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Proteomics

Protein fingerprints and personalised nutrition

The human body contains some 25'000 genes, but several 100'000 different proteins. Some of these are structural proteins like collagens, others are functional, like the oxygen-transport protein haemoglobin, digestive enzymes or the defensive proteins in the immune system. Every protein in the body is associated with a specific gene and, in the language of genomics, the presence or absence of a protein in the body depends on whether the associated gene is "expressed" or not. Hence, if we can chart all proteins in the body simultaneously, we can create a "snapshot" of protein patterns in body fluids and tissues that can serve as "biomarkers" to indicate which genes are "switched on" and which are "switched off" at a given time in a given health-related condition. This is the promise of proteomics, the protein counterpart of genomics, i.e. the total analysis of proteins in a body sample at a given time.

Pharmaceutical companies began using proteomics to look for protein biomarkers indicating disease states and the effects of drug treatment. Nowadays, the potential of proteomics in food research is increasingly being recognised. Scientists at the Nestlé Research Centre are employing proteomics to address questions of nutrition and health. Nestlé believes that foods and drinks affect individual consumers differently. Why does a food well-tolerated by one individual cause violent gastric discomfort in another? Are there biomarkers for food preference? What genes are activated by specific foods in procuring health and wellness? Certain individuals may be more predisposed than others to conditions like obesity or diabetes. If we at Nestlé can find the protein markers that indicate such predisposition before disease symptoms arise, this can result in dietary approaches to health promotion and disease prevention.

There is no doubt that food affects health and wellness. The difficulty with food research is that the good or bad effects of foods on the body and on the feeling of wellness are much more subtle than the more "black-and-white" situation of pharmaceutical research, which targets disease states. Moreover, food-consumer research at Nestlé is moving into a new era: traditionally, a purely sensorial approach was undertaken, in which the consumer, through questionnaires, served as an almost binary "multitasking" detector. Nestlé is now including genomics and proteomics approaches into consumer research to confer the health and wellness dimension and to more accurately address individual differences in terms of response to diet and food preference. The long-term deliverable of "Omics" driven food research is personalised nutrition.

For more information, please read the entire article:

Kusmann, M., Affolter, M., Fay, L.B., Proteomics in Nutrition and Health, Comb. Chem. & High Thr. Scr., 8, 679-696, 2005

The Internet link:

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=16464156&dopt=Citation