

Parallel Session RTD Line 2 / Nutrigenomics

Lecture 1: Omics driven biomarker discovery in nutrition and health

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Abstract

While traditional nutrition research has dealt with providing nutrients to nourish populations, it nowadays focuses on improving health of individuals through diet. Modern nutritional research is aiming at health promotion and disease prevention and on performance improvement.

Nutrigenomics addresses how diet influences gene transcription, protein expression and metabolism. A major methodological challenge and first pre-requisite of nutrigenomics is integrating genomics (gene analysis), transcriptomics (gene expression analysis), proteomics (protein expression analysis) and metabonomics (metabolite profiling) to define a "healthy" phenotype. The long-term deliverable of nutrigenomics is personalised nutrition for maintenance of individual health and prevention of disease.

Transcriptomics serves to put proteomic and metabolomic markers into a larger biological perspective and is suitable for a first "round of discovery" in regulatory networks. Metabonomics is a diagnostic tool for metabolic classification of individuals. The great asset of this platform is the quantitative, non-invasive analysis of easily accessible human body fluids like urine, blood and saliva. This feature also holds true to some extent for proteomics, with the constraint that proteomics is more complex in terms of absolute number, chemical properties and dynamic range of compounds present. Apart from addressing the most complex "-ome", proteomics represents the only platform that delivers not only markers for disposition and efficacy but also targets of intervention.

The Omics disciplines applied in the context of nutrition and health have the potential to deliver biomarkers for health and comfort, reveal early indicators for disease disposition, assist in differentiating dietary responders from non-responders, and, last but not least, discover bioactive, beneficial food components.

The talk briefly reviews the state-of-the-art of the three Omics platforms, discusses their implication in nutrigenomics and elaborates on applications in nutrition and health such as digestive health, allergy, diabetes and obesity, nutritional intervention and nutrient bioavailability.