Nutrigenomic, nutrigenetics and modern diagnostics

Lectures

L2.1

Nutrigenetics and intelligent diet

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Personalised, genotype-based nutrition is a concept that links genotyping with specific nutritional advice in order to improve the prevention of nutrition-associated, chronic diseases. There is convincing evidence that variant genes may indeed determine the biological response to nutrients. The effects of single-gene variants on risk or risk factor levels of a complex disease are, however, usually small and sometimes inconsistent. Thus, information on the effects of combinations of relevant gene variants appears to be required in order to improve the predictive precision of the genetic information. Furthermore, very few associations between genotype and response have been tested for causality in human intervention studies, and little is known about potential adverse effects of a genotype-derived intervention. These issues need to be addressed before genotyping can become an acceptable method to guide nutritional recommendations. We suggest that the OLT/OGTT insulin output ratio (NIOR) may be predictive for identifying individuals benefits from low lipid or low carbohydrate diet and are phenotypically susceptible to insulin resistance in response to high fat or carbohydrate in their habitual diet. The possible usage of NIOR index in diet recommendation will be presented during this lecture.

L2.2

Proapoptotic activities of plant polyphenols as an effect of their interaction with membrane rafts

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Plant polyphenols have a broad range of biological activities but specific molecular mechanisms of their action are not well known. They are generally regarded as antioxidants, but there is also evidence that they act as pro-oxidants. In addition to their anti-oxidative or pro-oxidative activities, they are able to control cell signal pathways by targeting receptors on the cell surface or by intercalating the lipid bilayer of membranes. Large differences in biological activities of structurally different polyphenols may be due to differences in their affinities to lipid rafts of cell membranes. Polyphenol influence on lipid bilayer correlates with the number of their hydroxyl groups and the hydrophobicity of molecules. Flavonoid molecules located in the hydrophobic region of the bilayer can initiate formation of additional raft-like domains (raft-making effect), while the molecules located in the polar interface region of the bilayer can fluidize membranes (raft-breaking effect). Because rafts participate in cellular signal transduction, endocytosis and transmembrane translocation of different compounds, polyphenols may control cell metabolism by modulating the bilayer state.