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Personalised nutritional advice thanks to digital look-alike

Scientists in Wageningen are using a digital look-alike to predict how people react to meals. Not everyone reacts in the same way to fatty or sugar-rich foods. The ultimate aim: a digitally generated personalised nutritional advice that reduces the rise in blood fats and sugars and thus prevents long-term health risks. ▶

Diederik Esser of WUR.

WUR

Problem: General guidelines work insufficiently to predict individual health risks of fat rich and sugar rich diets.

TO2 solution: Wageningen University & Research combines AI and nutritional knowledge in a digital twin that mimics an individual's biological system and can predict spikes in blood-sugar and fats after a meal. The aim is a personalised nutritional advice, for example via an app, that processes data such as BMI, age, fat distribution, blood pressure and fat response.

Impact: Personalised nutritional advice can make it easier to follow dietary guidelines.

Eat plenty of fruit and vegetables, avoid sugar and be cautious with fats – well-known advice for those who want to stay healthy. There is nothing wrong with these tips, say scientists in Wageningen, but they are actually too general. Each individual responds differently to nutrition. For example, when two people eat bananas, one may have a sugar spike, while the sugar level barely rises for the other. The degree to which this spike manifests itself, has an effect on the development of metabolism disorders such as diabetes. The use of AI makes personalised nutritional advice possible.

A digital twin mimics the reaction in the body and can make predictions about it.

Digital twin

The reaction to a meal is also different for each person on the intake of fats. Not everyone's fat content in the blood rises in the same way after eating a hamburger. This is important to know, because the rate of increase in blood fats is an important predictor of cardiovascular diseases. Unlike for glucose, there are no sensors for monitoring this. WUR does, however, have the data from previous studies of 500 middle-aged overweight people. They use that data to build a digital model that can be used in a digital twin, which mimics the reaction in the body and can make predictions about it.

What makes such a digital copy so convenient is that you can then adapt circumstances and predict effects, says researcher Diederik Esser. A team of researchers are working under the leadership of Lydia Afman on a biological digital look-alike project 'Me, my diet and I'. Aside from nutritionists such as Esser, the team consists of behavioural scientists, bioinformatics engineers, technical public administration experts and consumer surveyors.

Personal preferences

The ultimate aim is a personalised nutritional advice, which includes data such as BMI, age, fat distribution, blood pressure and nutrition, which aims to improve the spikes in blood-sugars

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and fats. By comparing the predictions of the digital twin to the actually measured blood values of fats and sugars, these predictions and the nutritional advice become increasingly more accurate. This information is used in a personalised advice that takes into account personal ▶

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The team wants to test a first prototype of the digital twin on real people.

preferences, such as taste and choice of organic products. Taking this into account increases the likelihood that users will actually follow the advice.

Anticipate

The team wants to test a first prototype of the model on real people. This will make it clear whether the predictions are correct and makes the predictive value transparent. In addition, data of the human guinea pigs provide new input to enhance the prototype even further, says technical public administration expert Marc-Jeroen Bogaardt. He focuses on the data governance and infrastructure in the project and the involvement of stakeholders throughout the digital twin's development. This means, among other things, that the target group – people with health problems – is involved in the project at an early stage. 'We want to take into account what potential end users consider to be important. Some people have doubts about

the use of a digital twin if, in future, it is managed by a commercial party and not by the university. Others have less difficulty with this. We want to anticipate these as well as other concerns and needs of society and thereby enlarge the eventual use and impact.' ■

Who: Multidisciplinary team under the leadership of Human Nutrition and Health (WUR).

Duration: 2019-2021.

Budget: €1.2 million for the whole period.

Follow-up: Personalised advice, e.g. in the form of an app.

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