

SCIENCE REPORT



EpiCor[®] and its Immune Effects on Gut Health

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Summary: The gut is extremely important for proper immune health. GALT (Gut-Associated Lymphoid Tissue) comprises a large part of the immune system. EpiCor appears to support gut health through a variety of mechanisms:

- ❖ **A multistage simulator of the human digestive system shows that EpiCor can act as a prebiotic, which helps explain part of its Mode of Action as an immune modulator. The model used an established human gut flora inoculum and showed that EpiCor increased the levels of butyrate, a short chain fatty acid (SCFA) that has been shown to be beneficial for gut immune health. Levels of beneficial bacteria (Bifidobacteria and Lactobacilli) were increased over the control.**
- ❖ **Levels of sIgA have been shown to increase with EpiCor vs. placebo in human clinical trials. This immunoglobulin is present in mucosal membranes and is important for protection from pathogens.**
- ❖ **EpiCor also contains β -glucans and mannan-oligosaccharides (MOS). There has been much research showing beneficial effects of these oligosaccharide on gut immune health.**
- ❖ **These results suggest that the immune and prebiotic effects of EpiCor can be complementary, and help to improve gut health.**

The major effects of EpiCor that have been measured so far *in vivo* and *in vitro* have been on the immune system. However, since there are complex interactions between the immune system and the digestive system, the possibility that EpiCor exerts some of its immune effects via the GALT merited exploration. As a first step, EpiCor was studied in a prebiotic screening *in vitro* model that was developed by the University of Ghent and conducted by its related research company, ProDigest in Belgium.

The model studied was a multistage simulator of the human digestive system, using an established human gut flora inoculum. The system is designed to screen products for prebiotic and probiotic activity, not to carry out a detailed analysis. To test for prebiotic effects, the relative amounts of SCFA (Short Chain Fatty Acid) levels and changes in populations of Bifidobacteria and Lactobacilli were measured. During this trial, cellulose was used as a negative control, and FOS (fructooligosaccharide) and inulin were used as positive controls.

Definitions

Probiotic: A product containing viable, defined microorganisms in sufficient numbers to alter the microflora in a compartment of the host digestive system, and thereby exert beneficial health effects in the host.

Prebiotic: A non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon.

Synbiotic: A mixture of a probiotic and a prebiotic.

Study of EpiCor Effect on Short Chain Fatty Acids in the Model System

EpiCor caused a similar increase in total SCFA as Inulin and FOS, but it shifted the pattern of SCFA to produce more butyrate (significant in the comparison of EpiCor to FOS, $p < 0.05$), as shown in the table below. This is very interesting; since butyrate is thought to positively interact with the immune system in a variety of ways (see discussion section below for more information on the benefits of butyrate).

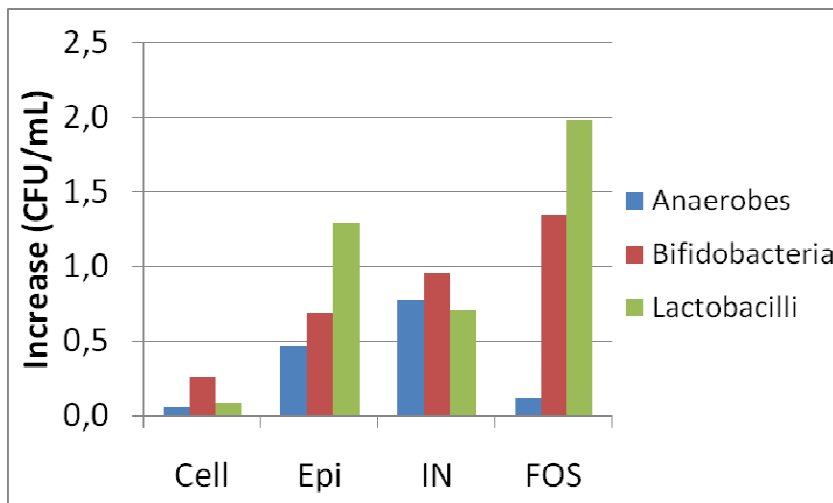
Table 1. The effect of EpiCor on SCFA

	EpiCor	Inulin	FOS
Acetate (%)	48	57	64
Propionate (%)	30	30	26
Butyrate (%)	21	14	9

Study of EpiCor Effect on Bacterial Populations in the Model System

The study results are reflected in the following graph (Figure 1), which shows the ability of EpiCor to increase the levels of the best studied beneficial bacterial groups (Bifidobacteria and Lactobacilli) as compared to the cellulose control. These results suggest EpiCor is acting as a prebiotic, with effects similar to those of inulin and FOS. These additional immune health benefits, combined with data from other human studies performed with EpiCor, may further explain why EpiCor helps the body achieve immune health.

Figure 1. The Effect of EpiCor® on Bacterial Populations in the Model System



Discussion

SCFAs produced by bacteria during digestion have been recognized for many years as sources of energy for the host, which are mainly derived from fermentation reactions in the distal sections of the digestive system. Recently, there has been considerable interest in the effect of SCFAs on immune health, and, in particular, butyrate. Apart from butyrate's association with energy, it is thought to interact directly with parts of the immune and digestive systems. Research has shown butyrate's beneficial effects on the structure of the gut wall and on its ability to alter cytokine profiles in such a way that the immune response is modulated. The effects include increasing levels of IL 10, an anti-inflammatory cytokine (Saemann *et al*, 2000).

Lactobacilli and Bifidobacteria are both considered beneficial bacteria in digestion, and indeed, many probiotics contain these species. These species have been shown to help "exclude" pathogenic bacteria, thus reducing the possibility of disease, especially traveler's diarrhea, and help balance the overall flora of the gut, leading to better and more regular digestion (Williams *et al*, 2001). Having the appropriate levels of the right bacterial species in the gut is also important for overall immune health. In addition to SCFAs, secretory IgA is also important for maintaining healthy intestinal flora and contributes to homeostasis (Shroff *et al*, 1995). The combination of the potential prebiotic effects shown here and the increase in secretory IgA shown in a human clinical study, suggest that daily consumption of EpiCor may help balance the gut flora and modulate immune health in a beneficial manner (Jensen *et al*, 2008 and Moyad *et al*, 2009). Furthermore, the presence of MOS in EpiCor, which is also known to be able to bind to, and exclude, pathogenic bacteria could also aid in this endeavor.

These demonstrated prebiotic effects of EpiCor help explain that the beneficial immune effects of EpiCor are related to its possible action on gut health.

References

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