Over the last decades, together with the decline of the natural marine and oceanic resources, there has been a huge increase in the production of farmed fish. Currently global aquaculture delivers half of the fish consumed worldwide. Considering the continuous increase of the human population, and the fact that fish are a significant source of protein, the importance of aquaculture in the global economy will grow. However, aquaculture is suffering important problems due to the outbreaks of infectious and parasitic diseases, which are promoted by multiple stress factors such as high stocking densities and poor water quality under farmed conditions. Among others, gill diseases have highly negative global impact on aquaculture production. Due to the multifunctional nature and the numerous interactions between the processes taking place in gills, the understanding of the impact of the gill diseases on the fish physiology is still illusive.

Infection of common carp with carp edema virus (CEV) induces the development of severe gill disease known as koi sleepy disease (KSD), which is fatal for the majority of the infected fish. In recent years CEV spread all over the globe and was related with mass mortalities of carp occurring especially in the autumn-winter-spring, which earlier were related to noninfectious agent's like ammonia intoxication. Due to severe effect on gills, CEV infection causes physiological distress to the fish as well as the virus seems to induce an impairment of the immunity in infected fish. Interestingly it was also demonstrated that different strains of common carp show high (Amur carp - AS strain) or low (koi strain) resistance to this virus. **Our working hypotheses propose that: (*i*) differential stress response/stress sensitivity might affect the outcome of KSD in koi and AS strains of carp and (*ii*) severe impairment of the immune response during KSD may have an impact on general immunological status of the survivors after CEV infection.**

In the present project, we will study the mechanisms underlying the differences in resistance to CEV between AS and koi carp strains. We will also study how CEV-induced impairment of immune response influences the resistance of carp to other pathogens such as bacteria *Flavobacterium branchiophilum* and other viruses: cyprinid herpesvirus 3 (CyHV-3) and spring viraemia of carp virus (SVCV). To study the mechanisms of the immunity diminishing we will use a "salt rescue model" which based on the supplementation of salt (NaCl) into the water. It is recommended to prevent increased KSD-related mortality.

The results of this project will also allow us to identify the role of stress in resistance/susceptibility of fish to viral infections. Finally, the results will allow us to expand our knowledge on important and phylogenetically conserved mechanisms regulating anti-viral immune response. In the future, in-depth knowledge of such interactions will help to develop a new aquaculture strategy that will stimulate the response against pathogens.