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# AMP mechanism of action on bacterial membranes determined by in vivo solid-state NMR

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Abstract:

Staphylococcus aureus is a Gram-positive pathogenic bacterium that is resistant to a wide range of antibiotics. DMS-DA6-NH2 (DA6) is a novel antimicrobial peptide (AMP) that has high efficacy on various bacterial strains (1). In vivo 2H solid-state Nuclear Magnetic Resonance (NMR) is used to study AMPs mode of action that disrupt bacterial membranes (2-3). We first determined the bacterial membrane lipid profile (lipids and fatty acids) and then optimised the bacterial culture conditions for lipid labeling with deuterated palmitic acid (PA-d31). 2H in vivo solid-state NMR spectrum under magic-angle spinning is then characterised by a central peak surrounded by rotational bands on both sides, whose spectral moment $M^2$ can be measured and is related to membrane rigidity (2). It is then observed that the membrane rigidity decreases progressively when DA6 concentration is increased. These results were compared with those of AMPs whose mode of action are already known (3). It is deduced that the AMP DA6 has a pore effect on S. aureus membrane.

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## Session

Molecular interactions at the membrane surface

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