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EDITORIAL

Dietary amino acids and intestinal microbiota

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We are pleased to present this Special Issue of *Amino Acids* dedicated to "Dietary amino acids and intestinal microbiota". Its original and review papers focus on how dietary amino acids affect the composition and functions of intestinal microbes. These articles deal with studies involving humans and animals (including mice, pigs, and fish), as well as cultured bacteria.

As highlighted in the pages of this Special Issue, an increasing number of studies in the past decades have indicated that the intestinal microbiota metabolize amino acids present in the intestinal lumen via multiple pathways, releasing numerous metabolites that are active on both the bacterial species themselves and the host intestine (Armand et al. 2022; Blachier and Andriamihaja 2022; Hyland et al. 2022; Liu et al. 2022). The microbial metabolites include ammonia, *p*-cresol, skatole, phenol, indole, hydrogen sulfide, nitric oxide, and polyamines, as well as acetylated and methylated compounds. Some of these bacterial metabolites are absorbed into the blood circulation and modified by the host peripheral tissues, leading to the production of co-metabolites, with several of them affecting the metabolism, physiology, and gene expression in various host cells (Beaumont et al. 2022; Gasaly and Gotteland 2022; Ji et al. 2022; Wu et al. 2022). Depending on the concentrations of these bacterial metabolites and co-metabolites, and on the overall context, the effects of these microbe-derived bioactive compounds have been shown to be either beneficial or deleterious for the host's health (Beaumont et al. 2022; Gasaly and Gotteland 2022; Paeslack et al. 2022). In addition, some recent studies have shown that several amino acids (e.g., arginine, glycine, threonine, and tryptophan) and probiotics can beneficially modify the composition of the gut microbiota, the metabolic activities of microbes, and intestinal anti-inflammatory responses (Beaumont et al. 2022; Hyland et al. 2022; Ji et al. 2022; Li et al. 2022; Riederer et al. 2022; Wu et al. 2022; Zhang et al. 2022). Furthermore, some amino acids, such as cysteine and methionine, can directly modulate the growth and abundances of some bacterial populations in cultures, which can modify the microbial communities in the context of wastewater treatment (Rosa-Masegosa et al. 2022).

The results of recent studies in this exciting research area have clearly a huge potential for improving human and animal nutrition in future. The underlying mechanisms involve: (a) reductions in the catabolism of dietary amino acids by microbes of the small intestine, leading to the enhanced entry of dietary amino acids into the portal circulation; (b) alterations in the availability of amino acids (e.g., branched-chain amino acids, glutamine, arginine, glycine, and tryptophan) and possibly their metabolites (such as polyamines and nitric oxide) to promote protein deposition in lean tissues and inhibit the accretion of fats in white adipose tissue; (c) beneficial modulation of the intestinal homeostasis to maintain crosstalk between its microbiota and the intestinal mucosa, resulting in optimum antioxidative and immune responses against food-borne pathogens and harmful toxins; (d) regulating microbial protein synthesis and microbial populations for sustaining sufficient concentrations of short-chain fatty acids in the large intestine so as to meet the energy needs of its mucosal epithelial cells; and (e) protecting the mucosal integrity and function of the small and large intestines by inhibiting the microbial production of toxic molecules and neutralizing them. This field is expected to advance our knowledge of relationships among dietary protein and amino acid consumption, microbiota composition and metabolism, and impacts on the host's health (including intestinal, cardiovascular, and metabolic health). We hope that this Special Issue of *Amino Acids* will further stimulate

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research in this important field regarding dietary amino acids on the intestinal microbiota.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethics statement This is an editorial and did not require the approval for the use of animals by Institutional Animal Care and Use Committee.

Informed consent No informed consent is required for this study.

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