

Cytogenetic analysis of breed resources of valuable fish species

Micronucleus (MN) test is one of the cytogenetic methods that uses aquatic organisms to assess the genotoxicity of water by the level of cytogenetic indicators. Research reports maintained that it can be applicable to freshwater and marine fish. The incidence of micronuclei in fish serves as an index of these types of damage and counting of micronuclei is much faster and less technically demanding than scoring of chromosomal aberrations [1]. In our work has been used micronucleus test and analysis of frequency of apoptosis of blood cells of paddlefish (*Polyodon Spathula*) and sterlet (*Acipense Ruthenus*).

The goal of investigations is to study of specificity of genetic variability by the cytogenetic indicators in groups of valuable fish species such as: paddlefish and sterlet.

Paddlefish (*Polyodon Spathula*) were caught at the ponds of the IF “Nyvka” of the Kyiv region and fish farm “Girskiy Tikich” of the Cherkasy region. Group of sterlet (*Acipense Ruthenus*) (10 individuals) from fish farm “Osetr” Kyiv region has been sampling. Peripheral blood has been obtained from the dorsal vessels of each individual by vertically puncturing of sterile syringe. It was carried out cytogenetic analysis in peripheral blood smears of fish using the micronucleus test and analysis of apoptosis frequency. The MN assay was performed as per the protocol of Davydov O. N. and Temnyhanov Y. D. but with own modifications [2]. There were counted the occurrence frequency of erythrocytes with micronuclei (EMN), lymphocytes with micronuclei (LMN), binuclear lymphocytes (BNL) and apoptosis. Statistical probability of differences by the cytogenetic indicators was assessed using the Student’s t-distribution.

The results of cytogenetic analysis of sterlet demonstrated that this fish were characterized not higher level of erythrocytes with micronuclei (EMN) ($2.6 \pm 0.4\%$). The frequency of lymphocytes with micronuclei (LML) was ($2.4 \pm 0.3\%$). The values of binuclear lymphocytes was $1.9 \pm 0.2\%$. The presence of binuclear lymphocytes at this level indicates about a little effect of direct-acting mutagens on the mitotic apparatus. According to the frequency of apoptosis, the group of starlet was characterized by the following values ($2.7 \pm 0.4\%$). This indicator testifies that a significant number of genetically defective cells were eliminated by programmed cell death, which made it possible to control normal cellular homeostasis in the studied group of sterlet and about normal ecological

conditions of water.

According to cytogenetic indicators, the studied group of paddlefish from farm “Girsky Tikich” was characterized by an medium value of EMN ($2.8 \pm 0.4\%$) but, at the same time, a low level of apoptosis ($0.8 \pm 0.5\%$). As to results of the comparative analysis of the same age groups of paddlefish caught in the same period in the farms “Nyvka” of the Kyiv region. and “Girsky Tikich” of the Cherkasy region. it was established that both groups of paddlefish are characterized by a different, but not high level of cells with micronuclei. As to the frequency of apoptosis ($1.2 \pm 0.3\%$) the groups of paddlefish from farm “Nyvka” was characterized by higher values. Statistically significant differences were determined by the frequency of EMN ($P < 0.005$). However, the middle values of this indicator indicates about normal cellular homeostasis and favorable living conditions. The results of studies of paddlefish breeding herd from farms “Nyvka” and “Girsky Tikich” are demonstrated that these groups are characterized by low values of cytogenetic indicators, which indicates about stable state of their genetic apparatus.

Comparative analysis of the same age groups of paddlefish from farms “Nyvka” and “Girsky Tikich” showed statistically significant differences by the frequency of EMN ($P < 0.005$), and that the last group was characterized a higher value of EMN ($2.8 \pm 0.4\%$). Also, as to result of cytogenetic studies, it was established that for an objective assessment of the heterogeneity of paddlefish breeding herds, it is necessary to analyze cytogenetic indicators in cells of both the erythrocyte and leukocyte series.

1. *Fagr Kh. Ali, El-Shehawi A. M., Seehy M. A.* Micronucleus test in fish genome: A sensitive monitor for aquatic pollution // African Journal of Biotechnology. — 2008. — Vol. 7, No 5. — P.606–612.
2. *Давыдов О. Н., Темниханов Ю. Д., Куровская Л. Я.* Патология крови рыб. — К.: ИНКОС, 2006. — 206 с.