Gastro-enterology

Macrophages and microbial metabolites in intestinal diseases

Humans with inflammatory bowel disease, such as Crohn's disease or eosinophilic esophagitis have an altered gut microbiome. Emerging evidence indicates that microbial metabolites and not only the microorganisms and their structural components modulate mucosal immune responses and metabolism. These microbial metabolites may influence the development of inflammatory bowel disease and eosinophilic esophagitis. Our research group aims to unravel some of the mechanisms how microbial metabolites are recognised by the host in the context of inflammatory bowel disease. We focus on studies, in which we genetically delete metabolite sensing receptors in macrophages and intestinal epithelial cells. Our studies suggest the possibility that microbial metabolites will fuel inflammatory bowel disease and eosinophilic esophagitis.

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Selected Publications

Herrema H, and Niess JH (2020). Intestinal microbial metabolites in human metabolism and type 2 diabetes. Diabetologia.

Kaya B, Donas C, Wuggenig P, Diaz OE, Morales RA, Melhem H, Swiss, I.B.D.C.I., Hernandez PP, Kaymak T, Das S, *et al.* (2020). Lysophosphatidic Acid-Mediated GPR35 Signaling in CX3CR1(+) Macrophages Regulates Intestinal Homeostasis. Cell Rep 32, 107979.

Wuggenig P, Kaya B, Melhem H, Ayata CK, Swiss, I.B.D.C.I., Hruz P, Sayan AE, Tsumura H, Ito M, Roux J and Niess JH (2020). Loss of the branched-chain amino acid transporter CD98hc alters the development of colonic macrophages in mice. Commun Biol 3, 130.

Radulovic K, Ayata CK, Mak'Anyengo R, Lechner K, Wuggenig P, Kaya B, Hruz P, Gomez de Aguero M, Broz P, Weigmann B and Niess JH (2019). NLRP6 Deficiency in CD4 T Cells Decreases T Cell Survival Associated with Increased Cell Death. J Immunol 203, 544–556.

Steinert A, Linas I, Kaya B, Ibrahim M, Schlitzer A, Hruz P, Radulovic K, Terracciano L, Macpherson AJ and Niess JH (2017). The Stimulation of Macrophages with TLR Ligands Supports Increased IL-19 Expression in Inflammatory Bowel Disease Patients and in Colitis Models. J Immunol 199, 2570–2584.

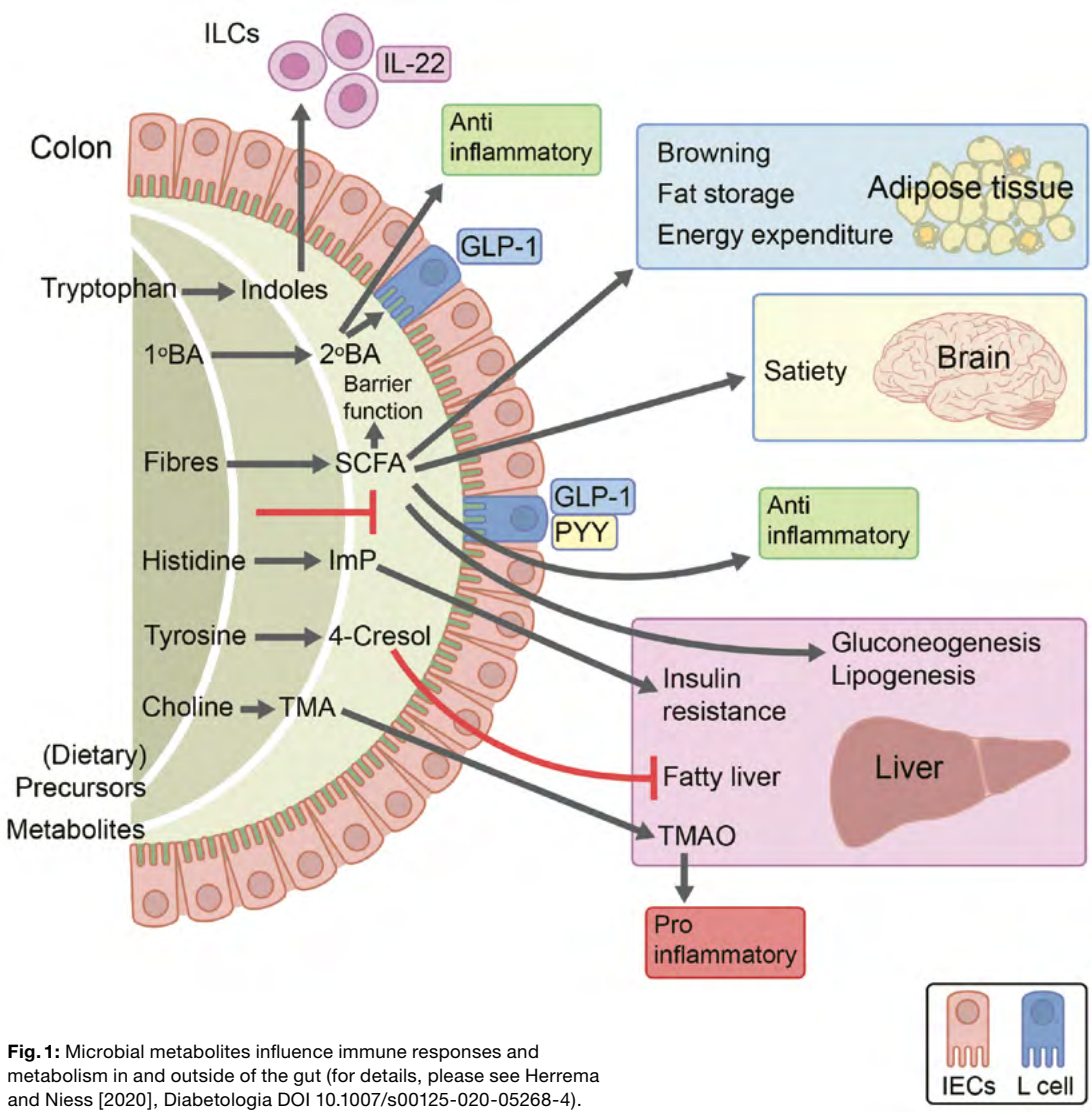

Fig. 1: Microbial metabolites influence immune responses and metabolism in and outside of the gut (for details, please see Herrema and Niess [2020], Diabetologia DOI 10.1007/s00125-020-05268-4).