Special Issue 5
2022 https://www.theghmethod.com

The GH-Method

Viscoelastic Medicine theory (VMT #365): Relationships of Cardiovascular Disease Risks and Four Lifestyle Details, Food Portion, Food Quality, Walking Steps, Sleep Score Using Viscoplastic Energy Model of GH-Method: Math-Physical Medicine (No. 966)

Gerald C. Hsu*

eclaireMD Foundation, USA

Abstract

The majority of mortality diseases stem from metabolic disorders, such as obesity, diabetes, hypertension, and dyslipidemia. Metabolism is significantly influenced by lifestyle factors like diet, water intake, exercise, sleep, stress, and daily routines. Diet encompasses both portion control and food quality maintenance. Food quality and sleep scores are detailed in the attached figure. The author's primary exercise is walking, measured by his daily step count.

Over 12 years (2013-2023), the author's food portion decreased from 125% in 2013 to 49% in 2023 (with 100% defined as his "normal" food portion before 2010). His food quality score has been reduced from 90% in 2013 to 50% in 2023, and his sleep score has also been reduced from 96% in 2013 to 47% in 2023. However, his walking steps increased from 7.5k (116%) in 2013 to 18.5k (60%) in 2018 and then decreased back to 12.7k (86%) in 2023 due to ageing caused discomfort.

This particular study explores his annual cardiovascular disease (CVD) and stroke risks associated with these four lifestyle changes.

In summary, traditional statistical analysis reveals very strong correlations (85% to 98%) between the author's CVD risk and lifestyle details: - CVD vs. Food portion: 86%; - CVD vs. Food quality: 98%; - CVD vs. Steps: 85%; - CVD vs. Sleep: 94%.

Additionally, the author employs the space-domain viscoplastic energy (SD-VMT) method, uncovering the following energy associations: - Energy from Food P: 31%; - Energy from Food Q: 22%; - Energy from Steps: 25%; - Energy from Sleep: 22%

Both food portions (31%) and exercise (25%) emerge as the two strongest influential factors in his risks of having CVD or stroke.

Key Message:

The author's lifestyle details are linked to his CVD risks. The food portion contributes the most energy (31%), followed by 25% from walking steps, with food quality and sleep contributing 22% each. These findings align with health observations from 1994 to 2023, including five cardio episodes between 1994 and 2005.

Keywords: Viscoelastic; Viscoplastic; Diabetes; Glucose; Sleep; Cardiovascular Disease

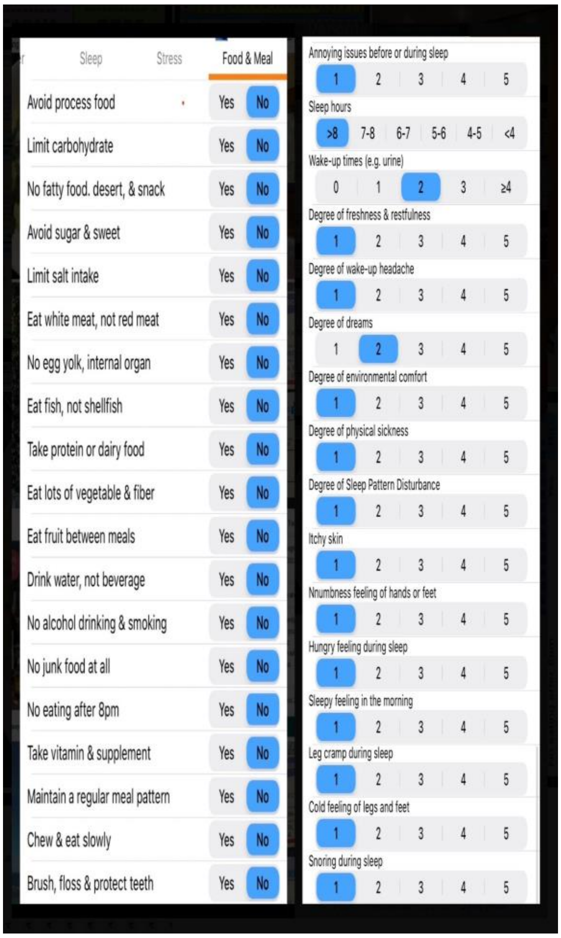
Abbreviations: CGM: continuous glucose monitoring; T2D: type 2 diabetes; PPG: postprandial plasma glucose; FPG: fasting plasma glucose; SD: space-domain; VMT: viscoelastic medicine theory; FFT: Fast Fourier Transform

1. INTRODUCTION

The majority of mortality diseases stem from metabolic disorders, such as obesity, diabetes, hypertension, and dyslipidemia. Metabolism is significantly influenced by lifestyle factors like diet, water intake, exercise, sleep, stress, and daily routines. Diet encompasses both portion control and food quality maintenance. Food quality and sleep scores are detailed in the attached figure. The author's primary exercise is walking, measured by his daily step count.

Available online: 19 March 2024

*Corresponding author: Gerald C. Hsu, eclaireMD Foundation, USA



Over 12 years (2013-2023), the author's food portion decreased from 125% in 2013 to 49% in 2023 (100% is defined as his "normal" food portion before 2010). His food quality score has been reduced from 90% in 2013 to 50% in 2023, and his sleep score has also been reduced from 96% in 2013 to 47% in 2023. However, his walking steps decreased from 7.5k (116%) in 2013 to 18.5k (60%) in 2018 and then increased back to 12.7k (86%) in 2023 due to aging-caused discomfort.

This particular study explores his annual cardiovascular disease (CVD) and stroke risks associated with these four lifestyle changes.

1.1 Biomedical information:

The following sections contain excerpts and concise information drawn from multiple medical articles, 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, to optimize 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.

Pathophysiological explanations of relationships between CVD or Stroke versus food portion, diet quality, exercise, and sleep:

The pathophysiological explanations reveal significant relationships between cardiovascular disease (CVD) and stroke and lifestyle factors such as food portions, diet quality, exercise, and sleep.

1. **Food Portion:** Excessive food portion sizes contribute to obesity and increased caloric intake, leading to metabolic imbalances and potential cardiovascular strain.

2. **Diet Quality:** Poor diet quality, characterized by high levels of processed foods and low nutritional value, can contribute to inflammation and arterial damage.

3. **Exercise:** Regular exercise supports cardiovascular health by improving blood circulation, managing weight, and reducing the risk of metabolic disorders.

4. **Sleep:** Inadequate or poor-quality sleep can disrupt hormonal balance, increase inflammation, and negatively impact cardiovascular function.

These pathophysiological explanations align with the author's statistical findings, emphasizing the intricate interplay between these four lifestyle factors and cardiovascular health. It underscores the importance of addressing food portion control, promoting a high-quality diet, incorporating regular exercise, and ensuring sufficient and restorative sleep to mitigate the risks of CVD and stroke.

Which foods contain antioxidants and anti-inflammatory compounds?

Foods rich in antioxidants and anti-inflammatory compounds can help combat oxidative stress and inflammation. Here are some examples:

1. **Fruits: **

- Berries (blueberries, strawberries, raspberries)

- Citrus fruits (oranges, grapefruits)

- Cherries
- Apples
- Grapes

2. **Vegetables: **
   - Leafy greens (spinach, kale, Swiss chard)
   - Broccoli
   - Brussels sprouts
   - Bell peppers
   - Tomatoes

3. **Nuts and Seeds: **
   - Almonds
   - Walnuts
   - Chia seeds
   - Flaxseeds

4. **Herbs and Spices: **
   - Turmeric
   - Ginger
   - Garlic
   - Cinnamon
   - Rosemary

5. **Fatty Fish: **
   - Salmon
   - Mackerel
   - Sardines
   - Trout

6. **Green Tea: **
   - Contains polyphenols with antioxidant and anti-inflammatory properties.

7. **Dark Chocolate: **
   - In moderation, dark chocolate with a high cocoa content provides antioxidants.

8. **Olive Oil: **
   - Extra virgin olive oil contains polyphenols and has anti-inflammatory effects.

9. **Whole Grains: **
   - Quinoa
   - Brown rice
   - Oats

10. **Legumes: **
    - Lentils
    - Chickpeas
    - Black beans

Incorporating a variety of these foods into your diet can contribute to a well-rounded intake of antioxidants and anti-inflammatory compounds. It's essential to focus on a balanced and diverse diet to provide your body with a range of nutrients.

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 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 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 travelled 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-travelling, 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 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 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 glucose 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 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) influence 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, 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 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 the data table, Time-domain curves and SD-VMT energies.

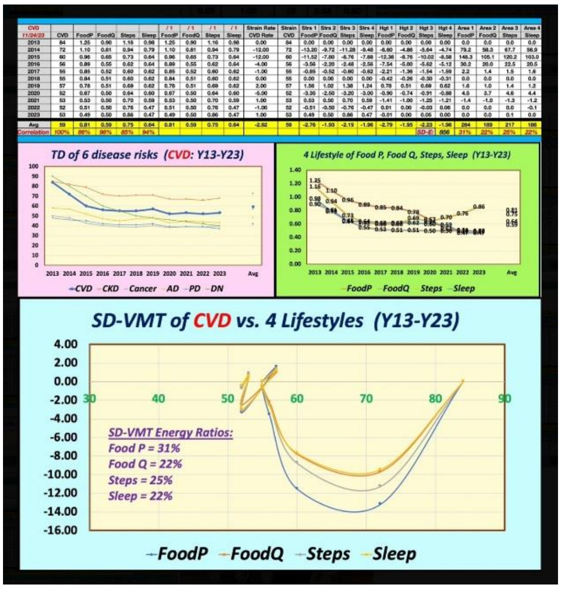


Figure 1: Data table, Time-domain curves and SD-VMT energies.

3. CONCLUSION

In summary, traditional statistical analysis reveals very strong correlations (85% to 98%) between the author's CVD risk and lifestyle details: - CVD vs. Food portion: 86%; - CVD vs. Food quality: 98%; - CVD vs. Steps: 85%; - CVD vs. Sleep: 94%.

Additionally, the author employs the space-domain viscoplastic energy (SD-VMT) method, uncovering following energy associations: - Energy from Food P: 31%; - Energy from Food Q: 22%; - Energy from Steps: 25%; - Energy from Sleep: 22%

Both food portions (31%) and exercise (25%) emerge as the two strongest influential factors in his risk of having CVD or stroke.

Key Message:

The author's lifestyle details are linked to his CVD risks. The food portion contributes the most energy (31%), followed by 25% from walking steps, with food quality and sleep contributing 22% each. These findings align with health observations from 1994 to 2023, including five cardio episodes between 1994 and 2005.

4. 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.

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

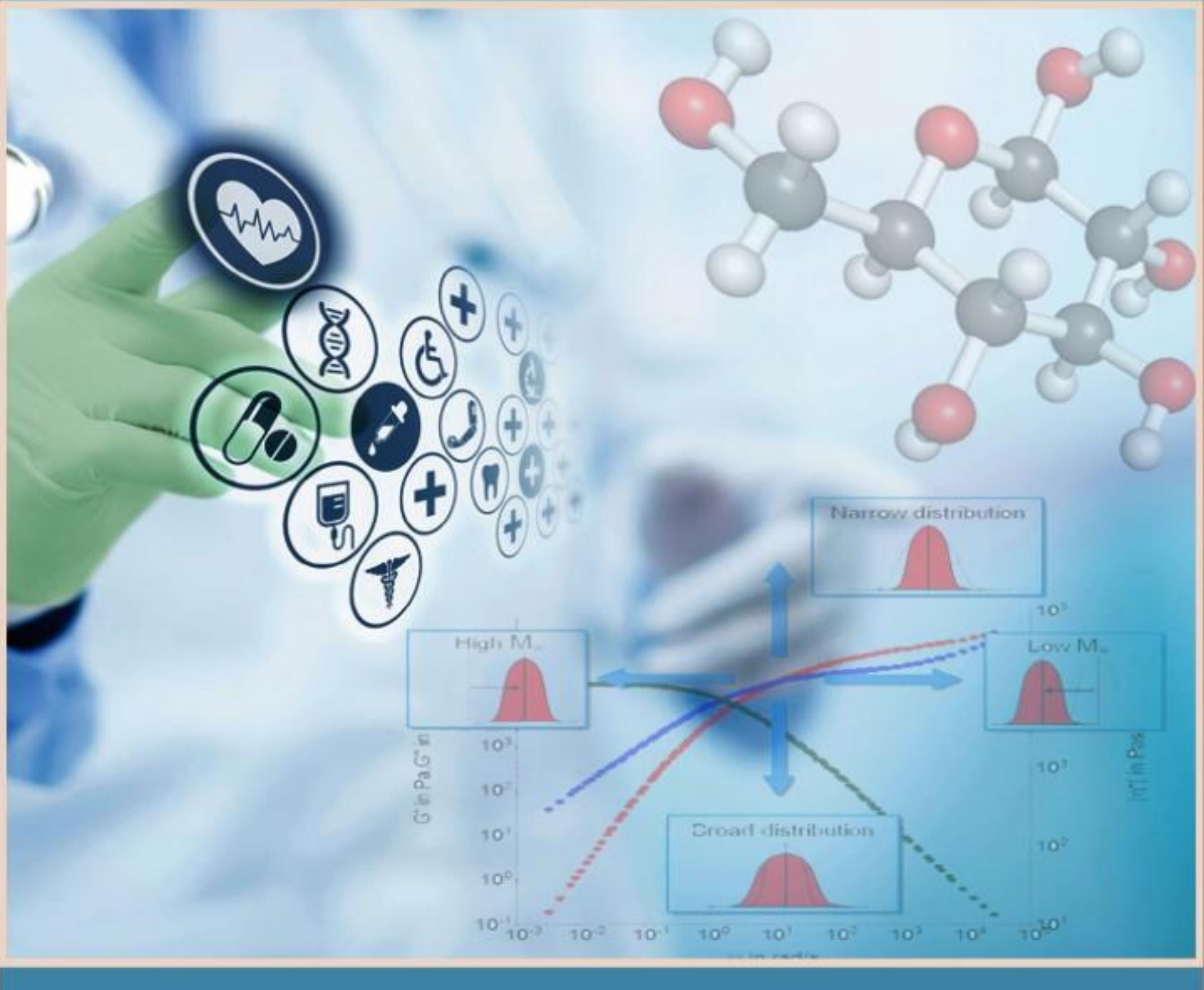
For reading more of the author’s published VGT or FD analysis results on medical applications, please locate them through platforms for scientific research publications, such as ResearchGate, Google Scholar, etc.

Special Issue | Issue No. 5

The GH-Method

Viscoelastic and Viscoplastic Glucose Theory Application in Medicine

Gerald C. Hsu



https://theghmethod.com

2022