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Effective health age resulting from metabolic condition changes and lifestyle maintenance program

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Introduction

In this paper, the author reviewed his past 8-years data from 2012 through 2019 and focused on both of his metabolic conditions and health lifestyle details. He then developed an "Effective Health Age" model by using the GH-Method: math-physical medicine approach in comparison with the "Real Biological Age".

Method

He defined the "Effective Health Age" based on the evaluation of his multiple medical examination reports and his ~2 million data of his lifestyle, metabolism, and diseases over an 8-year period. This is different from the "Real Biological Age" or "Chronological Age" defined as the actual amount of time a person has been alive.

As shown in Figure 1, approximately 2.1 million people died in 2017 from multiple causes of death in the United States. Among them, almost 79% (~1.7 million deaths) were related to metabolic conditions, whether directly or indirectly. It should be noted that in 2018, the total death figure reached more than 2.8 million people with ~2.2 million deaths related to metabolic conditions and diseases.

2017 Death Cause	Sub-Category	Metabolism related
Heart	647,457	647,457
Cancer	599,108	599,108
Accidents	169,936	
Respiratory	160,201	
Stroke	146,383	146,383
Alzheimer's	121,404	121,404
Diabetes	83,564	83,564
Pneumonia	55,672	
Kidney	50,633	50,633
Suicide	47,173	
Total	2,081,531	1,648,549
Percentage	100%	79%

Figure 1 US leading death causes.

In 2014, the author developed a mathematical metabolic model, including 4-categories of diseases (body outputs) and 6-categories of lifestyle details (body inputs). He started to collect his data of weight and glucose beginning on 1/1/2012 and other lifestyle data from 2013-2014. Thus far, he has collected nearly 2 million data regarding his body health and lifestyle details. He further assembled those 10-categories (with a total of ~500 detailed elements) and combined them into two new biomedical terms: the metabolism index (MI), which is a combined daily score to show the body health situation, and general health status unit (GHSU), which is the 90-days moving averaged number to show the health trend.

Figures 2 & 3 demonstrate the above-mentioned details of his metabolic diseases and conditions during the past 8-years (2012 - 2019).

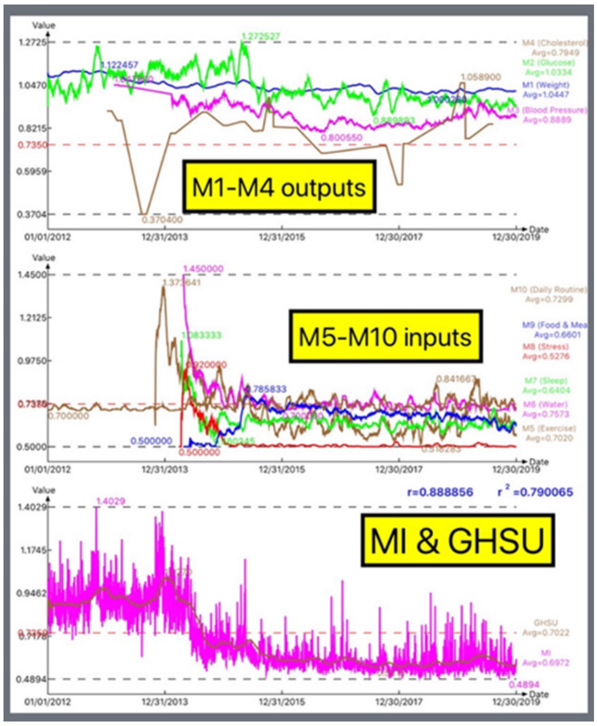

Figure 2 Metabolism model of inputs and outputs.

He has also identified a "break-even line" at 0.735 (73.5%) to separate his metabolic conditions between the healthy state (below 0.735) and unhealthy state (above 0.735).

He further developed a simple equation to calculate his effective health age as follows:

Effective Health Age

*= Real Biological Age**

(1+((MI-0.735)/0.735)/2)

He then utilized his annualized MI data to calculate his effective health age in order to compare against his real biological age.

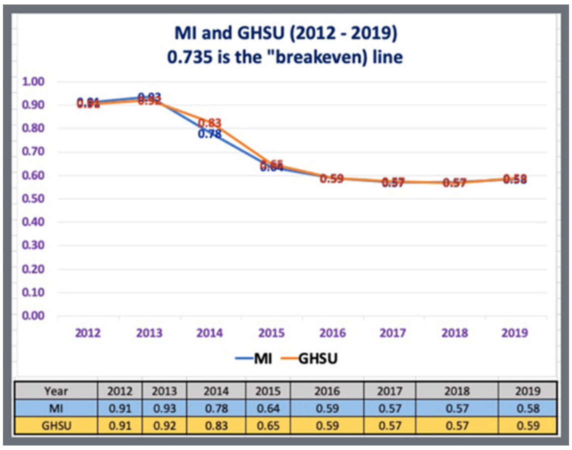

Figure 3 MI & GHSU (2012-2019).

Results

As shown in Figure 4, both of his MI and GHSU were >73.5% during 2012-2014 (unhealthy) and <73.5% during 2014-2019 (healthy). During 2014, his overall health condition improved significantly. It should be noted that his MI and GHSU during the years 2018 and 2019 were increased slightly due to his heavy travel schedule of attending more than 60 medical conferences worldwide. As a result, his risk probability of having a heart attack or stroke also increased by approximately 2% to 3%.

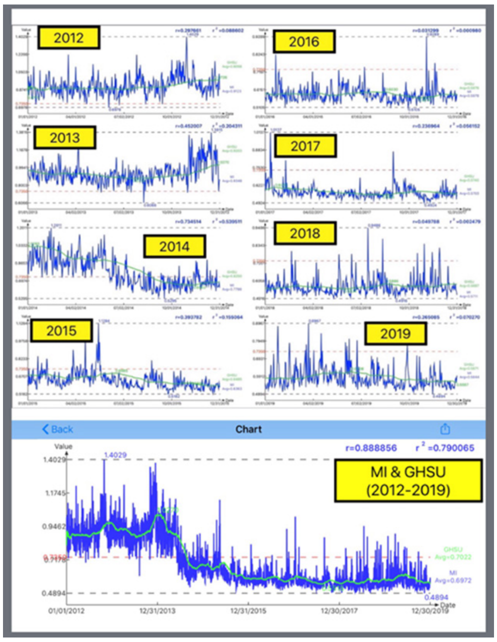

Figure 4 Annualized MI & GHSU.

Figure 5 depicts the comparison between his real biological age and effective health age. Of course, the real biological age increases annually, while the effective health age was higher than his real biological age during 2012-2014 and lower than his real biological age during 2015-2019. These changes are results of improvements on his bad metabolic conditions and poor lifestyle habits. These factors were significantly improved during 2015 and then maintained through 2019. Figure 5 also shows the two age differences between effective health age and real biological age. The age difference has changed from +8 years in 2012 to -7 years in 2019 (here, + is getting worse and - is getting better).

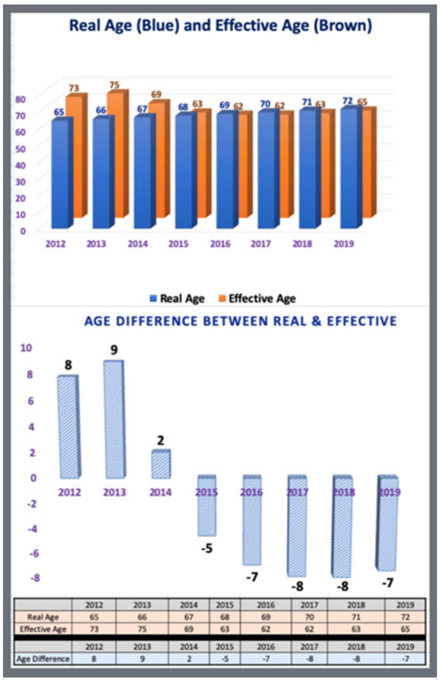

Figure 5 Differences between real & effective ages.

An interesting fact from the past decade is that three of his physicians indicated his age was about 10 years older after reviewing his medical examination reports when he was 63 years old. However, the same physicians told him during 2016-2019 that he was about 10 younger when he reached ~70 years old. This range of +10 years to -10 years was an ***empirical*** judgement based on their many years of clinical experiences from seeing hundreds of patients. However, the author used a ***scientific*** approach which is based on physical phenomena observations, big data analytics, and mathematical derivations to draw a conclusion of the range of +8 to -7 years. Nevertheless, these two guesstimated age ranges are actually quite comparable.

The life expectancy of an American male is 78.69 years (2016 data). If the author continues his metabolic conditions improvement, chronic disease control, as well as his existing lifestyle maintenance program, he may stand a good chance to extend his life for an additional eight years to reach to a real biological age of 87 (79 plus 8).

Conclusion

This simple numerical calculation based on big data analytics and sophisticated mathematical metabolic model has depicted a possible way to extend our life expectancy via an effective metabolic condition improvement and lifestyle maintenance program. This practical method has been applied and proven effectively in his own diabetes conditions control.

The author hopes that this method can also be applied in the field of geriatrics, longevity, or other forms of chronic diseases control. For example, if a particular patient is able to collect sufficient data regarding his particular chronic disease conditions, he can then replace those input data of M1 through M4 with his own disease data and utilizes similar lifestyle model of M5 through M10. In this way, he can then guesstimate his own effective health age and life expectancy under his own disease conditions.

Life is precious and health is important. A long and healthy life is the dream for everyone. This article provides a logical and practical way of achieving longevity.[1–5]

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Conflicts of interest

The authors declare have no conflict of interest about the publication of this paper.

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