Differential antiviral activity of *Porphyridium cruentum* polysaccharides against VHSV and NNV infections

Geovanna Parra-Riofrio[1], Patricia Moreno[2], Roberto Abdala-Diaz[2], Julia Bejar[2], Esther Garcia-Rosado[2], Eduardo Uribe-Tapia[1], M. Carmen Alonso[2]

[1]Universidad Católica del Norte (Chile). Facultad de Ciencias del Mar

[2]Universidad de Málaga (Spain). Facultad de Ciencias

Introduction: In addition to vaccination, the use of functional food can be an interesting approach to prevent viral disease outbreaks in aquaculture facilities. In recent years, an increasing number of studies have suggested that marine organisms and microorganisms can be a relevant source of substances with a putative use in preventing viral diseases. In particular, the antiviral activity of polysaccharides has been widely described against infections affecting higher vertebrates, suggesting that they can be good candidates to be used in aquaculture. In this study, we evaluate the antiviral activity of *Porphyridium cruentum* polysaccharides, which have been demonstrated to have important biological activities in mammals, such as antiviral or antioxidant effects.
Methodology: The antiviral activity of *P. cruentum* polysaccharides has been tested against two different fish viruses: (i) viral haemorrhagic septicaemia virus (VHSV, genotype I), an ssRNA enveloped virus, and (ii) nervous necrosis virus (NNV, RGNNV genotype), a bisegmented ssRNA naked virus. Both viruses may affect a broad range of fish species, causing massive mortality in aquaculture facilities at larval and juvenile stages. Two different approaches have been used, since polysaccharides can block either viral-cell adsorption or any other intracellular viral replication step: (i) treating cells (RTG-2 for VHSV and E-11 for NNV) with polysaccharides before virus inoculation (adsorption assay) and (ii) adding polysaccharides on cells after viral inoculation (post-adsorption assay).Viral multiplication in treated and non-treated cells has been measured by viral genome quantification at different times post infection (p.i.).
Results and conclusions: The anti-VHSV activity of *P. cruentum* polysaccharides has been demonstrated, acting at both levels, blocking viral adsorption to cellular receptor, and preventing intracellular viral replication. A significant decrease in viral genome multiplication has been recorded at 24 and 36 h p.i. in RTG-2 cells treated with polysaccharides compared to control untreated cells. On the contrary, no anti-NNV activity has been detected, demonstrating a differential antiviral activity of *P. cruentum* polysaccharides, depending on the viral-host system.

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