Interplay between food and gut microbiota in health and disease

Numerous microorganisms colonize the human gastrointestinal tract playing pivotal roles in relation to digestion and absorption of dietary components. They biotransform food components and produce metabolites, which in combination with food components shape and modulate the host immune system and metabolic responses. Reciprocally, the diet modulates the composition and functional capacity of the gut microbiota, which subsequently influence host biochemical processes establishing a system of mutual interaction and inter-dependency. Macronutrients, fibers, as well as polyphenols and prebiotics are strong drivers shaping the composition of the gut microbiota. Especially, short-chain fatty acids produced from ingested fibers and tryptophan metabolites are key in modulating host immune responses. Since reciprocal interactions between diet, host, and microbiota are personal, understanding this complex network of interactions calls for novel use of large datasets and the implementation of machine learning algorithms and artificial intelligence. In this review, we aim to provide a base for future investigations of how interactions between food components and gut microbiota may influence or even determine human health and disease.