

Posters from Section II

Proanthocyanidins: content in fruits and influence on health. Jadwiga Wilska-Jeszka.

Institute of Technical Biochemistry, Technical University of Łódź, 90-924 Łódź 40, Poland.

Proanthocyanidins — condensed tannins — are an important component of many fruits, and influence the sensory properties of fruits and fruit products. On the other hand, proanthocyanidins, as well as their precursors catechins, are biologically active compounds preventing some diseases of capillary blood vessels, having antioxidant properties and radical scavenger activities and also suppressing the superoxid anion radicals.

Numerous studies have been carried out on the proanthocyanidins' structure and content in grape, but there is little information concerning the occurrence of these compounds in other fruits. In this work the results of the studies of the proanthocyanidins content in different species of fruits, including some wild plant fruits, are reviewed, looking for rich sources of proanthocyanidins. The highest proanthocyanidins content was found in quince (2 g/kg) and in this case the dominant form is dimer — procyanidin B-2. Relatively high condensed tannins contents (0.3–0.9 g/kg) were observed in grape, apple, hawthorn, elderberry, chokeberry, sour cherry and blackcurrant. The lowest level of these compounds (< 0.3 g/kg) is found in the redcurrent, gooseberry, blueberry and raspberry.

The methods used to determine the total content of flavanols and proanthocyanidins are also discussed, as well as the influence of storage and heat treatment. It is concluded that the proanthocyanidins content in food of plant origin should also be determined and taken into account when their influence on health is evaluated.

Phenolic diterpenes from rosemary as antioxidants in linoleic acid, methyl linoleate and corn oil triglycerides. Anu Hopia,^{a*} Shu-Wen Huang & Edwin Frankel.

Department of Food Science and Technology, University of California Davis, CA 95616 USA. ^aPresent address: Department of Applied Chemistry and Microbiology, University of Helsinki, FIN-00014 University of Helsinki, Finland.

Herbs and spices are known to have antioxidant activity in food fats. Because rosemary extracts have exceptionally high antioxidant activity, and are commercially available, they are widely used in food industry. Phenolic diterpenes are considered the most active class of antioxidants in rosemary, of which carnosol and carnosic acid are two major compounds.

To determine the effect of different lipid systems on antioxidant activity, carnosol and carnosic acid were evaluated in bulk and emulsified corn oil triglyceride mixture, methyl linoleate and linoleic acid. Antioxidant activity was followed by measuring the formation of hydroperoxides by conjugated diene measurement and their decomposition by measuring hexanal, a major volatile decomposition product of linoleic acid hydroperoxides.

In bulk methyl linoleate, carnosic acid showed higher antioxidant activity than carnosol and both were more active than equal molar concentration of α -tocopherol. In contrast, in linoleic acid carnosol was more active than carnosic acid and had similar activity than α -tocopherol. In bulk corn oil triglycerides, the diterpenes were less active than α -tocopherol. Also, in emulsified systems, α -tocopherol was more active than the diterpenes.

The antioxidant activity of carnosol and carnosic acid were shown to be highly dependent on the polarity of oxidizing lipid system. Therefore, to better understand the effects of natural antioxidants in foods, it is of high importance to consider the type of lipid system used or testing their activity.

*To whom correspondence should be addressed.

Food compositions with antimutagenic and immunomodulating properties. Y. Shishkin,^{*} R. Ramanauskaite, A. Sergeev & R. Ramanauskas.

Cancer Research Center, Moscow, Russia. Lithuanian Food Institute, Kaunas, Lithuania.

A new food composition in the form of microgranules on the base of milk protein and beta-carotene was prepared. The high-quality milk protein was obtained according to a new technology of milk processing with help of a pectin. The immunomodulating properties of beta-carotene microgranules were studied in C57Bl/6 mice. Long-term feeding of C57Bl/6 mice with beta-carotene microgranules led to enhanced T cell proliferative response to Con A, which lasted for 15–45 days, and defended the bone marrow chromosomes from experimental cyclophosphamide-induced damage. The beta-carotene microgranules were given orally to patients with cancer in the large bowel, for 10–14 days during irradiation therapy as an immunomodulating agent. After 10–14 days of supplementation, plasma levels of beta-carotene had increased 1.6–2.7-fold. The beta-carotene microgranules prevented the decrease of the lymphocyte proliferation to PHA, cytotoxicity of NK-cells, indomethacin-sensitive suppressor cells, expression as CD7, CD25, CD45, CD50, HLA1 markers

of peripheral blood lymphocytes compared with patients treated by this therapy only. Additionally, the original recipes of enrichment of some food products by beta-carotene (the cheese, the cottage cheese, the bread) were elaborated.

*To whom correspondence should be addressed.

Determination of cholesterol oxidation products in four dried seafood products. Lucy Sun Hwang* & Quen-Song Chen.

Graduate Institute of Food Science and Technology, National Taiwan University, Taipei, Taiwan, R.O.C.

The presence of cholesterol oxidation products (COPs) in foods has received growing concern in recent years, due to the reported atherogenic effects of COPs and their ability to inhibit cholesterol biosynthesis *in vitro*. In this study, the analytical method of COPs in dried seafood products was established and the COPs contents of commercial salted mullet roe, dried squid, dried shrimp and dried scallop products were determined.

Capillary gas chromatography (GC) was employed in the analysis of COPs in dried seafood samples after oil extraction and cold saponification. Cholesterol and eight COPs can be analyzed simultaneously including 5-cholesten-3 β , 7 α -diol (7 α -OH), cholestan-5 β , 6 β -epoxy-3 β -ol (β -EP), cholesterol-5 α , 6 α -epoxy-3 β -ol (α -EP), 5-cholesten-3 β , 7 β -diol (7 β -OH), 20 α -hydroxycholesterol (20 α -OH), cholestan-3 β , 5 α , 6 β -triol (Triol), 5-cholesten-3 β -ol-7-one (7-Keto), and 25-hydroxycholesterol (25-OH). The presence of COPs in dried sea foods was confirmed with both GC co-chromatography and SIM (selected ion monitoring) technique of GC/MS.

Ten commercial samples of each kind of seafood product were surveyed. Results showed that the cholesterol content of salted mullet roe was in the range of 8,000 ppm ~12,000 ppm and there were six COPs found in the range of 15 ppb ~2 ppm. In dried shrimp, the cholesterol content was 1,900 ppm ~2,600 ppm, seven COPs were found in the range of 0.18 ppm ~2.5 ppm. In dried squid, the cholesterol content was 4,600 ppm ~6,200 ppm, seven COPs were found in the range of 10 ppb ~4 ppm. In dried scallop, the cholesterol content was 800 ppm ~1,300 ppm, seven COPs were found in the range of 10 ppb ~7 ppm.

*To whom correspondence should be addressed.

Development of pumpkin seed for production of edible oil: distribution of tocopherols in breeding lines. Michael Murkovic,** Andrea Hillebrand^a, Johanna Winkler^b & Werner Pfannhauser^a.

^aGraz University of Technology, Department of Bio- and Food Chemistry, Petersgasse 12/2, A-8010 Graz, Austria. ^bBSZG GmbH, Am Tieberhof 33, A-8200 Gleisdorf, Austria.

Pumpkin (*Cucurbita pepo*) seed oil is a common salad oil which produced in the southern parts of Austria, Slovenia and Hungary. It is dark green and has a high content of free fatty acids. Due to its colour the oil cannot be used for cooking. The content of vitamin E, especially γ -tocopherol, is also very high. The oil content of the pumpkin seed is about 50%. The seed itself can be eaten. Therefore a pumpkin variety with high vitamin E content is desirable. It can serve as a nutraceutical.

The γ -tocopherol, which is about 5–10 times as much as α -tocopherol, varies over a broad range (41–620 mg/kg dry pumpkin seeds). β -, δ -tocopherol and the tocotrienols are found in low levels.

The aim of this work is to find a variety of *Cucurbita pepo* which has a high oil yield and a high vitamin E content. One hundred breeding lines were tested for their tocopherol and tocotrienol content. The tocopherols are extracted with hexane and analysed by NP-HPLC/FLD with hexane/dioxan (96/4) as eluent with the detection 292/335 nm. The distribution of the dominant tocopherols is shown.

The broad distribution of the tocopherol shows a good potential for development of varieties with even higher vitamin E content. Future work will show whether the content of vitamin E is a stable phenotypic trait or is strongly influenced by the climate.

*To whom correspondence should be addressed.

Autoxidation of butter and rape seed oil triacylglycerols. Anna-Maija Lampi* & Vieno Piironen.

University of Helsinki, Department of Applied Chemistry and Microbiology, Post Box 27, Viikki-D, FIN-00014 University of Helsinki, Finland.

The purpose of the experiment was to study and characterize the autoxidation of two very different fat models consisting of natural triacylglycerols (TAG).

The TAGs were purified from butter (BO) and rape seed oils (RSO) and they contained less than 1 μ g/g of tocopherols. The amounts of unsaturated acyl groups in the fat models were 23% in BO TAGs and 93% in RSO TAGs. The TAGs were autoxidized in closed flasks at 40°C in the dark for 4 weeks. Autoxidation was followed by measuring oxygen consumption, peroxide values, anisidine values and amounts of volatile aldehydes.

RSO TAGs consumed more oxygen and produced higher peroxide and anisidine values than BO TAGs. However, the amounts of volatile aldehydes were greater in BO TAGs than in RSO TAGs. Also, the profiles of volatile aldehydes in the two fat models differed from each other.

Although RSO TAGs are more reactive to oxygen than BO TAGs, the autoxidation of BO TAGs proceeds more quickly from hydroperoxides to secondary breakdown products than in RSO TAGs.

*To whom correspondence should be addressed.