THE INFLUENCE OF ENVIRONMENTAL FACTORS ON KIDNEYS IN CHILDREN: PROBLEMS AND PERSPECTIVES (clinical and experimental study)

Head of the department: prof. Odynets Yu.
Golovachova V.

Kharkiv National Medical University, Department of Pediatrics № 2, Kharkiv, Ukraine

OBJECTIVES

Assess the possible role of environmental factors in the development of renal pathology in children by means of clinical and experimental research.

METHODS

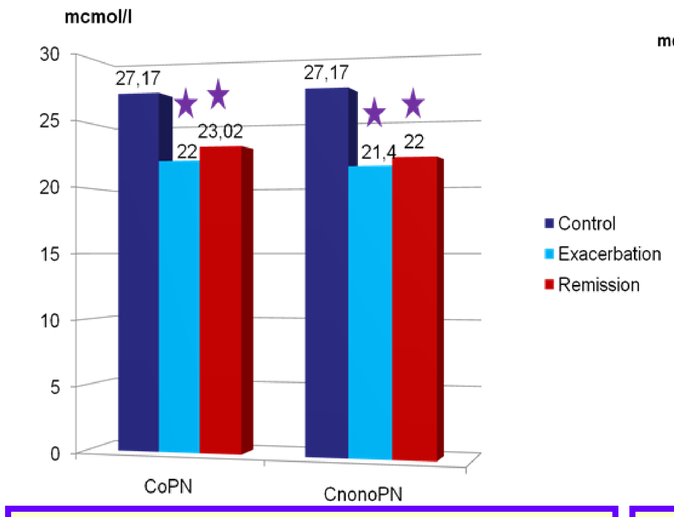
Clinical part of the work

99 children aged 1 to 18 years suffering from different nephropathies were examined, among them 38 children who live in districts with high pollution level and 61 patients who live in districts with low pollution level. 14 healthy children complete control group. Determination macro- and microelements of hair and blood serum were performed by spectrophotomeric method with the use of atomic absorption spectrophotometer "Saturn".

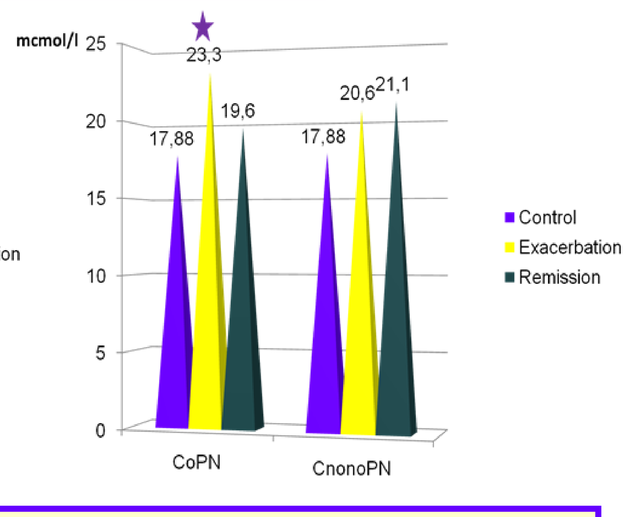
Experimental part of the work

was carried out on 3 months old Wistar rats and their descendants in the newborn period. The basic group (50 adult rats) was exposed to low-level electromagnetic radiation of centimeter range (1-10cm) with power flux density of up to 3mW/cm2 for 4 hours every day in the course of 1 month before and during pregnancy. 50 animals of the control group spent 4 hours in the chamber every day, the size of the chamber corresponding that the camera device. Morphological study of the descendant rats was performed.

Clinical part of the work



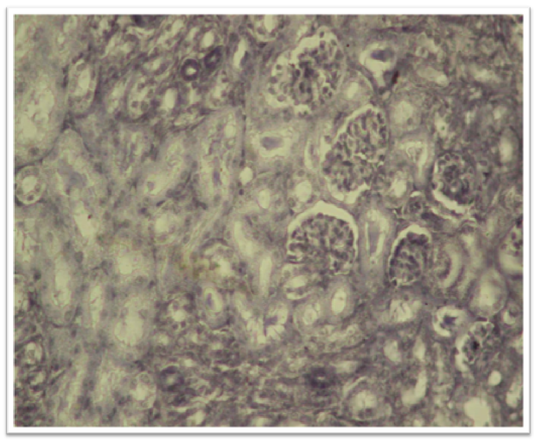
Pic.1. The level of zinc in blood serum of children with chronic pyelonephritis



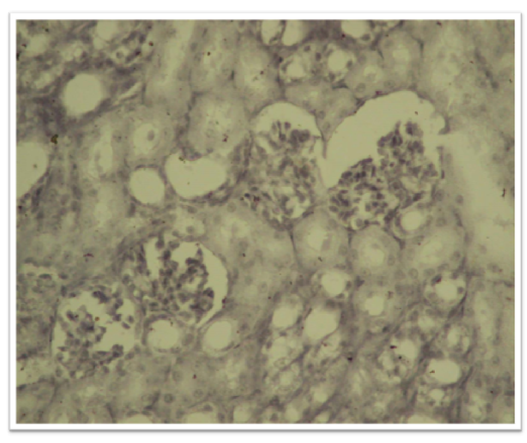
Pic.2. The level of copper in blood serum of children with chronic pyelonephritis

Note. p<0,05 as compered with indices of children in control group

Experimental part of the work



Pic. 3. Functionally active and embrional glomeruli in kidneys of newborn rats of control group. Staining with gallocyanine by Einarson. Ampification×100



Pic. 4. Increased glomeruli size in kidneys of newborn rats of main group. Staining with gallocyanine by Einarson. Ampification×100

RESULTS

Clinical part of the work. Increased levels (p<0,05) of lead (>0,15 mkg/g) and nickel (>9,9 mkg/g) in hair were found in children with nephropathies from ecologically "polluted" regions as compared to children from the "clean" regions of the city (<0,15 mkg/g and <9,9 mkg/g accordingly) and control group (lead 0,03±0,02 mkg/g, p<0,02; nickel 8,1±1,35 mkg/g, p<0,001). Besides, decreased level (p<0,05) of zinc of blood serum lower than 20,8 mcmol/l and increased level of copper of blood serum higher than 19,8 mcmol/l were found which is indicative of development of ecology related nephropathies in children. Levels of zinc and copper of blood serum were 27,17±0,75 mkg/g and 17,88±0,79 mkg/g accordingly.

The *experimental part* of the study showed that kidneys of the rats of the control group exposed to intrauterine influence of electromagnetic radiation were coated with evenly distributed thin layer of connective tissue capsule. The cortical substance contained 5 to 7 rows of nephrons. Glomerular capillaries were located compactly. Some the glomeruli located under the capsule were in embryonal condition. That is not yet involved in the work. Kidneys in descendant rats of the main group were covered with connective tissue capsule, in some places slightly wrinkled. Visual decrease was observed in the number of the glomeruli in the main group compared to that in the control group. There were less embryonal glomeruli in the main group than in the control one. The lumens some glomeruli were narrowed, the epithelium being edematous.

CONCLUSIONS

Based on the results obtained, the negative influence of environmental factors and electromagnetic radiation on the child's organism may be assumed, which dictates the need to develop methods of prevention to minimize the negative influence of exogenous factors.