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Research Article

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Using Mathematical Model of Metabolism to Estimate the Risk Probability of Having a Cardiovascular Diseases or Stroke during 2010-2019 (GH-Method: Math-Physical Medicine)

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Introduction

The author uses GH-Method: math-physical medicine (MPM) approach to investigate his risk probability on metabolic disorders induced CVD or stroke (Risk).

Methods

In 2014, the author applied topology concept, finite-element engineering technique, and nonlinear algebra operations to develop a ten dimensional complex mathematical model of metabolism which contains four output categories (weight, glucose, BP, lipid and other lab-tested data (e.g. ACR, TSH), six input categories (food, water drinking, exercise, sleep, stress, and routine life patterns), and approximately 500 detailed elements. He further defined two new parameters, metabolism index (MI), as the combined score of the above 10 metabolism categories and 500 elements, and general health status unit (GHSU), as the 90-days moving averaged value of MI. Since 2012, he has collected about 2 million data of his own biomedical conditions and personal lifestyle details.

He then developed suitable algorithms containing some detailed equations which include a patient's baseline data (e.g. age, race, gender, family genetic history, medical history, and bad habits) and conducted the following three sets of calculations:

(1) Medical conditions - individual M1 through M4, i.e. obesity, diabetes, hypertension, hyperlipidemia and others.

(2) Lifestyle details - individual M5 through M10 which affect medical conditions.

(3) MI & GHSU scores - a combined score of M1 through M10 and 90-days moving average MI.

With this mathematical risk assessment tool, he can obtain three separate risk probability percentages associated with each of the three calculations mentioned above. As a result, this tool would offer a range of the risk probability predictions of having a CVD or stroke based on the patients' metabolic disorder conditions, unhealthy lifestyles, and the combined impact on the human body. The author is a 73-year-old male who has a history of three severe chronic diseases for 25 years. He experienced five cardiac episodes from 1994 through 2008 and was diagnosed with an acute renal problem in early 2010. In addition, he also suffered from foot ulcer, bladder infection, diabetic retinopathy, and hyperthyroidism. His HbA1C level at 2010 was 10.0%.

In 2014, he developed the metabolism model and started his stringent lifestyle management program. As a result, his overall health conditions have been noticeably improving since 2014 when he started to reduce the dosage of his diabetes medications. By the end of 2015, he completely stopped taking them. During the entire period of 2016-2020, his HbA1C average value is 6.6% without medication.

Results

The author has written a few medical papers regarding the risk probability of having a CVD or stroke based on the annual data when available.

Figure 1 shows his medical conditions (M1 through M4), lifestyle details (M5 through M10), and his MI & GHSU for the entire year of 2019. Figure 2 illustrates the data table containing some "real" data with familiar units instead of just using the "normalized" values of Mi where I = 1 through 10. From this table, during the year of 2019, the results reflect that his medical conditions were healthy under a stringent lifestyle management.

Metabolism	Mi Score	Data	Details	Data
M1 (weight)	1.0222	172.6 lbs	Waistline/BMI	33.12 in./25.8
M2 (Glucose)	0.9572	115 mg/dL	FPG/PPG	114/115
M3 (BP)	0.9018		SBP/DBP/HR	117/71/60
M4 (Lipid)	0.8519		LDL/HDL/TG	123/49/110
			ACR/TSH	19.0/2.66
M5 (Exercise)	0.6881	15,742 steps	Post-meal	4,038 steps
M6 (Water)	0.7174			
M7 (Sleep)	0.6248		hours/wakeups	6.9/1.3
M8 (Stress)	0.5045			
M9 (Food)	0.6338		Quantity/Quality	0.7629/0.5047
			Meal carbs/sugar	13.2 g
M10 (Routine)	0.7370			
MI	0.5849			
GHSU	0.5876			

Figure 1: Scores of metabolism categories (M1-M10) during 2019

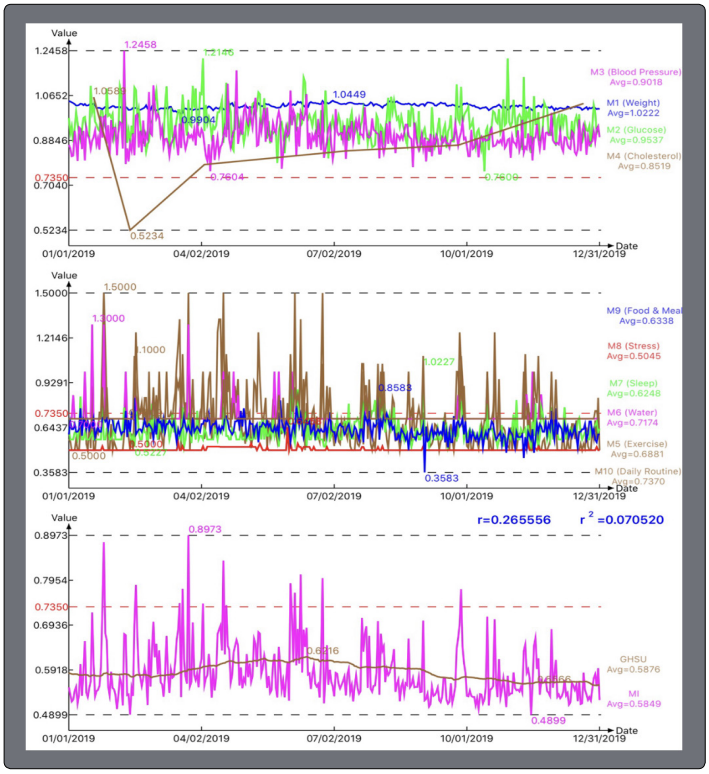


Figure 2: Table of MI scores (normalized numbers) and some real data with familiar units

The first 125 days from 1/1/2020 - 5/5/2020 is a specific sub-period of 2020 due to the COVID-19. The author has been self-quarantined for 107 days since 1/19/2020. His lifestyle has changed dramatically due to the impact on his diet, exercise, sleep, stress, daily routines, and so forth. He worked even harder to maintain his lifestyle management. Therefore, he decided to include this one-third of 2020 for a comparison against prior years, especially 2018 and 2019 during the heavy traveling years.

He collected and analyzed a big dataset from 1/1/2012 to 5/5/2020 based on his medical conditions, lifestyle, and MI scores, which provided a foundation for the comprehensive examination of his risk probabilities of having CVD, stroke, renal complication, and diabetic retinopathy progression (i.e. improving or worsening).

Here is his annualized risks probability ***based on MI*** of having a CVD or stroke (see Figure 3):

Y2000: 85% (weight 220 lbs., BMI 32.5, waistline 44 inches)
Y2010: 82% (weight 198 lbs., BMI 29.2, glucose 280 mg/dL)
Y2012: 82% (glucose 128 mg/dL)
Y2013: 84% (glucose 133 mg/dL)
Y2014: 71% (developed metabolism model, glucose 135 mg/dL)
Y2015: 60% (weight & FPG control, glucose 129 mg/dL)
Y2016: 55% (PPG control & stopped medication, glucose 119 mg/dL)
Y2017: 54% (BMI 25, glucose 117 mg/dL)
Y2018: 53% (heavy traveling, glucose 116 mg/dL)
Y2019: 55% (heavy traveling, glucose 114mg/dL)
Y2020: 51% (weight 171 lbs., BMI 25, waistline 32.5 in, glucose 112 mg/dL)

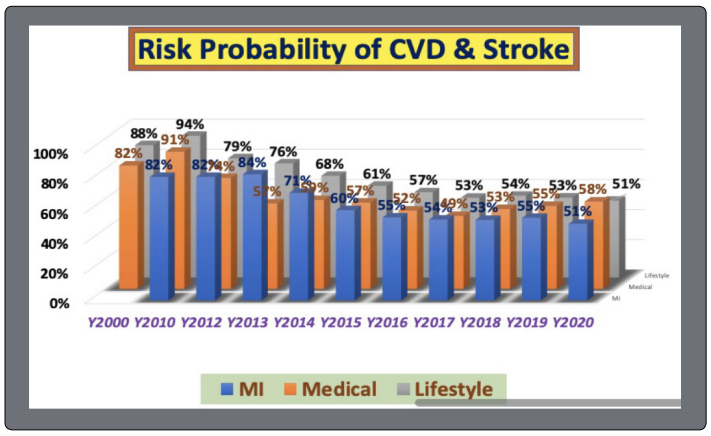
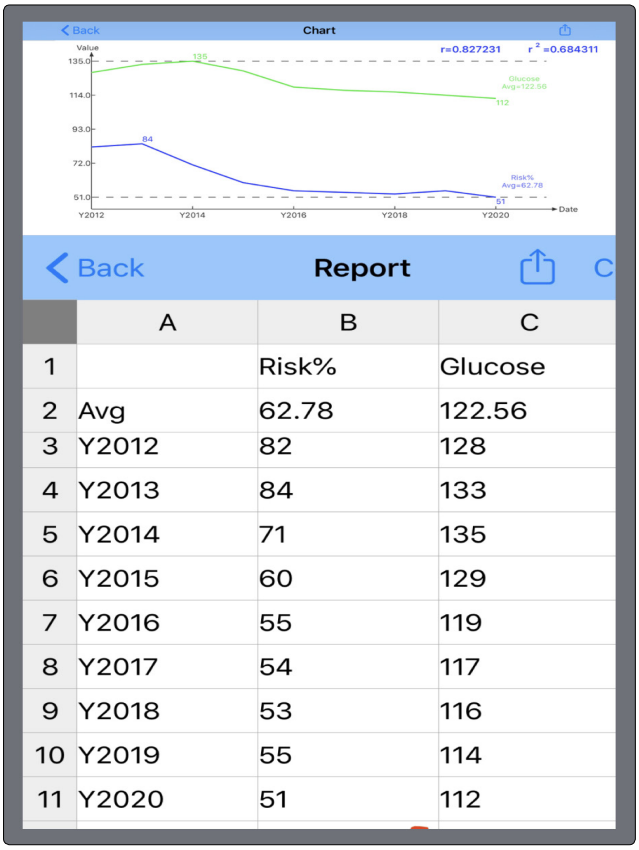


Figure 3: Risk probability from 2010 through 2020 (3 models)

Due to his heavy traveling schedules of attending more than 60 medical conferences from 2018-2019, his risks were in the range of 53%-55%; however, during this recent stabilized quarantine life in 2020 has actually helped him to bring his risk down to 51%.

It is quite obvious that his CVD risks and annual average glucoses have an extremely high correlation coefficient of 83% (Figure 4). Through his research for the past 5-years, he has already detected that glucose is the "principal criminal" and blood pressure with lipids are the "accessory criminals" in terms of induced complications from chronic diseases, specifically CVD, stroke, renal problems, and diabetic retinopathy (50%-60% due to glucose)



	A	B	C
1		Risk%	Glucose
2	Avg	62.78	122.56
3	Y2012	82	128
4	Y2013	84	133
5	Y2014	71	135
6	Y2015	60	129
7	Y2016	55	119
8	Y2017	54	117
9	Y2018	53	116
10	Y2019	55	114
11	Y2020	51	112

Figure 4: Correlation between CVD risks and annual glucoses

It should be noted here that the risk probability percentages are expressed on a "relative" scale, not on an "absolute" scale.

Conclusion

This article describes the impact of the MI score, a combination of metabolic disorder conditions and lifestyle details, on the risk probability percentage of having a CVD or stroke. His research results for the past 10-years have demonstrated the importance of maintaining the entire body in an excellent healthy state (i.e. good metabolism) in order to reduce the risk of having a CVD or stroke.

References

1. Hsu, Gerald C. (2018). Using Signal Processing Techniques to Predict PPG for T2D. International Journal of Diabetes & Metabolic Disorders 3: 1-3.
2. Hsu Gerald C (2018) A Clinic Case of Using Math-Physical Medicine to Study the Probability of Having a Heart Attack or Stroke Based on Combination of Metabolic Conditions, Lifestyle, and Metabolism Index. Journal of Clinical Review & Case Reports 3: 1-2.
3. Hsu, Gerald C. (2019). Using Wave and Energy Theories on Quantitative Control of Postprandial Plasma Glucose via Optimized Combination of Food and Exercise (Math-Physical Medicine). International Journal of Research Studies in Medical and Health Sciences 5: 1-7.
4. Hsu Gerald C (2019) Using Two Clinical Glucose Measurement Datasets, Finger Glucose as Lower Bound and Sensor Glucose as Upper Bound, to Establish a Rational Range of HbA1C Values for Type 2 Diabetes Patients (GH-Method: Math-Physical Medicine). Journal of Clinical Review & Case Reports 5: 1-2.
5. Hsu Gerald C (2019) Using GH-Method: Math-Physical Medicine and Energy Theory to Re-examine the Relationship with Food, Exercise, and Postprandial Plasma Glucose. Advances in Nutrition and Food Science 3: 1-3.