Iron is an essential component of metabolic and immunological processes. This element is used as a cofactor of several enzymes involved in basic cellular processes such as DNA replication and repair, reduction of ribonucleotides or electron transport in the mitochondria. Maintaining a balance between uptake of iron from food, and its transport and storage is extremely important and requires interaction of many genes. Over the past few years some of them were discovered and described in mammals, for example, hepcidin, transferrin and transferrin receptors. In contrast to the mammals, in lower vertebrates, e.g. carp (*Cyprinus carpio* L.) the role of these genes and the relationship between them has not been widely known. Furthermore, carp has a tetraploid origin and some of these genes were duplicated. On the other hand, this makes that *C.carpio*, is a unique model in evolutionary studies on the functional divergence of duplicated genes. The aim of this project is to determine the role of proteins involved in iron metabolism, with respect to defense mechanisms of the immune system in common carp. Research will focus on intra- and extracellular processes, transportation, reduction, accumulation and release of this element. For this purpose the expression pattern of genes related to iron metabolism: divalent metal transporter (DMT1), ferroportin (FPN), ferritin (FER), transferrin (TF), transferrin receptor (TFRs), hepcidin (HEP), metalloreductase (SEAP3) and iron regulatory proteins 1 and 2 (IRP 1, 2) will be determined. Analysis of the expression of these genes will be done bi-directional. In the first part of the project, research will focus on understanding the interactions between the parasite that obtains iron from infected organism, and host, whose function is to immobilize of this element. Changes in the expression of these genes will be tracked. For this purpose, the real-time PCR (RTq-PCR) reaction will be carried out on fish samples of various tissues collected at serial time points after infection with blood parasite (*Trypanoplasma borreli*). In the second part of the project we will try to explain the participation of genes involved in iron metabolism during the immune response. It is known that some of these genes, e.g. ferritin react by changing their expression not only under the influence of varying concentrations of iron, but also during the immune response. To clarify the mechanisms of these changes an experiment will be carried out, in which *C.carpio* individuals will be injected with stimulants - LPS (lipopolysaccharide) and HSA (human serum albumin), to induce an immune response. Then, at each time points tissue samples will be collected, and then RTq-PCR reaction will be made. In addition, we will determine the activity of macrophages (isolated from carps head kidney) by colorimetric measure the production of nitric oxide, arginase activity and the production of oxygen radicals.

The expected results will show how infection/inflammation affects the activity of genes involved in iron metabolism and explain their role in immunity. Further, data will help to better understand interactions between host and pathogen during infection.