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Antimicrobial Peptides Association to Living Eukaryotic Cells: A Quantitative Spectroscopic Approach

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Antimicrobial peptides (AMPs) represent a promising strategy to fight the global spread of superbugs.

Their main target is the bacterial membrane, making resistance unlikely. AMPs activity depends on their affinity for the bilayer and their ability to disrupt the membrane upon binding. Membrane perturbation and peptide-membrane association are intensely studied through microbiological assays and biophysical studies in model bilayers, respectively, but quantifying these phenomena in real cells has received very limited attention.

To bridge the gap between microbiological and biophysical studies, we exploited spectroscopic techniques to quantitatively characterize AMPs interactions with living cells. Using a labelled analogue of the AMP PMAP-23, we previously demonstrated that millions of peptide molecules must bind to each E. coli cell to induce its death [1]. In this study, we extended our approach to different cell types. In particular, we investigated the PMAP-23 association to a murine macrophage cancer cell line and healthy chinese hamster ovary cells. Our data confirm that PMAP-23 exhibits a high affinity for pathogenic cells. These findings demonstrate that a quantitative assessment of peptide binding to living cells is possible, providing valuable insights into their mechanism of action as both AMPs and Anti-Cancer Peptide. (1) ACS Chem Biol 2014, 9, 2003-7