Editorial

For possible beneficial effects of 'functional food', many organs depend on the blood circulation as a transport medium for putative functional constituents absorbed in the gut. For many of these compounds their minor oral bioavailability limits the perspectives for a relevant functionality. In contrast, the interaction of food and intestinal health has gained considerable interest in the recent years. A major reason is the fact that food constituents can be expected to reach parts of the intestinal mucosa at relevant concentrations. In this Special Issue, apple juices and materials derived therefrom have been investigated with respect to anti-inflammatory and anti-neoplastic effects in the colon. The methods used ranged from the technological design of the food itself including analytical aspects, over biochemical testing in cell cultures, to *in vivo* studies. The materials used included the juices, namely clear and cloudy apple juices, whole-fruit juices, so-called smoothies, as well as preparations made from apple juices such as extracts and individual constituents.

"apple juice has the potential for further development of more valuable products"

In a study by Bergmann *et al.*, the transport of certain apple juice constituents across monolayers of intestinal T84 cells was studied using an Ussing chamber. Furthermore, the authors also investigated the effects on expression of tight junction proteins. Bellion *et al.* investigated the role of polyphenolic antioxidants in tissue culture, with a focus on the possible pro-oxidative effects of polyphenols under certain *in vitro* conditions. Gerhäuser *et al.* identified carotenoid-derived apple aroma compounds as novel inducers of Nrf-2-dependent phase II enzymes and inhibitors of inflammation-related effects in cell culture. Petermann *et al.* used the HT29 cell line to investigate *in vitro* protective effects of polyphenol-rich apple juice extracts *via* GST theta 2 expression, and suppression of DNA damage. A similar study including the analysis of effects on proliferation, was carried out by Miene *et al.* in LT97 cells. Working with immuno-relevant human cell lines, Jung *et al.* present data on suppressive effects of apple constituents, most notably procyanidins, on pro-inflammatory gene expression. In two reviews, studies from *nutrition net* and others are compiled and discussed. The first reviews the evidence for a role of dietary factors in colonic inflammation in animal models. In the second, Koch *et al.* review their studies on the impact of apple juices on chemically induced colon cancer in normal rats, the role of obesity in colon cancer incidence in Zucker rats, and the effects of apple juices in this model.

The studies presented here originate from the research network 'Role of dietary constituents in the etiology of chronic intestinal diseases and perspectives for their prevention *via* nutrition' ('*nutrition net*') which was established in 2002 and has been funded by the German Federal Ministry for Education and Research until the end of 2009. The projects were carried out at various research centers in Germany including universities and non-academic research centers. For more details see http://www.nutrition-net.org.

In summary, the studies demonstrate that the popular food item apple juice has the potential for further development of more valuable products. Polyphenols and related constituents exhibit a number of effects in cell culture, most notably anti-oxidative, and anti-proliferative effects, and shifts in gene expression patterns which are likely to be beneficial *in vivo*. In animals, there is good evidence for a prevention of colo-rectal cancer in chemically induced models, while the role of polyphenols *etc*. in colo-rectal inflammation is less clear. Taken together, the studies envisage a large number of challenges related to the very demanding requirements of testing the preventive potency of food items. They provide a clear indication that apple juices have the potency to partially prevent colo-rectal cancer in experimental models. It remains a challenge for the future to test this hypothesis in the (more complex) human situation.

In memory of Beatrice Luise Pool-Zobel (1949–2008), an outstanding colleague, a dedicated scientist

Dieter Schrenk
University of Kaiserslautern

