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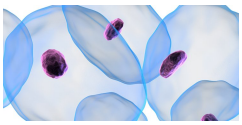


Quantitative analysis of an individuals diet on their metabolism and health 3: modelling blood plasma dynamics with the gut

Supervisors: Maria Suarez Diez, Robert Smith

Contacts: maria.suarezdiez@wur.nl + robert1.smith@wur.nl

Type of thesis: Computational

Required competences: Knowledge of ordinary differential equations (ODEs), their analysis, and ability to simulate systems in MATLAB or Python are desired skills.

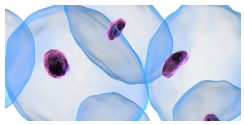
Acquired competences: Model construction and analysis. Parameter sensitivity analysis. Relating simulations to experimental data and understanding how to derive experimental hypotheses from models.

Date: 29-04-2020

Description

Diets and food consumption have a large impact on human metabolism. The wrong diet and the associated metabolic changes can lead to adverse individual health consequences and, on a larger scale, cause society-level issues. Current mathematical models bring together a range of data sources to describe the behaviour of metabolic pathways (e.g. glucose and TAG dynamics) across multiple tissues given a particular input diet. Here, we wish to extend on these models to incorporate dynamics of the stomach, and its effect on TAG levels in blood plasma.

This project will comprise of three key tasks: First, by taking published models of TAG levels in blood plasma and stomach dynamics, you will try combine these into a single continuous system. Second, given data from individuals, can the extended model be fit to the data, providing clues as to the role of stomach regulation of blood plasma TAG levels given an individual's diet. Third, given the metabolic profile of an unhealthy individual, could experiments (either by targeting metabolic pathways or changing the model



inputs/individuals diet) be designed that may yield healthier levels of blood plasma TAG levels in the individual. The results of this project will help inform future studies and experiments in this area.

References

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