The aim of this pilot study is to establish some mechanisms of morphological, immunohistochemical and metabolic changes of chronic cystitis and pyelonephritis in patients inhabiting the radiocontaminated areas of Ukraine.

The first part of our study was based on 40 patients with symptoms of chronic cystitis which were referred for cystoscopy to the Institute of Urology and Nephrology in Kiev in connection with benign prostate hyperplasia. The experimental group included 20 patients (male, 30 to 76 years old) treated from 1992 to 1994, inhabiting the radiocontaminated areas of Ukraine and the control group included 20 identical patients who were treated from 1984 to 1985 i.e. before the Chernobyl accident.

Morphological, proliferative and indications of possible genetic changes in bladder urothelium from patients with chronic cystitis from both groups were compared by immunohistochemical staining of proliferating cell nuclear antigen (PCNA), Ki-SI and indication of p53 expression. Our study has shown that p53-immunoreactivity occured in the nuclei of all layers of urothelium in 90% cases of experimental group. In the control group 70% of urothelia were p53 negative. The simultaneous p53 and PCNA overexpression as seen in urothelia in the experimental group possibly indicates the failure of check-point controls connected with their functions in cell-cycle phases. The results leave us with a possibility that continuous exposure to radioactive cesium which is known to concentrate in the urine during excretion adds to other possible carcinogenic influences. The study could also to the understanding of the progressive increase of bladder cancer in Ukraine.

The second part of our study based on 120 patients treated in the same Institute in period 1991-1995. 40 patients inhabiting the ecologically clean regions (group 1) and 80 patients living on the radiocontaminated areas (group 2). The third control group included 30 healthy people who had been examined before the Chernobyl accident. We studied the activity of free radical oxidation (FRO) by measurement of maloniledialdehyde (MDA), antioxident protection (superoxidedismutase), lactatedehydrogenase (LDH) and malatedehydrogenase (MDH) as the markers of energetic metabolism.
Patients with pyelonephritis from both groups had the increased MDA levels in cellular erythrocyte membranes and urine against the control, especially in the group 2. This date indicated the higher activity of FRO caused more significant unbalance of lipid structure of cellular membranes in comparison with the group 1. At the same time inhibition of superoxidedismutase activity was noticed in the blood serum of these patients. The total LDH and MDH activities were increased. Evidently, this date reflected the serious disorders in the aerobic and energetic metabolism in kidneys. The investigation of their isozymes discovered the more deep alterations in patients of the group 2 than in the group 1, such as the more expressive decrease of the mitochondrial m-MDH, the aerobic LDH-1 and LDH-2 fractions, on the one hand, and the increase of the cytoplasmic c-MDH, the anaerobic LDH-4 and LDH-5 fractions, on the other hand.

The early postoperative period in calculous pyelonephritis patients in the group 2 was accompanied by the deeper metabolic disorders, too.

In conclusion we could suppose that the long-term low doses of irradiation provoked the negative metabolic action followed by the progression of chronic pyelonephritis.