BRIGHAM AND WOMEN'S HOSPITAL

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Department of Medicine
Channing Division of Network Medicine

Channing Microbiome Seminar
May 26 (Friday), 2023, 9AM (ET)

Zoom: https://us02web.zoom.us/j/81070959105?pwd=RFJNd3dSZmR6dXJZNjJiYVVzQ3NEQT09
Meeting ID: 810 7095 9105
Passcode: 984617

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Network-based computational modeling of metabolism of the human gut microbiota with views to personalized nutrition

Abstract: Understanding how diet and gut microbiota interact in the context of human health is a key question in personalized nutrition. Genome-scale metabolic networks and constraint-based modeling approaches are promising to systematically address this complex problem. However, when applied to nutritional questions, a major issue in existing reconstructions is the limited information about compounds in the diet that are metabolized by the gut microbiota. Here, we present AGREDA, an extended reconstruction of diet metabolism in the human gut microbiota. We show that AGREDA outperforms existing reconstructions in predicting diet-specific output metabolites from the gut microbiota. Based on AGREDA, we present a novel food ranking algorithm that considers the individual gut microbiota composition, metabolomics data and nutritional databases. We apply our approach to an in vitro experiment using 16S rRNA gene sequencing data of fecal samples fermented in different foods. Preliminary results with large cohorts of individuals are also presented.

Bio: Professor Francisco J. Planes is principal investigator in the Computational Biology group at the School of Engineering of University of Navarra, Tecnun. His research has focused on the development of new algorithms, mainly based on optimization and statistical techniques, for the analysis of molecular networks in the context of high-throughput technologies ("omics" data), with varied applications, but mainly in cancer and personalized nutrition. He has participated in 15 research projects related with metabolism and health, in order to identify novel therapeutic strategies and biomarkers. He has published more than 40 scientific articles in high-impact journals, such as Nature Communications, Nature Protocols, Genome Biology, PLoS Computational Biology or Bioinformatics. In the context of Stance4Health project, Professor Planes has led the development of the food ranking algorithm based on gut microbiota metabolism and its application to the different cohorts of children and adults in order to guide nutritional interventions.

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