



RESEARCH ARTICLE

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## An Article for the General Public and Patients with Chronic Diseases Based on 11-years of Medical Research using Developed GH-Method: Math-Physical Medicine (No. 419)

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### ABSTRACT

Recently, the author received inquiries from patients, who have various chronic diseases, and their family members regarding general health, lifestyle management, metabolism, and certain chronic diseases and their complications.

Under life threatening events from heart attacks and possible kidney failure, the author initiated a journey of self-studying and researching endocrinology, with emphasis on diabetes, and food nutrition since 2010. Over the past 11 years, he has spent nearly 30,000 hours on this task and has written or published 400+ medical papers, including ~50 papers addressing his developed medical research methodology of GH-Method: math-physical medicine.

However, all of the published papers were written aimed at medical professionals, particularly medical research scientists. Therefore, he decided to write a different type of article which uses layman's terms or simpler language. By using as little as possible both scientific jargon or medical terminologies, he still includes fairly-accurate biomedical information and high-precision of results from his quantitative medical analysis work.

In summary, this article is written for the general public and patients with various chronic diseases covering topics of general health, lifestyle management, metabolism improvement, chronic disease control, complications risk reduction, and longevity. This starts with the subject of "death" and ends with the subject of "longevity" since "death and longevity" is the ultimate concern along with being content during the living years.

The author has made his best effort to describe all of the above-mentioned subjects without using scientific jargons or medical terminologies. Hopefully, it can serve the purposes of both ease-of-reading and useful information providing.

In 2010, three physicians warned him that he would die approximately in 2013-2015, but now in 2021, he is still alive and performing medical research. He is a living proof of this route of "health and longevity via lifestyle and metabolism".

### Introduction

Recently, the author received inquiries from patients, who have various chronic diseases, and their family members regarding general health, lifestyle management, metabolism, and certain chronic diseases and their complications.

Under life threatening events from heart attacks and possible kidney failure, the author initiated a journey of self-studying and researching endocrinology, with emphasis on diabetes, and food nutrition since 2010. Over the past 11 years, he has spent nearly 30,000 hours on this task and has written or published 400+ medical papers, including ~50 papers addressing his developed medical research methodology of GH-Method: math-physical medicine.

However, all of the published papers were written aimed at medical professionals, particularly medical research scientists. Therefore, he decided to write a different type of article which uses layman's terms or simpler language. By using as little as possible both scientific jargon or medical terminologies, he still includes fairly-accurate biomedical information and high-precision of results from his quantitative medical analysis work.

### Methods and Results

#### Death and Diseases

In 2019, the total death cases in the US was 2.8 million. Among them, there were 1.4 million (50%) deaths that resulted from various chronic diseases and their complications, including diabetes, heart, stroke, kidney, and Alzheimer's; 0.8 million

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(28%) from various cancers; 0.3 million (10%) from various infectious diseases, including respiratory and pneumonia; 0.4 million (12%) from injuries, accidents, and suicides. These distribution percentages were for year of 2019. Of course, due to the COVID-19 pandemic, the US map of death causes of 2020 will be significantly different from previous years with higher case numbers and percentage associated with infectious diseases. The death percentage resulted from infectious diseases, including COVID-19, could be as high as 20% to 25% in 2020 in comparison with 10% in 2019.

Actually, almost half of the cancer cases are metabolically induced (around 45% of the total number of cancers). Combining both chronic diseases and cancer, there were 2.2 million deaths (78%) directly related to metabolism. Although infectious diseases are solely depending on the immune system as their major defense force, metabolism and immunity are two sides of the same coin which are closely related to lifestyle.

In summary, the macro-view of death and diseases is that there are 2.5 million deaths (88%) in 2019 related to both metabolism and immunity which are closely related to people's lifestyle.

In general, the development into chronic disease situations, such as obesity, diabetes, hypertension, and hyperlipidemia, takes a long period of time to develop and be detected. That is why we choose the word "chronic" and, at the same time, it also takes a long duration and huge effort to fight against them. Strictly speaking, both cancers and dementia diseases belong to the category of chronic diseases as well. Some medical people call them together as "noncommunicable diseases (NCD)". Most chronic diseases are connected to various internal organs which can be treated via medications, injections, or surgeries (treatment is the actions to reduce or control the external signals or symptoms), but they cannot be "cured" the chronic diseases. The only realistic hope is to go to the root-cause and address their fundamental issues in order to either "repair" or "heal" the damaged organs; however, to a large degree, the root-cause issues usually originate from and are tightly connected to lifestyle details.

### Health and Lifestyle Details

The analogy of our health is a table with four legs. The tabletop carries the heavy weight of our health while it is further supported by four strong legs i.e., diet (food and water), exercise, sleep, and stress. If we miss one of the four table legs, the table can still stand up with three legs, but the table will be less stable than a 4-legged table. If the table only has two legs, we can imagine the outcome of its stability. If we want to extend this table's useful life in order to turn it into an antique table, we must do a good quality of "maintenance" job by having a regular daily-life routines and also being persistent with them which is the key element of "longevity".

Food is the most important and also the most complicated category of lifestyle. Not only does it involve nutritional quality, e.g., sugar and carbohydrates to diabetes, fat to cholesterol, salt to blood pressure, but the meal's quantity is as important as well. Furthermore, alcohol intake also belongs to this category. We should drink sufficient clean water every day, between 2000 to 3000 cc per day. By the way, bad habits, such

as smoking, alcohol drinking, and illicit drug using, are certainly damage our health.

Relatively speaking, exercise is an easier category to be dealt with. Of course, a variety exercise programs are available which have different degrees of impact on the body. However, from the viewpoint of chronic disease control, walking is one of the best types of exercise. First, walking impacts most parts of the body and its internal organs. It burns calories and also reduces glucose levels. Particularly, one hour of post-meal walking between the timespan from 1-hour after the first bite of meal to 2-hours after eating, with normal speed of walking, it can reduce the post-meal glucose by around 30 mg/dL to 36 mg/dL of glucose level. For a normal person, every 1,000 steps of post-meal waking would reduce post-meal glucose level by 5 to 6 mg/dL. On the other side of the equation, every gram of carbs/sugar intake via food and meal would generate around 2 mg/dL to 4 mg.dL of post-meal glucose level.

Please remember that food and meal bring energy into the body while exercise and activity burn off energy generated by food. The goal is to avoid having excessive "left-over" energy being stored in the body.

Sleep is especially important for body health and for the internal organ's self-repair and recovery. Not only do adults need a minimum of 7 hours of sleep, the quality of sleep, including wakeup times per night, is equally significant. Try not to bring your frustrations, worries, or stresses at daytime into you sleeping hours.

Stress is the major source of many psychological diseases but also for physiological diseases as well. The mind and body are truly inter-connected with each other. We should study and examine possible stressors in our life and understand their relationships with outcomes of multiple diseases, including both psychological and physiological diseases; therefore, it is vital to try and remove stressors, reduce stress levels or learn how to cope with them. Meditation is a good practice to help us calm down.

Since we cannot choose our parents, therefore, from DNA viewpoint, the genetic influences for certain diseases are inevitable. However, fortunately, for most known diseases, there are around 15% to 25% genetic influences. For example, we can still decide for ourselves not to smoke cigarettes, drink alcohol, or use illicit drugs even if our parents did so. In summary, all of the chronic diseases, including some kinds of cancer and dementia, are controlled by us with almost 80% of controlling power (including some of environmental factors) in our own hands. Of course, cancer are known to connected with environmental factors, such as pollution, radiation, etc. We become who we are and based on our own lifestyles, at least up to 70% to 80%, so we should not blame our chronic diseases to our parents.

If we can avoid developing chronic diseases, such as obesity, diabetes, hypertension, and hyperlipidemia, then our risk probability of further developing into many severe complications, such as heart attacks, strokes, kidney failure, retina problems, and peripheral nervous problems, would be greatly reduced; therefore, we can avoid a painful death process at an earlier age.

## Obesity and Food Portion

At present, nearly 2/3 of American adults are either overweight (BMI: 25-30) or obese (30-40).

In 1960, the average height of an American woman was 5'4" along with the average weight of 140.2 lbs. with a BMI of 24.0 (healthy). However, in 2016, the average height was still 5'4" but the average weight increased by 30.4 lbs. to a weight of 170.6 lbs. with BMI of 29.3 (overweight and near obese).

Similarly, in 1960, the average height of an American man was 5'8" along with the average weight of 166.3 lbs. with a BMI of 25.2 (overweight). However, in 2016, the average height was slightly taller by one inch to 5'9" but the average weight increased by 31.6 lbs. to a weight of 197.9 lbs. with BMI of 29.2 (overweight and near obese).

As a result, Americans being overweight and having obese situations reflect the extremely unhealthy diet of modern American which were originated from the agricultural industrialization and intensive food marketing via multiple medias. Having industrialization of our food industry and car industry in early 20th century, plus our own psychological weakness on resisting the temptation of process food seduction and moving around by car (move-but-inactive), the chronic diseases have been surged.

The author, who was 20 years old, weighed 145 lbs. when he came to the US. He became a severe type 2 diabetes patient in 1996. 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 to 1161, where the high-end of normal range is 150, and albumin-creatinine ratio (for kidney, the high-end of normal range is 30) at 116. He also suffered from five cardiac episodes within a decade. In 2010, three independent physicians warned him regarding his needs of kidney dialysis treatment and his future high risk of dying from his severe diabetic complications.

By the last quarter of 2020, his weight has been reduced to 168 lbs. from 198 lbs. in 2010. Using food portion in 2010 as the baseline of 100%, the average meal portion has been reduced to 65%. In other words, *over the 11-year period, he has reduced 30 lbs. of his weight by cutting off his meal portion size by 35%.*

Of course, combining exercise with food portion control would help with the weight reduction. However, *the major influential factor of his weight reduction (30 lbs.) is the food portion reduction (35%). The major influential factor of the post-meal glucose reduction is his "post-meal" walking (more than 4,000 steps after each meal) only if his intake amount of carbs/sugar is reasonable and under-control (low-carbs meals at below 20 grams per meal). He eats more vegetables and certain fruits, high-quality proteins, such as egg white, cheese, and fish, and avoids fatty food and red meats.*

## Weight, Glucose, and Diabetes

Generally speaking, glucose above 140 mg/dL is diagnosed of having a diabetes condition, between 120 mg/dL to 140 mg/dL is pre-diabetes, and below 120 mg/dL is normal and considered without diabetes. Three to four months of average glucose level is indicated by a percentage of red blood cells carrying glucoses known as "HbA1C or A1C". When A1C falls below

6%, it is considered as normal, while above 6.5% is considered having diabetes.

Glucose (blood sugar) attaches to red blood cells circulating through the internal organs, which has a double-edged sword effect on our health. Positively, glucose is converted into energy in order to meet our nutritional needs; however, too much glucose would cause structural damage to our blood vessel's wall, both macro-artery and micro-vessels. Glucose inside the blood vessels is similar to acid inside pipes, which is corrosive to the pipe's wall structure. Once damaged from excessive glucose, then high blood pressure would cause either rupture of artery wall or cause some tiny leakages in the micro-vessel wall. For macro-vessel (artery), the excessive lipid (cholesterol) would deposit inside the wall surface in the form of plaque which would cause an artery blockage situation. Combining high glucose (diabetes), high blood pressure (hypertension), and high lipids (hyperlipidemia), the risk probability of having different complications would increase due to particularly artery problems (heart attacks and strokes) and micro-vessels problems (kidney, eye, foot and nerves). Many of the diabetic complications would eventually lead to death, usually involving a long-lasting and painful process.

The energy infusion in the body is through food, sleep, etc., and energy consumption of the body is through exercise, stress, etc. Under normal conditions, energy equilibrium is difficult to maintain, usually either one of the two would have a greater amount. Of course, energy consumption more than energy infusion is feasible over a short period of time. But, if this kind of situation persists, people will die. On the other hand, most cases are where energy infusion is greater than energy consumption. Under this scenario, we would accumulate excessive "left-over" energy in the body that appears as fat deposits in the muscle and abdominal area, which then causes obesity disease and many other follow-on chronic diseases and their complications.

For many patients, obesity or being overweight is the root cause of other chronic diseases. Of course, there are some patients with normal weight but still develop chronic diseases, such as diabetes. But this case represents a lower percentage in total number of patients; therefore, the first and foremost priority for patients is to control their disease conditions by checking their weight and implement a "weight reduction" program. Please do not depend on medications or surgeries for weight reduction. From a long-term view, they would hurt your body and health. For readers who have tried weight reduction in the past, they would know how hard it is to reduce weight at first and even more difficult to maintain weight within a healthy range. Once weight is reduced, glucose would also drop, and blood pressure and lipids would follow.

In the early morning after waking up, you could measure your glucose level which is called "fasting glucose in the morning" or fasting plasma glucose (FPG). Of course, if you measure your glucose level three hours after your meal and right before your next meal, it is also considered "fasting glucose", but it is different from the fasting glucose in the early morning because there are more factors involved in this kind of fasting glucose. From here on, when the author discusses fasting glucose, he means the early morning glucose without influences from both food and exercise. Based on his previous analysis results, body weight and fasting glucose in the morning have an

extraordinarily strong relationship to each other (Correlation is above 80%). Their degree of relationship tightness can be described via a statistical term of “correlation coefficient or R”. When R is greater than 50%, it means two variables have a strong relationship between them. When R is below 50% it means two variables have a rather weak relationship between them. For example, the post-meal glucose variable has a +80% relationship with the carbohydrates and sugar intake amount variable. The post-meal glucose variable has a -70% relationship with the post-meal exercise variable. The negative sign here means the more you exercise after a meal, the lower your post-meal glucose will be (negative R). With the same logic, the more carbs/sugar you eat, the higher your post-meal glucose will be (positive R).

Although the author has identified around 20 influential factors on post-meal glucose formation, the top three factors constitute almost 90% of the post-meal glucose formation. Among these three factors, the existing health state of pancreatic beta cells insulin situation occupied around 50%, carbs/sugar amount 33%, and post-meal exercise 17%. The fasting glucose in early morning is a good “benchmark indicator” of the health state of your pancreas (beta cells) in terms of insulin quantity (production amount) and quality (insulin resistance). Our insulin problems with pancreatic beta cells are created by our prolonged poor lifestyle and health ignorance over a long period of time which cannot be cured or reversed by any medication. Insulin injection provides additional external insulin supplies to the body. The only slim hope of “self-repair” for the pancreas damage is through habits change and stringent lifestyle management over a long period of time. For the author’s case, he has been self-repairing his damaged beta cells at a slow rate of 2% to 3% per year since 2014. In total, he has self-repaired or reversed his pancreatic health state approximately 14%-21% over the past 7 years. In general, red blood cell’s lifespan is 3-4 months (115 days), liver cell’s lifespan is around one year, while pancreas beta cells have very long lifespan. Therefore, once liver and pancreas are damaged, it will take a long time and a big effort to repair them.

Of course, medications are very powerful and absolutely necessary for lots of diseases, particularly infectious diseases or diseases need surgery. However, personally, the author does not believe that medications can cure any chronic diseases within the endocrinology (loosely speaking, internal medicine) area. These medicines only suppress the external symptoms of the disease, not cure or reverse them at the root-cause level. Therefore, in order to control the post-meal glucose, the only major and effective influential factors are both through intaking less amount of carbs/sugar and doing more post-meal exercise. You will be surprised how much glucose improvement you would achieve just through these two naturals “lifestyle medications”.

Examples of other remaining influential factors are ambient weather, sleep, stress, sickness, measurement delay timing, etc. When we are sick or under a severe stressful situation, the factors of sickness and stress would supersede the role of food and exercise during that particular day.

#### **Other chronic diseases**

Once your weight and glucose are under control, your high blood pressure and high lipids (cholesterol, HDL, LDL, and

triglycerides) can follow suit and be under control without external chemical compounds intervention. Of course, there are more food items other than carbohydrates and sugar that we must pay attention to. For example, we should also avoid too much fat, particularly red meat and shellfish, avoid salty food, eat more fresh vegetables and certain fruits (diabetes patients should avoid overly sweet fruits, berries are good fruits). Mediterranean diet is one of the best diet options, but we should avoid trying the extreme diet style, such as keto-diet. “Taking moderate way in the middle” to avoid having “extremities at both ends” is always the best choice. Of course, exercise helps lower both blood pressure and blood lipid complications as well.

#### **Metabolism**

A proper definition and deeper understanding of the term “metabolism” is to understand the internal energy situation in human body. The author spent the entire year of 2014 to develop a mathematical model of metabolism and then programmed it into a software program on his iPhone. In this way, he could know his metabolism situation quantitatively at any time instant or over any time period, such as days, weeks, months, quarters, years, and decades.

He defines metabolism with two families and 10 categories as follows:

##### **Medical conditions**

Weight (obesity), Glucose (diabetes), Blood Pressure (hypertension), Lipid and others (including hyperlipidemia, thyroid, kidney, body temperature, blood oxygen).

##### **Lifestyle Details**

Food & Meal (food portion quantity and nutritional quality), Water Intake (2000-3000 cc per day), Exercise (post-meal walking, daily walking, others such as Tai-chi or Yoga), Sleep (hours, wakeup times, sleep quality score), Stress (21 identified stressors for normal people, plus 21 identified stressors for people who have suffered from variety of personality disorders), and Regular daily life routines (15 good daily-life habits plus 7 environmental factors to watch out for cancers). The author walks about 4,500 steps (3 km or 2 miles) after each meal and 16,000 steps (10 km or 6 miles) per day.

In total, these 2 families and 10 categories contain a total of ~500 elements. Using his iPhone, he enters the data manually every day. However, he has also developed his software program with big data analytics and artificial intelligence capabilities; therefore, he only needs to manually enter about 5% of data, where the other 95% of input are judged and handled by AI. Thus far, he has collected more than 2 million data over past 10 years regarding his medical conditions and lifestyle details. This big data provides foundations for his further analyses and medical research work which have been reflected in his published 400+ medical papers.

##### **Chronic Diseases Complications**

His medical research aims at prevention and control of chronic disease conditions resulted from metabolic disorders, not how to “treat” the external symptom, but how to “repair” or

“recover” from the root-cause level. Therefore, he spent his time to understand as much as possible regarding each disease complication related to the different internal organ. He did not spend his time to understand the biochemical chain reactions between the body and chemical compounds via medications. He does not even have the ability to pursue his medical research or knowledge following the traditional “*biochemical medicine*” approach. He is a mathematician, physicist, and engineer from both academic education and professional training. Therefore, he could only utilize his available tools, such as mathematical concepts and equations, physics principles and theories, and engineering theories and modeling techniques to study medicine, which he names the “*math-physical medicine*” approach.

Major chronic diseases complications include problems associated with heart, brain, eyes, thyroid, liver, pancreas, stomach, intestines, kidneys, bladder, nervous, hormones, feet and toes, etc. In other words, other than hairs and nails, all of the rest of the body which has blood vessel going through them would develop into some types of problems or complications from these chronic diseases. By definition, cancers (spread to all of internal organs, even skin) and dementia (many different types of dementia) are not only different chronic diseases, but they are also metabolic disorder related.

Based on his 11-years of self-studying internal medicine and food nutrition, and reading over 1,000 published medical papers, he decided to focus on understanding and knowing the “black box” of internal organs, particularly the branch of endocrinology. He is not capable and not allowed to provide medications or perform surgeries to patients; therefore, he has focused on preventive medicine in order to stop, reverse, or slow down the occurrence of various complications. He has developed many mathematical models including both disease characteristics (micro-level) and overall metabolism (macro-level) in combining with each complication’s specific features. Using these different biomedical mathematical models, he can predict the risk probability of having certain complications, such as heart attack, stroke, kidney failure, eyesight problems, etc. By watching out for these risk probability percentages

trending upward or downward, he can then improve his odds of surviving from these complications or even just preventing them from happening.

The author provides five graphs in this article to illustrate some of the key messages in this article.

Figure 1 shows the analogy between a table and our health state.

The top diagram of Figure 2 depicts a strong relationship ( $R=82\%$ ) between his weight and his fasting glucose (indicator of his pancreatic beta cells health state). The bottom diagram of Figure 2 reflects a strong relationship ( $R=73\%$ ) between his fasting glucose in early morning and his average post-meal glucose of 3 meals. This proves that post-meal glucose is moving along the same direction and trend as the fasting glucose in early morning.

Figure 3 illustrates his Lab-tested HbA1C values over 11-years from 10% in 2010 (severe type 2 diabetes) down to 6.2% in 2021 (normal) without taking any diabetes medications or insulin injections.

Figure 4 reveals his mathematical Metabolism Index (overall health) over the 11-year period from 112% in 2010 down to 54% in 2020, the risk of having a heart attack or stroke from 98% in 2010 down to 56% in 2020, and kidney problems from 57% in 2010 to 33% in 2021. That is why he has not suffered from any chronic disease complications after 2015.

Figure 5 indicates the comparison between his real biological age and effective health age and their age differences from 2012 through 2020. It is obvious that his expected age has been prolonged resulting from his improvement on his overall health i.e., Metabolism, control on his chronic diseases, and risk probability reduction of chronic disease complications. From Figure 5, he was 8 years older than his actual age of 65 in 2012 and 10 years younger than his actual age of 73 in 2020. Over these past 9 years, through his own effort, he has gained 18 years in his life expectancy.

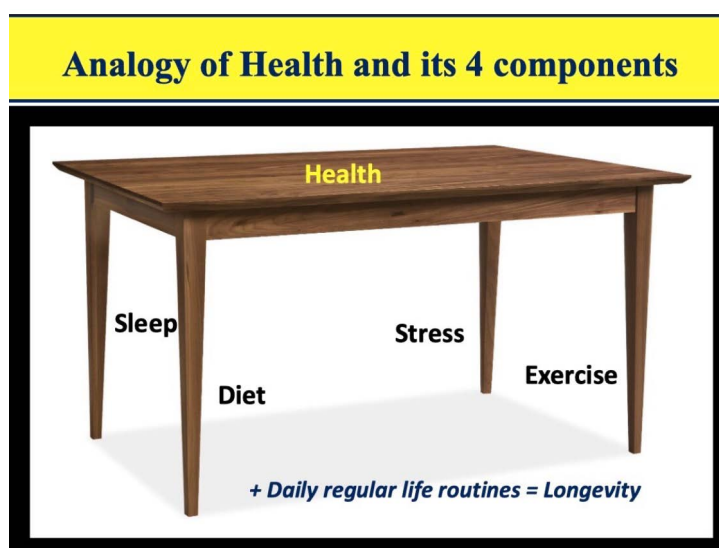


Figure 1: Analogy of table and health.

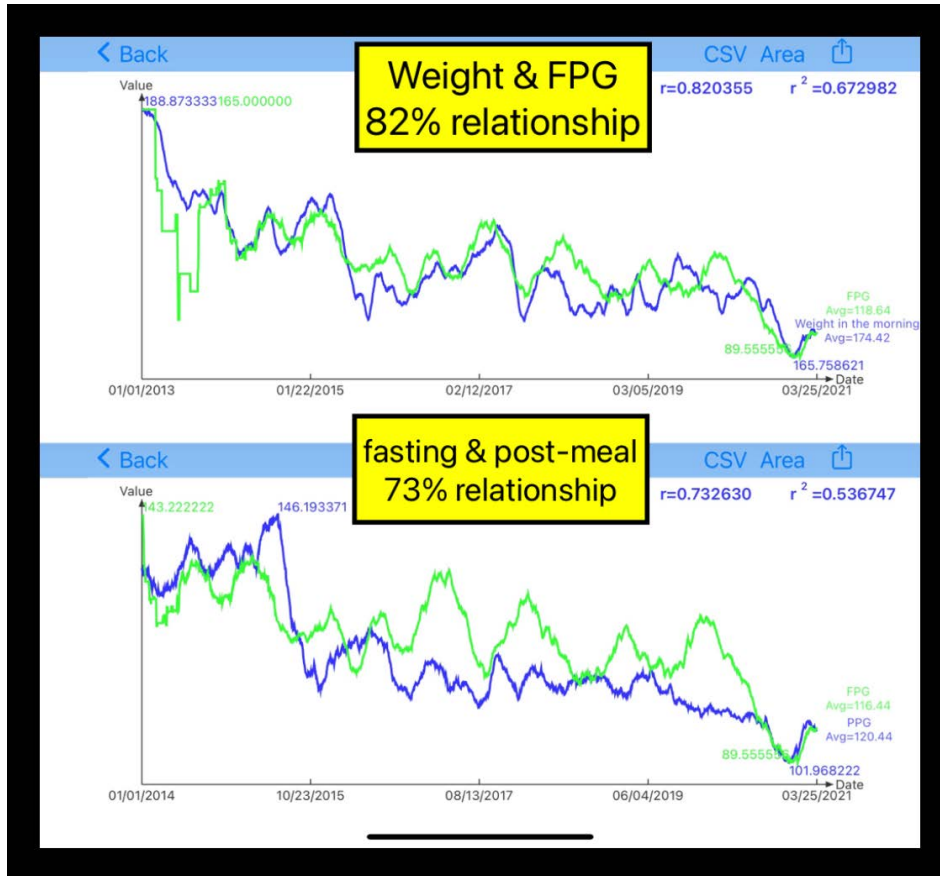


Figure 2: Weight vs. Fasting glucose (R=82%) and Fasting glucose vs. Post-meal Glucose (R=73%).

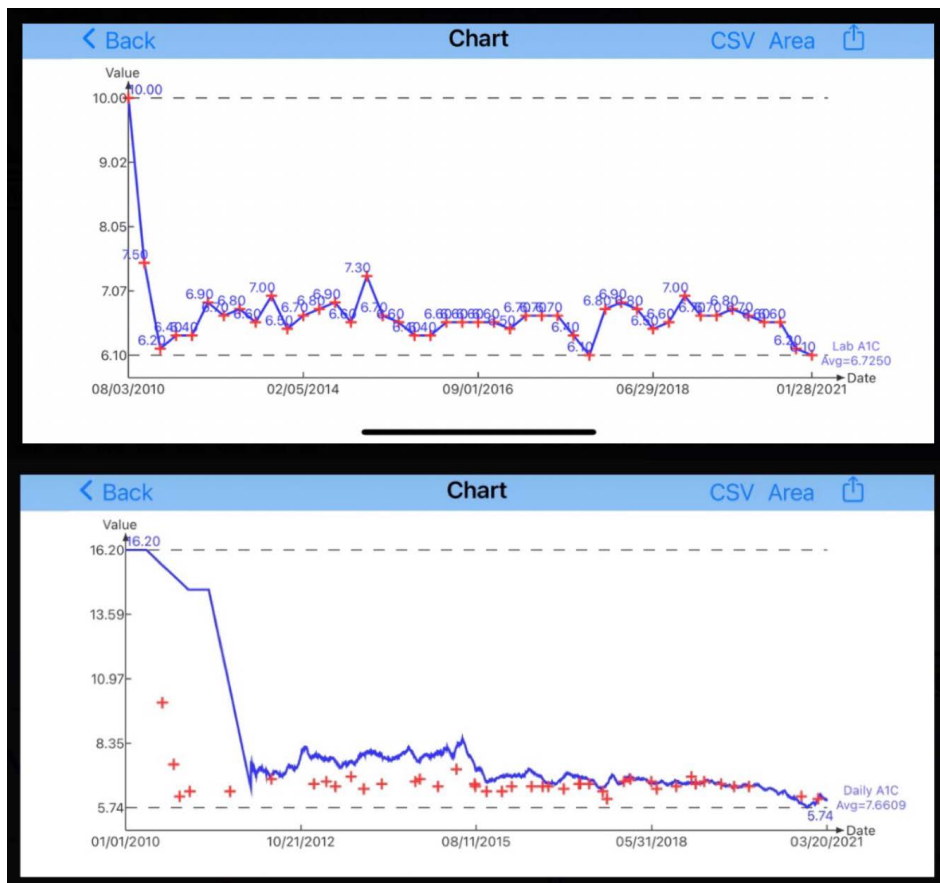
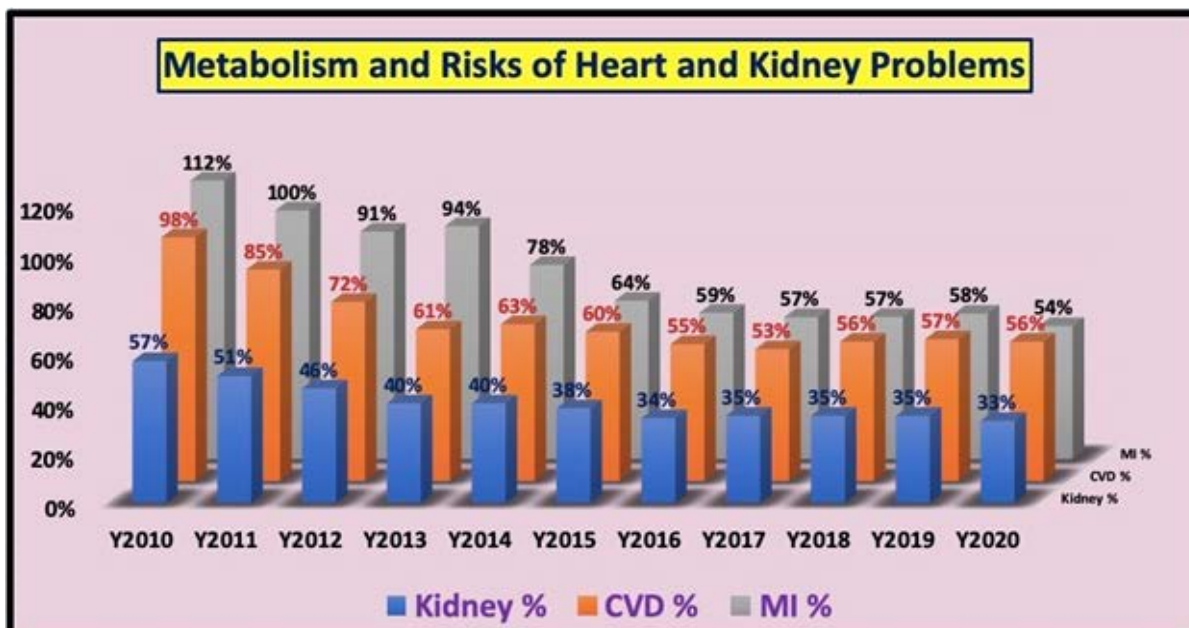
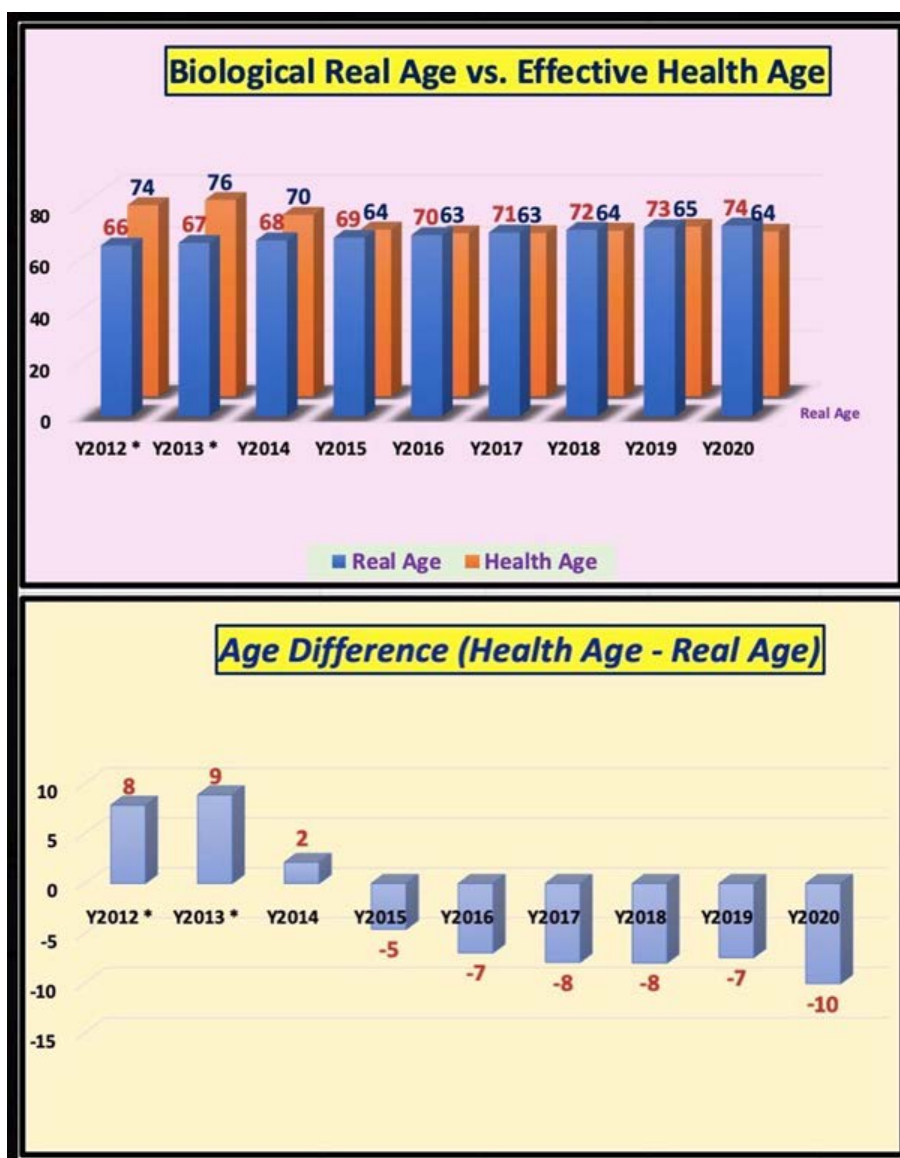


Figure 3: Lab-tested HbA1C over 11-years from 10% in 2010 (severe T2D) to 6.2% in 2021 (normal) without medications.



**Figure 4:** Metabolism Index over 11-years from 112% to 54%, Risk of heart attacks and strokes from 98% to 56%, Kidney problems from 57% to 33% (2010 vs. 2021).



**Figure 5:** Longevity via prolong expected age (i.e. lower health age).

## Conclusions

In summary, this article is written for the general public and patients with various chronic diseases covering topics of general health, lifestyle management, metabolism improvement, chronic disease control, complications risk reduction, and longevity. This starts with the subject of “death” and ends with the subject of “longevity” since “death and longevity” is the ultimate concern along with being content during the living years.

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## References

1. Gerald C Hsu. eclaireMD Foundation, USA. Biomedical research using GH-Method: math-physical medicine, version 3 (No. 386).
2. Gerald C Hsu. eclaireMD Foundation, USA. From biochemical medicine to math-physical medicine in controlling type 2 diabetes and its complications (No. 387).
3. Gerald C Hsu. eclaireMD Foundation, USA. Methodology of medical research: Using big data analytics, optical physics, artificial intelligence, signal processing, wave theory, energy theory and transforming certain key biomarkers from time domain to frequency domain with spatial analysis to investigate organ impact by relative energy associated with various medical conditions (No. 397), 2/3-6/2021.
4. Gerald C Hsu. eclaireMD Foundation, USA. Linear relationship between carbohydrates & sugar intake amount and incremental PPG amount via engineering strength of materials using GH-Method: math-physical medicine, Part 1.