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13<sup>th</sup> International Congress on  
Advances in Natural Medicines Nutraceuticals & Neurocognition  
&  
14<sup>th</sup> International Conference on Clinical Nutrition

July 27-29, 2017 Rome, Italy

# Posters

*Nutraceuticals & Clinical Nutrition 2017*

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## Chemical constituents of agarwood

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The *Aquilaria*, consisting of 14 species of trees which belong to *Thymelaeaceae*, is mainly distributed in the rainforest of Southeast Asia and India. Several species of this genus produce a dark aromatic resin in response to the insects, physical cut, microbial infections, or chemical stimulation. The resin-deposited heartwood is known as agarwood, which has long been used as an incense, sedative, analgesic and digestive herbal medicine in Asia. For the study on the chemical constituents and its biological activity, we extracted agarwood chips from artificially inoculated *A. malaccensis*. 34 compounds were isolated from the agarwood and their structures were elucidated using extensive spectroscopic methods which include NMR, Mass, IR and CD spectroscopy. Most of them are sesquiterpenes or 2-(2-phenylethyl)-chromone compounds. Anti-proliferation activity was tested for the isolated compounds. Compound I and J showed strong anti-proliferation activity against A-549 human lung cancer cell line.

## Biography

Jeong Hill Park has completed his PhD in 1987 from Seoul National University. He is a Professor at College of Pharmacy, Seoul National University since 1988. His main research interest is the development of biologically active natural products including ginseng and agarwood. He published more than 250 research papers and filed more than 20 patents.

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**Effect of nonalcoholic fatty liver disease on CYP2B1-mediated metabolism in rats**

**Dae-Duk Kim**

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**N**onalcoholic fatty liver disease (NAFLD) is defined as a condition that excessive fat is accumulated in hepatocytes without substantial alcohol intake, and refers to hepatic pathologies ranging from simple fatty liver (SFL; steatosis) to nonalcoholic steatohepatitis (NASH), fibrosis and cirrhosis, that may progress to hepatocellular carcinoma. These liver disease states may affect the activity and expression levels of drug-metabolizing enzymes, potentially resulting in an alteration in the pharmacokinetics, therapeutic efficacy and safety of drugs. This study investigated the hepatic cytochrome P450 (CYP) 2B1-modulating effect of a specific NAFLD state in dietary rat models. Sprague–Dawley rats were given a methionine/choline-deficient (MCD) or high-fat (HF) diet for eight weeks to induce NASH and SFL, respectively. The induction of these disease states was confirmed by Plasma Chemistry and Liver Histological Analysis. Both the protein and mRNA level of hepatic CYP2B1 was considerably reduced in MCD diet-fed rats, however, it tended to be similar between the HF diet-fed and control rats. Consistently, the enzyme-kinetic and pharmacokinetic parameters for CYP2B1-mediated bupropion metabolism were considerably reduced in MCD diet-fed rats, however, it tended to be similar between the HF diet-fed and control rats. These results may promote a better understanding about the influence of NAFLD on CYP2B1-mediated metabolism, which could have important implications for the safety and pharmacokinetics of CYP2Bs substrate drugs in patients with NAFLD.

**Biography**

Dae-Duk Kim has completed his PhD in 1995 from Rutgers University - The State University of New Jersey in the USA and worked as a Post-doctoral Fellow at the University of Washington in Seattle. He was a Faculty Member of the College of Pharmacy at Pusan National University until he transferred to his current position at Seoul National University in 2003. He has published more than 180 papers in peer-reviewed international journals, and has served as the Editor-in-Chief of the *Journal of the Pharmaceutical Investigation*. His research focuses on the optimization of therapeutic systems to maximize drug efficacy and minimize toxicity. He has developed diverse drug delivery systems that can control absorption and sustain drug action.

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**Andrographolide activates Keap1/Nrf2/ARE/HO-1 pathway in HT22 cells and suppresses microglial activation by A $\beta$ 42 through Nrf2-related inflammatory response**

Won Keun Oh and Ji Yeon Seo  
Seoul National University, South Korea

Therapeutic approach of Alzheimer's disease (AD) has been gradually diversified. We examined the therapeutic and preventive potential of andrographolide, which is a lactone diterpenoid from *Andrographis paniculata*, and focused on the Kelch-like ECH-associated protein (Keap1)/nuclear factor (erythroid-derived), (Nrf2)-mediated heme oxygenase (HO)-1-inducing effects and the inhibitory activity of amyloid beta (A $\beta$ )<sub>42</sub>-induced microglial activation related to Nrf2 and nuclear factor  $\kappa$ B (NF- $\kappa$ B)-mediated inflammatory responses. Andrographolide induced the expression and translocation of Nrf2 from the cytoplasm to the nucleus, thereby activating antioxidant response element (ARE) gene transcription and HO-1 expression in murine hippocampal HT22 cells. Andrographolide eliminated intracellular A $\beta$ <sub>42</sub> in BV-2 cells and decreased the production of interleukin (IL)-6, IL-1 $\beta$ , prostaglandin (PG)E<sub>2</sub> and nitric oxide (NO) because of artificial phagocytic A $\beta$ <sub>42</sub>. It decreased pNF- $\kappa$ B accumulation in the nucleus and the expression of inducible nitric oxide synthase (i-NOS) and cyclooxygenase (COX)-II in the microglial BV-2 cell line. In summary, andrographolide activates Nrf2-mediated HO-1 expression and inhibits A $\beta$ <sub>42</sub>-overexpressed microglial BV-2 cell activation. These results suggested that andrographolide might have the potential for further examination of the therapeutics of AD.

**Biography**

Won Keun Oh has acquired his PhD degree in studies about natural product's chemistry from Korea Advanced Institute of Science and Technology (KAIST). He has worked as a Visiting Scholar in Baylor College of Medicine, USA (2002-2004). He also worked in Korea Research Institute of Bioscience and Biotechnology (KRIBB) as a Principle Researcher (2005-2007) and moved to College of Pharmacy in Chosun University as Assistant Professor (2007-2013). He has worked at College of Pharmacy in Seoul National University as Associate Professor of Pharmacognosy since 2013. He has undertaken more than ten projects of the Korean Government including Individual Basic Science and Engineering Research Program (2012-2015), the Procurement and Development of Foreign Biological Resources (2010-2016) and the Korea Bioactive Natural Material Bank (KBNMB, 2012-2017), et al.

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***Spirulina maxima* extract protects against TMT-induced neuronal damage in HT-22 and SH-SY5Y cells**

**Boo-Yong Lee, Eun-Jeong Koh and Young-Jin Seo**  
CHA University, South Korea

Progressive neurodegeneration causes cognitive disease such as Alzheimer's disease (AD) due to neuronal death and dysfunction of neuronal system network. *Spirulina maxima* is a microalga and contains protein, flavonoids, polyphenols and other essential nutrients. Recently, many studies have been demonstrated that *Spirulina maxima* has anti-diabetes, anti-cancer and anti-inflammatory effects. However, the effects of *Spirulina maxima* extract on cognitive disorders are not studied in detail. And so we investigate whether *Spirulina maxima* extract has neuroprotective effect in TMT-induced neuronal damage in neuronal cells. Trimethyltin (TMT) is a neurotoxic compound which causes neuronal cell death and is used as model of cognitive disorders. Our results showed that *Spirulina maxima* extract increases cell viability with TMT treatment by measuring MTT assay in HT-22 and SH-SY5Y cells. *Spirulina maxima* extract reduced the cleavage of poly-ADP ribose polymerase (PARP). ROS production was repressed by down regulating nuclear factor erythroid 2-related factor 2 (Nrf2), and heme oxygenase 1 (HO-1) which is related with the oxidative stress. Recently, other publications also have been showed that Nrf2/HO-1 signaling pathways is associated with TMT-induced neuronal disorders. Furthermore, *Spirulina maxima* extract accelerated the neuroprotective related proteins such as brain-derived neuro-trophic factor (BDNF), and cyclic AMP responsive element binding protein (CREB) in HT-22 and SH-SY5Y cells. Conclusively in our study *Spirulina maxima* extract has neuroprotective effects against TMT-induced cognitive disorders in HT-22 and SH-SY5Y cells.

**Biography**

Boo-Yong Lee has his expertise in research and passion in improving the health and wellbeing. His open and contextual evaluation model based on responsive constructivists creates new pathways for development of functional foods and nutrigenomics. He has built this model after years of experience in Research, Evaluation, Teaching and Administration in education institutions.

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**Propolis extracts protects pancreatic beta cells from oxidative stress in-vitro**

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**Introduction:** Oxidative stress has been considered as one of the most important causative agents in the pancreatic  $\beta$ -cells dysfunction and demise observed in the pathogenesis of type 2 diabetes mellitus. Previously, our group reported that MIN6, a murine  $\beta$ -cell line, showed a significant increase in reactive oxygen species (ROS) after an incubation with high levels of palmitic acid, one of the main circulating saturated free fatty acids and this was associated with an increment in apoptosis levels, suggesting an interesting link between lipotoxicity and oxidative stress in  $\beta$ -cells. Propolis is a resinous product of honey bees, rich in compounds with antioxidant properties: polyphenols and flavonoids. Considering this, we proposed to evaluate whether aqueous extracts of propolis exhibit protective effects against oxidative stress in vitro in mouse  $\beta$ -cells.

**Methods:** We prepared methanolic extracts of propolis from Central Region of Chile, and they were diluted in sterile distilled water. An apoptosis assay based on annexin V-FITC by flow cytometry was performed to assess cell viability in  $\beta$ -TC cells, a  $\beta$ -cell line from mice, after exposition to hydrogen peroxide or tert-butyl hydroperoxide in vitro. Also, we evaluated TBARS (lipoperoxidation) and reduced glutathione levels (GSH) to determine the cellular oxidative stress. A tentative identification of propolis main compounds was made with HPLC-DAD (diode array detector) analysis.

**Results:** Exposure to oxidants results in a significant increase in TBARS levels and a decrease in GSH, but this was reversed with incubation with propolis extracts. Accordingly, apoptotic cell population induced by the oxidants was significantly reduced by incubation with propolis extracts. Finally, gallic acid, caffeic acid and ferulic acid were found to be the main phenolic compounds.

**Conclusion:** Aqueous Propolis extract showed a significant antioxidant and protective effect against oxidative stress in beta pancreatic cells cultured in vitro.

**Biography**

Sergio Wehinger has completed his PhD in Biomedical Sciences from University of Chile in 2013 and he is the Director of Magister in Biomedical Sciences of University of Talca. He has published more than 10 papers and currently he is investigating the molecular mechanisms involved in the cellular failure of the  $\beta$  pancreatic islets, which is induced by elevated free fatty acids and oxidative stress levels, to elucidate how to abolish these processes, especially by using natural compounds.

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**The inhibitory effect of spice extracts on the formation of amyloid fibrils using trypsin in aqueous ethanol**

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The formation of amyloid fibrils has been associated with several human diseases. Spices contain important bioactive compounds without undesirable side effects, which are necessary for the prevention and cure of various diseases. 52 phenolic compounds were identified in culinary herbs and spices. The aromatic rings of polyphenols may competitively interact with aromatic residues in amyloidogenic proteins, prevent the  $\pi$ - $\pi$  interaction and block the self-assembly process. The phenolic hydroxyls of polyphenols may inhibit amyloid fibril formation via binding the hydrophobic residues in amyloidogenic proteins. Here we report the inhibitory effect of some spice extracts on the formation of amyloid fibrils using trypsin as a model protein in aqueous ethanol. Inhibition of aggregation and fibrillation of trypsin was determined based on turbidity measurement, aggregation kinetics assay, amyloid specific dye Congo red (CR), electronic circular dichroism (ECD) and transmission electron microscopy (TEM). The experiments revealed that the greatest anti-fibrillation activity was exerted by chili extract from all the spice extracts investigated. It was found that the amount of fibril formation was greatly reduced with increasing concentration of chili extract. We demonstrated that chili extract significantly inhibits fibril formation as well as the inhibitory effect is dose dependent.

**Biography**

Phanindra Babu Kasi is pursuing his PhD in Biology under the supervision of Dr. Márta Kotormán at the Department of Biochemistry and Molecular Biology, Faculty of Science and Informatics, University of Szeged, Hungary. His studies are mostly focused on "Inhibitory effect of coffee, ginseng, herbs, red wines, grape seed extract, teas, vegetables, fruits and spices on amyloid-like fibril formation by trypsin in aqueous organic solvents". His PhD research mainly focuses on the effect of natural plant and food extracts or bioactive compounds on the amyloid related disorders.

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**Protective effect of perilla oil and alpha-linolenic acid on neuronal apoptosis induced by oxidative stress**

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Oxidative stress plays a key role in neuronal cell damage, which is associated with neurodegenerative disease. Recently, attention has been paid to searching for natural source that can protect neuronal cell damage against oxidative stress. Although there are evidences that dietary n-3 fatty acid has beneficial effects, it has been focused on fish oil. Alpha-linolenic acid (ALA) is also promising n-3 fatty acids in vegetable oils with health beneficial roles. Perilla oil (PO) contains the largest proportion of ALA. However, the study on molecular mechanism between ALA and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>)-induced neuronal apoptosis has not been studied yet. The aim of present study is to investigate the neuro-protective effects of PO and ALA against H<sub>2</sub>O<sub>2</sub>-induced oxidative stress in SH-SY5Y neuronal cells. Our result showed that treatment with PO and ALA significantly attenuated H<sub>2</sub>O<sub>2</sub>-induced cell death, indicating that PO and ALA potently blocks H<sub>2</sub>O<sub>2</sub>-induced neuronal apoptosis. Furthermore, cleaved-poly ADP ribose polymerase, cleaved caspase-3 and -9 activations were decreased in the presence of PO and ALA and H<sub>2</sub>O<sub>2</sub>-mediated down-regulated Bax/Bcl-2 ratio was blocked after treatment with PO and ALA. Taken together, the protective role of PO from neuronal cell damage is mainly attributed to ALA. The present study suggests that PO and ALA may play potent therapeutic agents for neurodegenerative disorders such as Alzheimer's disease.

**Biography**

Ah Young Lee is a PhD candidate in Food Science and Nutrition at Pusan National University of Korea, and conducts study under the guidance of Professor Eun Ju Cho. Her research activities include Bioavailability of Natural Sources in vitro and in vivo system. She has authored or co-authored 18 manuscripts, and is a fellow funded by Global PhD Fellowship from National Research Foundation. Her laboratory mainly conducts research on development of nutraceuticals with cognitive improvement using natural sources, and currently interests in mechanisms of amyloid beta metabolism that helps explain neurodegenerative disease such as Alzheimer's disease.

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## Production of spaghetti enriched with high protein sicilian lentils: First results

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**Statement of the Problem:** Sicily has a rich biodiversity of lentil (*Lens culinaris*) populations well adapted to small microclimate of the insula. A large work of chemical characterization has been conducted and some population resulted characterized by a good amount of fiber and protein vs. commercial varieties. An alternative way to valorize this germplasm and encourage people to consume grain legumes could be enriching pastas with Sicilian lentils.

**Methodology & Theoretical Orientation:** Spaghetti enriched with lentil cultivated in Ragusa (proteins equal to 28%), compared with pastas enriched with commercial lentil (proteins equal to 24%) were produced, using commercial durum wheat with: (1) 40% (w/w) commercial lentil; (2) 40% (w/w) lentils Ragusa, (3) 40% (w/w) commercial lentils + 2% carboxymethyl cellulose (CMC) and (4) 40% (w/w) of lentils Ragusa + 2% of CMC. Commercial durum wheat was used as control. On the raw and cooked dried pasta sensory analysis were conducted through a panel group and the color indices L\*, a\*, b\* were evaluated by Minolta colorimeter, CR 400.

**Findings:** The addition of 2 types of lentils has resulted in a decrease of the quality of dried pasta "1" and "2", due to the high adhesiveness. The use of CMC has improved all sensory parameters, interacting with lentils used: pasta "4" was more acceptable than pasta "3", because it is less adhesive and less fibrous. The grain of the "Ragusa" lentil presented indices L\* which was higher and so also pastas "2" and "3" vs. pastas "1" and "3".

**Conclusions & Significance:** Pastas enriched with Sicilian lentils can potentially satisfy consumers. Thanks to the high protein content and acceptability. Further studies are ongoing to improve rheological, sensory and chemical features of pastas.

### Biography

Antonella Pagliaro is a PhD student in Health Food Innovation and Management of Foggia University. She works at CNR-ISAFOM in Catania. She has a graduation degree in Biological Science (2012) and a Master's degree in Health Biology (2014). Now she is working on new types pasta that have the potentiality to decrease cholesterol and fight obesity, using different cultivars of durum wheat, added with biomolecules extracted from typical Sicilian germplasm and using mixture of other cereals, rich in  $\beta$ -glucans. The project wants to solve technological problems to obtain the new types of pasta, evaluating the effect of the addition on the rheological properties of the dough, the organoleptic properties of fresh and dry pasta obtained and the nutraceutical properties of the final products.

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## Effect of carboxymethylcellulose and guar on sensory quality of spaghetti enriched with lentil

Antonella Pagliaro<sup>1,2</sup>, Lucia Padalino<sup>2</sup>, Carla Sillitti<sup>1,2</sup>, Rosaria Bognanni<sup>1,2</sup>, Amalia Conte<sup>2</sup>, Maria Grazia Melilli<sup>1</sup> and Matteo A Del Nobile<sup>2</sup>

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**Statement of the Problem:** Pasta is traditionally made with only durum wheat, but it is possible to incorporate other flours or ingredients into pasta to improve its nutritional value. Among nontraditional raw materials, legumes represent an interesting source of proteins, fibres, vitamins and minerals. The purpose of the study was to improve the rheological and organoleptic characteristics of pastas enriched with lentil flour using carboxymethyl cellulose sodium salt (CMC) and Guar seeds flour (Guar).

**Methodology & Theoretical Orientation:** In a randomized experimental scheme, we have studied pastas produced with 40% (w/w) of lentils (1), 40% (w/w) of lentils + 2% CMC (2), 40% (w/w) of lentils + 2% Guar (3) and a control with commercial durum wheat (CTRL). On the fresh and dry pastas, raw and cooked, we evaluated the color indices L\*, a\*, b\* (Minolta colorimeter, CR 400), sensory analysis after cooking (panel group) and cooking quality analysis.

**Findings:** The results of color parameters are influenced by the addition of lentil flour, leading to the formation of products with L\* at an average of 30 vs. 60 of the control. The use of CMC and Guar has improved the taste and the overall quality of pastas "2" and "3" vs. the pasta "1" and these two pastas ("2" and "3") were not statistically different from the absolute control. The cooking quality analysis shows that cooking losses and water absorption were decreased using CMC and Guar.

**Conclusion & Significance:** The appreciability of the final products enriched with 40% of lentil flour and the addition of CMC and Guar makes possible the production of these pastas on a larger scale, allowing an easier consumption of legumes, that have cholesterol-reducing and hypoglycemic properties.

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**Sensory characteristics of pasta enriched in cladodes of prickly pear (*Opuntia ficus indica* (L.) Mill.) with cholesterol-lowering action**

Antonella Pagliaro<sup>1,2</sup>, Lucia Padalino<sup>2</sup>, Salvatore Scandurra<sup>1</sup>, Carla Sillitti<sup>1,2</sup>, Matteo A Del Nobile<sup>2</sup> and Maria Grazia Melilli<sup>1</sup>

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**Statement of the problem:** The main groups of substances contained in cladodes of prickly pear (*Opuntia ficus-Indica* (L.) Mill) are fibers and polysaccharides, the arabinogalactans, that have interesting biological effects such as cholesterol lowering effect, hypoglycemic effect and gastroprotective and immunomodulatory activities. Being consumed daily, pasta can be used as a vehicle to intake these substances. So is necessary to study, in addition to the beneficial effects, even the acceptability by the consumer. The aim of the work was the sensory evaluation of spaghetti enriched with cladodes of prickly pear.

**Methodology & Theoretical Orientation:** Pasta was produced with commercial durum wheat and dried cladodes at different concentrations: 0% (CTRL), 5% (1) and 10% (2) w/w. On the fresh and dried pasta after cooking, were conducted sensory analysis through a panel group, cooking quality analysis and the color indices L\*, a\*, b\* were evaluated by Minolta colorimeter, CR 400.

**Findings:** Sensory analysis on fresh cooked pasta show a significant difference among the pastas enriched with cladodes and CTRL. Increasing concentration of cladodes the overall quality of the pastas decreased, but remaining in an acceptable range (values >6.25). These differences were reduced after drying. There are no significant differences in values of taste and odor among CTRL and the two pastas "1" and "2". Cooking quality analysis show that the swelling index did not change in the pastas "1" and "2" vs. CTRL, while the cooking losses increased by increasing the concentration of the cladodes. However the yellow index of pastas "1" and "2" increased vs the CTRL.

**Conclusion & Significance:** The first results show a potential use of cladodes for the realization of a nutraceutical and functional pasta. Other studies are necessary to improve rheological characteristics of these products by maximizing the arabinogalactans content.

### Biography

Antonella Pagliaro is a PhD student in Health Food Innovation and Management of Foggia University. She works at CNR-ISAFOM in Catania. She has a graduation degree in Biological Science (2012) and a Master's degree in Health Biology (2014). Now she is working on new types pasta that have the potentiality to decrease cholesterol and fight obesity, using different cultivars of durum wheat, added with biomolecules extracted from typical Sicilian germplasm and using mixture of other cereals, rich in  $\beta$ -glucans. The project wants to solve technological problems to obtain the new types of pasta, evaluating the effect of the addition on the rheological properties of the dough, the organoleptic properties of fresh and dry pasta obtained and the nutraceutical properties of the final products.

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**The quality of pasta added with cardoon inulin: Evaluation of the part of the plant used for extraction of polymer**

Carla Sillitti<sup>1,2</sup>, Lucia Padalino<sup>2</sup>, Piero Calderaro<sup>1</sup>, Antonella Pagliaro<sup>1,2</sup>, Amalia Conte<sup>2</sup>, Matteo A Del Nobile<sup>2</sup>, Salvatore A Raccuia<sup>1</sup> and Maria Grazia Melilli<sup>1</sup>

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**Statement of the Problem:** The plants of cardoon (*Cynara cardunculus* L.) accumulate inulin both in the roots and in the receptacles. The yield of inulin in the heads is quite high; lower costs and greater ease of collection than the roots, led to an initial evaluation of this polymer as ingredient to functionalize pastas.

**Methodology & Theoretical Orientation:** Roots and heads were obtained from cardoon plants at the flowering stage. The crop was two years old. The inulin has been extracted, purified and characterized from both sources. Purified inulins were added to durum wheat semolina at 4% (w/w), to produce spaghetti. Pasta without inulin was used as control. The pastas were evaluated for: color (Minolta colorimeter CR, 400), cooking time (minutes), cooking quality, loss of inulin (HPAEC-PAD, Thermofisher) in cooking and sensorial qualities (panel test).

**Findings:** The inulin content of roots and capitula were 780 and 300 g kg<sup>-1</sup> dm respectively. In the pastas with the addition of inulin from heads it has been noticed an increase in the L\* value, and an increase in overall quality (7.0) vs. the control (5.95) and the spaghetti containing roots of inulin (6.76). On the contrary there was a greater cooking loss of the polymer (-31%) than that recorded in the pasta with roots inulin (-27%).

**Conclusion & Significance:** Despite the overall quality (panel analysis) of the pastas obtained with head inulin was good, the highest loss of the polymer during cooking, the lowest content in the receptacle in terms of yields, imply an increase of the concentration at the initial phase, making the use of roots more sustainable for inulin extraction than heads.

**Biography**

Carla Sillitti is a PhD student of the University of Foggia. She is carrying out her PhD work in collaboration with CNR-ISAFOM in Catania. She has completed her Master's in Health Biology. She is developing a project to produce new nutraceutical food, a type of pasta, based on the use of ancient Sicilian whole meal and inulin. Many studies were carried out to define the best type of semolina and inulin to be added. She is interested in nutraceutical food and food quality, as well as nutrition and human health.

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**The quality of pasta added with cardoon inulin: Evaluation of the environment of cultivation**

Carla Sillitti<sup>1,2</sup>, Lucia Padalino<sup>2</sup>, Piero Calderaro<sup>1</sup>, Antonella Pagliaro<sup>1,2</sup>, Amalia Conte<sup>2</sup>, Matteo A Del Nobile<sup>2</sup>, Salvatore A Raccuia<sup>1</sup>, Cristina Costa<sup>2</sup>, Salvatore Scandurra<sup>1</sup> and Maria Grazia Melilli<sup>1</sup>

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**Statement of the Problem:** Inulin is a fructose polymer with prebiotic and dietary fiber functions, found naturally in various plants including cardoon roots (*Cynara cardunculus L.*). The cardoon plant belongs to Asteraceae family and it is native of the Mediterranean area. Its degree of polymerization (DP) varies in relation to the growing environment and phenological stage of the plant and it may affect the quality characteristics of foods when it is added. The aim of the study was to evaluate the quality of whole meal pastas with the addition of inulin with high DP, extracted from cardoon plants grown in two different environments.

**Methodology & Theoretical Orientation:** The plants of cardoon were collected in two Sicilian growing environments, Assoro (AS) and Barrafranca (BR), in the internal hilly area of Sicily. Inulin was extracted from cardoon roots (genotype "CDL") and added to 4% (w/w) to the semolina cv. "Russello" to obtain pastas (spaghetti). Pasta without inulin was used as control. The pastas obtained were evaluated for: color (Minolta colorimeter CR, 400), cooking time (minutes), cooking quality, loss of inulin (HPAEC-PAD, Thermofisher) in cooking and sensory qualities (Panel test).

**Findings:** The highest DP (~80 units for AS and ~60 for BR), has improved the parameters of the color of the pastas, especially the L\* value compared to the control. On the contrary, the overall quality not being conditioned by the DP, is positively influenced by the addition of inulin (6.8) compared to control (5.9).

**Conclusion & Significance:** Considering that the quality parameters of the spaghetti improved, thanks to the addition of high DP inulin which did not get influenced by the environment of *Cynara* cultivation, it is possible to hypothesize the use of internal marginal area of Sicily for inulin production from cardoon roots.

**Biography**

Carla Sillitti is a PhD student of the University of Foggia. She is carrying out her PhD work in collaboration with CNR-ISAFOM in Catania. She has completed her Master's in Health Biology. She is developing a project to produce new nutraceutical food, a type of pasta, based on the use of ancient Sicilian whole meal and inulin. Many studies were carried out to define the best type of semolina and inulin to be added. She is interested in nutraceutical food and food quality, as well as nutrition and human health.

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**Nutritional characterization of Sicilian durum wheat for cuccia preparation**

Rosaria Bognanni, Antonella Pagliaro, Salvatore Scandurra and Maria Grazia Melilli  
University of Foggia, Italy

**Statement of the Problem:** In recent years, cereals have been rediscovered by the consumers and with them, local dishes such as cuccia, a Sicilian durum wheat soup, representing a good source of nutraceuticals and oligoelements are also discovered. In fact the use of whole grains of wheat allows the inclusion in the diet of protein, carbohydrates, dietary fiber, vitamins and minerals. The aim of the work was the chemical characterization of Sicilian durum wheat cultivars to be allocated for the production of cuccia.

**Methodology & Theoretical Orientation:** The whole kernels of 4 varieties of durum wheat (2 modern Simeto and Archangel and two traditional Russello and Timilia), were subjected to chemical analysis: ashes, proteins, fat, carbohydrates, mineral content (Na, Fe K, Ca, Mg, Mn) vitamins A and E content.

**Findings:** On average of the 4 accessions, the ash content was equal to 1.68, the proteins and fats 12.9 and 1.98 g 100 g<sup>-1</sup> DM. The content in Vitamin A was 0.5 µg 10<sup>-2</sup> g DM and Vitamin E 60.7 µg 10<sup>-2</sup> g DM. The cv Russello showed the highest content in protein (13.6 g 100 g<sup>-1</sup> DM), manganese (62.5 mg Kg<sup>-1</sup> DM) and Vitamin A (0.6 µg 10<sup>-2</sup> g DM).

**Conclusion & Significance:** The cuccia is a good source of vitamins and minerals. Among the accessions "Russello", different from modern varieties, could be devoted for cuccia preparation. It also important to note the difference in the nutritional composition between the whole wheat grains, used for the preparation of Cuccia, and semola, purified fraction used for the preparation of bread and/or pasta without the biomolecules naturally occurring in the pericarp and in aleuronic fraction of the kernel.

**Biography**

Rosaria Bognanni is a Food Technologist with a PhD in Science and Technology (formerly Food Biotechnology) with title of dissertation: "Durum wheat: compositional, nutritional and technologic aspects for innovative food production". Since 2004, she has been working as Researcher at the Stazione Consorziale Sperimentale di Granicoltura per la Sicilia, a Governmental Institute of Agronomic Research, mainly working with modern and ancient grains. Currently, she is working at the CNR-ISAFOM to research an innovative method to produce fortified bread made with antioxidant and lowering-cholesterol activities, using typical plants of the Mediterranean basin, known for its beneficial effects on human health.

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## The cuccia: A traditional soup prepared with an innovative method

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**Statement of the Problem:** The cereal-based foods are a good source of energy, protein, B vitamins, and minerals. The whole grain, used for the preparation of cuccia, a typical Sicilian soup, is considered rich in vit. E and B complex but they are destroyed by cooking. A method was rated to prepare the cuccia, to preserve the vitamin content and give to the soup the adjective “functional”.

**Methodology & Theoretical Orientation:** For the preparation of cuccia, 4 varieties of durum wheat (Simeto, Arcangelo, Timilia and Russello) were used comparing the traditional cooking method (TR - boiling for 5/6 hours), and an innovative one (IN - grains scarification, germination, and cooking at 50°C for 2 hours). On soups obtained the content of biotin, niacin and  $\alpha$ -amylase activity were determined.

**Findings:** ANOVA between the raw material, the cuccia TR and cuccia IN, showed that the cooking method influences biotin and niacin content having, in the average of 4 accessions, values from 0.56 ng ml<sup>-1</sup> and 1.72 ng ml<sup>-1</sup> (raw grain) and values close to 0 (soups TR), while only a 10% decrease (soups IN) respectively for both vitamins. On the contrary, the  $\alpha$ -amylase activity was reduced with IN method. The highest vitamin content was found in soups IN made with ancient grains (Timilia and Russello).

**Conclusion & Significance:** The IN method placing the cuccia as a traditional functional food, especially if you are using ancient grains, produces soups with a high content of vitamin B complex.

### Biography

Rosaria Bognanni is a Food Technologist with a PhD in Science and Technology (formerly Food Biotechnology) with title of dissertation: "Durum wheat: compositional, nutritional and technologic aspects for innovative food production". Since 2004, she has been working as Researcher at the Stazione Consorziale Sperimentale di Granicoltura per la Sicilia, a Governmental Institute of Agronomic Research, mainly working with modern and ancient grains. Currently, she is working at the CNR-ISAFOM to research an innovative method to produce fortified bread made with antioxidant and lowering-cholesterol activities, using typical plants of the Mediterranean basin, known for its beneficial effects on human health.

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## **The effects of ginseng and tribulus terrestris on athlete's physical performance**

**Kimia Moiniafshari**

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The use of dietary supplements is widespread among most of athletes. Herbs are used to improve performance, recovery time, health maintenance during intense periods of exercise, muscle mass build up and fat mass reduction. The two most common herbs which are used to improve physical performance in athletes, are tribulus terrestris (TT) and ginseng. Scientific researches have suggested that these improvements may affect muscular strength, maximum oxygen uptake, heart rate and exercise capacity. The aim of this review study was to determine the effects of ginseng and TT extract on athlete's performance. Ginseng extract is the most studied herb because of its effect on physical performance. Exercise is considered as a form of stress, and ginseng may be effective because of its adaptogenic characteristics to normalize the body function affected by the stress. Ginseng helps to restore energy, increases the production of cortisol and stimulates the anabolic reactions in the body. It may improve the physical performance because of the production of nitric oxide in immune and cardio-vascular system cells. Beside ginseng, TT extract has been shown to elevate the circulating amount of testosterone and luteinizing hormone. Furthermore, it may enhance the physical power, energy production, anaerobic lactic muscular power and lactic glycolytic power. The studies have suggested that TT extract increases the creatinase concentration and decreases the level of creatinine in athlete's blood. The results have shown that the ginseng and TT extract may play beneficial roles in athlete's physical performance improvement, specially during regular consumption.

### **Biography**

Kimia Moiniafshari has received her BSc degree in nutrition field from Shahid Beheshti university of medical science and is MSc student in sport nutrition field. She is nutrition and autism researcher and her BSc thesis was about management of nutritional strategies for preventing and controlling of autism and has some publications in this area and now is working on athlete's metabolism and effective supplements for improving their exercise performance.

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**Impact of usual intake of added sugars on nutrient adequacy in US children aged 2 to 18 years**

Theresa A Nicklas<sup>1</sup>, Carol E O'Neil<sup>2</sup> and Victor L Fulgoni<sup>3</sup>

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The impact of usual intake (UI) of added sugars on nutrient adequacy in US children (n=6,109) was measured using NHANES (2009-2012) data. Dietary intake data were obtained from 24-hour dietary recall interviews using an Automated Multiple-Pass Method. The National Cancer Institute Method was used to estimate UI of added sugars and other nutrients. Individual UI of children were separated into groups: 0 to <5, 5 to <10, 10 to <15, 15 to <20, 20 to <25, and  $\geq 25\%$  of energy as added sugars. Covariate adjusted regression coefficients examined the magnitude of the association between the percentages of the population below the Estimated Average Requirement (EAR) and added sugars intake. The percentage of children below the EAR significantly increased for vitamins D ( $p=0.0124$ ) and E ( $p=0.0029$ ) with increasing UI of added sugars. For each step in added sugars intake, there was an increase of  $\sim 5\%$  of the population being below the EAR. The percentage of children below EAR increased for calcium ( $p=0.0031$ ) with increasing UI of added sugars. For each step in added sugars intake, there was an increase of  $\sim 10.5\%$  of the population being below the EAR. The percentage below EAR increased for magnesium ( $p=0.0147$ ) with increasing UI of added sugars. The inflection point at which the greatest increase occurred was at 20% to <25% of total energy from added sugars. Results suggest that poor food choices independent, or only partially related to added sugars intake, probably have a larger impact on nutrient adequacy rather than added sugars specifically.

**Biography**

Theresa A Nicklas is a Professor of Pediatrics at Baylor College of Medicine. She has over 350 publications. For a decade, her research has focused on the epidemiological aspects of chronic disease prevention and health promotion. One of her primary interests has been looking at eating patterns associated or predictive of obesity between childhood and young adulthood.

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**Adult (19+ years) consumers of added sugars had a lower likelihood of lower uric acid level but no other associations were found with other physiological parameters**

Carol E. O'Neil<sup>1</sup>, Theresa A Nicklas<sup>2</sup> and Victor L Fulgoni<sup>3</sup>

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The likelihood of added sugars intake being associated with aberrant values of liver enzymes, cardiovascular risk factors and other physiological parameters was determined using NHANES (2001-2012) data from adults (n=26,402). Dietary intake was determined using 24-hour dietary recalls using an Automated Multiple-Pass Method. The usual intake (UI) of added sugars as a percent of energy was estimated using the Markov Chain Monte Carlo ratio method of the National Cancer Institute. Balanced repeated replication was used for variance estimation. Subjects were separated into six groups: 0 to <5, 5 to ≤10, 10 to ≤15, 15 to ≤20, 20 to ≤25 and ≥25% of energy as added sugars. Logistic regression was used to determine if the different levels of added sugars intake had an odds ratios indicating adverse physiologic outcomes (0 <5% intake was the reference group). Group and linear trends (p <0.01) for the six levels of intake were also determined for: high alkaline phosphatase, alanine aminotransferase, aspartate aminotransferase, gamma-glutamyl transferase, lactate dehydrogenase, blood pressure, high- and low-density lipoproteins, triglycerides, glucose, c-reactive protein, waist circumference and hemoglobin and high or low uric acid levels. Only low uric acid levels showed a significant group trend (17% less likely; p=0.0083). However, neither the linear trend nor uric acid levels as a continuous variable were significantly different across added sugars intake. Results suggest that there was a limited association of UI of added sugars with physiologic parameters in adults. Further studies are needed to confirm these findings.

### Biography

Carol E O'Neil is a Professor of Nutrition and Food Sciences at the Louisiana State University Agricultural Center. She has nearly 200 publications. For a decade, her research has centered on Nutritional Epidemiology and its relationship to nutrient intake and adequacy, diet quality and the association with cardiovascular risk factors. One of her principal interests has been monitoring the US national representative data set, the National Health and Nutrition Examination Survey.

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**The anticancer mechanisms of docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) on human hepatocarcinoma: a proteomic approach**

Jennifer Man-Fan Wan and Wing-Yan Jor  
The University of Hong Kong, China

Omega-3 fatty acids have been linked to cancers prevention. However it is not clear whether there are different anticancer mechanisms between the omega-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). The present study adopted a proteomic approach in order to identify specific biomarkers to define the signaling pathways that are unique to both DHA and EPA. By using the non-metastatic human hepatocarcinoma cell line PLC/PRF/5, we have profiled the protein expression of the PLC/PRF/5 cells after 72 hours treatment of DHA (200  $\mu$ L) and EPA (200  $\mu$ L) by the two dimensional gel electrophoresis (2D-PAGE). Differentially expressed proteins were identified by the matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF/TOF). Our results show that both DHA and EPA inhibited cancer growth and induced apoptosis. DHA posed a stronger cytotoxic effect than EPA. Differentially expressed proteins in the signaling pathways, cell proliferation, tumor metastasis and apoptosis were found between EPA and DHA treatment. DHA suppressed calumenin and annexin A2, which are proteins affecting tumor metastatic stability and EPA down-regulated. The heterogeneous nuclear ribonucleoprotein K (hnRNP K) and ubiquinol-cytochrome C reductase core protein 1 (UQCRC1) play a key role in the coordination of transcriptional responses to DNA damage and in mitochondria-to-nucleus retrograde response, respectively. The present study provides signature proteins associated with the anticancer mechanisms of DHA and EPA, and indicating some functional differences between the two different types of omega-3 fatty acids in the prevention of human liver cancer.

**Biography**

Jennifer Man-Fan Wan has completed her PhD from Southampton University and Postdoctoral studies from Harvard Medical School, Boston, USA. She is an Associate Professor at the School of Biological Sciences, the University of Hong Kong. She has published more than 100 papers in reputed journals and has been serving as an Editorial Board Member of *Nature Partner of Science of Food*.

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**Lower energy intake predicts 10-year mortality in patients with end-stage renal disease on hemodialysis**

Yongsoon Park<sup>1</sup>, Shin Sook Kang<sup>2</sup> and Jai Wone Chang<sup>2,3</sup>

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Protein-energy wasting (PEW) is associated with mortality in patients with end-stage renal disease (ESRD) on maintenance hemodialysis. The correct diagnosis of PEW is extremely important in order to predict clinical outcomes. However, it is unclear which parameters should be used to diagnose PEW. Therefore, this retrospective observational study investigated the relationship between mortality and nutritional parameters in ESRD patients on maintenance hemodialysis. A total of 144 patients were enrolled. Nutritional parameters, including body mass index, serum albumin, dietary intake, normalized protein catabolic rate (nPCR), and malnutrition inflammation score (MIS), were measured at baseline. 53 patients died during the study. Survivors had significantly higher nPCR ( $1.10 \pm 0.24$  g/kg/day vs.  $1.01 \pm 0.21$  g/kg/day;  $p=0.048$ ), energy intake ( $26.7 \pm 5.8$  kcal/kg vs.  $24.3 \pm 4.2$  kcal/kg;  $p=0.009$ ) and protein intake ( $0.91 \pm 0.21$  g/kg vs.  $0.82 \pm 0.24$  g/kg;  $p=0.020$ ), and lower MIS ( $5.2 \pm 2.3$  vs.  $6.1 \pm 2.1$ ,  $p=0.039$ ). In multivariable analysis, energy intake  $< 25$  kcal/kg (HR 1.860, 95% CI 1.018–3.399;  $p=0.044$ ) and MIS  $> 5$  (HR 2.146, 95% CI 1.173–3.928;  $p=0.013$ ) were independent variables associated with all-cause mortality. These results suggest that higher MIS and lower energy intake are harmful to ESRD patients on maintenance hemodialysis. Optimal energy intake could reduce mortality in these patients.

**Biography**

Yongsoon Park had completed her PhD from Washington State University and Postdoctoral studies from Mayo Clinic. She is a Professor at Hanyang University, Seoul, Korea. She has published more than 110 papers in reputed journals and has been serving as an Editorial Board Member of *Journal of Medicinal Food*, *Journal of nutrition and Practice*, *Korean Journal of Medicinal Crop Science*, and *Korean Journal of Obesity*.

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**Development of Korean traditional diet (HANSIK) education program to increase hansik consumption and prevent metabolic syndrome in children and adolescents**

**Young Kim, San-Eun Lee, Yangsuk Kim and Young Hwang**  
National Institute of agricultural Sciences, South Korea

The typical Korean diet (Hansik) is a low-fat diet with abundant plant foods including a variety of vegetables and Korean fermented cabbage (Kimchi), which has been known as a healthy diet that could reduce cardiovascular disease and improve blood lipids level. Therefore, the aim of study was to develop the hansik education program to increase the hansik's intake for children and adolescents. To develop the hansik education program, we assessed needs for the program in school dietitians as well as children and adolescents according to the education level. A total of 2,858 children and adolescents (elementary school 30.1%; middle school 34.8%; high school 35.1%) and were recruited in 2015 and 2016 in Gyunggi and Jeonbuk areas, South Korea and questionnaires were conducted by self-administration. School dietitians (n=221; elementary school 38.9%; middle school 34.4%; high school 26.7%) were participated in an online survey. There were significant differences in a nutritional education experience relating to hansik and preference for the hansik education program composition by the education level ( $p<0.001$ ). Based on the needs of students and school dietitians by the education level, hansik education program consisted of three parts; understanding hansik diet-improved awareness of hansik and its components, healthy eating habits-balanced food intake and proper serving sizes and hansik cooking classes. In conclusion, hansik education program was developed with consideration of needs and differences among the education levels. Further studies are ongoing to evaluate the program's effect on the increase of hansik consumption and the preventive effect on metabolic syndrome.

**Biography**

Young Kim has studied about the Korean traditional food culture as well as agricultural foods and their processing over 20 years at National Institute of Agricultural Sciences, RDA in South Korea. She is a Senior Researcher of Department of Agrofood Resources, RDA. She has recently published several books and papers related to Korean traditional diet called hansik and foods of a main family, *Jongga* that can trace its line of progenitors back to a single distinguished ancestor.

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# e-Posters

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## Antigenotoxic and anti-proliferative effects of *Pistacia lentiscus*

Bouguellid Ghania<sup>1</sup>, Russo Chiara<sup>2</sup>, Lavorgna Margharita<sup>2</sup>, Piscitelli Concetta<sup>2</sup>, Atmani Djebbar<sup>1</sup> and Isidori Marina<sup>2</sup>

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**Introduction & Aim:** *Pistacia lentiscus* (Anacardiaceae) is widely distributed in the Mediterranean basin ecosystem. The aerial parts are used in folk medicine as stimulants, diuretics, and to treat hypertension, eczema, stomach aches and jaundice. Fruits are consumed raw or roasted; while their oil is used internally in the treatment of ulcers or externally to heal psoriasis. Previous studies led to the quantification and/or identification of many constituents of different chemical classes such as flavonoids, anthocyanins, phenolic acids (gallic acid, digallic acid, catechin), triterpenoids, and tannins. These constituents are responsible for antioxidant and several pharmacological properties, including hepatoprotective, anti-atherogenic, anti-ulcer and anti-inflammatory. In this study, our aim was to examine the antigenotoxic and antiproliferative potential of different leaves and fruit extracts of *P. lentiscus*.

**Materials & Methods:** The genotoxic/antigenotoxic activities of *P. lentiscus* were evaluated using the SOS repair response induction assay on *Salmonella typhimurium* TA 1535/pSK 1002 in the presence and absence of metabolic activation system. The anti-proliferative effect was investigated by MTT assay for cytotoxicity on human hepatoma cancer cell line (Hepg-2).

**Results:** In preliminary studies, both leaves and fruit extracts did not show genotoxic activity when tested with *S. typhimurium* TA 1535 psK/1002 strains at concentration up to 1000 µg/ml in the absence and presence of S9 metabolic activation. However, a slight genotoxic effect was observed with the crude ethanolic extract of leaves at 1000 µg/ml; besides, when tested with 500 and 100 µg/ml, none of this effect was observed. Otherwise, when combined with mutagens 4-nitroquinoline and 2-aminoanthracene, different extracts showed moderate protective effect and a strong protective effect with crude ethanolic extract and the aqueous fraction of ethyl acetate. Treatment of the human liver cancer cell line Hep G2 with different extracts of leaves and fruit of *P. lentiscus*, at a concentration range of 25–2500 µg/ml, exhibited a fairly good anti proliferative effects, the most active effect was attributed to the ethanolic and aqueous fraction obtained from ethyl acetate of leaves with IC50 value of 271.5 and 249 µg/ml respectively.

**Conclusion:** These results provide experimental support for the therapeutic virtues of *Pistacia lentiscus* extracts.

### Biography

Bouguellid Ghania is pursuing her PhD and her thesis concentrates on the evaluation of the genotoxic/antigenotoxic activity of medicinal plant extracts, in order to remove the doubt about the toxicity of the extracts before envisaging their uses in therapy.

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### **A mediterranean diet enriched with $\omega$ 3-polyunsaturated fatty acids in the management of paediatric asthma: a randomised control trial**

**M M Papamichael<sup>1</sup>, Ch Katsardis<sup>2</sup>, D Tsoukalas<sup>3</sup>, B Erbas<sup>1</sup> and C Itsiopoulos<sup>1</sup>**

<sup>1</sup>La Trobe University, Australia

<sup>2</sup>National & Kapodistrian University of Athens, Greece

<sup>3</sup>European Institute of Nutritional Medicine, Italy

Asthma is an inflammatory disease in the lungs which, over the past thirty years has escalated in children. Considerable interest exists in the therapeutic potential of dietary omega 3 fatty acids, due to anti-inflammatory and immune-modulating effects on asthma. However, studies performed till date are inconclusive and this requires further exploration. This six month randomized controlled trial aims to investigate whether fatty fish, as part of the Greek Mediterranean diet reduces asthma symptoms in children. A sample of 64 children was recruited from a paediatric asthma clinic in Athens, Greece. Participant children will be randomized into two groups. The intervention group is required to consume two meals of fatty fish ( $\geq 150$  gr cooked fish) per week over a period of 6 months in the context of the Greek Mediterranean diet. The control group will consume their usual diet. Outcome measures will be assessed at base-line and at the end of six months. Questionnaires will be used to collect socio-demographics data, medical information, dietary habits, asthma control and quality of life details. Pulmonary function will be assessed using spirometry and exhaled nitric oxide. In addition, blood and urine tests will be examined to assess patient's metabolic profile, antioxidant status, plasma fatty acid composition and Vitamin D. This study intends to establish whether fatty fish consumption can be used as an adjunct therapy in the management of asthma in children.

#### **Biography**

M M Papamichael is a registered Dietician who has dedicated her life in educating people about the importance of good nutrition and exercise in the prevention and management of disease as well as in improving health and well-being. She is doing her PhD research project at La Trobe University about investigating the prophylactic potential of a Mediterranean diet enriched with fatty fish in the management of asthma in children.

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**Maternal obesity and redox status: correlation between plasma leptin and oxidative erythrocytic biomarkers**

Nassima Malti<sup>1</sup>, Hafida Merzouk<sup>1</sup>, Reda Bettioui<sup>1</sup>, Meriem Saker<sup>1</sup> and Loubna Bouhmama<sup>2</sup>

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Obesity is considered a risk factor during pregnancy and influences the development of obesity and its complications in adulthood during pregnancy (maternal, fetal or placental). Besides eating disorders and obstetric complications, obese mothers have a high incidence of oxidative disorders. Oxidative stress, characterized by an increase in free radical activity and a reduction in antioxidant defenses, is a common feature between metabolic and physiological disorders of obesity and those of pregnancy. It becomes a very important risk factor to consider in obese pregnant women. In addition, obesity is associated with an inflammatory state characterized by hyperleptinemia which plays a major role in the pathophysiology of insulin resistance. Leptin inhibits insulin secretion in the  $\beta$ -cell; there is a feedback loop, called the adipo-insular axis, where insulin increases the secretion of leptin which, in response, inhibits insulin secretion. A possible leptino-resistance, in which the loop is disturbed, would be responsible for hyperleptinemia and hyperinsulinemia observed in diabetes. The aim of this study is to evaluate the correlation between maternal leptin and some markers of erythrocyte oxidative status (nitric oxide, superoxide anion, malondialdehyde, carbonylated proteins) during pre-gestational obesity. This work is part of a study on the assessment of redox status during maternal obesity and its alterations on foeto-placental unit.

**Biography**

Nassima Malti is a Researcher at Laboratory of Physiology and Biochemistry of Nutrition, Department of Biology, Faculty of Sciences, University of Tlemcen. She has completed her PhD in 2014.

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# Accepted Abstracts

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## **Association between dietary patterns and cardiovascular risk factors in selected population of lower Silesia (PURE Study Poland)**

Anna Czekajło<sup>1</sup>, Dorota Różańska<sup>1</sup>, Katarzyna Zatońska<sup>1</sup>, Andrzej Szuba<sup>1,2</sup> and Bożena Regulska-Ilow<sup>1</sup>

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Dietary Pattern analysis is used to describe dietary habits of selected population. In many studies, dietary patterns (DPs) have been associated with the risk factors for cardiovascular disease (CVD). The aim of the study was to assess the association between dietary patterns identified in the population of Lower Silesia and anthropometric and biochemical risk factors for CVD. The study group included 2025 participants of the Prospective Urban Rural Epidemiological (PURE) Study. Dietary intake was evaluated based on the data from the Food Frequency Questionnaire (FFQ). Dietary patterns were derived using principal component analysis (PCA). The relationship between DPs and body mass index, waist circumference, waist-hip ratio, blood pressure, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides and fasting glucose level was assessed. Three dietary patterns identified in the study explained 35.6% of total variance. The “fruit, vegetables & dairy” DP, characterized by high intake of vegetables, fruits, nuts, seeds, raisins, milk and low-fat dairy, was associated with improved lipid profile and anthropometric measures, lower diastolic blood pressure and lower fasting glucose concentration. “Traditional” and “fat & sugar” DPs were unfavorably associated with most of the risk factors for CVD presented in this study. Dietary patterns identified in this study were differently related to selected anthropometric and biochemical risk factors for CVD. “Fruit, vegetables & dairy” DP was favorably associated with the biochemical and anthropometric CVD risk factors and was characterized by higher nutritional value in comparison with “traditional” and “fat & sugar” DPs.

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## **Willingness to pay (WTP) and incremental production cost: F.A.T.E.PreSco bread, a functional food to help heart failure prevention, treatment and recovery**

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**F**.A.T.E.PreSco bread is a functional food which aims to help people who suffer from heart failure to prevent acute episodes. F.A.T.E.PreSco, an antique Tuscan wheat genotype known for its properties and its biofortification with zinc and iron, is a new product that has been experimented in Pisa (Tuscany). Experimental study in vivo has demonstrated that  $\alpha$ -lipoic acid (ALA), highly concentrated in this wheat, has cardioprotective effects. Considering that bread is an essential element of the Mediterranean diet and that Italy is one of the first European countries for bread consumption (with a daily average of approx. 100 gr/person), it could be more than appropriate mean of prevention for heart failure. The aim of the study is twofold: firstly, to identify stages, viability, production costs and commerciality of this product; secondly, to evaluate the willingness of heart failure patients to buy and pay for this kind of product. Product costs and market data information for different bread types have been revealed through interviews conducted within the entire F.A.T.E.PreSco bread production chain. Willingness to Pay (WTP) data have been obtained through a survey on 100 heart failure patients. Preliminary results show that: a) the overall production cost is 64.7% higher than traditional bread, b) 15% of heart failure patients agree to pay up to 2 times the traditional bread price and c) 35% more than 1.5 times. Regarding the Propensity to Purchase, about 50% of these patients agree/strongly agree to buy this kind of bread; this percentage grows up to 91% if recommended by their doctor. According to the results, F.A.T.E.PreSco bread shows good features for healthcare market.

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## Maximizing the efficacy of the ketogenic diet nutrition medical treatment for super-refractory status epilepticus

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Super-refractory status epilepticus (SRSE) is defined as status epilepticus (SE) that continues or recurs despite 24 hours of high dose suppressive therapy. SRSE carries very significant morbidity in the pediatric population. A retrospective chart review was done to identify children with SRSE in our hospital. Charts were reviewed for demographic and patient factors, details of diet administration and outcomes were noted. Eleven children (7 boys, 4 girls), aged 0.5-13.4 years (mean±SD = 8.1±3.5) with SRSE were identified. In all cases, the diet was given via nasogastric tube. Diet ratios and calories were calculated according to patient's weight, age, bowel routine and concomitant treatments (steroid treatment and intubation). During the ICU admission, diets were modified up to 4 times per patient to achieve adequate ketosis by raising ratios or restricting calories. Ratios were adjusted up to a 5:1 (92% of daily calorie from fat) for patients with steroid therapy or insufficient ketosis. Post ICU discharge, diet ratios were reduced, once seizure control was achieved. The KD was effective in aborting SRSE in 9 of 11 children. In these 9 children, the diet was started between 0-34 days (mean±SD = 11.6±6.2 days) after ICU admission. They were discharged from the ICU 3-43 days (mean±SD = 15.1±14.1) following admission. In 8 of these 9 children, urinary ketones ranged from 8 to >16 mmol/L. The remaining children had urine ketones ranging from 4-16 mmol L-1. KD failed to control seizures in 2 patients. In these children, KD treatment was initiated at 36 and 46 days after onset of SE. In both cases, urinary ketones fluctuated between 0.5 to >16 mmol L-1 and both were receiving excess carbohydrates (CHO) from medications, which likely contributed to unstable ketosis. Data on longer term KD management was available for six children. In all, diet ratios were gradually decreased as the seizures improved, to KD ratios of 2.75:1 (86% of daily calorie from fat) to 4.25:1 (89% of daily calorie from fat). Calories were also adjusted to maintain growth. We have demonstrated success in utilizing the KD to abort SRSE in children. Multiple diet adjustments of calories and ratios were required to achieve stable ketosis. Difficulty in eliminating excess -CHO from IV fluids, medications and other sources are a barrier to effective KD administration in the ICU. In this series, children who did not respond to the KD initiated the diet later in the clinical course of SRSE. Earlier, initiation of the KD and consistent moderate to high levels of ketosis were more common among those children in whom the SRSE was aborted. Long-term diet and seizure outcomes in this series are currently under review.

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## Dietary supplement–drug interactions of patients with chronic disease in community pharmacy

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The present study is a cross-sectional descriptive study, investigating the interactions between nutritional supplements and medications in patients with chronic illness. Data was collected by interviewing. A sample of 58 patients with chronic illness who co-used medications for chronic disease and food supplement: 34 females (58.6%) and 24 males (41.4%), 41 out of 58 are over 60 years old (70.7%). Collecting data was done at Chiang Mai University Pharmacy, Faculty of Pharmacy, Chiang Mai University. The findings indicated that the medications for chronic illness could be divided into following diseases of 6 groups: hypertension, dyslipidemia, cardiovascular, diabetes, orthopedic and other chronic diseases. Obviously, the most commonly used drugs were for 55 hypertension patients (43.6%). Of these drugs, amlodipine was the most taken by 23 patients (18.2%). There are totally 34 types of nutritional supplement divided into 2 groups: 12 vitamins and minerals, 22 natural products. Calcium was the most common vitamin and mineral (10.6%) while fish oil was the most used natural extract (13.27%). It was found that there were 41 pairs of interactions between nutritional supplements and medications for chronic illness, and the potential interaction was at 1 pair (24.1%). Significantly, fish oil was the most potential food supplement causing drug interactions with amlodipine (8 pairs) and enalapril (4 pairs). In conclusion, this study can help pharmacists in order to evaluate the possibility of dietary supplement – drug interactions and giving the consumers practical advice for taking medications.

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**‘Cool dudes’ and African body-image – sports food and energy drink consumption in a sports-resource-deficient urban area in South Africa**

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Nutritional supplements (sports food) are used by competitive and recreational athletes of all ages. These are often people in predominantly affluent communities, who can afford the cost of nutritional supplements. The situation is further exacerbated by the general pressure placed on certain groups to use supplements. Young sports participants who are engaged in developmental and competitive phases of sport, in particular, encounter peer pressure to use supplements and to enhance body image. As a consequence the supplement industry has grown to meet the increasing demand. Food movements on the other hand, are a growing and a diverse phenomenon globally. In South Africa, where the youth are the majority of large unemployed sector, job creation for youth in poor communities is a key development goal. Recently there is evidence of a socio-cultural shift where young people have become involved in urban food gardens. There is a high level of bodily awareness, often with less access to formal sporting facilities. Township youth may thus redirect their ideas of a good body-image into new urban food movements. These youth may consume sports food and energy drinks if they are able to purchase these items. The research objective is to explore the supplement and energy drink labels and other sources of information that influence purchasing decisions and trends that may contribute to the body-image aspiration, in the respective communities.

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**Obesity prevention in preschool children: healthy caregivers-healthy children**

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There is a need for pediatric nutrition based programs that target young children in an effort to reduce the obesity epidemic. Obesity in children, is associated with elevated cholesterol and elevated blood pressure and tracks from childhood to adulthood. Currently, the science needed to promote successful implementation of primary prevention practices, under naturally occurring conditions, is poorly developed. We describe here the outcomes of “Healthy Caregivers, Healthy Children (HC2)” an obesity prevention program with young children. A randomized controlled trial was conducted with 1101 children aged 2 to 5 years old. The intervention focused on three components to support and encourage cardiovascular health: environmental changes related to food consumption and physical activity in the centers, a classroom curriculum, and family and teacher education regarding healthy role modeling behaviors. The primary outcome was the child’s body mass index (BMI). At 6 months post-intervention, children in the intervention centers were significantly more likely to consume fresh vegetables fruits ( $p=.006$ ) and vegetables ( $p=.001$ ) as compared to the control centers. 91% of parents who increased buying vegetables had children whose BMIs either stayed the same or improved ( $p=.01$ ), and 92% of parents who increased buying fruit had children whose BMI either stayed the same or improved ( $p=.03$ ). The goal of this project was to develop and evaluate a multifaceted obesity prevention intervention, targeting low-income, multiethnic children aged 2 to 5 years. These findings support efforts to implement healthy weight programs in the childcare setting as a means of primary prevention.

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## **Detox and metabolism practical orthomolecular and nutritional approach**

**Roni Moya**

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One of the main health problems of the contemporary life and a mandatory concern to all antiaging physicians is the outcome of the constant contact with the high level of intoxication, which can be connected to the wide range of diseases, from allergies till cancer or neural degeneration. Discussion of the physiological pathways for detoxification has been mainly centered on phase I and phase II enzyme systems. Some key nutrients and antioxidants substances, which can inhibit the oxidation of a molecule and have the capacity to nullify the ill effects of oxidation caused by free radicals in the living organisms, have been and continue to be investigated for their role in the modulation of metabolic pathways involved in detoxification processes. Superoxide dismutase (SOD), glutathione peroxidase (GPX) and catalase are the key enzymatic antioxidants of this defense system by which the free radicals that are produced during metabolic reactions are removed. Several publications to date have leveraged cell, animal, and clinical studies to demonstrate that within the correct dose and synergy, food-derived components and nutrients can function as important co-factors to modulate processes of conversion and excretion of toxins from the body. The "Phase I" Cytochrome P450 CYP450 superfamily of enzymes is generally the first defense employed by the body to bio transform xenobiotic, steroid hormones, and pharmaceuticals. This microsomal membrane bound, heme-thiolate proteins, located mainly in the liver, but also in enterocytes, kidneys, lung, and even the brain, are responsible for the oxidation, peroxidation, and reduction of several endogenous and exogenous substrates. It is accepted that any variability in the number of CYP450 enzymes could have benefit(s) and/or consequence(s) for how an individual responds to the effect(s) of (a) toxin(s). Many nutrients appear to act as both inducers and inhibitors of CYP1 enzyme. These findings indicate that specific foods, vitamins, minerals, enzymes, etc., may upregulate or favorably balance metabolic pathways to assist with toxin biotransformation and subsequent elimination. Various foods such as cruciferous vegetables, berries, soy, garlic, turmeric and other spices, plus probiotics and exogenous antioxidants such as vitamins C, E, B complex, glutathione, cysteine, taurine, methionine, L-carnitine, CoQ10, etc., have been suggested to be beneficial and commonly prescribed as part of the orthomolecular and functional medicine based therapies. The objective of this talk is to highlight the clinical effect of the orthomolecular nutrients in the DE intoxication mechanisms. Enhance the knowledge about the main antioxidants, foods and their individual phytonutrients, especially in the case of dietary supplements and functional foods, could be worthwhile for clinicians to consider for patients who are taking a polypharmacy approach or are in contact with pollution by-products, heavy metals, hormones and further xenobiotic.

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## **Prevalence of obesity and its association with diet among 13-year old Omani school children**

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Obesity is a global health disorder and the WHO considers obesity as the most serious non-communicable disease worldwide and is closely related to improper diet. All age groups are affected but the problem becomes worse when children are affected. Obesity in children is defined as BMI > 95th percentile as defined in the Expert Committee Recommendations. In the US, childhood obesity is about 11%, overweight is about 25%. Obesity prevalence worldwide is on the rise since 1970 especially in developed countries. A WHO report stated that, approximately 58% of diabetes mellitus, 21% of ischemic heart disease and 8–42% of cancer globally were attributable to obesity. These diseases can affect children and adolescents. Obesity also increase cardiovascular disease and increases the risks of all-cause mortality. Obese children are also more likely to become overweight in adulthood than are lean children. Approximately one half of overweight adolescents and over one-third of overweight children remain obese in adulthood.

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**Intrauterine Growth Restriction (IUGR): a serotonergic neuropathologic picture in experimental animals and human infants**

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In our lab, we evaluated if the free plasma fraction of L-Tryptophan (FFT) and the N1/P2 component of the auditory evoked potentials (AEP) were associated with impaired brain serotonin neurotransmission in infant rats and humans with IUGR. FFT, bound and total plasma L-Trp were measured and the AEP's, in a prospective, longitudinal and comparative study, comparing IUGR and control infants. Results showed that the FFT was increased and the amplitude of the N1/P2 component of AEP was significantly decreased in IUGR relative to control infants. FFT and the N1/P2 component had a negative association. We concluded that in newborns with IUGR, the changes in measured FFT and in the amplitude of N1/P2 component of AEP, suggest an inverse association between FFT and the N1/P2 component of AEP and that these changes observed may be causally related with brain serotonergic activity. In IUGR epigenetic factors such as nutritional stress induced disturbances in brain serotonin metabolism and in serotonergic activity, identifiable postnatally through alterations in AEP cortical responses, may have influenced brain cerebral sensory cortex development. These data allowed us to propose the presence of an impaired serotonergic transmission, installed very early in brain development and that might be also casually associated with brain serotonin-related disorders in adulthood.

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**The science behind citicoline to protect against neurodegenerative processes and maintaining normal cognitive function**

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**Statement of the Problem:** The human brain is under constant attack by various factors, including environmental pollution, internal toxicity, stress and lack of nutrients due to poor diet. As we age, communication between neurons decreases and affects memory, focus, attention, recall and mental energy. Critical to brain function is citicoline, or CDP choline. The compound is comprised of cytidine and choline, with the former crucial for proper absorption of choline. In the brain, citicoline promotes the production of phosphatidylcholine (phospholipids), which make up ~30% of brain tissue, aid in neural communication and provide essential protection for neurons. The body obtains choline naturally through foods such as eggs and meat. But as we age, the body loses some of its ability to absorb choline.

**Methodology & Orientation:** Numerous scientific studies have shown that daily supplementation of citicoline may improve brain function for subjects including healthy adolescent males, healthy middle-aged women and the elderly.

**Findings:** Clinical trials have shown that a branded form of citicoline—Cognizin®—may be effective in combating the effects of certain neurodegenerative processes. Studies also show Cognizin® may aid in maintaining normal cognitive function with aging and point to its ability to act as an antioxidant in preserving normal healthy visual function. This form of citicoline has been shown to protect neural tissue from the ravages of free radical damage and is the only form approved for use within Europe as a dietary supplement ingredient.

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## **Alpha lipoic acid alleviates hyperlipidemia, and inflammation of visceral adipose tissue in high-fat-diet plus STZ-treated rat model**

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**Statement of the Problem:** Hyperlipidemia is a symptom commonly occurring in type 2 diabetes mellitus (T2DM). Studies suggest that individuals with both T2DM and hyperlipidemia may increase the risk of cardiovascular disease (CVD)-related complications, such as coronary artery disease. The dysfunction of visceral adipose tissue (VAT) is considered to be associated with insulin resistance and subsequently results in the lipid metabolism abnormality in T2DM. Evidence indicates that inflammatory related markers such as tumor necrosis factor-alpha (TNF- $\alpha$ ), interleukin 6 (IL-6) and nuclear factor kappa- $\beta$  are associated with the serum lipid level. Alpha lipoic acid (ALA) is an endogenous cofactor located in mitochondria. Previous studies reported that ALA has therapy potential on hypoglycemia in diabetic rats. This study further investigates the effect of ALA on hyperlipidemia in high-fat-diet plus STZ-induced hyperinsulinemic rats.

**Methodology & Theoretical Orientation:** Male Wistar rats were fed high fat diet (HFD, 60% fat of calorie) for 4 weeks followed by single intra-peritoneal injection of Streptozotocin (STZ, 30mg kg<sup>-1</sup>) and then served HFD continuously for 8 weeks to induce hyperinsulinemia. These HFD-STZ-induced hyperinsulinemic rats were orally administered with ALA once a day at a dosage of 200 mg kg<sup>-1</sup> for 13 weeks. After rats were sacrificed, the serum lipid profiles were measured, the VAT (epididymal and perirenal adipose tissues) was picked up and weighed, and the pro-inflammation related cytokines of VAT were analyzed.

**Findings:** Our results showed that HFD plus STZ treatment results in hyperinsulinemia (1.53  $\mu$ g mL<sup>-1</sup>) in rats. The administration of ALA significantly reduced the levels of fasting serum insulin, total cholesterol (TC), low density lipoprotein (LDL), triglyceride (TG) and free fatty acid (FFA) by 55%, 39%, 73%, 68% and 53%, respectively, whereas significantly increased high density lipoprotein (HDL) level by 1.54 fold in hyperinsulinemic rats ( $p < 0.05$ ), suggesting the reduction on the risk of CVD-related complications. The relative VAT weights were significantly decreased by 40% ( $p < 0.05$ ) in ALA treated hyperinsulinemic rats ( $p < 0.05$ ), indicating the suppression of lipid accumulation. Moreover, ALA also significantly decreased the levels of pro-inflammatory cytokines such as IL-6, TNF- $\alpha$  in serum and IL-1 $\beta$  in VAT of hyperinsulinemic rats ( $p < 0.05$ ).

**Conclusion & Significance:** In conclusion, the present study demonstrates that ALA may have benefits on preventing the progression of hyperlipidemia via ameliorating blood lipid profiles and inflammation of VAT in HFD-STZ-induced hyperinsulinemic rats.

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## **Epidemiology and risk factor for hyperlipidemia in Pakistan**

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**H**yperlipidemia is very big health issue worldwide. Prevalence of hyperlipidemia is increasing in developed as well as developing countries. Hyperlipidemia incidence and prevalence is increasing in Pakistan due to change in the lifestyle of the Pakistani people. Hyperlipidemia is a major risk factor for cardiovascular disorders. Cardiovascular disorders are the leading cause of death in Pakistan. Hyperlipidemia has high mortality and morbidity because it is the major risk factor for developing stroke and cardiovascular disorders. Hyperlipidemia is very common in upper class society due to resting lifestyle and lack of exercise. This study aims to provide awareness about hyperlipidemia as well as an updated knowledge about the epidemiology and risk factor of hyperlipidemia in Pakistan.

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## **K36, a synthetic caffeamide derivative, improves the pathology of Alzheimer's disease in high-fat-diet plus streptozotocin-induced hyperinsulinemic and hyperglycemic rats**

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**T**ype 2 Diabetes Mellitus (T2DM), major caused by obesity and characterized with insulin resistance, is a metabolic disease commonly accompanied with hyperglycemia and hyperinsulinemia. Epidemiology studies have showed that T2DM is a risk factor of Alzheimer's disease (AD). Previous studies confirmed that caffeamide improves serum glucose and insulin resistance in diabetic animal model. This study aims to investigate the protective effect of caffeamide derivative compound K36 on pathology of AD in the high-fat-diet (HFD)-streptozotocin (STZ)-induced hyperglycemic and hyperinsulinemic rats. The male Wistar rats were fed with High Fat Diet (60% fat of calorie) for 4 weeks were intra-peritoneally (i.p.) injected with STZ (30 mg/kg b.w.) and then served HFD continuously for 8 weeks to induce hyperglycemia (mean serum glucose 224 mg/dL) and hyperinsulinemia (mean serum insulin 0.35 ug/ml). The HFD-STZ rats were then orally administered with K36 (15 mg/kg b.w.) once a day for 13 weeks. The Morris Water Maze trial was performed for evaluating the improvement of cognitive impairment before rats were sacrificed. The blood biochemical analysis was conducted after the rats were sacrificed. The expressions of hippocampus and cortex insulin signaling and synaptic function related proteins were analyzed by Western blotting. The rats exhibit hyperglycemia and hyperinsulinemia after HFD and STZ induction. The serum total cholesterol (TG) and serum triglyceride (TC) decreased by 37% and 36%, respectively, in K36 treated HFD-STZ rats compared to the HFD-STZ rats ( $p < 0.05$ ). The results from Morris Water Maze suggested that K36 significantly improved the cognitive ability in HFD-STZ rats ( $p < 0.05$ ). Western blotting assay revealed that the protein expression of cerebral insulin receptor (IR), phospho-cAMP response element-binding protein (pCREB), brain-derived neurotrophic factor (BDNF), postsynaptic density protein 95 (PSD-95) in K36 treated HFD-STZ rats were significantly increased compared to the HFD-STZ rats ( $p < 0.05$ ). In addition, K36 also suppressed the expression of brain amyloid precursor protein (APP) in HFD-STZ rats. According to the above results, we suggest that K36 may prevent AD progression via alleviating cerebral insulin resistance and ameliorating synaptic plasticity in HFD-STZ-induced hyperglycemic and hyperinsulinemic rats.

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## **Micronutrient status of pregnant women in Pakistan and its relation to perinatal complications and pregnancy outcomes**

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**P**regnancy is not solely the utmost imperative stage for both the mother and the child, but rather for the society as well, and to phase an appropriate nutrition in terms of micronutrients holds a decisive power for avoiding any serious complications or other way around. In order to study that impact, this study will focus on Pakistan, which is one of the low income countries, and is confronting various public health challenges such as; an increase in the rate of MMR and IMR with every coming year. The present study, therefore, has been designed to address this domain in a public health perspective. It will be conducted with the obtained blood samples of 80 pregnant and 40 non-pregnant age matched women from a mono-centric hospital to compare the status of iron, iodine, zinc, selenium and manganese in both groups. Furthermore, the birth defects like neonatal mortality, low birth weight, the risk for preterm birth would also be recorded to elucidate the adverse consequences of malnutrition on perinatal complications and pregnancy outcomes.

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