Editorial

In the plant kingdom, the biggest groups of phytochemicals are the phenolic compounds and especially the group of polyphenols. Up to now more than 8000 phenolic structures have been identified and among them 4000 flavonoids. They are recognized as bioactive compounds in plant food such as fruits, vegetables, whole grains and herbal plants. Within the last 20 years these compounds have received tremendous attention by researchers worldwide and are considered to play an important role in the prevention of degenerative or chronic diseases, such as diabetes type II, cancer and others. Within the last few years huge efforts have been undertaken to study the bioavailability and to cover the mode of action of this large class of compounds. In the beginning the focus was mostly set on antioxidative targets/effects, which has widened recently to diverse biological functions. In this issue effects on human health, functionalities, and occurrence of phenolic compounds are addressed and a wide range of research results is presented.

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First, the group of Duthie et al. have payed much attention to the occurrence of natural salicylates in the Scottish diet in order to extend food composition databases for salicylates. It was shown that major sources were non-alcoholic and alcoholic beverages, herbs, spices, and tomato sauces.

In general, the gastrointestinal tract plays an important role in the absorption of phenolic compounds and interactions with nutrient absorption such as glucose are of importance. It was shown by Azevedo et al. that in a diabetes animal model compounds from the medicinal plant *Salvia fruticosa* have the ability to influence the expression of the intestinal glucose transporter (SGLT1) under carbohydrate-rich diet. It was confirmed that the active ingredient in this assay was rosmarinic acid. Flavonoids such as the flavanone naringenin and the isoflavone daidzein were able to inhibit in adipocytes (2-deoxy)glucose uptake by GLUT4 significantly as shown by Claussnitzer et al. The impact of phenolic degradation products on the formation of advanced glycation endproducts (AGEs) and neurodegeneration was investigated in vitro by Verzelloni et al. Here the formation of AGEs was inhibited by degradation products of ellagitannins, whereas the protection of neuronal cells was shown by degradation products of chlorogenic acids such as dihydrocaffeic acid or feruloylglycin.

In various publications much attention is now given to the degradation of polyphenols by the gut microbiota and consequently their biological relevance in vivo. Fogliano et al. investigated the bioavailability of polyphenols from the water-insoluble fraction of cocoa after in vitro degradation using a three-stage model mimicking the colon. Information of the influence of digestive enzymes and intestinal microbiota on the solubility and identity of physiologically relevant cocoa derived metabolites are given. Pérez-Berezo et al. studied biological effects giving cocoa-rich food to rats. Intestinal and systemic immune responses were improved by a diet with 5 or more percent of cocoa. Li et al. were performing a study using rats to investigate the pharmacokinetic of the secondary plant metabolite mangostin from the tropical fruit mangostane. Mangostin was given intravenously and orally to rats to obtain detailed information on the absorption and elimination showing a very limited oral bioavailability of this compound.

Consequently, the improvement in bioavailability of flavonoids, such as the red pigments of most berries, the anthocyanins, wase investigated by Oehme et al. They used drug delivery formulations and studied the intestinal stability and release of anthocyanins in a digestive model. In addition, bioavailability is influenced by interactions of polyphenols with proteins in the body. Here Xiao et al. were using a structure activity guided approach to study interactions of polyphenols with bovine γ-globulin. Interestingly, the interactions depended on the polarity of the compounds and therefore the number of hydroxyl groups affected the interactions; consequently, galloylated catechins showed highest binding affinities.

Other in vitro studies used proteomic techniques to investigate the influence of polyphenols in a chemotherapeutic approach. The group of Tsolmon et al. was able to show that apigetrin, the glucoside of apigenin, induced cell cycle arrest in human leukemia cells with influence on erythroid differentiation. Hwang et al. have investigated in human fibrosarcoma cells the influence of acteoside, a phenolic compound from so-called bitter tea on metalloprotease-9 transcription and translation and the phosphorylation of ERK and JNK showing effects on major signaling pathways in cell growth.

Tumor development is a target of the investigations by Granados-Principal et al., who showed that hydroxytyrosol originating from olive oil was able to inhibit mammary tumor cell growth in rats and influenced signaling pathways such as the Wnt pathway.

Other topics in this issue deal with interactions of plant-derived polyphenols on human topoisomerases and potential effects on DNA integrity. Khalfalah et al. have drawn special focus to the interaction kinetics of flavonoids, such as genistein, with topoisomerase II and compared these effects to therapeutic relevant drugs, showing that the genotoxic potential of the drugs is higher than that of the natural compounds investigated. Preventive effects on DNA integrity by anthocyanin-rich berry extracts were shown in a mechanistic study by Esselen et al. focusing on the interactions with human topoisomerase I and II and potential consequences for DNA strand break induction.

Overall, most of the various studies presented in this issue show the wide range of biological effects and interactions of phenolic compounds in the body or cellular systems.

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