MyNewGut

PUBLISHERABLE SUMMARY

Reporting period: 2

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Name of the scientific representatives responsible for writing this report:

Consejo Superior de Investigaciones Científicas (CSIC)
Publishable summary

1. Summary description of project context and objectives

The MyNewGut Project, (Microbiome influence on energy balance and brain development/function put into action to tackle diet-related diseases and behaviour) investigates how the human gut microbiota and its genome (microbiome) influence diet-related diseases, such as obesity and metabolic syndrome, and behavioural disorders and vice versa. It also works on the design of specific dietary strategies that modulate the gut microbiota and, thereby, contribute to reducing the risk of developing these disorders and improving the long-term health of the population.

The general objectives of the project are to:

- Expand the knowledge of the contribution of the human gut microbiota and its genome (microbiome) to nutrient metabolism and energy balance.
- Identify microbiome-related features that contribute to or predict obesity and associated metabolic and behavioural disorders.
- Understand how the gut microbiota, under the influence of environmental factors, plays a role in programming the development and function of the metabolic, immune and nervous systems in early life and the long-term health consequences.
- Provide a proof-of-concept of the potential of dietary interventions with innovative foods and ingredients that target the gut microbiome to reduce disease risk in humans.

The MyNewGut project will investigate the influence of modifiable lifestyle factors on the gut microbiome and identify specific intestinal bacteria and pathways that contribute to and predict diet- and brain-related disorders at critical stages in the life-span and in different populations groups, representing diverse lifestyles and behaviours. This information will help to identify more effective nutritional interventions and microbiome-based dietary recommendations to ameliorate and prevent these disorders.

The MyNewGut project provides a unique multidisciplinary platform that will enable understanding of the extent to which microbiome components and functions are modifiable through lifestyle strategies to beneficially impact human health. This will be possible by conducting tightly controlled epidemiological observational and intervention studies in humans, as well as by assessing a combination of classical robust physiological and clinical outcomes with high-throughput omics-technologies and applying computational modelling and systems biology approaches. These will be complemented with animal studies, where cause-effect relationships between the microbiota and specific phenotypes will be established, and the mechanisms of action will be elucidated.
This initiative has a high breakthrough potential with respect to the current state of the art due to its multidisciplinary nature and integrated strategy that embrace all experts needed to translate microbiome data into human physiology, food-base applications and dietary recommendations and policies. This will ultimately improve industrial competitiveness and contribute to improving strategies for public health and the EU position in the field of diet-related disease prevention.

2. Work performed and main results achieved so far

The MyNewGut consortium has worked on the scientific, technological, dissemination and managerial activities as scheduled for this reporting period (30 months) for most of the tasks, resulting in the following achievements:

- Three human intervention trials with different macronutrients (proteins, fibre and fat) have been completed. Analyses of robust classical physiological and clinical outcomes/biomarkers and high-throughput omics-technologies have been done and all data will be integrated via a systems biology approach in the next months. The results of these trials will contribute to the understanding of the role played by specific components of the microbiota, metabolic pathways and specific metabolites in energy balance and metabolic disease risk markers. This will also help to inform microbiome-based dietary interventions and recommendations to reduce the risk of metabolic disease in the long-term.

- Epidemiological nested-case control studies in children and cross-sectional studies in adult woman are also on-going to gain understanding of the role of lifestyle, epigenetic factors and the gut microbiome composition and function in the development of obesity and related behavioural alterations, and to identify microbiome-related features that help to predict obesity.

- Epidemiological prospective studies in infants and cross-sectional studies in adults have been started in order to understand the role of early lifestyle and other modifiable factors in programming the function of the metabolic, immune and nervous systems and their long-term impact on health.

- Innovative food ingredients, targeting the gut microbiota, including prebiotic and probiotic candidates have been selected, based on consumers information, technological criteria and pre-clinical efficacy and mechanistic trials. Incorporation of these ingredients to different food matrices (dairy and cereal products) has been optimized in order to be tested in future human intervention trials.

- Studies on the mechanisms of action of dietary-induced gut microbiota changes and derived metabolites in obesity, ingestive behaviour and other associated behavioural alterations (anxiety, depressive-like behaviour) are on-going in animal models to understand the rationale of associations established in humans and to confirm causality.
• The design of human intervention studies to provide a proof of concept of the possibility of reducing diet-and brain-related disorders is on-going. A placebo-controlled cross-over study to evaluate the effects of a selected probiotic strain on a range of psychological and physiological measures is completed and the analysis of different parameters is underway.

• A data integration plan has been established for the assessment of microbiome composition and function in relation to health and dietary intake using a systems biology approach.

• A large number of additional dissemination activities regarding the project and its progress have been carried out and have been continually updated in the web and media. The project website, social media platforms and e-newsletters have had increased reach over this period and, as a result, the impact of the MyNewGut project has continued growing. All partners have been involved in a large number of Conferences and Workshops and massive media communications.

3. Expected final results and potential impact and use (including socio-economic impact and the wider societal implications).

1. Expand scientific knowledge to understand:

• The components of the gut microbiota and derived metabolites and pathways that influence nutrient metabolism and energy balance.

• Interactions between the gut microbiome, the host and lifestyle factors that influence the development and function of the metabolic, immune and nervous systems from early life to adulthood.

• The gut microbiome’s role in defining the risk of developing diet-related disorders, such as obesity and metabolic syndrome.

• The extent to which the gut microbiome is modifiable by dietary interventions to beneficially impact human health and reduce disease risk.

2. Enhance public health by:

• Developing microbiome-based dietary recommendations and inform expert committees to improve dietary guidelines that contribute to the well-being of the general and at-risk population.

• Providing robust scientific evidence that supports the future adoption of new policies for promoting healthy dietary habits and public health based on the newly generated microbiome data.

• Responding to EU societal challenges such as the demographic change and maintenance of a healthy active population by providing early and preventive lifestyle measures that reduce disease risk.
3. Improve industrial innovation and competitiveness by:

- Using knowledge gained from the project to produce innovative food products and ingredients with potential benefits to consumer health.
- Applying a multidisciplinary strategy that provides scientific data and validation of microbiome-based endpoints/biomarkers that help support and update legislative frameworks and boost industrial innovation.

4. Project public visibility tools

www.mynewgut.eu
https://www.facebook.com/mynewgut
https://twitter.com/mynewgut

Full list of partners in our website: http://www.mynewgut.eu/partners
Full list of the members of the Advisory Boards: http://www.mynewgut.eu/advisoryboards
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Dr Nebojša Ilić from the Institute for Food Technology of Novi Sad (FINS), Serbia, a partner in MyNewGut, appeared on Serbian television.

Interview of Prof. Peter Holzer in Swiss TV

Microbiome-based Foods for Health and Sustainability, APC Microbiome Institute, Brussels