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Research Highlights

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Omega-3 fatty acids in the elderly

This is a review of this topic (77 references) based on the study of 36 carefully selected articles. The challenge posed by population ageing translates into ensuring that the extra years of life will be as good as possible, free from high-cost dependency. Omega-3 fatty acids are now generally recognized as potential key nutrients to prevent the pathological conditions associated to the aging process. This report deals with the effects of omega-3 fatty acids on normal aging of older adults (> 65 years) mainly on the effects such as nutritional status itself, cognition, bone health, muscle tone and general health status. The preliminary broad search of the literature on the effects of omega-3 fatty acids on normal aging yielded 685 citations. Forty two full text papers were checked for inclusion and thirty six studies were finally included in this review. It may be concluded that paradoxically even though the elderly population is the largest one, the number of studies and the methodology employed clearly lacks sufficient evidence to establish definite conclusions on the effects of omega-3 fatty acids on aging metabolism without pathological conditions and on quality of life. /fg

Úbeda, N., et al., British Journal of Nutrition 2012, 107, S137–S151

Identification of phenolic compounds (hydroxychavicol and dimers) which are lipase inhibitors in the Indonesian spice *Eugenia polyantha*

Leaves of the tropical tree *Eugenia polyantha* are used as a spice and in traditional medicine in Indonesia. These are now shown to contain three phenolic compounds which act as lipase inhibitors. These make this spice an attractive food additive for the treatment and prevention of obesity. There is evidence that the traditional use of *E. polyantha* against ulcers, inflammation, diabetes, and diarrhoea is related to the presence of these phenolic compounds. /fg

Kato, E., et al., Food Chem. 2013, 136, 1239–1242

Isotopic analysis of eggs

Previous studies have indicated that stable isotope techniques (C, N, O, and S) provide a tool to differentiate egg production systems. This study has investigated the impact of collection times and preparation times on measured isotopic composition. Good agreement was observed between isotopic data obtained for the various production systems and the 'isotopic fingerprint' of a particular egg production system was maintained over time. Isotopic compositions were similar for the yolks and whites of fresh and pasteurized eggs. Future studies will cover egg production over four different seasons. The senior author has also reviewed this topic. /fg

Rock, L., et al., Food Chem. 2013, 136, 1551–1556
Rock, L., Trends Food Sci. Technol. 2012, 28, 62–68

Solid fat content as a substitute for total polar compound analysis in heated edible oils

When used in a heated form (*eg* frying) edible oils are known to deteriorate and after time must be discarded. Commonly this change is made when the content of total polar compounds (TPC) exceeds a defined value. TPC determination involves column chromatography using solvents and is necessarily a laboratory-based operation. However, solid fat content (SFC) is easily measured by low-resolution NMR and it is reported in this paper that SFC correlates with both TPC and triacylglycerol content. It is concluded that measurement of SFC may be an attractive alternative to TPC and could be used to track frying oil quality. /fg

Bakota, E.L., et al., J. Am. Oil Chem. Soc. 2012, 89, 2135–2142

Formation of *trans* fatty acids in irradiated ground beef and liquid egg

When irradiated at 2.294 kGy there is only a small increase in *trans* fatty acids (TFA) in beef fat detected by GC examination but large amounts of TFA are observed in egg irradiated under these conditions. The main TFA are 18:1-9t, and 18:2-9c12t and 9t12c. There was a significant increase in *trans* fatty acids with higher levels of radiation intensity. The results may be due to the oxidation of unsaturated compounds of both *cis* and *trans* acids. /fg

An Li, et al., J. Am. Oil Chem. Soc. 2012, 89, 2207–2213

Synthesis and characterization of allyl fatty acid derivatives as reactive coalescing agents for latexes

Palmitic acid and a mixture containing conjugated dienoic acids were converted to allyl esters ($RCOOCH_2CH{=}CH_2$) by reaction first with PCl_3 and them with allyl alcohol. Alternatively, soybean oil and sunflower oil were transesterified with allyl alcohol using NaOH as catalyst. The allyl esters were identified by MS and by ^1H and ^{13}C NMR. When blended with a commercial acrylic latex these allyl esters have a noticeable effect on the film forming temperature, reducing it from 15 to 0°C, Also the presence of double bonds promotes oxidative cure as demonstrated by an increase in glass transition temperature and improvement in rub resistance. Therefore these allyl esters have potential interest as non-volatile additives in waterborne coatings acting as coalescing and autoxidative crosslinking agents. /fg

Barbosa, J.V., et al., J. Am. Oil Chem. Soc. 2012, 89, 2215–2226

Influence of fatty acid desaturation on spontaneous acyl migration in 2-monoacylglycerols

2-Monoacylglycerols are intermediates in the synthesis of structured lipids. Such compounds readily undergo undesirable acyl migration which is influenced by the presence of solvent, solvent polarity, water activity, and chain-length. There is conflicting evidence on the effect of unsaturation in the acyl chain and this paper contains details of a study of the 2-monaacylglycerols with oleic, linoleic, and linolenic acid. Both theoretical calcula-

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tions and measured kinetic data showed that increasing unsaturation in these three compounds had no appreciable effect on acyl migration rates. /fg

Compton, D.L., et al., J. Am. Oil Chem. Soc. 2012, 89, 2259–2267

Effects of chemical interesterification on the physicochemical, micro-structural, and thermal properties of palm stearin, palmkernel oil, and soybean oil blends

Ten ternary blends of these three oils were interesterified using sodium methoxide as catalyst. The products were examined for solid fat content, triacylglycerol composition, thermal properties (DSC), polymorphism, and micro-structural properties. A palm-based, *trans*-free margarine comparable with commercial margarine was obtained using a 49/20/31 ternary blend. Design-Expert 8.04 (2010) software was a valuable tool in blend formulation. /fg

Fauzi, S.H.M., et al., Food Chem. 2013, 137, 8–17

Sitosterol as an antioxidant in frying oils

The antioxidative effect of sitosterol at 1, 2, and 5% levels in triolein, refined canola, sunflower, and flaxseed oils during frying at 180°C for 72 hours was studied by high pressure size exclusion chromatography to monitor triacylglycerol polymer, monomer, and hydrolysis products. Enhanced levels of sitosterol significantly decreased polymer formation in triolein and the vegetable oils and increased the content of intact monomeric triacylglycerol and of hydrolysis. It is concluded that increasing sitosterol levels may be a method of enhancing oxidative stability during frying. /fg

Singh, A., Food Chem. 2013, 137, 62–67

Geographical provenance of palm oil by fatty acid and volatile compound fingerprinting

With the development of sustainable palm oil it becomes important to distinguish the geographical origin of palm oil. As a first attempt at this it is shown that oil from SE Asia can be distinguished from oil from Africa and South America and also that African oil can be distinguished from S American oil. These results are based on a study of fatty acid composition and of volatile organic compounds of 94 palm oil samples followed by the application of partial least squares discriminant analysis. /fg

Tres, A., et al., Food Chem. 2013, 137, 142–150

Milk-like emulsions made from modified butterfats containing α-linolenic acid

Two ternary blends of anhydrous butterfat (ABF), palm stearin, and flaxseed oil (30;30;40 and 20:30:50) subject to lipase-catalysed interesterification followed by short path distillation gave modified butterfats. These contained respectively 21.7 and 26.5% of α-linolenic acid and 41.4 and 47.4% of total saturated acids. Cholesterol content was 21.0 and 12.1 mg/100g and melting points were 32° and 31°. These two products were converted to 'milks' as o/w emulsions which compared favourably with similar emulsions made from ABF in respect of no flocculation during 10 days storage, fat globule size distribution, and volume-surface mean droplet diameter. These may be useful in processed milk-based products. /fg

Shin, J.-A., et al., J. Food Sci. 2013, 78, C17–C24

Selective concentration of EPA and DHA using *Themomyces laniginosus* lipase is due to fatty acid selectivity and not to regioselectivity

The selectivity of anchovy oil hydrolysis with *Themomyces laniginosus* lipase was optimized so that DHA and EPA were concentrated and partially separated from each other. Enzyme concentration and pH were important factors for effective hydrolysis, Using appropriate chromatographic and spectroscopic procedures it was shown that during hydrolysis EPA was removed in preference to DHA and that selectivity was due mainly to fatty acid structure and not to regioselectivity with hydrolysis being equally favoured between *sn*-1/3 and *sn*-2 positions. Under optimum conditions with 2 g of oil 62% hydrolysis was achieved and 24% DHA was concentrated in the glycerol esters. /fg

Akanbi, T.O., et al., Food Chem. 2013, 138, 615–620

Effect of natural and synthetic antioxidants on the oxidative stability of walnut oil under different storage conditions

This study evaluated the effectiveness of rosemary extract (RE) and two synthetic antioxidants, ascorbyl palmitate (AP) and tert-butylhydroquinone (TBHQ), on the oxidative stability of walnut oil stored at room temperature under fluorescent light (800 Lux) or in the dark for 6 months. While the synthetic antioxidants or RE were unable to inhibit photo-oxidation of walnut oil, they proved more effective in controlling oxidation in walnut oil held in the dark. RE alone or in combination with AP or TBHQ effectively reduced lipid oxidation so that the oil was still of acceptable quality up to 6 months storage. These researchers suggested that walnut oil be packaged in containers with light-barrier properties so that these antioxidants can then be added. /me

Martinez, L.M., et al., LWT-Food Sci. Technol. 2013, 51, 44–50

Structuring lipids by aggregation of acidic protein microspheres in W/O emulsions

Semi-solid lipids were formed by controlled aggregation of an acidic aqueous phase (10 g/100 g of whey protein isolate, 100 mmol/L NaCl at pH 3.5) homogenized with an oil phase (8 g/100 g polyglycerol polyricinoleate in soybean oil) to form a water-in-oil (W/O) emulsion. Irreversible gelation of the globular proteins was then induced by heating the internal aqueous phase of the W/O emulsion. The resulting material exhibited paste-like properties, as measured by rheology, that were solid-like below a critical yield stress and a shear-thinning fluid above this value. It was evident that highly viscous or semi-solid lipids with low saturated and *trans* fat could be produced by controlled aggregation of whey protein microspheres within W/O emulsions for use in the food and other industries. /me

Iqbal, S., et al., LWT-Food Sci. Technol. 2013, 51, 16–22

Monoacylglycerols as fruit juices preservatives

The antimicrobial effects of eight monoacylglycerols were examined *in vitro* and in fresh unpasteurized apple juice. Of these, monocaprin (MAG C10:0) and monolaurin (MAG C12:0) were the most effective in suppressing and preventing the growth of filamentous fungi *in vitro*. Both monoacylglycerols also decreased the total viable counts of bacteria and yeasts when added to apple juice. At a concentration of 250 μg/ml, monocaprin com-

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pletely inhibited the growth of bacteria and yeasts and delayed any microbial spoilage in apple juice for at least two weeks. /me

Dolezalkova, I., et al., Czech J. Food Sci. 2012, 30, 567–562

Lipid oxidation of fat blends modified by monoglycerol

Model fat blends (FBs) were prepared by synthesizing tripalmitoylglycerol (TAG48) as the dispersive phase with soybean oil as the dispersive medium The efficacy of different monoglycerol (MAG) emulsifiers, with saturated acyl chain lengths ranging from MAG10 to MAG18, as well as 1-octa-decenoylglycerol on lipid oxidation of the model fat blends was examined. Based on the formation of conjugated dienes (primary oxidation products) and volatiles (secondary oxidation products), together with the oil stability index (OSI), MAGs with a shorter acyl chain length (MAG10–MAG14) proved more effective in limiting oxidation of TAG48. It was hypothesized that MAGs with shorter acyl chains or with the same acyl chain (MAG16) as TAG48 arranged themselves on the interface oil/crystals retarding diffusion of oxygen through the fatty layer. /me

Spevackova, V., et al., Czech J. Food Sci. 2012, 30, 527–533

Effect of sterilization on lipid oxidation in model liquid milk-based infant and follow-on formulas

The effect of sterilization on lipid oxidation was evaluated in model systems simulating milk-based infant and follow-on formulas. Of the methods used, solid phase extraction (SPE) and high-performance size-exclusion chromatography (HPSEC), provided the most complete information on both primary and secondary oxidation compounds formed. While sterilization did not cause significant changes in oxidation compounds, tocopherols levels were significantly reduced. Losses in tocopherol were significantly higher in protein-free formulas and in infant formulas (80% whey in protein) compared to the follow-on formulas (80% casein in protein). The latter was attributed to the protective effect of sodium caseinate and points to the need to ensure no additional losses in antioxidants occur during storage. /me

Garcia-Martinez, C., et al., Eur. J. Lipid Sci. Technol. 2012, 114, 1373–1380

On-line sorting of meat trimmings into targeted fat categories

Simulations and pilot plant trials were used to test a system developed for on-line sorting of meat trimmings into categories with different fat levels on five batches of pork and three batches of beef. An NIR imaging scanner, flow weighter and grader, and a host computer containing synchronising software and a sorting algorithm were used to monitor meat trimmings as they moved on a conveyor belt. The sorting algorithms worked well when fat measurements were accurate, however problems occurred when on–line fat measurements were inaccurate due to inhomogeneous meat trimmings. /me

Mage, I., et al., J. Food Eng. 2013, 115, 306–313

Characteristics of biologically-active substances of amaranth oil obtained by various techniques

Amaranth seeds contain oil rich in such bioactive compounds as squalene, tocopherols and sterols. This study compared the effectiveness of supercritical fluid extraction, extraction with chloroform/methanol, and cold expeller pressing, for producing amaranth oil rich in these bioactives. Supercritical extraction produced oils with highest levels tocopherols, squalene and sterols. The levels were slightly lower with chloroform/methanol extraction while the lowest levels were obtained using expeller processing. /me

Czaplicki, S., et al., Pol. J. Food Nutr. Sci. 2012, 62, 235–239

Essential oils to control *Botyris cinerea* in vitro and in vivo on plum fruits

As an alternative to using chemical biocides, this paper examined the inhibitory properties of black caraway, fennel, and peppermint essential oils for controlling *Botyris cinerea* in plum fruits. In vitro studies showed that both black caraway and fennel oils, at concentrations of 400 and 600^{-1}, completely inhibited the growth of B. cinerea. In vivo studies found all three oils inhibited the growth of plum fruits with positive effects on fruit quality. These essential oils could provide a viable alternative for controlling postharvest pathogenic fungi while enhancing fruit quality. /me

Aminifard, M.H., and Mohammadi, S., J. Sci. Food Agric. 2013, 93, 348–353

Bleaching augments lipid peroxidation products in pistachio oil and its cytotoxicity

This study examined the effect of bleaching on the nutritional quality and safety of pistachios. Bleaching significantly ($p < 0.05$) decreased β-sitosterol in pistachio oil by more than 12.6% compared to the control while bleaching with Fe^{2+} significantly increased 7-ketositosterol formation. The bleached pistachio oil also proved cytotoxic to hepatoma cells (Hepa 1c1c7). The detrimental effect of bleaching on pistachio oil suggests this practice should be discontinued and discouraged. /me

Racicot, K., et al., Eur. J. Lipid Sci. Technol. 2012, 114, 1362–1372

Chemical properties and oxidative stability of perilla oil obtained from roasted perilla seeds as affected by extraction methods

Oil was extracted from roasted perilla seeds by supercritical carbon dioxide (SC-CO_2), mechanical press and hexane extraction methods. The resulting perilla oil was then examined for chemical properties and oxidative stability. SC-CO_2 and hexane extraction both resulted in significantly higher oil yields compared to mechanical pressing. However the highest content of tocopherols, sterols and policosanols was obtained only in the SC-CO_2 extracted perilla oil. Photo-oxidative stability tests conducted with the different extracted perilla oils showed no differences between any of the extracted oils although the SC-CO_2 extracted oil exhibited the lowest oxidative stability during storage in the dark at 60°C compared to either the mechanically pressed or solvent extracted oils. /me

Jung, D. M., et al., J. Food Sci. 2012, 77, C1249–C1255

LC-MSMS analysis of acetamiprid residue in crude palm oil

An LC-MSMS method is described for determining acetamiprid residues in crude palm oil. Acetamiprid is a highly toxic insecticide used for controlling bagworms and leaf eating caterpillars in oil palm plantations. The method was validated by its linearity, intermediate precision and repeatability. The limit of detec-

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tion (LOD) was 4 ng/g with the limit of quantitation (LOQ) being 10 ng/g. The method also proved applicable to sunflower, rapeseed and soybean oils with satisfactory recoveries. /me

Yeoh, C.B., and Chong, C.L., Eur. J. Lipid Sci. Technol. 2012, 114, 1358–1361

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