P1-149

CHD Variant Dependence on Toxic Substances Content in Cardiovascular Tissue

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INTODUCTION: Etiology of congenital heart disease remains unsolved problem of pediatric cardiology. There are about 30 metals and metalloids that are potentially toxic to humans. Some of them, according to the experimental data, able to penetrate the placental barrier and violent cardiogenesis.
METHODS: We had determined content of toxic substances in 107 biosubstrates of heart and great vessels of 55 patients with CHD: 34 boys and 21 girls in age from 14 days till 17 years. Among 31 CHD variants 17,7 % of patients had heart malformations, 22,6 % – great vessels, the combination of heart and vascular malformations – 59,7 %; simple defects – 21,8 %, combined (2 to 8 variants) – 78,2 %. All patients were examined by the spectral analysis of Al, Cd, Pb, Hg, Be, Ba, Tl, Bi, As, Ni, Sb, Sn, Sr, Ti, W, Zr, Ag, Li, B, Co, Si, V content in heart and great vessels tissue by methods of the atomic emission spectrometry in the inductively coupled plasma and atomic absorption spectrometry with electrothermal atomization.
RESULTS: the presence of 12 toxic metals and metalloids (Al, Ba, Li, Ni, As, Sr, Pb, Zr, Sn, Ti, Ag, W) was documented in the cardiovascular tissues of patients with severe combined CHD, compared with children who had simple defects (9 substances). The average concentration of Ni, W, Ti and Ag ($p \leq 0,05$) was higher in patients with two or more malformations compared with children who had one. The presence of 3 and more toxic metals in pathological concentrations had 31.8% patients of complex combinative CHD, which were statistically significantly more higher than in patients with simple defects (7.1%) , $p < 0.05$. The greater amount of toxic metals in pathological concentration and a high concentration of Ba, As, Pb, Ag, Ti, Zr, Sn was revealed in patients with combined defects (heart and great vessels) compared with patients with isolated heart or great vessel defects.
CONCLUSIONS: Our results had determinate dependence on CHD complexity of toxic metals and metalloids quantity and concentration in cardiovascular tissue, that may indicate possible pathological impact of toxic substances on cardiogenesis violation in children.