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Management of *Helicobacter pylori* gastric infection via surface-grafted antimicrobial peptides

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Helicobacter pylori chronic infection is associated, among other severe gastric disorders, with intestinal-type gastric carcinogenesis, being the fifth most common cancer and the third leading cause of cancer-related death worldwide. Classical *H. pylori* eradication treatment, combining two antibiotics and a proton pump inhibitor, reduces the risk for gastric carcinoma development, but treatment of *H. pylori* infection is challenged by a dramatic fall in eradication rates all over the world. Currently, this bacterium is listed among the 16 antibiotic-resistant bacteria that pose greatest threat to human health according to the World Health Organization. Antimicrobial peptides (AMPs) present an alternative to conventional antibiotic therapies, being their most striking feature the low tendency to induce bacterial resistance, since AMPs selectively damage the bacterial membranes through mechanisms that bacteria find difficult to evade. In an *in vivo* scenario, "unbound AMPs" can undergo proteolysis and peptide aggregation, leading to efficiency decrease. AMP grafting onto nanoparticles has been reported as a good strategy to protect peptides from aggregation and enzymatic degradation *in vivo*, therefore increasing long-term stability and avoiding cytotoxicity associated with application of high AMP concentrations. In this study we demonstrated that the AMP MSI-78A could be surface-grafted without compromising its activity. Moreover, MSI-78A-decorated surfaces were highly effective against *H. pylori*, killing bacteria by contact in a short time span, since after 2h only 2% of *H. pylori* remained viable in suspension. These results encourage the utilization of grafted MSI-78A on biocompatible nanoparticles as an alternative to the currently available therapy against *H. pylori*, opening new routes for gastric infection management.

Speaker Biography

Paula Parreira graduated in Microbiology from the Universidade Católica Portuguesa (Portugal) in 2007. In the same year, joined the team of Prof. M Cristina Martins at the Institute of Biomedical Engineering of University of Porto (INEB) and from 2007 to 2013, conducted her PhD studies under the guidance of Prof. M Cristina Martins and Prof. Deborah Leckband (University of Illinois, at Urbana-Champaign, USA). After finishing her PhD, Paula Parreira's post doctoral research has continued to focus on development of non-antibiotic strategies against microbiological human pathogens, namely against the gastric pathogen *Helicobacter pylori*, with emphasis on natural molecules coupled with bioengineered approaches. Currently, Paula Parreira is a research assistant in the Bioengineered Surfaces Group at Instituto de Investigação e Inovação em Saúde (i3S; Portugal) and has published several papers in first quartile journals, book chapters and participated in several international conferences.

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