



Session of seminars on

“Bioactive compounds of natural
origin in Food Science and
Technology”



**3-4 March 2016 – Charles Darwin Hall
Faculty of Pharmacy. University of Valencia.**



www.congreso.avecta.org





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Jorge Calpe, Juan Manuel Quiles y Noelia Pallarés **AVECTA 2016**

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Welcome by the Congress Coordinator

The 2nd International (3rd National) Congress of Students of Food Science and Technology, included among the activities of academic extension of the Faculty of Pharmacy of the University of Valencia, is organized by the AVECTA (Valencian Association of Students of Food Science and Technology), in collaboration with different professors coordinating the Organizing and Scientific Committees. Last year, the 1st International Congress gathered more than 250 participants, and in this 2nd International edition, the congress is already a success since it will welcome more than 250 participants.

The congress is organized in invited plenary lectures, oral and poster sessions have been organized to favor meetings and interaction between participants on Food Science and Technology with the aim of integrating different disciplines and put together scientist and experts of different fields: Food Security, Food Technology, Food Chemistry and Food Analysis including several sessions on advances in applied research throughout the food chain, industrial and networking actions.

We hope that this congress will provide a vital forum Spanish and international colleagues to appreciate the current state of the art in Food Technology research and will be a unique opportunity for discussion of solutions to today's and tomorrow's challenges.

Finally, we would like to address our grateful thanks to our students of the Valencian Association of Students of Food Science and Technology, that greatly helped us to organize this congress: without their enthusiastic participation, we could not host the Second International Edition.

On behalf of the Organizing and Scientific Committees we would like to wish you an interesting and enjoyable Conference in one of the most attractive Spanish corners, with fruitful discussion and exchange of professional points of view from experts coming from different countries around the world.



Dr. Giuseppe Meca
Congress Coordinator



Dr. Guadalupe Garcia-Llatas **Dr. Reyes Barberá**
Scientific Committee Coordinators



Welcome by AVECTA's president

Estimated speakers, members of the scientific programme committee, members of the organizing committee and participants, from Avecta, we greet to you for third year, on this 2nd edition of the International Student Congress and 3rd edition of the National Student Congress of Science and Food Technology.

We are so proud we can stay here one more year accomplishing the objectives we have in our organization, celebrating this event in our search for the promotion and divulgation of science and food technology, as well as the continuous and high level education of the students.

We would like to show our gratitude to all the members of the scientific and organizing committees for their invaluable work and dedication, and also for their commitment to our careers and education of future professionals.

Thanks to the speakers who altruistically participate in the congress, for their willingness to share their knowledge and investigations, they give meaning, value and quality to this congress, which could not be possible without their collaboration.

Thanks to all the sponsors who have supported us, it would not have been possible to hold a conference with the quality and magnitude of the present one without their support; thanks for trusting us and focus on science, research and education.

Thanks to the University of Valencia and to the Faculty of Pharmacy, for giving us all their help and support, and for allowing us to hold this congress in their installations and put at our disposal everything needed.

Thanks to the participants for their involvement and confidence once again, we have made all this work only for you, you are what gives meaning to this project. We are proud and grateful for the high number of participants, and we want to do a special mention to all those who have travelled to attend the conference. We hope the congress satisfies your expectations and help you in your education and formation as food technologists.

We have put all our effort, courage and work waiting this congress runs as smoothly as possible, improving the previous one and laying the foundations for the next year. I would like to emphasize the high quality of both the presentations and papers submitted this year, this encourages us to continue working and it represents the best reward.

As president, I would like to thank all members of Avecta who have been part of the congress, for their hard work and commitment.

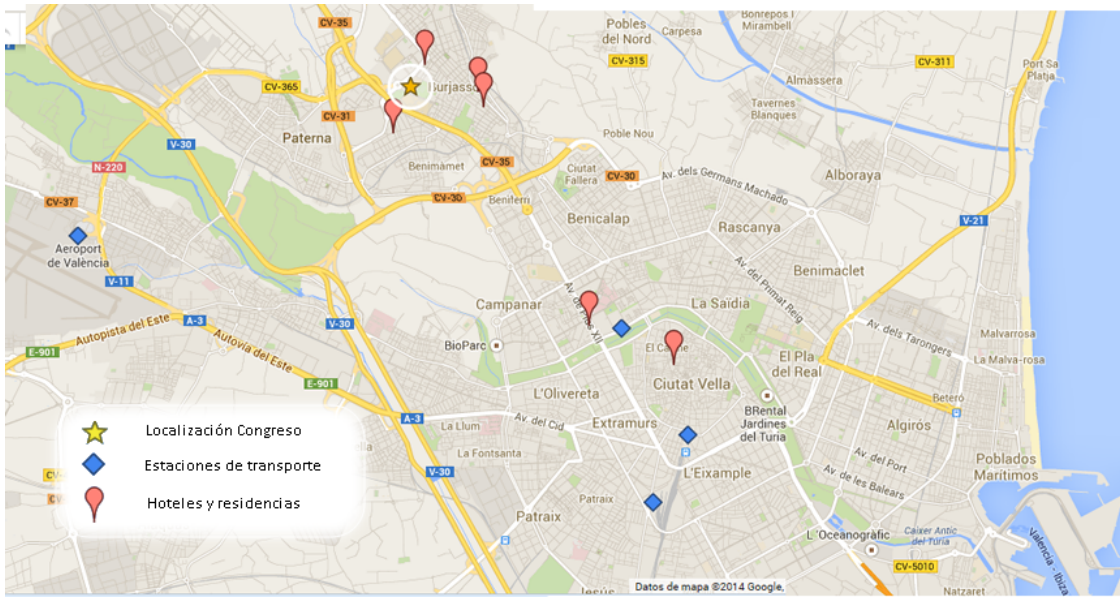
We wish you all a happy meeting.

Yours Faithfully,



Jorge Calpe Ruano

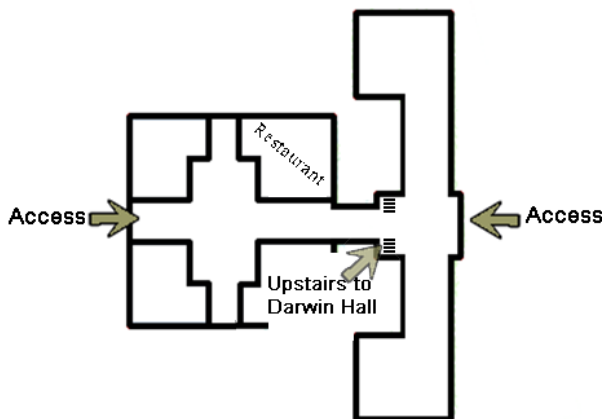
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General map of Valencia



General map of Campus de Burjassot



Pharmacy Faculty

Avenida de Vicente Andrés Estellés s/n 46100 Burjassot. Valencia.

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Scientific Programme

03/03/2016	
8:30- 9:30 – Registration	
9:30- 10.00 – Welcome ceremony	
First Session:	
Chairman: Giuseppe Meca (University of Valencia)	
10:00-10:30	“Relevance of modified mycotoxins in food: state of the art and future challenges.”- Chiara Dall’Asta. Department of Food Science, University of Parma (Italy)
Oral presentations of students	
10:30-10:50	Assessment of mycotoxins exposure by coffee consumption- A. García-Moraleja, G. Font, J. Mañes and E. Ferrer (Universitat de València, Spain)
10:50-11:10	Zearalenone and α-Zearalenol in vitro reduction using allyl isothiocyanate and bioaccessibility studies – F. Saladino, K. Bordin, Quiles JM., F.B. Luciano, M. Fernández-Franzón, G. Meca (Universitat de València, Spain)
11:10-11:30	Use of polylysine as a preservative to increase the shelf life of the sliced bread – J. Calpe, C. Luz, G. Meca (Universitat de València, Spain)
11:30-12:00	Coffee break
Second session:	
Chairwoman: María José Ruiz (University of Valencia)	
12:00-12:30	“Management of mycotoxin risk in the cereal chains” – Antonio Moretti. Institute of Sciences of Food Production. National Research Council (ISPA-CNR), Bari (Italy)
Oral presentation of student	
12:30-12:50	Development and validation of a liquid chromatography-tandem mass spectrometry method to assess human exposure to mycotoxins - L. Escrivá, P. Osorio, L. Manyes (Universitat de València, Spain)
12:50-13:10	Presence of deoxynivalenol and zearalenone in wheat and flour samples from different regions of Romania - O. Stanciu, D. Miere, F. Loghin, C. Juan (University of Medicine and Pharmacy Cluj-Napoca, Romania)
13:10-13:30	Mycotoxin occurrence in animal derived products: focus on aquaculture fish - J. Tolosa, E. Ferrer (Universitat de València, Spain)
13:30-15:00	Lunch
Third session:	
Chairwoman: Isabel Fernández (Polytechnic University of Valencia)	
15:00-15:30	“Production, bioavailability and health benefits of dairy peptides” – Isidra Recio. Institute of Food Science Research, CIAL(CSIC-UAM) (Spain)
15:30-16:00	“Natural strategies to enhance the aroma of reformulated meat products” – Mónica Flores. Institute of Agrochemistry and Food Technology, IATA-CSIC (Spain)
16:00- 17:30 POSTER SESSION*	
21:00 – Social dinner	

04/03/2016

Fourth session:

Chairman: Antonio Cilla (University of Valencia, Spain)

09:30-10:00	“Knowledge, skills and competences of the futures European food professional: the role of the ISEKI-Food Association” – Luis Mayor. ISEKI-Food Association
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Oral presentations of students

10:00-10:20	Iron-whey peptides complexes: obtaining and evaluating of bioaccessibility of iron in its free and complexed forms - M.E. Caetano-Silva, A. Cilla, M.T. Bertoldo-Pacheco, F.M. Netto, A. Alegría (University of Campinas, Brazil)
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10:20-10:40	Aroma synthesis by non-conventional yeasts in alcoholic beverages – A. Gamero (University of Valencia, Spain)
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10:40-11:00	Evaluation of antibacterial activity of natural sanitizers for food contact surfaces - W. Randazzo, I. Falcó Ferrando, M. Verdeguer, R. Aznar1,, G. Sánchez (Institute of Agrochemistry and Food Technology, IATA-CSIC (Spain))
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11:00-11:30	Coffee break
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Fifth session:

Chairwoman: Guadalupe Garcia-Llatas (University of Valencia, Spain)

11:30-12:00	“Risk assessment within AECOSAN” – Vicente Calderón, Subdirectorato-General for Food Safety Promotion, AECOSAN (Spain)
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12:15– CLOSING AND AWARD CEREMONY

***The best posters and oral presentations of the Congress, will be selected by the scientific committee. (there will be awards for graduate and postgraduate selection)**

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Invited speakers

Session I: FOOD CHEMISTRY

RELEVANCE OF MODIFIED MYCOTOXINS IN FOOD: STATE OF THE ART AND FUTURE CHALLENGES

Chiara Dall'Asta

Department of Food Science, University of Parma (Italy)

chiara.dallasta@gmail.com

The European Food Safety Authority (EFSA) has recently published a scientific opinion about the occurrence of modified forms of mycotoxins in food and feed. Based on the literature data so far, modified forms of mycotoxins may add substantially to the overall mycotoxin levels, in particular for zearalenone and fumonisins. Therefore, and in consideration of the possible release of the parent compound in the gastrointestinal tract of humans and animals, reliable data about occurrence and toxicological effects are required. While the collection of reliable occurrence data strongly needs calibrants and reference materials on the market, the identification of novel compounds and their mechanism of formation calls for -omics approaches. Toxicological studies at molecular level imply, on the other side, a deeper knowledge of metabolic processes, often supported by in vitro and in vivo studies. In this case, sensitivity and accuracy in identification are key factors. Moving to the most recent literature, this communication will cover the current knowledge on masked/modified mycotoxins in food and feed, with particular emphasis on the forthcoming challenges the scientific community will address in the next years.

Session II: FOOD ANALYSIS

MANAGEMENT OF MYCOTOXIN RISK IN THE CEREAL CHAINS

Antonio Moretti

Institute of Sciences of Food Production, Research National Council, ISPA-CNR, Bari (Italy)

antonio.moretti@ispa.cnr.it

Among the emerging issues in food safety, the increase of plant diseases associated to the occurrence of mycotoxigenic fungal species is of major importance. As a result of their secondary metabolism, these fungi can produce mycotoxins, which are low-molecular-weight toxic compounds that represent a serious risk for human and animal health worldwide. They occur naturally and are the most prevalent source of food related health risks in field crops, where approximately 25% of the global food and feed crop output is affected. Due to their broad range of biological activities, the consumption of mycotoxin-contaminated foods can have multiple consequences on both human and animal health worldwide. This is particularly so since a large proportion of the world's population consumes, as a staple food, cereals, which are the main targets for colonization by mycotoxigenic fungi. The management of good agricultural practices in the pre-harvest is a key issue for minimizing the risk of mycotoxin accumulation in cereals before the harvest. Such practices can involve crop rotation, tillage, proper fertilization and fungicide or biological control distribution, variety selection, timely planting and harvests and the control of the insects which often act as vectors of toxigenic fungi spores. On the other hand, the reduction of mycotoxins along the agro-food chains is also highly depending from a correct post-harvest management that must aim firstly at the separation of the infected crop products from the healthy material. Therefore, the use of different tools such as manual sorting or optical sensors is also a crucial point for reducing the level of mycotoxin contamination of a given crop. Moreover, it is extremely important to prevent post-harvest contamination during the storage by obtaining low temperature and humidity conditions, in order to limit the development of toxigenic fungal genera. An update review of an integrated management of pre-and post harvest practices aiming at the minimizing the risk of mycotoxin contamination of the main cereals will be provided in the presentation.

Session III: FOOD TECHNOLOGY

PRODUCTION, BIOAVAILABILITY AND HEALTH BENEFITS OF DAIRY PEPTIDES

I. Recio, B. Miralles, B. Hernández-Ledesma, L. Amigo

*Instituto de Investigación en Ciencias de la Alimentación, Nicolás Cabrera 9, 28049 Madrid
(CSIC-UAM) Spain*

**i.recio@csic.es*

During food digestion, a large variety of peptides are generated from food protein by enzymatic hydrolysis. Some of these peptides are structurally similar to endogenous peptides that play a crucial role in the organism as hormones, neurotransmitters or antibiotics. Therefore, food peptides can interact with the same receptors than endogenous peptides and exert an agonistic or antagonistic effect in the organism. The beneficial biological functionalities of milk-derived peptides include antimicrobial, antihypertensive, immunomodulatory, opioid-like activity etc, although the level of evidence for some of these activities is still scarce. Due to their physiological and physio-chemical versatility, food-derived peptides are regarded as highly prominent components for health promoting foods or pharmaceutical applications. However, the development of these new ingredients should be based on scientific criteria able to demonstrate their health properties unequivocally.

This communication will review our last results on the development of functional ingredients based on milk-derived bioactive peptides, mainly exerting an antihypertensive activity or with effect on the intestinal tract. Special attention will be paid to the identification of novel active sequences, the survival of peptides to gastrointestinal digestion, absorption and the search for the active form in the organism. Finally, incorporation to the developed ingredients into a final product, stability of the peptides to technological processes applied in the food industry and stability during self-life of the product will be also considered. In order to illustrate these aspects, several examples of ingredients will be shown. For instance, the identification of novel antihypertensive peptides in a casein hydrolysate will be presented together with the evaluation of the activity on animal models and clinical studies.

NATURAL STRATEGIES TO ENHANCE THE AROMA OF REFORMULATED MEAT PRODUCTS

M. Flores

Instituto de Agroquímica y Tecnología de Alimentos (IATA-CSIC) Avda. Agustín Escardino 7, 46980 Paterna, Valencia, Spain.

mflores@iata.csic.es

Reformulation of meat products in term of salt and fat reduction affects their sensory properties. In particular, a reduction in the aroma characteristics has been observed in reduced fat and salt meat products. Nowadays the search for natural alternatives is the main target to enhance sensory properties instead of using synthetic additives. In fermented meat products, coagulase-negative cocci has been selected as the most important group from the endogenous microbiota in the production of flavour compounds. In contrast, yeast contribution in dry fermented sausages has produced contradictory results attributed to low yeast survival or low activity during processing. However, yeast affect sausage colour and flavour by their oxygen-scavenging and lipolytic activities in addition to, their ability to catabolize fermentation products such as lactate increasing the pH and contributing to reduce the tangy taste and increase the aroma of dry sausages. Therefore, the appropriate selection of yeast strains with aroma potential can be used to improve the sensory characteristics of reformulated fermented sausages. In this presentation the inoculation of selected yeast strains in reformulated meat products will be shown, their capacity to increase the aroma and also its ability to mask off-flavors. The selection of yeast with aroma potential was performed through studies done on sausage model systems. This experiment will indicate how yeasts are able to produce flavor molecules producing different aroma notes from fruity to vegetal odours. Further studies will show the inoculation of the selected yeast in reduced fat and salt sausages and its sensory improvement. Finally, an example of the masking of an off-flavor will be shown by the inoculation of the selected yeast.

Session IV: FOOD TECHNOLOGIST COMPETENCES

KNOWLEDGE, SKILLS AND COMPETENCES OF THE FUTURES EUROPEAN FOOD PROFESSIONAL: THE ROLE OF THE ISEKI-FOOD ASSOCIATION

L. Mayor^{1*}, C.L.M. Silva², G. Schleining¹

¹ISEKI-Food Association, Department of Food Sciences and Technology, Muthgasse 18, 1190 Vienna, Austria.

²Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquitecto Lobão Vital, Apartado 2511, 4202-401 Porto, Portugal.

**luis.mayor@iseki-food.net*

The food and drink industry is the single largest manufacturing sector in the EU, yet it is in the lower part of the innovation performance ranking, and is losing relative importance in the global food market. To turn this scenario, a motivated and well trained high quality workforce of food professionals (FSTs) will be necessary. The knowledge, skills and competences of the current and future European FSTs are facing two main challenges: forecasting needs for a rapidly changing sector (due to technological innovations and to the change from a product-centred to a customer centred market) and size of European food companies (64% of employment is in SMEs, on average 16 persons employed per company). Then, adequate infrastructures and products/services are to be designed and implemented to identify, train and evaluate the required knowledge, skills and competences of FSTs. The ISEKI_Food Association (IFA) is an independent European non-profit organisation, with the aim of promoting synergies between research, education and industry in the food sector, with a focus on higher education and lifelong learning activities. As a world organization, IFA collaborates in international collaborative projects aimed at improving education and training of current and future FSTs. This work shows some of the most significant results of these projects and the crucial contribution of IFA.

Session V: FOOD SAFETY

RISK ASSESSMENT WITHIN AECOSAN

V. Calderón¹

*Spanish Agency for Consumer Affairs, Food Safety and Nutrition (AECOSAN). Calle Alcalá 56.
28014 Madrid (Spain)*

vcalderon@msssi.es

Risk analysis must be the basis of the food policy within the European Union. In Spain the Spanish Agency for Consumer Affairs, Food Safety and Nutrition (AECOSAN) has competencies in the three components of risk analysis: risk assessment (scientific advice and information analysis), risk management (regulation and control) and risk communication. Risk assessment is the scientific evaluation of known or potential adverse effects resulting from human exposure to foodborne hazards. In order to perform risk assessment, different kinds of data are needed, and AECOSAN supports or leads a number of initiatives to provide reliable data to risk assessors. The Spanish food composition database – Bedca -is one of the food composition databases within the EuroFIR network. These databases follow common guidelines for food indexing and quality evaluation systems. AECOSAN obtains food intake data through surveys intended to collect adult and infant dietary data following standards developed by the European Food Safety Authority (EFSA). EFSA also requires standardized data collection of food contaminants and AECOSAN is one of the focal points for transmitting data from Spain. The Scientific Committee is the body responsible for providing risk assessment within AECOSAN. It consists of two sections, a Food Safety and Nutrition Section and a Consumer Affairs Section. The Food Safety and Nutrition Section comprises 20 members of renowned scientific competence in various areas related to food safety. Its reports are published in the AECOSAN Scientific Committee Journal and in AECOSAN's website. AECOSAN's Scientific Committee reports cover all kind of foodborne risks related to chemical, technological, biological and nutritional hazards and include the assessment of novel food applications submitted to AECOSAN under the Novel Foods Regulation.

Oral presentations:

ASSESSMENT OF MYCOTOXINS EXPOSURE BY COFFEE CONSUMPTION ACCORDING TO STUDIES OF TOTAL DIET

A. García-Moraleja*, E. Ferrer

*Laboratory of Toxicology and Food Chemistry, Faculty of Pharmacy, University of Valencia, Av.
Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.*

**Ana.garcia-moraleja@uv.es*

Mycotoxins are toxic compounds that result from fungal secondary. Exposure assessment is an essential element for quantifying risk involved in food safety. The mycotoxins assessment is calculated as the product of food consumption and the average amount of mycotoxin in the food. In bibliography there are studies of exposure assessment to mycotoxins of total diet, attending cereal products, rice, pulses, corn, cocoa, etc. Coffee is only considered in ochratoxin A exposure assessment studies. However, coffee contamination by mycotoxins (aflatoxin B1, B2, G1 and G2; ochratoxin A; nivalenol; deoxynivalenol; 3-acetyldeoxynivalenol; 15-acetyldeoxynivalenol; diacetoxyscirpenol; neosolaniol; T-2 and HT-2 toxin; sterigmatocystin; enniatin A, A1, B, and B1; beauvericin; and fumonisin B1 and B2) has been demonstrated. While coffee makes up a small part of the overall diet, on basis of its weight equivalence in percentage, many individuals drink coffee daily, and segments of the population consume large quantities of coffee. Calculating mycotoxins exposures from coffee consumption and including them in total diet studies would increase the precision of the estimates. In this context the aim of the present work has been to calculate the Estimate Daily Intake (EDI) of mycotoxins by coffee consumption for comparison with studies of total diet available in bibliography. The estimated daily intake (EDI) has been calculated based on the recommendations of the International Program on Chemical Safety. Contamination level of mycotoxins has been purchased from previous studies at the laboratory in 169 coffee samples. The results show that coffee is a low contributor food to the overall exposure to most mycotoxins in an average consumer (from the 0.06% to the 0.48%). Nevertheless, contamination of coffee by mycotoxins affects the EDI of the total diet, in highly exposed segments of the population, achieving a share of 10% in some cases.

**ZEARALENONE AND α -ZEARALENOL *IN VITRO* REDUCTION USING ALLYL
ISOTHIOCYANATE AND BIOACCESSIBILITY STUDIES**

F. Saladino^{1*}, K. Bordin², JM. Quiles¹, F.B. Luciano², M. Fernández-Franzón¹, G. Meca¹

¹*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av.
Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.*

²*School of Agricultural Sciences and Veterinary Medicine, Pontificia Universidade Católica, BR 376
Km 14, 83010-500, São José dos Pinhais, Paraná, Brazil.*

*fesa4@uv.es

Zearalenone (ZEA) and its derivative α -zearalenol (α -ZOL) are non-steroidal estrogenic mycotoxins produced by fungi belonging to the genus *Fusarium* and *Gibberella*. Several studies have demonstrated hepatotoxic, hematotoxic, immunotoxic, genotoxic and teratogenic effects of these mycotoxins to a number of mammalian species. Isothiocyanates (ITCs) are bioactive compounds derived from glucosinolates (GLs) that are found in vegetables of the *Brassicaceae* family. Allyl isothiocyanate (AITC) is one of the most common ITC, which has been reported as potent antimicrobial. Previous studies have also demonstrated its capacity to react with mycotoxins. This study investigates the reduction of ZEA and α -ZOL on a solution model using AITC. Different concentrations of AITC were tested: 2, 20, 100 or 200 mM. The concentration of the mycotoxins studied was evaluated after 0, 4, 8, 24 and 48 h of reaction, using liquid chromatography coupled to the diode array detector (LC-DAD). Finally, the bioaccessibility of ZEA, α -ZOL and adducts, at concentrations of 15, 30 or 60 μ M, was determined, using a static simulated gastrointestinal digestion process. Mycotoxin reductions were dose-dependent, and ZEA levels decreased more than α -ZOL, ranging from 0.2 to 96.9% and 0 to 89.5% respectively. At 30 and 60 μ M, gastric and duodenal bioaccessibility were higher for α -ZOL than α -ZOL-AITC, while ZEA and ZEA-AITC did not present any significant differences.

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USE OF POLYLYSINE AS A PRESERVATIVE TO INCREASE THE SHELF LIFE OF THE SLICED BREAD

J. Calpe*, C. Luz, G. Meca

Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av. Vicent Andrés Estellés s/n, 46100 Burjassot, Spain

*calrua@alumni.uv.es

Food spoilage caused by mycotoxigenic moulds represents an important problem in food security. The bioconservation is a biotechnology application that consists in the use of microorganism or its metabolic products in food to inhibit the microbial growth, with the objective to improve the food security and extend the shelf life of food products. The antimicrobial peptides (AMP) are bioactive compounds constituted by a variable number (5 – 100) of amino acids united through peptidic links. In this study the polypeptide polylysine solutions formed by the union of 20 – 25 residues of L- lysine at different concentrations were tested against three mycotoxigenic moulds, *Aspergillus parasiticus* (aflatoxins producer) *Fusarium verticilloides* (fumonisin producer) and *Penicillium expansum* (patulin producer) using the Kirby-Bauer assay (antibiogram method). Besides determine qualitatively the antifungal activity of the polylysine, a quantitative study was conducted in liquid medium. Polylysine was subsequently used as a food additive in the preparation of bread doughs, with the aim of reduce the fungal growth of the mycotoxigenic strains tested and also the mycotoxin production. The results of the qualitative and quantitative studies of the antifungal property of the polylysine versus these three mycotoxigenic strains, demonstrates that the polylysine produces inhibition of the fungal growth of *Fusarium verticilloides*. The minimum inhibitory concentration (MIC) and the minimum fungicidal concentration (MFC) were calculated. It has been observed inhibition of fungal growth and lengthening of the useful life of breads using polylysine as additive.

DEVELOPMENT AND VALIDATION OF A LIQUID CHROMATOGRAPHY-TANDEM MASS SPECTROMETRY METHOD TO ASSESS HUMAN EXPOSURE TO MYCOTOXINS

L. Escrivá*, P. Osorio, L. Manyes.

Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Burjassot, Spain.

**laura.escriva@uv.es*

Mycotoxin producing moulds may contaminate numerous agricultural commodities either before harvest or during storage. A varied diet consisting of different foods may therefore be contaminated with a range of mycotoxins. Human exposure to mycotoxins is often based on the combination of both, food contamination and consumption data. However, biomarkers have been proposed as an alternative biomonitoring tool in measuring exposure at the individual level while avoiding the problems associated with dietary registration and the heterogeneous mycotoxins contamination in food (Wallin et al., 2015). Since biomarkers assays integrate the individual variation in absorption, distribution and metabolism, a more accurate assessment of individual's exposure can be performed by the measurement of urinary mycotoxin levels, but the development of sensitive and accurate analytical methods for detecting mycotoxins and their metabolites in urine is challenging (Heyndrickx et al., 2015). This study reports on the development of highly efficient sample preparation procedure for the quantitative measurement of 11 mycotoxins (AFB1, AFB2, AFG1, AFG2, OTA, ZEA, BEA, EN A, EN B, EN A1 and EN B1) in human urine by liquid chromatography-tandem mass spectrometry (LC-MS/MS). Several extraction methods, namely dilute and shot, miniQuEChERS, salting-out liquid-liquid extraction (SALLE), and dispersive liquid-liquid microextraction (DLLME) have been evaluated and compared based on analytical parameters data. Validation was performed in the range of ng/ml depending on the analyte and expected urinary concentration levels. The methods accuracy was evaluated by recovery assays at three concentration levels and precision, expressed as the intra- and inter-day relative standard deviations was calculated. All tested methods reached acceptable validation results in terms of recoveries, but slight differences related with accuracy and precision were observed. The selected methodology will be applied to real urine samples to estimate mycotoxin human exposure assessment in Valencian population through urinary multi-biomarker analysis.

This work was supported by the Ministry of Economy and Competitiveness (AGL2013-43194-P and BES-2014- 068039).

PRESENCE OF DEOXYNIVALENOL AND ZEARALENONE IN WHEAT AND FLOUR SAMPLES FROM DIFFERENT REGIONS OF ROMANIA

O. Stanciu^{1*}, D. Miere¹, F. Loghin², C. Juan³

¹*Department of Bromatology, Hygiene, Nutrition and* ²*Department of Toxicology, Faculty of Pharmacy, Iuliu Hațieganu University of Medicine and Pharmacy Cluj-Napoca, Romania;*

³*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Spain.*

**oana.stanciu@umfcluj.ro*

Deoxynivalenol (DON) and zearalenone (ZEA) are mycotoxins of significant public health concern as they can cause serious adverse effects in different organs. Romania is the fifth biggest wheat producers in the European Union – area harvested: 2.07 million hectares; production 7.45 million tonnes (National Institute of Statistics, 2015), but it is also one of the biggest consumers of wheat derivatives – 133.1 kg/year/capita (FAOSTAT, 2015). Romanian environmental conditions (10.2 °C average annual temperature with drought years but also with periods of heavy precipitation) may possible high levels of mycotoxins in wheat. The aim of this study was to evaluate the correlation between the levels of DON and ZEA in wheat and flour samples analyzed using liquid chromatography coupled to tandem mass spectrometry and the climatic conditions in the growing area (precipitation amount and mean temperature). The study was applied to 66 samples collected from four Romanian counties in 2014 (Bihor, Brașov, Dâmbovița, Teleorman). For the analyzed samples, analytical results showed that 18% of the investigated samples contained DON or ZEA (mean of positive samples for DON 685.8 µg/kg and for ZEA 466.6 µg/kg). Most of the positive wheat sample were from the same two growing areas, Brașov and Dâmbovița counties, correlated with the high precipitation amount (151-175 mm in the months of May, April and July). Only one wheat sample from Teleorman county was contaminated with ZEA. Regarding the detected values, three wheat samples were contaminated with DON and ZEA simultaneously and the highest level for DON and ZEA was found in the same wheat sample from Brașov county. The estimated daily intake for Romanian people was also calculated: for DON 0.57 µg/kg bw/day and for ZEA 0.26 µg/kg bw/day.

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MYCOTOXIN OCCURRENCE IN ANIMAL DERIVED PRODUCTS: FOCUS ON AQUACULTURE FISH

J. Tolosa*, E. Ferrer

*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia,
Avenue Vicent Andrés Estellés s/n, 46100, Burjassot, Spain.*

**josefa.tolosa@uv.es*

Mycotoxins are secondary fungi metabolites commonly found in cereals and fruits, among other diverse foodstuffs. Cereals and cereal by-products represent the main components of industrial feedstuffs. Currently, problems in diets used in aquaculture are associated with the replacement of fish meals with vegetable protein sources. However, the use of high levels of vegetable sources increases the risk of contamination by mycotoxins, whose effects on the health of fish are not yet completely clear (Nizza and Piccolo, 2009). Thus, mycotoxins constitute a significant problem to the animal feed industry and an ongoing risk to feed supply security. Besides their occurrence in feeds, animal derived products can also be contaminated with mycotoxins by the ingestion of contaminated feed and can be present in edible tissues of these animals (Ostry et al., 2013). Thus, animal by products could hence be a potential source of these mycotoxins for consumers (Caruso et al., 2013). Although this fact is described in terrestrial animal studies, only few recent studies are performed with fish aquaculture feeds or farmed fish (Tolosa et al., 2014). The aim of this work was to develop an analytical strategy for the determination of ENs and BEA in fish tissues by LC-MS/MS/LIT. The method was validated according to the guidelines established by the EU Commission Decision 2002/657/EC. Forty fish samples (*Dicentrarchus labrax* (n=10), *Sparus aurata* (n=10), *Salmo salar* (n=10) and *Oncorhynchus mykiss* (n=10)) were purchased from different supermarkets located in Valencia (Spain), all of them from aquaculture farming. The results showed that 70% of samples were contaminated. ENB was the most predominant mycotoxin in all samples analyzed. It is recommended to include the analysis of mycotoxins in monitoring and control programs of the aquatic breeding industry, aquatic product management and aquatic product safety administration.

IRON-WHEY PEPTIDES COMPLEXES: OBTAINING AND EVALUATING OF BIOACCESSIBILITY OF IRON IN ITS FREE AND COMPLEXED FORMS

M.E. Caetano-Silva¹, A. Cilla³, M.T. Bertoldo-Pacheco², F.M. Netto¹, A. Alegria³

¹*Faculty of Food Engineering, University of Campinas, UNICAMP, 13083-862 Campinas, SP, Brazil.*

²*Center of Food Science and Quality, Institute of Food Technology, ITAL, 13070-178 Campinas, SP, Brazil.*

³*Nutrition and Food Chemistry, Faculty of Pharmacy, University of Valencia, 46100 Burjassot, Valencia, Spain.*

**elisacaetano4@gmail.com*

Diet components may affect iron absorption; therefore, several studies have been done to raise it without side effects. This study aimed to obtain iron-peptides complexes and evaluate iron bioaccessibility in its free and complexed forms, as a first step to predict iron bioavailability. Whey protein isolate was hydrolyzed with pancreatin (40°C; pH 8.0; E/S 4%; 180 min) and ultrafiltered (cut-off 5 kDa). Hydrolysate (H) and its fractions retentate (R) and filtrate (F) were freeze-dried. Iron-peptide complexes were synthesized with 4% peptide and 0.1% iron (FeCl₂ or FeSO₄), pH 7.0, 60 min under stirring. After centrifugation (5000xg/20 min, 25°C), the supernatants were analyzed for iron content by atomic absorption spectroscopy and freeze-dried. Complexes or iron salts were submitted to *in vitro* digestion with an iron concentration of 30 µg Fe/mL. Pepsin and pancreatin/bile salts solutions were freshly prepared and demineralized. The gastric and intestinal phases were carried out at pH 2.0 and pH 6.5, respectively, both at 37°C/2h under stirring. Thereafter, digests were adjusted to pH 7.2, centrifuged (3200xg/60 min, 4°C) and analyzed for iron content, in order to determine the bioaccessible fraction. Synthesis reaction led to great increase in iron solubility (> 85%) compared to iron salts (1-18%), indicating an iron-peptide interaction. Thus peptides showed iron-binding capacity regardless of their molecular mass. Bioaccessibility of complexed iron ranged from 85-100% for all complexes, whereas free iron was 49% and 63% to FeSO₄ and FeCl₂, respectively. Soluble iron at intestinal pH, following digestion, means the mineral which is available to be absorbed, therefore all complexes showed potential to protect iron during gastrointestinal digestion and take it up to enterocytes, where most of its absorption occurs. However, more studies are required to predict the bioavailability of iron from these complexes, especially concerning their molecular mass and the dynamic of interaction with the mineral.

AROMA SYNTHESIS BY NON-CONVENTIONAL YEASTS IN ALCOHOLIC BEVERAGES

A. Gamero

*Dep. Preventive Medicine and Public Health, Food Science, Toxicology and Legal Medicine,
Faculty of Pharmacy, University of Valencia, Burjassot, Spain.*

Amparo.Gamero@uv.es

The aroma of alcoholic beverages is a key factor for assessment of product quality and its acceptance by the consumers. A great part of those aromas are generated as a consequence of the fermentative process and metabolism of the existing yeasts. Among these compounds, higher alcohols, acetate esters, ethyl esters, aldehydes, ketones, organic acids, volatile phenols, sulphur compounds, monoterpenes and volatile thiols are produced by a variety of yeasts. A great part of the alcoholic fermentations are carried out mainly by the yeast *Saccharomyces cerevisiae*. However, there are other 1500 yeast species which have been poorly studied despite presenting some of them good aptitude for aroma synthesis. They are the so called non-conventional yeasts. The present bibliographical review describes the main yeast species present in alcoholic fermentations leading to the production of different alcoholic beverages, such as wine, beer, cider and alcoholic beverages from Africa (sorghum beer and palm wine), South America (Agave beverages and cachaça) and Asia (rice wines), as well as the contribution of these yeasts to the aroma development, paying special attention to the non-conventional yeasts. The main conclusions reached were that in flavour development in wines is important the enzymatic release of bounded aromas at initial fermentation stages as well as the utilization of mixed cultures; in beer, the genus *Brettanomyces/Dekkera* is crucial in spontaneous Lambic and Gueuze fermentations; in cider, non-conventional yeasts have a remarkable role in oxidative phase; and finally, in alcoholic beverages from other continents, there is few information establishing relationship between specific yeasts and specific flavors.

EVALUATION OF ANTIBACTERIAL ACTIVITY OF NATURAL SANITIZERS FOR FOOD CONTACT SURFACES

W. Randazzo¹, I. Falcó Ferrando¹, M. Verdeguer², R. Aznar^{1,3}, G. Sánchez^{1,3}

¹*Biotechnology Department, (IATA-CSIC). Av. Agustín Escardino 7.46980 Paterna. Valencia, Spain.*

²*Instituto Agroforestal Mediterráneo, Universidad Politécnica de Valencia, Camino de Vera, s/n 46022, Valencia, Spain.*

³*Department of Microbiology and Ecology, University of Valencia. Av. Dr. Moliner, 50. 46100 Burjassot. Valencia. Spain.*

*walter.randazzo01@unipa.it

Nine essential oils (EOs) were extracted by hydro-distillation from different plants: *Eriocephalus africanus* L. (EO1), *Artemisia absinthium* L. (EO2), *Santolinachamaecyparissus* L. (EO3), *Mentha longifolia* (L.) L. (EO4), *Pelargonium odoratissimum* (L.) L'Hér. (EO5), *Thymus capitatus* (L.) Hoffmanns. & Link (EO6), *Citrus limon* (L.) Osbeck (EO7), *Citrus reticulata* Blanco (EO8) and *Eucalyptus camaldulensis* Dehnh (EO9). The EOs were firstly screened for their antimicrobial activity by disc diffusion assay against two common food-borne pathogenic bacteria *Escherichia coli* O157:H7 CECT 5947 and *Salmonella enterica* subsp. *enterica* CECT 4138. The EOs showing the highest antimicrobial activity (i.e. EO3, EO4, EO5, EO6, EO7, EO8, EO9) were further characterized by determining their Minimum Inhibitory Concentration (MIC). EO6, corresponding to *T. capitatus*, showed the lowest MIC (0.05%) and was tested as a potential natural sanitizing solution for food contact surfaces according to AOAC 960.09 and ISO 13697 methods. Three different materials of interest in the food industry (steel, glass and food plastic) were included in the study. Different EO doses, initial bacterial concentration, contact times and cleaning conditions (clean and dirty) were tested. Overall the average reductions on bacterial counts were between 1 to 3 logs depending on the initial bacterial concentration. Therefore, *T. capitatus* EO could represent a natural product to be applied for sanitizing food contact surfaces.

Posters: FOOD SECURITY

GRANADA'S ALLUVIAL PLAIN AND THIS ROLE IN FOOD SOVEREIGNTY OF THIS PEOPLE. OUTLOOK.

A. H. Sánchez Baca*, A. Cervera Mata, D. Diaby Sánchez

Facultad de Farmacia: Grado en Ciencia y Tecnología de los Alimentos. Departamento de Edafología y Química Agrícola, Universidad de Granada. Campus de Cartuja S/N. 18071, Granada, España.

**alejandrosbaca94@gmail.com*

"Food sovereignty" (FS) is defined taking into account their cultural and productive diversity and the right of each nation to maintain and develop their food. The base of the FS are soils main primary resource for food production. Granada's alluvial plain (GAP) is an area of great economic importance (over 500,000 habitants) within the province of Granada, with highly fertile soils (physical, physico-chemical and chemical): Deep, middle grain, rich minerals little altered, without structural or tillage problems, among others. In addition, the availability of water in the GAP, due to the seven rivers flowing through it and its important aquifer, make your suitability for cultivation is the largest and one of the best in the region. This is supported by history as the GAP has been the economic and food base of its inhabitants (roman, andalusian, christians). Food and typical products of the GAP are: fruit and vegetables, cereals, legumes (beans and forage), snuff, asparagus, wheat, corn, potatoes, flax, grapes, olives, hemp, beet, silk, etc. Actually, agriculture in the GAP (qualified as urban and periurban area) can't compete economically with other activities such as industry and construction, which is why these high quality soils are becoming unusable for the production of foods. In this way, the FS's GAP lose it's, wasting a non-renewable resource of great importance at the disposal of mankind: agricultural land. One possible strategy to reverse this crisis could promote agricultural associations, export and relocation of products, expansion of the food processing industry based in the GAP and production based on certified organic farming, which is currently impeded by pollution in soil and irrigation water.

**EVALUATION OF THE EFFECTS CAUSED BY DIFFERENT CONCENTRATIONS
AFLATOXIN B₁ IN JUNDIÁS (*RHAMDIS QUELEN*), BY THE HISTOLOGICAL AND
BLOOD BIOCHEMICAL ANALYSIS**

A. Anater*, C.K. Barbosa, C.M.T.D. Araújo, D.C.C. Rocha, D.R. Ribeiro, E.A. Iachinski, J.R.
Engracia Filho, R.R. Régio, C.T. Pimpão

*School of Agricultural Sciences and Veterinary Medicine; Pontifical Catholic University of Paraná,
Curitiba – PR, Brazil.*

**amanda_anater@hotmail.com*

Introduction: Aflatoxins are secondary metabolites produced by fungi *Aspergillus* sp. Contamination occurs through ingestion of food contaminated by fungi naturally. Aflatoxin B₁ (AFB₁) is one of the most potent carcinogenic, mutagenic and teratogenic substances known and is associated with liver cancer. In fish, contamination by AFB₁ can start many nonspecific clinical signs. Biochemical and histological parameters are considered important diagnostic tools to evaluate metabolic and cellular changes. Objective: The aim of this study was to evaluate the possible deleterious effects on Jundiá fed contaminated feed containing different levels of AFB₁, by histological and biochemical parameters. Method: 624 Jundiás fingerlings were used, divided into 4 different groups (GI – 0; GII – 45; GIII – 90 and GIV – 180 µg AFB₁.kg⁻¹ in the feed) and randomly divided into 24 aquariums (n=26 fingerlings/aquarium) and fed for 56 consecutive days. The organs (liver, kidneys and gills) and blood sampling were taken on +28, +42 and +56 days. Were dosed up enzymes ALT, AST, ALP, GGT and also albumin, in the tissue samples was looking for alterations between the groups. For statistical analysis was used ANOVA followed by Bonferroni and used Kruskal-Wallis followed by Dunn's. Results: Shown a significant increase (p<0.05) in ALP at GIII compare to GIV on day +42. A significant decrease (p<0.05) in ALT of GII, GIII and GIV in relation to GI on days +56, and a decrease (p<0.05) ALP and AST in GIII and GIV in relation to GI. No significant differences were observed (p>0.05) in histological evaluations, such as liver degeneration, necrosis and steatosis, kidney necrosis and degeneration. Conclusion: The severity of the change in hepatic metabolism of Jundiá may be related to increased concentration of AFB₁ in the feed, because the higher the level of AFB₁ provided, were larger metabolic changes related to the liver.

COMPARISON BETWEEN DIFFERENT COFFEE BREWING IN CONTAMINATION LEVELS OF DEOXINIVALENOL AND THEIR METABOLITES

A. García-Moraleja, E. Ferrer.

*Laboratory of Toxicology and Food Chemistry, Faculty of Pharmacy, University of Valencia, Av.
Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.*

**Ana.garcia-moraleja@uv.es*

Mycotoxins are secondary metabolites produced by filamentous fungi that usually contaminate food products. Deoxinivalenol and their metabolites are mycotoxins classified into type A trichothecenes group, they are not the most toxic mycotoxins, but represent an important hazard for health because of their high distribution. Coffee is one of the most consumed food products, with an important economic and cultural role. The coffee legislation of mycotoxins only sets maximum limits of ochratoxin A 5.0 µg/Kg (roasted coffee) 10.0 µg/Kg (soluble coffee), but not maximum limits are established for deoxinivalenol in coffee. The aim of the present study was to evaluate the contamination levels and occurrence of Deoxinivalenol and their metabolites (3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol) in coffee beverages in order to evaluate the effect of coffee brewing. Commercial roasted coffee samples (n = 169) were purchased from different supermarkets located in Valencia (Spain) and prepared according to the brewing process as follows: conventional (coffee maker), soluble, pre-portioned (electric machine), and Turkish coffee. The extraction was performed with ethyl acetate and formic acid in Ultra Turrax. The extract was injected on a LC-MS/MS (QQQ) instrument. All samples were processed in triplicate. The occurrences of deoxinivalenol, 3-acetyldeoxynivalenol, 15-acetyldeoxynivalenol in roasted coffee were 43%, 20% and 41% respectively. Mean concentrations were 102.22 µg/kg, 10.45 µg/kg, and 94.86 µg/kg respectively. DON and 15a-DON showed extensive degradation after pre-portioned electric machine brewing, and the level of degradation was next highest in soluble coffee. The traditional process with the moka machine showed the least degradation.

MYCOTOXINS IN FOOD

Beatrice Sabiu^{1*}, G. Sarais¹, G. Meca², M. Fernández-Franzón²

¹*Department of Life and Environmental Sciences, Faculty of Pharmacy, University of Cagliari, Palazzo delle Scienze, Via Ospedale 82, 09124 Cagliari, Italy;*

²*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av. Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.*

**sabiu@alumni.uv.es*

Mycotoxins are secondary metabolites that can be divided into different categories according to the type of fungus by which are produced. The most important mycotoxins in food and feed are: aflatoxins, produced by *Aspergillus* species; ochratoxin A produced by both *Aspergillus* and *Penicillium*; trichothecenes, zearalenone, fumonisin B₁ and B₂ and the emerging mycotoxins produced mainly by *Fusarium* species. Mycotoxins are about 400 organic molecules with different structures from simple heterocyclic rings with molecular weights of up to 50 Da, to groups with 6-8 irregularly arranged heterocyclic rings weighing more than 500 Da. All the crops stored for a long period are possibly target for fungi contamination but the most contaminated food are cereals, dried fruits, coffee, cocoa and also beer made with contaminated cereals. The contamination is possible at any stage in the food production chain and it depends on several factors such as temperature, humidity or concurrent mycobiota etc. Mycotoxins have a wide spectrum of toxicological effects and may affect many different cellular processes, due to their interactions with DNA, RNA, functional protein, enzyme cofactors or membrane components. Mycotoxins can be responsible of a wide spectrum of pathophysiological changes like for example neurotoxicity, nephrotoxicity, hepatotoxicity, neurological cardiac lesions, gastrointestinal disorders, Balkan endemic nephropathy, tubulonephritis and so forth. There is much concern about chronic effects of mycotoxins by low levels of exposure, and some of them have been classified by the International Agency for Research on Cancer as human carcinogens or probably human carcinogens or possible carcinogen to humans. The FAO estimates that as much as 25% of the cereals produced in the world are contaminated by mycotoxins, then monitoring studies of mycotoxins in several foodstuffs should be continuously conducted to obtain reliable information about the real exposure of human population to these toxic compound.

PURIFICATION AND ISOLATION OF ANTIMICROBIAL PEPTIDES PRODUCED BY LACTIC ACID BACTERIA

C. Luz*, J. Calpe, G. Meca

*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av.
Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.*

*carluz@alumni.uv.es

Mycotoxins are secondary metabolites produced by microfungi that are capable of causing disease and death in humans and animals. In food and feed, e.g. dairy products, sourdough bread and silage, lactic acid bacteria are used as started cultures. Besides lactic and acetic acid, some strains produce other compounds as organic acids and peptides with important antifungal activities. The bioconservation is a biotechnology application that consists in the use of microorganism or its metabolic products in food to inhibit the microbial growth, with the objective of improve (the) food security and extend the useful life of food products. The antimicrobial peptides (AMP) are natural origin compounds constituted by a variable number (5 – 100) of amino acids united through peptidic links. In this study some strains of lactic acid bacteria *Lactobacillus plantarum*, provided by the Spanish Collection of Typified Microorganisms (CECT), were cultivated in a liquid medium of MRS broth during 48 hours at 37°C in anaerobic conditions. After that, the fermented liquid mediums were concentrated by lyophilization, filtered and tested for the antifungal properties on *Aspergillus parasiticus* (aflatoxins producer) *Fusarium verticilloides* (fumonisin producer) and *Penicillium expansum* (patulin producer) using the Kirby-Bauer assay (antibiogram method). Then, fermented liquids were purified by molecular exclusion chromatography using as stationary phase Sephadex, with the aim of purifying low molecular peptides and isolated them by semi-preparative reversed-phase liquid chromatography (LC). The results of the qualitative studies of antifungal activity in solid medium show that the *Lactobacillus plantarum* strain used produces inhibition of the growth of the three mycotoxigenic fungi. Further investigations will focus on the identification of the peptides structure using the MALDI-TOF mass spectrometry.

EMERGING *FUSARIUM* MYCOTOXINS: ENNIATINS AND BEAUVERICIN IN DIFFERENT CEREALS FROM TUNISIA.

C. Juan*¹, Z. Dhahbi²; M. Drissi²; S. Oueslati^{2,3}

¹*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Spain.*

²*Département de Génie Biologique, Université Libre de Tunis.*

³*Regional Field Crop Research Center of Beja (CRRGC), Béja, Tunisia.*

**cristina.juan@uv.es*

In this study, samples of cereals (wheat, wheat flour, barley, maize and rice) purchased from Tunisian supermarkets were examined to evaluate the presence of emerging *Fusarium* mycotoxins: enniatins ENs (EN A, EN A1, EN B and EN B1), and beauvericin (BEA). The extraction of the samples was performed with acetonitrile and water using a stirrer to homogenize the sample with the solvent. Mycotoxins were analyzed with a liquid chromatography coupled to tandem mass spectrometry. The 50% of analyzed samples (n=26) presented emerging *Fusarium* mycotoxins above the LD. The cereal which has the higher incidence of *Fusarium* mycotoxins analyzed was barley. The frequencies of contamination of total samples with ENs were 62%. The maximum concentration of total ENs in a single sample was 376 ng/g (barley). EN B was the most common ENs found with the highest prevalence of 85%, its levels ranged between 2.35 (flour wheat) and 376 (barley) ng/g. EN B1 was evidenced in 10 samples and levels ranged from 1.1 (flour) to 25.5 (barley) ng/g. EN A was detected in 4 barley samples (15%) and detected levels varied from 25 to 122 ng/g and EN A1 was detected in 5 samples with contamination levels ranging between 1.64 (barley) and 25 (mix cereal) mg/kg. BEA was present in 38% of analyzed samples and levels ranged from 2.22 to 5.88 ng/g.

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DETERMINATION OF ALTERNARIOL,ALTERNARIOL METHYLETHER AND TENTOXIN IN RED FRUITS MARMALADE

C. Juan*, C. Lo Cascio.

Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Spain.

**cristina.juan@uv.es*

Alternariol (AOH), alternariol methylether (AME) and tentoxin (TENT), are *Alternaria* mycotoxins produced by fungal species persistent in fruits and vegetables during harvesting, transport and storage stages of various matrices particularly in tomato, apple, berries and fruit products (juice). This study aims to determine the above cited mycotoxins in red fruits marmalade by “*Quick, Easy, Cheap, Effective, Rugged and Safe*”(QuEChERS) extraction method and liquid chromatography coupled to tandem mass spectrometry (LC-MS/MS). So that, four different procedures of QuEChERS were tested, and the method chosen was that provided the highest recoveries and sensitivity. Method validation was performed by spiking the matrix according to their sensitivity detection; with a standard stock solution of all mycotoxins at two different levels 50 and 100 ng/mL. It was validated for recovery, repeatability, reproducibility, linearity, sensitivity and matrix effect of wheat flour for each analyzed mycotoxin. Recoveries obtained for the eight mycotoxins were higher than 70%. Repeatability, expressed as relative standard deviation, was always lower than 15%. Matrix-matched calibration was used for quantification. Good linearity ($R < 0.992$) was obtained and quantification limits ranged from 3.5 to 15 ng/g. The method was applied to determine the occurrence of the selected mycotoxins in 21 red fruits marmalade samples (strawberries, blackberries, cranberries and raspberries) purchased from different local markets of Valencian Community (Spain).

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ANTIFUNGAL ACTIVITY OF CINNAMALDEHYDE AGAINST *ASPERGILLUS PARASITICUS* AND BIOTECHNOLOGICAL APPLICATION FOR SHELF LIFE IMPROVEMENT AND AFs REDUCTION IN LOAF BREAD

JM. Quiles*, F. Saladino, M. Fernández-Franzón, G. Meca

Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av. Vicent Andrés Estellés s/n, 46100 Burjassot, Spain.

**quibe@alumni.uv.es*

Mycotoxins are secondary metabolites produced by microfungi that are capable of causing disease and death in humans and animals. *Aspergillus parasiticus* normally contaminates grains and nuts and is known to produce aflatoxins (AFs). Cinnamaldehyde (CA) is the main component of cinnamon and is recognized as natural antimicrobial agent and considered safe for its use in food. The aims of this study were to check the *in vitro* antifungal activity of CA against *A. parasiticus* and to evaluate the shelf life extension and the reduction of the production of AFs in bread contaminated by *A. parasiticus* using CA. The *in vitro* antifungal activity of CA was checked against *Aspergillus parasiticus* evaluating the growth inhibition by colony counting in solid medium after fungi incubation with different concentrations of the bioactive compound in tubes with liquid medium. Bread was made according to a traditional recipe, after the inoculation of the slices with a suspension of *A. parasiticus*, they were re-packaged in modified atmosphere plastic bags and closed and finally the slides were kept at room temperature and observed each day for 12 days. Fifty and one hundred $\mu\text{L/L}$ of CA are performed by sticking strips of filter paper with stock solutions of the bioactive compound inside the bags. Bread extract was analyzed by liquid chromatography coupled to tandem mass spectrometry detector. A minimum inhibitory concentration of 100 $\mu\text{L/L}$ and a minimum fungicidal concentration of 150 $\mu\text{L/L}$ were obtained for CA in the *in vitro* antifungal activity assay. An increment of the shelf life of one day was obtained in the bread treated with CA 50 $\mu\text{L/L}$ compared with the control. No growth of *A. parasiticus* was observed with CA 100 $\mu\text{L/L}$. Overall reduction for all AFs was between the 76-100%.

ALLYL ISOTHIOCYANATE TO CHEMICALLY REDUCE MYCOTOXIN LEVELS IN FOOD PRODUCTS

K. Bordin*¹, F. Saladino², G. Meca², F. B. Luciano¹

¹*School of Agricultural Sciences and Veterinary Medicine, Pontifícia Universidade Católica, BR 376 Km 14, 83010-500, São José dos Pinhais, Paraná, Brazil.*

²*Laboratory of Food Chemistry and Toxicology, Faculty of Pharmacy, University of Valencia, Av. Vicent Andrés Estellés s/n, 46100 Burjassot, Valencia, Spain.*

**kelianibordin@gmail.com*

Mycotoxins are toxic natural secondary metabolites produced by several species of fungi on agricultural commodities. Many strategies have been proposed to reduce mycotoxin contamination due to their deleterious effects in humans and animals. Moreover, the use of natural compounds as food preservatives is a current trend. The aim of this study was to assess the potential of gaseous allyl isothiocyanate (AITC) to react with aflatoxin B₁ (AFB₁) and B₂ (AFB₂), zearalenone (ZEA) and T-2 toxin on food products. The fumigation system was composed by two Petri dishes lids (50 mm diameter) containing 5 g of food sample (corn, corn flour, peanut, wheat and wheat flour) placed in 125 mL airtight screw-capped jars. Filter papers of 4 x 4 cm containing 50, 100 and 500 mg/L of liquid AITC were freshly prepared and inserted into the jars, which were tightly closed and kept at room temperature (23°C) for 48 hours. The flasks were opened for 1 hour and the mycotoxin content was determined. A control without AITC addition was also investigated. Duplicates were used for each treatment. Mycotoxins were extracted from the food matrices, and ZEA was monitored by HPLC-DAD, while AFB₁, AFB₂ and T-2 were quantified by LC-MS/MS. The effect of AITC was dose-dependent ($p < 0.05$), with mycotoxin reductions ranging from 0 to 40.3%. Among the food products investigated, corn and wheat flours resulted in a greater mycotoxin reduction. AITC seems to be more reactive with AFB₁ and AFB₂, with a 20% reduction of AFs present in corn flour at 50 mg/L. The results of this trial indicate that AITC can react and reduce levels of AFB₁, AFB₂, ZEA and T2 in foods.

TOCOTRIENOL'S PROTECTIVE EFFECT ON NEURONAL DAMAGE INDUCED BY PERMETHRIN IN PC12 CELLS.

Bordoni L.*^{1,3}, Capitani M.², Nasuti C.³, Manfredini S.⁴, Gabbianelli R.³

¹*School of Advanced Studies, University of Camerino, Italy.*

²*School of Biosciences and Veterinary Medicine, University of Camerino, Italy.*

³*School of Pharmacy, University of Camerino, Italy.*

⁴*School of Pharmacy and Health Products, Department of Life Sciences and Biotechnology University of Ferrara, Italy.*

**laura.bordoni@unicam.it*

Permethrin, a member of the family of synthetic pyrethroids, can induce specific conditions typical in neurons affected by Parkinson Disease (PD). Among these, an impairment in expression of Nurr1, a transcription factor essential for the maintenance of dopaminergic neurons has been observed. Considering that the primary source of exposure to permethrin is diet, we are interested in evaluating if other components of diet, in particular tocotrienols, could be able to exert a protective effect towards this neurological damage. Tocotrienols, members of the vitamin E family, are natural compounds (found in a number of vegetable oils, wheat germ, barley, and certain types of nuts and grains) that has been shown to exhibit important biological activities such as neuroprotective, anti-cancer and anti-inflammatory. Given that, we evaluated *in vitro* effects of tocotrienols (extracted from *Elaeis guineensis* oil) on PC12 cells culture treated with permethrin. PC12 cells were seeded and treated for 72h with permethrin 1µM, alone or combined with 1µM of tocotrienols. Then, RT-PCR was performed to evaluate Nurr1 gene expression. In cells cultures under stress condition, such as those induced by permethrin, Nurr1 gene expression increases, maybe as a compensatory effect to damage. In contrast, when cells are co-treated with tocotrienols, this increase does not occur. We hypothesized that tocotrienols can prevent cells over reaction to oxidative stress and downregulate the expression of Nurr1 gene. Pesticides, mainly assumed with diet, can modulate gene expression leading to the onset and progression of age-related diseases and permethrin, in particular, can induce stress in neuronal dopaminergic cells mimicking PD condition. Hence, the present study shows that tocotrienols could counterbalance *in vitro* cellular damage induced by permethrin, indicating tocotrienols supplementation or food enrichment as possible ways to remediate or to reduce oxidative damages induced by food contaminants.

ANALYSIS OF AFLATOXINS IN TEA DRINKABLE PRODUCTS

N. Pallarés*, E. Ferrer

Laboratorio de Toxicologia. Facultat de Farmàcia. Universidad de Valencia. Av Vicent Andrés Estelles s/n 46100 Burjassot

**noelia_pallares_14@hotmail.com*

The term mycotoxins refers to a variety of highly toxic compounds which are produced on different substrates as a result of secondary metabolism of fungal origin (Hathout & Aly, 2014). Toxigenic fungal species that are found most often in foods belong to the genera *Aspergillus*, *Fusarium* and *Penicillium*. Aflatoxins (AFs) are mycotoxins produced by species of *Aspergillus*. The International Agency of Research on Cancer (IARC) has classified them as human carcinogen, furthermore AFs have toxic effects such as genotoxicity, teratogenicity and immunosuppressive activity. Tea is the second most popular drink consumed after water and has benefits for health (El-Aly et al., 2014). Tea is a product susceptible of mycotoxin contamination, the levels of toxigenic fungal can increase during the manufacturing and processing of tea especially if the conditions are not correct. Different studies have identified species of toxigenic mold able to produce mycotoxins in teas (Monbaliu et al., 2010; Khosravi et al., 2013). There is not available information that permitted know the effect of elaboration of tea infusion in content of mycotoxins, only in one study, Monbaliu et al., (2010) determined the presence of mycotoxins in tea beverages. On the other hand, the European Commission has not established maximum limits (MLs) of AFs in tea (Commission Regulation, EC1881/2006). In this context, the aim of this study is determined the presence of AFs in teas beverages. The extraction was performed using DLLME procedure with a mixture of dispersant solvent (ACN) and extractant solvent (EtOAc) in a first step, and a mixture of dispersant solvent (MeOH) and extractant solvent (CHCL₃) in a second step. The determination was performed by LC-MS/MS-IT system of determination. The results obtained shows that about AFs analyzed, only AFB₂ and AFG₂ were detected in tea beverages at levels above quantification limits and only were detected in samples of green tea mint.

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POTENTIAL ANISAKIDOSIS RISK THROUGH THE CONSUMPTION OF HORSE MACKEREL, *TRACHURUS TRACHURUS*, SOLD AT SUPERMARKETS IN THE CITY OF VALÈNCIA

S. Laza-Rodríguez*, M.V. Fuentes

Department of Parasitology, Faculty of Pharmacy, Universitat de València, Burjassot, València, Spain.

**sularo@alumni.uv.es*

The presence of Anisakids in frequently consumed fish can be considered a serious public health problem, with regard to gastrointestinal parasitisation as well as allergies. The present work analyses the prevalence and abundance of *Anisakis simplex* in the horse mackerel and the possible influence of extrinsic and intrinsic factors on the above-mentioned parameters. 112 horse mackerel specimens originating from the Atlantic and bought at supermarkets in greater València have been analysed by means of dissection of the viscera and artificial digestion of the flesh. The factors considered in the analysis were the season of capture, the length and weight of the fish, and the number of days passed since the catch. The total prevalence and mean abundance were 98.21% and 41.40, always higher in viscera, being statistically significant ($p=0.0001$). The statistical analysis reflects the significant influence of weight ($p=0.0001$) and length ($p=0.0001$) of the horse mackerel, and the season of capture ($P=0.005$) on the mean abundance of *A. simplex*. However, given to the high prevalences, none of these factors can be considered determining. The influence of the days passed from the catch until consumption (date of analysis) does not show greater parasitisation in the flesh. Nevertheless, its proportion in the flesh was negatively influenced by the fish size (length and weight), reaffirming the hypothesis that the shorter distance the helminths has to cover, the more its migration will be favoured. Contrary to suggestions made in previous studies concerning the anisakidosis risk in horse mackerel, the presence of anisakids in the flesh is greater in small-sized specimens. A part from the preventive measures, i.e., cooking above 70 degrees or freezing at -20 degrees for three days or at -35 degrees for 15 hours, easy access to information on the product label would be recommended for the consumer's benefit.

MICROBIOLOGICAL ANALYSIS OF HANDLERS IN ONE ICE CREAM INDUSTRY

N.C.N.Henkin*, S.T. Cintia, R.C.AGuimarães, L. Miyagusko

Federal University of MatoGrosso doSul, Biological Science andHealth Center, Brasil.

**natalia.henkin@gmail.com*

Foodborne diseases (FBD) are an important cause of morbidity and mortality worldwide because the use of unsafe food is one of the biggest public health problems of the world. FBD are one of the main contributors to the high morbidity in Latin American Countries. In Brazil in recent years there has been an increase of almost 100% in the consumption of Ice cream, as pointed out by the Brazilian Association of Industries and Ice Cream Industry. Ice cream, a milk based product, can be considered a good medium for microbial growth due to its nutrient content, almost neutral pH and long storage duration. Besides that, several steps in the production of ice cream can cause microbiological hazards, like improper manipulation of own handlers of industries. The objective of this study was to assess the level of contamination in the employees of an ice cream industry, and determine the most frequent bacteria. The methodology applied was collection of biological materials (fingers) of the industry handlers in chromogenic 60 mm plates. The plates were incubated at a temperature between 35 to 37 ° C for 48 hours. After that was performed the colony count. This culture medium allows the isolation and differentiation of bacteria through the typical colors of the colonies of *Escherichia coli*, *Enterococcus spp*, *Klebsiella spp*, *Enterobacter spp*, *Citrobacter spp*, *Proteus spp*, *Pseudomonas spp*, *Staphylococcus aureus*, *Staphylococcus saprophyticus*. The bacteria most commonly found were *Pseudomonas spp* and *Staphylococcus aureus*, however it was observed a high level of contamination in all samples, including fungal growth. The results demonstrate a great risk of incidence of FBD due to the high amount of organic contaminants found. In conclusion the good hygienic practices of employees are essential to decrease the percentage of FBD and the risks to public health.

FOOD TECHNOLOGY

CHARACTERIZATION OF A HYBRID BEVERAGE SUPPLEMENTED WITH POLYPHENOLIC EXTRACT FROM *PUNICA GRANATUM* PEEL

López Hernández A.¹, Santiago Gómez M.P.¹, Arellanes Jiménez G.¹, Robles González V.S.¹,
Robles González I.V.², Gómez Castillo J.F.¹, González Mondragón E.¹.

¹*Instituto de Agroindustrias, Universidad Tecnológica de la Mixteca, Huajuapán de León Oaxaca, México.*

²*Universidad Mexiquense del Bicentenario, Unidad de Estudios Superiores Tultitlán, Estado de México.*

**ablopher@hotmail.com*

Punica granatum peel (pomegranate) can be an important source of polyphenolic compounds for the development of functional beverages. Polyphenolic extracts obtained from pomegranate peel (EPP) cultivated in Oaxaca, Mexico, showed *in vitro* virucidal activity against human respiratory syncytial virus (hRSV) (Asprón-Moncada *et al.*, 2014). Based on the above, this paper identified the major polyphenolic compounds in EPP by UPLC-QToF. A hybrid beverage was also developed with orange-guava juice (HB) and EPP at two concentrations (0.01 (HB1) and 0.09 (HB2) mg/mL), with possible activity against hRSV. A comparative analysis between HBs and control (HB without EPP), physicochemical properties, microbiological, sensory analysis, total polyphenols (TP), total flavonoids (TF) and antioxidant activity (AA) was carried out. The major compounds in the extracts were punicalagin and ellagic acid. There wasn't significant difference in the three treatments in terms of density (1.021-1.033 mg/mL), total solids (9.60-9.75%), °Brix (10.2), total ash (0.150-0.151%), reducing sugar (0.0273-0.0280 gEF/mL HB), pH (3.755-3.766), titratable acidity (0.240-0.254%), TF (0.179-0.187 EQ/mL HB) and AA (90-96%); the lowest IC₅₀/mL was for HB2. The TP concentration was 1.0-1.2 times higher than the control for HB1 and HB2 respectively. The microbial content was within normal specifications. The HB2 not showed a significant difference in color parameters except for a*. The darkening of HB2 was not important because the sensory evaluation had the highest degree of acceptance. In conclusion, it's possible to develop a hybrid functional beverage using EPP, with possible antiviral activity and added value to pomegranate peel, an agro-industrial waste.

STRUCTURAL CHANGES IN AN O/W HYDROCOLLOID EMULSION DURING IN VITRO DIGESTION

A.Pino, M. Espert, A. Salvador, T. Sanz

*Instituto de Agroquímica y Tecnología de Alimentos (IATA-CSIC). Avda. Agustín Escardino, nº 7.
46980 Paterna, España.*

**apifer@alumni.uv.es*

The interest in low fat food continues to be very high due to the relationship among high fat consumption and Obesity and related illnesses. For this reason, the industry is creating new products with fewer lipid content. Many of the fat we consume is in the form of oil/water (o/w) emulsions. One possibility to reduce the available fat in the body during consumption is to reduce the actions of the digestive enzymes. In this work different emulsions are formulated using an hydrocolloid and the relationship among structural changes during in vitro digestions are studied and related to fat lipolysis. Emulsions were prepared with different concentration of hydrocolloid, but the same lipid content. The physical characteristics (texture and linear viscoelastic properties) of the fresh emulsions, and after in vitro, stomach and small intestine digestion were studied. Also the effect of dilution in the structure was evaluated. Free fatty acids were quantified after the digestion in the small intestine. Differences in the physical properties were found among the two level of hydrocolloid concentration and during digestion. The levels of free fatty acids reveal that the hydrocolloid was effective to reduce fat digestion. Results are discussed in term of the relationship among the structural changes and fat lipolysis.

INFLUENCE OF TWEEN 80 DURING IN VITRO DIGESTION OF O/W EMULSIONS

A.Pino, M. Espert, A. Salvador, T. Sanz

*Instituto de Agroquímica y Tecnología de Alimentos (IATA-CSIC). Avda. Agustín Escardino, nº 7.
46980 Paterna, España.*

**apifer@alumni.uv.es*

Obesity has relationship with different illness such as diabetic type 2, cardiovascular diseases, and some types of cancer. New food products are created with lower fat and better fat quality. This work is focus in the study of factors that control fat digestion in o/w emulsions composed of oil, water, and a hydrocolloid, with and without the employ of Tween 80 as emulsifier. The structure of the fresh emulsion, and after in vitro mouth, stomach and small intestine digestion were studied. The in vitro model consists of a shaking water bath at 37°C (temperature of the human body), to simulate the peristaltic movements. Different enzymes and other reagents are incorporated to simulate the mouth, stomach and small intestine digestions. The enzymes employed are: α -amylase from porcine pancreas and mucin from porcine stomach for the mouth model; pepsin from porcine gastric mucosa for the stomach model; and bile extract from and pancreatin from porcine pancreas for the small intestine model. The effect of dilution is also studied. The emulsion structure is measured by a texture analyzer (back extrusion test) and by a control stress rheometer (small amplitude oscillatory test). The quantification of free fatty acids is measured with acid-base titration as an indicator of fat digestion. Changes in structure during digestion and fat lipolysis are related.

TEXTURAL CHANGES OF OIL/WATER/CELLULOSE EMULSIONS AFTER THE IN VITRO DIGESTION PROCESSES

Andrea Rubio*, María Espert, Teresa Sanz, Ana Salvador

IATA-CSIC Avda. Agustín Escardino 7, 46980-Paterna, Valencia, Spain

**arubiou@hotmail.com*

Obesity and overweight are among the metabolic disease that has increased in recent years due to the actual diet high in saturated and trans-fatty acids and cause 2,8 million of deaths annually according to the World Health Organization. The reduction and/or elimination of saturated and trans-fatty acids from diets constitute a difficult task for food manufacturers. Fats with low percentages of saturated fatty acid are liquid at ambient temperature and cannot accomplish the structural functions associated to solid fats. One way to confer semi solid structure to liquid oils without generating trans-fatty acids or increasing the saturated fatty acids is to incorporate them in a cellulose ether emulsion. The objective of this work is to study the textural changes of emulsions based on oil/water/cellulose after the mouth and stomach in vitro digestion and to evaluate the release of free fatty acids at the end of the intestinal in vitro digestion. Cellulose ethers used in the emulsions are two methylcellulose (A4M and MX) and three hydroxypropylmethylcellulose (F4M, E4M and K4M). No significant changes have been found in the profiles of texture curves with the in vitro digestion processes with all the celluloses used. The free fatty acids results indicate a lower oleic acid released after digestion in the emulsions prepared with MX cellulose, indicating that it is the most efficient cellulose to reduced absorption of dietary fat. Compared with a mix oil/water, all celluloses studied show a significant reduction of free fatty acids.

CIP SYSTEM FOR CLEANING AND DISINFECTING IN A BREWING INDUSTRY

L. Sánchez, D. Ordóñez, A.M. Monsálvez, A. Juan-García*

*Dpt. of Preventive Medicine and Public Health, Food Science, Toxicology and Legal Medicine
Faculty of Pharmacy, University of Valencia. Avda. Vicent Andrés Estellés s/n, 46100 Burjassot,
Valencia.*

**ana.juan@uv.es*

Cleaning and disinfecting in food hygiene is a basic mainstay to prevent food intoxication, food alterations and to eliminate food microorganisms. Cleaning-in-place (CIP) in brewing industry is a major cleaning system since it is involved of cleaning one or all facilities implied in brewing production. The present work was carried out by visiting a brewing company with the objective to know detergents and disinfectants used when beer production, number of CIP unit systems for warranting brewing production inequity and the toxicological compounds that might be present during brewing. Afterwards, a literature research was carried out to know the products characteristics used and to study hazard analysis critical control point (HACCP) in CIP's systems in brewing production. It resulted to be nitrosamines, mycotoxins, pesticides and heavy metals the chemical substances to needed topaid special attention. Detergents and disinfectants used were different according to the cleaning type in the system production; while three CIP units were used: i) during malt cooking, ii) during fermentation, cellar and filtrations and iii) in brewed filtration and packaging. Each CIP system units had different cleaning lines, which distribute detergents and disinfectants through several pipelines.

USE OF WASTE FROM THE TIGER NUT PROCESSING (HORCHATA) IN DOUGH FOR PRECOOKED FROZEN PIZZA

C. L. Alava*, S. Verdú, J.M. Barat, R. Grau

Polytechnic University of Valencia, Department of Food Technology, Doctoral student. Camino de Vera s / n 46022, Valencia, Spain

**calava81@hotmail.com*

The tiger nut is a typical food from Valencia, which is subjected to a specific process to get horchata. The shredded waste resulting from their processing are generally used for the manufacture of animal feed. In this study the addition of these products arises in developing dough for precooked frozen pizzas. The purpose of this study was to evaluate the effect of particle size on the product and processing characteristics of the final product. This has been identified five types of dough which after processing were subjected to precooking (150° and 10 minutes) and subsequent frozen. The five types of dough differed in the degree of incorporation by product (0 %, 10% and 20%) and the two particle sizes tested. The results have shown how the most influential factor was the degree of substitution, and not the particle size being from the point of view of thickness and color substitutions at the most 10% similar to the pizza made only with wheat flour, while for the loss weight during the precooking were those with a degree of substitution of 20 % regardless of the particle size tested.

ELECTROLYZED WATER AS A NEW TREATMENT TO CONTROL POSTHARVEST MOLD ROTS AND FUNGICIDES REMOVAL

Sánchez, J*., Calvo, H., Redondo, D., Venturini, M.E.

Plant Food Research Group. Instituto Agroalimentario de Aragón– IA2 - (Universidad de Zaragoza-CITA), Miguel Servet, 177. 50013, Spain.

**Juliosan_esparza@hotmail.com*

The control of pre- and postharvest mold rots in fruits is based on the use of synthetic fungicides. During the last decade several low impact technologies such as electrolyzed water have been developed in order to offer a healthier product. The aim of the present study is to determine the effect of neutral electrolyzed water to reduce the levels of some commercial fungicides, commonly used in the pre-and postharvest phases, and to determine its antifungal efficacy *in vitro* against several postharvest pathogens. For the first objective, each fungicide (Scholar, Iprodiona, Tebuconazol and Ciprodinil) was applied in 10 stone fruits that were stored at 1°C for 7 days. Afterwards, the fruit was treated with electrolyzed water (766 mV (Oxidation Reduction Potential), free chlorine (102 mg/L), 5 min immersion treatment) and the residual fungicide levels were determined and compared to a control washed with tap water. The *in vitro* antifungal activity was tested against four mold species (*Alternaria alternata*, *Botrytis cinerea*, *Penicillium expansum* and *Monilinia fructicola*). Fungal spores (10^6 spores/mL) were submerged in electrolyzed for 5 and 10 minutes and the number of survivors were determined. The percentage of fungicide removal was 22.6 %, 30 %, 27.2 % and 28 % for Iprodiona, Tebuconazol, Ciprodinil and Scholar, respectively. Populations of *M. fructicola*, *B. cinerea* and *A. alternata* were reduced by 3 logarithmic units and *P. expansum* even by 4 log units. These results show that electrolyzed water was not effective enough to remove the fungicides completely, although reduces significantly their concentration. On the other hand, it seems to have a high disinfectant activity *in vitro* against several postharvest pathogens. The determination of the antifungal activity on fruit will be study in future researchs.

CHARACTERIZATION OF MICROENCAPSULATED EUGENOL FOR BIOACTIVE FILMS

E. Talón¹, M. Vargas¹, K. Jouppila², C. González-Martínez¹

¹*Instituto Universitario de Ingeniería de Alimentos para el Desarrollo, Universitat Politècnica de València, Spain.*

²*Department of Food and Environmental Sciences, University of Helsinki, Finland.*

**emtalar@etsid.upv.es*

Eugenol is a phenolic compound abundant in clove (90%) and cinnamon (60%) essential oils with interesting antimicrobial and antioxidant properties. This natural compound can be incorporated into the formulation of bioactive films to be used for food preservation. However, they are difficult to handle due to the limited water solubility and they are susceptible of losing functionality during the film formation (by drying or extrusion). The aim of this work was to encapsulate eugenol by using WPI and a double layer system composed of WPI and chitosan (CH). Moreover, the effect of the addition of oleic acid (OA) on the emulsion properties was studied. All emulsions were processed with Rotor Stator, and three times microfluidized with the high pressure homogenizer, dissolving previously 43% (w/w) of WPI:MD solids (ratio 1:42). 3% (w/w) of eugenol was added to emulsions, with and without 7% (w/w) of OA. The coating of primary capsules with a second layer of CH (1% solution w/v) was assessed by measuring the change in the electrical surface charge of emulsions as a function of chitosan concentrations. Characterization of the emulsions were carried out in terms of particle size, zeta-potential, optical microscopy, rheological properties and TGA. Eugenol encapsulated with WPI showed a bimodal distribution, between 0,1-10 μm . The addition of oleic acid provided a more homogenous dispersion (monomodal) of around 0,5 μm , with similar rheological properties than the previous eugenol-WPI dispersion. The CH second layer was added to the OA emulsion in a CH:emulsion ratio of 1.5:10, where a charge saturation occurred. The incorporation of CH shifted the particle size distributions towards greater and more heterogeneous sizes due to the presence of large aggregates, in coherence with the microscopy observations and rheological behaviour. From the TGA results, a similar thermal stability was observed in all samples.

INFLUENCE OF THE RESTING TIME AND FREEZING ON THE RHEOLOGY PROPERTIES OF DOUGH AND CHARACTERIZATION OF CAKES

E. Ripoll*, S. Rubio-Arreaez., M.L. Castelló, M.D. Ortolá

Institute of Food Engineering for Development, Universitat Politècnica de València, Camino de Vera, s/n 46022, Valencia, Spain

* *evrise@doctor.upv.es*

The optimization of cake production in bakery depends on many factors. Some of them are temperature, force of flour, type of leavings, etc... However, resting time of dough in this type of products is not usually considered a relevant factor, since they are not fermented. Thus, the aim of this study was to assess the viscoelastic properties of dough as function of the resting time (0, 4, 24 and 50 h) and also freezing before baking. Besides, height of final product and mass loss of cakes were analysed. On one hand, a steady analysis based on Ostwald–de Waele model was performed to compare the parameters of consistency index (K) and index of fluidity (n) of dough. On the other hand, an oscillatory assay was carried out to obtain the shear storage modulus (G'), the shear loss modulus (G'') and the loss factor ($\tan \delta$). Height of cakes was measured with a calliper. The results showed that in non-frozen doughs, only after 24 hours of resting there was an increase in the consistency index and a decrease in the index of fluidity being both parameters constant after 50 hours. However, no differences in the rheology properties depending on resting time were found when dough was frozen. According to the results of the oscillatory essay only batter after 50 h of resting time showed a behavior more elastic than viscous but no influence of freezing was registered. Mass loss did not follow a clear tendency with regard to the resting time. Cakes baked after 50 h of resting time showed the lowest height, followed by the cakes prepared with frozen dough. Therefore, it seems that the analyzed rheology parameters would not explain enough the features of the final product and further studies should be carried out.

PHYSICAL PROPERTIES OF SOIL AND FOOD QUALITY. SOIL MICROCOSM IN VITRO ASSAY WITH *LACTUCA SATIVA* VAR. *LONGUIFOLIA*

J.M. Orduña*, A.M Megías, A.G. Cervera

Facultad de Farmacia (Grado de Ciencia y Tecnología de los Alimentos), Departamento de Edafología y Química Agrícola, Universidad de Granada, Campus de Cartuja, 18071, Granada (España)

*jordunamoreno@gmail.es

There is abundant literature on the relationship between the chemical soil fertility and food; include those relating to the quantity and availability of soil nitrogen. Conversely, shortage of work physical properties associated with plant-food. Some studies establish the influence of the structure with soil quality and indirectly with food quality. Mostly of these works concern the recovery of degraded soils and its effect on crop production. On the other hand, many studies dealing with the addition of "biochar" (carbonaceous particles from waste) and improving the structure, but few works that speak specifically of the coffee grounds (SCG), as amended organic, in improving the physical properties of soil. The aim of this work is to study the influence of the addition of SCG in Mediterranean agricultural soils in the physical properties and the nutritional characteristics of lettuce. An essay with two Mediterranean soils (red and vega), three doses of GCS (0, 2.5 and 10%) and 60 days in a climatic chamber (controlled temperature and humidity) was raised. Were analyzed the contents of Ca, Fe and Mg in lettuce. Adding SCG improves structural stability, increased water retention at -33 and -1500 kPa and decreases the bulk density of the soil (increased porosity). The morphology of aggregates with soil and VPSEM stereomicroscope, analytical data corroborates found. The results differ between the types of soils tested. Lettuce plants increase proportionally to the SCG added, the amounts of nutrients analyzed. We show that the improved structure also an improvement in the nutritional properties of the plant.

EFFECT OF CYCLODEXTRIN TYPE AND PROCESS CONDITIONS ON ASCORBIC ACID DEGRADATION ENCAPSULATED BY HIGH PRESSURE HOMOGENIZATION

L. Calabuig-Jiménez¹, P. Luna Pizarro², N. Betoret¹, C. Barrera¹, L. Seguí¹

¹ *Instituto de Ingeniería de los Alimentos para el Desarrollo, Universitat Politècnica de València. Camino de vera, s/n 46022 Valencia (Spain).*

² *Facultad de Ingeniería, Universidad Nacional de Jujuy, San Salvador de Jujuy, Argentina.*

**laucajim@etsia.upv.es*

Cyclodextrins are polycyclic oligosaccharides of glucopyranose units linked by α -(1-4) bonds. These molecules have a hydrophobic internal cavity which allows for making inclusion complexes. Bioactive compounds can be encapsulated to improve their solubility and their stability against light effect, heat and oxidation. Ascorbic acid is a very sensitive vitamin and there is a wide interest to improve its stability in food matrices. Encapsulation is a technology that creates a structure to protect bioactive compounds. Some studies are focused on the use of high pressure homogenization (HPH) as an encapsulation technology. In this study HPH and cyclodextrins have been evaluated as a process variables to encapsulate vitamin C. Models solutions were prepared with two types of cyclodextrins and a third one without encapsulant (as a reference to compare). Process conditions for encapsulation with HPH such as agitation time (0, 2 and 4 hours) and pH (3.5, 5.5 and 7) of solutions has been studied. After the encapsulation, a degradation stage was applied to solutions in order to evaluate the conditions were vitamin C present less percentage of degradation. Degradation was performed with light tubes during a fixed period of time. Results show that pH 3.5 is not a good condition to encapsulate ascorbic acid, whereas pH 5.5 and pH 7 are suitable to form inclusion complex with ascorbic acid. In particular at pH 5.5 was obtained lower degradation. In our study β -cyclodextrin gives higher protection of ascorbic acid than HP- β -cyclodextrin at a concentration of 1.5 g/L. Regarding to agitation time, 2 hours were enough to build the capsule. This study evidences that is possible to protect ascorbic acid in aqueous acid media with the use cyclodextrins and HPH technology to protect it against light degradation and oxidation, therefore allowing increasing its life in a media as a fruit juice.

ASSESSMENT OF DIFFERENT ACACIA AGING TREATMENTS ON THE VOLATILE COMPOSITION OF CHARDONNAY WINES

L. Marchante, M. Alarcón, M.S. Pérez-Coello, M.C. Díaz-Maroto, M.E. Alañón*

Área de Tecnología de los Alimentos, Facultad de Ciencias y Tecnologías Químicas, Universidad de Castilla-La Mancha, Avenida Camilo José Cela 10, 13071, Ciudad Real, Spain.

**mariaelena.alanon@uclm.es*

Actually, oak wood is the most used for making barrels intended for wine aging. As a result, the similar organoleptic characteristics of aged wines provided by oak, could lead to a homogeneous supply of this type of wine. Consequently, other oak species different from those traditionally used or other type of woods have been taken into consideration for aging process in response to the need of diversifying the spectrum of aged wines offered by the marketplace. In order to evaluate the enological potential of acacia wood (*Robinia pseudoacacia*), the volatile composition of aged Chardonnay wines have been studied. The traditional aging technique by means of barrels was compared with the alternative practice of the use of chips obtained from the manufacturing of barrels. Both assays were performed in duplicate and acacia wood was undergone a lightly toasting process. The volatile composition of aged wines was monitored along four timing points, monthly and weekly for barrels and chips respectively. These samples were submitted to a solid phase extraction (SPE) and analyzed by gas chromatography-mass coupled to mass spectrometry (GC-MS). Results showed that time aging were the most influential factor in the volatile composition of analyzed wines. The content of C₆ alcohols such as 1-hexanol, (Z/E)-3-hexen-1-ol, (Z)-2-hexen-1-ol, 3-methyl-pentanol, linalool, esters such as 3-methylbutyrate, isoamyl lactate, diethyl succinate and benzoic compounds such as benzyl alcohol was increased as consequence of aging time. Significant differences were observed among aging treatment with chips and barrels regarding to higher concentrations of alcohol acetates, volatile phenols, phenolic and furan aldehydes. The longest aging period in barrels led to a considerably decreased in some volatile compounds due to oxidation produced by wood porosity. Hence, no longer-term is recommended when acacia wood is involved in aging processes.

RHEOLOGICAL AND TEXTURAL CHANGES IN O/W CELLULOSE EMULSIONS DURING IN VITRO DIGESTION

M. Espert*, A. Salvador, T.Sanz

Instituto de Agroquímica y Tecnología de Alimentos (IATA-CSIC). Agustín Escardino, 7. 46980 Paterna (Valencia), Spain.

**estorma@alumni.uv.es*

Due to the increased consumption of fat and the concern about the population's health, comes the need to raise new formulations in the food industry. A highly concentrated O/W emulsion could be employed to replace the conventional fat. This paper is an experimental research on the rheological, structural properties and fat bioaccessibility in these emulsions after in vitro digestion. The emulsions were composed of methylcellulose, vegetal oil and water. Rheological properties were studied using a control stress rheometer by small amplitude oscillatory shear. The effect of higher magnitude forces in the structure was performed with a texture analyser applying a back extrusion test. After the stomach the structural changes were associated to dilution and not to pepsin or acid pH. The emulsion was more affected after intestinal digestion. However the structure adopted by the emulsion was homogeneous and is highly resistant during digestion, preventing surely an effective action of the enzymes and, therefore, reducing fat bioaccessibility. These results may have important implications for the design of improved food and low fat food and reformulated products with low fat digestibility.

OIL/WATER CELLULOSE ETHER EMULSIONS: A STRATEGY TO REDUCE FAT DIGESTION

M. Espert*, A. Salvador, T.Sanz

Instituto de Agroquímica y Tecnología de Alimentos (IATA-CSIC). Agustín Escardino, 7. 46980 Paterna (Valencia), Spain.

**estorma@alumni.uv.es*

The design of emulsions to control the rate and extent of lipid digestion within the gastrointestinal tract has received high interest lately. In this study we examined how the presence of cellulose ether in an oil/water emulsion structure may influence in the structural changes during digestion and fat lipolysis. The emulsion was composed of water, sunflower oil and methylcellulose. The changes in the structure were analyzed by particle size measurement and microstructure observation, before and after *in vitro* mouth, stomach and small intestine. Finally the fatty acids released after digestion was evaluated as an indicator of the action of pancreatic enzymes on emulsion lipids digestion. After *in vitro* intestine incubation a change in the particle size and an increase in fat globule size were observed, indicating that the intestine digestive fluids were able to come into contact, at least partially, with the oil phase of the emulsion. The level of free fatty acid was very low, which reveals that fat hydrolysis was very poor. This is expected to be mainly associated with the physical barrier exerted by the hydrated methylcellulose in the continuous phase. In conclusion the application of this emulsion would be effective in the development of low calorie/fat products, as the access of the digestive enzymes to the site of action will be reduced as well as the amount of fat available for absorption.

INFLUENCE OF THE MATURITY STAGE OF MANGO ON THE COMPOSITION OF MANGO PEEL AS A SOURCE

E.Valero-Cases, A.I. Caballero-García, N. Díaz-Rodríguez , M.J. Frutos*

Departamento de Tecnología Agroalimentaria.Escuela Politécnica Superior de Orihuela. Spain.

**mj.frutos@umh.es*

Nowadays, the disposal of millions of tons of vegetable waste from the industrial processing of fruits is a big problem. Therefore, its use for the development of food ingredients is important. The aim of this study was to study the changes in antioxidant capacity and total fibre in mango peels during storage, at different stages of maturity for the elaboration of flour to be used in food. . The mangoes were collected at their commercial maturity. The fruits were washed and stored refrigerated during three weeks . Four mangoes were taken at 0, 7, 14 and 21 days and were hand-peeled placing the peels in trays and dried at 50 °C during 72 h then the peels were milled and sieved through 0.1 mm mesh). The determination of the Antioxidant Capacity (AOC) was measured by ABTS, DPPH and FRAP. The total phenolic content (TPC) (by Folin–Ciocalteu) and total dietary fiber (TDF) (by AOAC official method) were also analysed TPC in the flour made from mango peel at the beginning of the storage was ca. 1700 mg eqpyrogallol/100g. These values increased during the storage reaching values ca. 2500 mg at 21 days. A high correlation between the DPPH, ABTS and FRAP with the TPC was observed during the storage. The total fiber content TDF in mango peel flour was high representing ca. 38%. A mix of all flours obtained during storage showed composition and properties similar to the flours after 21 days. The development of flour from mango mature peels, or from mixed peels during storage is a potential use of by-products for the fibre and antioxidant capacity enrichment of food products while promoting waste reduction.

SENSORIAL EVALUATION OF DIFFERENT ACACIA AGING STRATEGIES TO OBTAIN DISTINCTIVE AGED WINES

M. Alarcón*, L. Marchante, M.S. Pérez-Coello, M.C. Díaz-Maroto, M.E. Alañón

Área de Tecnología de los Alimentos, Facultad de Ciencias y Tecnologías Químicas, Universidad de Castilla-La Mancha, Avenida Camilo José Cela 10, 13071, Ciudad Real, Spain

**mariaelena.alanon@uclm.es*

Wine aroma is one of the most decisive factors influencing the quality and consumer acceptance. The complexity of aroma is increased during aging stage due to the extraction of certain compounds from the wood to wine joint a gentle microoxygenation through the pore wood. Traditionally, certain oak species (*Quercus alba*, *Q. petraea* and *Q. robur*) have been used for making barrels. However, other types of woods have been taken into consideration in the last years with aim of obtaining distinctive aged wines with different sensorial sensations. In our study, the suitability of different aging treatment with acacia wood (*Robinia pseudoacacia*) has been assessed. The traditional aging technique by means of barrels was compared with the alternative practice of the use of chips obtained from the manufacturing of barrels. Four timing points, monthly and weekly for barrels and chips respectively were monitored. Samples of Chardonnay aged wines were monitored weekly during 4 weeks for chips treatment and monthly during 4 months in the case of barrels. A descriptive sensory analysis was carried out by a panel of expert assessors with experience in sensory analysis. As consequence of acacia aging, new flavors described as nutty, honeyed and toasted were detected in wines aged with acacia. On the other hand, fresh, peach/apricot, tropical fruit and citrus, characteristic sensorial attributes of control wines, diminished according to the time in contact with acacia wood. Typical aged aromas described as vanilla or spicy were not detected by the panelists. The use of chips preserved varietal characteristics better, but wines aged in barrels resulted in a highly complexity due to the good balance between the varietal features from Chardonnay wine and the emergence of new clearly perceptible sensory notes described as consequence of the contact with acacia barrels.

ANTIMICROBIALS PHBV FILMS WITH ACTIVE COMPOUNDS OF ESSENTIAL OILS

R. Requena*, M. Vargas, A. Chiralt

Área de Tecnología de los Alimentos, Facultad de Ciencias. Universidad de Vigo. Campus As Lagoas s/n, 32004 Ourense (España).

**rarepe@upv.es*

Poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) bilayer films with antimicrobial activity were obtained by compression molding using two active compounds, carvacrol (CA) and eugenol (EU). These ones were applied at the interface by spraying (15% w/w) between two PHBV layers, which were attached by thermo-compression. The antimicrobial activity of the films was assessed against *Escherichia coli* and *Listeria innocua*. Likewise, the amounts of active compounds released from the PHBV films to the culture media was predicted in order to compare their effectiveness. In addition, the overall migration of the films was evaluated in three food simulants (A: ethanol 10 % v/v; B: acetic acid 3 % w/v; D2: isooctane) for 10 days at 40°C. The active compounds were released from the PHBV films in adequate amounts into culture media to inhibit both bacteria growths. The films were significantly more effective against *E. coli* than against *L. innocua*. Both bacteria were more sensitive to CA due to its higher antimicrobial effectiveness. Regarding the overall migration, all film formulations showed a significantly lower mass transfer into D2 simulant than into A or B simulants. The migration of PHBV films containing CA or EU in both polar simulants (A and B) was significantly lower than of the pure PHBV films, without significant differences among them. This result suggests that the active compounds promote the crosslinking within the polymer matrix decreasing the overall migration of the PHBV films. Therefore, the addition of active compounds such as CA or EU in PHBV matrixes is a promising option to obtain active films which comply with the safety requirements of the food packages.

ANTIFUNGAL PROPERTIES OF CINNAMON BARK ESSENTIAL OIL AND *TRANS-CINNAMALDEHYDE* AGAINST MOULDS

S. Ribes*, A. Fuentes, P. Talens, J.M. Barat

Food Technology Department, Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain.

**surillo@upvnet.upv.es*

Mould contamination is an important problem in the food industry. Chemical additives are used to prevent mould growth but their negative consumer perception has increased the interest in finding alternatives to protect food products by replacing synthetic chemical agents by natural extracts. In this sense, essential oils (EOs) and their main compounds have been used as antifungals against a wide variety of moulds. In this study, the *in vitro* fungal activity of cinnamon bark EO as well as their main compound, *trans-cinnamaldehyde*, against *Aspergillus flavus* and *Aspergillus niger* has been evaluated. Different concentrations of the natural products were tested: 0.03, 0.04 and 0.05 mg/g and 0.024, 0.032, 0.04 and 0.048 mg/g of cinnamon bark oil and *trans-cinnamaldehyde*, respectively, and 2 inoculum levels were assayed (10^3 or 10^6 CFU/mL). Minimal Inhibitory Concentration (MIC) and Minimal Fungicidal Concentration (MFC) were determined by agar dilution method. A strong antifungal effect was observed at the lowest inoculum density of both microorganisms (10^3 CFU/mL), with a MFC of 0.04 and 0.05 mg/g for *A. flavus* and *A. niger* when cinnamon bark oil was employed. In case of *trans-cinnamaldehyde*, the MCF values were 0.040 and 0.048 mg/g for *A. flavus* and *A. niger*, respectively. Nevertheless, when the lowest diluted suspension (10^6 CFU/mL) was assessed, the MIC value was 0.05 mg/g for both strains. Finally, all this data demonstrate that the inoculum concentration plays an important role in the degree of inhibition and there could also be a synergistic activity among the compounds present in the extracts to increase their antifungal potency.

NON-DESTRUCTIVE DETERMINATION OF INTERNAL QUALITY IN NECTARINES USING VISIBLE AND NEAR INFRARED SPECTROSCOPY

V. Cortés^{1*}, N. Aleixos², J. Blasco², S. Cubero², P. Talens¹

¹*Departamento de Tecnología de Alimentos. Universitat Politècnica de València. Camino de Vera s/n, 46022, Valencia (Spain).*

²*Centro de Agroingeniería. Instituto Valenciano de Investigaciones Agrarias (IVIA). Ctra. Moncada-Náquera km. 4.5; 46113 Moncada, Valencia (Spain).*

**viccor13@doctor.upv.es*

Quick assessment of internal quality in fruits is important both for growers and for consumers because the fresh fruit market is becoming increasingly demanding with regard to product quality. This study evaluates the capability of visible (VIS) and near infrared (NIR) spectroscopy to determine the internal quality of intact nectarines in post-harvest storage. A total of 150 nectarine fruits (cv. 'Big top') were sampled after 1, 2, 3, 4, 5 and 9 days of storage (15 °C, 95% RH) at commercial harvest time. The fruits were assessed by spectroscopic techniques in reflectance mode using two detectors, one with sensitivity in the VIS-NIR range 595-1100 nm and another with sensitivity in the NIR range 888-1795 nm. Firmness, flesh colour and total soluble solids were analysed using traditional destructive methods, and Internal Quality Index (IQI) was established based on a combination of these parameters. Models were developed by partial least squares (PLS) to establish the relationship between the spectra and the IQI. A set with the 75% of the samples was used for the set of calibration, obtaining a R^2 of 0.948 with the VIS-NIR detector and of 0.871 with the NIR detector. The remaining 25% of the samples was used to validate the model with good results in the prediction of internal quality ($R^2=0.897$ for VIS/NIR and NIR). These results showed that spectroscopic techniques could be used to monitor the changes in nectarine quality parameters during ripening post-harvest as an essential tool for decision-making both for in-field and for future on-line application.

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FOOD ANALYSIS AND CHEMISTRY

CITRUS RESIDUES UTILIZATION: ULTRASOUND ASSISTED EXTRACTION OF CAROTENOIDS FROM ORANGE PEEL

A. Montero-Calderón, M.C. Soriano-Zarzoso, J.M. Carbonell-Capella, A. Frígola, M.J. Esteve*

Av. Vicent Andrés Estellés, s/n, 46100 Burjassot (University of Valencia, Departament of Nutrition and Food Science) Spain

**maria.jose.esteve@uv.es*

Organic residues, such as fruit peel, are considered food waste with high implications on food security and natural resources conservation. Citrus by-products have the potential to be used because of their bioactive compounds content: ascorbic acid, phenolic compounds and carotenoids. Conventional extraction of phytochemical compounds using organic solvents produces high pollution, which is why green extraction techniques such as ultrasound-assisted extraction (UAE) are required. The aim of this investigation was the extraction of carotenoids from orange peel (*Citrus sinensis*) using UAE and environmentally friendly solvents. Orange albedo and flavedo were cut in pieces of 0.6 cm² and ultrasound treated (Qsonica, United States) using the following variables: power (100-400 W), time (5-30 min) and ethanol percentage (0-50 %). Carotenoid content was quantified in a UV/VIS Lambda 2 spectrophotometer (Perkin Elmer, United States) measuring absorbance at a wavelength of 450 nm. Calculations were made using the extinction coefficient of β -carotene ($E^{1\%}=2505$) given by Ritter and Purcell (1981). Response surface methodology with central composite design using Statgraphics[®] software was employed for the results optimization. Results show that ultrasound power of 400W, extraction time of 30 min and ethanol:water (1:1, v/v) as solvent are the optimal conditions which enable the extraction of 0.516 mg β -carotene/100g sample. These results evidence that UAE and 'green' solvents are a suitable method for the extraction of bioactive compounds such as carotenoids, which could be employed on functional food and nutraceuticals in the future.

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DEVELOPMENT OF AN ELISA TECHNIQUE TO DETERMINE THE ALLERGENIC PRU P3 PROTEIN FROM PEACH

A.P. Tobajas, D. Ripollés, J.A. Parrón, M. Calvo, L. Sánchez, S. Condón, M.D. Pérez*

Tecnología de los Alimentos, Facultad de Veterinaria, Universidad de Zaragoza. Instituto Agroalimentario de Aragón (IA2) (Universidad de Zaragoza-CITA). Miguel Servet 177, 50013, Zaragoza, Spain.

**dperez@unizar.es*

In Spain, about 70% of fruit allergies are associated with the consumption of fruits belonging to the Rosaceae family, mainly to peach. Pru p3 is the most allergenic protein of peach, as more than 40% of peach-allergic individuals have specific IgE for this protein. It is a basic protein of 9-kDa that shows a high resistance to heat treatments and proteolysis by digestive enzymes, which gives it the ability to produce severe allergic reactions. The aim of this work was to develop an ELISA technique to quantify Pru p3 protein and to perform a preliminary study to determine the effect of technological treatments on its denaturation. Pru p3 was isolated from peach by chromatographic techniques (cationic exchange and gel filtration) and characterized by SDS-electrophoresis and mass spectrometry. Purified protein was inoculated into rabbits to obtain antisera, which were used to develop an indirect competitive ELISA to determine Pru p3. The degree of denaturation of Pru p3 subjected to heat (60-100 °C, 1-10 min) or high pressure treatment (400-600 MPa, 15 min) was estimated by measuring the loss of its immunoreactivity. Furthermore, treated samples were assayed by competitive ELISA using sera of peach-allergic individuals. The purity of isolated Pru p3 was higher than 95%. Antisera showed cross reactivity with proteins of other Rosacea fruits, as plum or cherry. The ELISA technique using rabbit antisera has a detection limit of 1.6 µg/ml. Denaturation of Pru p3 after treatment at 60°C was low and marked at higher temperatures, however, pressure treatments did not affect its immunoreactivity. When treated samples were assayed using human sera, changes in reactivity of Pru p3 with IgE were not observed. Heat treatments decrease antigenicity but they do not affect allergenicity of Pru p3. Pressure treatment has no effect on antigenicity and allergenicity of the protein.

ANTI-INFLAMMATORY EFFECT OF PLANT STEROLS: CLINICAL STUDIES

V. Blanco¹, A. Álvarez-Sala^{2*}, A. Cilla, G. Garcia-Llatas, R. Barberá

¹*Master's Degree in Food Quality and Safety*

²*PhD in Food Science, Nutrition and Food Science. Faculty of Pharmacy, University of Valencia, Spain*

**andrea.alvarez@uv.es*

Although the cholesterol-lowering effect of plant sterols (PS) is well known, other effects, such as anti-inflammatory (associated with early stages of atherosclerosis) are currently of interest. There are few studies on that subject and, in some cases, report contradictory results. The aim of this paper is to review the existent literature on human clinical studies where the anti-inflammatory effect of PS is evaluated after the consumption of foods enriched in these bioactive compounds. The literature search has been conducted in Medline, Scopus and Web of Science, between years 2000-2015 using the keywords “C-reactive protein”, “cytokines”, “inflammation”, “plant sterols”. Eighteen research papers have been evaluated, with different clinical intervention designs that include both men and women, aged between 18 and 85 years, suffering of hypercholesterolemia, hyperlipidemia, metabolic syndrome or healthy individuals. PS-enriched foods are mainly margarines and drinks which provide of 2-3 g PS/day. The most studied inflammation marker is C-reactive protein (CRP) followed by pro-inflammatory cytokines (tumor necrosis factor- α (TNF- α) and interleukins IL-6, IL-8, IL-1 β) and anti-inflammatory (IL-10). In most studies the concentrations of CRP, TNF- α and IL-6 do not change significantly, but some studies indicate reductions of 12-42%, 10% and 11-39%, respectively. Pro-inflammatory IL-8 and IL-1 β are reduced in 11% and 43%, respectively. IL-10 is the only anti-inflammatory cytokine referred to in the studies and its serum concentrations are not modified by the consumption of food products enriched with PS. Results show that it is not possible to establish a direct relationship between PS intake from enriched foods and anti-inflammatory effect. This may be due to the great variability in the design of the intervention trials, their duration, different foods used and the methodologies employed to assess the markers of inflammation. More studies are necessary to elucidate the possible relationship of PS with the anti-inflammatory effect.

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IMPLEMENTATION OF DIFFERENT PULSE SET CONFIGURATION TO MEASURE ANTIOXIDANT CAPACITY OF ALISO (*ALNUS ACUMINATA*) THROUGH VOLTAMMETRIC ELECTRONIC TONGUES.

E. M. Fuentes¹, E. O. Baldeón^{1,2}, M. Alcañiz³, R. Masot³, J. M. Barat¹, R. Grau¹.

1 Departamento de Tecnología de Alimentos. Grupo CUINA. Universidad Politécnica De Valencia, España

2 Departamento de Ingeniería de Alimentos y Productos Agropecuarios. Universidad Nacional Agraria la Molina-UNALM, Av. La Molina s/n, Lima, Perú

3 Instituto de Reconocimiento Molecular y Desarrollo Tecnológico (IDM), Centro Mixto. Universitat Politècnica de València e Universidad de Valencia, Camino de Vera s/n, 46022 Valencia, Spain

**esfuepre@posgrado.upv.es*

Electrochemical techniques are widely used at the food industry during the last two decades, helping and allowing the measuring and determination of organoleptic and physical chemistry parameters. Electronic Tongues are the equipment used with this purpose, may be these impedance spectroscopy, potentiometric or voltammetric. The purpose of this study was to measure the total antioxidant capacity of aliso through a Voltammetric Electronic Tongue. Aliso is a plant with its origins at central and South American region, known by its high content of tannins and essential acids, beside the huge variety of applications given by the locals mainly at the ancestral medicinal field. To carry out this study, aliso leaves extracts and trolox samples at different concentrations were analyzed using an official method of analysis ABTS and through a voltammetric technique. Three pulse configurations formed by different potentials were built: + 3P (0; 500; 800mV); 4P + (0; 200; 500; 800 mV) and 50P (micro-pulses from 0 to 800mV with 18mV difference between each pulse) and pulse amplitudes of 20ms. Voltammetric responses were subsequently analyzed in order to compare between them and determine which of the configurations provides the best differentiation between concentrations based on the obtained response. As a result of this essay, voltammetric response corresponding to the pulse configuration 4P+ was the one which could distinguish better between sample concentrations and later was capable to provide an accurate mathematical model of prediction of the total antioxidant capacity of aliso, based on trolox equivalent.

**ASSOCIATION BETWEEN DIETARY INTAKE OF VEGETABLES AND NUTS AND
METHYLATION PATTERNS OF THE TCF7L2 GENE BY MASSARRAY
SPECTROMETRY IN A HIGH CARDIOVASCULAR RISK MEDITERRANEAN
POPULATION**

I. González-Monje¹, EM. Asensio^{1,2}, R. Barragán^{1,2}, JV. Sorlí^{1,2}, D. Corella^{1,2}, C. Ortega-Azorín^{1,2}

¹ *Department of Preventive Medicine and Public Health, Food Science, Toxicology and Forensic Medicine. University of Medicine and Odontology. Valencia. Spain.*

² *CIBER-OBN (Center of Biomedical Research Network Obesity and Nutrition). Carlos III Health Institute. Madrid. Spain.*

*ingonmon@alumni.uv.es

The Transcription Factor 7-like 2 (TCF7L2) is the most known gene associated with type-2 diabetes (T2D) risk, which is an important cardiovascular risk (CVR) factor. In the PREDIMED study we have demonstrated that Mediterranean diet (MedDiet) has a protective role by decreasing both T2D incidence and cardiovascular disease risk. Taking into account that dietary intake may influence the genetic effects by epigenetic mechanisms, such as DNA methylation, our aim is to analyse whether methylation at the Cytosine-phosphate-guanine (CpG) dinucleotides in TCF7L2 gene region is associated with typical food intake of the MedDiet. We studied 192 randomly selected participants in the PREDIMED-Valencia study. Participants were high CVR subjects aged 67±6 years. Food intake was measured by a validated food frequency questionnaire (FFQ) and adherence to MedDiet by a validated 14-item questionnaire on adherence. High adherence was considered when a score of 9 or more was recorded. DNA was extracted from leucocytes and we analysed the methylation of selected CpG sites in the TCF7L2 gene. Quantitative DNA methylation analysis were carried out by matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry and the EpiTYPER workflow. We evaluated methylation levels in 12 CpG sites (4 in amplicon A and 8 in amplicon B) of TCF7L2 gene. We did not find statistically significant differences in methylation depending on the level of the adherence to the MedDiet. However, we observed significant associations between methylation levels and food consumption of some foods. For vegetables (average food consumption per person was 2.35±0.98 times/week) and nuts (1.60±0.911 times/week) we obtained inverse correlations for the CpG site 4 in the amplicon B. Thus, a higher vegetable ($r=-0.169$; $p=0.023$) and nuts ($r=-0.169$; $p=0.023$) intake was associated with hypomethylation. Vegetables and nuts consumption is associated with decreased methylation of selected CpG sites within the TCF7L2 gene in a high CVR Mediterranean population.

APPLICATION OF THE FAST ENZYMATIC METHOD FOR THE DETERMINATION OF CHOLESTEROL IN HUMAN COLOSTRUM

I. J. A. Hamdan^{1*}, G. Garcia-Llatas¹, P. Codoñer-Franch², M. J. Lagarda¹

¹*PhD student in Food Science, Nutrition and Food Science Area, Faculty of Pharmacy, University of Valencia, Spain.*

²*Department of Pediatrics, Doctor Peset University Hospital, Valencia.*

**Islam.Ja@uv.es*

Colostrum is the first dynamic biological fluid produced by mothers in low quantities in the first few days postpartum. Although colostrum presents wide variations in the composition on any one day and from one day to the next, it has a lower energy value, fat and lactose contents than mature human milk (MHM), and is higher in total ash and protein. Cholesterol is the most abundant sterol in human milk (HM), is an essential compound in the functionality of the cell membrane in animals, and a precursor of important endogenous substances. High cholesterol intake from HM has been related to low levels of blood cholesterol in adult life, so its quantification is of importance to assess the functionality in infant health. A previous method proposed by Hamdan *et al.* 2015 for cholesterol determination in MHM has been applied, including a direct hot saponification and an enzymatic-spectrophotometric determination, where accuracy (by recovery tests) and precision are estimated. The recovery percentage was close to 97% (n=6), which is included in the accepted percentage range (90-107%) for this analyte concentration (100 ppm). This result shows that the method is accurate for application to colostrum. Intraday (n=10) and interday (n=10) precision values obtained were both lower than 6%, demonstrating a good repeatability and reproducibility of the method. This proposed method was applied for the determination of cholesterol in a pool of colostrum samples (n=24) resulting in 49.43 ± 4.07 mg/100 ml. Although, MHM contains 1.3 times more fat than colostrum (3.8 and 2.9 mg/100 ml, respectively), the cholesterol content found in colostrum is approximately 3.5 higher than MHM and 1.8 times higher than those determined by other authors (28.3-29.2 mg/100 ml, respectively).

Acknowledgments: To Hero España S.A. for financial support.

SEPARATION OF SARCOPLASMIC PROTEINS BY SEC

J. Ballester, S. M. Bascuas, F. Toldrà Vilardell, L. Mora Soler, M.C. Aristoy Albert

Instituto Agroquímica y Tecnología de los Alimentos (IATA), C/ Catedrático Agustín Escardino Benlloch, 7, 46980 Paterna - Valencia - Spain.

**jaime.ballester.sanchez@gmail.com*

Size exclusion chromatography (SEC) is an alternative technique to traditional separation by gel electrophoresis that enables the separation of proteins and peptides with a potential interest for their bioactive properties. This work is focused on the study of the soluble protein fraction hydrolysis of pork muscle *Longissimus dorsi* at three different times of ageing. An ÄKTA start chromatograph system and GE Superdex 75 10/300 GL gel filtration column with a working range of 70-3 kDa were used. The comparison was performed using gel electrophoresis SDS-PAGE (12%). The results showed a good separation for the soluble fraction of protein extract, obtaining short analysis time and good resolution. What is more, the optimised methodology confirmed the intense hydrolysis occurred, showing an increase in the number of proteins and small peptides during the ageing of meat.

THERMAL PROPERTIES OF SUNFLOWER HONEY AND SUGAR SYRUPS

L. Sobrino*, M. Vargas, A. Chiralt, I. Escriche

*Institute of Food Engineering for Development (IUIAD). Food Technology Department (DTA).
Universitat Politècnica de València. Camino de Vera 14, 46022 Valencia, Spain.*

**lasobgre@etsiamn.upv.es*

Honey is one of the food products at the highest risk of food fraud and thus ensuring authenticity is a priority for both producers and regulatory authorities. At present, the European Commission is promoting the development of analytical methods that allow for the detection of adulterated honey. Previous studies have shown that the characterization of thermal properties using Differential Scanning Calorimetry (DSC) can provide information on the presence of added sugar syrup to honey. The aim of this work, funded by Generalitat Valenciana (Project AICO / 2015/104), was to evaluate the thermal properties of different syrups (agave, brown rice, sugarcane and barley) and of monofloral honey (sunflower). Samples were lyophilized (Lyoalfa, Telstar, Spain) and were stored in desiccators with phosphorus pentoxide until constant weight. The resulting anhydrous samples (≈ 10 mg) were introduced in aluminum crucibles with microperforated lids. Samples were submitted to two subsequent cooling-heating cycles (10° C/min) in a Mettler Differential Scanning Calorimeter (Model DSC1 Mettler Toledo, Switzerland). Glass transition temperature ($T_{g_{onset}}$, $T_{g_{midpoint}}$) was obtained by analyzing the obtained thermograms by means of STARTe Evaluation V 12.00 software. The glass transition values ($T_{g_{midpoint}}$) of honey samples, barley and agave syrups were $83.1^\circ\text{C} \pm 1.9^\circ\text{C}$, $82 \pm 2^\circ\text{C}$; $79.28^\circ\text{C} \pm 1.07^\circ\text{C}$, respectively, with no significant differences among samples. Rice and sugar cane syrups showed significantly lower glass transition temperature values ($T_{g_{midpoint}} = 60.4^\circ\text{C} \pm 1.3^\circ\text{C}$ and $T_{g_{midpoint}} = 70^\circ\text{C} \pm 4^\circ\text{C}$, respectively). The obtained results can serve as a starting point for future applications of Differential Scanning Calorimetry in detecting the presence of syrups in honey samples.

Acknowledgment: The author thanks the Generalitat Valenciana (Spain) for funding the project AICO/2015/104.

GANGLIOSIDE CONTENTS IN HUMAN MILK vs INFANT FORMULA

L. Perea*, G. Garcia-Llatas, M. J. Lagarda

Nutrition and Food Science Area, University of Valencia, Spain

**laura.pereasanz@gmail.com*

Gangliosides (GG) are polar lipids containing sialic acid found in the animal cell membranes. In milk, they are part of the fat globule membrane, and are responsible of several beneficial functions in human milk (HM): anti-infectives, anti-inflammatory and promotes neuronal and cognitive development, among others. The aim of this bibliographic review is to know the GG contents in HM during the lactation and in infant formulas (IF) (1980-2015; Scopus and Medline; keywords: “gangliosides”, “human milk”, “infant formula” and “contents”). The complexities of GG determination justify the studies shortage. GG contents are expressed as mg of lipid bound sialic acid (LBSA)/L when spectrophotometric techniques are used for their determination. Whereas, HPLC-MS allows their quantification as mg of GG/L. The GG total content is higher in colostrum (2.3-9.97 mg LBSA/L; 27.05 mg GG/L) than in mature HM (0.56-10.4 mg LBSA/L; 9.1-23.9 mg GG/L), being lower in IF (0.23-6.2 mg LBSA/L). Regarding the profile of GG, GM3 and GD3 are the main in IF (0.35-13.4% and 58.5-86.61%, respectively) and in HM (2.22-29.2% and 46.15-74.4% in colostrum, 6.5-44.62% and 16.89-64.8% in transitional, 27.72-97.4% and 2.5-40.9% in mature, respectively). The relation GD3/GM3 is higher in IF (4.37-247.46) than in HM (2.35-21.12 in colostrum; 0.38-7.76 in transitional; 0.03-1.24 in mature). Despite the variability, it shows that GG are more abundant in HM than in IF. During the lactation, total GG content decreases in HM and, regarding the profile, GD3 decreases and GM3 increases. However, GD3 is the majority in IF since they are elaborated with cow's milk. Considering that different levels of functionality are attributed for each GG, it is interesting to study in depth GG in products intended for infant feeding.

BIOLOGICAL ACTIVITY OF PROTEOSE PEPTONE 3 FROM BOVINE MILK AND ITS HYDROLYSATE AGAINST *CRONOBACTER SAKAZAKII*

M. Hadidian, J.A. Parrón, D. Ripollés, M. Calvo, M.D. Pérez, L. Sánchez*

Departamento de Producción Animal y Ciencia de los Alimentos. Facultad de Veterinaria. Instituto Agroalimentario de Aragón (IA2) (Universidad de Zaragoza-CITA). Miguel Servet, 177, 50013, Zaragoza. Spain.

**lousanchez@unizar.es*

Health benefits of bioactive components from bovine milk are widely recognized. Some whey proteins have antibacterial activity, such as immunoglobulins, lactoferrin or lactoperoxidase. Furthermore, it is known that proteolysis of some of those proteins may generate peptides with beneficial biological activities. The milk protein proteose peptone component 3 (PP3), also called lactophorin, is a small phosphoglycoprotein expressed exclusively in the lactating mammary tissue. The C-terminal peptide, called lactophoricin, obtained upon proteolytic degradation of PP3, has been found to display antibacterial activity against Gram-positive and Gram-negative bacteria. The aim of the present study has been to isolate PP3 from raw bovine milk and to evaluate the antibacterial activity of the intact component and its hydrolysate against *Cronobacter sakazakii*, an emergent pathogen that has generated great concern, as it has affected infants fed with contaminated formula milk. The proteose peptone fraction was obtained by heating and acidifying raw bovine skimmed milk, from which PP3 was isolated by Sephadex G-75 gel filtration, Q-Sepharose chromatography and additional Sephadex G-75 chromatography. The presence of PP3 in chromatographic fractions was detected by SDS-PAGE and Western-blotting using specific antibodies. Hydrolysis of PP3 was carried out by incubating an 8 mg/ml solution in 0.1 N NH₄HCO₃, pH 8, with trypsin (1% w/w) for 2 h at 37°C. The antibacterial activity against *Cronobacter sakazakii* of both bovine PP3 and PP3 hydrolysate was tested by spectrophotometric measurement at 620 nm and plate counting after 24 h at 37°C. The results of this study show that PP3 has been isolated from bovine milk with great purity and that the whole protein and the hydrolysate exert a certain antibacterial activity against *Cronobacter sakazakii*. These preliminary results are very promising and encourage us to perform further studies to characterize the composition of PP3 hydrolysate and its potential use in functional products.

MEDITERRANEAN SNACKS: SOURCE OF ANTIOXIDANT COMPOUNDS

R. Lucas-González

Universidad Miguel Hernández de Elche. Department Agro-food Technology. Orihuela, Alicante. Spain.

raque.lucas21@gmail.com

Mediterranean snacks are unknown foodstuff with high nutritional value and soft, sweet taste. These are a good alternative for the consumer looking for healthy snacks. Dried fruit and nuts are the ingredients of this traditional snack from Mediterranean countries, mainly Spain and Turkey. In this work, total phenolic content (TPC), total flavonoid content (TFC) and antioxidant activity (Fic, DPPH and FRAP methods) of five different Mediterranean snacks (fig cake, fig with pomegranate cake, date cake, apricot cake and fruit mix cake) were determined spectrophotometrically using two different extraction solvents (methanol:water and methanol:acetone). Date cake and apricot cake samples showed the highest values ($P < 0,05$) of TPC, TFC and antioxidant activity (DPPH and FRAP methods). There were significant correlations between TPC and TFC ($r = 0,91$) and between TFC and antioxidant capacity determined by FRAP method ($r = 0,86$). Amongst the tested solvents, methanol:acetone extract exhibited the highest TPC, TFC and antioxidant activity (DPPH method).

VARIATIONS IN FOOD PROFILES, PROPORTIONAL TO BITTERNESS, SALTINESS AND SWEETNESS PERCEPTION LEVELS IN THE PREDIMED-PLUS VALENCIA PARTICIPANTS

R. Fernández-Carrión^{1,2*}, R. Barragán^{1,2}, I. González-Monje¹, E. Ferriz¹, EM. Asensio^{1,2}, C. Ortega-Azorín^{1,2}, P. Guillem-Saiz^{1,2}, JV. Sorli^{1,2}, D. Corella^{1,2}, P. Carrasco^{1,2}

¹ *Department of Preventive Medicine and Public Health, Food Science, Toxicology and Forensic Medicine. University of Medicine and Odontology. Valencia. Spain.*

² *CIBER-OBN (Center of Biomedical Research Network Obesity and Nutrition). Carlos III Health Institute. Madrid. Spain.*

**rebeca.fernandez@uv.es*

The Mediterranean Diet is characterized by high consumption of fruit, vegetables, pulses, cereals nuts, olive oil, and moderate consumption of seafood, white meat and fish. Individual preferences for one type of food or another have an influence on the choice between healthier or less healthy food. Our aim was to analyse food preferences depending on taste perception. 240 participants from the PREDIMED-Plus Valencia field centre, aged 55-75, took part in this prospective dietary intervention study, all fulfilling three of five metabolic syndrome criteria (hyperglycemia, low HDL-c, hypertension, hypertriglyceridemia, or a control with medication). To assess adherence to Mediterranean diet, a validated 17-item food questionnaire was used as well as a three-flavour perceived intensity test: saltiness, sweetness and bitterness. Participants were asked to taste solutions of different concentrations of sodium chloride, sucrose and 6-npropylthiouracil, respectively. Degrees of perception were measured using a quantitative scale from zero (no flavour) to five (very strong), 3 or higher being considered 'high-perception'. Flavour perception tests revealed that subjects with strong bitterness awareness (32.4% with a score of 3 or higher as against 67.6% with low perception) consumed less extra virgin olive oil (EVOO) than participants with low perception of this flavour (63.6 vs 81.7%, $p=0.010$). Regarding sweetness, participants with high perception of sweetness (39.9% as against 60.1% low perception) consumed two or more servings of vegetables a day (50.5 vs 66.2%, $p=0.038$). Participants who presented higher saltiness perception (49.7% as against low perception 50.3%) did not consume sugar or sweeteners in a greater proportion to those who were the least sensitive to this taste (57.8 vs 78.7%, $p=0.003$). Preference for foods, characteristic of the Mediterranean diet, may be influenced by bitterness, saltiness and sweetness perception levels.

DIFFERENCES IN FOOD CONSUMPTION BY AGE GROUPS IN A MEDITERRANEAN POPULATION

R. Barragán^{1,2*}, O. Portolés^{1,2}, EM. Asensio^{1,2}, R. Fernández-Carrión^{1,2}, I. González-Monje¹, D. Corella^{1,2}

¹ *Department of Preventive Medicine and Public Health, Food Science, Toxicology and Forensic Medicine. University of Medicine and Odontology. Valencia. Spain*

² *CIBER-OBN (Center of Biomedical Research Network Obesity and Nutrition). Carlos III HealthInstitute. Madrid. Spain*

**Rocio.Barragan@uv.es*

Low glycemic index grains, pulses, plenty of fruits and vegetables, olive oil, nuts and fish high consumption, characterize mediterranean diet (MedDiet). It is known that a high adherence to MedDiet provides many benefits. However, the dietary pattern is decreasing in the countries of Southern Europe in the last decades. This decline has been associated to typical western diet products consumption, such as refined grains, saturated fats, sugars, red meat and processed foods. Because of this, our aim was to study the differences in food consumption in different age groups. We carried out a cross-sectional study in 506 participants aged 18-82 (33.3% men and 66.7% women) from the general population of Valencia. Food intake was measured by a validated food frequency questionnaire (FFQ). Three age groups were considered: young people (18-35 y), middle-aged (36-59 y) and elderly subjects (60-82 y). We found high statistically significant differences between food intake by age groups. Mediterranean food was more consumed by elderly subjects, such as fruits (orange P=0.013, apple P=0.002, pear P=0.02, peach P=0.001, cherries P=0.001 and melon P=0.13), vegetables (tomato P=0.002, onion P=0.031, cucumber P<0.001, pepper P=0.02, green beans P<0.001, artichokes, spinach and chard P<0.001), blue fish like sardines P<0.001, pulses P=0.008, olives P=0.07 and red wine P<0.001. We detected a high consumption of less healthy foods in young people; bakery goods (biscuits P<0.001, donuts P<0.001, croissant P=0.007 and cakes P=0.037), red meat (small goods P=0.035, sausage P=0.042, bacon P<0.001, hamburger P<0.001 and beef meat P=0.025), sugars (P<0.05 for all) and refined grains (P<0.05). Consumption of healthy foods typical of the MedDiet in this Mediterranean population is lower in young subjects, adding more evidence to the need for the improvement of this pattern through nutritional education.

INFLUENCE OF TASTE PERCEPTION ON THE BODY MASS INDEX IN MEDITERRANEAN POPULATION

R. Barragán^{1,2*}, O. Portolés^{1,2}, EM. Asensio^{1,2}, R. Fernández-Carrión^{1,2}, I. González-Monje¹, D. Corella^{1,2}

¹ *Department of Preventive Medicine and Public Health, Food Science, Toxicology and Forensic Medicine. University of Medicine and Odontology. Valencia. Spain*

² *CIBER-OBN (Center of Biomedical Research Network Obesity and Nutrition). Carlos III HealthInstitute. Madrid. Spain*

**Rocio.Barragan@uv.es*

Obesity is considered one of the greatest epidemic of the 21st century. In Spain, the number of obese people accounts for 15-20% of the population and this obesity rates are increasing. Several epidemiological studies have tested how individuals who are classified as obese people present a higher risk of developing systemic arterial hypertension, type 2 diabetes, cardiovascular diseases or cancer. Food intake is one of the most important risk factors to develop obesity, and taste perception establishes food choice. Our aim was to study taste perception in different Body Mass Index (BMI) of people. 506 participants aged between 18 and 82 (33.3% men and 66.7% women) from the general population of the Valencia Region were analyzed. Tests undertaken on how strong sweet, salty, sour, umami and bitter taste were perceived. The degree of that perception was evaluated on a quantitative scale from zero (no taste) to 5 (extremely strong). When the score was ≥ 3 , participants were classified as “tasters”. BMI was tested through height and weight. Food consumption was obtained through a validated questionnaire. Significant associations between taste perception and BMI were detected. Obese patients being those who perceive sweet ($P=0.02$), sour ($P=0.027$), salty ($P=0.027$) and umami ($P=0.029$) less strongly than normal weight (NW) and overweight (OW) participants. We also observed differences between BMI and food consumption related with junk food, such as donuts ($P=0.03$), pork meat ($P=0.002$), bacon ($P=0.03$) and small goods ($P=0.02$). In all the cases obese had a higher consumption. Only female subjects showed differences in donuts, port meat and bacon consumption. Obese people perceive less strongly the different tastes, therefore having an influence on food consumption

SIALIC ACIDS CONTENTS IN HUMAN MILK AND INFANT FORMULAS

S.I. Rivas*¹, L. Claumarchirant², A. Alegría, M.J. Lagarda

¹ *Student of Master's Degree in Food Quality and Safety.*

² *Student of PhD in Food Science. Nutrition and Food Science Area, Faculty of Pharmacy, University of Valencia, Spain.*

**sileana90@gmail.com*

Human milk (HM) is the ideal food for the infant during the first 6 months of life according to World Health Organization. When breastfeeding it's not possible, infant formulas (IFs) that resemble to HM's composition are used. Sialic acids (Sia) are bioactive compounds presents in infant feeding that play an essential role in the brain development and the protection against intestinal infections during the first stages of life. The aim of this study is to know and compare the contents of Sia present in HM and IFs through bibliographic review. An extensive literature search has been made since 1980 until 2015 in scientific databases (Web of Science, Scopus and PubMed) using the keywords: "sialic acid", "human milk", and "infant formulas". Only 8 papers have been selected, of studies where it specified the lactation period of the HM's collection (n= 6) and the type of IF (n= 4), starter formula (SF) or follow-on formula (FF). A decrease of Sia content in HM is observed with the progression of the lactation (colostrum (C): 1277.0-1558.7 mg/L; transitional milk (TM): 910.8-1070.1 mg/L; mature milk (MM): 280.4-714.2 mg/L), the higher concentration of Sia is in HM for preterm infants (C: 1781.4 mg/L; TM: 1320.6 mg/L; MM: 402.1-791.7 mg/L). The concentrations of Sia found in the IFs (SF: 64. 9-185. 5 mg/L; FF: 107. 8-204. 6 mg/L) were lower than those found in mature milk collected at 2-4 month of lactation. HM's composition adapts to the necessity of the infant, that's why it contains more concentration of Sia for preterm infants and it decrease with the lactation period. Therefore a quantitative and qualitative characterization of these bioactive compounds is of interest to select ingredients, such as milk fat globule membrane, that allow resemble the composition of IFs to HM's composition and thus achieve its beneficial effects.

EFFECT OF SULPHUR DIOXIDE AS PRESERVATIVE IN THE BIOACTIVE COMPOUNDS AND COLOR OF BLUEBERRY FERMENTED BEVERAGES

M.A.Varo*, J. Martín-Gómez, M.P. Serratos, J.Mérida

Department of Agricultural Chemistry, Faculty of Sciences, University of Cordoba, Bd, Marie Curie, Campus of Rabanales, E-14014 Cordoba, Spain.

*q72vasam@uco.es

Nowadays berries processing has increased because of their beneficial health effects as antioxidant, anti-inflammatory, anti-allergic, anti-ulcer, antibiotic and anticarcinogenic properties. In this work, blueberry fermented beverages were made and the effect of sulphur dioxide on the antioxidant compounds and color was studied. Drinks were obtained by alcoholic fermentation of a sugary blueberry juice (21°Brix) using *Saccharomyces cerevisiae* yeasts. Fermentation temperature was modified during the process, first 18 ° C (from 0 to 12 days) and then 21 ° C (from 12 to 25 days). After fermentation the obtained drink was corrected by the addition of sulphur dioxide, both drinks, before (WTH) and after (WS) the correction were analysed. The antioxidant activity (by DPPH assay) and the absorbances at 420 and 520 nm were measured. Moreover, vitamin C and anthocyanin compounds were determined and quantified by HPLC-UV and HPLC-DAD-MS, respectively. Hue of the drinks and the initial juice were determined. WS showed higher hue values than WTH and the initial juice, indicating that this beverage has more amount of brown than red compounds. The absorbance at 520 nm of the beverage without sulphur dioxide was approximately the doubled of the drink with sulphur dioxide. Similarly, WTH showed approximately 55% more of anthocyanins than WS. Anthocyanins enrichment was 86.1% and 19.6% in WTH and WS beverages, respect to the initial juice WFT and WS showed lower values of vitamin C than initial juice. The values of antioxidant activity (mmol Trolox/L) in both drinks were higher than the initial juice. No large differences were observed in WTH and WS drinks in terms of vitamin

THE INFLUENCE OF FERMENTATION TIME IN THE COMPOSITION OF BLUEBERRY FERMENTED BEVERAGES

J. Martín-Gómez, M.A. Varo, M.P. Serratos, J. Mérida

Department of Agricultural Chemistry, Faculty of Sciences, University of Cordoba, Bd, Marie Curie, Campus of Rabanales, E-14014 Cordoba, Spain.

**juanmartingomez@outlook.es*

The blueberries have been classified as functional food due to its beneficial properties, fundamentally the antioxidant activity and the capacity of free radicals suppressors. These properties provide the possibility of inhibiting and reducing different enzymes. In this work, the influence of fermentation time in the elaboration of wines from blueberries sweet juice have been studied. To this aim, color parameters, concentration of anthocyanins and vitamin C, and antioxidant activity using the DPPH assay have been measured. The blueberries harvested in Huelva (Southern Spain) were dried in a chamber drying at 40 °C during 69 hours. The beverages of dried blueberry were elaborated with different fermentation times, obtaining a beverage of total fermentation, and other beverage through stops fermentation by adding wine alcohol at 6 % v/v of ethanol, where both reached 17 % of alcohol. The results showed that the beverage with total fermentation presented the lowest concentration of total anthocyanins and the lowest color parameters values, which can be due to colorants compounds have been adsorbed for cell wall of the yeasts (*Saccharomyces cerevisiae*), as well as the antioxidant activity. The both obtained beverage presented similar values of vitamin C. In conclusion, partially fermented beverage had higher concentrations of bioactive compounds, antioxidant activity and better color parameters values.

PILOT TOXICOKINETIC STUDY OF ENNIATIN B IN MICE AFTER INTRAPERITONEAL ADMINISTRATION

Y. Rodríguez-Carrasco^{1*}, M. Sulyok², R. Dornetshuber-Fleiss³, H. Berrada¹

¹*Department of Public Health (Faculty of Pharmacy, University of Valencia, Spain).*

²*Department of Agrobiotechnology (IFA-Tulln), (University of Natural Resources and Life Sciences, Vienna (BOKU), Austria).*

³*Department of Pharmacology and Toxicology, (University of Vienna, Austria).*

**yelko.rodriquez@uv.es*

Enniatin B (Enn B) is an emerging Fusarium mycotoxin commonly found in grain-based food and feed. However, scarce data is available as concerns toxic profile and thus, the aim of this pilot study was to investigate the Enn B persistence after intraperitoneal administration (5 mg/kg, two consecutive days) in mice. Liquid chromatography tandem mass spectrometry (LC-MS/MS) was used to analyze the distribution of Enn B in tissues (kidney, liver, muscle, colon, fat, brain) and biological fluids (urine, serum). The proposed procedure was properly validated with extraction recoveries ranging between 88–123%, and withintra- and inter-day precision lower than 12% and 15%, respectively. The limits of quantitation ranged from 0.05 – 0.15 µg/L. Enn B was found in all tissues and serum but not in urine. The highest contamination level was found in liver followed by fat samples. In addition three phase I Enn-B metabolites were found in liver and colon. Consequently, based in this previous results the contribution of hepatic and intestinal metabolism could be involved in the metabolism of this emerging mycotoxin.

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