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The gut-liver axis revisited regarding microbiome-nutrients interactions

Recent studies support the involvement of dozens of metabolites that are produced by gut microbes in the control of gut-liver axis. Certain bile acids, amino-acid derived metabolites, gazes or short chain fatty acids, as well as microbial components like lipopolysaccharides or peptidoglycans for example, participate to the regulation of key gut functions (immunity, cell renewal, neuro-endocrine function, gut barrier) that influence host behavior and energy metabolism. Some of those microbial derived metabolites reach the liver through the portal vein, where they regulate inflammatory and metabolic patterns. The dysbiosis refers to alteration of the gut microbiota composition and functions that characterizes several pathologies such as metabolic altered fatty liver disorders (MAFLD), diabetes, obesity, cardio-metabolic diseases, but also depression or food/drink addiction. Our presentation will illustrate the key role of the gut microbiome in the management of liver disease. By using the model of gut microbial transfer from obese or alcohol-dependent patients to mice, we have evaluated the causal role of the microbial dysbiosis in behavioral and metabolic alterations. We, and others have shown that metabolomic and metagenomic analysis can help discovering new biomarkers of hepatic disorders severity, and that breath metabolome can reveal nutrients-microbiome interaction. Promoting the intake of dietary fibers that interact with the gut microbiome (prebiotics) in obese and alcohol-use disorder cohorts, appears as an interesting way to modulate the gut microbiome, but leads to variable outcomes. Interestingly, the initial gut microbiota composition, drug treatment and physical exercise are interdependent components that explain individual variability in terms of health improvement by nutritional approaches. In conclusion, unravelling gut microbiome-liver interactions may be useful for diagnostic and therapeutic purposes, but requires to overcome the difficulty to implement meta-data analysis in day-to-day medicine for all (related funding projects.