INTERIM REPORT - PYTHON SIMULATION STUDY

This computer model is based on Python to simulate the effects of weight loss medication, specifically focusing on fat versus muscle loss. GLP-1 receptor agonists (Ozempic, Wegovy, and Mounjaro) are medications taken by people (Made for diabetics) to lose weight, but in recent studies, scientists have shown that these medications may be harmful as they lead to loss of weight not only in fat but also in muscle. While these medications show significant weight loss results, it is yet to be determined how much of the loss comes from the muscle. Losing a lot of muscle can be very harmful to any individual, as muscles play a major role in the human body.

I am using a Python simulation to study the fat versus muscle lost in various weight loss scenarios. The study uses a control group of 40 people with randomly generated data values. The simulated data is kept close to real-life data in order to maintain realistic output.

Because patient-level data is not publicly available, the program will generate 40 patients who each are given various characteristics such as an ID number, sex, weight, height, muscle mass, fat mass, activity level, and protein intake level. The code will run this data into a simulation function where I use three different test scenarios [[10% body weight loss, 20% from muscle],[15% body weight loss, 35% from muscle], [20% body weight loss, 50% muscle]] to understand the amount of muscle lost in each scenario. Then the data is represented in a bar graph. I used multiple python libraries to achieve and present my results. The libraries used were pandas (functions), Matplotlib (for plotting), and NumPy (for operations).

After the kickoff, I started by reading review articles on GLP-1 and their findings. I researched multiple programming languages in order to choose the optimal language for a simulation function. Once I finalized that I will be using Python to code my simulation function I enrolled in multiple courses and started to learn Python data types and how to use them in code, lists and libraries, then loops and ways to incorporate

them into my final code. I also read some more documents to boost my understanding of weight loss medicines and its full effect on human health. This allowed me to understand how to structure my code and what values to be included or calculated to achieve the project goal. So far I was able to define my simulation function and I am currently working on incorporating my test scenarios into my code environment.

The final output will be grouped by the three test scenarios and presented in a table as well as a graph. The output is expected to show that as body weight decreases, a measurable percent of that weight loss typically comes from the muscle mass. The output will allow us to understand the amount of muscle lost in different applied scenarios. The study can be further explored to analyze and understand the effects on various age groups, different genders, different BMI's etc.

Citations:

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Neeland, Ian J., Jennifer Linge, and Andreas L. Birkenfeld. "Changes in Lean Body Mass with Glucagon-Like Peptide-1-Based Therapies and Mitigation Strategies." Diabetes, Obesity and Metabolism, vol. 26, suppl. 4, 2024, pp. 16–27, doi:10.1111/dom.15728.

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