The features of the toxic metals content in malformation locus of the heart tissues of children with CHD

Koval O.P. (1), Nagorna N.V. (1), Mokryk I. Yu. (2)
pediatric department of Training Research Institute of Postgraduate Education of Donetsk National Medical University n.a. M.Gorkiy, Donetsk, Ukraine (1) children’s cardiology, cardio surgery department in Institute of urgent and recovery surgery n.a V.K. Gusak of Ukraine National Medical Academy, Donetsk, Ukraine (2)

OBJECTIVES: comparative analysis of toxic metals content in normal heart tissue and in malformation’s locus of children with congenital heart diseases (CHD).

METHODS: We had determined content of toxic in 107 biosubstrates of heart and great vessels of children with CHD (n=55), 82 sample (76.6%) presented by intraoperative bioptates. We have selected 38 children, which had biopsies of the affected (locus malformation) and unaffected areas of the heart. For comparative analysis was used Wilcoxon T-test. All patients were examined by the spectral analysis of Al, Cd, Pb, Hg, Be, Ba, Ti, Bi, As, Ni, Sb, Sn, Sr, Ti, W, Zr, Ag, Li, B, Co, Si, V 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 a wide range of toxic metals, a total of 10 in different areas of the heart and great vessels tissues, including malformation locus in children with CHD. The average concentration of toxic barium, lithium, nickel and arsenic in both investigated hearts areas had exceeded standard rates. The concentration level of toxic metals aluminum (p=0,011), nickel (p<0,001), barium, strontium, lead, arsenic and titanium was higher in malformation locus rate than in other parts of the heart.

CONCLUSIONS: The findings indicate about feature of the content of toxic metals in a locus malformations of the heart with a congenital defect and suggest about possible role of aluminum, nickel, barium, strontium, lead, arsenic and titanium in cardiogenesis violation in humans.