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Analysis of antimicrobial peptides from maggots potentially effective in the treatment of infected diabetic foot

R. Bem¹, A. Jirkovská¹, V. Čeřovský², V. Fejfarová¹, J. Žďárek², M. Dubský¹, L. Monincová²

¹Diabetes Centre, Institute for Clinical and Experimental Medicine, ²Institute of Organic Chemistry and Biochemistry, Academy of Sciences, Prague, Czech Republic

Background and aims: Our previous study demonstrated that maggot therapy was effective against some strains of Gram-positive and Gram-negative microorganisms in patients with diabetic foot. The treatment of infected diabetic foot ulcers (DFU) is often complicated by emergence of antibiotic resistance; antimicrobial peptides from maggots may be helpful in overcoming this problem. They are characterized not only by a direct antimicrobial effect but also in the stimulation of immune response. The aim of our study was to identify effective antimicrobial peptides from maggots in patients with infected DFU and to test their antimicrobial activity in vitro. Patients and methods The maggots (*Lucilia sericata*) were obtained from infected DFUs from 3 patients at the end of 3-day maggot therapy. An extract of excretion and secretion of approximately 50 maggots was ultrafiltered, lyophilized and fractionated by high-performance liquid chromatography (RP-HPLC). Fraction with anti-*Micrococcus luteus* activity assessed by drop diffusion test was re-purified by RP-HPLC. The primary sequences of final peptides were determined by mass spectrometry and Edman degradation. Antimicrobial activity of novel peptides against various pathogens were evaluated in vitro by drop diffusion test in Petri dishes by a double-layer technique and minimal inhibitory concentrations were established. Results: A novel homologue of insect defensin designated lucifensin (*Lucilia defensin*) was identified as a potentially effective antimicrobial peptide from maggots extracted after treatment of infected DFU and the primary sequence of this peptide was determined. In vitro, lucifensin was effective against *Staphylococcus aureus* PS 3A, PS 77, methicilin-resistant *Staphylococcus aureus*, *Bacillus subtilis*, *Rhodococcus* sp., but was ineffective against *Escherichia coli* and *Pseudomonas aeruginosa*. Conclusion: Our study suggests that lucifensin isolated from maggots may be promising an antimicrobial peptide in the treatment of DFU infection. There is some correspondence between in vitro assessed antimicrobial effect of this peptide and clinical effect of maggot treatment in our previous study. This study was supported by the grant MZO 00023001.