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Short Communication

Sources and Mechanism Involved in Prebiotics

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DESCRIPTION

Prebiotics are compounds found in food that stimulate the growth or activity of healthy bacteria and fungi. The most typical instance is in the digestive system, where prebiotics can change the composition of the bacteria in the gut microbiome. Dietary prebiotics are typically non-digestible fibre substances that pass through the upper gastrointestinal system undigested. By functioning as substrates for these substances, they encourage the growth or activity of beneficial bacteria in the colon [1]. The health claims they make for marketing purposes may be subject to regulatory scrutiny as food additives. Oat beta-glucan and chicory root inulin are two common prebiotics used in food production.

Prebiotic consumption may improve the host's health. According to the previous characterizations, resistant starch and oligosaccharides, which are carbohydrate molecules originating from plants, are the main sources of prebiotics that have been identified. Specific oligosaccharide sources that have been shown to promote the activity and expansion of advantageous bacterial colonies in the gut include fructans and galactans. Galactans are made up of galacto-oligosaccharides, whereas fructans are made up of Fructo-Oligo-Saccharides (FOS) and inulins [2]. It has been demonstrated that resistant starch alters gut bacterial composition and enhances biomarkers for a variety of diseases. Prebiotics include pectin, beta-glucans, and xylo-oligosaccharides, among other dietary fibres.

The current prebiotic targets have increased to include a wider variety of microorganisms due to improved mechanistic methodologies in recent years, including *Roseburia spp.*, *Eubacterium spp.*, *Akkermansia spp.*, *Christensenella spp.*, *Propionibacterium spp.*, and *Faecalibacterium spp.* These bacteria have been promoted as essential probiotics and beneficial gut flora because they may enhance digestion and the effectiveness and increased efficiency of the immune system in the host.

It has been discovered that prebiotic specificity varies between Bifidobacteria and Lactobacillus, and that both can specifically ferment prebiotic fibre dependent on the enzymes present in the bacterial population [3]. In this approach, while Bifidobacteria exhibit specificity for inulin, fructo-oligosaccharides, xylo-oligosaccharides, and galacto-oligosaccharides, Lactobacilli prefer inulin and fructo-oligosaccharides. Prebiotics can prevent the growth of harmful and potentially pathogenic microbes in the gut, such as clostridia, in addition to promoting the growth of beneficial gut bacteria.

Sources

Prebiotic sources must be demonstrated to benefit the host in order to be classified. One well-known example of a prebiotic is the fermentable sugars made from xylans and fructans.

Endogenous: Oligosaccharides in human milk are an endogenous source of prebiotics in humans. These oligosaccharides are structurally related to galacto-oligosaccharides. Human milk oligosaccharides have been found to enhance a child's immune system and Bifidobacteria bacterial population in breastfed infants. In addition, human milk oligosaccharides assist new borns in developing a balanced gut microbiota composition.

Exogenous: Prebiotics, an indigestible class of carbohydrate molecules, are a type of fermentable fibre and can be categorised as dietary fibre. But not all dietary fibre falls under the category of a prebiotic source. Raw oats, unprocessed barley, yacon, and whole grain breakfast cereals are also categorised as prebiotic fibre sources [4]. Depending on the meal, different prebiotic fibre types may be more prevalent. Oats and barley, for example, large amounts of beta-glucans, while fruits and berries, seeds, onions, Jerusalem artichokes, bananas, and legumes all include pectins and oligo-fructose.

Mechanism of action

Prebiotics are mostly utilised by healthy bacteria in the colon through fermentation. Bacterial communities such as Bifidobacteria and Lactobacillus use saccharolytic metabolism to digest substrates. Both genes encoding for carbohydrates-modifying enzymes and proteins that take up carbohydrates are abundant in the bifidobacteria genome [5,6]. These genes' existence suggests that prebiotics, or oligosaccharides originating from plants, can be fermented and metabolized through particular metabolic pathways found in bifidobacteria. Short

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chain fatty acids, which have a variety of physiological effects in bodily processes, are ultimately produced through these pathways in bifidobacteria.

CONCLUSION

Prebiotics can prevent the growth of harmful and potentially pathogenic microbes in the gut. These bacteria have been promoted as essential probiotics and beneficial gut flora. Milk oligosaccharides have been found to enhance a child's immune system and Bifidobacteria bacterial population in breastfed infants. Bifidobacteria have specific metabolic pathways that can ferment and break down prebiotics, or oligosaccharides derived from plants. These routes ultimately result in the production of short chain fatty acids, which have a variety of physiological effects on human functions.

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