Iron is an essential micronutrient for almost all living organisms. It is required for number of cellular processes and its importance for the proper functioning of the organism cannot be overestimated. However, iron level must be tightly regulated as there is fine line between excessive and insufficient body iron content.

Iron related diseases, can be classified into two groups: iron-overload disease and iron-deficient disease. Anemia caused by iron deficiency affects one sixth of humanity. Individuals at increased risk of developing iron deficiency are young children, adolescents, and postpartum women. The occurrence of the disease is associated with maternal and child mortality and affects baby's physical and mental performance. On the other site, there is no active excretory mechanism of iron and it can easily be accumulated when it is delivered in excess. This is an important problem, especially in the context of abuse of dietary supplements, including iron supplements. Advanced iron overload leads to failure of liver, heart as well as endocrine dysfunctions. Disease characterised by excessive iron absorption is called hemochromatosis.

The key question remains what affects iron metabolism and how to ensure optimal iron absorption and bioavailability? Newest studies have revealed link between omega-3 fatty acids and iron metabolism. Aim of our studies is to find how these two dietary components interact with each other. For this purpose we plan to use transgenic model organism – mice that as no other mammal are capable of synthesizing omega-3 fatty acids. Analysed animals will be treated with different levels of iron. Moreover, as part of our research, we will use a pig model that closely resembles human physiology. We will analyze healthy and anemic piglets, which will be supplemented with various doses of omega-3 acids. Based on molecular studies we want to determine what is the biological mechanism of interaction between iron and omega-3 fatty acids metabolisms and further how this knowledge can be used for fighting against disease or maintenance of proper body homeostasis.