Investigation of Antibacterial Activity of Temporin Derivatives, Containing Diaminobutyric Acid and Diaminopropionic Acid

Tsvetelina Foteva
University of Chemical Technology and Metallurgy, Sofia, Bulgaria

Dilyana Dimitrova
University of Chemical Technology and Metallurgy, Sofia, Bulgaria

Nelly Georgieva
University of Chemical Technology and Metallurgy, Sofia, Bulgaria

Dancho Danalevr
University of Chemical Technology and Metallurgy, Sofia, Bulgaria

Temporins, as a class of antimicrobial peptides (AMPs) derived from frog skin, play a crucial role in combating infections caused by pathogens, including gram-negative and gram-positive bacteria, fungi, and protozoa. AMPs utilize diverse mechanisms to enhance their antimicrobial potency, including membrane disruption and engagement with intracellular targets.

In this research, the Fmoc/OBut strategy was used to synthesize new temporin analogs introducing in position 7 the non-proteinogenic 2,4–diaminobutyric acid (Dab) and 2,3–diaminopropionic acid (Dap). The disk-diffusion assay and the determination of minimal inhibitory concentration were used to evaluate the susceptibility of the newly synthesized analogs against Arthrobacter oxydans 9333 and Pseudomonas aeruginosa 3700. The results reveal that the optimal lateral chain length for antibacterial activity was found to be two methylene groups in the molecule of Dab residue. The highest antimicrobial potential of all analogs was monitored in DTDab. Temporins and their synthetic derivatives exhibit promising potential as novel anticancer and antibacterial agents, owing to their selective toxicity against cancer cells and their capacity to trigger apoptosis. Continued research is essential to refine their therapeutic efficacy and facilitate clinical development.