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Metabolic markers of hypertension in ISIAH rats

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Arterial hypertension, being a complex multifactorial disease, affects various organs and tissues, eventually altering their metabolism. Search for metabolic markers of the disease is considered to be essential for working out ways of diagnostics, treatment and prevention. The aim of our research was to identify metabolic markers for hypertensive disease. In our study, NMR technique was applied to detect concentrations of 50 low-molecular metabolites in the serum sampled from the 6-month-old ISIAH rats with inherited stress-dependent arterial hypertension. Control group was formed of normotensive WAG rats of the same age. Statistical analysis of the data (two-way ANOVA with Tukey post-hoc test) showed that ISIAH rats had significantly lower serum concentrations of citrate, creatine, cytidine, dimethylglycine, formic acid, glucose, glycine, mannose, methionine, terephtalic acid and threonine, as compared to WAG rats. These data may indicate the alterations in TCA cycle and β-oxidation of fatty acids, which are due to arterial hypertension pathogenesis. Decreased levels of glycine in hypertensive rats may alter many metabolic pathways, although, according to previous studies, glycine concentration may be restored through oral consumption, which results in lowering blood pressure and reversing some of the adverse effects of the disease, if administered at the early stages. In addition, multivariate statistical analysis was performed on the data obtained. Principal component analysis demonstrated that differences between ISIAH and WAG rats may be due to alterations in β-oxidation of fatty acids and regulation of arterial wall elasticity involving NO-synthase and nitric oxide. Therefore, metabolic profiling does provide important information for understanding molecular mechanisms underlying the pathogenesis of arterial hypertension in ISIAH rats.
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