



"The FORMAMP project is progressing according to plan and I am glad to announce that several scientific publications displaying the results from the project are now available, and several more are on their way. It is always a joy to present FORMAMP, both at scientific meetings and at those directed towards a more general audience - as the interest is high and the discussions with industrial and academic colleagues are stimulating. Especially now as the project has generated a number of publications. I look forward to meeting and being in contact with many of you during the remainder of 2016. Meanwhile the work on strategic plans for the future of FORMAMP is underway."

Dr. Helena Bysell, FORMAMP Project Coordinator

Heightened awareness of the antimicrobial resistance problem

Since the start of the FORMAMP project the activity to highlight the antimicrobial resistance (AMR) problem has increased considerably among academia, industry, opinion and policy makers as well as general media. The UK-commissioned independent Review on Antimicrobial Resistance published its report *Tackling Drug-Resistant Infections Globally: Final Report and Recommendations* in May 2016. The report highlights the importance of tackling AMR on a global level. Key priorities listed in the report to decrease the demand for antibiotics include a massive global public awareness campaign, improvement of hygiene to prevent the spread of infection, reduced unnecessary use of antimicrobials in agriculture and their dissemination into the environment, as well as improved global surveillance of drug resistance and antimicrobial consumption in humans and animals.

Importantly, the report states that new rapid diagnostics and development and use of vaccines and alternatives to antibiotics should be promoted. Also the numbers, pay and recognition of people working in infectious disease should be improved and the number of effective antimicrobial drugs to defeat infections that have become resistant to existing medicines must be increased.

The *Declaration by the Pharmaceutical, Biotechnology and Diagnostics Industries on Combating Antimicrobial Resistance* has been signed by 85 pharmaceutical, biotechnology and diagnostic companies and by 9 industry associations. The declaration urges politicians worldwide to expand their work to combat antibiotic resistance while the industry agrees to implement strategies within a number of focus areas. These include decreased use of antibiotics by education of healthcare personnel

and limited use of antibiotics within agriculture, increased funding for research and innovation with a focus on new antimicrobials, diagnostics and vaccines and increased access worldwide to high-quality pharmaceuticals and vaccines.

EU Health Award 2016 for NGOs Fighting Antimicrobial Resistance. The European Commission calls upon international, European, national and regional non-governmental organizations (NGOs) active in the field of AMR to submit their initiatives to the EU Health Award 2016. The call for applications focuses on reducing the threat to human health in fields such as prevention of infection, appropriate use of antimicrobials, surveillance, tackling AMR from a specific disease perspective.



Alternatives to Antibiotics - a Pipeline Portfolio Review, was published in *The Lancet Infectious Diseases* earlier this year. This review discusses the prospects for alternatives to antibiotics by defining the present state of alternatives to antibiotics at the portfolio level, prioritizes approaches, and provides evidence-based expectations of their delivery to inform funding decisions and policy in this crucial area of health care. 19 alternatives to antibiotics approaches were considered, including antibodies, probiotics, bacteriophages, vaccines and antimicrobial peptides.



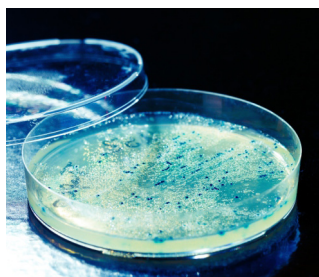
The research in FORMAMP receives funding from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 604182.
<http://ec.europa.eu/research>

Workshops ahead

A number of interesting workshops are organized in Q3 2016. FORMAMP is co-organizing *Novel Approaches to Fight Bacteria – A workshop with Translocation (IMI/ND4BB)* and FP7 projects NAREB and PneumoNP, 10-15 July in Bremen, Germany. A symposium on *Frontiers in Antibiotic Drug Discovery (FiADD)* is organized 14-15 September, in Stockholm, Sweden by the IMI/ND4BB project ENABLE.

Project progress on track

The research groups within FORMAMP are currently working on studying the interactions between the antimicrobial peptides and the carrier nanoparticles, and the mechanisms behind the antibacterial effect of peptide-loaded nanocarriers. A specific focus is on understanding the interaction with biofilms.



In parallel, incorporation of peptide-loaded nanocarriers into functional drug delivery systems for local administration is ongoing. This includes gels and creams to treat skin infections, and aerosols and powders for inhalation to treat lung infections. Stability studies of the formulated AMPs are in progress to evaluate the chemical stability upon storage and the proteolytic stability after administration. Importantly also, ongoing *ex vivo* studies evaluate the antibacterial effect of formulated AMPs on infected skin and the biosafety of inhaled nanocarrier systems.

Publications on FORMAMP research

Since the inauguration of the project in 2014, the scientific progress within FORMAMP has been significant. As a result five papers, that exhibit research findings generated by the project, have been published in peer-reviewed international scientific journals during the last months.

Boge *et al.* have published a paper in *Langmuir* concerning lipid-based liquid crystals as carriers for antimicrobial peptides focusing on phase behavior and antimicrobial effect. Umerska *et al.* have published a paper in *International Journal of Pharmaceutics* on adsorption of peptides to lipid nanocapsules. Braun *et al.* have published a paper in *Journal of Colloid and Interface Science* on membrane interactions of mesoporous silica nanoparticles as carriers of antimicrobial peptides, and a paper in *Journal of Sol-Gel Science and Technology* on dissolution kinetics of mesoporous silica nanoparticles in different simulated body fluids.

In addition, several FORMAMP team members presented their latest results at the *6th International Colloids Conference* in Berlin in June 2016.

See the FORMAMP web site for more information on the publications.

NMP AMR cluster

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



Meet a team member

We meet up with Lukas Boge, PhD student within FORMAMP at SP, to find out how his research contributes towards finding solutions to the antimicrobial resistance problem. Lukas just got his first article published [1].



What is the topic of your PhD project?

"I am trying to use liquid crystalline systems for delivery of antimicrobial peptides."

What results have you generated so far?

"I have investigated how several antimicrobial peptides influence the liquid crystalline structure of a cubic and a hexagonal gel. The hydrophobicity, net charge and size of the peptides were found to be important factors affecting curvature changes in the systems. Dispersions of the peptide loaded nanoparticles have shown good bacterial killing *in vitro*."

What are the potential clinical implications of your findings?

"Hopefully the liquid crystalline nanoparticles will protect the antimicrobial peptides from degradation and can be used in a formulation administered onto infections in burn wounds."

[1] Boge *et al.*, Lipid-Based Liquid Crystals As Carriers for Antimicrobial Peptides: Phase Behavior and Antimicrobial Effect, *Langmuir*, 2016, 32 (17), pp 4217–4228



FORMAMP

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

Dr. Helena Bysell Project Coordinator helena.bysell@sp.se +46 10 516 6024	Media and press enquiries Daniel Bolanowski Dissemination Manager daniel@bolanowski.se +46 703 30 30 68
--	---



Web site: www.formampproject.com
Twitter: @formamp
LinkedIn: www.linkedin.com/company/formamp

Sign up for future newsletters on the web site