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Risk Probability of Having a Cardiovascular Disease, Stroke, or Renal Complications Using Annual Segmented Data of Glucose and Metabolism Index (GH Method: Math-Physical Medicine)

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Introduction
In this paper, the author describes the quantitative relationship between his risk probability of having a cardiovascular disease (CVD), stroke, or renal complications and his annual segmented data of both average daily glucose and daily metabolism index (MI) by using GH-Method: math-physical medicine.

Method
In 2014, the author applied topology concept, finite-element engineering technique, and nonlinear algebra operations to develop a mathematical metabolism model, which contains ten categories including four output categories (weight, glucose, BP, other lab-tested data including lipids & ACR) and six input categories (food, water drinking, exercise, sleep, stress, routine life patterns and safety measures). These 10 metabolic categories include approximately 500 detailed elements. He further defined a new parameter referred to as the metabolism index (MI) that has a combined score of the above metabolic categories and elements. Since 2012, he has collected and stored ~2 million data from his own body health conditions and personal lifestyle details.

He then developed a set of algorithms which include a patient's baseline data, such as age, race, gender, family genetic history, medical history, and bad habits along with conducting the following three calculations:
1. Medical conditions - individual M1 through M4: i.e. obesity, diabetes, hypertension, hyperlipidemia and others.
2. Lifestyle details - individual M5 through M10.
3. MI scores - a combined score of M1 through M10.

With this mathematical risk assessment model, he can obtain three separate risk probability percentages to offer a range of the risk prediction of having CVD, stroke, or renal complications resulting from metabolic disorders, unhealthy lifestyles, and their combined impact on the human body.

It should be noted that through applications of his academically learned structure mechanics and fluid dynamics along with the newly acquired biomedical knowledge, he has accentuated the two different situations of CVD/stroke due to blockage or rupture of arteries impacted by glucose, BP, & lipids and renal complications caused by damage on micro-vessels or leakage caused by glucose and BP.

Through his developed predicted weight and glucose (FPG, PPG, and A1C) models, he has successfully reduced his glucose level from 280 mg/dL (A1C 10%) in 2010 to 116 mg/dL (A1C 6.4%) for the duration of his "no medication" period from 2015-2019. In addition, his ACR has also dropped from 116 mg/g in 2010 down to 8 mg/g in 2018.

During a specific period from 2018 through 2019, he attended more than 60 medical conferences located in 50 international cities and presented more than 100 presentations. This busy travel schedule and heavy workload have brought a tremendous amount of stress and strain on his body and health conditions. As a result, his overall MI scores has been slightly increased during these two years, although his annual average glucoses has continuously decreased slightly due to his through knowledge and acute attention to his diet and exercise during travel.

Results
Figure 1 shows his daily data of both glucose and MI from 2014 through 2019. The calculated annual glucose and MI values are displayed inside this figure.

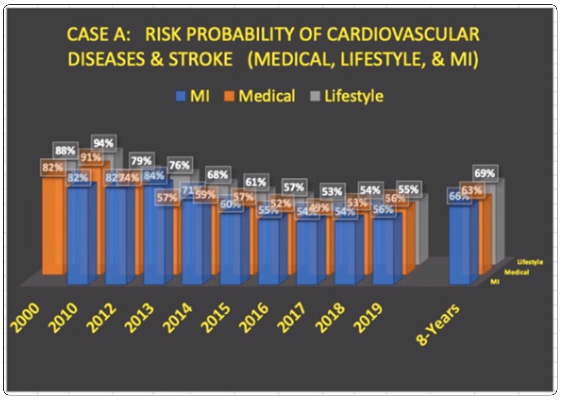

Figure 1: Annualized metabolism index (MI) and glucose data

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Figure 2 depicts his risk probability of having a CVD or stroke from 2010 through 2019. The risk was reduced from 82% in 2010 to 54% in 2017, however increased slightly to 56% in 2019.

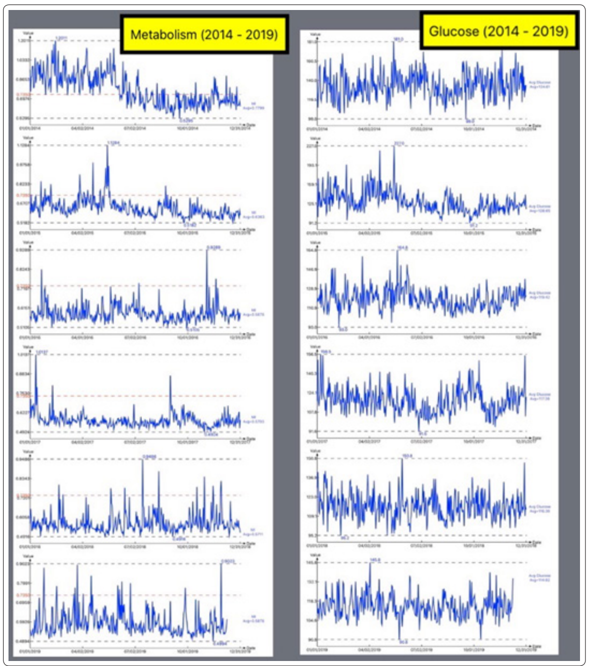


Figure 2: Annualized risk probability of having CVD or stroke

Figure 3 displays his risk probability of having renal complications from 2000 through 2019. The risk has been reduced from 69% in 2000 to 35% in 2017, and continuously further decreased to 33% in 2019.

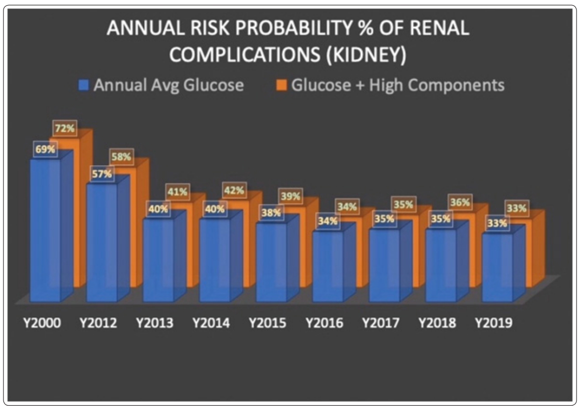
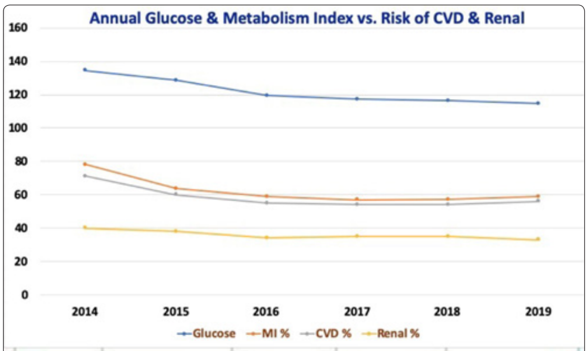


Figure 3: Annualized risk probability of having renal complications

Figure 4 illustrates three curves and data table of annualized glucose, MI, CVD risk %, and Renal risk % together. It clearly shows that glucose values are continuously dropping from 2014 through 2019; on the contrary, the MI values have slightly increased during 2018 and 2019 due to his travel.



	Glucose	MI %	CVD %	Renal %
2014	134.61	77.99	71	40
2015	128.65	63.63	60	38
2016	119.42	58.78	55	34
2017	117.38	57.03	54	35
2018	116.36	57.11	54	35
2019	114.62	58.78	56	33

Figure 4: Annualized curve and data of Glucose, MI, CVD %, and Renal %

Figure 5 presents the following two correlation coefficients (R) between:
(1) Glucose vs. CVD risk = 91.8%
(2) MI vs. CVD risk = 99.8%

These prove that risk probability of having a CVD or stroke depends more on the overall metabolism conditions, rather than just glucose condition (diabetes), though it is one of the vital contributors of MI.

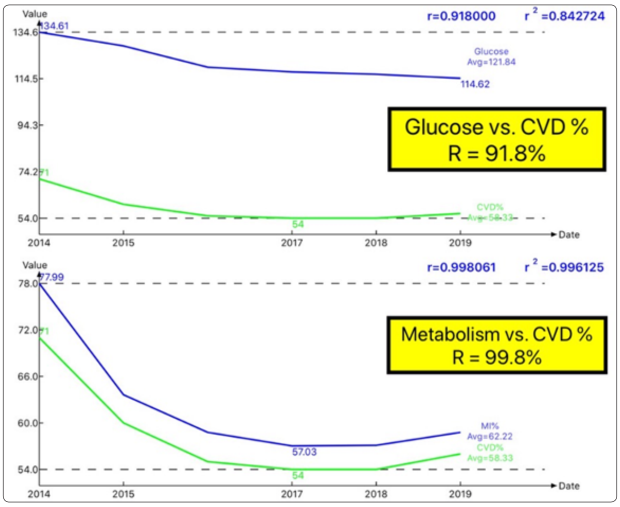


Figure 5: Two CVD Correlation Coefficients (R)

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Figure 6 shows the following two correlation coefficients (R) between:
(3) Glucose vs. Renal risk = 96.2%
(4) MI vs. Renal risk = 87.5%

These prove that the risk probability of having renal complications depends more on glucose condition (diabetes), rather than overall metabolism conditions condition despite of glucose is one of the vital input variables of metabolism index.

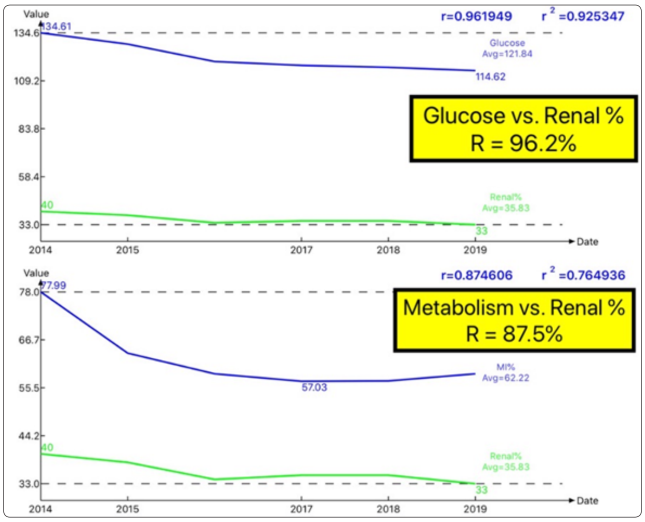

Figure 6: Two Renal Correlation Coefficients (R)

Figure 7 & 8 show combined diagrams of glucose, MI, with CVD/ strove risk probability %, and renal complications risk probability %, respectively.

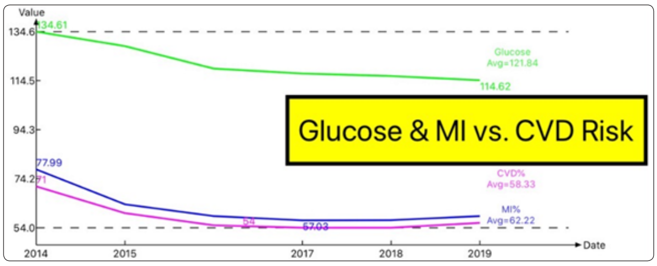

Figure 7: Three Curves of Glucose, MI, and CVD %

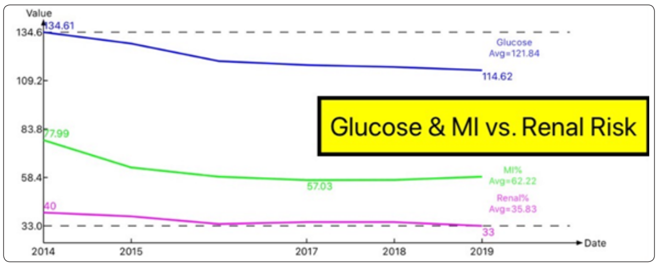

Figure 8: Three Curves of Glucose, MI, and Renal %

Conclusions

This paper has demonstrated the strong effect of metabolism (including glucose) on CVD/stroke risk probability % by using the annually segmented MI (and glucose) data.

It has also proven the solid influence of glucose on renal complications risk probability % using annually segmented glucose (and MI) data [1-5].

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