Abstract

Is Cantharidin Able to Reduce the Inflammation Produced by \(\lambda\)-Carrageenin in Head-Kidney Leucocytes from Gilthead Seabream (Sparus aurata)? †

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Abstract: Inflammation is a well-characterized process in mammals, but it has been poorly studied in fish. Among the diverse methods to study inflammation, carrageenin, a mucopolysaccharide obtained from the cell walls of the red algae (Rhodophyceae family), has been used for decades as a model of acute inflammation in rodents. Otherwise, cantharidin, a toxic vesicant terpene secreted by male blister beetles of the Meloidae and Oedemeridae families, has been used in low doses in both folk and traditional Chinese medicine due to its therapeutical properties. The present study aims to evaluate the effects of cantharidin on gilthead seabream (Sparus aurata) head-kidney leucocytes (HKLs) after their stimulation with \(\lambda\)-carrageenin. In this study, specimens of gilthead seabream were anesthetized with clove oil and bled from the caudal vein. Head-kidney leucocytes were isolated and incubated with combinations of final solutions of 1000, 1, and 0 \(\mu\)g mL\(^{-1}\) (PBS diluted in sRPMI; control) of \(\lambda\)-carrageenin and 5 and 0 \(\mu\)g mL\(^{-1}\) (DMSO diluted in sRPMI; control) of cantharidin for 24 h. After incubation, the following parameters were analyzed: viability, morphologic alterations by transmission electron microscopy, and the gene expression of inflammatory-related genes (\(il1b\), \(tnfa\), \(il6\), \(il10\), and \(tgfb\)). Results evidenced a decrease in viability in HKLs incubated with 1000 \(\mu\)g mL\(^{-1}\) of \(\lambda\)-carrageenin and 5 \(\mu\)g mL\(^{-1}\) of cantharidin compared with control HKLs. The morphologic study revealed evident signs of cell death in HKLs after being exposed to 5 \(\mu\)g mL\(^{-1}\) of cantharidin and 1000 \(\mu\)g mL\(^{-1}\) of \(\lambda\)-carrageenin. In addition, the expression of the \(il1b\) and \(il10\) genes were up-regulated and down-regulated, respectively, after the HKLs incubation with 1000 \(\mu\)g mL\(^{-1}\) of \(\lambda\)-carrageenin and 0 \(\mu\)g mL\(^{-1}\) of cantharidin in comparison to the control. In contrast, the gene expression of \(il1b\) was down-regulated in HKLs incubated with 1000 \(\mu\)g mL\(^{-1}\) of \(\lambda\)-carrageenin and 5 \(\mu\)g mL\(^{-1}\) of cantharidin in comparison to those incubated with the same concentration of \(\lambda\)-carrageenin and 0 \(\mu\)g mL\(^{-1}\) of cantharidin. Our results corroborate the effects of carrageenin as an inductor of inflammation in fish cells and point at cantharidin as a possible natural anti-inflammatory product able to reduce exacerbated inflammatory responses.

Keywords: \(\lambda\)-carrageenin; cantharidin; gilthead seabream (Sparus aurata); aquaculture

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