Atlantic salmon (*Salmo salar*) erythrocytes mount antiviral transcriptional responses to Piscine orthoreovirus (PRV) ex vivo

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Piscine orthoreovirus (PRV) is ubiquitous in Canadian and Norwegian farmed Atlantic salmon (*Salmo salar*) and preferentially infects erythrocytes. Although asymptomatic on the Pacific coast, the same virus causes heart and skeletal inflammation (HSMI) in the Norwegian Atlantic salmon through unknown mechanisms. Currently, the mechanism of PRV infection is largely obscure as Atlantic salmon erythrocytes elicit an antiviral response when infected with PRV *in vitro,* but past research has shown *in vivo* infection does not evoke a similar response. Therefore, if left unchecked, PRV could have the potential to cause considerable economic and ecological damage in Canada. In this study, I explored several putative factors that led Atlantic salmon erythrocytes to mount an antiviral response to viral infection. I also aimed to find an efficient technique to purify the PRV virus in the lab. qPCR analysis of PRV infected erythrocytes reveal that the antiviral response elicited through upregulation of the Mx1, Viperin, IFNa, and IFNc genes at 7 days post challenge (dpc) was independent of the PRV purification method and degree of viral transcription. In addition, erythrocyte recognition of PRV was independent of extracellular double stranded RNA debris, a byproduct of viral replication. In contrast, the erythrocytes did not mount an antiviral response against the viral hemorrhagic septicemia virus (VHSV), demonstrating that the antiviral response was virus specific. Density gradient cesium chloride purification of PRV demonstrated the greatest recovery of PRV transcripts and best viability of virions compared to other purification methods.