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Membrane disruption mechanism of antimicrobial peptides

KA YEE LEE, University of Chicago

Largely distributed among living organisms, antimicrobial peptides are a class of small (<100 residues) host defense peptides that induce selective membrane lytic activity against microbial pathogens. The permeabilizing behavior of these diverse peptides has been commonly attributed to the formation of pores, and such pore formation has been categorized as barrel-stave, toroidal, or carpet-like. With the continuing discovery of new peptide species, many are uncharacterized and the exact mechanism is unknown. Through the use of atomic force microscopy, the disruption of supported lipid bilayer patches by protegrin-1 is concentration-dependent. The intercalation of antimicrobial peptide into the bilayer results in structures beyond that of pore formation, but with the formation of worm-like micelles at high peptide concentration. Our results suggest that antimicrobial peptide acts to lower the interfacial energy of the bilayer in a way similar to detergents. Antimicrobial peptides with structural differences, magainin-1 and aurein 1.1, exhibit a mechanistic commonality.