

PHENFLEX

PHENOTYPIC FLEXIBILITY AND DIET-RELATED HEALTH



TNO innovation
for life

“Phenotypic Flexibility and Diet-Related Health” (PhenFlex) is a TNO research project in which we aim to measure health and the effects of food on health in a new way.

HEALTH

The WHO definition of health is: ‘A condition of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’ (1948). The WHO definition is mostly criticised for the word ‘complete’ in relation to wellbeing, something unachievable for most people. Additionally, there is a growing awareness that health means to be adaptable and flexible to the changing environmental conditions. A new definition for health was suggested: ‘Health is the capacity to adapt to the physical, emotional and social challenges of life’.

MEASURING HEALTH

The objective today is to measure health according to this new definition, in which health is the capacity to adapt to

constant changes caused by external factors. This is also termed phenotypic flexibility, or resilience, and can be used to quantify health. The external influences that pose challenges to the body are, first and foremost, food and lifestyle, but also include the effects of pathogens and other stress factors.

To be able to measure a person’s resilience, the homeostasis of that person must be perturbed, followed by determining the response of single or multiple markers during a limited period of time. The extent of the disruption and the speed of recovery to homeostasis are health indicators (see figure 1). Challenge tests have been designed to temporarily disturb the body’s homeostasis.

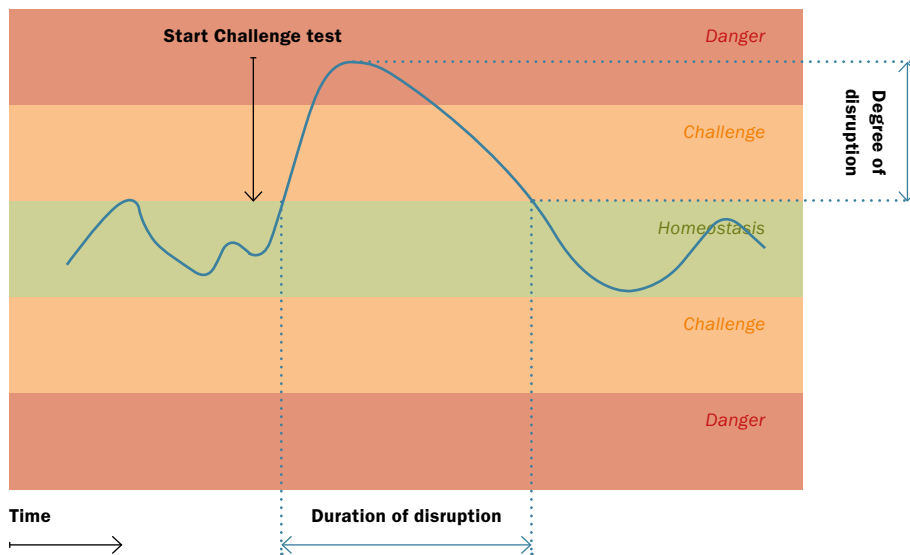


Figure 1: Profile of a single marker during homeostasis under challenged conditions.

Ways of disrupting homeostasis include administering a food challenge (exposure to a high dosage of sugar and/or fats) or a physical challenge (intensive physical exercise). Challenge tests play a key role in the PhenFlex project.

PHENFLEX: TO DEFINE BIOMARKERS OF HEALTH IN ORDER TO SUBSTANTIATE HEALTH CLAIMS

PhenFlex aims to develop a new method of quantifying health and establishing the health-promoting effects of food. Food is vital to maintaining body functions and fostering health. Foodstuffs, by nature, have a complex and diverse composition, which makes it difficult to sufficiently substantiate an effect on health. One of the reasons for this is that the effects of food on the health of healthy people are both multiple and subtle, and thus difficult to measure.

Because the effects of food on health are very subtle, finding suitable biomarkers that are able to reveal these small changes is difficult. The development of a challenge test that is sufficiently sensitive to measure these subtle changes due to food interventions is therefore an important component within PhenFlex.

Using a newly developed and standardized challenge test, PhenFlex wants to achieve the following:

- › Build evidence to assess phenotypic flexibility using food intervention studies including challenge tests;
- › The development of a new generation of biomarkers that assess health and can predict the tipping point when health turns into disease;
- › Development of a standardized challenge test that can be used globally to measure the health effect of the consumption of functional ingredients and food.

By presenting and publishing the results of this project to the scientific community, TNO aims to make this concept generally accepted in food and health research. Subsequently the objective is to have this concept also accepted by regulatory authorities in health claim dossiers.

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TNO HEALTHY LIVING

TNO initiates technological and societal innovation for healthy living and a dynamic society.

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