

## 24. HÜLSENBERGER GESPRÄCHE

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### **Prebiotic with special emphasis on butyrogenic carbohydrates and the effects on gut function**

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Short-chain fatty acids (SCFA) are the main products of anaerobic fermentation in the large intestine and affect colonic health by providing energy to the epithelial cells, and butyrate, in particular, is believed to play an important role in maintaining gut health and function. Apart from being the preferred energy source for colonic epithelial cells, butyrate can induce changes in gene expression influencing the colonic function, mainly by inhibiting histone deacetylase. Several studies have shown that butyrate has anti-carcinogenic and anti-inflammatory effects. *In vitro*, butyrate has been shown to reduce inflammation by inhibition of NFκB activation and up-regulation of PPARγ expression. Oxidative stress is involved in both inflammation and the process of initiation and progression of carcinogenesis.

During oxidative stress, there is an imbalance between the generation of reactive oxygen species and the antioxidant defence mechanisms leading to a cascade of reactions in which lipids, proteins and/or DNA may be damaged. Furthermore, butyrate has been demonstrated to have a potent effect on expression of genes involved in regulating cell proliferation, apoptosis, differentiation and metastasis in a human colonic epithelial cell line. There is compelling evidence that the production of butyrate in the gut can be increased by direct stimulation of polysaccharide-utilising, butyrate-producing bacteria (*Eubacterium rectal/Roseburia* spp. and *Faecalibacterium prausitzii*) or through cross feeding from other active polysaccharide-metabolising bacteria.

Not only does a higher DF intake lead to increased SCFA production, specific types of DF may also influence the balance between the individual SCFA's. For instance, resistant starch (RS) is well recognised as a prebiotic that stimulates butyrate production, but studies in our own laboratory and elsewhere have further pointed to arabinoxylan (AX) from rye, wheat and oats as a potent butyrogenic prebiotic. The presentation will discuss our current knowledge concerning RS and AX as prebiotics for butyrate formation in the gut and the effects they have on the gut function.