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Bactericidal nanostructured surfaces with high impact against *Helicobacter pylori*

Helicobacter pylori chronic infection leads to several gastric disorders, such as gastric cancer [1]. Success rate of available therapy, based on antibiotics, has dramatically decreased due to bacterial resistance [2]. Antimicrobial peptides (AMPs) are low molecular weight peptides that target bacterial cell membranes and cause disintegration of the lipid bilayer structure, having low propensity to induce resistance [3]. The AMP MSI-78A (GIGKFLKKAKKFAKAFVKILKK), also known as PexigananA, was effective against *H. pylori in vivo* but in dosages close to toxic level [4], which is related to AMPs loss of activity due to susceptibility to extreme pH and proteases [5]. AMP immobilization may allow overcoming these drawbacks and boosting its activity [5].

MSI-78A synthesized with an extra cysteine (C-MSI-78A) was immobilized onto biotinylated model surfaces (self-assembled monolayers; SAMs), using neutravidin as a protein bridge and a biotin-polyethylene glycol $(PEG)_n$-maleimide spacer. Spacers with different PEG_n arm length (n=2; n=11) were tested. Immobilization was characterized with Quartz Crystal Microbalance with Dissipation and best results were obtained with the spacer with PEG11 arm, allowing higher AMP surface coverage. Functionalized surfaces were tested against a human highly pathogenic *H. pylori* strain (*H. pylori* J99). *H. pylori* J99 viability was reduced in 75% for surface adherent bacterial cells and, more outstandingly, viability of planktonic bacteria was reduced in 99% after 2h of exposure to these surfaces. Also, no bacterial recovery occurred when transferred to optimal growth conditions, stressing the bactericidal effect. These results highlight the potential of AMP surface immobilization for development of non-antibiotic therapies against the gastric pathogen while demonstrating, for the first time, the activity of an immobilized AMP against planktonic *H. pylori.*

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