

Multivariate Data Analysis of Erythrocyte Membrane Phospholipid Fatty Acid Profiles in the Discrimination between Normal Blood Tissue and Various Disease States

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The aim of the study is to compare the fatty acid composition of red blood cells of patients with different disease states and to test the hypothesis that the changes in fatty acid profiles derived from erythrocyte phospholipids might be relevant to various diseases. The study consisted of 342 blood donors, among them 135 with inflammatory bowel disease, 53 with uterine leiomyoma, 14 with verified absence of uterine leiomyoma, 52 with asthma, 18 with colon adenomas, and 70 blood samples without any of mentioned diseases that was used as a control group. The fatty acid methyl ester (FAME) composition of the total red blood cell phospholipid fraction was analyzed by gas chromatography (GC) with flame ionization detector (FID). Additionally two fatty aldehyde dimethyl acetals (16:0 DMA and 18:0 DMA) derived from erythrocyte membrane plasmalogen phospholipids were also determined. The resulting fatty acid and plasmalogen linked fatty acid composition was evaluated by the principal component analysis (PCA). We demonstrated decreased levels of omega-3 polyunsaturated fatty acids (n-3 PUFAs) in red blood cell membrane of patients with colon adenomas. Also, a large negative correlation was observed among all samples between the quantity of saturated acids and arachidonic (20:4n6) acid as well as between saturated acids and adrenic (22:4n6) acid. In PCA score plot a group of female donors is distinguished mainly by the content of linoleic (18:2n6) acid; a small subgroup shows its concentration highly above the average value. At the same time, the same subgroup has both dimethyl acetals below the average concentrations. The study demonstrates feasibility of multivariate data analysis in discrimination of patients with different diseases according to their fatty acid profiles.