# EFFECT OF MILK FERMENTATION ON GENE EXPRESSION IN HUMAN BLOOD CELLS

F. Sagaya[1,2], B. Walther[1], M. Chollet[1] , R. Hurrell[2,] G. Vergères[1]

[1]Agroscope Liebefeld-Posieux (ALP), Switzerland
[2]Laboratory for Human Nutrition, Swiss Federal Institute of Technology Zurich (ETHZ), Switzerland

Novel developments in biological sciences, in particular the rise of systems biology, can now be applied to nutritional sciences. In this context, the field of nutrigenomics currently emerges as a powerful tool to study the mode of action of nutrients in humans.

The primary objective of this study is to define global patterns of gene expression in human blood cells that characterize the short-term response of healthy individuals to a single ingestion of milk and yogurt. The transcriptome resulting from the exposure of the volunteers to the bioactive components present in these dairy products was determined using microarray technology.

In order to understand the mechanisms by which the fermentation of dairy products imparts its beneficial effects on health we have conducted a randomized, controlled single-blinded crossover human nutritional intervention trial. Six Healthy male volunteers were set on a controlled diet devoid of dairy products and fermented food three days prior to the single ingestion of either 540g milk coagulated with Glucono-delta lactone or yogurt. Blood samples were taken before (t=0h) and after (t=2h, 4h, 6h) ingestion of the dairy products. Total RNA was purified from whole blood and global gene expression was analyzed on DNA microarrays covering the entire human genome represented by 44’000 probes.

Raw intensity values were normalized using SNOMAD (Standardization and Normalization of Microarray data) R package.

Analysis of variance was applied to normalized values and linear contrast was computed for all probesets.

This approach identified 576 and 626 statistically significant genes (FDR 12.5%) that responds differentially to the ingestion of either yogurt or milk respectively.

An effect related to macronutrient components in dairy product was observed as gene involved in protein biosynthesis were up regulated (ribosomal proteins).

Effects related to bioactive components in dairy products were also observed (TLR2).

We intend to conduct further nutritional trials based on the results of this gene expression study. In particular; we plan to compare the effect of different lactic acid bacteria, including probiotics, on gene expression. Such studies will eventually lead us to the identification of molecular biomarkers for the selection and the development of bacterial strains producing dairy products with specific nutritional and health properties.