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Viscoelastic Medicine theory (VMT #410): The interplay of medical research productivity with environmental comforts, distractions and focus, depth of medicine understanding, and self-study of pathophysiology using viscoplastic energy model of GH-Method: math-physical medicine (No. 1012)

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Abstract

The writer began his journey in internal medicine through self-study in 2010 and started his research work in 2014. Under Dr. Jeffrey Guardino's suggestion from Stanford in 2016, he ventured into writing medical research papers, with his first publication presented at the WHO-IDF in Abu Dhabi on December 7, 2017. By 2023, he has authored over 1000 papers. Within the year 2023, he has authored 331 papers.

In December 2021, Professor Norman Jones, his advisor at MIT, recommended he use the viscoelastic or viscoplastic approach in his research to address the time-dependent aspects of medical phenomena. This led to him authoring 412 papers focused on applying space-domain viscoplastic medicine energy theory (SD-VMT), with only about 10 outside of medicine scope, e.g. economics and corporate management.

In 2022, he automated numerical operations by developing an SD-VMT app for his iPhone, reducing his manual calculation time from 6 hours to 2 seconds per paper. However, this productivity analysis excludes this "numerical automation" factor, as it was implemented in 2022.

He spends his time traveling to various residences throughout the year and attends a few selected medical conferences, mainly in Europe, USA, and Japan. His primary productivity factor is environmental comfort, particularly ambient temperature and humidity (Temp). Additionally, his focus level, determined by daily life distractions (Focus), plays another crucial role. His depth and breadth of medical research (Med), along with his growing understanding of biomedicine, also significantly influence his work. Starting in early 2023, he self-studied both pathology and physiology, a traditional MD student path, making the study and research based on pathophysiology (Read) his fourth influential factor.

Interestingly, he decided to apply the same SD-VMT energy approach to this “non-medical analysis” of his medical research productivity against the influence of these four influential factors.

In summary, his energy levels at five different locations and time spans are ranked in this order: Honolulu 2 (11/11-12/31); Honolulu 1 (1/1-4/10); Asia (5/11-8/14); US cities (8/15-11/10); Europe (4/11-5/10).

Factors influencing these rankings include:

In Honolulu, Hawaii, the ideal ambient temperature and humidity coupled with minimal social distractions enhanced his work productivity.

In Asia, despite the summer heat, he was able to concentrate better at his own residence.

Europe's cooler climate in the UK and Iceland was manageable, but he was constantly moving around and staying in different hotels.

Other western US cities offered pleasant weather environments but came with numerous daily life distractions affecting his research focus.

Notably, Honolulu 2 from November to December proved more fruitful than Honolulu 1 from January to April, owing to his improved grasp of both biomedicine knowledge and pathophysiology understanding.

Regarding the energy contribution ratios of four influential factors: Ambient Temperature & Humidity = 28.0%; Distractions & Focus = 25.2%;

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Pathophysiology Understanding = 24.7%; Biomedical Knowledge = 22.2%.

Key message:

The year 2023 marks the pinnacle of the writer's productivity in his medical publications, especially in the preventive medicine segment of internal medicine. Several identified contributing factors include a comfortable living environment and an intensive focus coming from minimal daily life distractions, accounting for 53% of his success. Additionally, a continuously enhanced understanding of many biomedicine subjects, enriched by his research using math-physics and engineering methods combined with his recent pathophysiology studies, contributed 47% to his medical research achievements in 2023.

Keywords: Viscoelastic; Viscoplastic; Diabetes; Glucose; Biomarkers; Insulin; Hyperglycemia;

Abbreviations: CGM: continuous glucose monitoring; T2D: type 2 diabetes; PPG: postprandial plasma glucose; FPG: fasting plasma glucose; SD: space-domain; VMT: viscoelastic medicine theory; FFT: Fast Fourier Transform

1. INTRODUCTION

The writer began his journey in internal medicine through self-study in 2010 and started his research work in 2014. Under Dr. Jeffrey Guardino's suggestion from Stanford in 2016, he ventured into writing medical research papers, with his first publication presented at the WHO-IDF in Abu Dhabi on December 7, 2017. By 2023, he has authored over 1000 papers. Within the year 2023, he has authored 331 papers.

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1.2 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.

The author's diabetes history:

The author has been 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 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 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 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 checked 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 lengths 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 glucose 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 example, the combination of hyperglycemia and hypertension would cause micro-blood vessel leakage in 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, 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 have 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, 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 a certain specific time instant)

He also calculates his strain rate using the following formula:

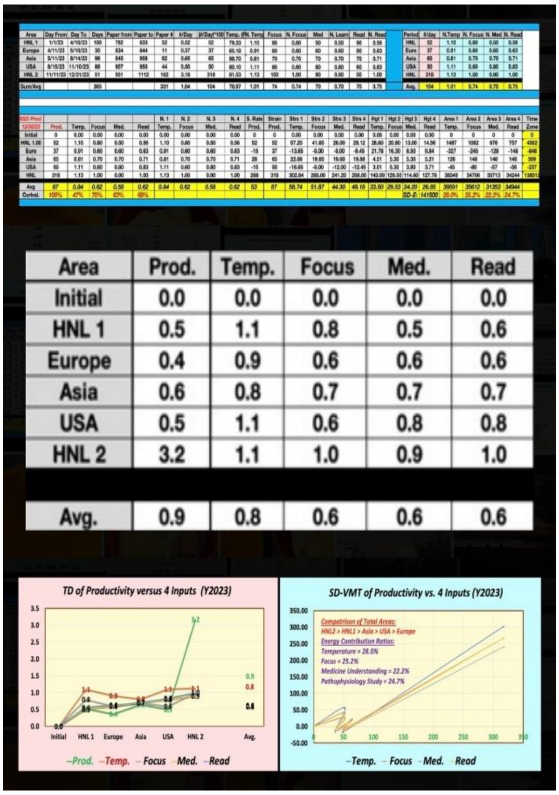
Strain rate = (body weight at next time instant) - (body weight at present time instant)

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 the 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).

2. RESULTS

Figure 1 shows data tables, inputs and SD-VMT energy output diagram.



Area	Prod.	Temp.	Focus	Med.	Read
Initial	0.0	0.0	0.0	0.0	0.0
HNL 1	0.5	1.1	0.8	0.5	0.6
Europe	0.4	0.9	0.6	0.6	0.6
Asia	0.6	0.8	0.7	0.7	0.7
USA	0.5	1.1	0.6	0.8	0.8
HNL 2	3.2	1.1	1.0	0.9	1.0
Avg.	0.9	0.8	0.6	0.6	0.6

Figure 1: Data tables, inputs and SD-VMT energy output diagram

3. CONCLUSION

In summary, his energy levels at five different locations and time spans are ranked in this order:

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Asia (5/11-8/14),
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4. REFERENCES

For editing purposes, the majority of the references in this paper, which are self-references, have been removed from 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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Viscoelastic and Viscoplastic Glucose Theory Application in Medicine

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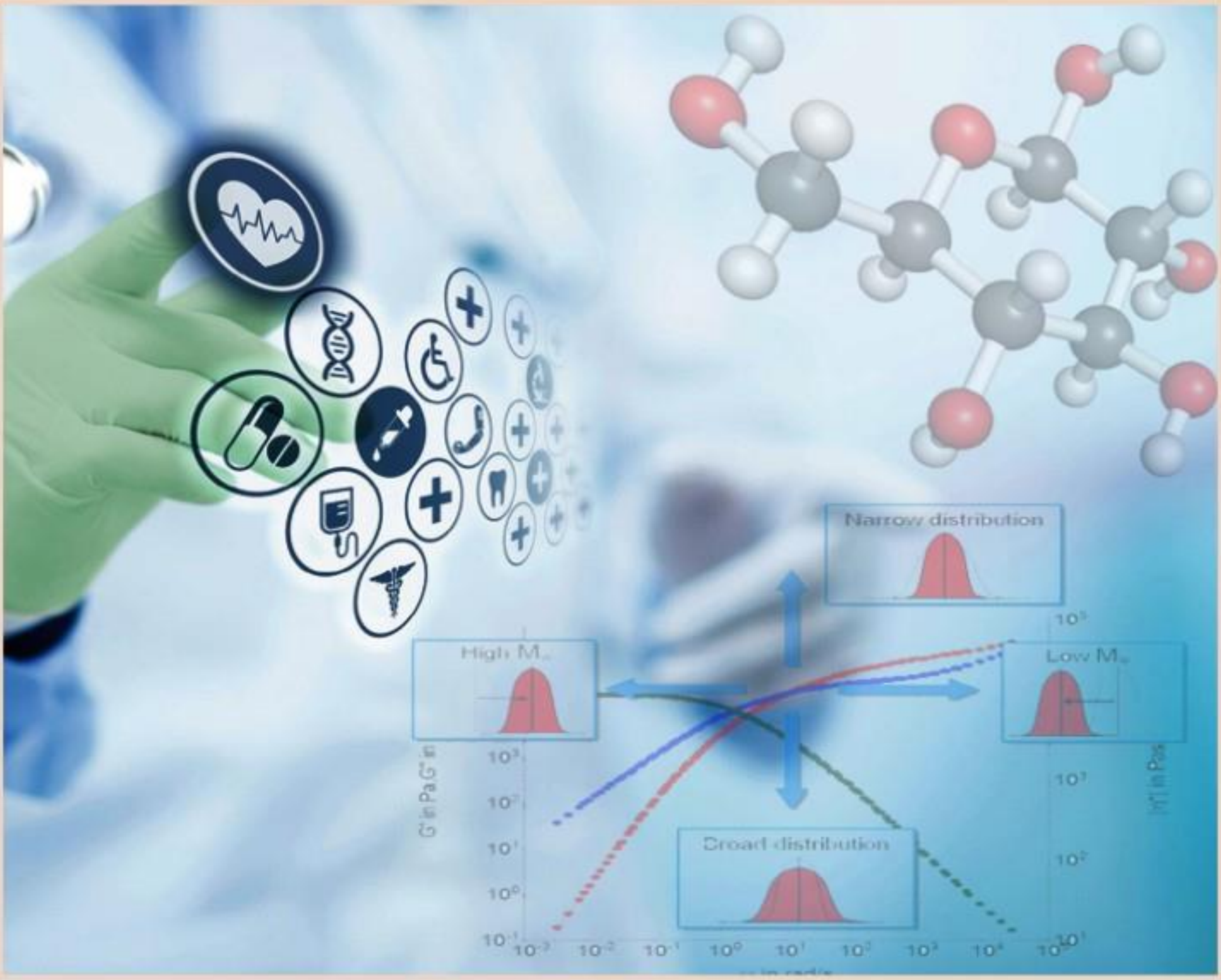

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