

Multivariate chemometric analysis reveals the effects of long-distance walking from flow cytometry of neutrophils and breath analysis

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Despite the obvious role of physical exercise in our health, not all its effects on the human body are fully understood. In the present investigation, the neutrophil immunoresponse and breath metabolites were monitored in 100 people aged 65 ± 6.7 years during the “4-Day Marches”, an annual long-distance walking event in Nijmegen. Both measurements were performed on-site in mobile labs, using Multicolor Flow Cytometry (MFC) and Proton Transfer Reaction Mass Spectrometry (PTR-MS), respectively.

The experimental data were analyzed by chemometric techniques such as Principal Component Analysis (PCA), Partial Least Squares (PLS), and ANOVA-Simultaneous Component Analysis (ASCA). All these methods find combinations or patterns of instrumental variables that best explain the data according to a given criterion, e.g. variance, correlation with a sample property or the experimental design. The multivariate approach allows for detecting effects that are often not visible on any variable taken singularly.

This analysis found some time-trends general to the whole study group, both for the MFC and the PTR-MS data, whereas other trends, e.g. the activation-deactivation patterns of neutrophils, were specific to certain subgroups. Several links were found between these subgroups and individual characteristics such as age, medicine use and regular physical exercise.