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A snapshot into ATP-binding cassette transporter mediated glycan uptake in probiotic bifidobacteria

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The interplay between the human gut microbiota (HGM), the host and diet has a profound impact on health. Imbalance in this community is associated with metabolic and immune disorders including obesity, type 2 diabetes, irritable bowel disease, allergies as well as colon cancer. The role of glycan metabolism in shaping the HGM is well established (1), but a basic understanding of the mechanisms underpinning this facet of glycan metabolism is lacking. Different HGM taxa employ different strategies to harvest energy from host and dietary glycans. Typically, bacterial cells deploy diverse systems for transport of glycan fragments of different size and complexity to their periplasm or cytoplasm for further degradation, precluding losses to competing taxa, and to accumulate these glycans against a concentration gradient. There is a conspicuous lack of data of these glycan uptake systems, particularly amongst HGM taxa and strains imparting probiotic activity. We have explored intracellular (2) and extracellular enzymatic activities (3) mediating the utilization of non-digestible glycans e.g. β -linked galactosides and mannosides in *Bifidobacterium animalis* subsp. *lactis*. We have more recently focused on getting insight into glycan uptake effectuated by ATP-binding cassette (ABC) oligosaccharide transporters that are preponderous in bifidobacteria (4). Two different examples will be presented to highlight how ABC importers interplay with hydrolytic enzymes to define the metabolic preference of health relevant bifidobacteria. This insight represents a framework for the development of more efficient therapeutic interventions relying on restoring or boosting a healthy HGM through diet supplements to combat lifestyle diseases.

Keywords: ATP-binding cassette transporter, glycan metabolism, human gut microbiota, prebiotics

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