

## Evaluation of the immune response in betanodavirus-vaccinated gilthead seabream

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**Introduction:** Reassortants between red spotted grouper- and striped jack nervous necrosis virus (RGNNV and SJNNV, respectively) have been reported as a threat for Senegalese sole (*Solea senegalensis*) and gilthead seabream (*Sparus aurata*) aquaculture in Southern Europe. An inactivated vaccine has been developed using a RGNNV/SJNNV reassortant strain isolated from Senegalese sole, which confers moderate protection against the homologous viral strain in sole juveniles. The aim of this study is to evaluate the differential expression of immune-related genes in gilthead seabream after vaccination, and in vaccinated fish after NNV infection. This research was funded by MCIUI and FEDER under Grant RTI2018-094687-B-C22.

**Methodology:** Gilthead seabream juveniles were vaccinated by intraperitoneal injection with an inactivated NNV vaccine, and control fish were injected with PBS. Thirty days after vaccination, fish were intramuscularly injected with the homologous viral strain ( $10^5$  TCID<sub>50</sub>/g fish). Head-kidney and brain samples were extracted at 2, 3 and 7 d post-vaccination (dpv), and at 1, 3, and 5 d post-challenge (dpc). The evaluation of the immune response was carried out using an OpenArray® platform with 56 gene targets.

**Results:** The vaccination triggered the differential expression of 41 of the immune-related genes analysed. All the differentially expressed genes (DEGs) showed an early down-regulation in head-kidney and/or brain, except *rag1* that was up-regulated in head-kidney at 2 dpv. The *il6* gene was up-regulated in the brain at 7 dpv, being the only DEG detected at this time point. After viral challenge, the response in vaccinated fish was characterized by an early up-regulation in head-kidney, with 21 out of 29 DEGs up-regulated at 1 dpc, whereas in non-vaccinated fish 15 out of 21 DEGs were down-regulated at the same time point. In brain samples from vaccinated fish, a total of 8, 36 and 32 DEGs were detected at 1, 3 and 5 dpc, respectively, all of them being up-regulated. However, a delay in the up-regulation response was observed in control fish, with most of the DEGs down-regulated at 1 dpc.

**Conclusion:** The immune response against NNV infection in gilthead seabream seems to be modulated by the previous response to the inactivated NNV vaccine.