Green tea decoction improves glucose tolerance and reduces weight gain of rats fed normal and high-fat diet

Green tea containing polyphenols exerts antidiabetic and antiobesity effects, but the mechanisms involved are not fully understood. In this study, we first analyzed and compared polyphenol compounds [epigallocatechin gallate (EGCG), epigallocatechin (EGC)] in decoction of green tea leaves versus usual green tea extracts. Second, the effects of acute (30 min) or chronic (6 weeks) oral administration of green tea decoction (GTD) on intestinal glucose absorption were studied in vitro in Ussing chamber, in vivo using isolated jejunal loops and in vivo through glucose tolerance tests. Finally, we explore in rat model fed normal or high-fat diet the effects of GTD on body weight, blood parameters and on the relative expression of glucose transporters SGLT-1, GLUT2 and GLUT4. GTD cooked for 15 min contained the highest amounts of phenolic compounds. In fasted rats, acute administration of GTD inhibited SGLT-1 activity, increased GLUT2 activity and improved glucose tolerance. Similarly to GTD, acute administration of synthetic phenolic compounds (2/3 EGCG+1/3 EGC) inhibited SGLT-1 activity. Chronic administration of GTD in rat fed high-fat diet reduced body weight gain, circulating triglycerides and cholesterol and improved glucose tolerance. GTD-treated rats for 6 weeks display significantly reduced SGLT-1 and increased GLUT2 mRNA levels in the jejunum mucosa. Moreover, adipose tissue GLUT4 mRNA levels were increased. These results indicate that GTD, a traditional beverage rich in EGCG and EGC reduces intestinal SGLT-1/GLUT2 ratio, a hallmark of regulation of glucose absorption in enterocyte, and enhances adipose GLUT4 providing new insights in its possible role in the control of glucose homeostasis [Chahira Snoussi, Robert Ducroc, Mohamed Hédi Hamdaoui, Karima Dhaouadi, Houda Abaidi, Françoise Cluzeaud, Corinne Nazaret, Maude Le Gall, André Bado* (Inserm UMRS1149, UFR de Médecine Paris 7, Université Paris Diderot, Sorbonne Paris Cité, Paris, France), The Journal of Nutritional Biochemistry, 2014, 25(5), 557–564].

Impact of native and chemically modified starches addition as fat replacers in the viscoelasticity of reduced-fat stirred yogurt

Three reduced-fat stirred yogurts were prepared from reconstituted milk (12.5 g L⁻¹ of milk-fat) added with native maize (YNMS), and chemically modified maize (YSMS) or tapioca (YTS) starches (10 g L⁻¹). The chemical composition, syneresis, flow and viscoelastic properties of the reduced-fat yogurts were evaluated and compared with those of a full-fat control yogurt (YC; 25 g L⁻¹ of milk-fat) without starch. The rheological analysis showed that the YC exhibited lower apparent viscosity-shear rate profiles and dynamic viscoelastic moduli, but higher syneresis than the reduced-fat yogurts. The reduced-fat yogurts showed little variation in their flow and viscoelastic properties with storage time (15 days). The addition of native or chemically modified starches from different origin to reduced-fat yogurts contributed to the formation of more stable dispersed acidified milk gelled systems[C. Lobato-Calleros*, C. Ramírez-Santiago, E.J. Vernon-Carter, J. Alvarez-Ramirez (Departamento de Preparatoria Agrícola, Universidad Autónoma Chapingo, Km 38.5 Carretera México–Texcoco, Texcoco 56230, México, Mexico), Journal of Food Engineering, 2014, 131, 110–115].
**Development of a new rice beverage by improving the physical stability of rice slurry**

“Rice slurry” made from brown rice with wet stone milling, which was developed as a new liquid food material. Raw brown rice is hard to be chewed and eaten unlike cooked rice. Therefore, “rice milk”, a beverage made from rice slurry, was developed to ingest raw brown rice. The rice particles in the rice slurry settled to the bottom when the slurry was allowed to remain for several hours. Two conditions, overly fine particles or an increase in the viscosity, suppress the sedimentation velocity of the particles. A separated milling method was established, which reduced the particle size to less than 20 µm. Moreover, the sedimentation velocity decreased exponentially with the viscosity and was steady at more 80 mPa.s when the concentration of xanthan gum exceeded 0.1 wt%. A sensory evaluation indicated a favorable rate of 55.6% for the rice slurry containing 0.3 wt% xanthan gum [Masaru Koyama, and Yutaka Kitamura (Graduate School of Life and Environmental Sciences, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba City, Ibaraki Pre 305-8572, Japan), *Journal of Food Engineering*, 2014, 131, 89-95].

**Cross-cultural acceptance of a traditional yoghurt-like product made from fermented cereal**

Akpan is a traditional ready-to-drink fermented yoghurt-like cereal beverage consumed in urban and rural areas in Benin. With the aim of adapting the product to new local and export markets, this work maps African and European consumer preferences for different types of Akpan. A sensory profile of Akpan was created and consumer tests were conducted with 103 consumers of African origin and 74 consumers of European origin. Consumer acceptance was significantly correlated with fermented odour \( r = -0.94 \) and milky taste \( r = 0.92-0.97 \) attributes. Cluster analysis revealed different behaviour by African and European consumers with respect to acceptability of Akpan; European consumers did not like the sour taste and African consumers liked an intense sweet milky taste. This study provides information on how Akpan, and other fermented yoghurt-type cereal products, could be adapted to African and European consumer preferences [Noël H Akissoé*, Carole Sacca, Anne-Laure Declemy, Aurelie Bechoff, Victor B nihouvi, Générose Dalodé, Dominique Pallet, Géneviève Fliedel, Christian Mestres, Joseph D Hounhouigan and Keith I Tomlins (Faculté des Sciences Agronomiques, Université d’Abomey-Calavi, 01 BP 526, Cotonou, Benin), *Journal of the Science of Food and Agriculture*, 2015, 95(9), 1876–1884, July 2015].

**Effects of processing sorghum and millets on their phenolic phytochemicals and the implications of this to the health-enhancing properties of sorghum and millet food and beverage products**

Sorghum and millet grains are generally rich in phytochemicals, particularly various types of phenolics. However, the types and amounts vary greatly between and within species. The food-processing operations applied to these grains, i.e. dehulling and decortication, malting, fermentation and thermal processing, dramatically affect the quantity of phenolics present, most generally reducing them. Thus the levels of phytochemicals in sorghum and millet foods and beverages are usually considerably lower than in the grains. Notwithstanding this, there is considerable evidence that sorghum and millet foods and beverages have important functional and health-promoting effects, specifically antidiabetic, cardiovascular disease and cancer prevention, due to the actions of these phytochemicals. Also their lactic acid bacteria-
fermented products may have probiotic effects related to their unique microflora. However, direct proof of these health-enhancing effects is lacking as most studies have been carried out on the grains or grain extracts and not the food and beverage products themselves, and also most research work has been in vitro or ex vivo and not in vivo. To provide the required evidence, better designed studies are needed. The sorghum and millet products should be fully characterised, especially their phytochemical composition. Most importantly, well-controlled human clinical studies and intervention trials are required [John RN Taylor* and Kwaku G Duodu (, Institute for Food, Nutrition and Well-being and Department of Food Science, University of Pretoria, Hatfield, 0028, South Africa), Journal of the Science of Food and Agriculture, 2015, 95(2), 225–237].

NPARR, 6(3 & 4), 2015-107 Green tea: A novel functional food for the oral health of older adults

Functional foods are foods with positive health effects that extend beyond their nutritional value. They affect the function of the body and help in the management of specific health conditions. Green tea, a time-honoured Chinese herb, might be regarded as a functional food because of its inherent anti-oxidant, anti-inflammatory, antimicrobial and antimitagentic properties. They are attributed to its reservoir of polyphenols, particularly the catechin, epigallocatechin-3-gallate. Owing to these beneficial actions, this traditional beverage was used in the management of chronic systemic diseases including cancer. Recently, it has been emphasized that the host immuno-inflammatory reactions destroy the oral tissues to a greater extent than the microbial activity alone. Green tea with its wide spectrum of activities could be a healthy alternative for controlling these damaging reactions seen in oral diseases, specifically, chronic periodontitis, dental caries and oral cancer, which are a common occurrence in the elderly population. [Sumit Gaur and Rupali Agnihotri* (Department of Periodontology, Manipal College of Dental Sciences, Manipal University, Manipal, Karnataka, India – 576104), Geriatrics & Gerontology International, 2014, 14 (2), 238–250]

NPARR, 6(3 & 4), 2015-108 Phenolic compounds, organic acids and antioxidant activity of grape juices produced from new Brazilian varieties planted in the Northeast Region of Brazil

The phenolic compounds, organic acids and the antioxidant activity were determined for grape juice samples from new Brazilian varieties grown in the Sub-middle São Francisco Valley in the Northeast Region of Brazil. The results showed that the Brazilian grape juices have high antioxidant activity, which was significantly correlated with the phenolic compounds catechin, epicatechin gallate, procyanidin B1, rutin, gallic acid, caffeic acid, p-coumaric acid, pelargonidin-3-glucoside, cyanidin-3-glucoside, cyaniding-3,5-diglucoside and delphinidin-3-glucoside. The produced juice samples showed higher concentrations of trans-resveratrol than those observed in juices made from different varieties of grapes from traditional growing regions. Organic acids concentrations were similar to those of juices produced from other classical varieties. It was demonstrated that it is possible to prepare juices from grapes of new varieties grown in the Northeast of Brazil containing a high content of bioactive compounds and typical characteristics of the tropical viticulture practised in the Sub-middle São Francisco Valley [Marcos dos Santos Lima, Igor de Souza Veras Silani, Isabela Maia Toaldo, Luiz Claudio Corrêa, Aline Camarão Telles Biasoto, Giuliano Elias Pereira, Marilde T. Bordignon-Luiz, Jorge Luiz Ninow* (Universidade Federal de Santa Catarina, Departamento de Engenharia de Alimentos, Campus Universitário, Trindade – 88040-900, Florianópolis, SC, Brazil), Food Chemistry, 2014, 161, 94–103].
Coffee with cinnamon–Impact of phytochemicals interactions on antioxidant and anti-inflammatory in vitro activity

This paper evaluates the potential bioaccessibility and interactions between antiradical and anti-inflammatory compounds from coffee and cinnamon. Results obtained for whole plant material extracts were compared with those for chlorogenic and cinnamic acids (the main bioactive constituents of the study material). All samples, coffee, cinnamon and a mixture of the two showed abilities to scavenge free radicals and to inhibit lipoxygenase (LOX) activity. Both activities increased after simulated gastrointestinal digestion. In the mixture antiradical phytochemicals acted antagonistically – isoboles adopted the convex form. The same interactions were determined for chemical standards. The water-extractable LOX inhibitors acted synergistically – the isobole curve was “concave”. The same type of interaction was determined for standard compounds. Interestingly, after digestion in vitro a slight antagonism in the action of LOX inhibitors was observed. The results show that the food matrix and/or its changes during digestion may play an important role in creating the biological properties [Agata Durak*, Urszula Gawlik-Dziki and Łukasz Pecio (Department of Biochemistry and Food Chemistry, University of Life Sciences, Skromna Str. 8, 20-704 Lublin, Poland), Food Chemistry, 2014, 162, 81–88].

Chemical guide parameters for Spanish lemon [Citrus limon (L.) Burm.] juices

To contribute for setting reference guideline for commercial juice extracted from the Spanish lemon varieties, chemical composition of 92 direct and 92 reconstituted samples were investigated. In direct lemon juice, titratable acidity was 52.4 g/L, being the citric acid the main component. Glucose, fructose and sucrose concentrations were 7.9, 7.3 and 4.5 g/L, respectively. Predominant mineral was potassium (1264.2 mg/L), followed by phosphorous (306 mg/L), calcium (112 mg/L) and magnesium (92.6 mg/L). Hesperidin ranged from 257 to 484.8 mg/L, while water soluble pectins varied between 164.8 and 550 mg/L. Similar values were obtained in reconstituted lemon juice. There are different parameters that did not reach or exceeded the limits proposed by the European Association of the Industry of Juices and Nectars. These levels should be taken into account to modify the present reference guideline and that Spanish lemon juices are not discarded for to have lower or bigger values [José Lorentea, Salud Vegarab, Nuria Murtic, Albert Ibarzb, Luís Colld, Julio Hernández®, Manuel Valerob* and Domingo Saureab (IBMC-JBT Corp., FoodTech R&D Alliance, Instituto de Biología Molecular y Celular, Universidad Miguel Hernández (UMH) – Campus de Orihuela, Carretera de Beniel km 3.2, 03312 Orihuela, Alicante, Spain), Food Chemistry, 2014, 162, 186–191].

Colour and carotenoid changes of pasteurised orange juice during storage

The correlation of carotenoid changes with colour degradation of pasteurised single strength orange juice was investigated at 20, 28, 35 and 42 °C for a total of 32 weeks of storage. Changes in colour were assessed using the CIELAB system and were kinetically described by a zero-order model. $L^*$, $a^*$, $b^*$, $\Delta E^*$, $C_{ab}^*$ and $h_{ab}$ were significantly changed during storage ($p < 0.05$). Activation energies for all colour parameters were 64–73 kJ mol$^{-1}$. Several carotenoids showed important changes and appeared to have different susceptibilities to storage. A decrease of β-cryptoxanthin was observed at higher temperatures, whereas antheraxanthin started to decrease at lower temperatures. Depending on the time and
temperature, changes in carotenoids could be due to isomerisation reactions, which may lead to a perceptible colour change. Although the contribution of carotenoids was recognised to some extent, other reactions seem of major importance for colour degradation of orange juice during storage [Scheling Wibowo, Liesbeth Vervoort, Jovana Tomic, Jihan Santanina Santiago, Lien Lemmens, Agnese Panozzo, Tara Grauwet, Marc Hendrickx and Ann Van Loey* (Scopus - Author details - Van Loey, Ann M L KU Leuven, Laboratory of Food Technology - LFoRCe, 3000 Leuven, Belgium), Food Chemistry, 2015, 171, 330–340]

NPARR, 6(3 & 4), 2015-112 Effect of stevia and citric acid on the stability of phenolic compounds and in vitro antioxidant and antidiabetic capacity of a roselle (Hibiscus sabdariffa L.) beverage

Plant infusions are consumed due to their beneficial effects on health, which is attributed to their bioactive compounds content. However, these compounds are susceptible to degradation during processing and storage. The objective of this research was to evaluate the effect of stevia and citric acid on the stability of phenolic compounds, antioxidant capacity and carbohydrate-hydrolysing enzyme inhibitory activity of roselle beverages during storage. The optimum extraction conditions of roselle polyphenolic compounds was of 95 °C/60 min, which was obtained by a second order experimental design. The incorporation of stevia increased the stability of colour and some polyphenols, such as quercetin, gallic acid and rosmarinic acid, during storage. In addition, stevia decreased the loss of ABTS, DPPH scavenging activity and α-amylase inhibitory capacity, whereas the incorporation of citric acid showed no effect. These results may contribute to the improvement of technological processes for the elaboration of hypocaloric and functional beverages [Iza F. Pérez-Ramírez⁎, Eduardo Castaño-Tostado⁎, José A. Ramírez-de León⁎, Nuria E. Rocha-Guzmán⁎, Rosalía Reynoso-Camacho⁎(Research and Graduate Studies in Food Science, Facultad de Química, Universidad Autónoma de Querétaro, Cerro de las campanas s/n, 76010 Querétaro, Qro., Mexico), Food Chemistry, 2015, 172, 885-892].