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The GH-Method

Viscoelastic Medicine theory (VMT #408): Relationships Between Longevity via Age Difference and Five Influential Factors, Obesity, Diabetes, Combined Hypertension and Dyslipidemia, Diet, Exercise, Using Viscoplastic Energy Model of GH-Method: Math-Physical Medicine (No. 1010)

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Abstract

The author, a non-smoker who abstains from alcohol and illicit drugs, and has minimal exposure to environmental hazards, recognizes an inability to alter his physical age, genetic conditions, or family history. Therefore, he decided to focus on five controllable factors, namely body weight (m1), glucose (m2), blood pressure and blood lipids (m3 & m4), diet quality and quantity (m9), and physical activity (m5). He has been gathering personal health data since 2012, utilizing this information to analyze various concerns about his health and diseases.

In his previous paper number 1009, the author conducted a study on his overall cancer risk using those five aforementioned influential factors. In this paper, he used the same space-domain viscoplastic medicine energy method (SD-VMT) to investigate his longevity perspective which is based on the "age difference" between his biological age and his health age. This was done in relation to the same five inputs over the same time period from 2012 to 2023.

His estimated "health age" is calculated using the following formula: Health Age = Real Biological Age * (1 + ((MI - 0.735)/0.735)/2)

Here, "MI" refers to the daily "metabolism index" value, which combines four metabolic disorders and six lifestyle details, consisting of over 500 detailed elements.

In summary, the correlations between his age difference and five inputs are very high, within the range of 81% and 96%.

His total SD-VMT energy is 441 with the following five energy contribution ratios: Obesity (m1) = 23%; Diabetes (m2) = 24%; BP and Lipid (m3 & m4) = 19%; Diet (m9) = 17%; Exercise (m5) = 18%

The time-zone energy distributions are:

Y12-Y17 = 97%; Y18-Y23 = 3%.

Key message:
The author was diagnosed with severe Type 2 Diabetes in 1995 and faced escalating health issues by 2010, with a high HbA1C at 11%, five cardio episodes, and kidney problems. At that time, he weighed 220 lbs (BMI 32) and struggled with hypertension and dyslipidemia for over ten years due to poor diet choices and physical inactivity. In 2010, the life-threatening situation prompted him to drastically overhaul his lifestyle to safeguard his health. From 2012 to 2017, 97% of his total energy of longevity versus five inputs was unhealthy, but from 2018 to 2023, it was merely 2%, indicating a very healthy lifestyle.

The author's longevity perspective was primarily influenced by his diabetes (24%) and obesity (23%), followed by blood pressures and cholesterol levels, diet, and exercise with notable impacts between 17% and 19%. To effectively reduce and maintain a healthy level of both body weight and glucose, he had to continuously focus on improving his diet and increasing physical activity.

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; BMI: Body Mass Index; CKD: Chronic Kidney Disease

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1. INTRODUCTION

The author, a non-smoker who abstains from alcohol and illicit drugs, and has minimal exposure to environmental hazards, recognizes an inability to alter his physical age, genetics conditions, or family history. Therefore, he decided to focus on five controllable factors, namely body weight (m1), glucose (m2), blood pressure and blood lipids (m3 & m4), diet quality and quantity (m9), and physical activity (m5). He has been gathering personal health data since 2012, utilizing this information to analyze various concerns of his health and diseases.

In his previous paper number 1009, the author conducted a study on his overall cancer risk using those five aforementioned influential factors. In this paper, he used the same space-domain viscoplastic medicine energy method (SD-VMT) to investigate his longevity perspective which is based on the "age difference" between his biological age and his health age. This was done in relation to the same five inputs over the same time period from 2012 to 2023.

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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, 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.

Pathophysiological explanations and statistical data of longevity versus body weight:

The pathophysiological explanations for longevity versus body weight often involve the impact of obesity on various physiological systems. Excess body weight is associated with increased levels of inflammation, oxidative stress, and dysregulation of metabolic pathways, which can lead to chronic diseases such as cardiovascular disease, chronic kidney diseases, type 2 diabetes, and certain types of cancer. These chronic conditions are linked to a reduced lifespan.

From a statistical perspective, numerous studies have demonstrated a clear association between body weight and longevity. Research shows that higher body weight, particularly in the obese range (BMI greater than 30), is consistently associated with a higher risk of premature mortality. Conversely, maintaining a healthy body weight within the recommended range (BMI lower than 25) is associated with a longer lifespan and a reduced risk of chronic diseases.

Additionally, statistical data from population-based studies, longitudinal cohort studies, and meta-analyses have consistently shown a dose-response relationship between body weight and mortality, with each incremental increase in body weight above the healthy range correlating with a higher risk of premature death. These statistical findings highlight the importance of weight management in promoting longevity and overall health.

Pathophysiological explanations and statistical data of longevity versus diabetes:

Pathophysiological explanations for longevity versus diabetes often revolve around the impact of diabetes on various physiological processes. Diabetes, particularly type 2 diabetes, is associated with a range of pathophysiological mechanisms that can contribute to a reduced lifespan. These mechanisms include chronic inflammation, oxidative stress, endothelial dysfunction, and dysregulation of glucose metabolism, which can lead to complications such as cardiovascular disease, kidney disease, neuropathy, retinopathy, dementia, and even certain types of cancer.

Statistically, there is substantial evidence linking diabetes to reduced longevity. People with diabetes, especially those with poorly

controlled blood sugar levels (both hyperglycemia and hypoglycemia), have been shown to have a higher risk of premature mortality compared to those without diabetes. Numerous epidemiological studies and meta-analyses have demonstrated a clear association between diabetes and increased mortality, as well as a higher risk of developing cardiovascular complications and other comorbidities that can shorten lifespan.

Furthermore, the statistical data from large population-based studies consistently indicate that improved diabetes management, including glycemic control and other risk factor modifications, such as body weight reduction, can lead to a significant improvement in life expectancy. These findings underscore the importance of early detection, effective management, and lifestyle interventions in promoting longevity for individuals with diabetes.

Pathophysiological explanations and statistical data of longevity versus hypertension and dyslipidemia:

Pathophysiological explanations for longevity versus hypertension and dyslipidemia involve the impact of these conditions on cardiovascular health and overall physiology.

Hypertension, or high blood pressure, is a major risk factor for cardiovascular disease and is associated with pathophysiological changes in the vascular system. Prolonged hypertension can lead to arterial stiffness, endothelial dysfunction, and remodelling of the heart, all of which increase the risk of heart disease, stroke, and other cardiovascular complications. These pathophysiological changes can significantly impact longevity.

Dyslipidemia, characterized by abnormal levels of cholesterol and other lipids in the blood, also plays a crucial role in cardiovascular health. Elevated levels of LDL cholesterol, triglycerides, and reduced levels of HDL cholesterol are associated with atherosclerosis, which can lead to coronary artery disease, peripheral vascular disease, and other cardiovascular disorders. These pathophysiological effects can contribute to a decrease in longevity.

Statistically, there is extensive evidence linking hypertension and dyslipidemia to reduced longevity. Numerous population-based studies and clinical trials have shown that individuals with untreated or uncontrolled hypertension and dyslipidemia have a higher risk of cardiovascular events, mortality, and reduced life expectancy compared to those with normal blood pressure and lipid levels.

Furthermore, the statistical data from large cohort studies and meta-analyses consistently demonstrate that effective management of hypertension and dyslipidemia through lifestyle modifications and pharmacological interventions can lead to a significant improvement in longevity. Controlling blood pressure and lipid levels is associated with a lower risk of cardiovascular events and improved overall survival, emphasizing the importance of managing these conditions to promote longevity and reduce the risk of premature mortality.

Pathophysiological explanations and statistical data of longevity versus poor diet and physical inactivity:

Pathophysiological explanations for longevity versus poor diet and physical inactivity are rooted in the impact of these lifestyle factors on overall health, including cardiovascular and metabolic health.

Poor diet, characterized by excessive intake of processed foods high in refined sugars, unhealthy fats, and low nutritional value, can lead to obesity, insulin resistance, inflammation, and dyslipidemia. These pathophysiological effects contribute to a higher risk of developing chronic diseases such as type 2 diabetes, cardiovascular disease, and certain types of cancer, all of which can significantly reduce longevity.

Physical inactivity also has various pathophysiological ramifications. Lack of regular physical activity is associated with decreased cardiovascular fitness, muscle wasting, impaired glucose metabolism, and reduced insulin sensitivity. These physiological changes are linked to an increased risk of obesity, type 2 diabetes, hypertension, and dyslipidemia, all of which can contribute to a decline in overall health and longevity.

From a statistical standpoint, numerous epidemiological studies and meta-analyses have consistently demonstrated the association between poor diet, physical inactivity, and reduced longevity. Research

indicates that individuals with diets high in processed foods, unhealthy fats, and added sugars, as well as those with a sedentary lifestyle, are at a higher risk of premature mortality and have a greater likelihood of developing chronic diseases that can shorten their lifespan.

Conversely, statistical data from intervention studies and longitudinal cohort studies highlight the impact of improving dietary habits (both food quantity reduction and meal quality improvements) and increasing physical activity on promoting longevity. Implementing a healthy diet and engaging in regular physical activity is associated with a reduced risk of chronic diseases, improved cardiovascular and metabolic health, and a longer life expectancy. These findings underscore the significant role of diet and physical activity in influencing longevity and overall well-being.

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 had 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 takes 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 travelling 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 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 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., 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 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 table, inputs and SD-VMT energy output diagram.

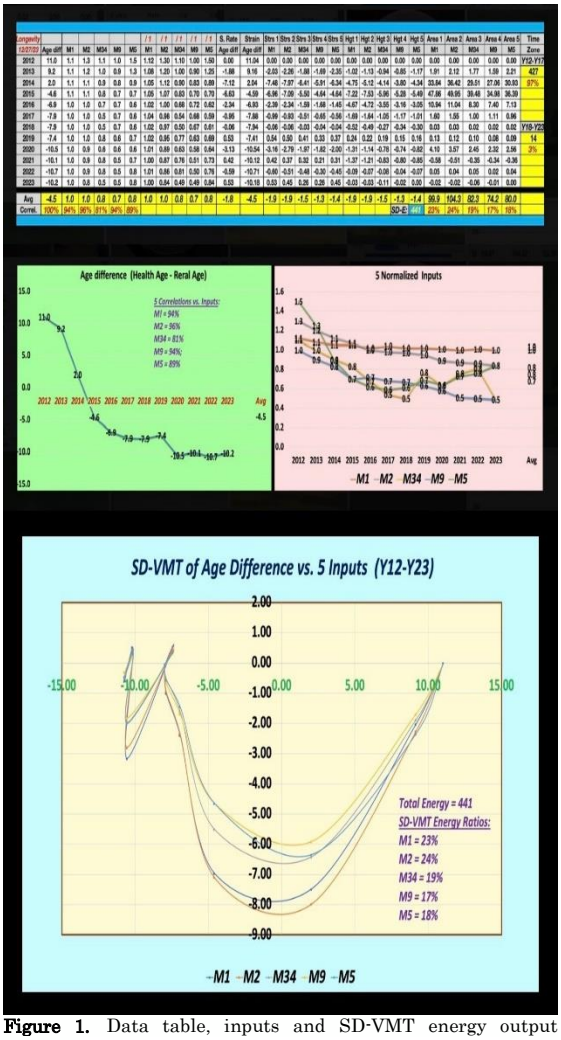

Figure 1. Data table, inputs and SD-VMT energy output diagram.

3. CONCLUSION

In summary, the correlations between his age difference and five inputs are very high, within the range of 81% and 96%.

His total SD-VMT energy is 441 with the following five energy contribution ratios:

- Obesity (m1) = 23%;

- Diabetes (m2) = 24%;

- BP and Lipid (m3 & m4) = 19%

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The time-zone energy distributions are:

- Y12-Y17 = 97%

- Y18-Y23 = 3%.

Key message:

The author was diagnosed with severe Type 2 Diabetes in 1995 and faced escalating health issues by 2010, with a high HbA1C at 11%, five cardio episodes, and kidney problems. At that time, he weighed 220 lbs (BMI 32) and struggled with hypertension and dyslipidemia for over ten years due to poor diet choices and physical inactivity. In 2010, the life-threatening situation prompted him to drastically overhaul his lifestyle to safeguard his health. From 2012 to 2017, 97% of his total energy of longevity versus five inputs was unhealthy, but from 2018 to 2023, it was merely 2%, indicating a very healthy lifestyle.

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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.

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 platforms for scientific research publications, such as ResearchGate, Google Scholar, etc.

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Viscoelastic and Viscoplastic Glucose Theory Application in Medicine

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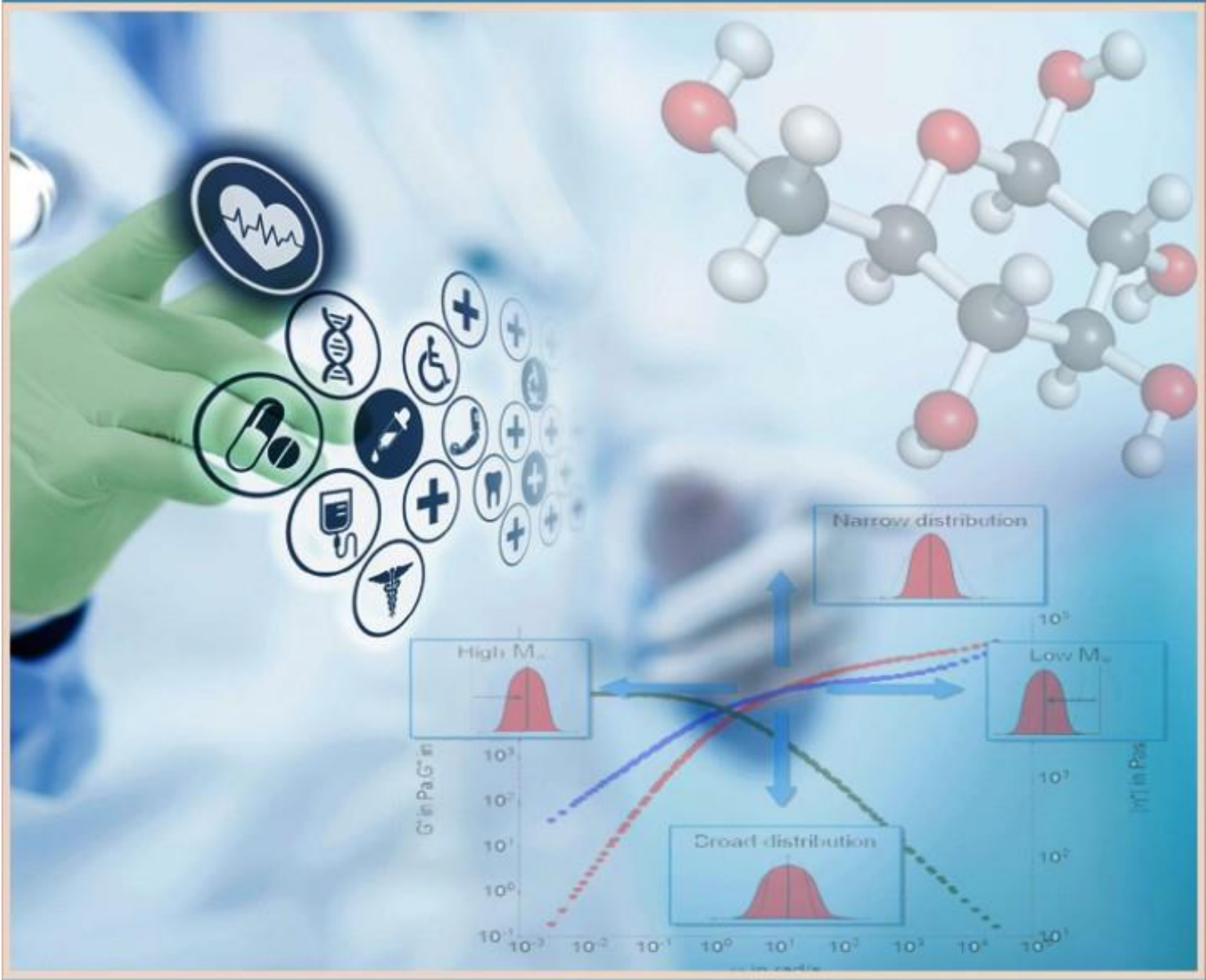

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