

## The Faculty of Biotechnology and Food Engineering

### Special seminar

# Diet: microbe interactions in the gut - molecular crosstalk across domains of life



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**Abstract.** The human gut microbiome is increasingly seen as relevant to host physiology and risk of chronic disease. Microbial exposures and the metabolites produced by the gut microbiota regulate host immune function from immune education in the infant to senescence in old age. They regulate host energy metabolism and the homeostasis of glucose and cholesterol, two critical factors in cardiovascular disease and the metabolic syndrome. Recent work has also shown that both the composition of the gut microbiota and gut microbiota derived metabolites play a critical regulatory role along the gut:brain axis impacting on sleep, stress resilience, cognitive function and psychiatric diseases including depression, autism, dementia, Parkinson's disease and Alzheimer's disease. The gut microbiota is shaped by many factors, including host intestinal secretions and immune effector molecules, age, disease, drug/xenobiotic exposure, lifestyle and diet. Indeed diet, especially consumption of dietary fibers and plant polyphenols on the one hand, and ultra-processed foods, sugar, saturated fat and animal protein on the other, has a dramatic effect on the diversity and relative abundance of different bacteria within the gut microbiota, and also on the profile of metabolites produced by the gut microbiota. These metabolites, especially short chain fatty acids from fiber fermentation and small phenolic acids from metabolism of plant polyphenols, are thought to mediate at least in part, the beneficial effects of healthy eating patterns like the Mediterranean style diet. Moreover, either directly through chelating activities or indirectly by modifying gut microbiota composition and their enzymatic potential, fibers and complex plant polyphenols can impact on the enterohepatic circulation of bile acids and in particular the type and quantity of secondary bile acids returning from the gut to the liver and systemic circulation. Different bile acid species, in the liver, muscle, adipose tissue, immune cells and intestinal mucosa, have different potentials to regulate inflammation, lipid and glucose metabolism, and the absorption of cholesterol from the intestine, as well as their own biosynthesis in the liver. Therefore the chemical cross talk between diet, microbiota and host immune and metabolic pathways in particular, is coming increasingly under the spot light in the search for the underlying mechanisms linking healthy eating patterns and chronic disease risk. This presentation will discuss recent examples from our work combining microbiota analysis with metabolomics, in order to identify key metabolites characteristic of diet:microbe interactions with potential to regulate host immune and metabolic pathways involved in obesity related disease. Recognizing that the gut is an open system, at both ends, and the potential of food chain microbiomes to act as microbiome modulators in humans and in other animals, I will also present our recent work on selecting probiotic strains from local Italian artisanal dairy products.

**Wednesday, 16/12/2020, 14:00 – 15:00, Via zoom**

**Meeting ID: 997 7045 0858**

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