Blood cell structure in Baikal omul (Coregonus migratorius Georgi) and changes under phenol exposure

Vera Yakhnenko*, Igor Klimenkov, Anatoly Mamontov, Elena Dzuba, Olga Chetverikova

with 8 figures and 2 tables

Abstract: The main organ of myelo- and erythropoiesis in Baikal omul (Coregonus migratorius Georgi) is the spleen and the main organ of lymphopoiesis is the kidney. Blast and maturing blood cells are also present in the tissues of the body kidney, gills, all sections of the gut, heart and liver. In this study, myelopoiesis was measured in omul after 1 h of phenol exposure (at concentrations of 3 and 6 mg L⁻¹) and lymphopoiesis was measured after 1 day of phenol exposure (at concentrations of 3, 6 and 12 mg L⁻¹). Myelopoiesis was inhibited at a phenol concentration of 12 mg L⁻¹. Ultrastructural disorders occurred in the blood cells as a result of toxicant effects and included vacuolisation of mitochondria and damage to mitochondrial cristae, destruction of endocellular structures, decrease in the number of ribosomes in the cytoplasm, fragmentation and vacuolisation of intracellular organelles, increase and swelling of the perinucleus space.

Keywords: Immunocytes, haematopoietic organs, peripheral blood, Lake Baikal, pollution.

Introduction

Baikal omul (Coregonus migratorius Georgi) is the most abundant representative of the coregonid fishes in Lake Baikal, Russia. It has adapted to a habitat of great depth (350 m) and water of low mineral content. As the general quality of water in Lake Baikal is satisfactory, and considered to be constantly pure (Ministry of Environment and Ecology of the Russian Federation 2012), the ecological and physiological state of omul may be regarded as being close to pristine.

The immune system of fish functions to promote stable conditions in the internal environment. However, unlike in higher vertebrates, in such species both haematopoietic and immune functions are carried out by the same organs. As a consequence, cellular elements of