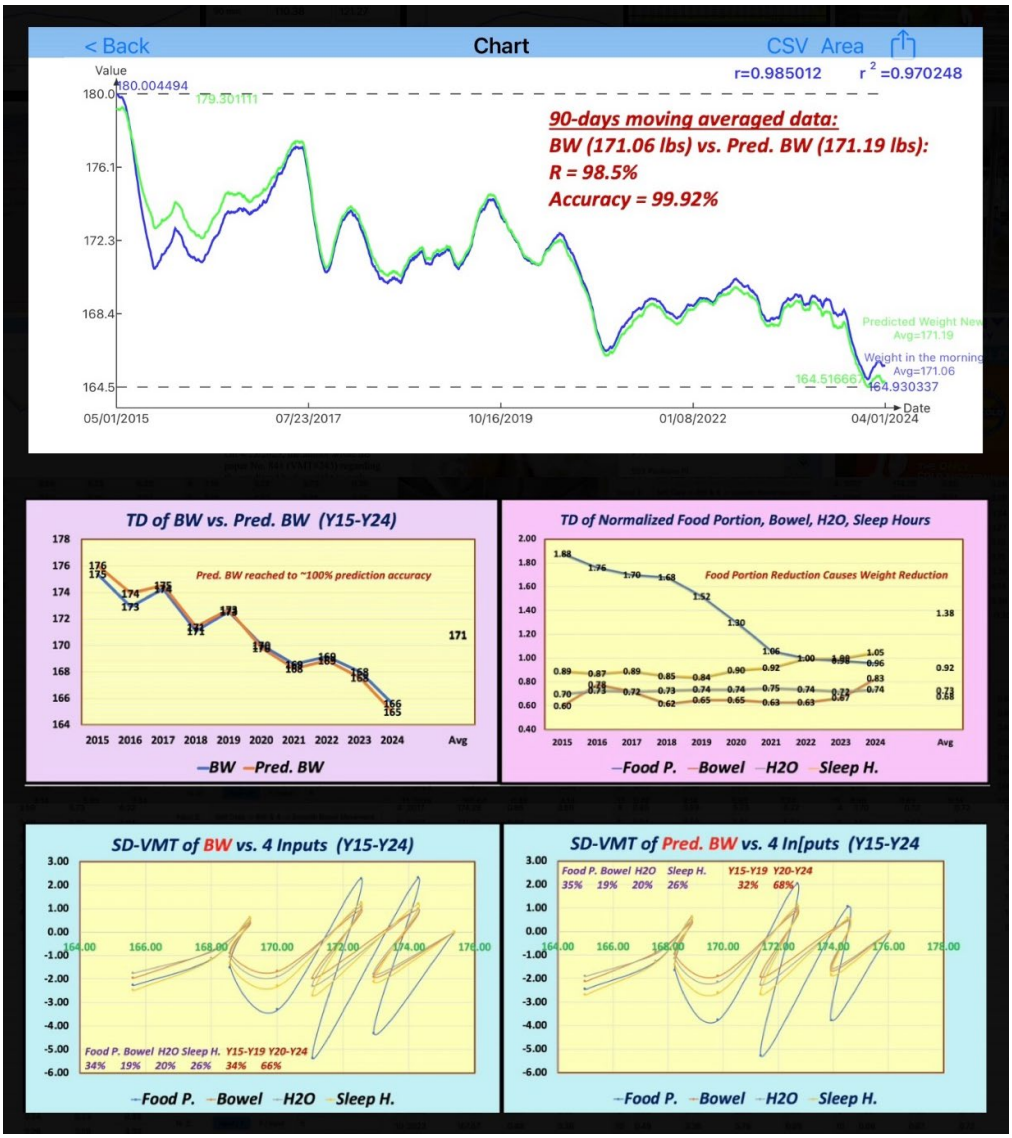
Thirdly, the time-zone energy distribution patterns reveal that the period from 2020 to 2024 accounts for 66%-68% of the total energy distribution, while the earlier period from 2015 to 2019 contributes only 32% to 34%.

Fourthly, ***over the nine years from May 1, 2015, to March 30, 2024, the measured body weight was 170.77 lbs, and the predicted body weight was 170.82 lbs. Aforementioned refined prediction equation for body weight boasts an exceptional accuracy rate of 99.97%. Using 90- days moving averaged data, BW and Pred. BW have a 99.92% prediction accuracy (171.06 lbs versus 171.19 lbs.)***

Key Message

For 69% of Americans, health improvement begins with weight management.

The author's refined body weight prediction formula boasts an accuracy rate of 99.92% to 99.97%. Food portion control is identified as the most critical factor influencing body weight, necessitating support through both the quantity and quality of sleep.



Viscoelastic Medicine theory (VMT #448):

A comparison study of measured and predicted body weights and VMT energy analysis of these two body weights versus four identical influential factors, food portion, sleeping hours, bowel movement, and water drinking using space-domain viscoplastic medicine theory based on GH-Method: math-physical medicine (No. 1050)

1. Introduction

The author improved his previous paper No.846 (written on May 15, 2023). He aimed to reevaluate his enhanced body weight prediction equation with an additional year of data and compare actual BW (BW) to predicted BW (Pred. BW). He retained those four influential factors: food portion size (Food P.), daytime water consumption (H2O), daily bowel movement volume (Bowel), and nighttime sleep hours (Sleep H.).

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For standardization, the author's food portion is set at 0.5 or 50% of the maximum portion, which is 100%. The daily water intake (H2O) is normalized at 0.8 or 80%, equating to 2,400 cc out of a total 3,000 cc. Bowel movement volume is normalized on a scale of 5, representing 100% (total emptiness). His target sleep duration is normalized to 7 hours per night.

2. Methods

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 the 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.

3. 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 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 developing 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 has no longer taken any diabetes-related medications since 12/8/2015.

In 2017, he achieved excellent results on all fronts, especially his glucose control. However, during 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 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 of over 40,000 hours and reading 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.

4. 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 circulate 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 example, the combination of hyperglycemia and hypertension would cause micro-blood vessel leakage in the kidney systems which is one of the major causes of CKD.

The author then applied Fast Fourier Transform (FFT) operations to convert 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. deforms; 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, 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 the 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, 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 a 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, and 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).

5. Results

Figure 1 shows data tables, TD and SD results.

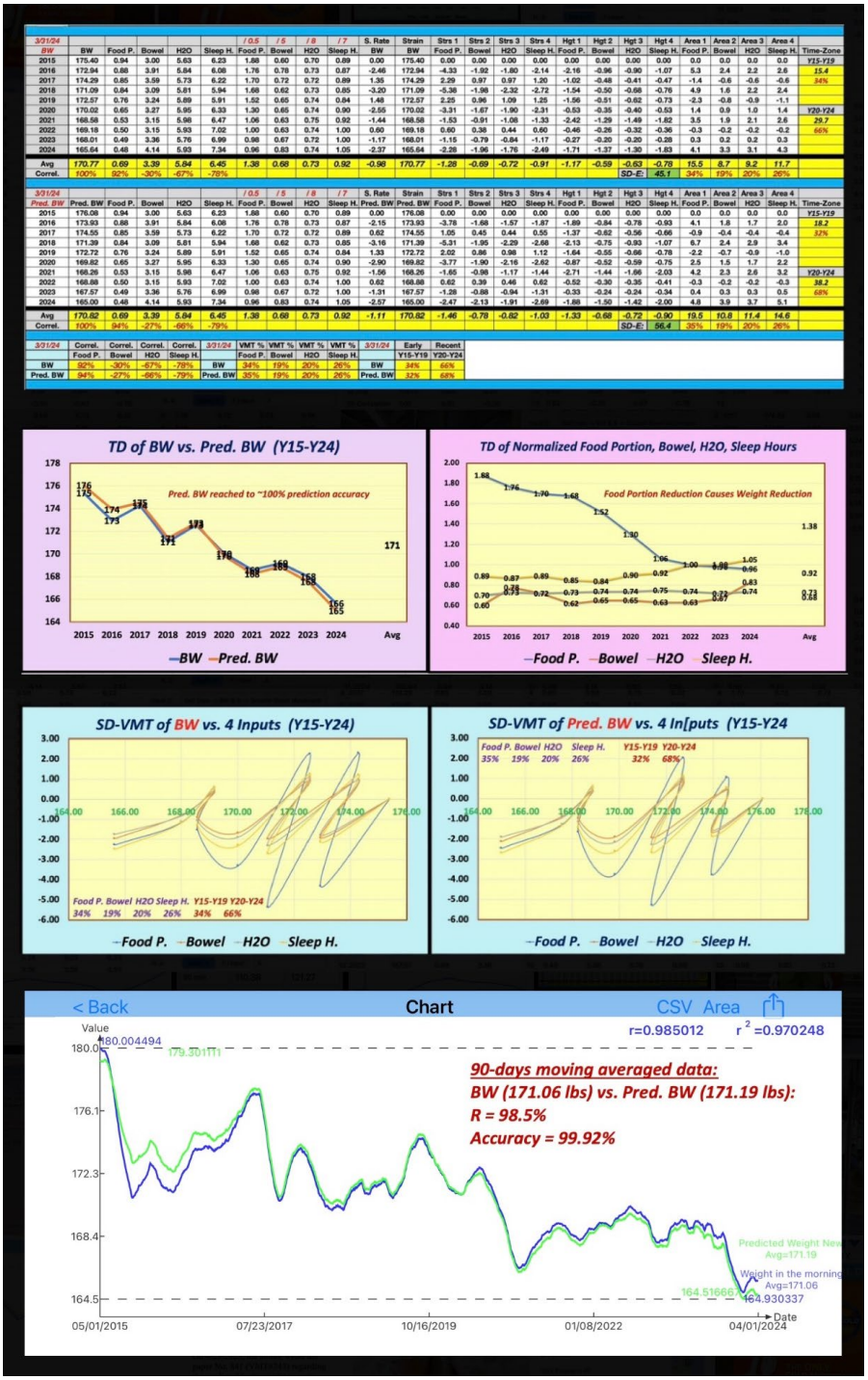

Figure 1: Data tables, TD and SD results

6. Conclusions

In summary, this analysis yielded four main findings:

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References

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

Readers may use this article as long as the work is properly cited, their use is educational and not for profit, and the author's original work is not altered.

For reading more of the author's published VGT or FD analysis results on medical applications, please locate them through three published special editions from the following three specific journals:

(1) Series of Endocrinology, Diabetes, and Metabolism (contact: Patrick Robinson).
(2) Journal of Applied Material Science & Engineering Research (contact: Catherine).
(3) Advances in Bioengineering and Biomedical Science Research (contact: Sony Hazi).