

“DETERMINING THE HEMATOLOGICAL AND IMMUNOLOGICAL PARAMETERS AND MECHANISMS INVOLVED IN HOST RESPONSES TO CALIGUS INFESTATIONS”

This is a working synthesis prepared by Acuaim SpA in order to advise a Consultative Committee, based on the original Report prepared by Laboratory of Biotechnology and Aquatic Pathology of the Austral University, the Clinical Laboratory of the Austral University and the Pathovet Laboratory in February of 2017.

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ABSTRACT

The present report provides information regarding the effects of *Caligus rogercresseyi* infestations on the transcriptional expression levels of immune response markers in Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*) in experimental conditions.

INTRODUCTION

Sea lice are copepods that infect wild and farmed salmon. They are considered as one of the most important challenges for the global salmon industry. In Chile, *Caligus rogercresseyi* is the biggest concern in salmonid farming. Sea lice feed on skin, causing damage that affects osmosis and that makes the fish vulnerable to secondary infections. Though the economic data regarding this infestation is scarce, it is estimated that sea lice infestations cost approximately 480 million USD per year at a global level. For this reason, it is important to understand the modifications that occur in the host, because these can help increase our understanding of the mechanisms through which *Caligus rogercresseyi* interacts with the host. This is very useful information for the improvement of vaccines and therapeutic treatments for aquaculture.

METHODOLOGY

Young Atlantic salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*), of approximately 170 and 250 grams respectively, were acclimated during 20 days in circular tanks (300 L) in controlled conditions, with filtered sea water + UV at 14°C, 30% salinity. These salmonids were fed with commercial pellets. All of the experimental protocols were carried out in accordance with the norms of the Bioethics Committee of the Universidad Austral de Chile. Following acclimation, the salmonids were inoculated with a load of 100 copepods per fish, maintaining non-infested control fish in the same conditions. Twelve infested and control fish were sampled 20 days post-infestation, in order to obtain fresh samples of the muscles/skin and in order to carry out an analysis of the expression of immunity indicators, through RT-qPCR.

RESULTS

Differences in expression of the studied immunity markers are observed. It is important to highlight the fact that the analyzed tissues correspond to healthy tissues that are not directly in contact with ulcers provoked by the initial attachment of the copepods. Thus, it is estimated that these expression levels reflect a systemic response rather than a local response.

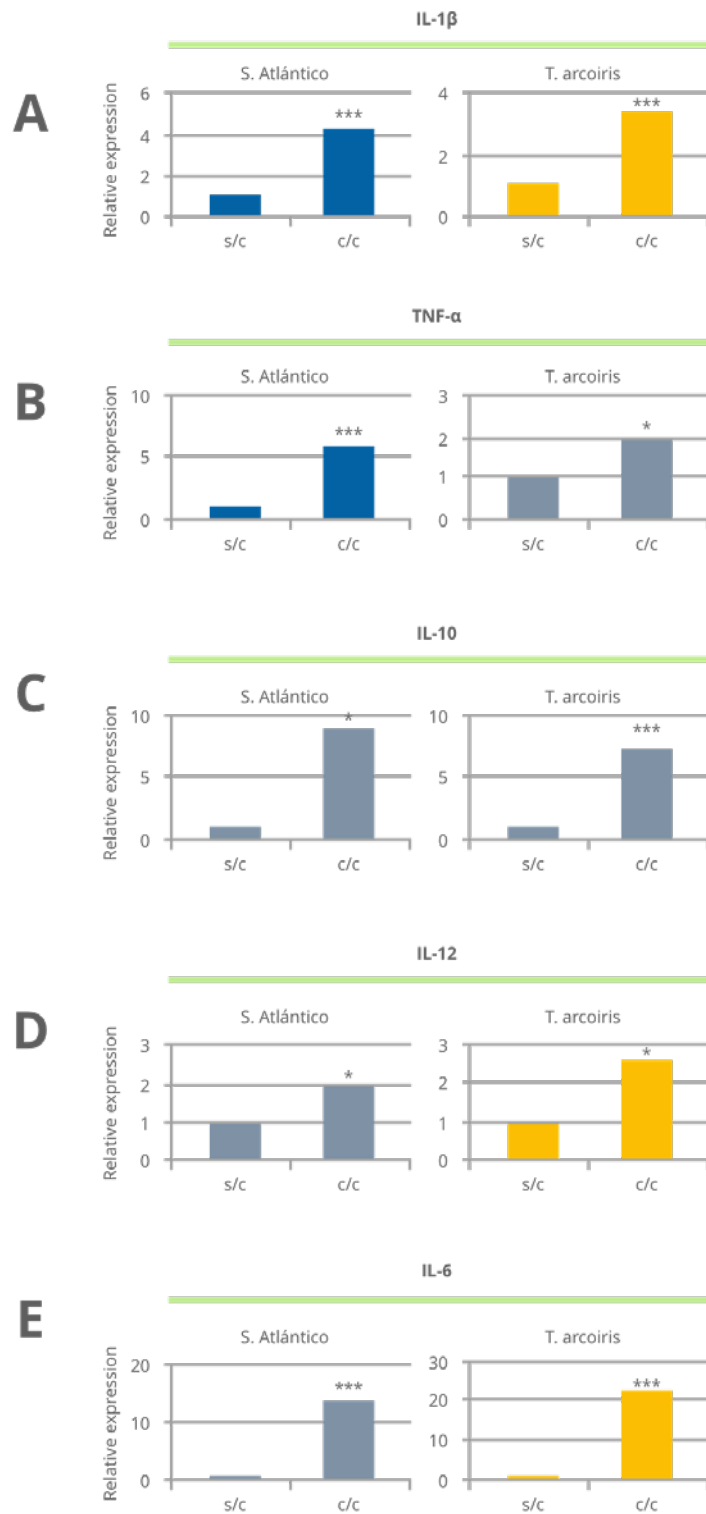


Figure 1: Effect of the *C. rogercresseyi* infestation on the expression levels of RNAm for IL-1 β (A), TNF- α (B), IL-10 (C), IL-12 (D) and IL-6 (E) in the muscle/skin of Atlantic salmon and rainbow trout. c/c, salmonids infested with *Caligus*; s/c, without infestation. p<0,001 (***) ; p<0,05 (*).

CONCLUSIONS

- A strong immunological response at skin/muscle level in fish infested with *Caligus* is observed, associated with the expression of the 5 analyzed cytokines.
- For all of the analyzed cytokines, the increases in expression are similar and significant, both for Atlantic salmon and trout at skin/muscle level, with the exception of TNF and IL-6, which presented higher expression levels in Atlantic salmon and trout, respectively.
- The analyzed tissues corresponded to healthy tissues that are not directly in contact with ulcers provoked by the initial attachment of copepods. Thus, it is estimated that the expression levels reflect a systemic response rather than a local response.

