

Nutrigenomics measures subtle food effects

Healthy food is important but the effects of food ingredients on health is often difficult to measure. TNO researchers have come up with a new technological strategy that is able to identify even subtle effects of food on health. A study into overweight healthy men reveals the positive effect of food additives on their 'inflamed' fat tissue.

The fat tissue of overweight people often becomes slightly inflamed, and this is a key factor in the onset of metabolic problems like diabetes type 2 and cardiovascular diseases. Specific food ingredients can reduce the level of inflammation among people with such symptoms. Nutrigenomics has helped to reveal that food ingredients can also reduce the level of inflammation among healthy overweight men. Nutrigenomics studies the effects of food on health by measuring the interaction between food and metabolic changes (metabolomics), signal proteins like antibodies, hormones and enzymes (proteomics) and our genetic information (transcriptomics).

MARKERS

The inflammation of fat tissue is a new field of research for which no standard risk indicators (biomarkers) have yet been identified, says Dr Gertruud Bakker, the project's chief researcher. 'We were using nutrigenomics to try to find markers. And we have to say: so far, so good. There was plenty of work to do and a lot of data to analyse. The results of the study carried out in 2007 have now been published. We looked at 120 proteins, 274 metabolites and some 16,000 genes,' her colleague, Dr Linette Pellis, adds.

The study involved 36 overweight healthy men being given a daily dose of food supplement containing resveratrol, green tea extract, vitamin E, vitamin C and fish oil for a period of five weeks. 'All of these food ingredients have a demonstrable effect on inflammation. We chose our men carefully. They all had a body-mass index (BMI) of between 25 and 35, which is indicative of overweight. They also had to be healthy, so not have any diabetes, but with a slight degree of inflammation,' Bakker explains. 'Before and after the test period we measured the effect of the supplement on the gene expression in blood and fat tissue and on proteins and metabolites in blood. This enabled us to say something about the effect of the supplement.'

PREVENTION

The study revealed that the level of inflammation in the fat tissue was reduced by the food additives and that this could be measured using nutrigenomics. 'No detectable effect was recorded for the classic inflammation biomarkers such as C-reactive protein (CRP). Body weight and blood pressure were also unaffected. The fat tissue of the participants did, however, noticeably produce more adiponectin (an inflammation inhibitor) – something you only tend to see in considerable weight-loss,' Bakker adds.

In the future the researchers want to use the method for prevention. 'This study was very broad and demonstrated that the nutrigenomics strategy works. We want to find out why one person develops a metabolic problem and another doesn't. And why one



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person responds to nutritional intervention and the other doesn't. Subtle physiological changes may be important, for instance, in preventing diabetes in the longer term. And nutrigenomics can be used to a much wider extent, for instance, to measure all kinds of health parameters,' Pellis believes.

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