Improved Immunity of Aquacultured Animals: the Integrated Project IMAQUANIM

The overall goal of this integrated project is to establish a platform of knowledge and tools for improving the immunological status of aquacultured animals. One of the project priorities is to develop and strengthen basic knowledge of how fish and shellfish acquire immunity to diseases. IMAQUANIM'S data will provide a strong technological basis for qualified strategies to counteract rapidly known or new diseases in aquacultured fish and shellfish. The resulting gene arrays and immune-response assays will be employed to develop efficient vaccines and feed-based immuno-stimulants for finfish and shellfish species.

The European Union's Integrated Project IMAQUANIM has brought together 17 universities and governmental research institutes, as well as 5 small and medium size enterprises (SMEs) working to develop technology to improve the disease immunity of Europe's major aquaculture species (project duration: April 2005-April 2010).

Based on important disease models, this project concerns the development of a technological knowledge platform for a future improved immunity to infectious pathogens in the major aquaculture species in Europe (Atlantic salmon, rainbow trout, sea bream, sea bass, carp, mussel and oyster). Focus will be put on use of vaccines, immuno-stimulants, immuno-diagnostic surveillance as well as markers for selection of the most immuno-competent individuals. Assays for qualitative and quantitative monitoring of key elements of the innate and adaptive immune system at genetic and functional levels will be established and used for determination of response profiles which correlate with protective immunity. Infection trials with various types of pathogens, including re-challenge of survivors, will be used to determine reference response profiles of naïve and primed animals. For finfish, vaccination trials with efficiently working commercial and experimental vaccines and corresponding control reagents will be used to identify critical response

elements/profiles for vaccine efficacy. Variability both in terms of gene polymorphism and occurrence of isoforms among the immunological key elements and their regulation will be related to the functional response in *in vitro* assays as well as *in vivo* in terms of disease susceptibility of naïve and primed/vaccinated animals. Assays for direct functional determination of gene functions will also be developed.

A more full genomic approach will be undertaken for selected species (salmon and mussel) with the aim to identify immunological key molecules. Genes up- or down-regulated in response to infection, vaccination or immunostimulation will be characterized by using different procedural approaches in reference and pathogen-challenged individuals, finally establishing a functional relationship between immune response profiles and protective immunity. The outcome of the project will be versatile gene arrays, including genes related the immune system/defence mechanisms, and immune response assays which can be implemented in development of efficient vaccines and immuno-stimulants for the finfish species and for genetic typing, monitoring of immuno-competence and immuno-diagnostic surveillance in both finfish and shellfish. In combination with the know-how established during the project these tools will represent a strong platform for immunity-based reduction of losses caused by infectious diseases in future aquaculture.