Microbiome influence on energy balance and brain development/function put into action to tackle diet-related diseases and behaviour

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Final Conference 18 October 2018
Gut microbiome role in metabolism, brain function, obesity and behaviour

- Funded under the call KBBE.2013.2.2.-02 7FP
- Large Collaborative Project
- Project duration: 5 years
- Start date: 1 December 2013 until 30 Nov 2018
- EU contribution = € 9 million
- Multi-disciplinary and multi-sectorial consortium: experts in microbiology, nutrition, physiology, immunology, neuroscience, omics, systems biology and computational modelling, food industry, associations.
30 Partners of 15 EU and non-EU countries
The burden of obesity and behavioural disorders

"The globalized food system is not delivering the diets necessary for healthy living"

(GAIN, WHO, FAO, Sept 2018, Rome)
Microbiota and diet’s roles in metabolic health, obesity & behaviour

- High energy intake
- Emotional behaviour and Mood
- Western diet
- Sedentary life

OBESITY

Eating behaviour
OVEREATING

Highly palatable foods
Stress, sleep pattern, food preferences
Gut microbiota and diet in metabolic health, obesity & behaviour in humans

Intervention trials in humans

1. INRA-CSIC-UREAD-URG
   Diet-Microbiota
   • Metabolic Risk
   Does protein source matters?
   Proteins Fibres PUFAS

2. AMC-CSIC-UREAD-URG
   Causality - MetS
   • Microbiota vs butyrate
   Butyrate
   Donor microbiota’s effect
   Serotonin
   Dopamine
   Frontal cortex

INRA-CSIC-UREAD-URG
AMC-CSIC-UREAD-URG
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Gut microbiota and diet in metabolic health, obesity & behaviour

Observations studies in humans

3 UNIBO-BIPS-CSIC

Obesity prediction
• Microbiome
• Diet, Exercise
• Inflammation

Biomarker development

4 UNIBO

Eating behaviour

Control women

Obese

Food-addictive behaviour

Reward vs homeostatic pathways

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Cultivating uncultured bacteria 200 from 50 new spp.

**Effectiveness in DIO**
- *B. uniformis* 7771
- *B. unif* + fibres
- NGP (patents)
Gut microbiota and diet in metabolic health, obesity & behaviour in models

Mechanisms of gut-liver-brain communication

3 UCL/TUM-MUG-CSIC
DPPIV & Metabolites

Gut – liver axis
- Gut microbiota
- Antimicrobials
- Liver inflammation

4 MUG-UREAD-UCL-CSIC
Obesity & Emotions

Gut – brain axis
- Gut microbiota
- Brain metabolites

- DPPIV
- NPY
- GLP1
- Cytokines
Early microbiota, immune and brain development & role in health programming
Early microbiota, immune and brain development & role in health programming

From pregnancy to infancy, childhood and adulthood

My New GUT

1. UCC-UREAD INFANTMET
   Lifestyle & microbiota
   IMMUNITY & STRESS

2. UGR-UNIBO-CSIC PREOBE
   Lifestyle & microbiota
   NEURODEVELOPMENT & OBESITY

MICROBIOME MODULATORS
- Maternal obesity - diabetes
- Delivery mode
- Antibiotic intake
- Dietary patterns

ASSESSMENTS
- Omics
- Immune-Endocrine markers
- Brain imaging
- Behaviour
- Neurodevelopment

“connectome”

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Innovation activities to translate microbiome science to industry and consumers

- Selection of functional ingredients
- Development of innovative food prototypes
- Scaling production for efficacy trials
- Evidence-based information for consumers

CAPSA, CARGIL, AH, ADMS, FINS & LALLEMAND
Effectiveness of foods & ingredients targeting the gut on metabolic & mental health

Randomized Control Trials in humans

1. UCC-AH
   Probiotics & brain
   - PROBIOTIC
   - PLACEBO

2. UCPH-CAPSA
   Fiber & metabolism
   - MILK ENRICHED WITH FIBER
   - MILK -PLACEBO

RESILIENCE TO STRESS
OBESITY AND RISK MARKERS

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Exploitation of results and knowledge

**POLICIES & CONSUMERS**
- Support health policies
- Inform future dietary recommendations
- Information to facilitate consumer’s choices (EUFIC, ICC, TNO, etc.)

**INDUSTRIAL COMPETITIVENES**
- Next Generation Probiotics-Live Bio-Terapeutics (CSIC)
- Biomarkers for disease prediction (CSIC, UNIBO)
- Healthy foods & ingredients (CAPSA, AH, UCHP, UCC, etc.)
- Start-Up: Wellmicro (UNIBO)

**FOSTERING SCIENCE**
- Datasets (8 + 4 studies)
- Phenotype database (TNO)
- Standards
- Analytical tools:
  - Lipidomics (UHR)
  - Long-amplicon seq (CSIC)
Further EU R&D Activities

**7+ New R&D Projects**  
MICROBIOMESUPPORT, CIRCLES, MIVAO, ERA/JPI-HDH, etc.  
(CSIC, CARG, UNIBO, UCC, EUFIC MUG, UCC, UHR))

**Scientific Advisory Board**  
Antony Leeds, Garrath Williams, etc.

**14 PhD students, 13 Postdocs, many undergraduates**  
Training & education activities
Dissemination highlights

109K+ webpage views
558 e-newsletter subscribers
6.5K+ followers
1.5K+ likes

www.mynewgut.eu

>200 presentations at events

48 scientific publications

Special Issue & Opinion Papers

“FOOD COMPANIES WILL BE ABLE TO USE THE KNOWLEDGE THAT WE DEVELOP.”

30 players, 5-years: EU project investigates obesity, energy and the microbiome (& more)

By Shane STARLING
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Thanks all MyNewGut partners and SAB
Thank you!