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Toxic Metals in Children's Heart Tissue

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OBJECTIVES: investigation of toxic metals content in heart tissues of children with and without congenital heart diseases (CHD).

METHODS: We had divided children in 2 groups. In first group we had included 46 children (aged from 14 days to 17 years) and 2 fetus with various cardiovascular malformations. The second group were 19 children and fetuses without CHD, died from different reasons. 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 in intraoperative and autopsy biopsies of endocardium, myocardium, pericardium, aorta, pulmonary artery, ductus arteriosus by methods of the atomic emission spectrometry in the inductively coupled plasma and atomic absorption spectrometry with electrothermal atomization.

RESULTS: We revealed the presence of toxic metals in heart tissue in $85,4 \pm 5,1\%$ ($p < 0.05$) of patients with cardiovascular malformations and in $47,4 \pm 11,5\%$ children without CHD. Patient of first group had exceed of acceptable level of barium, aluminum, lithium, nickel, strontium, arsenic, zirconium, lead; patients of second group - barium, aluminum, nickel. We had determined that children with cardiovascular malformation significantly ($p < 0.05$) more frequently in comparison with patients without CHD had Ba, Al, Li and Sr in heart. In children with CHD we discovered dependence of the toxic metals level concentration and the topography of biopsy: at the location of the malformation – in locus of aortic coarctation, valve atresia, in septum of septal defects open ductus arteriosus it concentration was significantly ($p < 0.05$) higher than in other heart and vessels areas. Children with elevated toxic metals level in heart tissue significantly frequently ($p < 0.05$) had combined CHD.

CONCLUSIONS: The above mentioned is the basis for suggestion about possible barium, aluminum, lithium, and strontium, role in cardiogenesis violation in humans. Future development of this methods may possible serve as addition diagnostic tool in detection of congenital heart diseases in fetus and kids.