



The human body contains around ten times as many bacterial cells than it does human cells, and this gut microbiota provides the body with many useful metabolic functions. The ways in which the human and bacterial cells interact with each other is little understood, and this has been the focus of CROSS-TALK, a project in which these mechanisms are studied in a variety of different ways, and in which a new generation of scientists are being trained to deal with the demands of the emerging subject of functional metagenomics and interactomics

Human microbiota interactomics and multidisciplines

The CROSS-TALK project (www.cross-talk.eu) aims to achieve major breakthroughs in understanding the mechanisms behind the dialogue between intestinal microbiota and hosts. It is now well established that microbiota is involved in non-communicable diseases such as obesity, diabetes, metabolic disorders. Such diseases are rapidly increasing in both developed and developing countries and are expected to surpass infectious disease deaths in the future. The project will decipher the molecular mechanisms involved in microbiota-host recognition, revealing how bacterial signals are integrated by different areas of the mucosal immune system. This knowledge will be particularly useful for application in the food and drugs industries.

At the same time, the project is focused on helping to nurture a new generation of young scientists who will be well trained to sustain the emergence of interactomics and functional metagenomics, a new supra-discipline that will require competencies in microbiology, cell biology, immunology, human physiology, bioinformatics and various “omics” approaches. This is being achieved by providing individual training through research projects, mobility in different laboratories and a variety of group training projects. These include network meetings that encourage scientific exchange within the network, spring schools focused on the development of transferable skills with a strong involvement from the economic sector, and workshops that allow time to talk with recognized scientists and to broaden scientific knowledge.

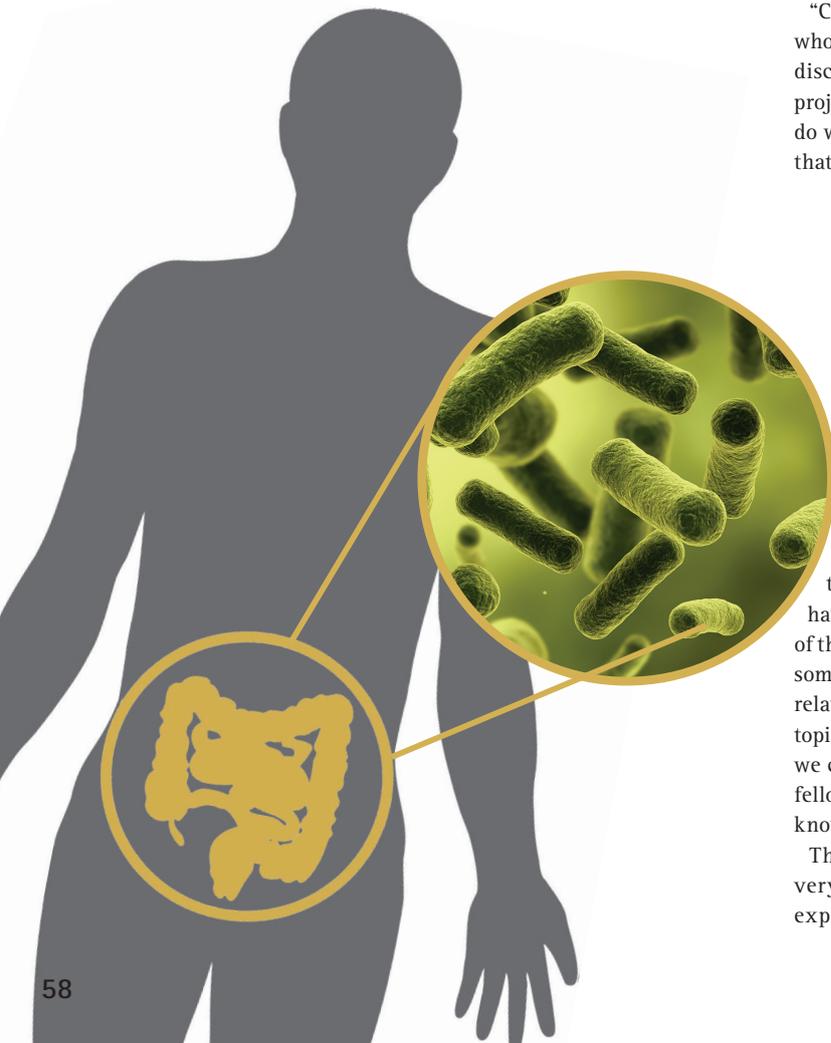
“CROSS-TALK is the kind of project where you need to have people who are trained and have an understanding in several different disciplines,” says Dr Emmanuelle Maguin, the coordinator of the project. “We realized as soon as we started our work that what we do was not really covered by any curriculum of young scientists at that point. Most of the time we would have people who would be

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very well trained in one discipline such as microbiology, but then would not have any knowledge at all about other areas such as human physiology and bioinformatics.

“That is the point at which we made it our objective within the network to mix people from different backgrounds, and to have projects that focused on different aspects of our work. Some of them are based around biology and in silico analysis of sequences, some of them are based on bioinformatics, and others are more related to human microbiology and immunology. This range of topics meant that when we all came together to present our work, we could have specialists from each disciplines present so that the fellows could develop a more specialist understanding and knowledge of these different areas.”

The industries that are associated with the project have been very keen to support this multi-disciplinary training, having expressed similar difficulties in finding young scientists who



were adequately trained in all the necessary fields. Recent technology changes have meant that there is a lot of new data and information than before, making it a highly active and competitive field, and so the need for people trained in this way from the beginning has become a high priority in recent years.

With the project having begun in October 2008, Dr Maguin is pleased with the progress that has been made within the network and by the fellows involved. "I think we have some very exciting results, and we will be seeing these in the public eye within the next year or so as our current batch of fellows finish their PhDs. Many European countries actually require 4 years of work to complete a PhD, so about half of our current fellows will be continuing for another year from now before they present their work. Although we already have 23 publications completed including some in journals with high impact factors, I think it will be next year in which we will start to see the real scientific impact of the project. Briefly, we identified new components and mechanisms of dialogue between the microbiota and its human host. Beneficial effects were confirmed in experimental models and a number of new tools, assays and models were developed during the project"

The role of industry has been pivotal to the success of CROSS-TALK, with many personnel and training sessions for the fellows. "We have two major firms in the field, Nestlé and Danone, who are very interested in our work," explains Dr Maguin. "They want to gain a greater understanding of how food can impact on people's health, and in particular they are interested in the health-promoting aspects of cross-talk between the microbiota and the host. Our work is very fundamental, so we were not doing specific experiments with their products, but it is certainly relevant to their aims.

"We also had an industrial platform, LABIP (the Lactic Acid Bacteria Industrial Platform www.labip.com), which consists of 24 companies that work in the field of food, probiotics, immunology and vaccinations, who

were very interested in the project. Many members have attended our presentations, and some have even got involved in the training of our fellows. Once a year we have had 3 -4 days of training that have been attended by all of our fellows, and these sessions were completely organised by people from LABIP, which I think shows how

important our work in creating this new breed of scientists is to them. We had personal development training from Nestlé, training on how to present ones work and many other topics, and it was all highly appreciated by the fellows.

"From my point of view, the training was very professionally done, and was probably better than what we as academics could have

provided, so it has been a mutually beneficial relationship between our network and the industrial associates."

With metagenomics becoming a more and more well established subject in the scientific community, the likelihood is that the work published in this discipline as well as the people who are properly trained to understand it will be becoming an increasingly precious commodity. With the way in which CROSS-TALK has been moving from strength to strength, it is highly probable that they will be a key European hub for this development.★

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Dr Emmanuelle Maguin



Emmanuelle Maguin is the head of the Microbiology and the Food Chain Division (MICA) at INRA which mission is to contribute to sustainable development through microbiology and to reduce risks in animal health, food chain and human health. She is also heading a group working on the adaptation of Firmicutes to their environments.



Dr Hervé Blottière

Research Director at MICALis Institute of INRA. He has a long track record in gut physiology with a particular emphasis on intestinal epithelial and immune cells.

At a glance

Project Information

Project Title:

Cross-Talk: Health-promoting cross-talk between intestinal microbiota and Humans

Project Objective:

The multi-partner Initial Training Network aims at preparing qualified young professionals/researchers and future scientific leaders in the human microbiome metagenomics by answering key questions on the role of the host-gut microbiota cross-talk in the development and maintenance of a healthy gut through new concepts and trans-disciplines.

Project Duration and Timing:

4 years, October 2008 to September 2012

Project Funding:

FP7 Marie Curie actions

Project Partners:

Partners:

- INRA, France (National Institute for Agricultural Research)
- IEO, Italy (European Institute of Oncology)
- IMIC, Czech Republic (Institute of Microbiology)
- Karolinska Institute, Sweden
- UNIABDN, United Kingdom (University of Aberdeen)
- University of Debrecen, Hungary
- University of Oslo, Norway
- WU, The Netherlands (University of Wageningen)
- Nestlé Research Center, Switzerland
- Danone Research, The Netherlands

Associated partners:

- INSERM, France (National Institute of Health and Medical Research)
- LABIP, The Netherlands (Lactic Acid Bacteria Industrial Platform)
- CIR, Norway (Centre of excellence of Immune Regulation)
- Paris Descartes University, France



Contact:

Main contact name:

Dr Emmanuelle Maguin

Tel: +33 1 34 65 22 97

Email: Emmanuelle.maguin@jouy.inra.fr

Main contact name:

Dr Hervé Blottière

Tel: +33 1 34 35 23 19

Email: Herve.blottiere@jouy.inra.fr

Web: www.cross-talk.eu