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Isolation, Characterization, and Antibacterial Evaluation of Antimicrobial Peptides and Derivatives from Fly Larvae Sarconesiopsis magellanica (Diptera: Calliphoridae)

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Abstract : Sarconesiopsis magellanica (Diptera: Calliphoridae) is a medically important necrophagous fly which is used for establishing the post-mortem interval. Dipterous maggots release diverse proteins and peptides contained in larval excretion and secretion (ES) products playing a key role in digestion. The most important mechanism for combating infection using larval therapy depends on larval ES. These larvae are protected against infection by a diverse spectrum of antimicrobial peptides (AMPs), one already known like lucifensin. Special interest in these peptides has also been aroused regarding understanding their role in wound healing since they degrade necrotic tissue and kill different bacteria during larval therapy. The action of larvae on wounds occurs through 3 mechanisms of action: removal of necrotic tissue, stimulation of granulation tissue, and antibacterial action of larval ES. Some components of the ES include calcium, urea, allantoin ammonium bicarbonate and reducing the viability of Gram positive and Gram negative bacteria. The Lucilia sericata fly larvae have been the most used, however, we need to evaluate new species that could potentially be similar or more effective than fly above. This study was thus aimed at identifying and characterizing S. magellanica AMPs contained in ES products for the first time and compared them with the common fly used L. sericata. These products were obtained from third-instar larvae taken from a previously established colony. For the first analysis, ES fractions were separate by Sep-Pak C18 disposable columns (first step). The material obtained was fractionated by RP-HPLC by using Júpiter C18 semi-preparative column. The products were then lyophilized and their antimicrobial activity was characterized by incubation with different bacterial strains. The first chromatographic analysis of ES from L. sericata gives 6 fractions with antimicrobial activity against Gram-positive bacteria Micrococus luteus, and 3 fractions with activity against Gram-negative bacteria Pseudomonae aeruginosa while the one from S. magellanica gaves 1 fraction against M. luteus and 4 against P. aeruginosa. Maybe one of these fractions could correspond to the peptide already known from L. sericata. These results show the first work for supporting further experiments aimed at validating S. magellanica use in larval therapy. We still need to search if we find some new molecules, by making mass spectrometry and ‘de novo sequencing’. Further studies are necessary to identify and characterize them to better understand their functioning.

Keywords : antimicrobial peptides, larval therapy, Lucilia sericata, Sarconesiopsis magellanica
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