ERA-NET PathoGenoMics
Consortium: Focusing on *Escherichia coli*
Interview with Prof. Jörg Hacker and Dr. Ulrich Dobrindt

1) If you look back at the first year of funding, what have you managed to achieve?

Firstly, all the groups involved in *E. coli* research have shared their information and their methodologies. We have now conducted the first studies and obtained the first results based on this cooperation. One of the most important results is that the so-called ExPEC-strains and non-pathogenic strains are building a sort of continuum, meaning that, depending on how they exchange or activate their genes, they may have pathogenic potential or be able to colonise without causing disease. This is in contrast to pathogenic *E. coli* strains in the gut, which have a very specific set of virulence factors. A second important result is that the expression of virulence-associated genes as well as the presence and activity of regulator elements play a vital role in the development of a disease. However, we are only slowly beginning to understand how this works in detail. A third result is that there exist certain genetic loci that are responsible for the production of colonisation and fitness factors, and which may play, under certain conditions, a role in the infection process. These are adhesin and polyketide associated genes which we have to work on, as well as some iron-related genes.

2) Do you think that your results have therapeutic potential?

On the one hand, it is important to have reliable markers for pathogen diagnosis. This is especially difficult for the differentiation of ExPEC strains and non-pathogenic strains. We hope our results will help to identify the dangerous strains and develop better diagnostic tools. On the other hand, there are some non-pathogenic strains that show asymptomatic colonisation, which seems to be of relevance for therapeutic uses. These, for example, could be used to colonise the urinary tract of patients suffering from chronic urinary tract infections. To better characterise these strains, and also to ameliorate them, could be a therapeutic approach, in terms of combating bacteria with bacteria. However, before beginning the clinical research, we first have to understand the basis for such potential displacement, to prevent the pathogenic bacteria from developing into even more dangerous strains.

3) What role does it play that this consortium is a European network?

This kind of research would not have the same potential on a purely national level. Such a network is a combination of intellectual ideas, different methods and specific competencies. For example, our colleagues in Sweden are specialised in the colonisation of urinary tract infection patients, which can only be found there. On the other hand, they have deficits with regard to chip technologies, a capacity that lies more in our group. Furthermore, there are teams that are analysing the reservoir of strains in animals that do not exist in Germany, but can be found in France, Israel and Hungary. In this way, different teams with different experiences come together under one roof, add their skills to the whole group, and channel their competencies to build up a powerful network.

4) What are your goals for the future?

I think we will make significant progress. It needs to be made clear that *E. coli* will become increasingly relevant as an infection-causing agent, as they are accumulating drug resistances at a greater rate than ever. Here, we are in genuine need of good diagnostics, and we will try

to reach this within the ERA-NET funding period. On the other hand, we aim to evaluate the therapeutic approach of colonisation of the urinary tract in terms of its clinical effectiveness.