

## PROCEEDINGS OF THE CONFERENCE ANTIOXIDANTS 2009

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Guest Editors: Martina Čižmárová and Katarína Fatrcová-Šramková

### DO WE KNOW WHAT IS HAPPENING WITH METAL IONS IN VERTEBRATES?

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#### ABSTRACT

One intracellular heavy metal binding protein, metallothionein (MT), was discovered in vertebrates in 1957. Its molecular weight ranges from 6 to 7 kDa in all mammalian species and it may be characterised by a unique content of metal ions as well as sulphur. It has a high affinity for various metal ions which may represent up to 20% of the metallothionein weight. Based on the results obtained phylogenetically related families and subfamilies of evolutionary similar complexes of MT families in vertebrates can be distinguished. Primarily metallothioneins were divided into three classes. Class I includes MTs found in various mammalian species. Class II comprises all other protein MTs not belonging into class I. Class III contains metalloisopolypeptids with a gamma-glutamyl-cysteine unit. Sequential similarity, however, may not be sufficient for the classification of MTs. Moreover, MT can be considered as a tumour disease marker.

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KEYWORDS: heavy metals, DNA damage, electrochemical detection, oxidative markers, thiol, metallothionein

### IMPACT OF IODINE-CONTAINING PUMPKIN OIL ON THE COURSE OF CARDIAC ISCHEMIA IN THE RESIDENTS OF ZAKARPATTYA REGION

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#### Abstract

The main aim of the study was exploration of the influence of the traditional treatment in combination with simvastatin and iodine-containing pumpkin oil “Fortuna vita” on the values of lipid metabolism in cardiac ischemia patients residing in the setting of iodine deficit. The patients were divided into 2 groups: group 1– patients underwent conventional treatment with application of simvastatin of 20 mg daily during the whole course of observation; group 2 – same treatment in combination with iodine-containing pumpkin oil “Fortuna vita” of 10 ml daily which contains 200 µg of organically combined iodine form. The level of total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL cholesterol) and low-density lipoprotein cholesterol (LDL cholesterol) in serum, and aspartate aminotransferase and alanine aminotrasferase in patients before treatment, after 10 days, and after 1 month of treatment was measured. It was determined that simvastatin is an effective and safe cholesterol-reducing preparation for cardiac ischemia

patients which results in reduction of cholesterol level by 18% and LDL by 23% in one month. A combination of simvastatin and iodine-containing pumpkin oil appears more effective, probably because of potentiation of their effects, which also facilitate growth of antiatherogenic HDL and consequently decrease the atherogenicity coefficient. The general clinical state of both groups improved as a result of the treatment, though more so for the patients treated in combination with iodine-containing pumpkin oil.

KEYWORDS: cardiac ischemia, simvastatin, cholesterol, lipoproteins, iodine-containing oil

## VALUE OF NON-ENZYMATIC ANTIOXIDANTS IN ADOLESCENTS

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### ABSTRACT

To prevent the damage caused by free radicals there is possibility of a defence antioxidant system in the body. The epidemiological and clinical studies predicated of preventive role antioxidants in origin cardiovascular and cancer diseases.

The aim of our work was detected values of serum concentrations of non-enzymatic antioxidants and anthropological parameters in medical student during study. 34 men and 51 women, students of the medicine at the age of 18–23 years formed a set. They were examined in the 1<sup>st</sup> and 6<sup>th</sup> year of their study. We observed their anthropometric parameters, body weight and height from which the body mass index – BMI ( $\text{kg}\cdot\text{m}^{-2}$ ) was calculated. The serum concentration of transferrin (Trf) and ceruloplasmin (Cpl) were determined by commercial sets of fy Sevapharma, CR. Concentrations of vitamin C were determined using the spectrophotometric method of Roe and Kuether. In the group of men in the 6<sup>th</sup> year of study the mean value of BMI was significantly increased in comparison with the 1<sup>st</sup> year of study ( $22.55 \pm 2.29$  vs.  $21.26 \pm 2.30$ ,  $p < 0.05$ ) as well as at comparison of men and women in the last year of study (men:  $22.55 \pm 2.29$ , women:  $20.59 \pm 2.47$ ,  $p < 0.001$ ). The mean values of Trf and Cpl were higher in the group of men also of women in the 6<sup>th</sup> year of study in compare to the 1<sup>st</sup> year. A statistically significant increase in the Cpl values was found in men in the 6<sup>th</sup> year of the study in comparison with the 1<sup>st</sup> year ( $0.39 \pm 0.09$  vs.  $0.33 \pm 0.08$ ,  $p < 0.01$ ). In the values of vitamin C was a statistical increased in men as well as women in the last year of study and between groups compared with the 1<sup>st</sup> year of study ( $p < 0.01$ ). Despite of intersexual differences in our study was remarked that values of choice parameters were occurred in physiology range with tendency to improve value of antioxidant to the end of study, what testify to positive approach of the students to their health.

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KEYWORDS: transferrin, ceruplasmin, vitamin C, health

## ANTIOXIDANT EFFECT AND RUTIN CONTENT OF WHEAT BREADS SUBSTITUTED BY DIFFERENT AMOUNTS OF BUCKWHEAT

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### ABSTRACT

This study describes the evaluation of antioxidant activity and rutin content as the most represented flavonoid of buckwheat in wheat bread enriched by different amounts of buckwheat. The antioxidant (antiradical) effect was tested by DPPH method in the ethanolic solvent ( 90% ) and rutin content was determined by HPLC. Wheat bread was substituted by different amounts of buckwheat – 10%, 25%, 50%. The antioxidant (antiradical) effect ranged from 44.8% (wheat bread-control) to 74% (wheat bread with 50% buckwheat substitution), antioxidant effect of

breads increased with buckwheat additions. Similar trend was found in rutin content of breads, the highest rutin was determined in bread substituted by 50% of buckwheat. Rutin content of breads ranged from 2.86 mg.kg<sup>-1</sup> to 26.9 mg.kg<sup>-1</sup>. We can conclude that antioxidant (antiradical) activity of breads was not markedly affected by thermal processing during bread making. Substitution of wheat flour by 25% of buckwheat showed good antiradical effect of bread, substitution of wheat flour by 50% of buckwheat confirmed high antioxidant (antiradical) effect.

KEYWORDS: rutin, buckwheat, antioxidant activity, DPPH

## THE INFLUENCE OF MERCURY ON SELECTED ANTIOXIDANT PARAMETERS

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### ABSTRACT

Heavy metals are widespread in our environment. Humans and animals are exposed from numerous sources, including contaminated air, water, soil and food. Recent studies indicate that the toxicity of heavy metals is associated with their ability to catalyse of the reactions of oxidative stress. We observed the effect of subchronic exposure of mercury on the erythrocyte antioxidant enzymes (superoxide dismutase – SOD, glutathione peroxidase – GPX) and total antioxidant status (TAS) in blood plasma in Wistar rats. Daily administration of mercury in 5 different doses from 0.15 to 2.47 mg HgCl<sub>2</sub>.kg<sup>-1</sup> per day for 30 days led to elevation of SOD in all experimental groups but without any association with the mercury dose. There was a nonsignificant elevation of GPX activity in all groups. The total antioxidant capacity (TAS) decreased significantly in two groups with the highest mercury doses. The results demonstrate that subchronic mercury exposure influences the activity of red cell antioxidant enzymes. The elevation of some key antioxidant enzymes may enhance the antioxidant potential of cells. This elevation can be compensatory reaction to the exhaustion low molecular antioxidants demonstrated by the decrease of total antioxidant capacity after mercury exposition.

KEYWORDS: mercury, superoxidismutase, glutathione peroxidase, total antioxidant status

## THE EFFECT OF FERTILIZATION ON THE YIELD AND CONTENT OF ANTIOXIDANTS IN CAULIFLOWER

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### ABSTRACT

The small-plot field experiment with cauliflower (variety FLAMENCO F1) was established in the area of Demonstration garden of SAU in Nitra in 2008. In the field experiment, we investigated an effect of three different variant of fertilization on the yield and content of sulforaphane, acid ascorbic and β-carotene in the cauliflower. The first variant was without fertilization, the second one (2) was fertilized on level N:S = 250:50 kg.ha<sup>-1</sup> and the third one (3) on level N:S = 250:60 kg.ha<sup>-1</sup>.

The applied fertilization at all variants expressively increased the yield of cauliflower. The highest yield of cauliflower was reached at the variant 3 - the increase of yield against control variant represented value 21.5%. At the variant 2, we achieved the increase of yield about 18.8%.

The fertilization also positively affected the accumulation of sulforaphane, acid ascorbic and β-carotene in the cauliflower. The highest content of mentioned compounds was also found at variant 3 and their content decreased at following sequence of variants: 3 > 2 > 1. At the variant 3, in comparison with control variant, we achieved the increase of sulforaphane about 1.9%, acid ascorbic about 20.3% and β-carotene about 34.4%.

We can assert that system of nutrition and fertilization has got unsubstitutable role in the growing technology of vegetables because it markedly affects the quantity and quality of grown vegetable.

KEYWORDS: cauliflower, fertilization, yield, sulforaphane, acid ascorbic,  $\beta$ -carotene

## WINE LIKE ANTIOXIDANTS SOURCE AND PREVENTIVE MEANS OF CARDIOVASCULAR DISEASE

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### ABSTRACT

Epidemiological, experimental and clinical investigations have shown that diets supplemented with moderate quantities of alcoholic beverages lead to biochemical changes, that are widely regarded to prevent atherosclerosis. Red wine contains a naturally rich sources of antioxidants which may protect the body from oxidative stress. We investigated the relationship between red wine intake and lipide profile, glucose, blood pressure changes and total antioxidant status. Participants consumed 200 ml of red wine Frankovka modra (VÍNO-MASARYK, s.r.o., Skalica) each day during supper for six weeks and were encouraged to maintain their usual diet and exercise habits. Daily intake of Frankovka modra during six weeks was associated with lower plasma levels of total cholesterol ( $5.66 \pm 1.12$  vs.  $5.36 \pm 1.04$ ), triglycerides ( $1.68 \pm 1.23$  vs.  $1.47 \pm 0.66$ ), LDL-cholesterol ( $3.46 \pm 0.81$  vs.  $3.26 \pm 0.76$ ) and glucose ( $5.35 \pm 0.82$  vs.  $5.26 \pm 0.78$ ). On the contrary we recorded higher level of „good“ HDL cholesterol ( $1.42 \pm 0.63$  vs.  $1.80 \pm 0.58$ ). Systolic and diastolic blood pressure was also decreased. Our results show red wine consumption increases serum antioxidant status ( $1.1 \pm 0.12$  vs.  $1.65 \pm 0.21$ ) and demonstrate a positive association between moderate wine consumption and risk of cardiovascular disease. We found that six weeks is long enough to boost total antioxidant status important for decrease in oxidative stress.

KEYWORDS: wine, total antioxidant status, HDL-cholesterol, LDL-cholesterol, triglycerides, blood pressure

## FREE RADICALS DISEASES

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### ABSTRACT

In our summary, we focus on two most important free radical disease representatives. These are cardiovascular and oncological diseases and a possible effect of antioxidants on these diseases in light of the most recent research. Atherosclerosis plays an essential part in cardio-vascular diseases. It is associated with so called lipid theory relevance of which has been widely acknowledged among medical society. Despite this, there are situations where this theory can not explain all manifestations of the atherosclerosis. In 1980, Gey formulated an antioxidant hypothesis and in 1992 he defined an antioxidant cumulative index that showed the relationship between vitamin C, E, beta carotene, selen and cholesterol. Antioxidants are also important in the process of oxidation of low density lipoprotein cholesterol and last but not least in the oxidative modification of unsaturated fatty acids. It was already 20 years ago when USA National Committee for Nutrition and Health identified NaCl, aflatoxin, and obesity as the main risk factors in the process of carcinogenesis. On the other hand, the committee highlighted the importance of fruits and vegetables in fighting the cancer, in particular colon cancer. From this point of view, our population belongs to a risk category, as our research also suggests, that: we consume too much of saturated fatty acids; we do not consume enough of fruits and vegetables - we use improper cooking. The effect of antioxidants in the area of cardio-vascular diseases and their prevention is more less medically acknowledged. In the area of oncology the effects in different forms and amounts

are not so explicit, e.g. higher intake of nutritional supplements can have a pro-oxidant effect (like free radical). Most of the scientists are cautious in their conclusions. However, diversified and balanced nutrition rich in antioxidants does not have any contraindication. The future also belongs to so called functional type of food. This work was supported by project KEGA 3/5082/07.

KEYWORDS: oxidation, low density lipoprotein, free radical diseases, atherosclerosis, carcinogenesis

## CONSUMPTION OF FRUITS AND VEGETABLES IN UNIVERSITY STUDENTS AS A NATURAL SOURCE OF ANTIOXIDANTS

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### ABSTRACT

The aim of this work was to evaluate a survey of consumption of fruits and vegetables as a natural source of antioxidants in a group of the university students in Košice. The monitoring method relied on a questionnaire examining besides nutritional habits and food preferences also respondents' health, attitude to smoking, physical activities and some more aspects. All interviewee were students of the three universities in Košice aged 25. According to the obtained results it was observed that 82.16 respondents consumed fruits and 80.0% probands consumed also vegetable. For about 93 of the respondents consume mostly strawberries per year. The only one student (0.71%) consumes strawberries every day during a year and nine of the respondents (6.42%) have never consumed this fruit. From the group of vegetable, the tomatoes are preferred (38.39%), then carrot (22.32%), fresh pepper and cabbage (12.5%). This work was supported by project KEGA 3/5082/07.

KEYWORDS: nutrition, university students, fruits, vegetables, antioxidants

## FLAVONOIDS AND ANTIRADICAL ACTIVITY OF SELECTED BEE POLLEN

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### ABSTRACT

The objective of the study was to evaluate differences in antioxidant properties of selected bee pollen types: *Helianthus annuus* L. and *Papaver somniferum* L. Analyzed samples were dried at 35 °C until moisture reached the 9 to 11%. Antiradical activity was determined by modified DPPH method according to Brand-Williams et al. (1995). Total content of flavonoids was determined according to Chang et al. (2002) method. Differences between selected bee pollen types in antiradical activity and total flavonoids content were specified by correlation analysis. Statistically significant differences ( $P < 0.05$ ) within selected samples were determined in case of antiradical activity and total flavonoids content. Average value of scavenger activity was  $64.02 \pm 17.08\%$ . In the case of flavonoids content the average value reached  $148.67 \pm 120.52 \text{ mg}\cdot\text{kg}^{-1}$ . Higher value of scavenger activity and flavonoids content was detected in *Papaver somniferum* L. pollen, whereas *Helianthus annuus* L. pollen contained less flavonoids. According to our results the

antiradical activity of *Papaver somniferum* L. pollen is classified as pollen with high antiradical activity. In this group (Leja et al., 2007) are situated pollens from species like *Trifolium* sp., *Phacelia tanacetifolia*, *Lupinus polyphyllus*. This work was supported by APVT-20-026704, aAV/1121/2004.

KEYWORDS: antioxidant properties, antiradical activity, flavonoids, bee pollen, sunflower, *Helianthus annuus* L., poppy, *Papaver somniferum* L.

## ANTIOXIDANTS' FOOD RESOURCES FOR SCHOOL AGE CHILDREN

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### ABSTRACT

The aim of the study was to collect and analyze dietary patterns in a group of 593 children; to evaluate differences in food consumption, particularly fruits and vegetable as a main food sources of antioxidants, between girls (n = 319) and boys (n = 274), from elementary schools in Nitra, aged from 6.54 to 15.87 years (average age 12.05 ± 2.32 years). Children's parents completed a questionnaire about food habits. Participants' age was calculated according to methodology of World Health Organization. At least once a day have consumed fruit statistically significantly more girls (63.01% versus 54.01%) than boys (P < 0.05), and also statistically insignificantly more girls than boys in case of vegetable consumption (P ≥ 0.05). Daily 39.50% of girls and 35.40% children from Nitra's elementary schools have included vegetable into diet. This work was supported by project „Healthy city Nitra“.

KEYWORDS: fruit, vegetable, anthropometry, pupils, elementary schools, Nitra

## ANTIOXIDANT ACTIVITY and vitamin C content IN BERRIES AND FRUIT PRODUCTS MADE FROM BERRIES

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### ABSTRACT

Berries (raspberry, blueberry, blackberry, black and red currant, gooseberry, etc.) are one of the popular group of fruits. They contain pigments in a big quantity. These pigments belong to the group of the anthocyanidins and are mostly flavonoids. These compounds are very important in the healthy nutrition. Our aim was to examine the berry species known in Hungary and the foods made of them. We wished to collect data with the examinations the fruit's antioxidant characteristics, and to find contexts concerned with the measured anthocyanidin pigment content with C-vitamin content. Highest (more than 200 mg.100 g<sup>-1</sup>) C-vitamin content was measured in the elder, black currant, blueberry and in the blackberry. Very high (50 mg.100 g<sup>-1</sup>) anthocyanidin quantity was measured in the elder and the blackberry. High pigment content (10 - 20 mg.g<sup>-1</sup>) was in the black currant, blueberry and in the josta. Anthocyanidins and C-vitamin are responsible for the antioxidant activity together. The quantity of antioxidant activity in fruit-foods differ from that of the fresh fruits with an order in generally. We found very big differences in measured nutritional value because of different quality of jams and frozen fruits.

KEYWORDS: berries, C-vitamin, anthocyanidin, pigment content, antioxidant activity

## THE ANTIOXIDANTS RECEIVING NATURALLY IN NUTRITION OF SCHOOL CHILDREN IN NITRA TOWN

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### ABSTRACT

The aim of the work was to qualify catering habits of school children in Nitra town, especially shortages of fruit, vegetables and additional natural sources of antioxidants and to evaluate a level of body growth of kids. The total number of pupils was 203 (57.14% girls and 42.86% boys). The questionnaire was used for children. In comparing of sex the results of research were compared as frequent differences in %. The anthropometric symbols were evaluated by the age and sex. They were compared individually with reference values in percentile form. By evaluation of catering routine we found out, that just half of the boys and girls in our research have a mid-morning snack consisting of fruit, vegetable or dairy product regularly. According to research results with increasing age of children, there was a reduction of children, who had a healthy mid-morning snack. Twice a day and more frequently fruits consumed 42 girls, but only 35% boys. The optimal frequency of vegetables consumption was higher at girls' file than at boys'; more often ate vegetables girls - 18% and just 10% boys. In sex comparison the fruits and vegetables representation is in strong disadvantage of boys. In monitored kids' file we found out worse results and higher occurrence of the average values monitored biological coefficients in disadvantage of boys. By analyzing BMI rates, in our research was found out that 9% girls was robust or overweight (90.-97. percentile) and 4% girls are corpulent (attributes above 97. percentile). The results were worse at boys' file, 15.33% of them were overweight and 5.84% are corpulent. The basic recommendation for a practice is to support the right nutrient habits formed from babyhood as one of the most effective forms of prevention of nutritional acquired diseases. This work was supported by project „Healthy city Nitra“.

KEYWORDS: school children, nutrition, fruit, vegetable, anthropometry, overweight, Nitra

## THE ROSEMARINIC ACID CONTENT IN SELECTED MEDICINAL PLANTS OF FAMILY LAMIACEAE

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### ABSTRACT

Current results of several research teams refer to possibility utilize the rosmarinic acid in pharmaceutical and cosmetic industry as well as in the food products. Hydroxycinnamic acids are a group of substances with significant antioxidant activity. Rosmarinic acid has antioxidant, antimicrobial, anti-inflammatory, and fungicidal effects. In our work we used the method of liquid chromatography for establishing the content of rosmarinic acid in selected plant sources of the Lamiaceae family. We investigated the content of rosmarinic acid in relation to the species of medicinal plant, the time of harvest, and the year of growing (2006, 2007). We found that the content of rosmarinic acid varies: *Origanum vulgare* L. (11 442,5 - 28 658,9 mg.kg<sup>-1</sup> of dry matter), *Melissa officinalis* L. (11 766,4 - 33 352,8 mg.kg<sup>-1</sup> of dry matter), *Mentha x piperita* /L/. Huds. (11 307,0 - 25 579,3 mg.kg<sup>-1</sup> of dry matter), *Salvia officinalis* L. (10 378,7 - 29 104,8 mg.kg<sup>-1</sup> of dry matter) and *Thymus vulgaris* L. (10 425,7 - 17 089,7 mg.kg<sup>-1</sup> of dry matter).

KEYWORDS: antioxidants, medicinal plants, time of harvest, rosmarinic acid

## THE EVALUATION OF QUALITY INDICATORS OF THE CHOSEN KINDS OF FOREST FRUITS

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### ABSTRACT

In our research, the quality indicators of chosen sorts of berries were observed. The highest values of vitamin C were obtained from raspberries (25.64 mg.kg<sup>-1</sup>) and blackberries; bilberries proved to contain higher quantity of organic acid (6.40 mg.kg<sup>-1</sup>). We found out the black elder had the highest quantity of sugar (14.2 mg.kg<sup>-1</sup>) and natural pigments (11.00 mg.kg<sup>-1</sup>). The highest content of anthocyanins was in blueberries (8.34 g.kg<sup>-1</sup>) and in elderberry (5.68 g.kg<sup>-1</sup>), while the greatest antiradical activities we recorded in cornelian cherry (88.1% inhibition) with the content of anthocyanins 3.03 g.kg<sup>-1</sup>. The high antiradical activity we also detected in blackberry (75.26% inhibition) despite of lower anthocyanins content (2.61 g.kg<sup>-1</sup>). The obtained results indicate that increased consumption of the monitored sorts can significantly contribute to the prevention of free radical diseases.

KEYWORDS: forest fruits, antioxidants, anthocyanins, antiradical activity

## ZINC AND ITS ROLE IN HUMAN BODY

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### ABSTRACT

Zinc (Zn) is an essential element in human and animal nutrition with multiple biological functions. Zinc plays catalytic, structural or regulatory roles in the metalloenzymes that have been identified in biological systems and zinc fingers. Another structural role of zinc is in the maintenance of the integrity of biological membranes resulting in their protection against oxidative injury. Zinc is an integral component of antioxidant enzymes that protect organism against free radical damage. In selected group of hospitalized Romany children (25 boys and 22 girls) aged from 2 month to 6 years we examined selected parameters – zinc, alpha-2-macroglobulin, Cu/Zn superoxidismutase and their relationship. The serum concentration of Zn was measured with commercial kit fy AMP Diagnostic (Austria) and serum concentration of alpha-2-macroglobulin ( $\alpha$ 2M) radial immunoassay fy Sevapharma (CR). The enzymatic activity of Cu/Zn superoxidismutase (Cu/Zn SOD) was measured spectrophotometric method with RANSOD kit (Randox Lab., U.K.). The mean concentration of zinc was  $11.78 \pm \mu\text{mol.l}^{-1}$ . The zinc deficiency, it means the serum concentration of Zn lower than  $9 \mu\text{mol.l}^{-1}$  had 23.4% children and zinc concentration more than  $16 \mu\text{mol.l}^{-1}$  had 12.8% children. Significant correlation ( $r = 0.326$ ;  $p < 0.05$ ) was between zinc and  $\alpha$ 2M only in the physiological range of zinc. The activity of Cu/Zn SOD was increased with mean concentration of zinc and  $\alpha$ 2M. Results of our study showed on decreased saturation of organism with zinc in Romany children caused by insufficient exogenous intake of zinc or as a secondary consequence of respiratory system infection. Zinc supplementation may be an effective public health intervention means to improve the zinc status of the population. VEGA 1/4232/07

KEYWORDS: zinc, Cu/Zn superoxidismutase, alpha2macroglobulin, children



## AFFECT OF PHENOLIC PROFILE OF BERRIES AND THEIR ANTIOXIDANT ACTIVITY BY NONSPECIFIC INHIBITOR OF ENZYMES

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### ABSTRACT

The changes of the antioxidant activities (AOA), antiradical activities (ARA) and total contents of phenolics, anthocyanins, flavonols, hydroxybenzoic acids and hydroxycinnamic acids in black currant variety Otelo, black chokeberry variety Nero and grape berries varieties Saint Laurent (SL), André (AD) and Alibernet (AL) after treatment with ornithine decarboxylase inhibitor, a polyamine inhibitor (O-phosphoethanolamine, KF), were analyzed spectrophotometrically. The content of free aliphatic polyamines, gallic acid, hydroxycinnamic acids and selected flavonols was analyzed by RP-HPLC. KF increased the AOA measured as inhibition of peroxidation (IP) in black chokeberry, 1.71-fold after treatment with KF<sub>1</sub> and had an expressively different effect on IP of grape varieties with the lower antioxidant activity, phenolic content or the lower color density (SL, AD) than on overall qualitatively better variety, AL, because significantly increased only IP of SL and AD berries. In black chokeberry the total phenolics content was elevated 1.49-fold after KF<sub>1</sub> application. The regulator had the lower effect on the phenolic accumulation in black currant and surprisingly decreased the phenolic accumulation in grapes. There was a strong relationship between the total phenolics in all crops and anthocyanins, and hydroxycinnamic acids contents, respectively. KF significantly changed the ratio of conjugated (rutin) to free (quercetin) flavonol mainly in black chokeberry and decreased the content of free aliphatic polyamines in all grape varieties, very dramatically in SL.

KEYWORDS: berries, phenolics, inhibition of peroxidation, antiradical activity, free aliphatic polyamines

## ASSESSMENT OF ANTIOXIDANT CAPACITY BY USING OF CYCLIC VOLTAMMETRY – CLINICAL APPLICATION

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### ABSTRACT

It is a common knowledge that oxidative stress relates with imbalance between concentration of prooxidants and the antioxidant. Moreover, it appears that these changes are very important in the pathophysiology of critically ill patients. The main aim of this contribution is to study antioxidant activity by using of cyclic voltammetry (CV) at carbon working electrodes. For measuring antioxidant capacity, we utilized carbon paste electrodes, which are easy to prepare. As a part of carbon paste, microparticles of sizes 2-5 mm (expanded carbon and carbon nanoparticles) were used. Acetate and phosphate buffers were tested as the supporting electrolytes. In animal organisms ascorbic and uric acids belong to the important antioxidants. Therefore, these two dominant antioxidants were investigated by using of above-mentioned CV at carbon paste electrodes. For the assessment of antioxidant capacity the sum of the areas of all signals measured in the samples were used. The highest signals were detected in the potential range from +.5 to +0.8 V. The experimental results were compared with antioxidant capacity measured by Trolox (UV-VIS spectrometry). Changes in antioxidant capacity were observed in patients with medulloblastoma by using of both methods.

Acknowledgements: Financial support from the grants Liga proti rakovine Praha a KAN208130801 is highly acknowledged.

KEYWORDS: cyclic voltammetry, electrochemical detection, reactive oxygen species, redox status

## ANTIOXIDANTS AND ATHEROSCLEROSIS

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### ABSTRACT

Autors in the paper submit literary review about favourable and negative effects of antioxidants on the atherosclerosis. Autors also analyzed some randomized, double-blind, placebo-controlled trials of antioxidant (and in particular vitamins E, C and/or  $\beta$ -carotene) supplementation and as the majority of studies included in this review does not support a possible role of antioxidant supplementation in reducing the risk of cardiovascular disease, no definite conclusion can be drawn to justify the use of antioxidant vitamin supplements for the prevention of atherosclerotic events. A lot of many another studies present, that the drinking low doses of wine have positive reactions on the health, especially on the decrease of morbidity and mortality of cardiovascular and oncologic diseases. The antioxidants in this case are the base of preventive effect, which are present in the increase concentration a stable state in the wine and their positive influence on the cholesterol levels (increase of HDL cholesterol level and decrease of LDL cholesterol level), antithrombotic effect by decreasing of plasmatic fibrinogen level, increasing fibrinolytic activity and decrease of activity of blood platelets and antioxidant effect of phenolic matters – flavonoids (especially resveratrol, quercetin and catechin), which is by their redox qualities and potentials, which protected to origin and development of oxidative stress. Oxidative stress is thought to play a substantial role in the pathogenesis of atherosclerosis. Supplementation of antioxidants has been studied as a strategy in the prevention of occurrence and progression of atherosclerosis. This work was supported by project KEGA 3/5082/07.

KEYWORDS: antioxidants, atherosclerosis, prevention, wine

## ANTIOXIDANT ACTIVITY OF SOME HERBS USED IN DIETOLOGY PRACTICE

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### ABSTRACT

Modified diets used for the protection of the gastrointestinal system usually have a bland taste and aroma. The motivation for consumers to restrict their normal diet and to adhere to these modified diets is very weak. Therefore, modern dietology recommends the use of various herbs (fresh or dried) in meal preparation to improve the flavour. These herbs often contain various compounds with antioxidant effects, mainly phenols and/or ascorbic acid. The antioxidant activity of some herbs used in dietology was determined by monitoring their ability to scavenge radicals

from 1,1-diphenyl-2-picryl-hydrazyl (DPPH). This method is calibrated with ascorbic acid as a very important hydrophilic antioxidant. In herbs various phenols are the most active compounds. Therefore, the activity was measured in water extracts of selected herbs. Mentha (*Mentha x piperita*), oregano (*Origanum vulgare*), greek oregano ("rigani"; *Origanum heracleoticum*), sage (*Salvia officinalis*) and savory (*Satureja montana*) showed very significant activity. Amazingly lower activity was observed for marjoram (*Majorana hortensis*), thyme (*Thymus vulgaris*), hyssop (*Hyssopus officinalis*), basil (*Ocimum basilicum*, var. *Compato*) and lovage (*Levisticum officinale*). Tested samples of cumin, dried parsley and celery leaves showed practically no activity.

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KEYWORDS: antioxidants, herbs, DPPH radical, ascorbic acid, phenols

## ANTIOXIDANTS AND THEIR IMPORTANCE FOR PREVENTION OF NON COMMUNICABLE DISEASES

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### ABSTRACT

The authors present the results about important antioxidant – vitamin C. They also provide evidences about its antiatherogenic activity through hypocholesterolemic effect, which was experimentally confirmed in guinea pigs. An observation of antioxidant biological function was in the spotlight in the study with oyster mushroom. The authors present evidences about important antioxidant effect of oyster mushroom (increase of GSH-Px and glutathione,  $P < 0.05$ ) and about important decrease of lipoperoxidation products – namely conjugate diene ( $P < 0.02$ ) by the betaglucans activity. Simultaneously there is recorded the hypolipidemic effect of oyster mushroom by the confirmation of statin – Mevinolin K effect (by the Institute of Organic Chemistry of Slovak Science Academy). The authors discuss about importance of antioxidant – nutrition intervention in case of diabetes mellitus, but also after organ transplantation – namely in primary and secondary prevention and in clinical praxis too.

KEYWORDS: antioxidants, prevention, non communicable disease, antiatherogenic activity

## NEW METHODS FOR ASSESSMENT OF ANTIOXIDANT PROPERTIES OF IMPORTANT FOODSTUFF

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### ABSTRACT

This study reports with optimization of liquid chromatography coupled with electrochemical detector CoulArray, while sensing current response to the series ranked eight electrodes. Coulometric multi-channel detection provides higher sensitivity and selectivity than the determination of spectrometric methods. It does not require special procedure to

prepare a sample. Substances can be identified not only by the retention times for each component, but also according to their electrochemical characteristics. The method was used to analyze samples of Moravian wines. The significant differences in the composition and content of substances with antioxidant properties among white, red and pink wines were found. Moravian red wine contained six times more antioxidants compared to white wine.

Acknowledgements: Financial support from the grants KAN208130801 and Vitamins 2000 is highly acknowledged.

KEYWORDS: electrochemical detection, oxidative markers, food analysis, high performance liquid chromatography

## ORGANIC BOUND SELENIUM IN RAW COW'S MILK

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### ABSTRACT

We studied the effect of feeding the organic selenium on somatic cell count in milk of dairy cows, health status of mammary gland, and the increase of selenium content in milk. Selenium was added to the premix in form of Selplex Se (firm Alltech, Inc.) in the amount 0.2 ppm into 1 kg feed mixture. The enriched mixture was fed to 44 dairy cows during 8 weeks. Somatic cell count and Selenium content was studied in milk samples and compared with the control group. Decrease of somatic cell count from  $229.3 \times 10^3 \text{ ml}^{-1}$  to  $174.5 \times 10^3 \text{ ml}^{-1}$  ( $P < 0.001$ ) was noticed with Se feeding from 1st to 8th week of experiment. Content of Se in milk rose from  $0.048 \text{ mg ml}^{-1}$  to  $0.138 \text{ mg ml}^{-1}$  during the experiment, i.e. by 288% compared with common cow's milk.

KEYWORDS: milk, selenium

## IMPORTANCE OF CHLOROPHYLL IN HUMAN NUTRITION

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### ABSTRACT

Chlorophyll together with carotenoids belongs to photosynthetic pigments. Just like carotenoids, chlorophyll also reacts to oxygen and the present enzymes are able to decompose and neutralize free radicals. Noticeable is the fact that the composition of molecule of chlorophyll is very similar to the structure of many biologically active substances and vital substances such as haemoglobin, myoglobin, peroxidase, catalase etc. Chlorophyll plays a vital role in body recovering, serves as an anti-inflammatory agent, increases the transferring capacity for oxygen, has antimicrobial and other healing effects. The best donor of chlorophyll is green vegetables. Based on the above mentioned findings, a random anonymous research has been conducted. Participants included for the study were 200 randomly chosen respondents, 44 patients from advisory service for diabetics and 30 citizens above the age of years 90. The aim of the research was to find out what amount of green vegetables people include in their diet and to what extent the protective effects of chlorophyll are being utilized. Despite the fact that almost 86% of participants know and believe in the healing effects of vegetables, only approximately one third of participants include vegetables in their diet on daily basis. When it comes to respondents above the age of 90 years, almost 66% of them strongly admitted consuming more green vegetables, milk, and legumes and less meat during their juvenility as opposed to what they eat now. The results of the research reveal the fact that consumption of green vegetables is insufficient among healthy and sick respondents. Nowadays, eating habits among Slovak population are not favourable in regard to the chlorophyll intake and other antioxidants.

KEYWORDS: antioxidants, chlorophyll, green vegetables, vegetable consumption, research

## ROLE OF VITAMIN C IN METABOLISM OF LIPIDS IN OBESE MAN

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### ABSTRACT

Obesity is an important risk factor of early atherosclerosis which usually associates with hyperlipidemia. Vitamin C is an effective antioxidant, acting to lessen oxidative stress and oxidation of atherogenic LDL-cholesterol and can protect against atherosclerosis. To the study of the serum concentrations of vitamin C (vit.C), apolipoproteins (apo B, apo C-III) and lipids: total cholesterol (TC), triacylglycerols (TG), LDL-cholesterol (LDL-C), non HDL-cholesterol (non HDL-C) and HDL-cholesterol (HDL-C) were observed in 34 obese man (BMI =  $29 \pm 2$  kg.m<sup>-2</sup>) of middle age ( $49 \pm 9$  years) (OB). Twenty-five healthy subjects with normal body weight ( $23 \pm 2$  kg.m<sup>-2</sup>) and comparable age were involved into the control group (C). Serum concentrations of vit.C were determined by colorimetric method. Apo B was quantified by electroimmunoassay and apo C-III by method of radialimmunodiffusion. The lipids were determined by commercial biochemical kits. The deficiency of vitamin C in obese subject was found significant ( $p < 0.05$ ) in comparison with control group. The mean values of apo B and apo C-III were highly increased in OB ( $p < 0.001$ ). The concentrations of atherogenous lipids (TC, TG, LDL-C and non HDL-C) were also highly significantly increased ( $p < 0.001$ ). Significantly increased concentrations of apo B, apo C-III, spectrum of lipids and elevated concentration of vitamin C in obese subjects are a very dangerous combination for development of early atherosclerosis.

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KEYWORDS: vitamin C, apolipoproteins, lipids, obesity

## OXIDATIVE DAMAGE OF LIPIDS AND PROTEINS IN RELATION TO PLASMA VITAMIN C AND E VALUES

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### ABSTRACT

Imbalance in reactive oxygen species production and antioxidant defense system leads to oxidative stress. Oxidative damages are minimised by sufficient intake of antioxidants, which provide protective plasma concentrations of antioxidative vitamins and thus prevention from harmful effects of free radicals. Results of long-term epidemiological and clinical studies suggest that protective plasma vitamin concentrations for minimum risk of free radical disease are  $>50$   $\mu\text{mol.l}^{-1}$  of vitamin C and  $>30$   $\mu\text{mol.l}^{-1}$  of vitamin E. In randomly selected population group of apparently healthy adult subjects ( $n = 48$ ) were evaluated values of oxidative damage of lipids (conjugated dienes of fatty acids, malondialdehyde) and proteins (carbonyls) in correlation to plasma vitamin C and vitamin E concentrations. In group of subjects with deficient plasma vitamin concentrations ( $<50$   $\mu\text{mol.l}^{-1}$  of vitamin C,  $<30$   $\mu\text{mol.l}^{-1}$  of vitamin E) were recorded significantly increased all investigated products of oxidative damage (by 46 - 61%) if these values were compared with those values in group of protective plasma vitamin concentrations (control group). In case of deficient concentrations of vitamin E but protective concentrations of vitamin C were found significantly increased only products of lipid peroxidation. In group of deficient vitamin C but protective vitamin E concentrations were significantly increased all oxidation products, but these increases were less pronounced than in group of deficient both vitamin concentrations. The results document a requirement of optimal plasma vitamin concentrations which maintain the prooxidant-antioxidant balance and thus reduced values of oxidative damage.

KEYWORDS: vitamin C, vitamin E, lipid peroxidation, protein carbonyls

## AGE-DEPENDENT CHANGES OF PEROXIDATION INDICES AND SYSTEMS OF NITROGEN OXIDE AT EXPERIMENTAL STRESS

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### ABSTRACT

One of the major mechanisms of vessel tone disturbance under acute stress is the endothelial dysfunction, which is characterized by an increased production of nitrogen oxide (NO) and active oxygen forms as well as by a decreased antioxidant system defense of the myocardial cells. This diminishes adaptive possibilities of the organism and conditions age-dependent pathology development. This investigation aimed to study influences of acute immobilization stress on lipid peroxidation processes and nitric oxide (NO) state in the myocardium and vascular wall of adult (6 - 8 months) and old (24 - 28 months) experimental animals. The results obtained evidenced for the increase of level of lipid peroxidation products in the myocardium and vascular wall of experimental animals of different ages under acute stress action. The elevated level of end peroxidation products in blood plasma and tissues (aorta, myocardium) found predominantly in old animals is the key factor in acute stress pathogenesis. The level of stable NO metabolites raised at the expense of increasing NO-synthase activity. In the myocardial tissues there occurred a decrease in the level of NO production, being conditioned by reduced cNO-synthase activity. Age peculiarities of changes in study processes consisted in the greater rise of level of lipid peroxidation products and stable NO metabolites in old experimental animals.

KEYWORDS: age, peroxidation, nitrogen oxide, stress

## CHANGES OF PLASMA TOTAL ANTIOXIDANT STATUS AFTER GAMMA IRRADIATION

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### ABSTRACT

This study was designed to evaluate the effect of gamma irradiation on the plasma total antioxidant status in four time periods after irradiations in chickens. 40 broiler chickens (age 31 days) were irradiated by gamma rays (<sup>60</sup>Co source) at a total dose 3 Gy (dose rate 0.08 Gy.min<sup>-1</sup>), using whole body irradiation. Plasma total antioxidant status (TAS) was determined 1, 3, 14 and 25 days after irradiation. 20 chickens were used as a control. TAS was significantly elevated 1 hour after irradiation (1.11 ± 0.16 mmol.l<sup>-1</sup>, p < 0.05 vs. control: 0.88 ± 0.16 mmol.l<sup>-1</sup>). On the 3<sup>rd</sup>, 14<sup>th</sup> and 25<sup>th</sup> days after irradiation, TAS decreased highly significantly, when compared with group 1 hour after irradiation (0.76 ± 0.08 mmol.l<sup>-1</sup>, p < 0.0001; 0.80 ± 0.10 mmol.l<sup>-1</sup>, p < 0.0005; 0.86 ± 0.20 mmol.l<sup>-1</sup>, p < 0.01). We suppose that the elevation of extracellular antioxidant capacity after gamma irradiation was caused by intracellular antioxidants released from the damaged cells. The TAS decrease in the 3<sup>rd</sup> day might be a result of exhaustion of plasma antioxidants after previous stimulation. Next days TAS slowly rose nearly up to control value on the 25<sup>th</sup> day after irradiation.

Supported by the grant VEGA 1/3503/06.

KEYWORDS: total antioxidant status, gamma irradiation

## EATING HABITS OF THE UNIVERSITY STUDENTS FROM THE ANTIOXIDANT'S RECEIPT VIEWPOINT

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### ABSTRACT

A study was conducted to determine the eating habits of the university students in Košice. The investigation was a randomized crossover design with 140 respondents. Students aged 23 to 26 years were recruited to be subjects. The data were collected from 57 questions given into the questionnaire. It was observed that 94.28% students consumed a common meal, and only 5.71% of respondents consume a selected diet. There were the students with the autoimmune disease - celiac sprue, also known as [celiac disease](#), gluten-sensitive [enteropathy](#), and gluten-induced enteropathy, is a [chronic disease](#) of the digestive tract that interferes with the digestion and [absorption](#) of nutrients from food. According to the results from questionnaire, subjects (30.71%) consumed all of their calories for weight maintenance distributed in either 3 meals/ day, 4 meals per day (29.28%) and five meals per day (25.71%). Meat as [animal flesh](#) is used as food. All [muscle](#) tissue is very high in [protein](#), containing all of the [essential amino acids](#), and in most cases is a good source of [zinc](#), [vitamin B12](#), [selenium](#), [phosphorus](#), [niacin](#), [vitamin B6](#), [iron](#) and [riboflavin](#). Muscle tissue is very low in carbohydrates and fibers. The fat content of meat can vary widely depending on the [species](#) and [breed](#) of animal, the way in which the animal was raised, including what it was fed, the [anatomical](#) part of the body, and the methods of butchering and cooking. Decades of breeding meat animals for fatness (to provide calories for hard work) are being reversed by consumer demand for meat with less fat (for a more sedentary lifestyle). Red meat, such as beef, pork, and lamb, was consumed by 57.85% respondents in this survey. 71.42% of respondents consume white meat, which is most suitable because of its content of unsaturated fatty acids. On the other hand, oxidative processes in meat lead to meat quality deterioration. Meat has endogenous antioxidants and prooxidants, but information on factors influencing the activity of antioxidant enzymes in meat is limited. Lipolytic and proteolytic enzymes are involved in important aspects of meat quality. That is why one of the questions involved methods of meat and meal cooking. The respondents preferred mostly cooking (49.28%). Only 5.71% of respondents prefer (pan) fry and grill (0.71%).

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KEYWORDS: nutrition, university students, meat, meat products, antioxidants

## THE CONTENT OF ASCORBIC ACID AND ANTHOCYANINS IN SELECTED CLONES OF LONICERA KAMTSCHATICA IN 2007 AND 2008

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### ABSTRACT

In our research we focussed our attention to study a collection of 17 clones of *Lonicera kamschatica* (Sevast) Pojark in term of anthocyanins and ascorbic acid content in the conditions of Nitra in 2007 and 2008. Results of chemical analyses and their statistical evaluation pointed to a wide variation range of anthocyanins that was more significant in 2007 (5.96 – 19.18 g.kg<sup>-1</sup>) than in 2008 (5.63 – 12.94 g.kg<sup>-1</sup>). We also determined a high variability in ascorbic acid content (in 2007 9.71 – 46.47 mg.100 g<sup>-1</sup>, in 2008 63.75 – 183.61 mg.100 g<sup>-1</sup>). The content of ascorbic acid and

anthocyanins was statistically significantly depending on climatic conditions (influence of year) while difference between 2007 – 2008 in anthocyanins was on the border of probability level  $\alpha = 0.05$ . In respect of anthocyanins and ascorbic acid content clones LKL – 31 (14.53 g.kg<sup>-1</sup>; 46.47 mg.100 g<sup>-1</sup>) and LKL – 18 (14.36 g.kg<sup>-1</sup>, 39.91 mg.100 g<sup>-1</sup>) in 2007 and LKL – 2 (12.94 g.kg<sup>-1</sup>, 172.66 mg.100 g<sup>-1</sup>), LKL – 35 (11.2 g.kg<sup>-1</sup>, 170.55 mg.100 g<sup>-1</sup>) in 2008 seem to be a more perspective in term a selection of the best clones. It was determined moderate positive correlation between the content of anthocyanins and ascorbic acid in both years (in 2007  $r = 0.325$ , in 2008  $r = 0.576$ ).

KEYWORDS: *Lonicera kamtschatica*, clones, ascorbic acid, anthocyanins content

## MOLECULAR MECHANISMS OF PRODUCTION AND ELIMINATION OF REACTIVE SPECIES OF OXYGEN

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### ABSTRACT

This paper analyses molecular mechanisms of free radicals production and way of their elimination. Presence of reactive oxygen species have control affect for the execution of numerous processes of metabolism in cell. Insufficient or uneffective control of the concentration of reactive oxygen species can cause some health ailments in cell. Between pathological processes belong particularly inflammatory processes, atherosclerosis, heart attack, digestive problems, carcinogenesis etc. Reactive oxygen species, which are created during redox reactions, can be partially eliminated by natural substances, antioxidants, which are present in food, especially of plant origin.

KEYWORDS: reactive oxygen species, oxygen radicals, superoxide, hydrogen peroxide, antioxidants

## THE SUPPLEMENTATION OF PORK MEAT WITH ORGANIC SELENIUM AND ITS EFFECT ON SELENIUM AND TOTAL ANTIOXIDANT STATUS IN HEALTHY VOLUNTEERS

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### ABSTRACT

It is known that organic selenium (Sel Plex) supplemented to pig feed mixture is significant for effective transport of essential element selenium to the food chain. It enables to create important body deposits of selenium in skeletal muscles and also increases selenium transfer in natural metabolic form of selenomethionine into functional food. The intake of feeding mixture with increased organic selenium at the dose of 0.3 mg.kg<sup>-1</sup> probably increase selenium concentration in MSM (musculus semimembranosus) - experimental selenium group 1.293 mg.kg<sup>-1</sup> and control group 0.513 mg.kg<sup>-1</sup> and in MLT (musculus longissimus thoracis) - experimental selenium group 1.364 mg.kg<sup>-1</sup> and control group 0.506 mg.kg<sup>-1</sup>. The aim of this study was to evaluate the selenium and total antioxidant status (TAS) in selected group of healthy people. 25 volunteers consumed pork meat enriched with organic selenium three times a week during one month (average age in 9 men was 51.2 years, in 16 women 39.06 years, respectively). Daily selenium intake of 110 µg was calculated by Alimenta software, version 4.3 on the basis of nutrition statement. Recommended daily selenium intake of 50 – 200 µg was stated by World Health Organization (WHO). During the research time the volunteers consumed pork enriched by 35 µg of selenium. At the beginning mean selenium concentration in blood serum was at 75.41 ± 14.18µg.l<sup>-1</sup> in men, 75.21 ± 15.20µg.l<sup>-1</sup> in women. After two weeks of consuming the mean



selenium concentration in blood serum in men increased to  $86.69 \pm 11.72 \mu\text{g.l}^{-1}$ , in women to  $87.93 \pm 16.22 \mu\text{g.l}^{-1}$ . At the end of the study mean selenium concentration decreased in men to  $85.75 \pm 2.72 \mu\text{g.l}^{-1}$  and in women to  $84.07 \pm 15.62 \mu\text{g.l}^{-1}$ . In selected group of healthy people the increase in total antioxidant status from  $1,68 \text{ mmol.l}^{-1}$  to  $1,86 \text{ mmol.l}^{-1}$  after two weeks of consumption of selenium enriched pork, but decrease in TAS at the end of study were recorded. Improving in selenium status has positive influence on human health and our results could contribute to new trends in production of functional food.

Acknowledgments: The research was solved with the support of APVV 0399/07 and VEGA 1/4433/07 project.

KEYWORDS: supplementation of pork, organic selenium, selenium status, total antioxidant status

## EFFECT OF BIOFLAVONOIDS ON TYPE 1 DIABETES ONSET AND ANTIOXIDANT STATUS IN SPONTANEOUSLY DIABETIC RATS OF BB STRAIN

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### ABSTRACT

The aim of this study was to establish the effect of bioflavonoids on Type 1 diabetes onset in spontaneously diabetic BB rats. The experiment was carried out on 40 male BB-DP rats aged 21 days at the beginning. The animals were divided into control and bioflavonoid ( $0.2 \text{ mg.l}^{-1}$  in tap water) treated groups. The animals were fed and had water intake ad libitum up to the 171st day of life. At room temperature in 12/12 hour light/dark regime in separate glass metabolic cages. Blood glucose, whole blood glutathione, plasma total antioxidant status and red cell antioxidant enzyme activities (superoxidismutase, glutathione peroxidase, and catalase) was analysed weekly. The results were evaluated by one-way ANOVA with post hoc Student-Neuman-Keuls test. The manifestation of diabetes was lower in treated group as compared with the controls (10 and 65%, respectively). The age of two animals at the manifestation of overt diabetes onset was 127 and 141 days against the 13 diabetic controls ( $98.0 \pm 9.0$ ). There was a decrease in the concentration/activity of antioxidant markers at the time of diabetes manifestation in both groups. On the other side these markers were normalized in bioflavonoid treated diabetic animals during the experiment. Based on the results it is possible to conclude that bioflavonoid treatment had a preventive effect against the manifestation of diabetes in BB-DP rats. Animals with bioflavonoid treatment had a milder progress of diabetes and a better antioxidant status.

KEYWORDS: bioflavonoids, antioxidant status, type 1 diabetes, BB rats

## ANTIOXIDANT ACTIVITY AND POLYPHENOLS OF BEE POLLEN

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### ABSTRACT

The objective of the study was to evaluate correlation between polyphenols content and antioxidant activity of selected bee pollen species: *Brassica napus* subsp. *napus* L. and *Helianthus annuus* L. The bee pollen samples were freeze-dried by table laboratory lyophilizator LYOVAC GT 2 by Amsco/Finn-Aqua. The process of lyophilization

lasts until the samples reached 2% moisture. This is gentle treatment method which keeps all nutrition substances without degradation. Antioxidant activity was evaluated by DNA-Based biosensor, according to Heilerova et al. (2003). The polyphenols content was determined by spectrophotometer Folin-Ciocalteu agent with the tannin as reference standard (Singleton et al., 1999). The correlation analysis was evaluated by software SAS 9.1.3. Statistically significant correlation ( $P < 0.05$ ) between polyphenol content and antioxidant activity was determined. Higher values of contained polyphenol (1.92-fold) and antioxidant activity (6.25-fold) were detected in *B. napus* pollen versus *H. annuus* L. pollen. The polyphenols content in studied samples was in the range from 799 to 1550 mg.kg<sup>-1</sup>. The antioxidant activity of bee pollen samples occurred in the range from 0.2 to 1.28. The antioxidant activity significantly differs in different plant species. In the future studies is necessary to orient research to other antioxidant and nutritional properties of bee pollen; and to compare them between individual plant species. This work was supported by APVT-20-026704, aAV/1121/2004.

KEYWORDS: antioxidant activity, polyphenols, bee pollen, *Brassica napus* subsp. *napus* L., *Helianthus annuus* L.

## ANTIOXIDANT EFFECTS OF PLANT PHENOLS

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### ABSTRACT

Food of plant origin often contains compounds with antioxidant activity in foods and in organisms. Besides ascorbic acid, tocopherols, carotenoids, glucosinolates and other natural compounds with antioxidant activity there is also a large group of phenolic compounds. The main active antioxidants are phenolic acids and their esters and glycosides, flavonoids and catechins. Their effect depends mainly on the phenolic structure. Some phenolics, for example anthocyanins or simple derivatives of benzoic acid are practically ineffective. On the other hand some derivatives of cinnamic acid, many flavonoids and catechins have an extremely high antioxidant activity. Vegetables are the main source of active phenolics containing mostly moderately active flavonoids. Fruit contains predominantly less active anthocyanins, and the content of more active flavonoids is usually low. A more remarkable content of active compounds is present in some berries, for example in blueberries or cranberries. Compounds with a very high activity can be found in some lesser-known plants (e.g. buckwheat contains high amount of rutin) and especially in some herbs and green tea. The total antioxidant effect in plant material depends not only on the phenolic compounds content and composition, but also on the content of other antioxidants, for example ascorbic acid. Besides that, synergism or antagonism between the main active compounds can occur. Therefore it is difficult to predict the antioxidant activity in real materials and it is necessary to determine the total antioxidant activity experimentally. There are several methods used for antioxidant activity determination based on free radical inhibition by antioxidants (FRAP, ORAC, DPPH etc.).

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KEYWORDS: antioxidants, phenolics, flavonoids, catechins

## ESSENTIAL ANTIOXIDANTS IN ROMANY CHILDREN IN THE EASTERN SLOVAKIA

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### ABSTRACT

Within the research 400 children at the age of 1 to 15 years from the various regions of the eastern Slovakia were examined. The first set consisted of 130 Romany children from the above-mentioned regions. The second one – control group (KS-90) consisted of non-Romany children and children in both groups were at the age of 1 to 5 years of life. Out of the wide spectrum of examinations we aimed at the anthropometric parameters such as body weight, body height and BMI (kg.m<sup>-2</sup>) values. Pot of the essential antioxidants we aimed at the determination of the concentration of vitamin A, E, and C with respect to seasonality. Blood was collected in the fasting state by a standard way and vitamin concentrations were determined using the liquid chromatography (HPLC). The values measured were processed by the programme Arcus BioQuickstat and Mann Whitney test for expression of the difference significance degree of selected parameters between both groups. Romany children in comparison with non Romany ones were shorter and had lower values of body weight. The BMI values, used for indication of the degree of obesity, revealed no statistically significant differences between boys and girls. The mean BMI values was higher in majority population ( $16.49 \pm 2.31$  vs.  $14.62 \pm 1.8$ ,  $p < 0.05$ ). Statistically significant changes in essential antioxidants were recorded in the values of the concentration of vitamin A in Romany children ( $3.73 \pm 1.62$  vs.  $3.87 \pm 1.13$ ,  $p < 0.01$ ), vitamin C ( $29.19 \pm 9.55$  vs.  $37.84 \pm 8.42$ ,  $p < 0.001$ ), and vitamin E ( $10.06 \pm 3.04$  vs.  $16.49 \pm 2.31$ ,  $p < 0.001$ ) compared to majority population. Protective effect of antioxidant nutrients such as vitamins A, C, and E emphasised its significance in the risk prevention of so-called free-radical diseases, especially cardiovascular and oncological ones. Research of more studies brings facts about inversion relationship between the intake of vitamins and their concentrations as well as the risk of onset and development of diseases. VEGA 1/4232/07

KEYWORDS: antioxidants, Romany population

## TOTAL PHENOLICS CONTENT AMONG SELECTED PLUM GENOTYPES

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### ABSTRACT

Fruits contain a range of phenolics compounds which have been implicated in improving human health. Our objective was to determine the amount of total phenolics in plum fruits. Genotypic variation in total phenolic content was evaluated using three cultivars of *Prunus domestica* var. *juliana* (Bluma, Durancie, Kulovacka) and three cultivars of *Prunus domestica* var. *pruneauliana* (Pavluvka, Svestka domaci, Wangenheimova). These varieties are typical and well adapted in the White Carpathians region which was established as Protected Landscape Area. Moreover, for the comparison, total phenolics content was measured in three widespread cultivars of *Prunus domestica* var. *juliana* (Augustinka, Bryska, Kirkeho) and three cultivars of *Prunus domestica* var. *pruneauliana* (Hamanova svestka, Stanley, Vlaska). Average sample was harvested from six trees of each cultivar (from each tree 10 fruits) of the same locality. For extraction buffer (HCl:methanol:water, 2:80:18 v/v/v) was used. Phenolics compounds were extracted at 50 °C for 2 h using a horizontal shaker-water bath. The plum fruit extracts were measured with spectrophotometer (apparatus LIBRA S6). Total phenolic content was conducted using Folin-Ciocalteu reaction, with gallic acid (GAE) as the

standard. The higher contents were determined in the local varieties characteristic of the White Carpathians region. It is interesting to note the diversity in the concentration of phenolic compounds (227 – 495 mg GAE.100 g<sup>-1</sup> FW). The highest amount of phenolics was observed in 'Svestka domaci' variety.

KEYWORDS: plums, phenolics, local varieties, White Carpathians

## THE IMPROVEMENT OF THE EFFICIENCY IN TREATMENT OF BURN PATIENTS UNDER ECOLOGICALLY CONDITIONED IODINE DEFICIENCY

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### ABSTRACT

The functional status of hypophysis-thyroid system, the provision of the body with iodine and fluorine in patients with burn diseases inhabiting regions with ecologically conditioned iodine-fluorine deficiency has been investigated in the dynamics of the conventional treatment as well as in combination with iodine-fluorine correction. The peculiarities of the reaction concerning the function of hypophysis-thyroid system in patients with burn diseases in the dynamics of the conventional treatment has been shown. It was estimated that the victims of the burn in the stage of a shock have the inhibition of the function of the thyroid gland with the decrease of the reserves T4 in the serum of blood; blocking excretional function of kidneys including KI, NaF, decreasing of the reserves of iodine in the serum of blood by the increasing of their losing under the burned surface. The following development of the burned disease by the conservative treatment with using of csenoplastics on the fone of decreasing reserves of iodine of the body is expressly stimulated the hormonal function of thyroid gland with its decreasing to 15-17<sup>th</sup> days; that stimulates the tissue conversion of T4 and supposing of the extrimly increased levels of T3 in the serum of blood and under the reconvalisation. Iodine-fluorine correction supports the possibility of the adequate hormonoproduction of the thyroid gland to answer the stress from the trauma and hormonal activation of immunial system to provide the stable undesirable influence of the environment.

It has been established that the tandem application of KI and NaF in the combined therapy with patients suffering from burns corrects the thyroid gland function efficiently as well as the iodine hormone provision of the body, improves markedly the wound process proceeding and the efficiency of surgeries, cosmetologic and functional results in the period of reconvalence, reducing the term of burn-wound healing.

KEY WORDS: burn patients, hypophysis-thyroid system, iodine-fluorine correction

## PREVENTION PROGRAMME "VEGETABLES AND FRUIT 5x DAILY!" –PRACTICAL RECOMMENDATIONS FOR SUPPLY OF ANTIOXIDANTS

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### ABSTRACT

The aim of this Prevention Programme is to achieve WHO recommended consumption of 400 – 600 g of different kinds of, preferably fresh, vegetables (not potatoes) and fruit each day and so contribute to reduction of risk of diseases where antioxidants contained in vegetables and fruit play a part. To promote the adoption of these recommendations, relevant information concerning the benefits, availability, choices, preparation and suitable combinations of various kinds of vegetables and fruit, has been prepared and published in both, print and electronic format, to suit respectively

laymen, experts, children and adults. Manuals were prepared to aid the acquisition of this dietary pattern. An indispensable part of this Programme is co-operation with the Media and organising health-educational activities for all target groups. Meals prepared from vegetables and fruit have low energy content, they are easy to prepare, tasty and satious. Vegetables and fruit are readily available all year round nowadays. To counteract assertions, that it is financially prohibitive to achieve this standard and that it is not possible to eat 5 portions of vegetables and fruit every day, we prepared dietary schedules for each day of the week, including information on the amount of energy and vitamins. Financial comparison is also made with the cost of cigarettes, alcohol, sweets, fast food and food supplements. The main argument continues to be that adoption of these recommendations is a very good investment in one's own health. Experience, gathered from the application of this programme, justifies optimism in „5x/ Day“ becoming an indispensable part of dietary habits for the majority of population.

KEY WORDS: prevention programme, antioxidants, vegetable, fruit, health.

## INTERDISCIPLINARY DIALOGUE ON POTENTIAL HEALTH BENEFITS FROM BLUE HONEYSUCKLES (*LONICERA EDULIS* TURCZ. EX FREYN), (*LONICERA KAMTSCHATICA* L.) AND THEIR HYBRIDES WITH RESPECT TO COMBINATORIAL INVESTIGATION OF ANTIMICROBIAL EFFECTS AND ANTIOXIDANT PROPERTIES

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### ABSTRACT

Among the foodborne diseases, bacterial infections have been previously thought to be eliminated by the end of last century. Keeping in timeline of several past decades, both chronic gastrointestinal infection such as food intoxication are growing public health problem worldwide. From the environment, microbial contamination may enter the agricultural food chain via crops such as fruits or vegetable and cause two types of food poisoning. Although natural products are susceptible to contamination during growth, harvest, and post-harvest processes, antimicrobial properties of several antioxidant-rich plant foods have been described. Among the neglected or underutilized crops, many of less common fruit species meets this regard. The purpose of the study was to investigate antibacterial activity of fruit juice obtained from Blue Honeysuckles (*Lonicera kamtschatica* L.), (*Lonicera edulis* Turcz. ex Freyn) such as their interspecific hybrids against two bacterial strains. (*E. coli*) and (*Salmonella enterica*) a causative agents in foodborne problems, were routinely maintained at 37°C. A sensitivity test was carried out on agar cultures by application of paper discs (1 mm in diameter) impregnated with 0.1 and 1 ml of fresh juice. Following 24 hour exposure, anti-bacterial activity

was measured and expressed in terms of the diameter of zone of inhibition. Furthermore, HPLC-ED profile of the fruit samples was investigated to find out a relationship between antioxidant and antibacterial properties. Finally, data from both experimental and analytical measurements were applied to Pearson's chi-squared test. Resulting correlation coefficient indicated a statistically significant linear relationship between total phenolic content ( $\text{mg}\cdot 100\text{ g}^{-1}$ ) and antibacterial activities against (*E. coli*) and (*Salmonella*). However various parts of *Lonicera* shrub had been utilized in urban medicine for many decades, only recently, several phenolic matrix constituents have been suggested as the main compounds responsible for the health benefits of Blue Honeysuckles. With respect to emerging burden of food-borne problems, it is widely accepted that there is an urgent need for diet with specific antimicrobial properties to prevent food-borne diseases. Based on our results, antioxidant formation observed in Blue Honey berries may inhibit growth of examined both gram-negative bacterial strains.

KEYWORDS: (*Lonicera edulis* Turcz. ex Freyn), (*Lonicera Kamtschatica* L.), HPLC-ED, TAC - CoulArray, DPPH test, (*E. coli*), (*Salmonella*)

## ACUTE MYOCARDIAL INFARCTION AND TOTAL PLASMA ANTIOXIDANT CAPACITY

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### ABSTRACT

The ample data indicate that excessive production of reactive oxygen species plays critical role in the progression of ischaemic-reperfusion injuries including acute myocardial infarction (AMI). In the current study, the dynamics of oxidative stress markers was evaluated in patients with acute myocardial infarction (AMI) treated by primary percutaneous coronary intervention (PCI). Thirty consecutive patients with ECG-verified ST-elevation AMI were included. Total plasma antioxidant capacity (TAC) was evaluated. Peripheral venous blood samples were obtained prior to reperfusion and at five time points after reperfusion. The control group consisted of 20 ischemic patients without acute coronary syndrome. TAC in the AMI group at admission was lower than in control patients ( $1.26 \pm 0.32$  vs.  $1.52 \pm 0.24$   $\text{mmol}\cdot\text{l}^{-1}$ ). Within 1 h after reperfusion, in most cases, values significantly declined (1 min,  $1.10 \pm 0.33$   $\text{mmol}\cdot\text{l}^{-1}$ ; 1 h,  $1.06 \pm 0.21$   $\text{mmol}\cdot\text{l}^{-1}$  [ $p = 0.03$ ]). After 3 h, values began to increase ( $1.14 \pm 0.29$   $\text{mmol}\cdot\text{l}^{-1}$ ) and returned to basal values after 3d ( $1.29 \pm 0.24$   $\text{mmol}\cdot\text{l}^{-1}$ ). Reperfusion of the occluded coronary artery by PCI in AMI lead to an immediate decrease in TAC, suggesting formation of reactive oxygen species.

KEYWORDS: acute myocardial infarction, primary percutaneous intervention, free radicals, antioxidants, total plasma antioxidant capacity

## VOLTAMMETRIC DETECTION OF NUCLEIC ACIDS BY USING OF CARBON ELECTRODE

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### ABSTRACT

We analyzed all four nucleic acid bases – adenine, guanine, cytosine and thymine in the presence of 0.1 M phosphate buffer with pH = 6.0. Well reproducible data were obtained under this condition. Moreover under the same conditions the genomic DNA, both in native and denatured state, was analyzed. In comparison to native DNA the same concentration of the denatured state gave approximately 40% higher signal. In the following experiments the change of the oxidation signal of the nucleic bases on their increasing concentration was determined. The calibration curves with correlation coefficient higher than 0.98 were measured for the single bases. The detection limits evaluated at the fabricated electrodes were 0.2  $\mu\text{M}$  for cytosine, 1.5  $\mu\text{M}$  for guanine, 0.8  $\mu\text{M}$  for thymine and 1.5  $\mu\text{M}$  for adenine. The detection limit of native DNA was of about 1.5  $\mu\text{g}\cdot\text{ml}^{-1}$  and the detection limit of denatured DNA was 0.5  $\mu\text{g}\cdot\text{ml}^{-1}$ .

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KEYWORDS: DNA signal, DNA damage, electrochemical detection, oxidative markers

## MODERATE INTAKE OF ALCOHOL – BENEFIT OR RISK?

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### ABSTRACT

Moderate intake of alcohol reduces the incidence of death from Coronary Disease, in comparison with total abstinence or excessive intake. Beneficial effect is believed to come from both, alcohol and flavonoids contained in alcoholic drinks. Majority of beneficial effects of flavonoids depends on their structure; some flavonoids do not have all the beneficial properties, ascribed to them. Alcohol has also harmful properties. It increases the incidence of a number of tumours, particularly of carcinoma of the breast and digestive system, it is a risk factor for chronic pancreatitis and other illnesses. Moderate intake of alcohol in pregnancy is probably not harmful to the fetus. Pregnant women should however abstain from alcohol completely, because it is impossible to determine the upper limit of tolerable consumption. Even low blood levels of alcohol impair the abilities of a driver in many ways, particularly his ability to respond to changes in traffic situation, co-ordination of movement, visual functioning, assessment of distance and speed. Alcohol increases aggressivity and willingness to take risks.

KEYWORDS: alcohol, flavonoids, effects, recommendations

## PRO-INFLAMMATORY NUTRITION COMPONENTS – END PRODUCTS OF NON-ENZYMATIC REACTIONS AND THEIR IMPORTANCE IN THE GENESIS OF THE CHRONIC DISEASES

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### ABSTRACT

Advanced glycation end products (AGE) formed during non-enzymatic glycosylation (Maillard reaction), advanced lipoxidation end products (ALE) produced by lipid peroxidation, and advanced oxidation protein products (AOPP) represent the most important dietary compounds that accumulate within the internal environment during life span. They are often regarded as one of many causations having negative influence on health and causative agents of global chronic diseases burden. These non-enzymatic reactions are mutually interrelated and the products of each reaction influence the other. These processes proceed both within an organism and particularly during industrial technologies of food preparation or making food safer. The role of nutritional AGE/ALE/AOPP accumulated and deposited in vivo and their possible relationships to various chronic diseases is discussed.

KEYWORDS: pro-inflammatory components, nutrition, non-enzymatic reactions, end products

## ADAPTOGENIC EFFECTS OF PLANT POLYPHENOLS IN CONDITIONS OF ACUTE EMOTIONALLY-PAINFUL STRESS FOR RATS

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### ABSTRACT

It were studied protective effects of Phytosed, drug PP1 and Diazepam on state of organism and rat's behaviour in acute emotionally-painful stress (EPS) (once at 3 hours) (Desiderato et al, 1974) in experiments on 30 white male rats. "Phytosed" (Ukraine) (1.0 ml.kg<sup>-1</sup>), laboratory drug PP1 (0.4 ml.kg<sup>-1</sup>) from wheat leaves and Diazepam (1.25 ml.kg<sup>-1</sup>) were injected per os 60 min. before EPS. Phytosed – sedative drug, contains extracts from fruits of Crataegus, coriander, Avena; herb of Melissa, Leonurus. Its composition includes coumarins, phenolic acids, polyphenols (PP): quercetin, apigenin, luteolin and their glycosides; in PP1 composition – vitexin, isovitexin, orientin, isoorientin. EPS was estimated at relative mass (RM) of target organs; ulcerogenic effect; cellular composition of blood (CCB). Rat's behavior was estimated by CAR-method (Conditioned Avoidance Response) for 3 min. (Costall et al., 1988), based on rat's natural ability to hide in hole saving from danger. Plant: 2 cells – light and dark (20×30 cm) with a hole between them. EPS caused an anxiety in rat's behaviour. Rats behaved calmly under the influence of Phytosed and PP1, spent more time in dark cell, was reduced amount of crossings, that says about anxiolytic effects of drugs. RM of rat's spleen was reduced in EPS. Phytosed normalized this index. RM of test-organs under the influence of Diazepam and PP1 corresponded with datas of intact group. Phytosed and PP1 protected mucous coat of stomach (MCS), reduced rate of erosions and ulcers on 50% and Diazepam – on 14.3% (for intact group – 5.7%). Phytosed reduced severity of MCS affect by ulcers in 2.9 times, and PP1 – 6.3. EPS increased amount of neutrophils in blood in 2.7 times; decreased amount of eosinophils – in 1.9 and lymphocytes – in 3.2 times. PP drugs influenced positively on CCB. Phytosed and PP1 totally normalized CCB index of stressed rats. Analysis of results indicatives of brightly expressed protective adaptogenic properties of plant PP drugs in EPS at rats.

KEYWORDS: acute emotionally-algesic stress, plant polyphenols, Diazepam, adaptogenic effects



## ANTIOXIDANT PREVENTION OF AN ORGANISM – SOURCES AND EFFECTS OF ANTIOXIDANT SUBSTANCES

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### ABSTRACT

Free oxygen radicals, reactive oxygen species (ROS) like singlet oxygen, hydroxyl radicals, peroxide and superoxide anions generate during various chemical processes in the external environment, processing of foodstuffs and also during metabolic, immune and pathological responses within an internal milieu of an organism. These reactive compounds interfere with cell-cell communications in tissues e. g. in membrane signal transitions, which could induce decrease of immune functions, acceleration of ageing processes and finally, may contribute by a great degree to the genesis of chronic diseases including tumors. These unfavorable interferences are neutralized by antioxidant protection, in which mainly vitamins (A, E, C, D), trace elements bound within antioxidant enzymes like Se, Zn, Cu, and Mn, and other various substances (coenzyme Q<sub>10</sub>, glutathione, lipoox acid, taurin, carotens, flavonoids, often contained in fruits, vegetables and spices like rosemary, citruses, berries, Chinese herbs) are included. Antioxidant with universal effects is unknown. This is a reason why the natural sources containing mixtures of antioxidant substances are so important for the complex prevention of detrimental consequences of oxidative stress. Various nutritional supplements which combine the most effective antioxidants have the same value. The vitaminized preparations supplemented by dietary nucleotides, quercetin, and Zn could serve as examples.

KEYWORDS: reactive oxygen species, antioxidants, vitamins, microelements

## ANTIOXIDANT PROPERTIES OF SELECTED TRADITIONAL AND NON- TRADITIONAL FRUIT SPECIES

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### ABSTRACT

The aim of this work was to evaluate the antioxidant properties of some selected traditional and non- traditional species of fruits, especially their content of anthocyanins (method by Fuleki and Francis, 1968), vitamin C (method by Lásztity and Törley, 1987) and their antiradical activity (method by Brand- Williams et al., 1995 and Sánchez- Moreno et al., 1998). All of the selected species of fruits are natural sources of vitamin C. The highest amount of vitamin C was evaluated in *Ficus carica* and in apple cultivar Primula. It was detected a small amount of anthocyan pigment in *Ficus carica*. The other species of fruits do not contain this plant pigment. Analyzed species of fruits had high antiradical activity. The value of antiradical activity was the higher than the content of vitamin C and anthocyanins higher was. However the selected species of non- traditional fruits possess higher antiradical activity than the traditional species. The highest level of antiradical activity was evaluated in *Ficus carica* and *Passiflora mollissima*. Selected species of non- traditional fruits due to their content of anthocyanins and vitamin C with high antiradical activity should be included in the diet more often, especially by prevent and treat chronic diseases.

KEYWORDS: vitamin C, anthocyanins, antiradical activity, DPPH', antioxidants, fruit, health

## BIOLOGICAL CHARACTERISTIC OF SELECTED SPECIES OF VEGETABLE

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### ABSTRACT

The aim of this work was to characterize the biological properties of selected vegetable species based on the evaluation of their vitamin C content and antiradical activity. The measurements were carried out on the spectrophotometer of type Thermo Spectronic at the characteristic wavelength. The reduction property of ascorbic acid was used to evaluate the vitamin C content. To evaluate the antiradical activity of extracts a method based on the reaction of antioxidants with stable radical 2,2-diphenyl-1-picrylhydrazyl-hydrate (DPPH) in methanol solution was used. It was shown, that pepper of the variants 'Imeľská' ( $154.95 \text{ mg} \cdot 100 \text{ g}^{-1} \pm 5.94 \text{ mg} \cdot 100 \text{ g}^{-1}$ ) and 'Nesvadská' ( $141.68 \text{ mg} \cdot 100 \text{ g}^{-1} \pm 6.02 \text{ mg} \cdot 100 \text{ g}^{-1}$ ) are the richest sources of vitamin C. The lowest vitamin C was measured in celery of the variants 'Onion' and 'Kompakt' among the analysed plant materials. Analysed vegetables showed high antiradical activity, whereas the highest DPPH-scavenging ability was observed in peppers of both variants (variant 'Imeľská'  $79.05\% \pm 1.65$ ; variant 'Nesvadská'  $65,18 \pm 2,20$ ). The lowest antiradical activity was shown cabbage of the variants 'Pourovo polopozdní' and 'Polar'. The analysed vegetables are suitable sources of vitamin C, particularly pepper. Their consumption can be recommended more often, because they can provide natural antioxidants and can protect the organism against toxic free radicals due to their high antiradical activity.

KEYWORDS: vegetables, vitamin C, antiradical activity

## NUTRITION EFFECT ON OXIDATIVE DAMAGE PRODUCTS OF LIPIDS, PROTEINS AND DNA

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### ABSTRACT

Damage of molecules as a consequence of oxidative stress has been implicated in the pathogenesis of chronic diseases related to aging. Diet is a key environmental factor affecting the incidence of these diseases. Antioxidant substances in such diet enhance DNA, protein and lipid protection by increasing the scavenging of radical oxidative species that occur during metabolic reactions. The main goal of this study was to assess the products of oxidative damage to lipids, proteins and DNA in relation to nutrition and age. Here we compare two nutritional regimens: vegetarians vs. non-vegetarians (traditional mixed diet - general population). In young subjects, no differences in values of oxidative damage were observed between vegetarian and non-vegetarian groups. In older vegetarian group vs. non-vegetarian group significantly reduced values of DNA breaks with oxidised purines, DNA breaks with oxidised pyrimidines and lipid peroxidation were found. Significant age dependences of measured parameters (increase in all oxidative damage products in older women) were noted only in non-vegetarians. Vegetarian values of older women vs. young women were similar or non-significantly changed. The results suggest that increase of oxidative damage in aging may be prevented by vegetarian nutrition.

KEYWORDS: oxidative damage, vegetarians

## UTILIZATION OF HYPHENATED CHROMATOGRAPHIC AND ELECTROCHEMICAL TECHNIQUE FOR EVALUATION OF FUNCTION FEEDSTUFF

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### ABSTRACT

Antioxidative and anti-inflammatory properties are hypothesized for natural phenolics, a group of plant secondary products that may positively impact neurodegenerative diseases. In these studies, phenolic-rich extracts from less common fruit species: Blue honeysuckle (*Lonicera edulis*, Turcz. ex. Freyn), Saskatoon berry (*Amelanchier alnifolia* Nutt.) and Chinese hawthorn (*Crateagus pinnatifida* Bunge) were obtained and analyzed to detect neuroprotective substances content and establish a potential therapeutic value. High performance liquid chromatography with electrochemical detection was optimized and further applied on analysis of the extracts of less common fruit species. It was observed that Chinese hawthorn and Blue honeysuckle extracts are potent source of neuroprotective phenolic antioxidants.

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KEYWORDS: phenolic compound, electrochemical detection, fruit, chromatography, neuroprotective food

