Topical delivery of antimicrobial peptides

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Resistance to traditional antibiotics is a rapidly increasing problem that in a few years could make infections impossible to treat and bring the state of medical care back to the pre-antibiotic era from the beginning of the last century. Antimicrobial peptides (AMPs) have a huge potential as new therapeutics against infectious diseases as they are less prone to induce high level resistance due to their fast and non-specific mechanism of action. However, only a few AMPs have reached later stages of clinical trials and there are not yet any products on the market based on AMPs. The main reason for this is the challenge related to peptide stability during storage (chemical degradation, self-aggregation) and after administration (proteolytic degradation, self-aggregation). This can be overcome through smart formulation strategies and local administration, which in turn minimizes the exposure.

In FORMAMP efficient treatment strategies for local treatment of infections by use of AMPs are developed by means of different nanoformulation strategies. The different types nanocarriers investigated are lipidic nanocapsules, liquid crystalline nanoparticles, mesoporous silica nanoparticles, dendrimers and nanogel particles.

Topical delivery systems with AMPs in nanocarriers incorporated into a gel, cream or ointment have been developed in FORMAMP. The systems are evaluated in terms of physical and chemical stability (measured with UPLC) with the aim to achieve one year stability of the formulation in room temperature. The efficacy of the topical delivery systems is aiming at achieving a broad spectrum activity and dosing frequency of 1 % in the target dose. Ex vivo studies of the topical delivery systems on wounded pig skin have been performed for studying the efficacy. In addition the release behavior of the systems has been evaluated in a dynamic setup using a diffusion cell followed by a tape stripping method to measure the penetration of the AMP in the *strateum corneum*.