Immune response of DNA vaccinated-gilthead seabream against LCDV-Sa infection: relevance of the inflammatory process

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Introduction: Lymphocystis disease is one of the main viral pathologies affecting cultured gilthead seabream (*Sparus aurata*) in the Mediterranean area. Recently, we have developed a DNA-vaccine based on the major capsid protein (MCP) of the *Lymphocystis disease virus 3* (LCDV-Sa). The immune response triggered by LCDV-Sa or the vaccine in gilthead seabream has been previously study. In infected fish, the response is characterized by a slightly and transitory activation of type I IFN system and a lack of systemic inflammatory response, while a systemic inflammatory process and a humoral adaptive immune response have been observed for vaccinated fish. In the present study, a comprehensive evaluation of immune-related gene expression in vaccinated fish after viral infection has been carried out to identify immune genes involved in the vaccine-induced protection. This work was funded by Junta de Andalucia and FEDER (Grants P12-RNM-2261 and UMA20-FEDERJA-076).

Methodology: Gilthead seabream specimens (5 g mean weight) were distributed into 3 experimental groups; two of them were inoculated with the vaccine and the empty plasmid at 0.1 µg/g fish dose, respectively, whereas fish in the control group were inoculated with PBS. Thirty days post-vaccination, fish were intramuscularly injected with the virus at 10^6 $TCID_{50}$/fish. Samples of head-kidney, spleen, intestine and caudal fin from 6 fish per group were individually collected at 24, 48 and 72 h post-challenge. The expression and quantification of viral DNA in fins of fish challenged with LCDV-Sa were carried out by a qPCR assay targeting a viral structural gene (putative myristoylated membrane protein, MMP). Immune response was studied by an OpenArray® platform of 56 gene targets.

Results: The global effect of vaccination was a significant decrease of viral replication in vaccinated fish compared to fish in the control group, and the differential expression of immune genes related to viral recognition (*tlr9*), humoral and cellular response (*rag1* and *cd48*), inflammation (*csf1r*, *elam*, *il1β*, and *il6*), antiviral response (*isg15*, *mx1*, *mx2*, and *mx3*), cell-mediated cytotoxicity (*nccrp1*), and apoptosis (*prf1*).

Conclusions: The exclusive modulation of the immune response provoked by the vaccination seems to control the progression of the infection in the LCDV-Sa challenged gilthead seabream.