



Exertion test to measure the physical resilience of a test subject.

Photo: TNO

Tip-top health with vegetables?

Everyone agrees that vegetables are healthy. But how can you demonstrate that eating vegetables makes you healthier? TNO is investigating the health-promoting efficacy of vegetables. Physical stress challenge helps to measure physical resilience and the impact of vegetables on this.

Health research tends to focus on people who are ill. But in terms of food, you want to be able to demonstrate how people who are healthy 'according to the book' can become even healthier. Before health improvement can be measured, better methods of measuring are needed. TNO is trying to develop methods that can demonstrate which are health-promoting foods. 'The ultimate objective is to discover how we can measure health. Our vegetable study is trying to establish the positive health effects of vegetables,' says professor Renger Witkamp, senior TNO researcher and professor of Food and Pharmacology at Wageningen University.

PHYSICAL RESILIENCE

Our physical flexibility, also known as "elasticity of the homeostasis" by researchers, is a good yardstick for health. So TNO is employing a 'challenge' concept to test health and its relationship with food. Witkamp explains how

it works. 'You give the system (the human) a *nudge* (like intensive exertion) and monitor the reaction and recovery. We do that by measuring all kinds of parameters such as immunological resistance, bowel function, cardiovascular functions and metabolism.'

Project manager Dr Wilrike Pasman outlines how the vegetable study works. 'Participants undergo exertion tests once they have eaten hot meals containing 50 or 200 grams of vegetables over a period of four weeks. Both overweight and lean men are taking part. The exertion test is not about how fast or how far you go on the exercise bike but that you put in maximum effort. We then measure the physical recovery by taking blood samples at certain moments and by measuring specific variables that tell us something about damage and recovery. We take a blood sample before and after the test, one hour and twenty-four hours after cycling. We try to use these results

to learn about the effects of vegetables on the recovery of people who differ in their health Status.'

In addition to the effect of vegetables on general recovery, the study will later measure the effect of weight loss on health. 'The participants will no longer have to eat a certain amount of vegetables but just eat a third less than before so that we can measure the impact of weight loss on the recovery and, therefore, health,' Pasman says.

MENTAL STRESS

It is not just physical stress that is being monitored but also mental and metabolic resistance. An example of a mental stress test is the Trier Social Stress Test in which a person has to address an audience without any preparation. How the body responds to this kind of stress is examined. As for a metabolic 'challenge', or metabolism test, physical reaction to, for instance, extra sugar or fat is studied.

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