Title

Evaluation of the Biological Activities of Peptides from Epidermal Mucus of Marine Fish Species from Chilean Aquaculture

Abstract

The skin of fish is a physicochemical barrier that is characterized by being formed by cells that secrete molecules responsible for the first defense against pathogenic organisms. In this study, the biological activity of peptides from mucus of Seriola lalandi and Seriolella violacea were identified and characterized. To this purpose, peptide extraction was carried out from epidermal mucus samples of juveniles of both species, using chromatographic strategies for purification. Then, the peptide extracts were characterized to obtain the amino acid sequence by mass spectrometry. Using bioinformatics tools for predicting antimicrobial and antioxidant activity, 12 peptides were selected that were chemically produced by simultaneous synthesis using the Fmoc-Tbu strategy. The results revealed that the synthetic peptides presented a random coil or extended secondary structure. The analysis of antimicrobial activity allowed it to be discriminated that four peptides, named by their synthesis code 5065, 5069, 5070, and 5076, had the ability to inhibit the growth of Vibrio anguillarum and affected the copepodite stage of C. rogercresseyi. On the other hand, peptides 5066, 5067, 5070, and 5077 had the highest antioxidant capacity. Finally, peptides 5067, 5069, 5070, and 5076 were the most effective for inducing respiratory burst in fish leukocytes. The analysis of association between composition and biological function revealed that the antimicrobial activity depended on the presence of basic and aromatic amino acids, while the presence of cysteine residues increased the antioxidant activity of the peptides. Additionally, it was observed that those peptides that presented the highest antimicrobial capacity were those that also stimulated respiratory burst in leukocytes. This is the first work

that demonstrates the presence of functional peptides in the epidermal mucus of Chilean marine fish, which provide different biological properties when the fish face opportunistic pathogens.

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