Pharmacogenetic approach in treatment of arterial hypertension in children

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Background: Hypertension affects up to 5% of all children and the incidence of pediatric hypertension is increasing, mainly due to an increase in primary (essential) hypertension. Evidence suggests that blood pressure response and outcomes associated with antihypertensive drugs are influenced by genetic variation. Most of medications used for adults can be also used for children. However, efficacy data is limited for the pediatric population.

Objective: To analyze the efficacy of hypertension treatment approach in children, based on evaluation of specific genetic polymorphisms responsible for hypertension.

Methods: The study subjects consisted of 54 adolescent patients with essential hypertension [mean age 13.2 ± 2.9 years]. We identified the following genetic variants of ADD1 1378 G>T, AGT 704 T>C (Met235Thr), AGT 521 C>T (Thr174Met), AGTR1 1166 A>C, AGTR2 1675 G>A, CYP11B2 344 C>T, GNB3 825 C>T, NOS3 786 T>C, NOS3 894 G>T (Glu298Asp) in all subjects. Gene DNA was extracted from blood samples and amplified by polymerase chain reaction (PCR). We divided all patients into two groups. First group consisted of 26 children who received treatment based on their genetic profiles. Subjects from the second group (29 subjects) have been treated in strict accordance with the fourth report on the diagnosis, evaluation and treatment of high blood pressure in children and adolescents without taking genetic profile into consideration.

Results: All children had more than five genetic polymorphisms of genes, associated with arterial hypertension in the homozygous or heterozygous state. In our study genetic-based treatment was statistically more effective than traditional. As a result of treatment systolic blood pressure lowered more significantly in first group (14.4 mmHg) vs second group of patients (6.1 mmHg), p<0.05.

Conclusions: Our study has shown that hypertension treatment based on evaluation of individual’s genetic profile is more effective than traditional. The study suggests that current management strategies for treatment of essential arterial hypertension in children need to be changed, and pharmacogenetics may be a tool to help achieve a goal.