Interaction Studies of the Antimicrobial Pantinin's Peptides with Phospholipids Vesicles

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Nowadays, infections caused by multidrug-resistant bacteria have become a critical situation worldwide. The abuse of traditional antibiotics has been pointed as causing the appearance of many drug-resistant bacterial strains. Antimicrobial peptides (AMPs) have become a promising alternative as antibacterial agents that could defeat these superbugs. Some structural features of AMPs influence directly on their peptide-membrane binding, such as charge, polar angle, hydrophobic moment and hydrophobicity. Here we present interaction studies of phospholipids vesicles with three antimicrobial peptides (Pantinin-1, Pantinin-2 and Pantinin-3) isolated from scorpion venom of *Pandinus imperator*. Our main goal was to investigate the influence of structural features in different mimetic membrane environment. For this purpose, we used a set of phospholipids vesicles (LUVs) composed by POPA, POPG, POPC, POPC:Chol (3:1 ratio) and POPC:POPE (3:1 ratio). The peptides were synthesized by spps-Fmoc chemical approach and the dynamic structure of the peptides was investigated by circular dichroism in aqueous solution and in the presence of LUVs. In addition, we examined peptide-induced membrane permeability by carboxyfluorescein leakage experiments. CD studies in aqueous solution demonstrated that the peptides are unstructured, and in presence of LUVs, Pantinin-2 and 3 have a propensity to adopt a secondary α-helix structure, while Pantinin-1 has a reduced capacity, specially in POPC:Chol an POPC:POPE (ratio 1:100 peptide:lipid). This effect reflected in the carboxyfluorescein leakage experiments, which it was observed a decrease in the ability of Pantinin-1 to promote membrane disruption. In conclusion, depending on the type of phospholipids, the peptide-membrane interaction is altered, due to the peptide's polar amphipathic face and fluidity of the membrane. Our study suggests that particular differences among the peptides, specially concerning the hydrophobic/hydrophilic faces, results in specific folding of this molecule and interaction with membranes.

Key words: peptide-membrane interaction; circular dichroism; LUV; biophysical studies; scorpion toxins.

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