EFFECTS OF PISCINE REOVIRUS INFECTION ON INNATE IMMUNE SIGNALLING IN SALMON

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ABSTRACT

Piscine reovirus (PRV) has been associated with the serious disease known as Heart and Skeletal Muscle Inflammation (HSMI) in cultured Atlantic salmon *Salmo salar* in Norway. Recent studies have also found PRV to be prevalent in wild (*Oncorhynchus spp.*) and farmed Chinook (*O. tshawytscha*) and Atlantic salmon from the west coast of North America. Interestingly, HSMI or other disease associated with PRV infection has not been seen, suggesting factors beyond the simple presence of PRV are required to initiate disease. Here, we explore whether the presence of PRV could influence how Atlantic and Pacific salmon respond to additional infectious agents or have other impacts on host physiology and/or ecological performance. To this end we have studied the transcriptional responses of Sockeye (*O. nerka*) and Atlantic salmon head kidney and blood to infection with PRV, Sockeye head kidney to co-infection of PRV and Infectious Hematopoietic Necrosis Virus (IHNV), and Atlantic salmon erythrocytes to infection with PRV under *in vivo* and *ex vivo* conditions. We have used laboratory challenges and transcript profiling by RNA Sequencing (RNA-seq) and RT-qPCR to study these responses at high PRV loads. We found that infection with PRV alone caused a very limited immune response at the transcript level in blood and head kidney of Sockeye and Atlantic salmon. Infection with PRV also had little to no effect on the subsequent immune response at the transcript level to IHNV in Sockeye head kidney. Interestingly, the well develop immune response to IHNV did not have a measurable effect on PRV loads or infectivity. In contrast, *ex vivo* Atlantic salmon erythrocytes demonstrate substantial innate antiviral responsiveness to exposure with PRV. The potential mechanisms for evasion of host immune responses as well as the possible role of PRV in HSMI or other disease manifestations are discussed.

KEYWORDS
Piscine reovirus; Salmon; Erythrocyte culture; RNA-seq; De novo Transcriptome assembly

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