GH-Method: Math-Physical Medicine
Special Issue

Cancer Prevention Through Improvements in Lifestyle and Metabolism Using GH-Method: Math-Physical Medicine (No. 342)

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Abstract

This paper describes the author's investigation into the prevention from having various cancers and his risk probability based on improvements in lifestyle and metabolism.

His risk probabilities percentage of having cancer over the past 11 years with lower risk percentages (< 50%) from 2014–2020 and higher risk percentages (> 50%) from 2010–2013. It should be noted that the higher prediction accuracy occurred during 2015–2020 due to his collection of more completed data.

1) Year of 2010: 88%; 2) Year of 2011: 74%; 3) Year of 2012: 58%; 4) Year of 2013: 55%; 5) Year of 2014: 50%; 6) Year of 2015: 48%; 7) Year of 2016: 46%; 8) Year of 2017: 45%; 9) Year of 2018: 45%; 10)Year of 2019: 45%; 11)Year of 2020: 43%

It seems that 50% is a reasonable "cut-off" line between higher risk vs. lower risk. The trend of the past 11 years risk probability percentages of having cancer from the viewpoint of cancer prevention is being reduced year after year, which is an encouraging fact.

The calculated cancer prevention and risk probability results via lifestyle and metabolism have been validated by his many health examination reports from the past 20 years. This big data based on a dynamic simulation model and data mining using GH-method: math-physical medicine (MPM) approach can provide an early warning to which factors or areas to monitor in order to continuously improve his health conditions.

The author wrote this article to share with other people, who may have similar interest in reducing their risk probability of getting cancer. As stated previously, he is not an expert on oncology but a research scientist in both lifestyle and metabolism. Metabolism and cancer have a strong relationship with one another; therefore, hopefully, his research method and preliminary findings would have some merit to help others to prevent them from getting cancer.

Keywords: cancer, risk probability, lifestyle, metabolism, diabetes, chronic diseases

Abbreviations: MPM: math-physical medicine; CVD: cardiovascular disease; CKD: chronic kidney disease; AI: artificial intelligence; FPG: fasting plasma glucose; PPG: postprandial plasma glucose; HbA1C: hemoglobin A1C

Introduction

This paper describes the author's investigation into the prevention from having various cancers and his risk probability based on improvements in lifestyle and metabolism.

Methods

Background

To learn more about his developed GH-method: math-physical medicine (MPM) research methodology, readers can review his article, "Biomedical Research Methodology Based on GH-Method: Math-Physical Medicine", to understand his developed GH-method: MPM [1].

Using the same methodology, he has developed, written, and published numerous articles regarding the risk probability of having a stroke, cardiovascular disease (CVD), or chronic kidney disease (CKD) over the past 2 years [2, 3].

Data collection

He has spent 10 years collecting big data (~2 million data) of his health and lifestyle details in order to conduct his biomedical research on chronic diseases and their various complications. Since 1995, he has suffered 3 chronic diseases, including diabetes, hyperlipidemia, and hypertension. He has also endured 5 CVD from 1994–2006, CKD in 2010, bladder infection, foot ulcer, diabetic retinopathy (DR), and hypothyroidism over the past decade. By 2017, most of his metabolic disorders induced chronic diseases and complications have been well controlled. During the same year, he started to self-study cancer diseases with a particular interest on its causes and preventive ways *via* the improvement in lifestyle and metabolism.

Mathematical model

Since 2014, by using topology concept and finite element engineering modeling, he developed a complex mathematical metabolism model to calculate and check his overall metabolism state on a daily basis. This developed mathematical model of metabolism includes 2 specific areas. For the first area, the medical conditions have 4 categories, weight (m1), glucose (m2), blood pressure (m3), lipid and others (m4). Only m1 of weights and m2 of glucoses are utilized in this cancer prevention study. For the second area, the lifestyle details have 6 categories, exercise (m5), water drinking (m6), sleep (m7), stress (m8), diet (m9), and life routine regularity (m10). All 6 lifestyle categories are utilized in this cancer study.

Furthermore, he subdivided diet (m9) into food quantity (m9a) and food quality (m9b) along with subdividing life routine regularity (m10) into life habits (m10a) and cancer-related habits (m10b). In these 2 categories, he emphasized food quality (m9b) and cancer-related habits (m10b). He continues to add detailed elements into the mathematical model of metabolism during his self-study and research process. This model has the capability to automatically calculate the combined sub-group scores of medical conditions (m1 through m4) and lifestyle details (m6 through m10), as well as the total combined score of metabolism or metabolism index (MI). It should be mentioned that the 10 categories also contain around 500 detailed elements. He utilized artificial intelligence (AI) technology for auto-judgement and auto-correction to assist with the daily data collection.

From 2015–2017, he applied optical physics, wave theory, energy theory, quantum mechanics, big data analytics, AI, segmented analysis, pattern recognition, and various statistics tools such as time-series, spatial analysis, and frequency domain analysis to his method. As a result, he developed 4 prediction models for body weight, fasting plasma glucose (FPG), postprandial plasma glucose (PPG), and hemoglobin A1C (HbA1C) as biomarkers. All these models have achieved greater than 95% prediction accuracy. From 2018–2019, he also developed 2 risk assessment models for having CVD/stroke or CKD [3].

The author spent 10 years to develop and continuously enhance a sophisticated and customized software program to collect all types of input data and process them dynamically in order to provide a daily guideline for the purpose of improving his overall metabolism and health. Once his metabolism is in good condition, then his immune system will be strong enough to defend against 3 major groups that lead to death [4]. They include chronic diseases with various complications (50%), cancers (29%), infectious diseases (11%), along with another special group of non-diseases related death (10%), from the data observed in the figure (Figure 1).

2017 Death	Category	percentage
Heart	647,457	31%
Cancer	599,108	29%
Accidents	169,936	8%
Respiratory	160,201	8%
Stroke	146,383	7%
Alzheimer's	121,404	6%
Diabetes	83,564	4%
Pneumonia	55,672	3%
Kidney	50,633	2%
Suicide	47,173	2%
Total	2,081,531	100%
Chronic Related	**1,049,441**	**50%**
Cancer	**599,108**	**29%**
Infectious	**215,873**	**11%**
Accidents & Suicide	**217,109**	**10%**

Figure 1: 2017 death case percentage of cancers which have 599,108 death cases and 29% of total death cases.

This section has described the backbone of his mathematical model for calculating his risk probability of having various cancers closely related to the prevention *via* improvements in lifestyle and metabolism.

Cancer data

Cancer is an exceedingly difficult and complicated disease that can affect any organ within the body, where abnormal cells divide and mutate rapidly, destroying healthy normal cells in the process. The possible cause of cancer can result from a combination of many different reasons. The author has dedicated the past decade on researching endocrinology and metabolism. He considers that both endocrinology and cancer are quite similar from the viewpoint of "digging into the black box of science". However, based on his rudimentary understanding of cancer, he also feels that the diseases caused by cancer are probably at least 10 times more complicated than endocrinology. Although he is not an oncology expert, only a veteran and research scientist on chronic diseases and their complications, he still has a strong curiosity and motivation in wanting to know what his risk probability percentage is of having cancer. This reason inspires his cancer research work by using his strength of lifestyle management and metabolism knowledge to conduct his assessment on the relationship between metabolism and cancer [2]. This article only serves as the beginning of his long journey in studying cancer using his research methodology, the GH-method: MPM.

The article [5] indicates that there are 23 cancer factors in the area of metabolic disorders which cause a total of 45.2% of the entire cancer cases in China (around 2.3 million cases per year). In addition, Harvard Health has also mentioned certain cancer prevention information listed in the following excerpt [6].

"About one of every three Americans will develop some form of malignancy during his or her lifetime. Despite these grim statistics, doctors have made great progress in understanding the biology of cancer cells, and they have already been able to improve the diagnosis and treatment of cancer.

But instead of just waiting for new breakthroughs, you can do a lot to protect yourself right now. Screening tests can help detect malignancies in their earliest stages, but you should always be alert for symptoms of the disease. The American Cancer Society developed this simple reminder (CAUTION) years ago:

- C: Change in bowel or bladder habits
- A: A sore that does not heal
- U: Unusual bleeding or discharge, unexpected weight loss or fatigue
- T: Thickening or lump in the breast or elsewhere
- I: Indigestion or difficulty in swallowing
- O: Obvious change in a wart or mole
- N: Nagging cough or hoarseness

Early diagnosis is important, but can you go one better? Can you reduce your risk of getting cancer in the first place? It sounds too good to be true, but it's not. Scientists at the Harvard School of Public Health estimate that up to 75% of American cancer deaths can be prevented. You don't have to be an international scientist to understand how you can try to protect yourself and your family. The 10 commandments of cancer prevention are....”

The author compiled the following list of 18 specific cancer prevention recommendations from 5 reputable sources, including the American Institute of Cancer Research (AICR), American Cancer Society (ACS), Harvard Medical, Mayo Clinic, and UCLA. He then links each of these 18 recommendations with his 10 established metabolism categories (*i.e.*, mi where i = 1 through 10) from his mathematical metabolism model as shown below:

1) m1: Be a healthy weight (AICR)
2) m5: Be physically active, exercise regularly, and stay lean (AICR, Harvard)
3) m9b: Eat a diet rich in whole grains, vegetables, fruits, and beans (AICR, Harvard)
4) m2, m9a, m9b: Limit consumption of “fast foods” and other processed foods that are high in fat, starches, or sugars (AICR, Harvard)
5) m9a, m9b: Limit consumptions of red and processed meat (AICR, Harvard)
6) m2, m9a, m9b: Limit consumption of sugar-sweetened drinks (AICR); this is also related to diabetes, glucose, and meal quantity
7) m10b: Genetic & basic habits: limit alcohol consumption (AICR, Harvard)
8) m10b: Genetic & basic habits: do not smoke cigarettes and avoiding other exposure to tobacco (AICR, Harvard)
9) m7: Make quality sleep a priority (Harvard)
10) m9b: Get enough vitamin D, but don't count on other supplements for cancer prevention (AICR, Harvard)
11) m10b: Avoid risky behaviors, *e.g.*, safe sex, don’t use illicit drugs, don’t share needles, and avoid infections that contribute to cancer (Mayo, Harvard)
12) m4b and m10b: Get vaccinated and have regular checkups to receive medical care (Mayo)
13) m9b: Lower risks *via* dietary patterns rich in plant foods and low in animal products and refined carbohydrates; and the Mediterranean diet pattern. Consumption of non-starchy vegetables and/or vegetables rich in carotenoids may lower risk for estrogen receptor-negative breast tumors; diets higher in calcium/calcium-rich dairy may reduce risk (ACS, Harvard)
14) m10b: Avoid unnecessary exposure to radiation, and excessive sun radiation (AICR, Harvard)
15) m10b: Avoid exposure to industrial and environmental toxins (Harvard)
16) m10b: Beware and stay away from air and water pollution (UCLA)
17) m10b: Don’t get food poison or eat polluted food (UCLA)
18) m10b: For mothers, breastfeed your baby, if you can; this is for 99% of women who get breast cancer - not having children, not breastfeeding, birth control (hormones content), hormone therapy after menopause, breast implant (AICR)

In this article, he omits the genetic and basic habits, such as smoking tobacco and alcohol intake, which may result in an additional ~10% to his calculation of cancer risk probability. These findings are remarkably similar to his research findings regarding chronic diseases and their complications, such as CVD or stroke, which have ~80% or more preventable *via* lifestyle and metabolism.

Results

In figure 1, it shows the number of US deaths in 2017 due to 3 chronic diseases and their complications (50%), various cancers (29%), infectious diseases (11%), and non-diseases death (10%). Cancer deaths total almost 600,000 cases in 2017. If only 33–50% of these American cancer patients paid attention to cancer prevention *via* improvements in lifestyle and metabolism, it could save at least 200,000–300,000 lives per year.

The figure (Figure 2) is the background data table of this study. It should be pointed out in the medical conditions group, weight, and glucose data during 2010 and 2011 were guesstimated numbers based on partially collected data. In the lifestyle group, its data during 2010 through 2014 were also guesstimated data based on partially collected data. Nevertheless, all the data after 1/1/2015 have been based on daily collected raw data. In addition, since his medical conditions only used weight and glucose, he assigned a weighting factor of 20% for weight (overweight or obesity) and glucose (diabetes). Since this study is more focused on lifestyle, he assigned a weighting factor of 60% for the 6 lifestyle categories (m5 through m10). The author is currently expanding the scope of his software to include more influential factors related to cancer prevention, especially in the two sub-categories of food quality (m9b) and cancer related daily life routines (m10b which includes environmental factors). His follow-up cancer investigations will further improve its cancer risk prediction accuracy and effectiveness of cancer prevention methods.

Cancer Prevention Study	Y2010	Y2011	Y2012	Y2013	Y2014	Y2015	Y2016	Y2017	Y2018	Y2019	Y2020
Weight	220	200	189	183	177	175	173	174	171	173	171
Weight / 167.61	1.2941	1.1765	1.1119	1.0739	1.0425	1.0465	1.0228	1.0352	1.0167	1.0222	1.0135
Glucose	180	175	128	132	135	129	119	117	116	114	108
Glucose / 120	1.5000	1.4583	1.0644	1.1041	1.1218	1.0726	0.9958	0.9791	0.9705	0.9537	0.8991
Cancer Prevention Study	**Y2010**	**Y2011**	**Y2012**	**Y2013**	**Y2014**	**Y2015**	**Y2016**	**Y2017**	**Y2018**	**Y2019**	**Y2020**
Averaged Medical	1.3971	1.3174	1.0882	1.0890	1.0821	1.0596	1.0093	1.0072	0.9936	0.9880	0.9563
Weighted Medical (20%)	0.2794	0.2635	0.2176	0.2178	0.2164	0.2119	0.2019	0.2014	0.1987	0.1976	0.1913
Averaged Lifestyle	1.0000	0.8000	0.6000	0.5500	0.4800	0.4480	0.4341	0.4132	0.4174	0.4254	0.3921
Weighted Lifestyle (60%)	0.6000	0.4800	0.3600	0.3300	0.2880	0.2688	0.2605	0.2479	0.2504	0.2552	0.2353
Cancer Prevention Study	**Y2010**	**Y2011**	**Y2012**	**Y2013**	**Y2014**	**Y2015**	**Y2016**	**Y2017**	**Y2018**	**Y2019**	**Y2020**
Total Weighted Risk Score	88%	74%	58%	55%	50%	48%	46%	45%	45%	45%	43%
Weighted Medical (20%)	28%	26%	22%	22%	22%	21%	20%	20%	20%	20%	19%
Weighted Lifestyle (60%)	60%	48%	36%	33%	29%	27%	26%	25%	25%	26%	24%

Figure 2: Background data table.

The figure (Figure 3) shows his risk probabilities percentage of having cancer over the past 11 years with lower risk percentages (< 50%) during 2014–2020 and higher risk percentages (> 50%) during 2010–2013. It should be noted again that the higher prediction accuracy existed during 2015–2020 due to his collection of more completed data.

- Year of 2010: 88% (obesity BMI 31, 3 chronic diseases, 5 cardiac episodes)
- Year of 2011: 74% (still bad condition on both weight, glucose, and lifestyle)
- Year of 2012: 58% (weight reduction started, more careful about diet, started daily exercise, CKD)
- Year of 2013: 55% (making progress on lifestyle, but still not good enough)
- Year of 2014: 50% (developed metabolism model and started his lifestyle management program)
- Year of 2015: 48% (BMI 25, FPG under control due to his weight reduction)

- Year of 2016: 46% (both PPG and HbA1C under control due to his development of PPG and HbA1C prediction models)
- Year of 2017: 45% (overall lifestyle, medical conditions, and metabolism were under control)
- Year of 2018: 45% (heavy traveling for attending medical conferences)
- Year of 2019: 45% (heavy traveling for attending medical conferences)
- Year of 2020: 43% (from 1/1/2020–10/6/2020, already reaches to the best state within past 25 years due to COVID-19 quarantined life)

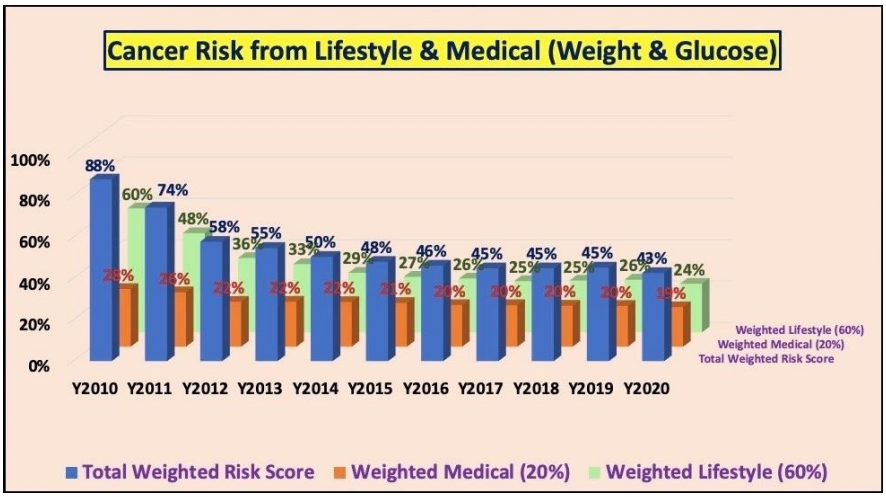

Figure 3: Risk probability percentage of having cancer based on lifestyle, medical conditions, and combined metabolism categories.

It should be noted that the risk probability percentages are expressed on a relative scale, not on an absolute scale, with an emphasis on lifestyle management. It seems that ~50% is a reasonable "cut-off" line between higher risk *vs.* lower risk. The trend of his 11 years risk probability percentages of having cancer is being reduced year after year, which is an encouraging fact. Cancer by definition can also be a chronic disease and its listed prevention recommendations are highly similar to diabetes prevention.

Conclusion

The calculated cancer prevention and risk probability results *via* lifestyle and metabolism have been validated by his many health examination reports from the past 20 years. This big data based on a dynamic simulation model and data mining using GH-method: MPM approach can provide an early warning to which factors or areas to monitor in order to continuously improve his health conditions.

The author wrote this article to share with other people, who may have similar interest in reducing their risk probability of getting cancer. As stated previously, he is not an expert on oncology but a research scientist in both lifestyle and metabolism. Metabolism and cancer have a strong relationship with one another; therefore, hopefully, his research method and preliminary findings would have some merit to help others to prevent them from getting cancer.

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