Application of New Technologies and Methods in Nutrition Research
The Example of Phenotypic Flexibility

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Background

Diet, foods and food components are prime environmental factors affecting the genome, transcriptome, proteome and metabolome. This life-long interaction largely defines the health or disease state of an individual. The adaptive capacity of the body to alterations in dietary conditions is called "phenotypic flexibility" and is key to maintenance of overall homeostasis and consequently, health and healthy ageing.

Expected results

Apart from the assessment of the emerging technologies, NutriTech will provide a new generation of biomarkers, essential added value to the nutrition and health research area, including the substantiation of health claims. Nutrition and health research is slowly but definitely moving from the use of single and static biomarkers as "intermediate endpoints", usually associated to the development of a disease, to a detailed quantification of processes essential for maintenance of health.

Two major assets in this transition are:
1. the integration of current biomarkers and technologies with modern "extensive phenotyping" technologies, which reveal a wealth of relevant process descriptors, and
2. the inclusion of stress response quantification as an essential characteristic of optimal health.

NutriTech stimulates this development by further developing these two assets, demonstrating their values in a proof of principle study, validating resulting markers in longitudinal cohorts, providing a new integrated view on data analysis and dissemination of the outcomes.

About NutriTech

NutriTech is a European Commission funded FP7 research project (2012-2016). NutriTech is a consortium of 23 partners, from 16 countries including 6 non-EU groups. NutriTech will combine classical approaches of human nutrition research with new analytical technologies and methodologies to comprehensively assess the diet-health relationship and critically assess their usefulness and value for the future of nutrition research. Technologies will include genomics, epigenomics, transcriptomics, proteomics, lipidomics and metabolomics (including flux analysis), laser scanning cytometry, Nuclear Magnetic Resonance (NMR) lipoprotein profiling and advanced imaging by MRI/MRS.

Objectives of the project

1. Evaluate the value of emerging technologies in the quantification of subtle effects of dietary interventions on health;
2. Evaluate the added value of emerging technologies to elucidate mechanisms of action in human studies;
3. Validate the use of emerging technologies for studying human metabolic and physiological adaptive processes in response to a shift from a suboptimal to a healthy diet;
4. Develop the integrated quantification of aspects of phenotypic flexibility as biomarkers of diet-related health improvement;
5. Develop methods integrating established as well as emerging technologies to study nutritional effects on health;
6. Provide guidelines and protocols to harmonise the use of the developed integrated methods;
7. Establish a data infrastructure in a global network of laboratories to disseminate and implement the new methods and technologies developed in nutrition research;
8. Valorise the new integrated technology for the food industry in a renewed effort to demonstrate health benefits of defined dietary interventions.

Partners

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