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Abstract

Antioxidant Effect of *A. chilensis* on the Production of Infectious Viral Particles of ISAv and Its Consequences on the SUMOylation of NP Protein †

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Abstract: Infectious salmon anemia virus (ISAv) is a pathogen of high economic importance worldwide; it produces a highly fatal clinical symptomatology called infectious salmon anemia (ISA), which is one of the main causes of economic loss in Chilean aquaculture, specifically in Chilean salmon, being responsible for a mortality rate greater than 80% when outbreaks of this pathogen occur in fish farms. ISAv dramatically increases levels of reactive oxygen species (ROS) by increasing the activity of the p38MAPK protein, which activates p47phox, by phosphorylation, allowing its binding to the membrane subunits of the NADPH oxidase complex, which is an important positive regulator of ROS levels in cells. Further, it is known that oxidative stress is able to regulate the SUMOylation machinery, producing an increase in SUMOylated proteins. Together with this background and various bioinformatic analyses, it was found that the ISAv nucleoprotein (NP) has a highly conserved capacity for SUMOylation, and this protein alone is capable of causing strong oxidative stress in transfected cells and is therefore able to regulate the SUMOylation machinery. Immunoprecipitation assays confirmed the bioinformatic analyses, where NP was seen to be SUMOylated, and this signal decreased considerably when cells were treated with a p38MAPK inhibitor. Together with this, the number of copies of NP and the viability in cells infected with ISAv were also evaluated, where it was observed that there was a strong increase in the number of copies of NP and a marked decrease in cell viability, this being in contrast to when, in addition to the infection, the cells were treated with a natural product "maqui" (*A. chilensis*), which, due to its high content of polyphenolic compounds, has been shown to have a high antioxidant capacity, greatly reducing the number of copies of NP and the percentage of mortality compared to cells that are only infected with ISAv.

Keywords: ISAv; SUMOylation; NP; ROS