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Review Article

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A Clinical Report on the Relationships Between Metabolism and Obesity, Type 2 Diabetes, Cardiovascular Risk by Using the GH-Method: Math-Physical Medicine

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Introduction

By using the GH-Method: math-physical medicine and big data on one particular patient (the author), this clinical paper describes the relationship between his metabolic state and medical conditions, including obesity, type 2 diabetes (T2D), and cardiovascular risk.

Method

The obese patient was diagnosed with T2D, hyperlipidemia, and hypertension over 25 years ago and suffered five cardiac episodes from 1994 to 2006. For this study, approximately 1.5M detailed metabolic conditions and lifestyle data (1/1/2012 - 12/31/2018) were collected and processed; advanced mathematics, physics concepts, engineering modeling, and artificial intelligence (AI) were utilized rather than following the traditional biology and chemistry approach as research tools. The author defined two new terms: Metabolism Index (MI) and General Health Status Unit (GHSU) to evaluate his overall metabolism and associated chronic diseases.

Here are the Steps to his Research Process:

1. Observing physical phenomena and metabolic changes, collecting relevant data using software.
2. Applying appropriate engineering modeling and deriving various inter-relationship mathematical equations for predictions, along with applying statistics tools for variance and sensitivity studies.
3. Using machine learning and AI to predict important metabolic changes.

Results:

	2000	2010	2012	2017	2018	Note:
Metabolism						
MI & GHSU			102%	57.4%	56.6%	73.5% is "break-even" line
Lifestyle Management						
Food Quantity (% of normal portion)		112%		85%	84%	
Daily Exercise (Walking steps)		2,000		17,863	18,292	
Post-Meal Walking (steps)		500		4,440	4,570	
Obesity						
Weight (lbs)	220	210	196	174	171	took 3 years efforts
Waistline (inches)	46	44	44	33	32	took 5 years efforts
BMI	32.7	31.2	29.1	25.8	25.4	
Diabetes						
Daily Glucose (mg/dL)		279		117	116	Using glucose prediction models
A1C		10.0%		6.5%	6.5%	
Chronic Diseases						
SBP		150	127	106	106	
DBP		100	85	64	64	
Triglyceride (<150)		1161		115	85	
HDL (>40)		24		45	49	
LDL (<130)		174		99	109	
ACR (Kidney <30)		116		25	15	High ACR was the "wake-up call"
Cadiovascular Risk						5 heart episodes (1994 - 2006)
Heart Attack or Stroke (%)	74%		62%	26.4%	31%	Framingham's 2017 is 26.7%

Table 1: Chronic diseases, including obesity, T2D, hyperlipidemia, hypertension show significant improvements when metabolism improved

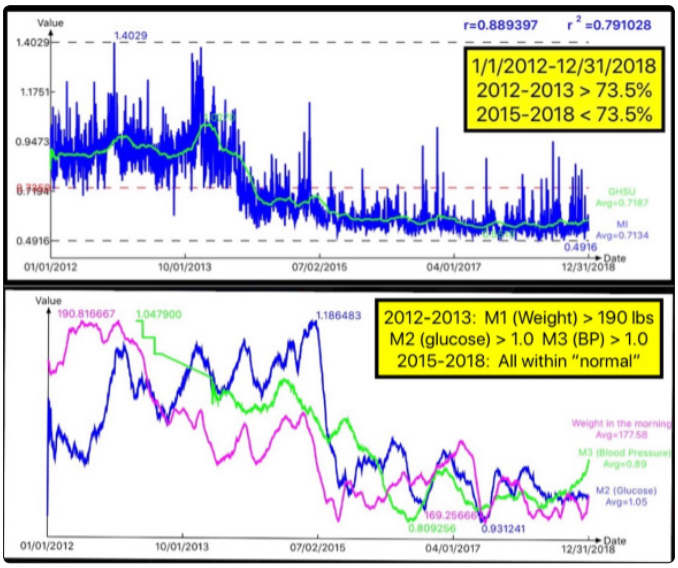

Figure 2: Relationship between Metabolism, including MI, GHSU and chronic diseases

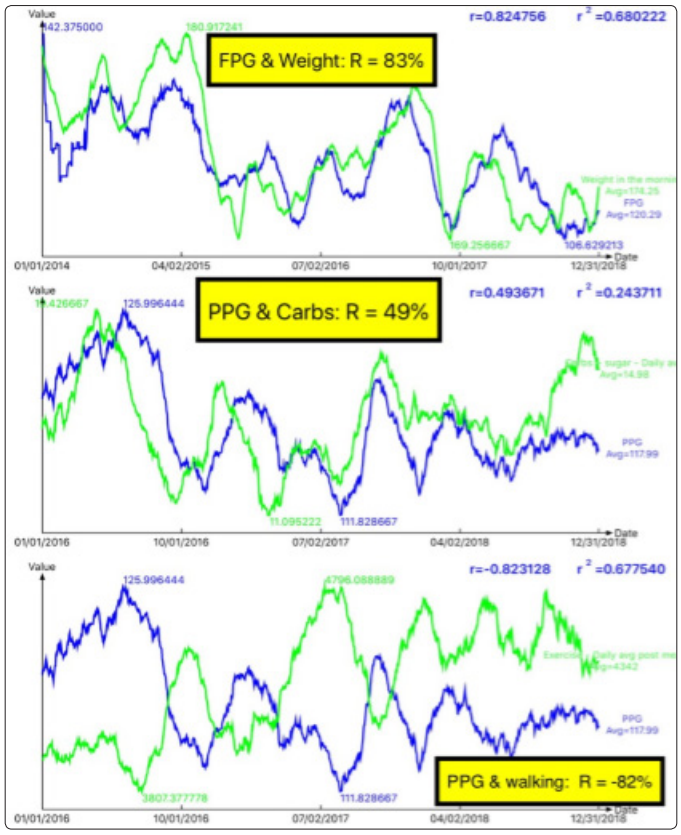

Figure 3: Relationship between T2D and weight, food, and exercise

Year	Probability MI	Probability Medical	Probability Lifestyle	Year Averaged
2000		74%	83%	79%
2012	74%	62%	70%	69%
2013	77%	38%	66%	60%
2014	59%	42%	54%	51%
2015	43%	39%	44%	42%
2016	36%	31%	38%	35%
2017	34%	26%	33%	31%
2018	33%	31%	33%	32%
7-Years	52%	34%	34%	40%

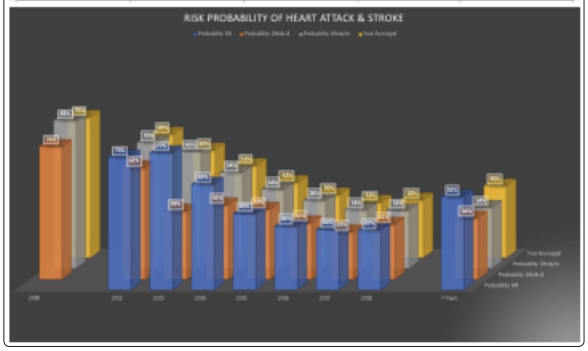

Figure 4: Risk probability of having a heart attack or stroke reducing significantly

Conclusion

This math-physical medicine approach has quantitatively proven the close relationship between metabolic changes due to lifestyle improvement and effective chronic disease control.

Referesces

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