

Unique Properties and Possibilities of Polar Phytosterol Conjugates

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Phytosterols (plant sterols) are above all known as dietary components that can inhibit cholesterol absorption and thereby decrease serum cholesterol levels and further the risk of coronary heart diseases. Various functional foods enriched with phytosterols or stanols (saturated sterols) and their fatty acid esters are readily available on the market and are allowed to include health claims in their packaging. However, also the natural intake of plant sterols has been associated with several health benefits, which deserve further attention. In fact the variety of phytosterols and their conjugates in a normal, mixed diet is much more complex than in the foods with sterol ingredients. The possibilities of this phytosterol cornucopia are, however, still poorly understood.

Polar phytosterol conjugates, namely steryl glycosides (SG), acylated steryl glycosides (ASG) and steryl ferulates (SF) are characteristic to specific plant foods. Steryl ferulates, for example, are virtually only present in cereal grains like rice, corn, wheat and rye. Furthermore, the sterol profile (different molecular species of plant sterols esterified to ferulic acid) varies between the different grains. On the other hand, the glycosylated sterols (SG and ASG) are in some selected plant foods the major sterols observed contributing up to 60% of all sterols. Similarly as with SF, also the sterol profiles of SG and ASG are unique in various plants. Though the metabolism of these sterol conjugates in the human body is still poorly understood, it has been demonstrated that they too possess the cholesterol lowering functions and could therefore be applied to functional foods. Furthermore, these conjugates have also other possible health supporting properties that need further studies. The most well known additional property is the antioxidant activity of steryl ferulates, which increases the shelf life of foods, but also may prevent oxidation in the gastrointestinal tract.

The polar nature of the glycosylated sterols (ASG and SG) and the phenolic acid esters (SF) enables their incorporation to aqueous foods, unlike the more common free sterols and fatty acid esters. Further possibilities of these groups of sterol conjugates are related to the characteristic sterol profiles of different plants, which could be used to track raw material or product authenticity. However, also the metabolism of these less studied conjugates needs still further research to ensure their safe use.