

Functional role of tomato products on lipid profile and liver function

A study was carried out by the scientists of Helwan University, Cairo, Egypt to investigate the functional role of lycopene obtained from powder prepared from fresh tomato, tomato paste and ketchup that contained equal amounts of lycopene based on levels of intake on body weight gain (BWG), feed intake, feed efficiency ratio (FER), lipid profiles, atherogenic index and liver enzymes of hyperlipidemic rats. Forty-eight male albino rats were divided into two main groups: the first group ($n = 6$ rats) was kept on the basal diet as a normal control, while the second group ($n = 42$ rats) was fed a hyperlipidemic diet for 5 weeks to induce hyperlipidemia. The latter group was divided into seven subgroups: the first subgroup was the positive control group, while the others were supplemented with one of the tomato products at one of two levels (10 or 20 mg of lycopene/kg of

diet). BWG, feed intake and FER were calculated and blood samples were collected to determine total lipids, total cholesterol, triglycerides, lipoprotein fractions, atherogenic index and liver function in sera. Relative organ weights were also calculated. Results revealed that administration of various tomato products produced a significant reduction in feed intake except for the hyperlipidemic group that supplemented with the lower lycopene level from tomato paste. In addition, BWG and FER were not influenced by addition of tomato products at any level of intake. Hyperlipidemic rats supplemented with tomato powder, tomato paste, or ketchup showed significant improvement in almost all the parameters studied compared to the positive control group. Results showed that the higher lycopene level from tomato paste produced significant improvement

in all lipid parameters, followed by 10 mg of lycopene/kg from tomato paste, which caused significant elevation in high-density lipoprotein cholesterol comparable to that of the negative control group. The lowest atherogenic index was achieved by addition of the lower lycopene level from tomato paste followed by the higher lycopene level from the same source. Thus, because of the positive effect of tomato products on the tested parameters an increase in consumption of tomato and its products in the diet is recommended. Nutrition education programs should be encouraged to inform the public of the importance of tomato and its products, especially tomato paste and ketchup, in decreasing the risk of hyperlipidemia [Ibrahim Hoda Salama, Ahmed Lamiaa Ali and El-din Maha Mohamed Essam, The Functional Role of Some Tomato Products on Lipid Profile and Liver Function in Adult Rats, *J Med Food*, 2008, **11**(3), 551-559].

Heavy metal accumulation in vegetables irrigated with water from different sources

A study was carried out by researchers at India to assess levels of different heavy metals like iron, manganese, copper and zinc, in vegetables irrigated with water from different sources. The results indicated a substantial build-up of heavy metals in vegetables irrigated with wastewater. The range of various metals in wastewater-irrigated plants was 116-378, 12-69, 5.2-16.8 and

22-46 mg/kg for iron (Fe), manganese (Mn), copper (Cu) and zinc (Zn), respectively. The highest mean levels of Fe and Mn were detected in mint and spinach, whereas the levels of Cu and Zn were highest in carrot. The study highlights that both adults and children consuming vegetables grown in wastewater-irrigated soils ingest significant amount of these metals. Though the values of these metals

were below the recommended maximum tolerable levels proposed by FAO, the regular monitoring of levels of these metals from effluents and sewage, in vegetables and in other food materials is essential to prevent excessive build-up of these metals in the food chain [Arora Monu, Kiran Bala, Shweta Rani, Anchal Rani, Barinder Kaur and Mittal Neeraj, Heavy metal accumulation in vegetables irrigated with water from different sources, *Food Chem*, 2008, **111**(4), 811-815].

Production of antioxidant high dietary fibre powder from carrot peels

The feasibility of using carrot peels, by-products from food industry, as a starting raw material to produce antioxidant dietary fibre powder was investigated by the scientists at King Mongkut's University of Technology, Thonburi, Thailand. The effects of blanching and hot air drying (60-80°C) on the drying kinetics and physico-

chemical properties of dietary fibre powder were first evaluated. The results showed that blanching had a significant effect on the fibre contents and compositions, water retention and swelling capacities of the fibre powder. In contrast, drying temperature in the selected range did not affect the hydration properties. In terms of the antioxidant

activity, thermal degradation during both blanching and drying caused a decrease in the contents of β -carotene and phenolic compounds, hence leading to the loss of antioxidant activity of the final product [Chantaro Prawta, Devahastin Sakamon and Chiewchan Naphaporn, Production of antioxidant high dietary fibre powder from carrot peels, *LWT-Food Sci Technol*, 2008, 41(10), 1987-1994].

A comparative study of high pressure sterilization and conventional thermal sterilization: Quality effects in green beans

Experiments were conducted by researchers at UK to compare the colour, texture and microbiological quality of green beans that had been either high pressure sterilized (HPS) using commercially achievable pressures (a pre-heat to 86°C followed by two treatments of 2 min at 700 MPa) or were conventionally thermally sterilized (F_0 1 to 3 min with a retort temperature of 115°C). Samples were assessed immediately after processing and after 7 months of ambient storage. HPS treated

samples were generally darker in appearance (L^* values shifted downwards) compared with heat treated (F_0 3 min) samples. The a values for HPS samples were significantly ($P < 0.05$) higher than F_0 3 min treated samples after processing but were not significantly different after 7 months storage ($P > 0.05$). HPS treated samples were typically twice as firm as F_0 3 min treated samples ($P < 0.05$). There was some softening over storage but this differential in firmness was maintained after 7 months.

Total aerobic and anaerobic plate counts and spore counts after storage were below the limits of detection in all samples apart from one canned sample where leaker spoilage had occurred. Thus, high pressure sterilization is a promising method for the production of ambient stable products with improved quality [Leadley Craig, Tucker Gary and Fryer Peter, A comparative study of high pressure sterilization and conventional thermal sterilization: Quality effects in green beans, *Innov Food Sci Emerg Technol*, 2008, 9(1), 70-79].

Effects of high pressure processing on antioxidant activity and total carotenoid content and availability in vegetables

High pressure processing (HPP) is a relatively new food preservation processing technology that enhances food safety and shelf-life without compromising organoleptic qualities. There has been little research on the impact of HPP on the nutritional and health-promoting

properties of foods to date and most of it has focused on juices and purees of fruit such as oranges and tomatoes. The objective of the study conducted by researchers at Australia was to determine the effects of HPP treatment at two pressure levels (400 and 600MPa) on antioxidant

activity, total carotenoid content and carotenoid availability *in vitro*, of three commonly consumed vegetables, carrots, broccoli and green beans. Antioxidant capacity and total carotenoid content differed between vegetables but were unaffected by HPP treatment. *In vitro*

availability of specific carotenoids also varied greatly between vegetables (3-35%). HPP altered availability of carotenoids according to the type of vegetable treated and processing pressure applied, however the magnitude of the responses was minor.

The study provides further scientific evidence of the benefits of high pressure processing in retaining the

nutritional attributes of fresh foods. Antioxidant activity and levels of carotenoids before and after exposure to high pressures (up to 600 MPa for 2 min) were essentially no different. Also, the data suggest that micronutrients and phytochemicals in certain vegetables may be made more bioavailable by high pressure treatment. From a nutritional perspective, high pressure processing is

an attractive food preservation technology and clearly offers opportunities for horticultural and food processing industries to meet the growing demand from consumers for healthier food products [McInerney Jennifer K, Seccafien Cathryn A, Stewart Cynthia M and Bird Anthony R, Effects of high pressure processing on antioxidant activity, and total carotenoid content and availability, in vegetables, *Innov Food Sci Technol*, 2007, **8** (4), 543-548].

Oral bioavailability of nitrate from nitrate-rich vegetables in humans

High dietary nitrate intake may pose a risk to human health. Since up to 80-85% of dietary nitrate intake comes from vegetables, thus the aim of the study conducted by scientists working at Netherlands was to determine the absolute bioavailability of nitrate from three nitrate-rich vegetables. In an open, four-way cross-over, single dose study, 12 human subjects underwent the following treatments: (1) intravenous infusion of 500 mg sodium nitrate, (2) oral administration of 300 g cooked spinach,

(3) oral administration of 300 g raw lettuce and (4) oral administration of 300 g cooked beetroot. The wash-out period between treatments was at least 6 days. Plasma samples were analysed to assess the nitrate and nitrite concentrations, and pharmacokinetic parameters were calculated. The bioavailability of nitrate was 98±12% from cooked spinach, 114±14% from raw lettuce and 106±15% from cooked beetroot. There was no significant increase in plasma nitrite concentrations. This study shows

that nitrate from vegetables, whether cooked or uncooked, is absorbed very effectively, resulting in an absolute nitrate bioavailability of around 100%. Thus, reducing the amount of nitrate in vegetables can be an effective measure to lower the systemic nitrate exposure of the general population [van Velzen Agnes G, Sips Adrienne JAM, Schothorst Ronald C, Lambers Annette C and Meulenbelt Jan, The oral bioavailability of nitrate from nitrate-rich vegetables in humans, *Toxicol Lett*, 2008, **181**(3), 177-181].

Effect of cooking on *Brassica* vegetables

Assessing antioxidant intake requires a food antioxidant database. However, cooking may affect antioxidant content due to antioxidant release, destruction or creation of redox-active metabolites. The researchers working at Department of Health Technology and Informatics, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong aimed their study to explore the effects of boiling, steaming and microwaving of broccoli, cauliflower,

cabbage and choy-sum (Chinese cabbage) by measuring antioxidant contents of raw and cooked vegetables. Cooking water was also tested. For all cooked vegetables, antioxidant content was highest in steamed>boiled>microwaved and decreased with longer cooking time, regardless of method. All steamed vegetables had higher antioxidant contents than had matching raw vegetables. Effects were variable for boiling and microwaving. Microwaving caused greater

antioxidant loss into cooking water than did boiling. Marked losses of antioxidants occurred in microwaved cabbage and spinach. To assess food antioxidant content/intake accurately, cooking effects need detailed study. Steaming may be the cooking method of choice to release/ conserve antioxidants. The cooking water is a potentially rich source of dietary antioxidants [Wachtel-Galor Sissi, Wong Ka Wing and Benzie Iris FE, The effect of cooking on *Brassica* vegetables, *Food Chem*, 2008, **110**(3), 706-710].

Physico-chemical characteristics and some nutritional values of vegetable Amaranth

Twenty one major supermarkets and ten independent green grocers in the city of Nairobi were surveyed by the scientists at University of Nairobi, Kangemi, Kenya and Wageningen University, The Netherlands for types of vegetable amaranths sold and their post harvest handling. The nutrient composition of the vegetables was also analyzed. In addition, information on three other traditional leafy vegetables (TLVs) namely, *Cleome gynandra* Linn., *Solanum nigrum* Linn. and *Vigna unguiculata* (Linn.) Walp. was also obtained. All the vegetables were sold in bundles of average weight 0.45 kg. The edible fraction per bundle averaged 38.9%. Chemical analyses showed that vegetable amaranth had a

moisture content of 85.5%, therefore, a dry matter content of 14.5%. Expressed on dry matter basis, the mean total ash content was 19.2%, crude protein content 26.1% and the crude fibre content 14.7%. The mean ascorbic acid content was 627 mg/100g, zinc content 5.5mg/100g and iron content 18 mg/100g. The mean nitrate content was 732.5 mg/100g, total oxalates 5830 mg/100 g and soluble oxalates 3650 mg/100g, while the lead content averaged 1.03 mg/100g. The study concludes that vegetable amaranth has potential as popular vegetable in the diets of Kenyans to



Solanum nigrum



Vigna unguiculata

significantly contribute to provision of micronutrients, particularly iron and zinc [Onyango Cecilia M, Shibairo Solomon I, Imungi Jasper K and Harbinson Jeremy, The Physico-Chemical Characteristics and Some Nutritional Values of Vegetable Amaranth Sold in Nairobi-Kenya, *Ecol Food Nutr*, 2008, 47, 382-398].

EPR as an analytical tool in assessing the mineral nutrients and irradiated food products-vegetables

EPR (Electron Paramagnetic Resonance) spectral investigations of some commonly available vegetables in south India, which are of global importance like *Daucus carota* Linn. (Carrot), *Cyamopsis tetragonoloba* (Linn.) Taub. (Cluster beans), *Coccinia indica* Wight & Arn. (little gourd) and *Beta vulgaris* Linn. (beet root) have been done by scientists at India. In all the vegetable samples a free radical corresponding to cellulose radical was observed. Almost all the samples under investigation exhibited Mn ions in different

oxidation states. The temperature variation EPR studies were done and discussed in view of the paramagnetic oxidation states. The radiation-induced defects have also been assessed by using the EPR spectra of such irradiated food products [Lakshmi Prasuna



Cluster beans



Carrots

C P Chakradhar RPS, Rao JI and Gopal NO, EPR as an analytical tool in assessing the mineral nutrients and irradiated food products-vegetables. *Spectrochim*

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