GEMMA Project:
a biomedical study to identify novel biomarkers for early diagnosis and personalized treatment of Autism Spectrum Disorders

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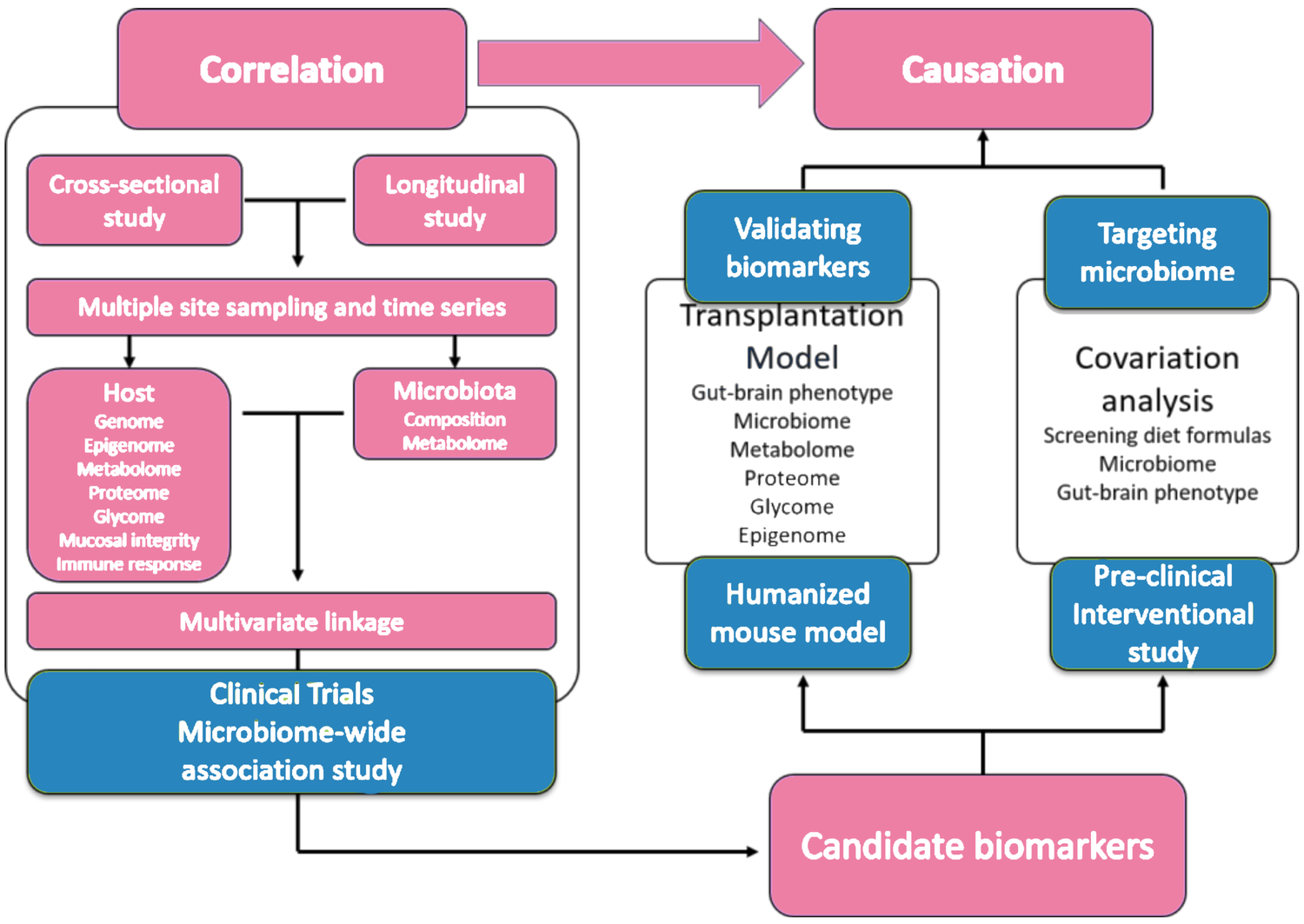
INTRODUCTION

GEMMA project (Genome, Environment, Microbiome and Metabolome in Autism), is a prospective study aiming to identify potential biomarkers for early diagnosis and personalized treatments of autism, followed by validation on large multi-omics datasets. The project is focused on gut microorganisms causing epigenetic modifications controlling gut barrier and immune functions. GEMMA will in-depth evaluate 600 newborns who have a family history of autism (i.e. siblings of children with an autism spectrum condition)

METHODOLOGY

Experimental design



Recruitment

- **Irish Centre for Autism and Neurodevelopmental Research (www.icanautism.ie), University of Galway**
  geraldine.leader@universityofgalway.ie
- **ASL Salerno, Italy**
  reclutamento@gemma-project.eu
- **The General Hospital Corporation, MGH, Boston, U.S.A., (www.partners.org)**
  mghgemma@mgh.harvard.edu

Communication

website:
www.gemma-project.eu

RESULTS

180 families with newborns enrolled and relative biological samples collected and analysed by omics

- We expect differences in xenobiotic, lipid and amino acid metabolism, lipid profile, mitochondrial dysfunction, and altered levels of phenolic microbial metabolites, between children with autism and neuro-typical controls
- We expect correlations between specific metabolite profiles and clinical behavioural traits
- Small noncoding RNAs were described, for the first time, in faeces collected from children with autism
- We have conducted ASD-faecal transfer in germ-free mice and demonstrated intestinal, immune system, neuro-inflammatory and behavioural changes.
- We will conduct a dietary intervention targeting prebiotic fibres in an ASD murine model

15 articles published

DISCUSSION

We expect the results to highlight a connection among intestinal physiology, metabolism and behavioural traits that may promote the discovery of novel biomarkers for autism. The completion of analyses on a large number of samples and the integration of the preclinical and clinical data produced will help even more to find diagnostic and prognostic biomarkers and to understand the molecular mechanisms of autism.

A Happy Journey through Life