“The FORMAMP project has reached its final year and we have focused the pre-clinical development around a limited number of prototype formulations. However, the scientific research in the project still evaluates many peptide and nanocarrier combinations in parallel, in order to get a deeper understanding for the interactions occurring in these systems. The first PhD thesis from FORMAMP has been successfully defended by Nada Matougui at the University of Angers. Scientific publications displaying results generated in the project continue to be published, with more in the pipeline. As a further proof of a successful collaboration, several patent applications are in progress. I look forward to interacting with you during the last period of the FORMAMP project and am happy to discuss potential future collaboration as a continuation and extension of the FORMAMP concept.”

Dr. Helena Bysell, FORMAMP Project Coordinator

Part of a global initiative to fight antimicrobial resistance

The FORMAMP project is at the forefront of the development of the antibiotics of tomorrow in order to face the increasing global threat of resistance development of microbials to conventional drug treatments. The European Union plays a very active role in the mission to battle antimicrobial resistance (AMR) and the seventh framework founding and funding of FORMAMP and similar projects is only one part of the ongoing efforts. For example, the European Commission has initiated the One Health network – a cross-functional initiative that involves plans from the European Food Safety Authority (EFSA), the European Medicines Agency (EMA) and the European Centre for Disease Prevention and Control (ECDC) in how these agencies may contribute in the fight against AMR. In February this year chief veterinary officers and chief public health officers from all EU member states gathered for a first meeting to exchange views and plans for their ongoing commitment.

Recognizing that AMR is a global health issue, the European Union works on several levels with global policy players. The G7 and G20 countries have collectively recognized AMR as a grave threat to human life, and have committed to the ‘One Health’ approach to tackle it. Many of the United Nation’s branches, such as the Food and Agriculture Organisation (FAO) and the World Organisation for Animal Health (OIE) are playing key roles with their initiatives. But perhaps most distinctly, the World Health Organization (WHO) has become a key driver for change in the wake of the dire AMR projection should current trends continue unchecked.

Earlier this year WHO published a list of 12 bacterial families that pose the greatest risk to human health “in a bid to guide and promote research and development (R&D) of new antibiotics”. The list includes multidrug resistant bacteria that are a particular acute threat to the healthcare system and vulnerable patients. Two of the bacterial strains on the list Pseudomonas aeruginosa and Staphylococcus aureus are particularly targeted within FORMAMP. These strains are heavily featured in the research results that have been published by project participants regarding the antibacterial effects by nanocarrier associated peptides.

Project progress on track

The FORMAMP research groups are finalizing studies to understand the interactions between the antimicrobial peptides and the carrier nanoparticles, and the mechanisms behind the antibacterial effect of peptide-loaded nanocarriers. In parallel, several prototype formulations containing the peptide-loaded carriers have been developed including gel formulations for local administration to treat skin infections as well as powders for inhalation to treat pulmonary infections. These formulations are currently being evaluated in ex vivo and in vivo models to assess effect and safety. Stability studies of the nanoformulated AMPs reveal that peptides sensitive towards proteolytic degradation can be stabilized when administred in nanocarriers. Two prototype formulations have been selected to progress through process development, scale-up and preparation of regulatory strategies in order to increase translation to clinics.
Publications and events

With the project in its final year, FORMAMP has generated a wealth of research results of which many have been published in peer-reviewed scientific journals. Over the last year, Nada Matougui has received her PhD at the University of Angers with the thesis entitled Development and characterization of antimicrobial peptides loaded lipid nanocapsules to treat bacterial infections.

Umerska et al from the University of Angers and University Hospital of Angers, France, have published results on their work on lipid nanocapsules in the European Journal of Pharmaceutics and Biopharmaceutics.

Boge et al. have published a paper on cubosomes post-loaded with antimicrobial peptides in the International Journal of Pharmaceutics.

Nordström and Malmsten at Uppsala University had a review article published in the journal Advances in Colloid and Interface Science that covered the challenges and possibilities of using antimicrobial peptides in novel drug delivery system. Another review article in Frontiers in Cellular and Infection Microbiology authored by Mahlapuu et. al from FORMAMP partners Pergamum (Promore Pharma) and RISE Research Institutes of Sweden as well as The Sahlgrenska Academy at University of Gothenburg has also been published.

Before the finalization of the project, several other journal publications and conference presentations are expected. For more information about publications from the project in scientific and general media, see the FORMAMP web site.

2017 includes several conferences within pharmacology, medicine, biochemistry and materials science that will feature FORMAMP participants. One such example was the FIP Pharmaceutical Sciences World Congress in Stockholm in May. The city will also host the Annual Surface and Materials Chemistry Symposium 24-26 October this year. The symposium will be co-hosted by FORMAMP and will also serve as the venue for the final formal meeting of the project participants. See www.asmcs.se.

Meet a team member

We meet up with Randi Nordström, PhD student within FORMAMP at Uppsala University, to find out how her research contributes towards finding solutions to the antimicrobial resistance problem.

What is the topic of your PhD project?

“I am developing and evaluating polymeric nanogels that can be used for delivery of antimicrobial peptides. My very unlikely dream result would be to find a delivery system that could be triggered to release antimicrobial peptides only when encountering a bacterial infection.”

What results have you generated so far?

“I have evaluated two nanogel libraries as antimicrobial peptide carriers, one that releases peptide when it comes in contact with the high salt concentration in the body and one that is bio-degradable, releasing peptide as the material dissolves. Peptides loaded onto both types of gels kill bacteria in vitro and the gels improve the ability of the peptides to interact with bacterial cell walls.”

What are the potential clinical implications of your findings?

“It depends on the type of gel used. A salt sensitive gel can be more suitable for a lotion-type formulation for skin infections, whereas the degradable material could be developed into an inhalation formulation for lung infections.”

The FORMAMP project aims to develop new and innovative formulation strategies, based on the combination of nanotechnology-based delivery systems and antimicrobial peptides (AMPs). The project is focused on the development of novel treatments of infections in connection with tuberculosis and cystic fibrosis as well as treating antibiotic resistant Staphylococcus aureus infections (MRSA). The 16 partners in the project include academic research groups, clinicians, biotechnology companies as well as regulatory authorities from five countries within the European Union.

Are you interested in getting in touch with FORMAMP? Please contact us

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Participants at the FORMAMP consortium project meeting held May 29-30, 2017. The meeting was hosted by the University Medical Center Groningen.

NMP AMR cluster
FORMAMP is associated with two other European Projects working on strategies to decrease the development of antimicrobial resistance by innovative nanomedicine.

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