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Monitoring of the immune system in fish and shellfish

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This workshop aimed at presentation and discussion of new tools and assays for qualitative and quantitative monitoring of key elements of the innate and adaptive immune system in fish and shellfish.

Results and problems related to the use of quantitative real-time RT-PCR (Q-PCR) for monitoring gene expression was one of the major topics. One essential element in Q-PCR assays is the reference gene(s) used for normalisation of the samples in order to make them comparable. The risk by using, for example, only one housekeeping gene for this purpose is that if the housekeeping gene itself is regulated under the applied circumstances, this will affect the whole interpretation of the data. Therefore some of the participants preferred to add externally generated reference gene mRNA based on sample weight or to add a known amount of competitive template. The optimal solution is probably to include two types of references, possibly one internal and one external.

An interesting application of gene expression studies is the analysis of changes in gene regulation at early time points following a given treatment, as outlined for vaccination of Atlantic salmon. The fascinating power of the gene array technique was also illustrated by presentations of work performed both in fish and in shrimp. While gene array does not allow the same accurate level of quantitative measurements as Q-PCR, the strength of this technology lies in the possibility for simultaneous monitoring of the expression levels of many genes. Furthermore, previously uncharacterised genes/gene sequences, for which a certain treatment strongly affects the expression level can also be identified.

Although the main focus of the workshop was on measuring of the immune response at gene expression level following various treatments such as infection or vaccination, functional assays for interferon and for cytotoxic cells were also included. While a lot of new

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information can be obtained from studying what goes on at the level of gene regulation, interpretation of the results in terms of what they mean in a functional context is often difficult. The new functional assays, where the activity of specific proteins or cell populations can be determined therefore represent an important step towards our understanding of protective immunity in fish and shellfish.

Oral contributors are acknowledged for presenting their work. The workshop was well attended and the audience was highly engaged in the discussions. We therefore expect to continue to organize immunology workshops at future EAFP conferences.

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Oral contributions

EXPERIENCES WITH QUANTITATIVE PCR FOR MONITORING CARP CYTOKINES Maria Forlenza, Wageningen University Department of Animal Sciences, Wageningen, The Netherlands.
CLONING OF TROUT INTERFERON GENES AND DEVELOPMENT OF REPORTER ASSAYS TO MEASURE INTERFERON SIGNALLING Chris Secombes, Scottish Fish Immunology Research Centre, University of Aberdeen, Aberdeen, UK.
CYTOTOXIC T-CELLS IN RAINBOW TROUT: FUNCTIONAL TESTS AND GENE EXPRESSION ANALYSIS Uwe Fischer, Friedrich-Loeffler-Institute, Federal Research Institute for Animal Health, Greifswald-Insel Riems, Germany.
EXPRESSION PROFILES OF INFLAMMATORY AND IMMUNE-RELATED GENES IN ATLANTIC SALMON (SALMO SALAR L.) AT EARLY TIME POST VACCINATION Øyvind Haugland, Norwegian School of Veterinary Science, Oslo, Norway.
ANALYSIS OF THE RESPONSE TO INFECTION/VACCINATION IN JAPANESE FLOUNDER BY GENE MICROARRAY Ikuo Hirono, Tokyo University, Marine Science & Technology, Lab. Genome Science, Japan.
TRANSCRIPTOME STUDIES ON SHRIMP BIODEFENCE-RELATED GENES USING MICROARRAY ASSAY Takashi Aoki, Tokyo University, Marine Science & Technology, Lab. Genome Science, Japan.