TNO innovation for life

MICROBIOLOGY & SYSTEMS BIOLOGY: PARTNERSHIPS

Microbiology & Systems Biology (MSB) has a longstanding scientific track record in microbiology, systems biology, microbial biotechnology, toxicology, nutrition and study of metabolic syndromes. We have a lot of knowhow in consolidation and integration of big data. We are therefore a valued partner in many (inter-)national innovation networks and public private partnerships.

We have access to a broad collection of state of the art analytical platforms, which we apply to an extensive collection of in vitro and in vivo models of health and disease. We can accurately measure all relevant bio-molecules including DNA, RNA, protein, metabolite and data on tissue, organs and clinical phenotypes in these models, for example in response to interventions. We are particularly strong in integrating and consolidating such big data. We use advanced bio-informatics, statistics and computational modeling to analyze and interpret the data. We are partner in more than 20 innovation networks, academic research consortia and consortia with approximately 150 partners from academia, industry and SME. Below a list of our partnerships.

Academic partnerships

- **BIOCLAIMS**: Identification of early and robust biomarkers that are predictive of a healthy metabolic phenotype when facing stressors to homeostasis (high fat diet, exercise). These biomarkers may be used to establish health claims by testing food products for health-promoting activity. Dr. Marjan Van Erk. *www.bioclaims.eu*
- **Food4me:** aims to show the added value of personalized nutrition. TNO's activities focus on the establishment of a global personalized nutrition knowledge base that will be validated by experts in the field and that will preserve data and information collected in the consortium for new studies or commercial potential. Dr. Marjan van Erk. *http://www.food4me.org/nl/*
- **Sino-Dutch centre for Preventive and Personalized Medicine**: aims at improving current diagnostics, patient stratification and prevention-based approaches. The main objective is to discover novel biomarkers for type 2 diabetes and arthritis. Prof. Jan van der Greef. *www.sinodutchcentre.nl*
- **IT-FOM**: aims to exploit the unprecedented amounts of detailed biological data for individual people, and turn this information into actual knowledge that helps us in taking medical and lifestyle decisions. Dr. Albert de Graaf. *http://www.itfom.eu/*
- **EURO DISH**: Develops recommendations of research infrastructures needed for efficient use of public research resources for food and health research. Dr.

Jildau Bouwman. *http://www.wageningenur.nl/en/show/EURODISH-the-need-for-food-and-health-research-infrastructures-in-Europe.htm*

- **COSMOS**: Brings together European metabolomics data providers to set and promote community standards that will make it easier to disseminate metabolomics data through life science e-infrastructures. Dr. Jildau Bouwman. *http://cosmos-fp7.eu/*
- **NU-AGE**: Seeks to fill the current lack of knowledge on how the whole diet can impact on and counteract age-related disease and functional decline. This will contribute to improved health and quality of life in the ageing population in Europe. Jildau Bouwman. *http://www.nu-age.eu/*
- **ANTIRESDEV**: Aims to study the effects of antibiotic administration on the emergence and persistence of antibiotic-resistant bacteria in humans and on the composition of the indigenous microbiotas at various body sites. Bart Keijser. *http://www.ucl.ac.uk/antiresdev/*

Figure 1: Our consortium partners from academia and RTOs

Mixed partnerships with academia, industry and SME.

- **NutriTech**: Evaluates the use of cutting-edge analytical technologies and methods to comprehensively measure the relationship between diet and metabolic health. NutriTech will study the underlying and related cellular and genetic mechanisms and multiple physiological processes of adaptation when the body is challenged with stressors (exercise, high-fat diet). Dr. Marjan Van Erk. *www.nutritech.nl*
- **PhenFlex**: Development of biomarkers for optimal health that can be used to back health claims. Dr. Annelies Dijk-Stroeve.
- **TIFN oral health**: Investigates the biological processes involved in maintaining oral health and how these processes can be influenced by food or dental care products to improve oral health. Dr. Bart Keijser. *http://www.tifn.nl/webdb/xpRE.xsp?page=theme&themecode=OH*
- **TIFN Gastro intestinal Health**: investigates the potential relationship between the gastrointestinal microbiota in development of obesity and type 2 diabetes, by combining state-of-the-art detailed human phenotyping and detailed characterisation of gastrointestinal microbiota composition and functionality. Dr. Tineke van den Hoorn.*http://www.tifn.nl/webdb/xpRE.xsp?page=project&projectcode=GH-003&key=GH003*
- **TIFN, Food Safety and Preservation Detection**: aims to develop an integrated approach for the detection and evaluation of microbial contaminants. Prof. Remco Kort. *http://www.tifn.nl/webdb/xpRE.xsp?page=project&projectcode=SP-003&key=SP003*
- **CCC**: The Carbohydrate Competence Center (CCC) was established to generate and develop high-quality knowledge in the field of carbohydrates with the aim of stimulating innovation and contributing to a healthier and more sustainable society. Dr. Frank Schuren. *http://www.cccresearch.nl/en/*
- **Chitosmart**: investigates the use of the antimicrobial peptide chitosan for use in food packaging in order to enhance product shelf life. Dr. Nynke van Berkum. *http://www.biobasedperformancematerials.nl/uk/1166/9/0/32*
- **EHEDG**: a consortium of equipment manufacturers, food industries, research institutes as well as public health authorities with the aim to promote hygiene during the processing and packing of food products. The principal goal of EHEDG is the promotion of safe food by improving hygienic engineering and design in all aspects of food manufacture. Jacques Kastelijn. *www.ehedg.org*

- **Netherlands Metabolomics Center**: develops metabolomics-based technologies and instrumentation to address the current and future challenges in biology, biotechnology and biomedical research in order to improve personalised health and quality of life. Prof. Jan van der Greef. *www.metabolomicscentre.nl*
- **MISSION-T2D**: aims at developing and validating an integrated, multilevel patient-specific model for the simulation and prediction of metabolic and inflammatory processes in the onset and progress of type 2diabetes (T2D). Albert de Graaf. *http://www.iac.rm.cnr.it/iacsite/index.php?page=list_project&cod=260&lang=eng*
- **NTC**: The Netherlands Toxicogenomics Centre (NTC) aims to employ toxicogenomics to increase the basic understanding of toxicological mechanisms. Its mission is to develop new methods that better chart the risks of chemical compounds and simultaneously offer an alternative to the current practice of animal testing. Dr. Eugene van Someren. *http://www.toxicogenomics.nl/*.
- **DECO**: integrates chemo-informatics approaches with experimentally-derived big data, to predict whether structurally related compounds behave similarly in terms of their toxicological profile. This would allow for improved identification of toxicological hazards leading to better classification and labeling of chemicals. Dr. Eugene van Someren.
- **EU LED**: proposes to design, construct and operate the first biofuel commercial facility in Europe using second generation technology, consisting on a lignocellulosic biomass to ethanol plant. Dr. Jasper Kieboom. *http://www.ledproject.eu/*
- **BIOTIC**: identifies different types of innovation hurdles in industrial biotechnology across Europe and formulate action plans and recommendations to overcome them. Prof. Peter Punt.
- **BioConSepT**: aims at the demonstration of the technical and economic feasibility of white biotech processes that convert 2nd generation biomass into valuable bi-functional platform chemicals for bioplastics, which are 30% cheaper and 30% more sustainable than the corresponding conventional chemical route or 1st generation process like glucose. Prof. Peter Punt. *http://www.bioconsept.eu/*
- **EUROFUNGBASE**: designs versatile filamentous fungal cell factories in order to produce useful compounds. Example are: pharmaceutical proteins, antibodies and vaccines and of novel non-ribosomal peptide antibiotics. Prof. Peter Punt. www.eurofung.net
- **D-BOARD:** focusses on the identification of new biomarkers and development of diagnostic tests capable of subclinical disease diagnosis for degenerative and inflammatory diseases of joints. Dr. Marijna Radonjic.

http://ec.europa.eu/research/health/medical-research/severe-chronic-diseases/projects/d-board_en.html

Figure 2: Our consortium partners from industry and SME