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Review Article

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Effective age resulting from Metabolic Changes

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Introduction

In this research note, the author reviewed his past 8-years data from 2012 through 2019 by focusing on the relationship between his metabolism and overall health conditions. He decided to write this paper regarding his "Effective Age" using the GH-Method: math-physical medicine approach.

Method

He defined the "Effective Age" based on the appearance and evaluation of his medical examination reports and his ~2 million data of his lifestyle, metabolism, and diseases. This is different from the "Real Age" or chronological age which is the actual amount of time a person has been alive.

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

In 2014, the author developed a mathematical model of metabolism measurements, including 4-categories of diseases (body outputs) and 6-categories of lifestyle details (body inputs). He started to collect his detailed data on 1/1/2012. Thus far, he has collected nearly 2 million data regarding his body health and lifestyle details. He further assembled those 10-categories (with ~500 detailed elements) and combined them into two new 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 trend.

Figures 2 and 3 demonstrate the above-mentioned details of his metabolism conditions during the past 8-years (2012 - 2019). He has also identified a "break-even line" at 0.735 (73.5%) to separate his metabolism conditions between healthy (below 0.735) and unhealthy (above 0.735). He further developed an equation to calculate his effective age as follows:

Effective Age

= Real Age *

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

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

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). In 2014, his health improved. 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.

Figure 5 depicts the comparison between his real age and effective age. Of course, the real age increases annually, while the effective age was higher than his real age during 2012-2014 and lower than his real age during 2015-2019. These changes are results from his bad metabolic conditions that were significantly improved over the period of 2015 through 2019. Figure 5 also shows the age difference between effective age and real age. The age difference has changed from +8 years in 2012 to -7 years in 2019.

The life expectancy of an American male is 78.69 years (2016 data). If the author continues his metabolic maintenance and improvement program, he may have the opportunity to extend his life for an additional 14+ years (real age at 87).

Conclusions

This simple calculation based on big data analytics and sophisticated mathematical metabolism model has depicted a possible way to extend our life expectancy via an effective metabolic improvement and maintenance program. This practical method has been utilized and proven in the application of his diabetes control very effectively. The author hopes that this method can also be applied in the field of geriatrics for other people as well [1-5].

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

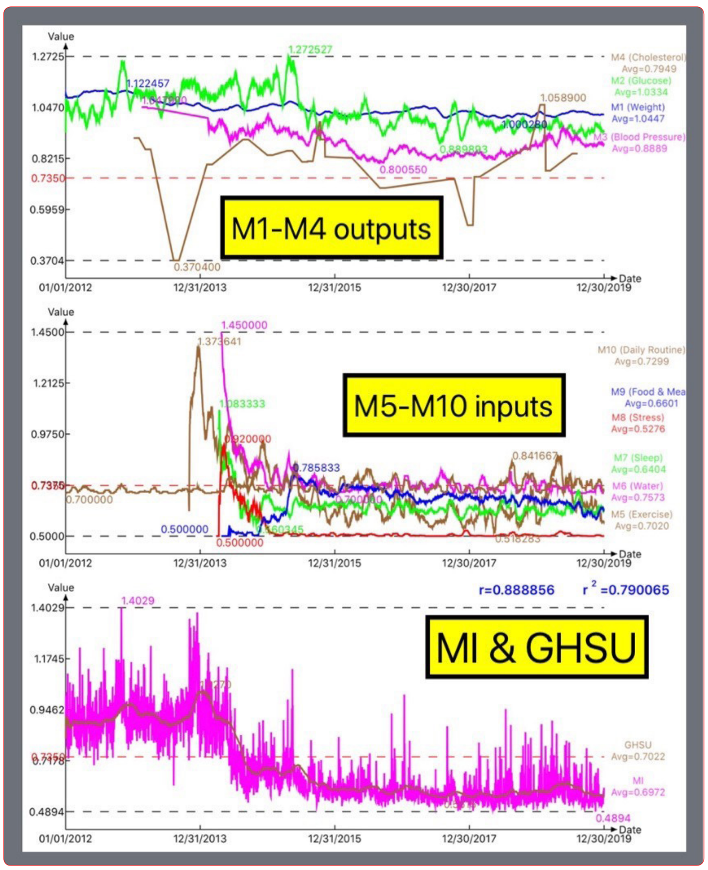


Figure 2: Metabolism model of inputs and outputs

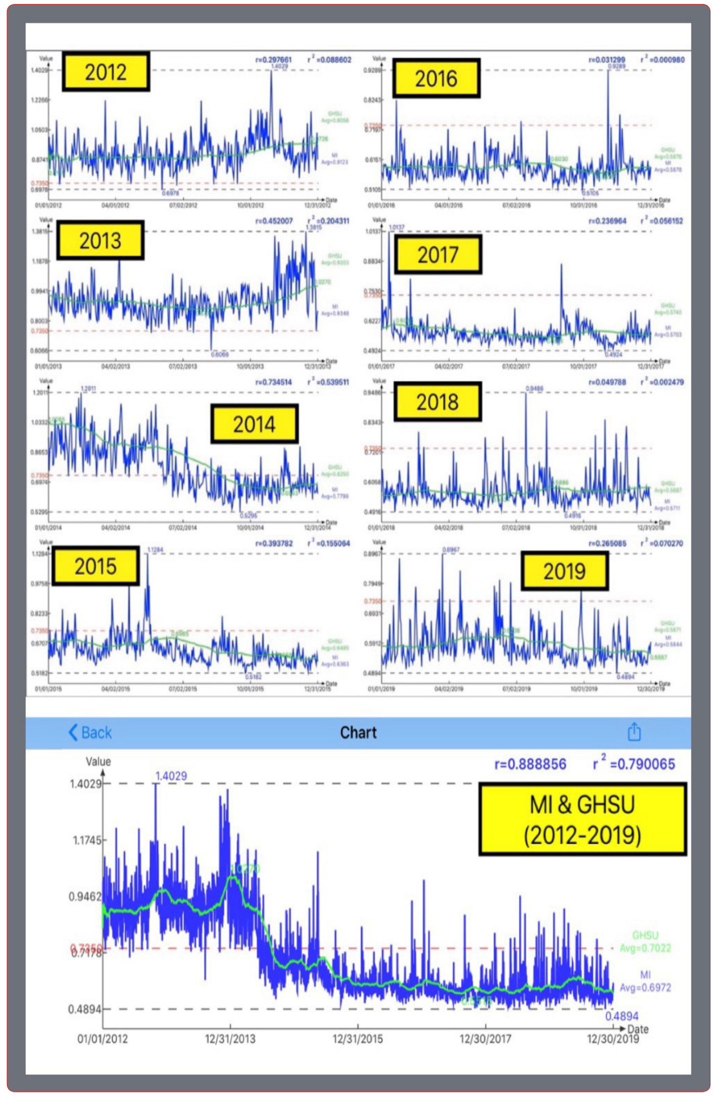
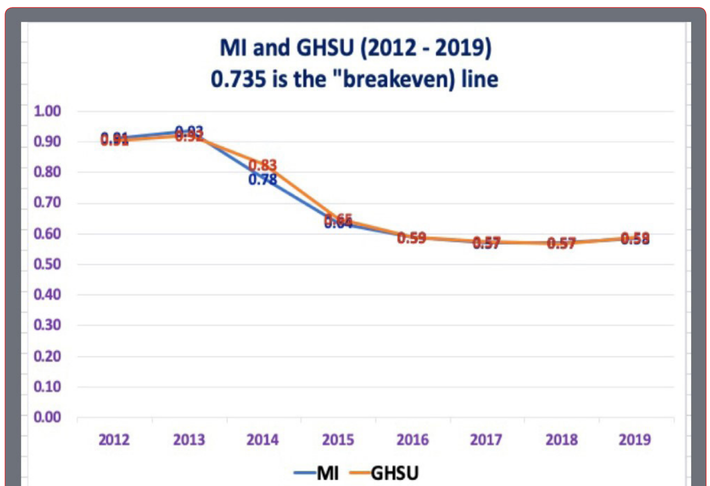
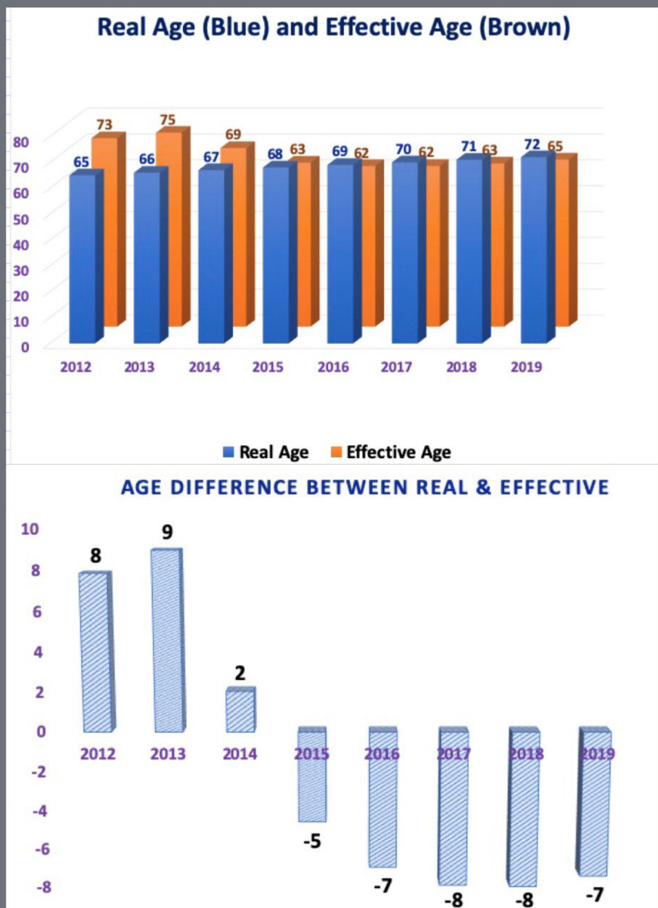


Figure 3: MI & GHSU (2012-2019)



Year	2012	2013	2014	2015	2016	2017	2018	2019
MI	0.91	0.93	0.78	0.64	0.59	0.57	0.57	0.58
GHSU	0.91	0.92	0.83	0.65	0.59	0.57	0.57	0.59

Figure 4: Annualized MI & GHSU



	2012	2013	2014	2015	2016	2017	2018	2019
Real Age	65	66	67	68	69	70	71	72
Effective Age	73	75	69	63	62	62	63	65

	2012	2013	2014	2015	2016	2017	2018	2019
Age Difference	8	9	2	-5	-7	-8	-8	-7

Figure 5: Real & Effective Ages

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