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Mechanism of Membrane Disruption by Antimicrobial Peptide Protegrin-1 KIN LOK H. LAM, The Institute for Biophysical Dynamics, The James Franck Institute, The Materials Research Science and Engineering Center, The University of Chicago, YUJI ISHITSUKA TEAM, ALAN J. WARING COLLABORATION, ROBERT I. LEHRER COLLABORATION, KA YEE C. LEE TEAM — Protegrin-1 (PG-1), a cationic antimicrobial peptide, kills bacteria by causing an increase in membrane permeability to ions or larger molecules. To understand the mechanism of antimicrobial peptide action, we investigated, via atomic force microscopy, topological changes in supported phospholipid bilayers induced by PG-1. We have observed PG-1 induces structural transformations progress from fingerlike instabilities at bilayer edges, to the formation of sievelike nanoporous structures and finally to a network of stripelike structures in a zwitterionic dimyristoylphosphatidylcholine (DMPC) model membrane in buffer, with increasing PG-1 concentration. In addition, to investigate the dependence of lipid-peptide interactions on electrostatics, studies involving charged lipids have been carried out. Similar progression of structural transformations has been observed in membranes containing anionic lipids, but with lower critical concentrations compared to the zwitterionic system. The visualization of structural transformation provides details of membrane disruption mechanism by PG-1.

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