Basketball is an alternate aerobic-anaerobic activity [1–2], a sport of resistance and duration, characterized by energetic and intermittent work, followed by moments of rest and/or less intense exercise. The most important energetic process for the basketball performance is the anaerobic-alactacid phase. Of secondary importance is the anaerobic-lactacid phase, less relevant is the aerobic one. The athletic capacity to utilize aerobic energy is due to the percentage of muscular fibro cells present in the muscle: Type II (white or fast), and Type I (red or slow).

This is the reason why the Type II fibers prevail during the best performance.

During a basketball game the muscle utilizes first glucids, and then lipids to regenerate ATP from ADP and inorganic phosphate. Sophisticated mechanism control the availability of this substrate, in harmony with the energetic demand of the muscle, according to the intensity and duration of the practice [3–4].

During the short but intense activity the glucids are the best energy providers. Instead, during long efforts, fats are the muscle best providers.

For an optimal daily diet, the glucids must exceed the recommended amount for the Italian population, reaching above 60% of the total intake, while the fats need to be reduced according to the proportion.

The basketball player will have the following nutritional diet:
- GL. 58%; or: – GL. 60%; or: – GL. 62%;
- L. 26%; – L. 26%; – L. 25%;
- P. 16%; – P. 14; – P. 13%;
Leaving the food choice to the athlete, according to his taste.

Bibliography

PS.L2
The Challenge to Increase Physical Activity in School-Age Children: The Pilot Study ‘It’s Time to Move’
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Physical activity is important for a healthy life. Research shows that children need plenty of exercise for a normal growth and development. The recommended amount of physical activity for this age group is 60 minutes or more. Despite the benefits of exercise many children do not meet the recommended guidelines. The main objective of this study was to develop and test a methodology to stimulate exercise in children. The target is to achieve a shift of 30 minutes from sedentary behaviour to 30 minutes of active behaviour. Different methodologies of communication were used in order to involve parents, children and teachers in the project.

The pilot study was implemented at a primary school and lasted for six weeks. One class of 22 children (13 boys and 9 girls) was included. At baseline an anthropometric evaluation was done (weight and height) and tests of fitness (endurance, strength and co-ordination) were performed. A lifestyle questionnaire and a three-day record for daily activities were submitted to collect information about the use of time and the attitude regarding exercise. Heart rate monitors were used in a small group (8 children, 5 boys and 3 girls) to validate the three-day record data collection.

During the intervention a weekly meeting with the children was held. For each meeting we set a specific goal. To achieve this goal we played games with the children and had a discussion about activity topics. The children received a game book and activity cards to use at home and they had to tell us about their efforts. At the beginning of the study parents and teachers filled in a questionnaire and attended a presentation. They received a practical guide about ways to increase physical activity in children. During the study the parents had to encourage their children in their changes.

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PS.L3
Comparison Between Anthropometric and Bioelectrical Impedance Analysis in Estimating Body Composition in a Sample of Athletes
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Introduction: Body composition and energetic balance are two variables influencing the nutritional status in a subject; in the long
term, body composition is the best indicator because it reflects the previous availability of nutrients, whereas the energetic balance is responsible for changes in the short term.

At present one of the most used index in the evaluation of the ideal weight is BMI, whose importance is well correlated with mortality rate.

To determine body composition, the techniques usually used are anthropometry and bioelectrical impedance analysis. Data obtained by both methods associated with body density allow to obtain the percentage of body fat using Durnin and Siri’s mathematic equations.

Objectives: As anthropometry and bioelectrical impedance methods used to assess body composition do not always give imposable results, the aim of our study was to analyse both methods and compare the results obtained.

Subjects and Methods: The study group consisted of 43 male athletes at agonistic level divided into two categories semi-professional footballers and amateurs. The survey was carried out in two stages: survey of nutritional consumption, determination of anthropometric parameters and body composition by means of plicometry and monofrequency impedance.

Results: The anthropometric survey allowed as to affirm that amateurs show a 24.6 mean value of BMI in comparison with 23.4 of semi-professionals and the assessment of body composition that lean mass (FFM) was higher in semi-professionals compared with amateurs. In the whole sample and in the amateur group the mean evaluation of FM determined by BIA exceeds the plicometric one of 4.2% and the correlation of TBW obtained by the two methods appears to be highly significative. The same correlation exist between FM value determined by the two methods and between FM obtained by both methods and BMI. The two methods we analysed show limits mailing due to the assessment of body density, and particularly in the athletes as it is impossible to correctly evaluated the changes in consequence of training.

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The aim of the study was to investigate the influence of exercise on oxidative stress in group of young sportsmen and a role of protein intake in human defence against free radicals.

The research was carried out on over a hundred youth of different physical activity (15–18 years old). To check out the influence of physical activity and protein intake on body composition, the urea excretion, fat mass and creatinine excretion were measured. The fat mass was assessed by bioimpedance analysis. The protein intake and muscular mass were counted using biochemical parameters.

The obtained results indicate that physical activity influences body composition. Body Mass Index value was dependent on physical effort in group of girls (p < 0.05). The low level of fat tissue was observed in group of adolescents physically active. There was significant difference (p < 0.05) in fat mass between sportsmen (boys 5.38% ± 3.38 girls 16.06% ± 5.08) and youth of average activity (boys 11.02% ± 5.32 girls 25.92% ± 6.51). We came to a conclusion that protein intake corresponds to fat mass. No significant changes were observed in muscular mass following the protein intake. The study demonstrates that in spite of energy balance there are some abilities to increase body fat mass and change the body composition.

Low protein diet can be associated with higher consumption of fat and carbohydrates because of energy balance. If protein intake is too low, carbohydrates and fat must be supplied in greater amounts. The high physical efforts and low caloric diet observed in group of ballet dancers and runners may lead to very low level of fat tissue.

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often restrict calorie intake to maintain low body weights. Anthropometric parameters and body composition data are, in turn, useful in evaluating nutritional status, and make it possible to assess the existing degree of malnutrition. The aim of this study was to evaluate the nutritional status of 3 groups of young females 1) 22 elite rhythmic gymnasts (RG) (48 h/wk of physical exercise); 2) 10 elite artistic gymnasts (AG) (40–48 h/wk of physical exercise) and 3) 50 volunteer students (C) (<12 h/wk of physical exercise).

Methods: Fourteen volley male athletes (mean ± s.e age: 16.4 ± 0.4 y), after a period of general training (t0) were categorized into following groups: A (aerobic ability, n = 7); B (anaerobic ability, n = 7). All the exercises were accomplished 4 times a week with a duration of 60 min. At t0 ad after 45 d (t1) body composition was evaluated by a validated bioelectrical impedance spectroscopy (BIS) technique (1), using a XITRON 4,200 apparatus (Xitron Tech., Inc., San Diego, CA, USA). At the same time abdomen circumference (AC) was measured with an anelastic meter and skinfolds thicknesses (triceps, biceps, subscapular, suprailium, abdominal, medial thigh and calf) with a skinfold caliper (Holtain Ltd, UK). The following measures and indexes were obtained: BMI (body mass index), FFM free fatty mass), FM (fatty mass) ICW (intra-cellular water) ECW (extra-cellular water), RECF (resistance of extra-cellular fluids), RICF (resistance of intra-cellular fluids). The ANOVA test (SPSS v10.0) for repeated measures was utilized for statistical analysis. Parameters tested, the nutritional status of sportswomen might be damaged, as the imbalance of the intense exercise and energy intake is even more enhanced due to their restricted diets.

Results: Significant differences were found for some selected parameters measured at different times (see table). Any statistical significant difference was observed between the two training programs.

Conclusions: The reduction of BMI observed after 45 d of training was independent from the type of exercise program, with a significant increase of FFM. ICW shown a not statistically significant increase which is supported by a significant reduction of RICF. The fat reduction was particularly evident for lower limb which are heavily interested in the volley training exercises.

Reference

PS.L8
Correlates of Meeting Physical Activity Recommendations in Middle-Aged French Men and Women: Results from the SU.VI.MAX Study

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Objective: To investigate, in free-living French adults, sociodemographic and geographic correlates of meeting current recommendations for physical activity.

Methods: Past-year leisure-time physical activity and sedentary behavior (TV watching) were assessed cross-sectionally using the Modifiable Activity Questionnaire in 3,404 men and 4,000 women from all over France included in the French Supplementation with Antioxidants and Minerals (SU.VI.MAX) Study.

Results: 62% of men and 52% of women achieved recommended levels of activity. In both sexes, moderate-intensity activities were the major contributor to total time spent in activity. The contribution of time spent in vigorous activities decreased with increasing age; however, in each sex and age class, it was about twice higher in subjects meeting recommendations. Multivariate logistic regression analyses showed that the likelihood to meet recommended levels was higher in subjects aged ≥ 60 y compared to those aged 45–49 y (OR [95% CI]: 1.81 [1.46–2.26] in women, 1.98 [1.48–2.66] in men), in women with a university level compared to those with primary education (1.21 [1.00–1.47], in women living in rural municipalities compared to those living in urban poles (1.39 [1.15–1.68]), and was
lower in current smokers compared to never smokers. No association was found with TV watching neither in men nor in women.

Conclusions: Our data suggest that, in middle-aged French adults, the correlates of recommended activity differ by sex. And the influence of urban/rural location might differ from what is observed in the United States. These findings should be taken into account in designing national public health policies and interventions to promote health-related physical activity.

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**PS.L9**  
**Athletes’ Pyramid**  
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Information on dietary guidelines to optimize performance and knowledge on how to achieve a desired food and nutrient intake are not easily transferred to athletes. Generally endurance athletes have difficulty meeting the proposed goals for carbohydrate (CHO), whilst commonly exceeding fat and protein intake. They also use supplements in an indiscriminate way. Adequate diet for athletes in training should cover energy, CHO, protein and fat and provide vitamins, minerals, water and electrolytes. In order to help athletes visualize food groups and servings size that should be consumed to assure a nutritionally balanced diet an Athletes’ Pyramid was adapted. The Athletes’ Pyramid is divided in six levels. The base of the pyramid shows training as the main performance enhancement and the range of total energy expenditure (9.2 to 16.8MJ) for 8 to 10 hours of weekly training. The next level relates to body hydration. The food groups follow as: bread, cereals, pasta and roots (7 to 13 servings), vegetables (5 to 7 servings), fruits (4 to 7 servings), milk, yogurt and cheese (3 to 4 servings); meat, poultry and eggs (1.5 to 3 servings); beans and nuts (1 to 2 servings); fats and oils (1 to 2 servings); sweets (1 to 2 servings). The pyramid covers 60–65% CHO, 15–20% protein and 20–25% fat from total energy. Fruits and vegetables portions are increased in order to improve nutrient density of diet. The size of servings and examples of food items in each food group are shown on the corresponding side of the pyramid. If a well balanced diet is consumed there is no need for supplementation. In conclusion, unfounded nutritional practices may prevail among athletes while they fail to recognize sound scientific guidelines on optimal nutrition. The Athletes’ Pyramid is a tool to help athletes follow a well-balanced food-based diet.

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**PS.L10**  
**Effect of Branched-Chain Amino Acid Supplementation on Human Growth Hormone and Cortisol Secretions After Exercise**  
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The double-blind and counter-balance study investigated the effect of branched-chain amino acid (BCAA) supplementation on human growth hormone (HGH) and cortisol secretions induced by 25 min breast stroke exercise (60–70% maximum heart rate reserved, 60–70% HRR) and 600 m crawl stroke competition. Nineteen (19–22 years old) male university students with physical education majors were recruited in the study. Based on the swimming score of 600 m crawl stroke, the students were divided into two groups: Placebo (n=9, BMI = 24.2 ± 2.1 kg/m²; 12 g glucose/day; in capsule) and BCAA (n = 10, BMI = 22.7 ± 1.5 kg/m²; 12 g BCAA/day; in capsule: leucine 54%, isoleucine 19%, valine 27%) groups. Participants maintained regular diet intake and exercise activity with moderate/low intensity (60–70% HRR, swimming and rowing, ~1.5 hour/day) during the study period of two weeks. After 25 min breast stroke exercise and 600 m crawl stroke competition, plasma glucose concentration significantly decreased (p < 0.05) whereas plasma HGH, cortisol and lactate concentrations significantly increased (p < 0.05) in both groups. Plasma glucose and lactate concentrations were not affected by the dietary supplements during the entire study period. Hormones measured, however, were significantly increased (p < 0.05) by BCAA supplement. The HGH secretion of BCAA group was significantly enhanced (p < 0.05) after either form of the swimming exercise. In conclusion, either exercise or BCAA supplement would significantly affected plasma HGH and cortisol concentrations. The combined effects of exercise and BCAA supplement would be more manifested in the increased concentration of plasma HGH. It is suggested, with adequate high-quality protein intake, moderate/low intensity exercise, via high HGH secretion, could enhance the muscle mass development in adolescents, which would decrease the risk of obesity.

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**PS.L11**  
**Nutrition Knowledge, Beliefs and Practices of UK Tennis Coaches**  
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The purpose of this investigation was to measure nutrition knowledge, beliefs and practices of a sample of UK tennis coaches. It aimed to assess differences by qualification and gender, and correlations between the above variables, for the purpose of training development. Subjects (n = 54) completed a purpose made questionnaire with questions on knowledge, beliefs and practices. Descriptive statistics, ‘t’ tests and Mann Whitney tests for two independent samples and Spearman tests for correlation (K samples) were used for data analysis.
Overall, coaches scored 62% for nutrition knowledge, males scored higher than females (non significant $p > 0.05$) except for the questions on vitamins and minerals (female > male, $p < 0.05$ significant). The higher level coach groups (CCA/PCA) scored higher than Level 1 coaches (DCA) on all (but one) topics. Scores on questions on general nutrition were higher than for those on sports nutrition. However, the lower level group (DCA) showed stronger belief in sports nutrition than the CCA/PCA, this was significant ($p < 0.05$). There was no significant correlation between knowledge, belief and behaviour. 22% of coaches gave weight control advice; 42% provided drinks (15% advice). 8% or less of coaches had advised on supplements, meals, weight control, education (of parent or player). Coaches who had experience of playing at national level were most involved in provision of nutrition advice. The results indicate that coaches at all levels need increased training from qualified nutritionists, and more support with respect to sports nutrition.

**PS.M Nutrition and Ageing**

**PS.M1**

A Comparison of Different Methods to Estimate Height in Elderly

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Body weight and stature are the principal measures used in clinical practice to evaluate the nutritional status of individuals but some questions rise for elderly people. One of the main problems is that may be difficult or impossible to measure standing height, e.g. in non-ambulatory subjects or in persons with an important kyphosis. Other methods have been developed to estimate body height.

The aim of this study is to determine what is the most accurate method to estimate standing height in elderly.

A sample of 202 subjects (89 men and 113 women) aged between 70–85 years has been selected from an Italian population group of elderly able to stand and walk. These subjects represent the preselection sample of the European Zenith project ‘Zinc effects on nutrient/trend in health and ageing’.

For each subject body height, arm span (AS) and knee height have been measured according to standardised procedure. Stature has been also estimated by applying equations based on knee height developed by Chumlea et al. (HtCh 1998) and by Donini et al. (HtDo 2000).

The correlation coefficients are high for all height estimates ($r = 0.77–0.82$). AS exceeds significantly measured height (men: $6.3 \pm 4.0$ cm; women: $5.0 \pm 4.5$ cm; $p < 0.005$), while HtCh is nearer to measured height (men: $-0.4 \pm 3.6$ cm; women: $-0.9 \pm 3.4$ cm; n.s.). Significant differences are observed for HtDo (men: $-2.9 \pm 3.6$ cm; women: $-1.2 \pm 3.3$ cm; $p < 0.005$). Bland and Altman’s analysis shows that for AS and HtDo, differences decrease with the increase of the measured height.

In conclusion there is poor agreement between AS and standing height in elderly confirming that AS represents the maximum stature at maturity rather than current height. Better results are obtained using knee height especially when Chumlea’s equations are applied.

**PS.M2**

Short-Term Supplementation with Lutein Affects Biomarkers of Lutein Status Similarly in Young and Elderly Subjects


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There is evidence that lutein may protect against age-related macular degeneration, cataracts, cancers and cardiovascular diseases, but there no data has been published on the effect of age on lutein status. The purpose of this work was to determine whether there are major differences in the status of this carotenoid between young and elderly subjects. Initial lutein status and the effect of a five-week lutein supplementation (9 mg/d) on the most common markers of lutein status were compared in 12 young (26.9 ± 8.8 y) and 17 older subjects (67.3 ± 1.1 y). Lutein was measured by HPLC in fasting serum, adipose tissue and buccal mucosa cells (BMC) before and after supplementation. Macular pigment optical density (MPOD), which partly depends on retina lutein concentration, was measured by reflectometry before and after supplementation. Initial lutein status was not significantly different between the two groups, irrespective of the lutein status marker. Plasma and BMC lutein concentrations significantly increased in both groups after lutein supplementation, but not MPOD or adipose tissue lutein. Plasma and BMC responses to lutein supplementation (percent variation from initial values) were not significantly different between the two groups. These results suggest that there is no major effect of age on lutein status in healthy subjects.

**PS.M3**

Waist Circumference as a Determinant of Hypertension and Diabetes in Brazilian Women


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**Study Objective:** To evaluate the role of central adiposity, as evaluated by waist circumference measurement as an independent
Risk factor for hypertension and type 2 diabetes mellitus in a developing country setting.

**Design:** Population based cross sectional study.

**Setting:** A median size Southern Brazilian town participants: 1,085 non-pregnant women 20 to 69 years old, recruited by cluster random sampling between 1999 and 2000. Their mean waist circumference (WC) was 85.3 cm (SD = 13.9 cm) and 23.3% (n = 255) were obese (BMI over 30Kg/m²). The prevalence of hypertension and diabetes were 25.6% (n = 280) and 6.2% (n = 68) respectively.

**Main Results:** The risks of hypertension and diabetes were directly related to waist circumference measurement. Women with waist circumferences over 80 cm had increased risk of hypertension (odds ratio (OR) = 2.8; p = 0.013) than in those over 40 years old (OR = 1.27; p = 0.016). In the multivariable analysis, the odds ratios were 5.7 (p = 0.12) in those under 40 years old and 2.8 (p = 0.008) in older women.

**Conclusions:** Waist circumference is an independent determinant for hypertension and diabetes in women in this population. The stronger association between waist circumference and diabetes in younger women suggests the validity of this indicator to assess visceral obesity is age-specific. Further studies should validate the usefulness of waist circumference measurement in different age groups.

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**PS.M4**

Which Anthropometrical Markers are More Related to Fitness in Elderly Subjects?

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**Objective:** To assess which anthropometrical marker is more closely related to fitness levels among elderly subjects.

**Subjects and Methods:** Transverse study conducted among 478 women and 84 men, mean age 67 ± 7 and 71 ± 6 years, respectively. Height and weight were measured using analogical scales (Seca®); waist and hip by flexible ruler; % of body fat mass by manual bioimpedance (Omron BF-300®) and blood pressure by an automated device (Omron M-4®). Fitness levels were assessed using a validated functional fitness test (Faculdade de Motricidade Humana, Portugal).

**Results:** In men, weight was positively related to grip strength (r = 0.30; p < 0.01) and with the step test (r = 0.33; p < 0.004), whereas % of body fat was negatively associated with grip strength (r = −0.37; p < 0.002). Conversely, no relationships were found between body mass index (BMI) and all fitness parameters studied. In women, weight and BMI were positively associated with systolic (r = 0.11; p < 0.02) and diastolic (r = 0.24; p < 0.001) blood pressure levels and grip strength (r = 0.25; p < 0.001), and negatively associated with leg strength (r = −0.11; p < 0.02). Percent of body fat was also associated with an increase in systolic (r = 0.19; p < 0.001) and diastolic (r = 0.12; p < 0.02) blood pressure levels, and with a decrease in grip strength (r = −0.20; p < 0.001).

**Conclusion:** In elderly subjects, % of body fat is a better marker of fitness than body mass index.

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**PS.M5**

Are Nutritional Guidelines Against Cardiovascular Risk Factors Implemented in Elderly Subjects?

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**Objective:** To assess the prevalence of the main cardiovascular risk factors and their nutritional management among elderly subjects.

**Subjects and Methods:** Transverse study conducted among 397 women and 71 men over 50 years. Prevalence and nutritional prevention of hypercholesterolaemia, hypertension and diabetes mellitus were assessed by questionnaire.

**Results:** Prevalence of diagnosed hypertension was 47% in men and 42% in women. Only 52% of men and 61% of women with hypertension had dietary counselling, whereas all hypertensive subjects were medically treated. Prevalence of diagnosed hypercholesterolaemia was 37% in men and 43% in women. Again, only 61% of men and 71% of women with hypercholesterolaemia had dietary counselling, whereas 81% of men and 73% of women were medically treated. Prevalence of diagnosed diabetes mellitus was 9% in men and 10% in women, and over 80% of them had dietary counselling. The analysis of the dietary recommendations for hypertension showed that the main foodstuffs excluded were (in decreasing order): fats, sweets, fried foods and finally salt; for hypercholesterolaemia, the foodstuffs were fats and fried foods, and for diabetes sweets, sugars and other carbohydrates such as bread, whereas for all cardiovascular risk factors vegetables, fruit and fish were the most frequently recommended foods.

**Conclusion:** Prevalence of the main cardiovascular risk factors is high in this sample of Portuguese elderly; nutritional prevention is relatively low and needs to be implemented.
Old people commonly display a deficient status of B vitamins. Inadequate intake often contribute to this situation, but the role of metabolic changes remains unclear. Despite possible species particularities, the rat constitutes a valuable model for studying the mechanisms of the effect of ageing on B vitamin metabolism. Additionally, it allows to determine the consequences of variations in B vitamin intake at tissue and gene levels. To investigate changes caused by ageing and/or folate depletion, 18-months (OLD) and 4-months (YOUNG) aged rats were fed a diet with (FOL+) or without (FOL−) folates during 28 d. Plasma concentrations of folate, vitamin B6 and vitamin B12 in OLD rats were lower than those in YOUNG rats (P < 0.009; 0.072 and 0.012, respectively, with n = 7 rats/group). On the other hand, a slight (8%), but significant (P < 0.02), higher level of RBC folate was found in OLD rats, while homocysteinaemia was not significantly augmented in the latter (7.3 ± 2.8 μM) relatively to that of YOUNG rats (6.4 ± 1.8 μM). In both groups of rats, folate depletion caused a dramatic decrease in plasma folate concentrations with, however, a 12% increase (P = 0.04) or no change (P = 0.98) in RBC folate level in YOUNG or OLD rats, respectively. Moreover, the hepatic concentration of many folate forms was decreased in FOL− rats compared with FOL+ controls. Ongoing studies aim (i) to characterize the other forms of folate affected by folate depletion and/or ageing in rat liver and (ii) to identify changes in tissue gene expression occurring concurrently.

An important role for B vitamins on the prevention of hypertension have been suggested. However, there is still a matter of controversy about the side effects from megadoses. Therefore young (14 wk) and aging (40 wk) SHR and WKY fed a standard diet and water ad libitum were tested for the effects of vitamin B supplementation in different ways: (i) vitamin B6 or folic acid were supplemented at doses representing from 5 to 20 times their nutritional needs or (ii) vitamin B6 was associated to folic acid at dose corresponding to 5 times their respective RDA. The systolic blood pressure (SBP) was monitored by tail-cuff plethysmography. Folic acid or B6 at 5 × RDA did not provoke SBP alteration in SHR or WKY. However young SHRs under B6 supplementation at 20 × RDA present a significant (p < 0.05) SBP reduction from 170 mmHg (SD3.0) to 150 mmHg (SD3.0) without alterations of other biological parameters. WKY rats also presented a slight decrease of SBP but there was no statistical significance. Aging SHRs under B6 at doses 20 × RDA did not present SBP reduction instead there were signs of toxicity: dermatitis, ataxia, convulsion and death. At the same way, aging SHRs and WKY rats receiving the highest doses of folic acid presented a decrease of food intake and body weight spite a significant (p < 0.05) SBP reduction observed in both strains from 175 mmHg (SD3.0) to 155 mmHg (SD3.8) by SHR and 140 mmHg (SD2.5) to 130 mmHg (SD4.0) by WKY. Folic acid plus B6 resulted in significant SBP reduction of 20 mmHg by young and aging SHR without side effects, suggesting that combined therapy should be advisable instead of megadoses of an isolated B vitamin mainly for aging people.

The age structure of the population is expected to shift significantly in the future as a result of increased life expectancy and declining birth rates. Older people will account for a larger proportion of the population and it is predicted that the worldwide elderly population (people aged 65 years plus) will increase three fold in the next 50 years. An increasing number of older people in the population will have a significant impact on the prevalence of age-related disorders and will increase the burden on already stretched medical resources. Age is a risk factor is a wide range of degenerative diseases including cancer, cardiovascular disease, stroke and osteoporosis and also has a significant effect on joints, eyes, skin and cognitive function. There is therefore interest in ways of preventing and delaying age-related conditions and in particular, the role that diet may play in the progression of these processes. Increasing evidence about the role of nutrients on anti-ageing has already boosted interest in supplements for managing and preventing a variety of age related conditions. Typical examples include the use of glucosamine in alleviation of rheumatoid arthritis and lutein for the prevention of AMD, the major cause of premature blindness in Western countries. These nutrients/ingredients also offer the food industry the opportunity to develop manufactured products for consumers who are increasingly want to stay healthy and feel younger in later life. This presentation will summarise the evidence on the effects that certain dietary components may have on joint, eye, skin and cognitive functions, highlighting those ingredients which appear to offer most potential both in terms of efficacy and potential to add to foods. Examples of how some of these nutrients/ingredients have already been used in innovative food and drink products targeted at these health categories will be highlighted.
**PS.M10**

**Body Composition and Body Mass Index in Elderly Man**

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1Department Public Health Unit Nutrition, Acerra, 2Department of Neuroscience Nutrition Unit, University ‘Federico II’, Napoli, Italy

**Introduction:** The assessment of the physiological changes in the body’s composition with aging is important for to determine the nutritional status of the elderly. In clinical practice and epidemiological surveys, anthropometric measurements represent reference values for the study of nutritional status. These parameters permit detection of alterations in the nutritional status which will contribute to maintain an appropriate quality of life in a population group that is highly sensitive to the associated morbidity and mortality. Body mass index (BMI) is the cornerstone of the current classification system for obesity. However, it is only a surrogate measure of body fitness and provides misleading information about body fat content in a wide range of conditions as elderly age. The bioelectrical impedance (BIA) is gaining increased acceptance in routine nutritional assessment of healthy individuals and in clinical practice. Recent evidence indicates that the BIA method is an accurate and sensitive method for measuring changes in body composition.

**Aim:** To evaluate relationship between body composition and BMI in elderly males.

**Methods:** We studied 305 healthy South Italian males aged 50–80 years. BMI (kg/m²) was calculated and subjects were divided in normoweight (NW), overweight (OW) and obese (OB) according to Clinical Guidelines of NIH 1998. Body composition was assessed by BIA and Systems. In subjects over 60 years old, fat free mass (FFM) and fat mass index (BMI) is the cornerstone of the current classification system for obesity. However, it is only a surrogate measure of body fitness and provides misleading information about body fat content in a wide range of conditions as elderly age. The bioelectrical impedance (BIA) is gaining increased acceptance in routine nutritional assessment of healthy individuals and in clinical practice. Recent evidence indicates that the BIA method is an accurate and sensitive method for measuring changes in body composition.

**Results:** Table 1 shows FFM and FM in kilogram (mean ± standard deviation). Table 2 shows the percent of increase in FFM and FM calculated respect to body weight of NW in two different groups of age.

**Conclusion:** The percent of increased FM is greater in elderly (60–80y) than in younger (50–59y) age category, comparing all subjects according to the increasing BMI. BIA continues to serve well for many purposes, but it is time to initiate a gradual evolution beyond BMI towards standards based on actual measurements of body FM. BIA could be of practical utility for the clinical evaluation of a deficit in GFM with or without excess FM (sarcopenic obesity) for a given age category, complementing the classical concept of body mass index in a quantitative manner.

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**Table 1 for abstract number PS.M10**

<table>
<thead>
<tr>
<th>Age 60–80 years</th>
<th>Age 50–59 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI</td>
</tr>
<tr>
<td>NW n.47</td>
<td>23 ± 2</td>
</tr>
<tr>
<td>OW n.105</td>
<td>27 ± 1</td>
</tr>
<tr>
<td>OB n.33</td>
<td>32 ± 2</td>
</tr>
</tbody>
</table>

*p < 0.05 vs NW; **p < 0.05 vs 50–59.

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**PS.M11**

**Assessment of Serum Folate, Vitamin B₁₂ and Homocysteine Concentrations in Elderly Living in Warsaw**

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Elevated serum total homocysteine (tHcy) concentration is a risk factor for cardiovascular diseases. Increased intake of B-group vitamins, especially folic acid, can reduce serum tHcy level. The objective of this work was to assess the concentration of tHcy in elderly people in relation to folate and vitamin B₁₂ status. A group of 124 non-institutionalised subjects aged 75–80 living in urban, suburban, and rural areas of Warsaw region participated in the study. Serum folate and vitamin B₁₂ were measured using dual isotope simultaneous method (Simul TRAC-SNB Radioassay Kit) and tHcy was measured by HPLC.

Mean serum folate and B₁₂ was 15.2 ± 7.5 nmol/l (range 3.4–36.9 nmol/l), with significant difference between men (13.7 ± 6.5 nmol/l) and women (16.9 ± 8.1 nmol/l), and 217 ± 103 pmol/l (range 20–558 pmol/l), respectively. Serum folate <6.8 nmol/l and serum vitamin B₁₂ <103 pmol/l were both observed in 15% of subjects. The elevated level of tHcy was 13.7 ± 4.9 µmol/l (range 5.6–37.1 µmol/l). In total 40% of the subjects with elevated level of tHcy was found. The frequency of including yoghurt or kefir, fruit juices and very lean meat into the diet was lower among people with elevated tHcy level (8, 4 and 4%, respectively) than in the rest of the subjects (24, 12 and 12%, respectively). The results of our study indicated that the prevalence of elevated tHcy in elderly was high and could be related to low folate and B₁₂ concentrations in serum.

This study forms part of the FolateFuncHealth project (QLRT-1999–00576) and is funded by the EU under KA1: Food, Nutrition & Health.

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**Table 2 for abstract number PS.M10**

<table>
<thead>
<tr>
<th>Percent of increased FFM</th>
<th>Percent of increased FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>OW vs NW</td>
<td>OB vs NW</td>
</tr>
<tr>
<td>Age 50–59 years</td>
<td>+7.7%</td>
</tr>
<tr>
<td>Age 60–80 years</td>
<td>+4.6%</td>
</tr>
</tbody>
</table>
PS.M13

Characteristics of the Nutrition Models of the Youth and Elderly People Living in North-Eastern Poland

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Objective: The aim of the work was identifying the characteristic nutrition models of youth and people in advanced age.

Materials and Methods: The research included 1,648 people living in the North-Eastern Poland, including 650 school youth (17.9 ± 0.44 years old), 644 students (20.7 ± 1.68 years old) and 354 persons in the advanced age (76.9 ± 1.63 years old). The nutrients consumption was specified by means of the 24-hour recall method [1], which, after having included loses, was compared with the safe level of Poland’s RDA. For the characteristic nutrition models identification the factor analysis (the main components method) and the cluster analysis (grouping by the k-means method) was applied [2]. The diversity of the food rations nutrient value of people with different nutrition models was verified on the basis of the single-factor variation analysis (ANOVA) according to STATISTICA v.6.0.

Results: In each examined subpopulation 3 nutrition models were identified – among youth: low nutritive (62.0% of the subpopulation), with the vegetable fats domination (25.1%) and dairy (12.9%); among students: low nutritive (50.6%), with the vegetable fats domination (25.6%) and dairy-vegetable-fruit (23.8%), and among the elderly people: low nutritive (56.5%), with the vegetable-fruits and vegetable fats domination (32.2%) and dairy-cereal and vegetable fats domination (11.3%). The significant differences in the nutrient value of the identified nutrition models were revealed (p ≤ 0.001).

Conclusions: The significant diversity in the nutrients intake by youth and the elderly people was revealed. The identified nutrition models characterised the examined people’s food rations nutrient value well.

References


PS.M14

Indicators of Nutritional Status in Older South Africans

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Nutritional status is a major determinant of both physical and cognitive functioning in old age. A cross-sectional study of 283 black South Africans (60 + years), both free-living (85%) and frail/institutionalised (15%), was undertaken to develop methods to assess indicators of nutritional status in this population. Trained fieldworkers administered a 24-hour recall, and nutritional status was assessed using both the DETERMINE and Mini Nutritional Assessment (MNA) tools. Anthropometrical measurements and physical function tests (sit-to-stand test and grip strength) were performed. Fasting blood samples were drawn for analyses of serum albumin; haemoglobin, ferritin, vitamin B12, RBC folate, cholesterol and vitamin C. Ten percent of subjects had sub-optimal albumin levels, 24.5% were anaemic; 66% had low plasma vitamin C; 18% had deficient folate levels, while only 1.7% had deficient plasma vitamin B12 levels. According to classification of nutritional status by the MNA instrument, 12% of subjects were ‘undernourished’, 33% were in the ‘at-risk’ group, while 55% were considered to be well nourished. The DETERMINE instrument classified 82% of subjects as being at either moderate or high nutritional risk. The MNA was positively associated with all skinfold measurements (calf, biceps, triceps; r = 0.31, 0.42, 0.47; all P < 0.0001), as well as with mid-arm circumference (r = 0.33, P < 0.0001), however the DETERMINE instrument had weak, if any, association with these variables. Grip strength was not associated with either of the screening instrument scores, nor with mid-arm circumference. We conclude that a high prevalence of poor nutritional status was found. The DETERMINE instrument (developed for use in American elderly) does not appear to be valid for older African populations, however the complexity of the measurements included in the detailed MNA tool (developed for use in European elderly) may prohibit its use on a wide scale. It is evident that a new screening tool is required in order to improve the early identification of subjects at nutritional risk.

PS.M15

A New Approach to Promoting Retired People Department Health and Retired People Nutrition Using an Organisation Model

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Dean, School of Public Health, Isfahan University of Medical Sciences, Isfahan, Iran

The concept of ‘health promoting organization’ is closely linked to the general WHO EURO policy towards HP/HE within setting approach, which resulted in creating a number of different ‘health promoting settings’. This study is grounded in theory and practice of the new health education and health promotion, which produced in the health promotion, retired people department and retired nutrition.

The health promoting retired people department approach aims at promoting health within a department as a complex social system. The intervention was based on a number of theoretical approaches, which can be summarized as follows: The ecological approach (WHO 1978) and the setting approach as proposed by the Ottawa Charter (1986) also Jakarta Conference (1997) and fifth global conference for health promotion in Mexico (2000).

The study was carried out in retired department in Isfahan Province in Iran. The aims of the study include the testing of the participants’ acceptability of the new approach promoting retired people...
Many elderly people tend to drink less water and consume less nutrients than the recommended quantities for this age group. This might potentially lead to malnutrition and avitaminosis and multiple nutritional deficiencies. For this reason more research is needed to assess nutritional status and screen the elderly for nutritional risk.

To assess the nutritional status of vitamin B1, B2 and B6 of elderly Austrian people, 226 persons (196 female and 30 male) ages, ranging from 53 to 93 years were studied. The evaluation was done using functional parameters, the erythrocyte transketolase, glutation reductase and transaminase activation coefficients as well as measuring quantity of vitamin B1 and B2 in urine and the concentration of vitamin B6 in plasma. The status of tested vitamins, as assessed by enzymes activation coefficients has been considered to be adequate in 61% (B1), 53% (B2) and 46% (B6) of the investigated population. The deficiencies were identified in 12% of the subjects for thiamine, in 5% for riboflavin and in 39% for vitamin B6. Furthermore, there was, an alarming high percentage of marginally provided elderly persons for thiamine (27%) and riboflavin (42%). In the case of vitamin B6, the urine excretion data revealed different results – 39% of elderly showed inadequate status of this vitamin. The concentration of P-5-P in plasma indicated that only 5% of the senior citizens suffered from a deficiency of vitamin B6. However, as the erythrocyte enzyme activation is a marker for long-term status, and urinary excretion or plasma concentration reflects recent dietary intake this might provide an explanation to these results. Based on dietary intake data, all subjects consumed on average more of vitamin B1, B2 and B6 than recommended daily intake.

We conclude that the prevalence of vitamin deficiencies in elderly Austrian people may be greater than expected on the basis of dietary intake data. It should be recommend to monitor and verify the reference value for elderly people.

PS.M17
Anthropometric Status and Lifestyle in Elderly
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1National Institute for Food and Nutrition Research, 2Department of Neuropsychiatry, University ‘La Sapienza’, Rome, Italy

In order to determine any relationship between nutritional status and lifestyle, we have selected 219 subjects (95 men and 124 women) aged between 70 and 85 years living in Rome. These subjects represent the preselection sample of the European Zenith project ‘Zinc effects on nutrient/nutrient interactions and trends in health and ageing’.

Weight and height were measured according to standardized protocol; a complete clinical examination was performed and a life style questionnaire was also submitted to subjects. Cognitive impairment and depression were undertaken by the Mini Mental State Examination (MMSE) and Geriatric Depression Scale (GDS). 23% of males and 18% of females were affected by several pathologies, especially diabetes. Average BMI was 27.5 ± 3.4 kg/m² for men and 27.6 ± 4.5 kg/m² for women. The prevalence of overweight and obesity was high (56% of overweight and 22% obese men; 43% of overweight and 26% obese women). Only 3 females were underweight. When self-reported data were used the prevalence of overweight and obesity was lower (47% for males and 42% for females) especially for over estimation of stature (+4.8 ± 3.4 cm). MMSE questionnaire showed a low prevalence of cognitive impairment (less than 1% of subjects had a MMSE score <23) and GDS indicated that 13% of subjects had a possible mild depression (GDS score between 6–10), while 2% had a severe depression (GDS score >11). Most of the subjects had stopped smoking, only 0.4% of them smoked more than 10 cigarettes/day. The lifestyle questionnaire showed that most of time is spent in light activities such reading, watching TV or playing cards.

Data demonstrate a high prevalence of overweight mainly due to a sedentary life style.
PS.M18

Nutritional Intake in a Sample of Portuguese Elderly

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¹ISCSC-Sul, Monte de Caparica, ²Departamento de Desporto da Câmara Municipal de Lisboa, ³Centro de Nutrição e Metabolismo, Faculdade de Medicina da Universidade de Lisboa, Lisboa, Portugal

Objective: To assess the nutritional intake of Portuguese elderly.

Subjects and Methods: Transverse study conducted among 40 men and 186 women aged participating in the 'Desporto e Prevenção em Lisboa' activity of the Lisbon City Hall. Nutritional intake was assessed by a questionnaire of the previous 24 hours.

Results: Men consumed more wine and women more yoghurt, whereas no differences were found for other foodstuffs (see table). Also, no differences were found for obesity, educational level or dieting. Results expressed as number of subjects and (percentage).

<table>
<thead>
<tr>
<th>Food</th>
<th>Men Consumed</th>
<th>Women Consumed</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soup</td>
<td>39 (98)</td>
<td>164 (88)</td>
<td>0.09</td>
</tr>
<tr>
<td>Meat</td>
<td>27 (69)</td>
<td>107 (58)</td>
<td>0.21</td>
</tr>
<tr>
<td>Fish</td>
<td>31 (79)</td>
<td>140 (77)</td>
<td>0.53</td>
</tr>
<tr>
<td>Eggs</td>
<td>8 (22)</td>
<td>30 (17)</td>
<td>0.48</td>
</tr>
<tr>
<td>Pasta</td>
<td>13 (35)</td>
<td>38 (21)</td>
<td>0.09</td>
</tr>
<tr>
<td>Rice</td>
<td>16 (42)</td>
<td>72 (40)</td>
<td>0.86</td>
</tr>
<tr>
<td>Bread</td>
<td>39 (98)</td>
<td>168 (91)</td>
<td>0.21</td>
</tr>
<tr>
<td>Potatoes</td>
<td>30 (77)</td>
<td>123 (66)</td>
<td>0.26</td>
</tr>
<tr>
<td>Salad</td>
<td>26 (70)</td>
<td>123 (67)</td>
<td>0.85</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>17 (46)</td>
<td>82 (45)</td>
<td>1.00</td>
</tr>
<tr>
<td>Fruit</td>
<td>40 (100)</td>
<td>179 (96)</td>
<td>0.36</td>
</tr>
<tr>
<td>Yoghurt</td>
<td>14 (38)</td>
<td>117 (64)</td>
<td>0.005</td>
</tr>
<tr>
<td>Coffee</td>
<td>25 (64)</td>
<td>126 (68)</td>
<td>0.58</td>
</tr>
<tr>
<td>Wine</td>
<td>25 (64)</td>
<td>28 (15)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conclusion: Consumption of fruit and vegetables is high among Portuguese elderly, and there appears to be no differences between educational level, dieting or obesity.

PS.M19

Relationship of Body Weight with Serum Glucose and Lipid Levels in Free Living Elderly People

G. Ristić, D. Ristić-Medić, V. Tepšić, A. Arandjelović, M. Poštić, G. Petrović, V. Ristić, S. Sušić, M. Pavlović

Institute for Medical Research, Laboratory for Nutrition and Metabolism, Belgrade, Serbia and Montenegro

There is abundant evidence that links increased body weight with diabetes mellitus and hyperlipidemia. The aim of this study was to determine and analyze the relationship of body weight with glucose levels and serum fasting lipid profile (triglycerides, total cholesterol, HDL-cholesterol, LDL-cholesterol) in 885 (405 males, 480 females) free-living elderly persons. Study participants were divided into 2 age groups: I: 60–69y (188 males, 305 females), II: ≥70y (217 males, 175 females). According to body mass index (BMI) every group was divided into 3 subgroups: normal weight (NW <24.9 kg/m²), overweight (OW 25–29.9 kg/m²) and obese (OB ≥30 kg/m²). Results of our study shows that in age group I normoglicemia was present in NW subjects in 79% males and 87% females while in age group II there is decrease in normoglicemic both males (71%) and females (76%). In OW subjects from age group I there is 68% males and 84% females with normoglicemia and in OB subjects 55% and 57% respectively. Similar trend is present in age group II. Incidence of diabetes mellitus in both age groups is increasing with BMI (from 10.5 to 34% males, 5 to 30% females). Hyperlipidemia was in direct correlation with the increase of BMI, significantly higher in females than in males. In conclusion, our findings suggest that the majority of cases of diabetes mellitus and hyperlipidemia are linked to weight and emphasizes the importance of weight loss by nutritional modification and life style changes.

PS.M20

Acute Phase Reaction and Nutritional Status in Elderly Patients Affected by Acute Cerebrovascular Disease

S. Ronzoni¹², S. Meirovici¹, M.R. Lupattelli², G. Marchetti², A. Menasci², M. Manori¹, A. Mariano¹, F. Vetta², S.M. Zuccaro², M.R. Bollea²

¹Department of Geriatrics, Israelitic Hospital, ²Department of Internal Medicine, Clinical Nutrition Unit, 'Tor Vergata' University, Roma, Italy

Malnutrition is a condition often found in elderly population, due to many conditions and to acute or chronic diseases. In acute patients it's quite difficult to define malnutrition using traditional parameters because of the influence of acute phase reaction (APR). Aim of this study is to evaluate the influence of APR on nutritional parameters in over 85 affected by acute cerebrovascular (CV) diseases matched with 20 ambulatory patients. All subjects underwent a complete biochemical and geriatric assessment (MMSE, ADL, IADL); nutritional status was assessed also by Mini Nutritional Assessment (MNA); ACP was investigated by ESR, PCR, fibrinogen, α-globulins and ferritin levels. Exclusion criteria were considered malignant neoplasm, heart, liver and kidney failure. In CV patients we found lower levels (compatible with malnutrition diagnosis) of albumin and total cholesterol (46%), and of transferrin and number of lymphocite (69%). Linear regression analysis showed in CV patients an inverse correlation among total cholesterol and acute phase indicators, this kind of correlation was present also among albumin and α-globulins and ESR; ADL correlated directly with albumin (p < 0.05). MiNu correlated directly with BMI, ADL and MMSE and inversely with α-globulins and ferritin (p < 0.05). In controls we found only a direct correlation of BMI with MiNu and ADL. These preliminary data, although the limited size of the sample and the absence of follow up, show an overall alteration of nutritional status in acute CV patients. The correlation of albumin and total cholesterol with some modifications of acute phase factors suggest that some modifications of nutritional status in the acute CV patients may be secondary to APR rather than real indicators of malnutrition.
or that acute disease could worsen a condition of preclinical malnutrition sustained by a chronic activation of inflammatory response.

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**PS.M21**

**Protein Energy Malnutrition, Tumor Necrosis Factor-α and Depression in the Elderly**

F. Vetta, S. Ronzoni, M.R. Lupattelli, B. Novi, P. Fabbriconi, G. Marchetti, C. Ficoneri, S. Pierangeli, N. Romeo, M.R. Bollea

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Several studies have addressed their attention on mood disorders in aged subjects, suggesting different etiopathogenetic factors. Recently growing interest has been concentrated on the role of immunological alterations related to depression, showing contrasting data. The aim of this study was to evaluate the correlation between depression and cytokines’ network alterations in aged patients in relation to nutritional status. In order to that we included 53 elderly subjects (mean age 83 ± 12.1) age and sex matched. All subjects underwent a wide nutritional and biochemical assessment as well as a psychological (Mini Mental State Examination – MMSE; Geriatric Depression Scale – GDS) and a self-sufficiency (Activity Daily Living – ADL; Instrumental Activity Daily Living – IADL) examination. Students’s t test and linear regression analysis carried out statistical analysis. According to international criteria we defined depressed all subjects with GDS score >11. (n.28). They showed higher values of TNF-α (49.4 ± 13.6 Vs 8.7 ± 4 pg/ml; p < 0.0001) and lower values of serum iron concentration (44.3 ± 11.2 Vs 94.5 ± 18.5 mg/dl; p < 0.0001) than controls, without statistical differences in two groups with regard to MMSE scores and Cholesterol levels.

Moreover the analysis of data in depressed subjects further divided in two subgroups, according to nutritional status (No 20 affected by protein-energy malnutrition – PEM, No 8 well nourished subjects), showed higher values of TNF-α, CRP and GDS score in pair with lower serum iron levels in subjects with PEM (p < 0.001).

Therefore, according to our previous data reports, our data suggest that depression is closely related to cytokines’ network alterations, chiefly in subjects affected by Homeostatic Balance Failure Syndrome. Nevertheless further studies are necessary to clarify both the strength and the etiopathogenetic meaning of this correlation.

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**PS.M22**

**Related Risk Factors in the Elderly Associated with Cardiovascular Pathologies and Life Expectancy: Influence of Age**

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Agencia Española de Seguridad Alimentaria and Nutrition Department, UCM, Madrid Carretera Majadahonda-Pozuelo, Madrid, Spain

Risk factors in cardiovascular pathology are traditionally considered to be obesity and hyperlipemia, among others, with higher incidence in the elderly population. Recently it has been reported that the fat distribution plays a decisive role as a predictor of cardiovascular risk ahead of the obesity. Also higher levels of C-reactive protein could be a suitable parameter to judge increased risk in cardiovascular disease. At the same time it has been associated with obesity and hyperlipemia.

**Objective:** To study the relationship between anthropometric parameters: the waist measurement such reflects, special fat distribution, body mass index (BMI) and C-reactive protein in order to judge the baseline obesity and four-five years follow up of Spanish subjects participating in the SENECA study. Also to check this relationship as orientating parameter of life expectancy and as possible markers of cardiovascular risk.

**Methods, Subjects:** All were Spanish from the SENECA study (birth cohort 1913–1918), men and women.

**Parameter:** Obesity judged according to BMI was considered to be over 30 BMI. Special fat distribution in this collective, judged by waist measure. Statistical analysis: SPSS11.0.

**Results:** The waist showed a correlation with BMI, and it presents a correlation with the C-reactive protein. The fat distribution was associated with the gender. Women and men have the same evolution of the studied parameters, but with significant differences.

**Conclusions:** Anthropometric parameter (waist, BMI) showed correlation with C-reactive protein It could play a decisive role when considering the recommendations according to age.

**Acknowledgment:** The authors want to express their acknowledgement to all principal researches and collaborators in SENECA study.

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**PS.M23**

**Effect of Zinc Supplementation on Immune Status in the Older Population in Northern Ireland**


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Zinc is an essential trace element and is thought to promote a healthy immune system. Immunosenesce may contribute to mortality and morbidity, and concentrations of zinc tend to decrease with advancing age.

This project is part of the ongoing ZENITH multi-centred EC Fifth Framework funded project, the aim of which is to investigate the effects of zinc supplementation in late middle-aged and older population groups on, micronutrient status, oxidative stress, immune status, bone metabolism, lipid metabolism, psychological and behavioural factors, to make specific dietary recommendations for these vulnerable population groups.

Within the Zenith project, the focus of this centres research group is examination of the interrelationships between the immune system and psychological functioning. In a randomised, double blind, placebo-controlled intervention study, with a supplementation period of 6 months, volunteers (96 in total) were randomly assigned to one of
three treatment groups: placebo, 15 or 30 mg zinc. Together with putative markers of zinc status, immunological, physiological and psychological measurements are made at baseline, 3 and 6 months.

To identify age-related changes in both representation and immunophenotyping of lymphocyte populations, we are investigating, by means of whole-blood immunostaining and quantitative flow cytometry, the percentage values and the absolute numbers, as well as the levels of surface antigen expression or antigen molecules of different peripheral blood lymphocyte subsets, from volunteers. Total T- and B-lymphocytes, T-helper cells, NK cells, and early and late-activated T-lymphocytes numbers. Emerging technologies are being employed to measure intracellular cytokines in lymphocytes (IL-2, IFN-γ, TNF-α), and monocytes (IL-1β, IL-6, TNF-α).

Phagocytic activity of monocytes and granulocytes is being assessed using the Phagotest® kit (BD Biosciences), and the marker Annexin V is being used to assess apoptotic activity of lymphocytes.

Data will be correlated with psychometric measures including cognitive function (assessed by the CANTAB battery) and mood, thereby exploring the role of zinc in psychoneuroimmunology in ageing.

PS.M24

Distribution of Overweight and Obese Patients According to Age Groups

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Background of Study: Overweight and obesity are not only the problems connected to the person’s appearance, but also the risk factors for chronic non-infectious diseases.

Aim: The aim of this study was to determine the difference in the distribution of persons with this risk factor according to age groups at the beginning and the end of the medical intervention.

Methodology: The study included 103 persons, age 25–64. The criteria were that the person has one or more of the following risk factors: genetic predisposition, physical inactivity, smoking, obesity, hyperglycemia, hypercholesterolemia, hypertriglyceridemia and hypertension. The examined persons had their body mass index (BMI) determined before and after the medical intervention, which lasted three months.

Results: Of 103 persons involved, most of them were in the 45–54 age group – 42, which is a 40.8% of all examined person. Of the total number, 88 persons (85.4%) were either overweight or obese at the beginning of the study. There 46 obese persons (52.3%), most of them in the 55–64 age group. There were 42 overweight persons (47.7%), 17 of which in the 45–54 age group and 17 in 55–64 age group. At the end of the intervention, there were 84 overweight and obese persons, since 4 people (4.5%) normalized their weight.

Of 84 persons, 25 (29.8%) were obese, most of them in 55–64 age group. Of 59 examined persons (70.2%) that were overweight, most of them were in the 45–54 age group.

Conclusion: The prevention of this risk factor is necessary, as well as the earliest possible medical intervention on overweight and obese persons, since with time the risk factors multiply.

PS.M25

Transcription of Carnitine Acyltransferases (CAT) and the Organic Cation Transporter OCTN2 is Downregulated in Blood Cells of Aged Persons and Increased by L-Carnitine-L-Tartrate Administration

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Background: Aging is characterized by a general decline in mitochondrial function and fatty acid oxidation, accompanied by a reduction in the activity of carnitine acyltransferases. As previously shown, there is a significant correlation between the transcriptional regulation in mononuclear blood cells (PBMC) and muscle cells.

We quantified the mRNA content of CAT in PBMC in order to investigate the effects of aging. Because carnitine levels decline significantly with age and carnitine deficiency causes downregulation of the carnitine acyltransferase genes in vitro we supplemented the diet of elderly females with 2 g/d L-carnitine-L-tartrate for 2 month.

Methods: PBMC were isolated from 23 healthy adults (mean age 45 years) and 19 elderly volunteers (mean age 85 years). Quantitative reverse transcriptase real time PCR (RTqPCR) of carnitine palmitoyltransferases CPT1A (liver isoform), CPT1B (muscle isoform), CPT2, carnitine acetyltransferase (CRAT) and the carnitine transporter OCTN2 was performed using the LightCyclerSYBR Green Technology.

Results: Compared to healthy adults, there was a 50% downregulation of CPT1A and CPT1B in elderly in PBMC. Reduction of CRAT, CPT2 and OCTN2 was more than 85%. In accordance to studies in old rats, dietary supplementation with L-CAR-L-TAR resulted in a significant increase of the mRNA content of CPT1A and CPT1B, and consequently in an increase of the expression of key enzymes of the oxidative metabolism to a level comparable to younger individuals.

Conclusion: Aging process dependent changes of oxidative metabolism were partly reversible by L-carnitine-L-tartrate administration.

PS.M26

Longitudinal Changes in Energy Expenditure in Elderly German Subjects

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Longitudinal studies regarding energy expenditure of elderly women and men are scarce. Therefore within the longitudinal study on nutrition and health status in an aging population of Giessen, Germany (GISELA) the changes of the separate components of energy expenditure were investigated over the course of 8 years.
From 1994 to 2000 in a sample of 55 women (1994: age 67.5 ± 5.8 y, BMI 26.4 ± 3.4 kg/m²) and 26 men (1994: age 65.2 ± 5.2 y, BMI 25.4 ± 2.0 kg/m²) resting metabolic rate (RMR) was assessed by indirect calorimetry after an overnight fast. Physical activity patterns of the subjects were assessed by a questionnaire. Energy expenditure of the different physical activities (EPA), total energy expenditure (TEE), and physical activity level (PAL) were calculated using multipliers for RMR according to the WHO.

Results (mean ± SD):

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>RMR [kJ/d]</td>
<td>5,141 ± 597</td>
<td>+0.1</td>
<td>6,257 ± 506</td>
<td>-2.6</td>
</tr>
<tr>
<td>EPA [kJ/d]</td>
<td>3,930 ± 962</td>
<td>-11.0**</td>
<td>4,622 ± 1,135</td>
<td>-15.4**</td>
</tr>
<tr>
<td>TEE [kJ/d]</td>
<td>9,071 ± 1,354</td>
<td>-4.7*</td>
<td>10,880 ± 1,338</td>
<td>-8.1**</td>
</tr>
<tr>
<td>PAL [kJ/d]</td>
<td>1.76 ± 0.16</td>
<td>-4.5**</td>
<td>1.74 ± 0.18</td>
<td>-8.0**</td>
</tr>
<tr>
<td>Housework [kJ/d]</td>
<td>1,908 ± 1252</td>
<td>-27.5**</td>
<td>676 ± 669</td>
<td>-10.0</td>
</tr>
<tr>
<td>Gardening [kJ/d]</td>
<td>672 ± 676</td>
<td>-25.2*</td>
<td>1,341 ± 1,060</td>
<td>-27.0*</td>
</tr>
<tr>
<td>Walking [kJ/d]</td>
<td>260 ± 276</td>
<td>-33.9</td>
<td>340 ± 326</td>
<td>-14.6</td>
</tr>
<tr>
<td>Sports [kJ/d]</td>
<td>554 ± 566</td>
<td>-16.2</td>
<td>1,171 ± 946</td>
<td>-47.9**</td>
</tr>
</tbody>
</table>

Referred measurement analysis of variance * = \( p < 0.05 \); ** = \( p < 0.01 \); *** = \( p < 0.001 \).

Because of a decrease of physical activity, especially housework and gardening in women and gardening and sports in men, TEE decreases in the course of ageing.

PS.M27

The Effect of Nutrition Status in Elderly People with Blood Pressure, Covered by Health Houses in North of Tehran

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Hypertension is the most common public health problem worldwide. Untreated hypertension leads to many degenerative diseases including congestive heart failure, stroke, and end-stage renal disease.

The present study was conducted over 23 patients who have blood pressure (female = 12, male = 11). The data were collected by interview, questionnaires and anthropometrics measurement. The average mean of age, respectively in females and males were about 59, 66 years old. The mean height, weight and BMI in females, were: 154.1 cm, 68.5 kg, 28.1 kg/m² and for males 165 cm, 70.1 kg, 25.6 kg/m² respectively. The mean of micronutrient on the same group (energy, protein, iron, calcium, zinc, vit-A, vit-B_{12}) were: 1,689, 72.5, 17.9, 641, 6.7, 260, 2.1. We concluded that, nearly 52% of patients BMI were 27 kg/m² and over. According to RDA the mean consumption fat was very high, and the consumption of calcium, zinc, vit-A in both groups were very low.

PS.M28

Lipid and Fat Soluble Vitamins Status of Seniors in Austria: Institutionalised versus Free Living Elderly

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Referring to the total population, the number of elderly people is increasing continuously in Central Europe. Ageing is associated with a high risk of micronutrient deficiency based on a lower energy intake, which is largely a physiologic effect of ageing and may reinforce the harmful anorectic effects of physiological, social and physical problems. In Austria no data are published so far on the nutrient status of elderly.

In order to get first information on the lipid and antioxidant status 226 seniors (196 women, 30 men), 60 from senior homes and 166 free living, were recruited. The elderly were all retired and aged between 53–93 years, mean age was 70 ± 10 years. Plasma levels of total cholesterol (TC), LDL-Cholesterol (LDL-C), HDL-Cholesterol (HDL-C) and Triglycerides (TG) were assessed colorimetrically. Vitamins A (retinol), E (tocopherol-equivalents), K (phyloquinone), D (25OH-D_{3}) and carotenoid pattern were determined using HPLC.

TC (5.5 ± 1.0 mmol/l) and LDL-C (3.6 ± 0.9 mmol/l) were borderline, however, HDL-C was surprisingly high (1.4 ± 0.4 mmol/l) resulting in an acceptable TC : HDL-C ratio of 4.4 ± 1.4. Moreover, TG values were with 1.4 ± 0.6 mmol/l far below the reference level. No difference was observed between institutionalised and free living subjects.

Retinol and tocopherol-equivalents were 100% within the reference values with means of 2.0 ± 0.5 μmol/l and 40.3 ± 11.5 μmol/l, respectively. About 16% were identified with low phylloquinone levels (<0.38 nmol/l), 19% with low and 2.3% with marginal (<12 nmol/l) 25OH-D_{3} levels. 25OH-D_{3} plasma levels showed an inverse relation with the age (r = -0.231, p = 0.001). The nutrient with the highest risk of deficiency was β-carotene with 57% below a threshold level of 0.35 μmol/l. The only nutrient with significantly lower plasma levels in the institutionalised was 25OH-D_{3}.

Biochemical lipid status identified the subjects to be at low risk for cardiovascular disease. Status of fat soluble vitamins was good for retinol and tocopherol-equivalents, acceptable for phylloquinone and 25OH-D_{3}, but less satisfying for β-carotene. Except 25OH-D_{3} no difference was observed between institutionalised and free living elderly.
Nutritional and Functional Status of Elderly
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Introduction: Rapidly increasing number of old population sets great demands for the health care system in near future. The goal is that old people manage as long as possible outside institutional care. Therefore it is important to recognise the determinants of functional capability. In this study we investigated the relationship between nutritional and functional status among elderly living at home.

Subjects: 100 men and women, aged between 75 and 95 years, were investigated. They were customers of municipal home-care system (n = 81) or outpatient clinic for elderly (n = 10), or they were contacted personally (n = 9).

Methods: Nutritional assessment included MNA (Mini Nutritional Assessment), anthropometric measurements (weight, height, BMI, triceps skinfold, mid-arm muscle circumference), blood values (haemoglobin, serum albumin) and dietary intake measured by 24-h recall. Functional status was estimated using a disability classification based on non-instrumental and instrumental activities of daily living and memory function. The categories for functional status range from A (independent) to G (totally dependent).

Results: Two of the participants were malnourished (MNA < 17), 43 were at risk of malnutrition (17 < MNA < 24); nutritional status of others was adequate. 32 subjects had blood haemoglobin below 125 g/l, and 35 had serum albumin below 36 g/l. The mean of body mass index was 26.9 ± 4.4 kg/m². On average, intake of energy was 1,349 kcal/day, and that of protein 59 g/day. In covariance analysis adjusting for age and sex, low values of MNA, blood haemoglobin, serum albumin and a high number of prescribed medicines were associated with poor functional status. Anthropometric measurements, intakes of energy and protein were not significantly associated with functional status. In logistic regression analysis including age, sex, MNA, haemoglobin, serum albumin and a number of prescribed medicines, those at risk of malnutrition (MNA < 24) and those with low blood haemoglobin had significantly increased risk of poor functional status.

Conclusions: Our results demonstrate a close relationship between nutritional status and functional capability in the elderly.

PS.N Infant Nutrition

Infant Feeding Attitudes in Northern Ireland
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While the benefits of breast-feeding over formula-feeding are well-documented, it is speculated that Northern Ireland has one of the lowest rates of breast feeding initiation worldwide (Campbell, 2000). Preliminary small-scale research carried out in Northern Ireland has suggested that breast-feeding mothers experience social isolation as compared with formula-feeding mothers. The objective of this paper has been to determine and compare the infant feeding attitudes of expectant mothers, and those of their primary source of support. This paper presents quantitative data reflecting the current attitudes of expectant mothers and their primary source of support, toward both breast and formula-feeding in urban Northern Ireland. Two hundred expectant mothers were recruited from antenatal booking clinics (~gestational age 8–12 weeks) in the Royal Maternity Hospital, Belfast. Upon agreement, they completed in the waiting area a demographic questionnaire and a self-administered infant feeding attitude scale (Iowa Infant Feeding Attitude Scale). A second scale was completed by each woman’s primary source of support. The perceived benefits of breast-feeding are examined as are the advantages of formula feeding. The infant feeding attitudes of expectant mothers are further compared with those of their primary source of support.

Results indicate that there are vast differences in the attitudes toward both breast and formula-feeding by expectant mothers intending to breast-feed compared to those intending to formula-feed.

Reference

PS.N2
Does Predominant Rather than Exclusive Breastfeeding at Birth Shorten the Duration of Breastfeeding?
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It is unknown whether predominant, rather than exclusive, breast-feeding (according to WHO definitions) at the maternity ward may influence the duration of breastfeeding. To describe reasons for the babies are predominantly breastfed during the first 48h after birth, and to examine whether any difference in the duration of breastfeeding exists between infants exclusively or predominantly breastfed at birth, a one-year longitudinal telephone survey has been conducted, 1999 to 2000, on a total of 2,450 healthy, term infants randomly recruited among singleton newborns occurred in Italy, November 1999. Main outcome measure was the percentage of breast-fed infants through the first year of life using WHO criteria for breastfeeding. The national rate of initiation of breastfeeding within the first 48h after birth (‘at birth’) was 91.1% (95% confidence interval, CI, 90.0–92.2%). Breastfeeding at birth was exclusive in 38.7% (36.8–40.6%) and predominant in 28.9% (27.1–30.7%) of babies. The main reasons for predominant breastfeeding at birth were ‘persistent crying’ (35.9%, 32.4–39.4%) and ‘customary routine at maternity ward’ (29.0%, 25.6–32.3%). At birth, 28.0% (24.7–31.3%) babies were given fluids due to clinical problems of baby and/or mother. No difference was found in the duration of breastfeeding between infants exclusively or predominantly breastfed at birth (mean [median] of

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Ann Nutr Metab 2003;47:319–666
5.6 [6] months vs. 5.3 [6]), independently of reason for predominant breastfeeding. Predominant, rather than exclusive, breastfeeding at birth may not negatively influence the duration of breastfeeding in industrialized countries. Unwarranted predominant breastfeeding is currently supplied to many babies at the maternity wards.

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**PS.N3**

**The Contribution of Non-Core Foods to the Diets of Australian Children 18 Months of Age**

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**Background:** At ages 1–2 years, children are in transition from an infant milk-based diet to a solid food diet. This study aimed to describe the consumption of non-core (‘extra’) foods and their contribution to the diets of children at age of 18 months.

**Methods:** Data for this study were derived from the Childhood Asthma Prevention Study (CAPS), a randomised controlled trial investigating the prevention of asthma from birth to five years. Three-day weighed food records were collected from 465 subjects (85% response) at age of 18 months. After exclusions, the final number of records analysed was 429. Recorded foods were classified into major food groups and subgroups following the system created for the 1995 National Nutrition Survey. These groups were further classified as ‘core’ or ‘extra’ foods.

**Results:** Extra foods contributed 27% of total energy intake (EI) with cereal-based products (biscuits, cakes, pastries, hamburgers and pizzas) being the most important sources of energy (8% of EI). Other important contributors to EI were beverages (excl. fruit juices) (5% of EI), fats and oils, confectionery and fried potatoes (each 3% of EI).

**Conclusions:** At 18 months of age, these children were consuming approximately one-quarter of their energy intakes from non-core (‘extra’) foods. Further information is needed to assess the extent to which this proportion is typical of Australian children of this age group, how it changes as children age, and how it relates to weight status and the risk of becoming overweight.

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**PS.N4**

**Whole Cow’s Milk and Milk Products in Infant Weaning in Italy**

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1Department of Pediatrics, 2Unit of Medical Statistics, San Paolo Hospital, University of Milan, Milan, Italy

Unmodified cow’s milk is not recommended before age 12 months, and milk products should not be used as first weaning foods. Aim of this study was to describe weaning practices in Italy in relation to use of cow’s milk and milk products. A sample of 2,450 mothers randomly selected among women who delivered healthy, term singleton infants in November 1999 in Italy were interviewed within 4 weeks after delivery and when infants were 3, 6, 9 and 12 months-old about feeding practices. The age of infant at the first introduction of cow’s milk, or non-milk foods was recorded. Unmodified cow’s milk was defined as a milk the infant was given without any change of composition. At hospital discharge, 89% of infants were breastfed. Among infants 65% were given unmodified cow’s milk as a beverage before 12 months of age. Whereas 5% of infants were given cow’s milk at age 4 months, the majority was given it after 8 months of age. Median age at introduction of solids was 17 weeks (range 4–36 weeks). Milk products were the first weaning foods in 9% of infants. Median age at the introduction of whole-milk products was 27 weeks (range 12–52 weeks). At the age of 12 months 100% of infants were given whole-milk products (88% were given yogurt, and 97% cheese). The results show that the use of unmodified whole-cow’s milk and milk products is widespread within the first 12 months of life.

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**PS.N5**

**Intestinal Lactobacilli in Breast Fed Colicky and Non Colicky Infants**

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**Introduction:** Infantile colics are a common problem in the first months of life. Intestinal lactobacilli play a role in the development of gut associated lymphoid tissue (GALT) and favour oral tolerance with a reduction of food allergy. It is possible that an alteration of intestinal lactobacilli may be involve in the development of infantile colics that are considered a first clinical manifestation of atopic diseases.

**Aim:** To evaluate intestinal lactobacilli in breast-fed colicky and healthy infants in the first three months of life.

**Methods:** 28 breast-fed infants, aged 15–90 days, free from episodes of gastroenteritis and without assumption of antibiotics and probiotics drugs, were enrolled in the study. They were divided into two groups according to Wessel’s criteria: colicky (15 cases) and healthy (13 cases) infants. Stool samples were collected, diluted 1:10 in normal saline, cultured on selective media to detect lactobacilli. The colonies found on the different media were counted, reported as colony forming unit (cfu) per gram of faeces and identified by biochemical methods. Statistical analysis was performed using t test and c2 test.

**Results:** Different colonization pattern of lactobacilli were found among colicky and healthy infants. *Lactobacillus brevis* (1.58 × 107 cfu/gr) and *L. lactis* lactis (9.71 × 107 cfu/gr) were found only in colicky infants while *L. acidophilus* (8.53 × 107 cfu/gr) were found only in healthy infants.

**Conclusions:** Our findings suggest that gut microflora is involved in pathogenesis of infantile colic. Further studies are required to understand if the differences observed in our study may contribute to the cause of infantile colic and may influence future therapeutic choices.
Nutrition in the early years of life is considered an important determinant of growth and development, which may also influence adult health. Wilson et al. (1998) have demonstrated that infants introduced to solid food early (before 4 months of age), have higher levels of features characteristic of cardiovascular risk. These findings support current recommendations that the majority of infants should not be given solid foods before the age of 4 months. However, in Scotland, around 28% of infants had received solids by 3 months. Building on earlier qualitative work, we aimed to investigate the determinants of the timing of introduction of complementary food to infants by undertaking a prospective study in a community sample of primiparous mothers giving birth at Forth Park Hospital, Fife. A total of 448 mothers were recruited in the postnatal word and 338 agreed to be interviewed at home at 12 weeks postnatal on their infant feeding practices using a questionnaire based on the ‘Theory of Planned Behaviour’ model. At 20 weeks postnatal they were sent a postal questionnaire with questions about their decisions and feeding behaviour and this was returned by 286 mothers. Most mothers (70%) had initiated breastfeeding but only 15% exclusively breastfed for 12 weeks and 39% had introduced solids before 12 weeks. Multiple logistic regression analysis suggested that early introduction of solids was associated with the opinions of the grandmother, living in a deprived area, personal disagreement with the advice to wait until the baby was 4 months old, lack of encouragement from friends to wait until 4 months and being in receipt of free samples of manufactured food.

The Scottish Office (Home and Health Department) funded this work.

Factors Affecting the Early Introduction on Complementary Feeding

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Background: Appropriate breastfeeding practices are known to be important for child survival, growth and development. In some rural areas in Mali, West Africa, breastfeeding and complementary feeding practices often do not follow the guidelines outlined by WHO. More specifically, delayed initiation of breastfeeding after birth by up to several days, and early (before 6 months) or very late (after 12 months) introduction of complementary foods is commonly found.

Objective: To assess the implication of delayed initiation of breastfeeding and time of introduction of complementary foods for children’s nutritional status (stunting).

Methods: 576 children (279 girls and 297 boys) aged 12–72 months were randomly selected in a cross-sectional study in a rural area in the Kayes region, Mali. Pre-coded questionnaires were directed to the children’s caretakers. The children’s height was measured and height-for-age Z-scores were calculated.

Results: The overall prevalence of stunting was 33%. Initiation of breastfeeding later than two days after birth (27% of sample) resulted in a doubled risk (OR > 2, p < 0.1) of being stunted compared to those breastfed within 30 minutes after birth (8% of sample). Children who received complementary foods earlier than 6 months (16% of sample) had almost doubled increased risk of being stunted (OR = 1.9, p < 0.05) compared to children receiving its first complementary foods in the age of 6–12 months (49% of sample). Children receiving complementary foods later than 18 months (10% of sample) had 3 times higher risk of being stunted (OR = 3.0, p < 0.01). All results were controlled for age.

Conclusion: Delayed initiation of breastfeeding and early or late introduction of complementary foods were associated with stunting. The promotion of good breastfeeding and complementary feeding practices is essential in order to improve the nutritional status of children in developing countries.

Socio-Demographic Factors and Infant Nutrition

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Objective: To examine the association of socio-demographic factors with breast-feeding and consumption of selected foods in infancy. The study is a part of larger study which examines many aspects of diet and nutrition during the first year of life.

Methods: In a longitudinal prospective study infants were randomly selected according to the mother’s domicile (n = 180) of which 138 participated (77%). Food intake was recorded once every month. Forty-eight-hour weighed food records at 12 months and duration of breast-feeding was used to study the association with socio-demographic factors, i.e., age of parents, education level, family income, marital status, number of siblings and smoking habits of the mother.

Results: Exclusive breast-feeding duration was shorter among mothers in the lowest (of three) education class (2.2 ± 1.6 month) than in the other two (3.4 ± 1.6 month) (P = 0.003), and among mothers who smoked during pregnancy (1.1 ± 1.4 month) compared to those who did not (3.3 ± 1.6 month) (P = 0.002). Regression analyses with smoking and education revealed that smoking during pregnancy was the only significant determinant (t = −2.703; P = 0.008). The food factors associated with socio-demographic factors were fruits, vegetables and added sugar. Children whose mothers smoked during and/or after pregnancy consumed less vegetables at 12 months (17 ± 19 g) than children of nonsmokers (40 ± 33 g) (P = 0.005), and children of parents in the two higher education classes consumed more fruits at 12 months (88 ± 65 g) than children with both parents in the lowest education class (35 ± 35 g) (P = 0.003). Children of mothers in the lowest education class...
consumed more added sugar than children of mothers in the two higher classes (19 ± 10 g vs. 14 ± 9 g) (P = 0.013).

Conclusions: Smoking of mothers and education level of parents seem to be related to lifestyle factors and can be indicative for duration of breast-feeding, consumption of fruits and vegetables and added sugar intake in infants at 12 months of age.

PS.N9
A Randomized Controlled Trial of Processed Complementary Food on Growth and Iron Status of Tanzanian Infants from 6–12 Months of Age
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A processed complementary food (CF) was developed which increased in vitro iron solubility from 4.8% to 19%. The CF contained germinated finger millet, kidney beans, peanuts and mango. The CF had a high-energy density 1731 kJ/100 g and provided 1194 kJ/day for infants aged 6–8 months and 9–11 months, respectively. The study was a double-blind-randomized, placebo-controlled trial, conducted from March 2001 to March 2002 involving 309 infants. The infants were randomized individually to receive processed CF or placebo, a blend of the same composition but not processed, from the age of 6 months until 12 months. Parameters followed were weight-for-height (WHZ), height-for-age-z-scores (HAZ), hemoglobin (Hb), zinc protoporphyrin (ZP) and malaria. Measurements were made at 6 and 12 months of age. From the results we concluded that processing did not have the anticipated effect of improving growth, hemoglobin and iron status of infants. The gain in Hb and ZP observed in both groups by either feeding processed or non-processed food was probably because adequate CF was provided and mothers were motivated to comply with instructions. The theoretical advantage of higher energy dense food was therefore neutralized. Equally, the effect of malaria and other diseases had an influence.

PS.N10
Presence and Exposure Assessment of Fumonisin in Finger Millet, Kidney Beans and Peanuts, which are Ingredients Used for Complementary Food in Tanzania
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Finger millet, kidney beans and peanuts were collected from various farmers, transporting lorries and market retailers in Tanzania. The objective was to evaluate the presence and exposure of fumonisins associated with the consumption of these ingredients, which are used in complementary food (CF) for children in Tanzania. Fumonisins were quantified by enzyme-linked immunosorbent assay (ELISA). Children’s exposure assessment on fumonisins intake was estimated, based on the finger millet, kidney beans and peanuts consumption data of various CFs obtained from twenty-four-hour dietary recalls. All the grains were found to have fumonisin concentrations ranging from 5 µg kg⁻¹ to 440 µg kg⁻¹. The fumonisin levels found in these grains are below the suggested fumonisin limit of 1,000 µg kg⁻¹. Ninety-nine percent of the children were below the suggested tolerable total dietary intake (tTDI) of 2 µg kg body weight⁻¹ day⁻¹. The low fumonisin concentrations found in finger millet kidney beans and peanuts suggest that the exposure to fumonisin among children consuming these ingredients is relatively low, and that these ingredients are less susceptible to Fusarium attack as it has been found in corn. Since the majority of children in Tanzania are given maize porridge as a CF, an alternative crop such as finger millet could be promoted for CF for children since the levels of fumonisins are very low.

PS.N11
Breast and Bottle Feeding in Northern Ireland: What are the Influencing Factors in the Uptake and Duration of Breastfeeding?
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This research explored the perceptions and factors influencing infant feeding decisions in a sample of mothers from Northern Ireland. Expectant women (n = 81) were recruited and interviewed during their third trimester of pregnancy at ante-natal clinics and parent craft classes taking place in five maternity units across Northern Ireland. From the initial sample, 28 mothers were re-interviewed (3–8 weeks post-natally), using a qualitative approach. Views and attitudes toward both breast and bottle-feeding were sought, along with the perceived views of other family members and acquaintances. Their experiences of their chosen feeding method and its impact on family life were also discussed. The interviews were taped and a thematic content analysis was conducted.
Although there is a predominant desire to breast-feed, there are a vast number of factors determining women from pursuing their expressed preference to breast-feed, ranging from concern that the child is undernourished to cultural trends and implications. During the postnatal interviews, a wide range of topics were identified by mothers as being important to the choice and uptake of breast-feeding or bottle-feeding and the subsequent duration of breast-feeding. These included:

- previous perceptions of and exposure to breast and bottle-feeding and how these together with other factors, such as familial attitudes, influenced their decision to breast or bottle-feed,
- any problems experienced since birth with the chosen infant feeding method and whether solutions were found or if subsequent changes to the feeding method were deemed necessary,
- support by medical staff, family and friends and the uptake and duration of breast-feeding, and
- attitudes toward exposure to breast-feeding in both the private and public arena, both in terms of being exposed to and being the exposer.

**Conclusion:** The maternal undernourished induces, in short-term, the increase of the glucose-induced insulin secretion only in neonates males and is associated to the increase of the concentration of GLUT-2 in the β-cell.

**PS.N13**

**Evaluation of the Impact of Weaning Food Messages on Infant Feeding Practices and Child Growth in Iranian Tribes**

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Breast feeding among the Iranian rural inhabitants and tribes is considered a cultural and religious value. Therefore, the children of these people grow well during the first 6 months of their life. However, children aged 1 to 5 years rank below 50 percentile in term of the physical growth. Moreover, malnutrition is more common among children below 5 years of age as compared to a reference group derived from the national population.

To assess the efficacy of a nutrition education program on improving the growth rate among these children, 96 tribal families voluntarily participated in this study. They were requested to attend on a regular basis, the special classes held by tribal teacher, where information and instructions on complementary diet were provided. Afterward, the rate of body weight increase along with some other indices were recorded both for the children of these families (116 people) and reference group (89 people). The results indicated that the average increase in NCHS, and this value was significantly (p < 0.05) higher than that of the reference group (0.68 kg, 32.8% of the recommended value by NCHS). Similarly, the average increase in subject's height was found to be 3.82 cm, 64% of the recommended value by NCHS. This value is also significantly value by NCHS, for the reference group.

Like wise, the presence of severe malnutrition (below-3 WAZ) cases found to be less common (9%) in the subjects as compared to the reference group (25%). This difference was statistically significant (p < 0.05).

Interestingly, both test and control basket food consisted of 24 gr. Wheat flour, 20 gr. Grain, 80 gr. Sugar, 89 gr. Meat, 16 gr. Egg, 58 gr. Dairy products and 69 gr. Fruits that provides an average of 1,716 calories and 42.5 gr. Protein. This affordable complementary diet mainly consisted of cereals and seeds porridge with oil and sugar.

In conclusion, our finding suggested that nutrition education may assist the low-income families to supply and consume a simple, cheap, energy enriched complementary diet. This inturn significantly improves the rate of weight and height increase among children under 5 years of age.
**PS.N14**

**Essential Fatty Acid Profile in Human Milk in Relation to the Diet of Breastfeeding Mothers**

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Linoleic acid (C 18:2n 6, LA) and α – linolenic acid (C 18:3n 3, ALA) are precursors of long-chain polyunsaturated fatty acids arachidonic acid (C 20:4n 6, AA) and docosahexaenoic acid (C 22:6n 3, DHA), which are important for infant growth and neural development.

**Aim:** To determine the polyunsaturated fatty acids content in human milk samples in relation to dietary intake in breastfeeding Polish women.

**Methods:** A 7-d dietary recall was completed at 9–10 wk of lactation and breast milk fatty acids were measured in 3–4 day and at 5–6 wk and at 9–10 wk in 34 breastfeeding mothers.

**Results:** Median (lower–upper quartile) essential fatty acids concentrations (% wt/wt) in human milk were as follows: *colostrum* – LA 7.27 (6.39–8.42), ALA 0.38 (0.27–0.51), AA 0.48 (0.40–0.54) and DHA 0.25 (0.18–0.31), *mature milk* at 5–6 wk – LA 8.01 (7.30–10.67), ALA 0.78 (0.55–1.17), AA 0.31 (0.26–0.35) and DHA 0.13 (0.00–0.21), *mature milk* at 9–10 wk – LA 9.61 (8.00–11.35), ALA 1.03 (0.76–1.44), AA 0.27 (0.25–0.31) and DHA 0.00 (0.00–0.08). The daily intakes (means ± SD) were 113.7 ± 37.7 g total fat/d, 19.2 ± 7.8 g polyunsaturated fatty acids/d, 0.17 ± 0.06 g AA/d, and 0.16 ± 0.16 g DHA/d. Among breastfeeding women about 30% did not eat fish at all and following 22% mothers ate below 20 g/d of fish and fish products.

**Conclusions:** Values of LA in the mature milk in Poland were lower than that for other European countries, whereas those of AA and ALA were similar. DHA levels were considerably lower than the values reported for other European populations. The low levels of DHA in milk in Poland may be related to the low marine fatty acids consumption. Further studies should consider the significance of maternal fat intakes during lactation as well as the early consumed diet in pregnancy.

**PS.N15**

**Health Status of Preterm Infants with Different Level of Renal Iodine Loss**

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The goal of this investigation was analysis of clinical status of preterm infants depending on renal iodine losses. 65 mother-infant pairs were under our investigation. 95% of mothers had various levels of iodine deficiency. Mean iodinuria in mothers was 46.4 ± 5.4 µg/l (Me = 47.5 µg/l), in infants – 100 ± 10.5 µg/l (Me = 85.5 µg/l). Newborns birthweight varied from 1,360 to 2,990 g, length – 40–49 cm, gestational age was 33–36 weeks. All infants were divided in two groups depending on ioduria median: 1st group includes infants with ioduria 37.7 ± 5.7 µg/l (Me = 40.5 µg/l), 2nd group – ioduria level was 126.2 ± 8.6 µg/l (Me = 127.8 µg/l). It was shown that infants of the 2nd group had worse health indices in comparison with 1st group with increase of neonatal morbidity. Ig (A, M, G) level was lower in infants of the 2nd group (p < 0.05), which could explain higher level of infections in this group. High level of ioduria corresponded with blood lower hormonal level, which reflects pathogenic role of renal iodine loss for preterm infant’s health status. High renal iodine loss should be prevented with iodine supplements in lactating women especially in the regions with endemic iodine deficiency.

**PS.N16**

**A Model for Prediction of Child Growth Status at Birth**

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**Objective:** Many environmental and familial factors influence child growth. The aim of this analytical cross-sectional study was determination the effects of ecological and demographic factors on 6–36 month age children growth at 10 Health and Medical Center of Asadabadi region (northwestern Tabriz) during January to February 2002.

**Methods:** At first 1,560 child was selected randomly by using familial fold number. Then we classified them to two groups: case groups; growth failure children (n = 200) and control groups; well growth children (n = 150) by using of Anthropometrical and growth charts (NCHS) indicators and Gomez method. Then a questionnaire was completed for each child by interviewing with mother and using health records include weight and height of child birth, weight and height of mother, weight gain during pregnancy, mother and father literacy, mother and father ages and so on. Data was analysed with X² and ANOVA methods.

**Results:** A significant correlation were found between weight and height child birth (p < 0.001), weight and height of mother (p < 0.05), weight gain during pregnancy, (p < 0.05) and mother and father literacy (p < 0.03) with child growth.

**Conclusion:** By using of this data and with attention to available demographic and ecological variables we designed a model that may predict future child growth status at birth.

The research was approved and supported by Tabriz University of Medical Sciences, Iran.
**Introduction:** The first two years of life, characterized by rapid physical and social growth and development, in which many changes that affect feeding and nutrient intake occur. An adequate intake of energy and nutrients is essential to maintain health and growth. Most growth failure occurs from 6 and 24 months of age.

**Materials and Methods:** In this descriptive national study, 16,418 children under 3 years were included. Trained interviewers based on recall of the mothers collected information of food frequency and number of feeding in last week.

**Results:** Results of the study shown that during the last week consumption of bread, cereal and dairy products (without breast milk and formula), meat, eggs, legume, vegetables, and fruit in urban areas were 99.7%, 95.7%, 98.3%, 84.4%, 92.2%, 98.6% and in rural areas 99.1%, 89.3%, 95.9%, 81%, 97.9%, 96% respectively. The consumption of bread and cereals were higher in compare with other food groups. Food frequency of bread and cereals were similar in urban and rural areas. 11% of urban and 4.3% of rural had not consumed dairy products. The average number of times of fruit consumption in urban area was higher than rural (18 and 16 times per week respectively). More than 20% of rural and 15% of urban children had not consumed egg.

**Conclusion:** Considering the results of this survey, complementary feeding is poorly done in our country, due to lack of mother’s information about what foods are appropriate, how much should be given, and their inadequacy in quantity and quality, among other problems. With attention to importance of balance feeding in children less than 2 years requires promote accessibility to different kind of food especially in rural areas and design intervention projects focusing on improving childcare.
**PS.N21**


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*Introduction and Objective:* Since one reason of malnutrition in infancy is early or late introduction of complementary feeding, which leads to fail both in physical and mental growth, so it is important to determine the effect of age at introduction of complementary feeding on physical growth of infant for prevention of malnutrition in children.

*Methods:* The research method was longitudinal observational study in 5 health centers of Hamadan city that had similar socioeconomic and cultural status. The data of 137 infants were collected on 3 visits. Subjects were divided to 3 groups according to age at introduction of complementary feeding (before 4 months, 4–6 months and after 6 months). Demographic and socioeconomic data were collected by questionnaire, and infant’s weight, height and arm circumference were measured. The data were analyzed by SPSS and EPI packages.

*Results:* The nutritional status of 3 groups infants were not different significantly (W/A, H/A, W/A, Arm/A) at 3, 6 and 8 months. But infants who had complemented after 6 month, had slightly slower length increment compared to other groups at 8 month (2.64 ± 1.34 vs. 3.44 ± 1.72 and 3.46 ± 1.51 cm P = 0.01). Among confounding variables, low educated father, poor nutritional care of infant by mother and more frequency of respiratory disease before 4 month were positively linked to early introduction of complementary feeding (p = 0.01).

*Conclusion:* Although the result of this study showed that, there were no differences in growth pattern of infants in 3 groups at 3 and 6 month but at the end of 8 month length increment of infants in 3rd group were significantly different from the others. So for better judgement it is suggested to follow-up the growth pattern of children at later age (12 month).

**PS.N22**

**Changes in Adrenergic Receptor Content in Maternal Brown Adipose Tissue During Placentation Process**

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Brown adipose tissue (BAT) plays an important role in the regulation of the energy balance since it is a major site of facultative thermogenesis, mediated by the uncoupling protein 1 (UCP1), whose function is to dissipate, as heat, the proton gradient energy generated by the respiratory chain. Activity and expression of UCP1 is under adrenergic control, mainly through the presence in brown adipocytes of adrenergic receptors (ARs). The balance between the cellular content of alpha2-AR (inhibitor) and beta3-AR (activator) is central to the regulation of thermogenesis by modulating the net adrenergic signal response in the adipocyte. During pregnancy, BAT undergoes profound changes in order to adjust energy expenditure to the energy requirements of the developing conceptus. We have investigated the existence of changes in the beta3-AR and alpha2-AR balance in BAT and its relationship with the expression of UCP1, as well as with the mitochondrial content, in pregnant rats on gestational days 11, 12 and 13. No significant differences were found in the alpha2-AR content, neither during the gestational days studied or between pregnant and non-pregnant rats. Conversely, the beta3-AR content tended to decrease during the period studied, being significantly lower on day 13 as compared to non-pregnant rats, thus leading to a diminished beta2/beta3-AR balance. These changes were not accompanied by any significant modification in the UCP1 content. A marked decrease in the number of mitochondria in the tissue (as reflected by a lower mitochondrial DNA content) was found in pregnant rats compared to non-pregnant rats. In conclusion, our results demonstrate the existence of changes in the BAT AR content during the gestational period studied. These changes could be involved in the BAT functional atrophy in late pregnancy.

**PS.N23**

**Childhood Obesity: Early Programming by Infant Nutrition? (CHOPIN) – Un Update of the Ongoing Survey in Italy**

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*Background:* A high protein intake in the first years of life has been related to an early adiposity rebound and childhood BMI.

*Aim:* To test the influence of the protein intake during the first year of life on growth through two years of age and to challenge the hypothesis that an early high protein intake is associated with early indicators of future obesity development.
Subjects and Methods: A multicentric intervention trial sponsored by the European Commission is going in five European countries (Belgium, Germany, Italy, Poland, Spain). The study is performed as a double blind randomised clinical trial with two parallel groups of formula fed (FF) infants (two formulas with different protein contain, 7.3% vs. 12% of energy, supplied by BLEDINA, France) and a non-randomised reference group of breast fed (BF) infants. Infants (enrolled according to major criteria of normality) are randomised in either formula groups in case of lack of breast milk within 8 weeks of life. The study formula is given through all the first year of life. Infants are considered breast fed if fully breast fed up to 3 months of age. The infant’s anthropometry is recorded at birth and periodically up to 2 years. Details about pregnancy, infantile behaviour and development as well as the dietary habits are also studied. After 24 months of age, the infants’ anthropometry will be recorded up to 8 years of age. A total of 500 infants per each formula group and 250 breast fed infants included as reference have been calculated (two-sided t-test; \( \alpha < 0.05 \); power 85%).

At present in Italy 89 BF and 70 FF have been enrolled. The percentage of drop-out was 32% and 20.5% respectively.

Conclusion: While the study is still in progress, this is one of the first multicentric trials to check the programming effects of early postnatal dietary habits.

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**PS.O Nutrition Education and Training of Nutritionists**

**PS.01 Validation of the Dutch Eating Behaviour Questionnaire Parent Version (DEBQ-P) in the Italian Population: A Screening Tool to Detect Differences in Eating Behaviour Among Obese, Overweight and Normal-weight Preadolescents**

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Introduction: Childhood and adolescent obesity and overweight have a significant impact on later mortality and morbidity in adulthood. More effective prevention and treatment strategies are becoming a major public health focus. Individual differences in several aspects of eating style have been implicated in the development of weight problems in children and adults at both ends of the weight spectrum. Nevertheless, studies describing attempts at measuring eating behaviour and eating style in preadolescents are rare. Detecting differences in eating behaviour between obese, overweight and normal-weight children may improve our understanding of the aetiology of overweight and obesity and provide new directions for prevention strategies.

Aims: The aims of the present study were to validate the Dutch Eating Behaviour Questionnaire Parent version (DEBQ-P) in the Italian population and investigate the differences in eating behaviour among Italian normal-weight, overweight and obese preadolescents.

Methods: 312 preadolescents (mean age 12.9 years; SD 0.8) from the province of Bergamo, Northern Italy, were measured and classified as normal-weight, overweight and obese, according to the new standards developed by the International Obesity Task Force (IOTF) and recommended by the World Health Organisation. Their parents filled in the approved translation of the DEBQ-P.

Results: 4.2% of the sample were classified obese, 18.9% overweight and 76.6% normal-weight. Factor and internal consistency analysis confirmed the factor structure of the DEBQ-P and the high internal consistency of its three scales. Variance analysis showed that eating behaviour of Italian normal-weight, overweight and obese preadolescents differs significantly only in regards to the ‘restrained eating’ scale, with overweight and obese scoring higher.

Conclusions: The DEBQ-P can be used for screening projects regarding eating behaviour in the Italian population. Further studies are required in order to verify the differences in eating behaviour among Italian preadolescents.

**PS.O2 Evaluation of Attendance Regularity and Counseling of Iranian Mothers in Health Centers**

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The purpose of this study was to evaluate the strength and weakness of growth monitoring (GM) program. The study were carried out by qualitative research method based on interviews, observation and focus group in urban and rural health centers. 8 provinces were randomly selected from nutritional status. 320 mothers were interviewed and 86 health care activities. Findings of the study showed that the regularity of mothers attendance in rural health house (86%) more regular than urban centers (44.4%). The mothers who never attended were 11.2% in urban and 2% in rural centers during the last 6 months before the study. The frequency of attendance declines as the children age increases. There was no significant relation between educational level of mothers and their attendance. The average time spent for each child was 6:5 min (2:24 min for counseling, 30 second for weighing). The card were not shown to the mothers (87%) and did not inform about their childs nutritional status. It is concluded that there is a lack of understanding of GM program and failure in nutrition education program among the health workers within the PHC system.
PS.03  
**Functional Food Science at Lund University**  
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The prevalence of diet-related diseases is increasing and for certain diseases, e.g. type II diabetes and obesity, an epidemic propagation is seen. A major challenge for functional food science is the development of functional foods that can help in combating diet-related disorders. Functional food science also includes the knowledge on the positive effects on physical and psychological performances, e.g. cognitive function. The Functional Food Science Centre (FFSC) is a multi-faculty centre at Lund University. The objectives of FFSC are to strengthen research in functional food science at Lund University, to stimulate interdisciplinary research projects and to contribute to an increased exchange of ideas with industry and society. The FFSC network includes about 75 senior researchers from 40 departments and 5 faculties. Some areas of special excellence are: gut health including probiotic and prebiotic aspects; metabolism with extensive research in important areas such as obesity, regulation of appetite, diabetes and hyperlipidaemia; antioxidants and their effects on health. Other important research areas include marketing of functional foods and other consumer aspects. Clinical documentation of the physiological effects of food products is performed by several groups. Within some areas, clinical documentation of products is commissioned by the food industry. Lund University offers a unique breadth in expertise in functional food science. This includes research in several key areas, such as food-related nutrition, food science, biotechnology, medical sciences, product design, process technology, health and market economy and consumer aspects. The expertise at the School of Economics and Management and the Research Policy Institute provides excellent opportunities for the development of methods for the evaluation of the ‘functional food process’. The functional food cluster around Lund University has recently been top ranked in several international studies.

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PS.04  
**Breakfast and Cognition**  
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Breakfast clubs have been introduced in the UK in an attempt to improve the diets of school children. The aim of this research was to determine the effect of a breakfast club breakfast (BC) compared to a breakfast served at home (HB) on nutritional intake and cognition of Scottish primary school children. Breakfast Clubs serving a choice of cooked breakfasts and/or toast or cereal were available to the BC group at school. Dietary information and Digit Span, Coding and Arithmetic subsets from the Wechsler Intelligence Scale for Children (WISC-IIIUK) were collected at baseline before the commencement of the breakfast club, and 3 time points at 9-week intervals post intervention. There were more cooked breakfasts consumed by the BC (p < 0.01) group and greater amounts of cereal eaten by the HB group (p < 0.001). Percentage energy from fat, polyunsaturated and monounsaturated fat was higher in the BC group as compared to the HB group at collections 3 and 4 (p < 0.05–0.001). In the HB group percentage energy from carbohydrate and starch was greater at collections 2, 3 (p < 0.01) and 4 (p = 0.05–0.06). There were pronounced improvements in the HB group in all WISC-IIIUK subsets when baseline results were compared to scores at collection 3 and 4 (p < 0.001). A positive correlation was found between Coding and percentage energy from sugars and carbohydrate (p < 0.01) at data collection 3 and 4 in both groups. A positive correlation between Coding and starch existed in the HB group at data collection 4 (p < 0.05). Digit Span and glucose were positively correlated (p < 0.05) in the HB group at data collection 3. These findings suggest that a breakfast higher in percentage energy from carbohydrate might benefit short-term memory and contribute to academic performance in school children.

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PS.05  
**‘Mediterranean Clepsydra’: New Model for Nutritional Assessment and Education**  
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We propose a new instrument called ‘Mediterranean Clepsydra’ that it could be used to manage diet and to improve the knowledge in the nutritional assessment/education. The clepsydra is the result of the idea of making equilibrium in the nutrients variety using the classical model of Mediterranean diet. It is divided in 4 different nutrients groups.

Group A: proteins and lipids (particularly saturated fat). Group B: lipids (i.e., olive oil, as mono-saturated lipid), carbohydrates (mainly...
Sugar (specifically wine, that contains polyphenols with anti-oxidant function). Group C: complex carbohydrates, proteins and vegetables. Group D: vitamins and fibers, specifically vitamins A and C, carotenoids that have an important anti-oxidant function.

This 'new' model has a specific place inside in order to define the 'regular' portion of food, the personalized one, and the instructions to use the number of portions per week.

**Conclusion:** The 'Mediterranean Clepsydra' offers a new possibility for using the Mediterranean diet to have:
- the perfect equilibrium between different quality and quantity of food
- a standard criteria for dietitians/doctors to prescribe and personalize diet
- a new model for education in nutrition area.

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**PS.06**

**Train of the Trainers on Food Safety Course: Experience from South East Asia**

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Foodborne and waterborne diarrheal diseases are leading cause of illness and death in developing countries. The WHO advocates food safety as an essential public health priority, and capacity building through education and training is one of the strategies. Only through education and training, the necessary information to make decision upon a sound scientific basis can be provided to food control, industry and consumers. The ICD/SEAMEO Cooperative Program has been conducting the Food Safety Course using the WHO/ICD/SEAMEO/GTZ Manual 'Food Safety for Nutritionist and Other Health Professionals' since 1992. The course is attached to the MSc in Community Nutrition Training Program at the SEAMEO TROPMED Regional Center for Community Nutrition, University of Indonesia, Jakarta.

A training of the Trainer (TOT) workshop integrated into the course provides a tool to cascade the course for message dissemination. Since 1996, seven workshops have been conducted attended by 58 trainers from 29 institutions in 9 different countries. Trainers were mostly from the academia (44 persons) and government officials (14 persons). The manual has been translated into 6 languages. Comprehensive module and supporting material, local expertise utilization as well as sharing resources from different stakeholders make the course sustainable.

The TOT has substantially increased the knowledge of the trainers. The overall performance of the ICD/WHO/SEAMEO/GTZ TOT program is timely to be evaluated to provide basis for improving the effectiveness of the model.

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**PS.07**

**Nutritional Counselling in Diabetes Management**

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Evidence-based, individual nutritional needs considering nutritional counselling can facilitate the compliance in diabetics. The aim of this work is to present nutritional counselling as part of diabetes self-management education and its impact on diabetes management. 84 diabetics, mainly overweight, poorly controlled, inactive, with high total cholesterol values and elevated systolic blood pressure participated in diabetes self-management workshops. During the workshop every patient filled in the appropriate questionnaire, got the written individual opinion on his/her dietary habits and recommendations how to change them to achieve better diabetes management, which have been discussed with the counsellor. The short- and long-term impact on dietary changes and diabetes management one year later were checked up. The majority of patients ought to change their dietary habits. The quality factors of diabetes and related complication management was significantly influenced by the BMI (physical activity), WHR (physical activity, total cholesterol by females), and treatment (number and timing of meals). Participation on course significantly improved short-term control of blood sugar (HbA1C 7.72 ± 1.47% vs 7.51 ± 1.17%, p < 0.05). Long-term significant reduction of blood sugar (HbA1C 7.31 ± 1.30%, p < 0.05), and non significant reductions in BMI (27.80 ± 17.18 vs 27.30 ± 15.89), WHR (0.89 ± 0.01 vs 0.88 ± 0.005) and total cholesterol (4.88 ± 0.83 vs 4.80 ± 0.73) were observed. The main changes in dietary habits were increase in fresh vegetable, fruit and pulses consumption, reduction of food quantity, cooking fat and salt, exchange normal fat milk and fermented milk for low fat ones, eating poultry without skin and increase of physical activity. It is possible to improve diabetes management with individual nutritional counselling, but the long-term assessment of dietary habits modifications and markers of diabetes management are needed to confirm the educational method.

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**PS.08**

**A Qualitative Approach of Nutrition Social Programmes Utilization**

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This paper, based on qualitative methodology of social research, intends to analyse two nutrition social programmes starting from users' perceptions. The population researched is composed by frequent and non frequent users in order to show similarities and differences and to apprehend different perspectives of the investigated phenomenon. Two main themes appeared in the discourse analysis: 'daily operation' and 'status of being a user'. Those themes, in turn, gave rise to different categories that allowed to identify an association between the programmes in focus and poor identity, as well as feelings related to...
this status, such as ‘resignation’, ‘humiliation’ and ‘embarrassment’. The results indicate the necessity of considering subjectivity, that influences social experiences and founds individual’s singularity, so that an effective dialogue between government planners and population can be established at last.

PS.O9

Dietary Advice for People at Risk from CHD: Quality of Advice in East Surrey and East Elmbridge and Mid Surrey PCTS

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This research project fits into current PCT priorities because the government have made CHD a public health priority. The White Paper Saving Lives: Our Healthier Nation committed the government to reducing the death rate from heart disease and related illnesses in those under 75 by two-fifths by 2010. In March 2000 the National Service Framework for Coronary Heart Disease was published, a ‘blueprint’ for tackling heart disease. Standards three and four in the NSF are aimed at preventing CHD in high risk patients. One of the strategies to reduce risk factors for CHD, is to provide patients with information about modifiable risk factors and personalised advice about how they can be reduced (including advice about physical activity, diet, alcohol consumption, weight and diabetes).

Objectives: To determine how, when, by whom and in what context and format dietary advice is given. To devise a framework using the published literature for assessment of the quality of advice to interview Health professionals and patients to assess the quality of advice given using the framework. To make recommendations for improving dietary advice for CHD patients for the PCTs and more generally.

Design: Cross Sectional Survey Setting: General Practices in Surrey Subjects: Health Professionals giving dietary advice and Patients with Coronary Heart Disease.

Methods: Qualitative in depth interviews Main Outcome.

Measures: The number of practices who have systematically developed and maintained a practice based CHD register. The ways in which practices are working on standards 3 and 4 of the NSF on CHD and problems in achieving these standards. The quality of health information in relation to the framework. Practical recommendations to PCTs for working on standards 3 and 4.

Results: The study has not yet finished and so results are not yet available.

PS.O10

Teaching Customers Healthy Nutrition Principles as a Component of Implementation of Healthy Nutrition Policy in Russia

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Teaching people healthy nutrition skills requires a comprehensive approach and different organizations to be involved. That is why one of the Russian leading retailers, Trading House ‘Perekroistok’, combining about 50 supermarkets, together with the Institute of Nutrition and I.M. Sechenov’s Moscow Medical Academy elaborated and implements now a program ‘Healthy Nutrition’. The goal of this program is to teach buyers basic healthy nutrition principles, skills of self-dependent choice of food to make their own diet, which could provide for health and prevention of major noncommunicable diseases. ‘Healthy Nutrition’ program is a long-term marketing program, which consists of three-week actions of seasonal subjects. Each of these actions is devoted to a certain nutrition problem, connected with a season and in a perceptive way informs buyers about the advantages of efficient nutrition. To make a correct choice of food, necessary for healthy nutrition, all range of foods is subdivided into 5 groups of its own color. Program corporate identity was worked out. The sales areas are arranged with promotional material, which makes the program attractive for the customers. Their consulting by nutritionist and dietitians was organized. Much attention is paid to publishing booklets, leaflets and articles in a special magazine and other consumer editions, giving an account of information about healthy nutrition. All this material contains data on food composition and its importance for human nutrition, practical advice on nutrition arrangement, recipes of dishes, diet, teaching tests etc. The information contained is based on the modern advances, WHO recommendations on nutrition adapted to national traditions. The program envisages training of shop assistants. Evaluation of program efficacy is under way.

PS.O11

How to Meet Employers’ Needs for Skills in Public Nutrition

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Background: Public Nutrition takes a holistic approach in addressing nutritional problems. This includes i.a. needs assessment, casual factor analysis, actor analysis, developing nutrition policies, strategies and means to achieve adequate nutrition and health, and to prevent malnutrition. Higher nutrition training is often teacher rather than student based; students are seen as receivers of information, which they are expected to use in practical work in tackling food, nutrition and health problems.
Aim: To assess the needs of potential employers for competence and skills of public nutritionists, and to translate these into learning objectives in higher training of public nutritionists.

Methods: A questionnaire was developed using the web-based program 'QuestBack' and sent to 221 relevant institutions, organizations and the private sector. Response rate was 45%.

Results: The result was a professional profile consisting of a list of functions, seen from the employers' side. The most important functions of a public nutritionist, included: communicate with mass media and various stake holders; identify relevant legislation and rules; run courses for and inform other professionals; transform scientific information into practical tasks; run nutrition education campaigns of the public; co-ordinate activities at different levels and between sectors; plan, implement, monitor and evaluate nutrition projects.

Conclusion: The survey provided a professional profile of a public nutritionist seen from the employers' side. The functions are transformed into general objectives of a Bachelor and Master degree in Public Nutrition and will be used as a basis for specifying the content structure of such higher education.

PS.O12
Content Analysis of Nutritional Messages in Iranian Newspapers, 1999–2000
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The press plays an important role in conveying the relatively complex nutrition information to a wide audience. To evaluate the nutritional messages in Iranian newspapers, a content analysis study was conducted on 192 issues of 8 largest national daily newspapers using a systematic monthly content analysis from March 1999 to March 2000. A coding form was devised to tabulate information. All messages related to food and nutrition was recorded by 5 trained nutritionists and double-checked by a senior nutritionist and a communication expert. In total, 122 nutrition messages were found with a mean of 0.65 messages per issue and total printed surface of 0.3%. In terms of style, 64.8, 1.6, 4.9 and 28.7% of messages classified as news, reports, articles and as others, respectively. The most frequent topic was food safety (35.3%), followed by nutrition related disorders (17.6%) and food properties (14%). While about 70% of messages were scientific-based, 17% identified as ambiguous. About 40% of messages were written by a nutritionist or an allied expert. The target audience for 75% of messages was the public. Only 1 message was written in a non-popular language. About 30% of messages contained promotional statements, while 47.5% presented bleak news. Messages cited from different resources, from which Islamic Republic of Iran News Agency (18.9%), four major news agencies (UP, AP, Reuters and France Press) (1.6%), international and national organizations (23%) and Internet (1.6%) were foremost. According to this study, it seems that both quantity and quality of nutrition messages in most popular newspapers are not public need oriented.

PS.O13
Does Patient’s Knowledge about Osteoporosis have Influence on Calcium Intake?
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The aim of the study was to determine if calcium intake in patients with osteoporosis and osteopenia is influenced by patient’s knowledge about the disease. Results presented are part of a so far collected from an ongoing survey about dietary and other behavior in women with osteoporosis and osteopenia.

Subjects were women (n = 197) with diagnosed osteoporosis or osteopenia (mean age was 62.9 years). The dietary method used was completely quantified Food Frequency Questionnaire (FFQ). Additional questions provided demographic data.

Mean daily dietary calcium intake was 945.9 mg i.e. 78.8% DRI. Calcium supplement use reported 59.8% subjects, and when counted supplemental calcium intake, daily intake was 99.2% DRI. Supplement users in average had higher calcium intake (1,574.5 mg) than those who do not use supplements (1,023.4 mg) and those who consumed calcium fortified milk had higher calcium intake (1,524.9 mg) than those who do not (1,045.3 mg).

When asked in what period of life consumed the highest quantity milk and dairy products, the highest percent of subjects (27.8%) answered after the age of 50 years, but age negatively correlated with calcium intake although not significantly. Years of education did not significantly correlated with calcium intake. Subjects that knew recommended calcium intake (mean age was 62.9 years). The dietary method used was Osteoporosis and osteopenia is influenced by patient’s knowledge about the disease. Results presented are part of a so far collected from an ongoing survey about dietary and other behavior in women with osteoporosis and osteopenia.

Significant correlation (p < 0.01) was observed for calcium intake with osteoporosis and osteopenia. Period of time from diagnosis did not correlate with calcium intake. Time spent in light to moderate physical activity also did not significantly correlated with calcium intake. Significant correlation (p < 0.01) was observed for calcium intake and number of correct answers to questions about osteoporosis and on food checklist where task was to recognize good calcium sources.

This study showed that patient’s knowledge about osteoporosis is important in achieving adequate calcium intake.
PS.014
Role of Nutritional Education Using Health Belief Model for Prevention of Failure to Thrive
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Objective: Children younger than 2 years are susceptible to intestinal, parasitic disorders and malnutrition. Lack of information about proper supplemental feeding among their mothers is one of the important risk factors predispose these children to failure to thrive (FTT). This study wants to show if Nutritional education can promote the mother's information.

Methods: As a self-controlled field trial using cluster-Sampling technique, we selected 112 mothers whose under 2 year child was following up by Tabriz health center. These mothers were educated for 3 months. Significant change of their knowledge was determined using student t-test and chi-square.

Results: Our study shows that only 23% of mother have enough information about their child nutritional needs. Educational course promoted their knowledge significantly (P < 0.05)

Conclusion: The level of mothers knowledge about nutritional need of their child are low and educating mother using health belief model can increase their knowledge.

PS.015
Design of a Proposal for Nutritional Education at the Schools in Catalonia
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Introduction: Catalonia is an autonomous community in Spain, with more than 4,000 public or private schools. Nutrition is very important for health (there is great scientific evidence that relate diet and health) which is especially important in the evaluative stage and requires the participation of both the school and the family.

Objectives:
1. To approach eating habits to healthy behaviour.
2. To design an intervention addressed to the all whole of the educational community.
3. To evaluate the process, the impact and the results of the intervention.

Methodology: It is a pilot educational intervention which differentiates and interrelates the three sectors of the educational community: (teachers, pupils and family), at school located in two different geographical areas (seaside and inland) the age range of pupils involved should be between 10 and 15.

Preparation of questionnaires prior to the intervention for three population groups, followed by further questionnaires after the intervention. Activities would include: Healthy and balanced nutrition, food security, cultural integration (differences between school and family menu, inclusion of all food groups in the meals, influence of Mediterranean diet,...) there will be workshops with all possible technological support, lectures,... addressed to the sectors concerned. Additionally, we would receive the co-operation of health authorities and the local administration.

Results and Conclusions: The results of the pilot test should enable us to elaborate a nutritional intervention in the whole of the educational centres in Catalonia, which may allow the whole of the educational community (teachers, parents, and pupils) to adopt healthy eating habits.

PS.016
Assessing Impact of a Change – Based Nutrition Education Program on Growth Indices of Iranian Qashqa’i Tribes Children under Five Years Old
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Introduction: A nutrition education program, entitled ‘volunteer health workers and nutrition education in four qashqa’i tribes’, was designed according to the stage of behavior change model, and implemented in four tribes of Iranian nomads. The objectives were to improve the nutrition related knowledge, skills and behaviors that lead to healthy life styles in a low-income family population.

Methods: This population presents many obstacles for nutrition educators including limited resources, child care, transportation, language, culture, literacy, health beliefs, and in some cases, the transient nature of the population. The program attempted to overcome these barriers by incorporating a flexible program format carried out by V.H.W. (volunteer health workers) educators using the processes described in the stage of behavior change model. The program was evaluated using knowledge, skills and behavior pre-test, post test, and 12 months follow-up survey on both the tribal volunteer health workers as educators and the tribal mothers as information receivers.

Results: The adjusted mean baseline WAZ for treated and control children was (−1.4 vs. −0.97), HAZ was (−2.1 vs. −1.68) and WHZ was (−0.02 vs. 0.27); the average child was already moderately malnourished when recruited. The increased final mean WAZ, HAZ and WHZ of the treatment group was 0.43 SD, 0.32 SD and 0.23 SD, respectively, which was better than that of the control subjects, indicating that the treated children were nearly 1.17kg heavier and 3.7 cm taller at the time of the final measurement than the children at baseline. The adjusted changes in WAZ and HAZ were also significantly different between test group and control group (p < 0.001). Treated children grew 1.94 cm taller than the control group mean.

Discussion: Results of this program suggest that this type of training program can be effective in increasing the knowledge, skills of volunteer health workers and improve the behavior of mothers as well as reduce malnutrition among children under five years old. Additionally, the results suggest that this type of program can be effective in changing selected nutrition related beliefs, attitude,
subjective norms and behaviors leading to healthy lifestyles for low-income tribal family, their mothers and children.

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**PS.O17**

**World Food Day Celebration Network in Healthy Nutrition Promotion in European Countries**

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Promotion and education of healthy nutrition and lifestyle in childhood are important because that is a period of getting habits that last during life. For effective nutrition promotion in Subotica, 1999 marked the first celebration of World Food Day (WFD) on October 16 with the Festival of Healthy Nutrition and Physical Activity Promotion. In 2001 in Republic of Serbia, October was determined as the month for promoting healthy nutrition and this model of WFD celebration was accepted as a national model. In 2002 a WFD Network was created for CEE Countries with FAO SEUR Budapest. WFD events were organized in Subotica, Budapest, Nitra, Bukurest and Yerevan with aims to celebrate the WFD as well as create the beginning of partnerships between the participating countries. This initiative aims to give publicity to the different local events, and to act as a forum share and exchange ideas. The WFD web subportal was created in CEE AgroWeb Network as a virtual meeting place to collectively display each country’s activities included in celebration: organisation the competition for the best fine art and literary works and theatrical performances for children related to topics from nutrition, physical activity, obesity with cooperation with preschool and school institutions. The celebration ended as Festival with exhibition of the best awarded works, theatrical performance, and food exhibition and testing, quiz about healthy nutrition. Engagement the whole community in education and promotion on healthy nutrition, importance of physical activity and healthy lifestyle we perform organizing campaigns, free nutritional status and nutrition evaluation, festivals, workshops, seminars, lectures, education through media, press conferences, internet communication, preparing video film, brochures with recommendations and other education materials. Movement towards healthy nutrition and lifestyle promotion in childhood can be implemented in other countries.

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**PS.O18**

**Nutrition and Nutritional Status in Schoolchildren as Indicators for Implementation of Dietary Guidelines**

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**Introduction:** Optimal nutrition and healthy diet of children are the most important determinants of their health, development, growth and nutritional status. The objective of this study has been to determine the quality of family nutrition and nutritional status of schoolchildren.

**Methods:** A representative sample of 8,851 girls and 9,304 boys aged 7–18 from Subotica examined during systematic examination in 2001–2002. Evaluation of nutritional status was done on the basis of BMI (kg/m²) NHANES I by software ‘CHILD’. A 7 day food records of food consumption by questionnaire were used by the aid of software ‘NUTQ’ for evaluation of energy and nutrient intake (n = 388).

**Results:** Mean energy intake in family nutrition was 2,469.39 kcal where the proteins were represented with 15%, fats with 40% and carbohydrates with 45%. Analysing the percentage supply of different food groups in daily energy, milk and products contributed with 9.48%, meat and products with 17.02% fat and oils with 12.53% cereals and grains with 31.75%, sugar and sweet 8.73%, vegetables and products 4.68%, fruit and products 7.97% and fish only with 1.4%. Nutritive risk factors of family nutrition exist in 62% of families in the form of increased intake of fats over 30% of energy value (EV), then sugar over 10% EV in 59%, saturated fatty acids over 10% EV in 48%, ratio P/Z < 0.4 in 81%, cholesterol intake over 300 mg/day in 13%, while in all families there were determined consumption of salt over 6g/day and insufficiency of dietary fibre, with insufficient intake of most vitamins and minerals. Normal nutritional status (BMI P15–85) was noted at 65.5% of boys and 67.9% of girls, underweight (BMI < P5) at 7.0–8.0% of children, moderate overweight (BMI P5–15) at 9.6–10.4% while overweight (BMI P85–95) was noted at 8.9–10.6% and obesity (BMI > P95) at 5.5–6.0% of boys and girls.

**Conclusions:** Nutrition of schoolchildren in our area is relatively high in total fat, saturated fatty acids, free sugars, salt, and low in vegetables, fruits, dietary fibres and some minerals and vitamins. Registered inadequate nutritional status and nutritive risk factors present important nutrition indicators for implementation of dietary guidelines – Nutrition Action Plan. In order to improve nutrition and health of schoolchildren parallel conducting the strategy of high risk and population nutrition with optimal school meals and health promotion strategy is needed.

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**PS.O19**

**Situation in Nutrition and Nutritional Status of the Polish Population**

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In 2000 National Food and Nutrition Institute carried out country-wide representative survey of dietary habits and nutritional status of male and female population. This survey was conducted in cooperation with Central Statistical Office within project ‘Household Food Consumption and Anthropometric Survey’ and with financial and technical assistance from FAO. Individual food consumption of 4,134 individuals who were the members of the 1,362 randomly selected families was examined through the use of 24h recall.

According to the results of the survey, energy, protein, total fat and cholesterol intakes were higher than recommended for all age groups in both genders. The highest energy intakes in relation to national recommendations were noted in the group of males aged 19–25 and amounted...
to 147.5% of the recommended amount. The highest protein intakes in comparison to recommendations at the safe level – 272.7% – were observed among boys aged 1–3 years. Males aged 19–25 years showed the highest fat intakes in relation to recommendations – 185.2%.

11.8% of the boys aged 1–18 years were underweight, 75.5% were of normal weight, and 12.6% were overweight or obese (according to standards developed by the Polish Mother and Child Institute). Amongst girls in this age group, the values were 14.2%, 74.0% and 11.8%, respectively. In contrast to the children, only 1% of adult males and 3.3% of females were underweight. 42.3% of men and 48.2% of women were in the normal weight range; 41% of adult males and 28.7% of adult females were overweight; and 15.5% of men and 19.9% of women were obese (according to BMI categories, WHO 1997).

**PS.O20**

**Effect of Nutrition Education on Level of Knowledge of Community Health Volunteers in Hakimieh Health Center Tehran**

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**Introduction and Objective:** Since one of the most important causes of the prevalence of food borne diseases in suburban regions is food contamination due to lack of awareness safety in preservation and preparation of food. So one way of decreasing this problem is to promote the level of knowledge of the community health volunteers for transferring the information in households.

**Methods:** This research was done by semi experimental method in Hakimieh health center. In this study 40 C.H.V. were chosen by random in 2 groups’ case and control. The level of their knowledge were compared by questioner before and after intervention.

**Results:** The mean of knowledge of 2 groups were not different significantly before education but after intervention it was significant (P < 0.001).

**Conclusion:** The results of this study showed that implementing of training courses have positive effect on the level of C.H.V. knowledge.

**PS.O21**

**‘S.O.S.’: Why Am I hungry?**

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In our opulent and overindulgent society, there is a need to ascertain the reality of our ‘S.O.S.’ for food, or the real meaning of the sentence, ‘Why am I hungry?’: I am ‘biologically’ hungry because it is necessary to nourish my body with food (= physical need), or I am hungry as a gratification for my emotional distress (= emotional need).

The ‘biological hunger’ indicates the real need for food to end the psychophysical distress it provokes; the ‘emotional hunger’ indicates that food is the easier answer for every stimulus triggered by an unpleasant reality: we eat because of fear, sadness, anger [1].

Under these conditions, the aphorism ‘I am what I eat’ becomes ‘I eat what I am’.

In light of the previous explanation, the nutritionist has a multi-purpose target:

- Educate people to acquire strategic and coherent attitudes. This knowledge will stress meaningful values for the food and the body. People will be able to differentiate between hunger and emotions, and react to stimuli with responsible ‘nutritional behavior.’ A correct food intake will not necessarily be determined by the personal knowledge of the differences previously mentioned, but, the individual will answer better to problematic situations based on the knowledge of this topic. This influences the way of perceiving oneself, others, and the environment.
- Educate the individual to train himself/herself in new situations, avoiding irrational solutions, false role-models, and impossible goals.
- Teach an ‘assertive rapport with food’. Under a contingent situation, food intake should be neither an aggressive nor a passive experience. With this gratifying knowledge, the stress is shifted from food to the importance of self and others.

**Bibliography**


**PS.O22**

**Vitamins – Food or Drugs**

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Question what is food and what is medicinal products have been defined through legislation; thus categories of food and medicinal products have been clearly separated by EU regulation. Harmonization and implementation of EU legislation in countries preparing for European integration have also been expected. Food supplements definition also contributes to the elucidation of the position of vitamins and their use in nutrition (diet). The new EU Directive relating to food supplements containing vitamins was issued and the subsequent application in the Member States expected.

Upper safe levels of vitamins established by scientific risk assessment based on generally accepted scientific data should be taken into account. Based on upper safe levels data no adverse effects have been associated with excess vitamins intake (even intake exceed several times) from food and supplements in most segments of the population.

Addition of nutrients (vitamins) to food and food supplements can undoubtedly improve the nutritional status and health of those segments of the population that are vulnerable and susceptible to deficiencies. Generally accepted recommended daily allowances of vitamins in EU and USA as the representatives of the most developed markets and regulatory do not comply. The product containing exceeding levels of vitamins (3 RDA or more) actually represents medical product implying the detailed documentation of bioavailability concerning active substance from pharmaceutical formulation, as well as documentation of acute and chronic toxicity.

All known vitamins have been clinically tested and can be used for preventing, treating or curing purpose.

**PS.O23**

**Evaluation of the Impact of Seminarian Program about Nutritional Education with Cardiovascular Diseases Prevention Aim on Patients Enrolled in a Rehabilitation Center**

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This study was carried out by the addition of a seminar about nutritional education in the rehabilitation programs of our center. The seminar consisted in a two hours lesson about importance of cardiovascular (CV) diseases, responsible of 49% of mortality in Europe, and about nutritional goals pointed out by EHN1 for CV diseases prevention in Europe. The aim of this study is to evaluate the impact of nutritional seminar on 36 of our patients without CV diseases and enrolled in a respiratory or orthopaedic rehabilitation program.

**Methods:** The impact was evaluated using a ten items questionnaire; the items are grouped into 2 scales: Contents and Form of Presentation. The data analysis shows a considerable sensitiveness to nutritional subjects related to CV diseases prevention of these patients. In 82% positive was Content scale (qualified, interesting, to spread, important and to probe). A positive valuation, 74%, was Form of Presentation (easy, understandable, clearly explain and involving). The results of this study show the presence of a good concordance between us and our patients on the importance of nutritional education in preventing CV diseases and support our aim to add nutritional seminars to patients’ rehabilitation programs in order to reduce CV morbidity and mortality risk.

**References**


**PS.O24**

**Effect of Prenatal and Child Nutrition Education on Low Income Hispanic Pregnant College Students**

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**Aim:** The purpose of this study was to provide prenatal and child nutrition education to low income Hispanic pregnant college students.

**Methods:** Pretests and posttests data were analyzed based on the knowledge of nutritional principals of pregnant women and nursing mothers attending the workshops.

**Results:** Data indicated that 88 percent of the participants knew that prenatal care was important to ‘both mother and fetus’. Ninety percent of the participants indicated that pregnancy is divided into 3 trimesters compared to 82 percent prior to training. Sixty eight percent of the participants indicated urination is one of the signs of pregnancy. Ninety eight percent of the participants indicated that ‘low birth weight is associated with lack of prenatal care’ compared to 82 percent prior to training. Ninety eight percent of the participants answered correctly that ‘certain foods are rich in fiber’ compared to 4 percent of the participants prior to training. Seventy two percent of the participants mentioned that ‘body’s main source of energy comes from carbohydrates’ compared to 65 percent prior to training. Ninety eight percent of the participants realized that ‘body uses protein mainly for growth and repair’ compared to 75 percent prior to training. Ninety two percent of the participants indicated that ‘folic acid is important in preventing birth defects’ compared to 68 percent prior to training. Ninety eight percent of the participants believed that ‘drinking excessive amount of alcohol during pregnancy could cause fetal alcohol syndrome’ compared to 72 percent prior to training. Ninety eight percent of the participants answered correctly that breast milk is rich in all nutrients compared to 80 percent to 80 percent of participant prior to training. Ninety eight percent of the participants believed that ‘smoking during pregnancy could cause birth defects,’ compared to 84 percent prior to training.

**Conclusion:** The workshop had a positive impact on improving the nutrition knowledge of the participants.

**PS.O25**

**Fitness and Nutrition Education Benefits in Low Income Hispanic Women**

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**Aim:** The purpose of this study was to provide fitness and nutrition education to low income Hispanic women.

**Methods:** Pretests and posttests data were analyzed based on the knowledge of nutritional principals of participants attending the workshops.

**Results:** Posttests data indicated that 82 percent of the participants answered correctly when asked ‘you can rely on thirst to tell even when you need to drink more fluids’, compared to 78 percent prior to training. One hundred percent of the participants answered correctly when asked, ‘which are good sources of vitamin A’, compared to 28 percent prior to training. One hundred percent of the participants indicated that ‘taking vitamin supplements is not the best way to obtain nutrients,’ compared to 78 percent prior to training. One hundred percent of the participants indicated that ‘good source of iron defects,’ compared to 84 percent prior to training.

**Conclusion:** The workshop had a positive impact on improving the nutrition knowledge of the participants.
is from beans’ compared to 90 percent prior to training. One hundred percent of the participants answered correctly that ‘good source of folic acid is from pinto beans’, compared to 22 percent during pretests. One hundred percent of the participants indicated correctly that ‘orange juice will help your body to absorb iron that is in grain products’ compared to 15 percent who took the pretests. Approximately 82 percent of the participants indicated correctly that ‘adults need to eat 2 servings of calcium per day’ compared to 15 percent during pretests. Knowledge about food labels increased from 30 percent to 40 percent during posttests. One hundred percent of the participants indicated that ‘potatoes have 3 times more fiber with peel on it’ compared to 15 percent during posttests. Eighty two percent answered correctly to ‘swimming is an example of aerobic exercise’ compared to 50 percent prior to training. Posttest results indicated that 100 percent of the participants answered correctly that ‘chili and pork have a high risk for causing food borne illness if not cooled and reheated properly’.

**Conclusion:** The study indicates that individuals can improve their knowledge on nutrition education.

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**PS.P Food Technology**

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**PS.P1**

**Activity of the Enzymatic Complex in the Function of Technological Quality**

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The amylolytic activity in 15 wheat varieties was followed by comparative analyses for: a) the values of peak viscosity on amylograph (AJ), b) the values of falling number according to Hagberg (sec).

The obtained values were compared against the values of bread made from the flour of these varieties. Bread quality was assessed via crumb quality, the parameter that represents the numerical expression of crumb elasticity and grain fineness. The obtained results show that the different levels of amylolytic activity of the tested varieties depend not only on the climate and environmental conditions in the various production locations but also on the genetic characteristics of the varieties. The varieties were divided into three groups, with low, medium and high amylolytic activity. However, the optimum amylolytic activity is defined as the activity which has the largest influence on crumb quality of each individual variety. A general classification of varieties, on the basis of their amylolytic activities and its effects on bread quality, may be done without previous knowledge of the varietal characteristics of the varieties under study.

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**PS.P2**

**Quality and Nutritional Characteristics of Bakery Products from Frozen Dough with Added Substances**

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Bread has been a basic part of human diet for centuries, providing some of the most important nutritional compounds (carbohydrates, fibers, proteins etc.) along with appealing sensory and textural characteristics. However, quality features of bakery products deteriorate immediately after baking resulting to staling, loss of moisture, flavor etc. and limited shelf life.

For the above reasons, during the last years research has been focused on the development of advanced preservation technologies for bakery products, especially of freezing technology. This trend appeared since freezing technology has many applications in food industries providing several advantages for the preserved products. Frozen bakery products in particular exhibit extended preservation and short preparation time providing freshly baked products with protected nutritional characteristics at any time. All these profits led to the continuing extension of their consumption.

However, the application of low temperatures in breadmaking exhibits several problems. Usually frozen dough presents increased proofing time, decreased volume, degrading texture characteristics and unstable behavior after thawing. Final products quality and retainability depend on parameters such as dough formulation, raw materials, mixing time and method, freezing rate, storage duration and thawing rate. The above parameters may act individually or synergistically reducing yeast activity. As a result carbon dioxide production is reduced and gluten network is destroyed resulting in reduced carbon dioxide retention and lower baking efficiency. The use of certain substances such as gluten, milk and soy proteins has been proved to obtain both the retainability of quality characteristics and improvement of nutritional value of the end product. The objective of this work is the production of bakery products from frozen dough with several added substances in order to improve final products quality and nutritional characteristics.

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**PS.P3**

**Fortification and Rice**

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The nutrients such as vitamins and minerals are essential in certain amounts for a normal metabolism of human organism. Many studies have been taken place on human nutrition resulting to nutrient requirements. Relative European legislation describes the corresponding requirements for vitamins and minerals (vitamin A, B-complex, C, D, E, iron, calcium, potassium, iodine, selenium, zinc, sodium,
magnesium). Different limits of the nutrient intakes are set in the legislation of the countries of the world based on specific dietary habits of population. The referral Recommended Daily Allowance (RDA) for each nutrient always tends to be the lowest level required in the diet to prevent the occurrence of various clinical deficiencies. The nutrient deficiencies it is possible to cause diseases (anaemia, osteoporosis, nucleotide bad synthesis, etc.). The processing of food can cause small or high decrease of contained nutrients and for that reason, in specific cases, specific processings on food fortification have been developed. The fortification of food with nutrients is practiced around the world as a public health measure and a cost-effective way of ensuring the nutritional quality of the food supply, particularly in regard of changing lifestyles and dietary patterns.

An example of the above is represented by the rice fortification. Rice from the category of cereals form the staple food of diets around the world. Rice is characterized as the most consumed food of both developing and third world counties. Rice contains a lot of nutrients (proteins, fats, fiber, vitamin B-complex, minerals), the major of which are removed during the conventional milling process because they are concentrated in the outer layer (bran) of the kernel. Scope of the present study is rice fortification with vitamins and minerals to improve its nutritionality. The fortification methods which are studied are spraying and soaking. Also, the absorbency of vitamins from the uncooked rice kernel, their retention after cooking and the percentage covering of Recommended Dietary Allowances are studied as well as the effects on physical and sensory properties of rice.

**PS.P4**

**Wholesomeness Quality of Cooked Potatoes in Relation to Cooking Methods**

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Objective of the study was to determine the influence of cooking methods on nitrates and heavy metals levels (lead and cadmium) in cooked tubers. The experimental material consisted of 6 samples varieties of potatoes: Balbina, Baszta, Ditta, Mors, Sante and Tokaj, grown in the Potato Research Institute at Jadwisin (near Warsaw). In experiment were applied 5 cooking methods: traditional way, in pressure cooker, in microwave oven, in acuthermal pots and in food steamer. Nitrates and heavy metals contents were determined according to Polish Official Standards. Investigated raw potatoes were relatively low level of contaminants: 40–48 mg NaNO₃/kg, 0.007–0.033 mg NaNO₃/kg of lead and 0.01–0.019 mg/kg of cadmium. In cooked potatoes the cadmium content ranges from 0.007 mg/kg (variety of potatoes Tokaj cooked in traditional way) to 0.033 mg/kg (variety of potatoes Ditta cooked in microwave oven). The lead content of the tested varieties of cooked potatoes came out on the level from 0.065 mg/kg (variety of potatoes Mors cooked in pressure cooker) to 0.0199 mg/kg (variety of potatoes Ditta cooked in microwave oven). The nitrate content varied from 30.14 mg NaNO₃/kg (variety of potatoes Tokaj cooked in pressure cooker) to 41.90 mg NaNO₃/kg (variety of potatoes Sante cooked in microwave oven). The content of nitrates, lead and cadmium in raw potatoes did not exceed limits defined by the Ministry of Health and Social Welfare regulation. The results indicate that ‘dry’ cooking method had no effect on nitrates, lead and cadmium in cooked potatoes. When ‘wet’ methods were used nitrates reduced by 20%, lead and cadmium by 30% depending on cooking methods applied.

**PS.P5**

The Influence of the Addition of Whey Protein Concentrate on Chemical Content and Durability of Wheat – Rye Bread

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In this work the influence of the addition whey protein concentrate (WPC) on chemical content, durability, baking feature was investigated on wheat – rye bread 70/30. Low quality Polish flour and WPC-75 obtained in ultrafiltration method were used in the experiments. Dough was prepared by simultaneous mixing of following components: wheat flour 750, rye flour 720, salt, citric acid, glucose crystalline, ascorbic acid with water. WPC-75 addition was used in the amount of 1, 2, 3% in ratio to flour.

Baking yield, 100 g volume of sample bread, porosulation of pulp and organoleptic quality were determined. In bread: water contents, nitrogen total, fat, salt, mineral compounds and acidity were marked. Pulp squeezeability of bread after 2, 24, 48, 72 hours of storing was studied.

WPC addition in the range of 1–3% as regards flour exerts a profitable influence on organoleptic properties baking yield, causes the increase of nitrogen in general, fat, and mineral compounds content. It also increases storing durability as far as wheat – rye bread is concerned. No substantial influence of WPC addition was observed in bread volume or pulp moisture.

**PS.P6**

In vitro and in vivo Efficiency of Organozeolite on Toxic Effects of Mycotoxins

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In vitro and in vivo studies were conducted to evaluate the efficiency of organozeolite (OZ) to alleviate the toxic effects of zearalenone (ZEN) in lambs and swine. In vitro examinations were done with the aim to determine the degree of adsorption of ZEN, ochratoxin A (OCHRA), aflatoxin B₁ (AFB₁) and ergopeptine alkaloids.

The OZ, at pH 3, 7 and 9, showed high in vitro adsorption of ZEN (93%), OCHRA (96%), ergopeptine alkaloids (>96%) and AFB₁ (99%).
In vivo investigations of OZ added to animal feed contaminated with ZEN were done on lambs and different categories of swine.

Twenty four lambs were divided into four groups which included: 1. control group-basal diet containing neither OZ nor ZEN; 2. basal diet supplemented with 8.3 mg ZEN/kg diet; 3. basal diet supplemented with 8.3 mg ZEN/kg and 0.2% of OZ; 4. basal diet supplemented with 8.3 mg ZEN/kg and 0.5% of OZ.

The OZ dramatically reduced the presence of ZEN in liver, kidneys and muscles. The amount of 0.2% of adsorbent reduced content of ZEN in all samples, but ZEN was still present in small amount in all organs. The addition of 0.5% of OZ reduced ZEN in liver, kidneys and muscles of lambs, totally. The obtained results suggested that OZ was effective in preventing the toxic effects of ZEN, when lambs consume feed contaminated with ZEN.

The production results (average final weight, weight gain for feeding day, feed conversion) on different category of swine (pigslets, fattening swine and sows) showed that applied adsorbent reduced the negative effects caused by ZEN in animal diets. The amount of 0.2% of OZ significantly decreases the appearance of zearalenonotoxinoses, improved the state of health and increases the economic effects on production of all categories of swine.

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**PS.P7**

**The Use of Synbiotics in the Production of Fermented Sausages**

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The aim of the present studies was to produce fermented uncured sausages, using – apart from traditional starter cultures – probiotic bacteria: *Lactobacillus acidophilus* and *Bifidobacterium lactis*. The effect of prebiotics (inulin) on the growth and survival of probiotic bacteria in the sausages, and on their sensory properties, was also determined.

The sausages were produced in four variants: (1) control – without synbiotics, (2) experimental – with probiotic cultures, (3) experimental – with synbiotics and growth-stimulating inulin as a prebiotic, (4) experimental – with synbiotics and texture-forming inulin. The sausages were made of uncured meat. The probiotic cultures were added in such an amount that directly after production their count was 10^6 cfu per g of the sausage. Inulin was added in the amount of 2%.

The counts of probiotic bacteria and coli rods were determined in ready-made products, in the middle and on the last day of the expiration period, and three days after the expiry date, during sausage storage at room temperature and at 6°C. An organoleptic evaluation of the sausages was also made.

Inulin had no or a slight stimulating effect on the growth of probiotic bacteria. The counts of *Bifidobacterium lactis* and *Lactobacillus acidophilus* were higher in the sausages containing synbiotics than in those without the prebiotic on the last day before the expiry date and three days after this date. This shows that inulin affects positively the survival of probiotic strains in fermented sausages. During the storage their count varied from 10^6 to 10^7 cfu/g, irrespective of temperature. Inulin had also a favorable effect on the sensory properties of the products.
**PS.P10**

**The Effect of Culinary Treatment Techniques on the Nutritional Value of Fish Dishes***

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The objective of this work was to determine the weight yield factors and the nutrient retention factors for selected types of dishes made from fatty saltwater fish prepared using modern catering equipment and culinary techniques.

Each of the analysed dishes was prepared using modern catering equipment, i.e.: Zepter utensils and Rational combi-steamer ‘ClimaPlus Combi’. Each of the analysed fish species was fried without fat or steam-cooked. For comparison the same dishes were prepared in traditional way i.e. fish was fried in fat or boiled.

The highest weight yield factors were obtained using modern techniques: 0.831 – for frying fish in accuthermal stainless steel cookware and 0.993 – for cooking in combi-steamer.

For steam-cooked fish both modern techniques gave the highest nutrient retention factors for most analysed nutrients as opposed to the traditional boiling.

For fried fish no significant differences were observed between nutrient retention factors for proximates or minerals as a result of application of various catering equipment. For instance nutrient retention factors for protein were approximately 1.0, while for sodium 0.9.

The highest nutrient retention factors for vitamins were obtained when fish was fried without fat in accuthermal stainless steel cookware. The nutrient retention factors are 0.8 for thiamin and 0.9 for niacin respectively. The nutrient retention factors for individual n-3 fatty acids ranged approximately from 0.7 to 0.8, depending on category of fatty acid and catering equipment used for fish frying.

Based on the research findings it can be stated that fish dishes prepared using modern catering equipment are, as a rule, characterised by higher nutritional value than fish dishes prepared in a traditional way.

*Research Project No. 3P06T 069 22, Poland.

**PS.P11**

**Sensory Quality Changes in Juices with Varied Fructan Contents**

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The aim of this research was to evaluate organoleptically clear fruit juices with fructan contents. The material for the research was a variety of blends of the following fruit juices: cherry juice, black currant juice (sweetened with sucrose), with an addition of topinambur (Jerusalem artichoke) juice in a proportion of 1 to 3 (when converted to dry mass). After closed hermetically in non-transparent glass bottles, the juices were pasteurised and then stored for 2 months in cool conditions.

The organoleptic evaluation was done on the scale from 1 to 5. The features considered were clarity, colour, smell and taste. The standard juices rated high, i.e. 4.4 points (good) for cherry juice and 4.7 points for black currant juice (very good).

Cherry juice with an addition of juice from topinambur tubers was rated good and its overall sensory grade was 4.2 points when juice of the Albik variety was used as an additive, and 4.4 points for the Rubik variety. The maximum of 5.0 points was given to black currant juice with an addiction of the Albik variety juice, and the Rubik variety earned 4.8 point.

After the first month of storing, all the blends except for standard black currant juice (4.7 points) were rated lower. The satisfactory grade of 3.0 points was given to the blend of cherry juice and juice from Albik tubers. The other blends were graded good.

After the second month of storing, the number of scores ranged between 3.0 and 4.0. Good grades were given to standard juices and the blend of black currant juice with topinambur juice (regardless of variety). The blend of cherry juice with topinambur juice was rated satisfactory.
antibacterial and anti-*Helicobacter pylori* (one of the main causes of peptic ulcer) activity of oleoresin.

**PS.P13**

**Polyamine Levels and Citrus Fruits Ripening**

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**Introduction:** The polyamines, spermidine and spermine and its precursor putrescine, are small aliphatic amines found in all plant cells; indeed these are ubiquitous in nature. It is evident that all types of food, whether they originate from plants (vegetables and fruit) or animals (milk, eggs and meat), contain polyamines. Based on information from the UK National Food Survey, the diet of inhabitant of southern Italy compared with those of the UK contains twice as much putrescine and spermidine, but the same amounts of spermine per day. These dietary polyamines become part of the body’s polyamine pool and can be used in cell division and proliferation. Polyamine concentrations were monitored during ripening in common lemon, orange and tangerine meal; for this reason in our paper, we evaluate the free polyamines kept at 60°C/H11034.

**Materials and Methods:** Fresh fruits were selected and picked manually at different stages after fruit set. Polyamines from fruit portion were extracted with 5% PCA, mixed with benzoyl-chloride and kept at 60°C for 1 h. The benzoylpolyamines were analyzed and quantified with HPLC method.

**Results and Discussion:** Higher levels of putrescine and spermidine were found during fruit set for all species considered and diminished as the fruit matured, but spermine remained nearly constant. A correlation has been shown between high putrescine levels and the early stages of fruit growth, suggesting a direct involvement in cell division and proliferation. Polyamine concentrations were more high in immature tangerine than in other fruits, and decreased by maturation. However, polyamines contained in this fruit are important source of the daily requirement for normal tissues metabolism; but in some pathological cases (such as in people with respiratory and coronary problems, gastrointestinal problems, Alzheimer’s and Parkinson’s diseases and especially tumours) the presence of large amounts of polyamines in the diet may be harmful.

**PS.P14**

**Food Containing GM Preparations Placed on the Polish Market**

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In Poland the issues of production of novel food, including genetically modified organisms or placing it on the market are regulated by the act of 11 May 2001 on health conditions of food and nutrition and the ordinance of the Minister of Health of January 2, 2003 on methods and procedures concerning novel food. The above mentioned act regulates also the issue of labelling of food and food ingredients which may contain or consist of genetically modified organisms.

Polish food law in this area is prepared basing on European Union regulations and directives. Production starting or placing on the market of such food needs the decision of the Chief Sanitary Inspector. This food must not present a danger for human health or life and to the environment.

Since 1997 Chief Sanitary Inspector has placed on the market 235 genetically modified preparations. The analysis of genetically modified preparations placed on the market before and after enter into force of the act of 11 May 2001 was accomplished.

More than 50% genetically modified preparations in products placed on the Polish market are: soy isolates and concentrates and their preparations. Considerable group of genetically modified preparations are enzymes and enzyme preparations – about 40%.

The soy isolates and concentrates and their preparations are mainly used in meat and poultry industry, whereas enzymes and enzyme preparations are used in starchy, fruit and vegetable industry and bakery’s trade.

**PS.P15**

**Food Intake, Body Weight Gain, Dietary and Protein Efficiency Ratios and Apparent Digestibility Coefficient of Rats Fed Traditionally or Sous Vide Processed Salmon**

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The nutrient composition and bioavailability of fish cooked by conventional methods has been studied by several authors, but in recent years new techniques for heat treatment and storage of foods have been developed specially for catering and production of prepared meals for retail. Sous vide cooking is the term used to describe the process where the food is pastuerised under vacuum in hermetically sealed pouches, and then stored under refrigeration conditions. The purposes of this work were i) to study the acceptability of diets containing sous vide cooked fish by the rat; ii) to compare the dietary effects in rats of a oily fish cooked by conventional or sous-vide methods on the following: body weight gain, dietary and protein efficiency ratios and apparent digestibility coefficient.

The rats were fed from weaning with the experimental diets, containing roughly 10% protein, and 8% fat. Food intake was checked daily and body weight variations were measured on alternate days. Feces were dried, weight and homogenised and the nitrogen content was measured by the kjeldahl procedure. Water and food were provided ad libitum over the experimental period (two weeks) (Table 1).

No significant differences were found between the intakes of the experimental groups suggesting that all the diets were well accepted by the rat. Body weight gains were similar in all the experimental groups, but S and SV showed the highest values. ADC was not significantly affected. DER and PER did not shown any difference.
Table 1: Food intake, Body weight gain, dietary and protein efficiency ratios (DER and PER), and apparent digestibility coefficient (ADC) of rats fed experimental diets containing casein (C), raw salmon (S), conventional processed salmon (ST) and sous vide processed salmon (SV)

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>S</th>
<th>ST</th>
<th>SV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food intake</td>
<td>41.78 ± 6.66</td>
<td>40.17 ± 10.16</td>
<td>41.86 ± 3.12</td>
<td>42.69 ± 8.39</td>
</tr>
<tr>
<td>Body weight gain</td>
<td>8.57 ± 1.45</td>
<td>11.57 ± 3.36</td>
<td>8.47 ± 1.56</td>
<td>10.34 ± 2.72</td>
</tr>
<tr>
<td>DER</td>
<td>0.22 ± 0.05</td>
<td>0.32 ± 0.13</td>
<td>0.21 ± 0.03</td>
<td>0.27 ± 0.09</td>
</tr>
<tr>
<td>ADC</td>
<td>99.06 ± 0.24</td>
<td>98.87 ± 0.23</td>
<td>99.30 ± 0.47</td>
<td>98.98 ± 0.26</td>
</tr>
<tr>
<td>PER</td>
<td>2.20 ± 0.52</td>
<td>3.05 ± 1.21</td>
<td>2.10 ± 0.26</td>
<td>2.63 ± 0.90</td>
</tr>
</tbody>
</table>

Values are mean ± standard deviation of 7 rats.

between the groups. These results suggest that the sous vide salmon have the same effect than conventionally processed on the studied parameters in the rat.

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**PS.P16**

**Nutritional Quality of Oats**

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Results from a number of observational and clinical trials provide evidence that modifications in the diet can exert beneficial effects on common medical conditions. Oats provide one of the richest sources of the dietary soluble fiber beta-glucan, providing 5.0 g to 7.2 g per 100 g serving. Both are also valuable sources of total dietary fiber, which ranges from 9.9 g to 14.9 g per 100 g serving. Oats also contain more lipids (5–9%), than other cereal crops and are rich in unsaturated fats, including the essential fatty acid linoleic acid. Oats contain unique antioxidants, called avenanthramides, as well as the vitamin E-like compounds, tocotrienols and tocopherols. The hypocholesterolemic properties of oats were first demonstrated in 1963., followed by at least 50 studies in humans evaluating the effects of oats on blood lipids. Analysis of individual whole grain foods showed that oats consumption alone also reduced the risk for diabetes onset. Accumulating evidence from epidemiological, clinical and animal studies suggests that fiber sources, including oats, can significantly aid in reducing blood pressure and/or prevent the onset of hypertension. Data from a large prospective study showed that fiber intakes of more than 24 g/d were associated with a 57% reduction in risk for the development of hypertension in comparison to those who consumed less than 12 g/d. Meals enriched with β-glucan elevate plasma levels of cholecystokinin, a hormone that mediates fat-induced satiety. Fiber may also increase fecal energy excretion. Protein has also been found to be more satiating than isoenergetic amounts of carbohydrate of fat, and oats containing the highest protein content of all the common grains. This would be aided by development of more innovative products and oat-based functional foods.

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**PS.P17**

**Total and Resistant Starch Content of Roasted Flours (Canary Islands Wheat- and Corn-Gofio)**

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Canary Islands gofios are foods traditionally produced and consumed by the islanders since pre-Hispanic times, but their consumption has also spread to Northern Africa and South America. They are used as drinks (mixed with water, milk or red wine), in meals (soup, cereals, desserts) or as gofio-dough. Gofios are produced by roasting grains and then grinding to produce flour. Barley, wheat, rye, and corn (among others), either individually or in mixtures, can be used. Little is known about the dietary starch fractions present in this food. The aim of this study therefore was to characterise the digestibility of the most important Canary Islands gofios. Both wheat-gofio and corn-gofio were supplied by Molineria Miraflor (Las Palmas de Gran Canaria, Spain) and tested for the digestible and non-digestible fractions using Englyst Starch kit (Englyst Carbohydrate Services Ltd., Cambridge, UK). Total starch was 599 ± 5 and 652 ± 3 g/kg for wheat- and corn-gofio (n = 4; p = 0.001, unpaired t-test), respectively. In both samples, almost 80% of the starch was rapidly digestible, but corn-gofio had twice the amount of slowly digestible starch. Resistant starch content was similar (p = 0.3) for both samples and comparable to breakfast cereals (Corn Flakes, Rice Crispies) and fried potato (25–50 g/kg), but higher than resistant starch content for wheat and corn flours (<10 g/kg). In conclusion, gofios may provide a significant contribution to slowly digestible and resistant starch in the diet of gofio consumers.

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**PS.P18**

**Estimation of Nitrates and Nitrites Content in Potatoes and Other Vegetables Kept in Stock in Selected Polish Military Units in 2002**

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The significant source of nitrates and nitrites in daily food ration are vegetable origin products. The aim of the work was estimation of nitrates and nitrites content in potatoes and other vegetables kept in stores in selected military units. Researches were performed in 2002 and included 14 military units. There were 98 samples of potatoes and other vegetables including: potatoes – 14, beetroots – 12, onion – 12, carrot – 17, parsley – 14, celery – 17, leek – 12. Nitrates (NO₃⁻) and nitrites (NO₂⁻) levels were indicated by colorimetric method.

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Nitrates content in potatoes shaped within the limit 3.9–183.2 mg/kg, beetroots contained 35.5–1,124.0 mg/kg, carrot 6.2–380.8 mg/kg, and parsley, celeries and leeks: 4.6–967.0 mg/kg; 3.5–1,043.5 mg/kg; 1.3–61.2 mg/kg respectively. The lowest nitrates level was found in onion i.e. 0.0–28.3 mg/kg. Examined samples of potatoes, beetroots, onion, carrot and leek did not indicate excess of maximum nitrates contamination levels compared to the obligatory in Poland maximum values of chemical contamination levels. Other examined vegetables indicated excess of maximum contamination values (celery 29.4% and parsley 14.3% of analyzed samples). Nitrites level in examined potatoes samples included in the limits of 0.4–1.6 mg/kg, and beetroots 0.5–1.3 mg/kg. Nitrites content in carrot, parsley and celery shaped as follows: 0.1–0.9 mg/kg; 0.2–0.7 mg/kg; 0.3–1.0 mg/kg respectively. Examined onion samples and most of the leek samples did not indicate nitrites presence. Performed tests showed considerable divergences in nitrates and nitrites levels in examined potatoes and vegetables samples kept in stores in military units.

PS.P19
Viscous Properties of Milk Protein Concentrates
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Proteins are used in all kinds of food products to profit from their nutritional value or from specific functional properties. Their physicochemical behavior impede the use of proteins in some products. For example, in high-energy drinks, where high viscosity or limited solubility restricts the protein concentration. The application of any protein to a food product requires knowledge about its flow properties under various conditions. The aim of this work was to study the viscous properties of bovine milk protein concentrates (sweet whey, acid whey and sodium caseinate). The products presented the following protein composition: sweet whey, 80.80%; acid whey, 81.86% and sodium caseinate, 72.10%. The parameters tested were temperature and added salt. The viscosity of protein solutions was determined, in triplicate, using a Brookfield viscometer with an UL adapter. As the viscosity of caseinate dispersions increases in a linear fashion, with protein concentration, the protein dispersions were prepared at 10%. Sweet and acid whey had little viscosity at 25°C. Heat increases the viscosity of the whey concentrates, particularly at 70°C. Sodium caseinate showed little or no changes in viscosity as a function of shear rate. The addition of sodium chloride increased the viscosity of sodium caseinate in all range of temperature studied. Viscosity of caseinate could be altered by addition of salts and temperature. When compared with most other proteins, the viscosity of whey concentrates is low at room temperature. This is interesting in dietary products, which could be indicated as substitute for whole meals. Their ability to increase viscosity with heating might be used to thicken food, such as soups and sauces.

PS.P20
Enzyme Hydrolysis of Freshwater Fish (Oreochromus niloticus) Myofibrilar Proteins: Effects on Hydrophilic Properties
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The methods for preparation of fish protein concentrates and hydrolysates may have a profound effect on their functional and nutritive properties. These methods can increase the potential commercial value of underutilized fish by yielding value-added products with a good essential amino acid profile and functional properties. In the present investigation a myofibrillar fish protein concentrate was prepared and exhibited a low functionality profile. The objective of this work was to study the influence of various degrees of enzymatic hydrolysis on the functional properties of nile tilapia (Oreochromus niloticus) concentrate. The protein concentrate (PC) was prepared from eviscerated and mechanically deboned fish. Enzyme (Flavourzyme) hydrolysates were prepared with degrees of hydrolysis (DH) from 2.5 to 25%. The influence of DH on functional properties was evaluated. Solubility was fairly low for the PC (5% at pH 7.0). The DH had significant influence on solubility, with values above 70% for DH = 25%. A linear positive correlation (R = 0.99, Y = 1.831X + 27.675) was demonstrated between solubility (%) and DH (%) in the range of 2.5% to 25% DH. Hygroscopicity increased in all hydrolysates for environmental relative humidities above 40%. Water retention, water absorption and oil absorption all decreased as a function of DH. pH (3 to 9) influenced water and oil absorption of the hydrolysate with 7% DH and pH near the pI tends to decrease water absorption but increases oil absorption capacity. Standardized procedures to examine the functional properties are needed, as well as more studies on the use of enzymes to make functional hydrolysates for specific applications.

PS.P21
Flavonols and Antioxidant Capacity Changes of Broccoli, Cauliflower and Onion Effected by Drying Process
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Flavonols and other antioxidant compounds in vegetables recently have been of a great interest due to their positive effect on human health. Dried vegetables are used widely as a part of various food products (e.g. flavorings blends, ready-to-serve meals). We have been investigating the influence of different drying conditions (temperature and air velocity) on flavonols and antioxidant capacity of broccoli, cauliflower and onion. Drying experiments were carried out in a pilot plant drier with suction flow. Quercetin and kaempferol were determined by HPLC with UV-Diode Array detection and antioxidant activity of vegetable extracts was measured using free radical
2,2-Diphenyl-1-picrylhydrazil (DPPH). In all cases a loss of components of interest was noticed but the remaining content was still sufficient. Statistical analysis showed that temperature and air velocity had different influence on the flavonol content and vegetable antioxidant capacity. Diverse effects in each vegetable there had been noticed but the remaining content was still sufficient. Quercetin and kaempferol were effected differently by the drying conditions. Diverse effects in each vegetable there had been noticed but the remaining content was still sufficient.

2,2-Diphenyl-1-picrylhydrazil (DPPH). In all cases a loss of components of interest was noticed but the remaining content was still sufficient. Statistical analysis showed that temperature and air velocity had different influence on the flavonol content and vegetable antioxidant capacity. Diverse effects in each vegetable there had been noticed but the remaining content was still sufficient.

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**PS.P22**

**Polyphenolic Compounds of Fruit and Jams of Raspberry and Strawberry Grown in Croatia**

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Certain polyphenolic compounds in raspberry and strawberry grown in Croatia were detected and quantified in fresh fruit and related jams by high performance liquid chromatography (HPLC). Hydroxybenzoic acids (ellagic and p-hydroxybenzoic), hydroxycinnamic acids (caffeic, p-coumaric and ferulic), flavonols (quercetin and kaempferol) and flavanols [(+)-catechin and (−)-epicatechin] were determined. Ellagic acid, the main phenolic compound in both fruit was found and in similar quantities, while p-hydroxybenzoic acid was not present in significant level, p-coumaric acid was determined in both fruit and in higher concentration in strawberry but caffeic and ferulic acid were present only in raspberry. Quercetin was the main flavonoid in raspberry. In strawberry quercetin and kaempferol were determined in similar concentrations. Flavanols, (+)-catechin and (−)-epicatechin, were determined only in fresh strawberry. Jams were made in laboratory conditions and this process influenced on qualitative polyphenolic profile. Decreased concentrations of polyphenolic compounds in raspberry and strawberry jams were observed. The ellagic acids remained more stable in prepared raspberry jam than in strawberry jam. The concentrations of phenolic acids were about 10% lower in raspberry jam and about 20% lower in strawberry jam than in fresh fruit. Flavanols (+)-catechin and (−)-epicatechin were not found in strawberry jam, while caffeic and ferulic acid were not found in raspberry jam. The concentrations of flavonoid compounds in both jams were about 30% lower than in fresh fruit.

**PS.P24**

**Determination of Polyphenols and Methylxanthines in Chocolates Produced in Croatia by UV/VIS and HPLC**

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The benefits of chocolate have been recognized due to the presence of polyphenols [(−)-epicatechin, (+)-catechin and procyanidins] and methylxanthines (theobromine and caffeine), biologically active compounds. Polyphenols show the antioxidant capabilities higher than some fruit and vegetables and have protection effect against cardiovascular diseases, and possibly cancer. Therefore, the exact nature and amounts of flavonoids in commercially available chocolates should be known. The common methods for estimating their total content are colorimetric measurements, for radical scavenging capabilities the measurement with DPPH, while the identification of individual polyphenols and methylxanthines can be done by high performance liquid chromatography (HPLC). The objective of our study was determination of total amounts of polyphenols and methylxanthines in dark and milk chocolates on the Croatian market by UV/VIS spectrometry and HPLC. The total amounts of polyphenols were obtained by the Folin-Ciocalteu reagent and their range was 2.94–8.81 mg g−1 chocolate, depending on amount of cocoa liquor. The chocolates with a higher content of cocoa liquor showed higher content of total polyphenols and procyanidins. Radical scavenging measurements with DPPH exerted strong dependence on the content of cocoa liquor, too. In all the chocolate samples the estimated content of (−)-epicatechin (0.206–0.524 mg g−1 chocolate) was higher than that of (+)-catechin (0.078–0.216 mg g−1 chocolate). The procyanidins were identified by UV-DAD as well as some other polyphenolic compounds. The predingominant compounds in acetone extracts analyzed by HPLC were theobromine (5.12–14.22 mg g−1 chocolate).
and caffeine (0.328–1.15 mg g⁻¹ chocolate) making chromatographic separation of other compounds especially difficult.

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**PS.P25**

**Gluten in Gluten-Free Foods**

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This poster set out to establish the level of gluten in the foods not labelled as ‘gluten-free’, and to find a labelling method that would allow the results to be displayed as prescribed, while also being comprehensible and acceptable to their intended public. Mainly the foods were selected in accordance with the wishes of glutenic enteropathy (coeliac disease) patients. Ninety percent of these foods were found to have gluten levels below 20 mg/kg, or <0.002%. Analyzing ‘gluten-free’ foods (marked with crossed ear), we found that only 30% of such foods can be said not to contain gluten (<0.5 mg/kg), 47% having 0.5–10.0 mg/kg gluten, with as many as 23% having 30.0–132.0 mg/kg gluten. In conclusion, a supervision of ‘gluten-free’ foods is particularly important and necessary.

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**PS.P26**

**Quantitative Analysis of Antinutritional Factors in Dietary Supplements**

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The use of dietary supplements, especially those for weight control, is increasing. Among them several products are claimed to block dietary sugar or fat absorption but their advertising claims may give consumers unrealistic expectation. A class of dietary supplements contains a legume protein concentrate providing an alpha-amylase inhibitor that reduce the starch digestibility. Therefore, supplementation with bean extract is been found to improve lipoprotein profile and enhance fat excretion in feces in overweight and obese subjects. It has been known for a long time that most varieties of beans contain factors such as trypsin inhibitors and lectins that produce adverse physiological responses, depending on the level, when tested in animals. To evaluate the efficacy and the safety of weight loss dietary supplement consumption, we assayed the content of alpha-amylase inhibitor, active lectin and trypsin inhibitors. Samples of dietary supplements intended to weight control and containing bean or pod kidney extracts were chosen among those most widely commercially available. The active lectin content was analyzed in sample extracts by a sensitive enzyme immunoassay including microtiter plates coated with porcine thyroglobulin (Boniglia et al. 2003). Trypsin inhibitors activity was measured by the inhibition of the hydrolysis of alpha-N-benzoyl-DL-arginine-p-nitroanilide by bovine trypsin. The alpha-amylase inhibitor activity was measured by the amount of maltose released from starch according to Bernfeld procedure with some modification: porcine pancreatic alpha-amylase 1 U/ml was preliminary incubated with different aliquots of sample extracts. Total protein content was found ranging from 6% to 20%. Data showed an increasing of active PHA, trypsin inhibitor and alpha-amylase inhibitor content positively related to protein level. Since the real efficacy of weight loss dietary supplements depends on a higher activity of alpha-amylase inhibitor and the safety depends on a lower presence of active lectin and trypsin inhibitor we classified these products on the basis of a risk/benefit coefficient.

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**PS.P27**

**Factors Determining the Use of Bioactive Substances Aiding Weight Reduction in the Production of Food-Stuff Intended for Particular Nutritional Uses**

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In the process of production of food-stuff intended for particular nutritional uses specific ingredients containing bioactive substances are used. They are requisites of assumed, physiological efficacy of these foods. These substances may be added in the form of different ingredients, for example chemical compounds or natural extracts of various concentration of bioactive substance. Eight different preparations, which could serve as a source of bioactive substances in dietetic foods aiding weight reduction, have been examined. They were: a) L-carnitine, L-carnitine tartrate, L-carnitine citrate, L-carnitine hydrochloride (Acetyl L-carnitine), b) green tea extracts of various composition and concentration of bioactive substances, hydroxycitric acid (HCA), chitosan.

The usage of bioactive substances in food-stuff intended for particular nutritional uses (functional, dietetic) depends on their functional properties, i.e. sensory quality and physicochemical parameters, such as for example dissolving and suspending in water ability, absorption of water or oil. Functional properties of such preparations define the level of accepted sensory addition and mark their technological usefulness (ways of application in the production of liquids, powder, tablet or capsule forms) as well as condition recommended daily intake of the preparation. Ingredients such as L-carnitine hydrochloride, L-carnitine citrate even in small concentration proved to have a strong sour flavour, green tea extracts – intensive bitter and grassy flavour, HCA extract – intensive insipid flavour, while chitosan – strong piscine flavour. The factors determining the usage of bioactive substances in the production of different forms of food (liquid, powder, capsules or tablets) were the sensory value, while in case of liquid forms additionally dissolving and suspending in water ability.
Analysis of Polyphenols in Apples Farmed in Traditional and in Biological Way

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Introduction: Several epidemiological studies confirm the positive correlation between the incidence of some cardiovascular and chronic-degenerative diseases and the consumption of fruit and vegetables. The reason of this correlation seems to be imputable to the presence in vegetable matrix of bioactive compounds (flavonoids, carotenoids, phenolic acids, vitamins etc) that have a remarkable antioxidant activity acting in synergism with the enzymatic endogenous systems against free radical’s diseases on macromolecules of our organism. Furthermore apples are able to be the vehicle of phenolic compounds such as catechins, epicatechins, glycosilate flavonols and phenolic acids. These metabolites are in in vitro studies more antioxidant than the well known compounds vitamin C and E.

Materials and Methods: The apple varieties are Golden Delicious, Red Delicious and Annurca. These varieties are usually consumed as fresh fruits in the Mediterranean diet. In particular, the variety Annurca is a typical product of South Italy. The samples were acquired in a local marked. Freeze dried apple were stored at −20°C until analyzed. We have performed chromatographic analysis by HPLC with DIODE-ARRAY detector using a column Luna 10 µ. Phenyl-Hexyl (250 × 4.6 mm) eluted with acidified water (0.01 M phosphoric acid) in gradient with methanol (λ = 280 nm and λ = 325 nm) according to the method of Escarpa and colleagues [1] that has allowed identification and quantification of chief biophenols in the apple flesh; afterwards we have measured the antioxidant activity of the extracts using a spectrophotometric assay [2] and furthermore we have evaluated the total phenolics in according to the Folin-Ciocalteu procedure [3].

Results: Our results demonstrated that only for the variety Red Delicious there was difference after statistical analysis of data between the concentration of biophenols and the antioxidant activity of ‘traditional’ and ‘biological’ apples, anyway for others varieties ‘biological’ apples are lightly more rich in biophenols concentration and in the antioxidant activity.

These preliminary results seem to be consistent with the hypothesis the apples provide to intake of antioxidant compounds and moreover the consumption of biological fruit products seem not always to enhance this intake.

References

The packaging materials for packing of hard and semi-hard cheeses should prevent the drying, penetration of oxygen into the cheese, and to enable the diffusion of CO2 from the cheese into the external space. The barrier properties, e.g. permeability of gases and water vapour are the main characteristics that determine the suitability of a certain material for the packing of specific kinds of cheese, in order to preserve optimally the nutritive value.

The paper presents the results of investigations of different multilayer polymeric coextruded foils, of domestic production, intended for packing of semi-hard cheeses. Foils produced by Krehalon, Cryovac, Curwood, used for cheese packing, were also investigated. The obtained results showed that the investigated foils can be used for packing of semihard cheeses, applying combination of vacuum and thermo-shrinkage.

The results showed that the good properties of certain monomaterials remained unchanged in the combined material and such packaging material, of this structure, is of good characteristics and can be successfully used for the packing of functional food and beverages.

**PS.P32**

**Characteristics of Packaging Materials for Packing of Functional Food**

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The physico-chemical and barrier characteristics are important for the preservation of the integrity and quality characteristics of food. The packed content is especially affected by the barrier characteristics e.g. permeability of light, gases and water vapour of packaging material.

The choice of packaging material for a certain product depends on the properties of the product, applied technological process, characteristics of packaging material, predicted shelf-life, storage conditions and economy and environmental factors.

The combined packaging material, basic structure PE/PAP/PE/AI/PE was chosen for the packing of special whey based beverage. Investigation of physico-mechanical and barrier characteristics of monomaterials and combined material was performed.

The results showed that the good properties of certain monomaterials remained unchanged in the combined material and such packaging material, of this structure, is of good characteristics and can be successfully used for the packing of functional food and beverages.

**PS.P33**

**Variability in the Zinc Content of Rice is Important for Human Nutrition and is Related to the Soil Environment**

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The aim was to explore connections between soil, crop and human micronutrient deficiencies. Zinc was used as an example of a nutrient that is often deficient in soils and humans. We explored agricultural and processing factors that could influence rice zinc. We also assessed the impact of the variability in the rice zinc content on dietary zinc intake.

Samples of soil, unpolished and polished rice were collected from farmers in Bangladesh in 2 seasons. The rice samples were digested using nitric acid and the soil nutrients extracted using DTPA. ICP-AES was used for mineral analysis off both soil and rice samples. Forty survey households were selected at random from 4 villages in different districts. We used 24-hour recall for the dietary survey. We used the zinc analysis from polished rice samples collected in each household to individualize the nutrient intake.

During both seasons, log of soil zinc was significantly and positively related to unpolished rice zinc after controlling for soil pH and rice variety. Milling removed from 10 to 50% of the unpolished rice zinc. On average, polished rice contained 1.32 mg/100 g zinc (s.d. 0.38). We defined ‘high zinc rice’ as mean ± 1 s.d. and ‘low zinc rice’ as mean – 1 s.d. The children aged 5–10 years ate, on average, 378 g rice per day which supplied 68% of their dietary zinc intake. The total dietary zinc intake would change from 6.4 mg per day if they consumed the ‘low zinc rice’ to 9.0 for the ‘high zinc rice’. (Requirement is 10.3 to 11.3 mg/d). The total dietary zinc intake of children was therefore highly influenced by variability in the rice zinc. Optimizing the zinc content of rice through changes in agriculture and processing would be useful for tackling human zinc deficiency. This cross-disciplinary research design will be useful for exploring zinc and other micronutrient deficiencies in many different countries and crops.
Vitamin 'A' deficiency (VAD) remains a significant problem in many parts of the world, especially under developing countries. Reasons for inadequate vitamin A intake are due to be from low intake of milk, eggs, fish and lack of fruits, vegetables reach in provitamin 'A' carotenoids. Bioconversion of carotenoids is not the same as bioavailability, it relates to the efficiency with which the carotenoids in question is converted to vitamin 'A' in the body. A study concerning the bioavailability of B-carotene (BC), Lutein (LU) and Lycopene (LY) during processing from spinach and tomato fruits were conducted.

### Table: Provitamin 'A' – non Provitamin 'A' mg/100g fresh weight

<table>
<thead>
<tr>
<th></th>
<th>B-carotene (BC)</th>
<th>Lutein (LU)</th>
<th>Lycopene (LY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinach</td>
<td>3.3</td>
<td>9.5</td>
<td>n.p.</td>
</tr>
<tr>
<td>Tomato</td>
<td>0.4</td>
<td>0.08</td>
<td>5.6</td>
</tr>
</tbody>
</table>

By thermal cooking of Spinach diet we found after consumption for 4 weeks plasma concentration of BC and LU was increased 14% and 62% respectively.

Distribution of Spinach matrix by mechanical homogenization significantly improved the bioavailability of LU from spinach by 20% and Lycopene from tomato by 25% to 60%. One hour additional heating of tomato juice (100°C) also enhanced the bioavailability. Dietary (CA) are absorbed in the association with fat is increased the absorption. In this study consumption of unabsorbed fat replacer sucrose polyester with the main meal for four weeks significantly reduce the bioavailability.

### Minor Conclusions:
- The results reported here are in agreement with the findings of a parallel in vivo study of ileostomy volunteers and subsequent solubilisation by emulsion and lipid phases was measured during a simulated in vitro digestion. The factors investigated were: tissue particle size, lipid composition, concentration and homogenisation and pH. Optical microscopy of the digesta from the in vitro digestion was compared with ileostomy effluent from volunteers and gastric aspirations from intact individuals who had ingested comparable meals.

### Major Results:
- We have found the factors that determine the extent of transfer of carotenoids from tissues to an oil phase within a model gastric environment can be ranked in the following way: Tissue structure integrity > heating > pH > oil concentration and interfacial area. These results indicate that lipid soluble nutrients are not released from intact cellular structures during gastric and duodenal digestion of the tissue. There is also evidence for an alternative route for solubilisation from the tissue directly to a micellar phase and that there is selectivity in the degree of solubilisation of the two carotenoids within the mixed micellar phase.

### Major Conclusions:
- The results reported here are in agreement with the findings of a parallel in vivo study of ileostomy volunteers and as such indicate the validity of the IFR in vitro model for investigation of the bio-accessibility of lipid soluble nutrients.
The brown breads are, in the conscience of consumers, connected with healthy food. Consequently, such products were the object of this investigation. The whole wheat bread, the bread with 30% of rye flour, the bread produced with 30% of various grains mixes are very applicable products in enriching the everyday diet with quality dietary fibers. In this paper, the source of the dietary fibers was the sugar beet pulp originating from sugar beet plants. The finally ground product was separated by sieve in several fractions. The fractions under 95 μm of particle size was selected for further work. It contained 82% of total dietary fibers with a water binding capacity of up to 400 g/g. Dietary fibers were supplemented in a quantity of 1.5%, 2.0% and 5.0% based on the flour. Better rheological dough properties were obtained, as well as a better binding of water in dough, smaller overall losses during baking and cooling and a decreased energy.

PS.P38
Utilisation of Sugar Beet Pulp for the Production of Mycelial Biomass of Edible Mushroom Polyporus squamosus MMOL76 in Submerged Cultures: Dietary Supplement
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This study was undertaken in order to optimise the production of mycelial biomass of edible mushroom Polyporus squamosus – strain MMOL76, using only sugar beet pulp as substrate in submerged culture. This aspect offers a promising future for standardisation of production of well-preserved mushrooms of this type. Submerged culture yields more consistent and predictable composition than found in fruit bodies. Most substances found in this mycelium biomass obtained by submerged cultivation also has higher nutritional value. Sugar beet pulp, an abundant by-product of the sugar refining industry, is mainly used in cattle feeding. However, its chemical composition suggests some alternative utilisation with a higher added-value. Sugar beet pulp contains: 19.5% cellulose (w/w); 18.93% hemicellulose (w/w); 11% pectin (w/w); 9.32% crude proteins (w/w); 0.23% sucrose (w/w); 0.47% reducing sugars (w/w); 0.47% lipids, 0.5% total phenolic content (TPC) (w/w). The mushroom P. squamosus strain MMOL76, can grow in the form of mycelial biomass in submerged culture, using only sugar beet pulp. The fermentation medium of this liquid culture contains: 1.5% sugar beet pulp, 0.15 mol/l sodium phosphate and 0.2% ammonium sulphate. The mycelial biomass has high nutritive values and is made up of 40% crude proteins with 60% digestibility, 4% lipids, and insoluble dietary fibre – 28% cellulose, 7.36% hemicellulose and 0.103% TPC. This biomass also contains high molecular weight components of defence antioxidant system, such as superoxide dismutase (SOD) EC 1.15.1.1 and catalase (CAT) EC 1.11.1.6 (1.05 U/mg proteins and 13.01 U/mg proteins, respectively). The produced biomass represents a new nutrition supplement, containing a high percentage of digestible proteins and insoluble dietary fibres.

PS.P39
Sugar Beet Fibers as Supplements for Brown Bread
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The increased consumption of dietary fibers with common food not only can improve digestion and the elimination process, but also can aid in the treatment or prevention of diet-related chronic disorders, as it was emphasised in numerous papers. Increased dietary fiber intake could be achieved by changing dietary habits, increasing the consumption of high fiber foods, and by the help of consuming fiber-fortified foods and fiber supplements. Fiber fortification of common food has an advantage. Consumers remain by local dietary habits, but the producers have to find proper ways for supplementation. As a result, it has become a dominant claim to incorporate dietary fibers in an adequate amount into daily meals by a specific variety of breads.

Fish production in the Republic of Macedonia had its peak in the 60’s, and this ascent continued to the 80’s. In the period of disintegration of former SFRJ, drastic decline of the production level is noticed. Actually, this radical change of the economy and society, leads to ‘social breakdown’. Globally, in the last decade, fishing in the lakes has been decreased, but fish breeding has been increasing.

Fish consumption in Macedonia of approx. 3.5 kg per capita is far from the world average. Domestic fish production satisfies only ¼ of total fish consumption, due to insufficient production, poor assortment and shortage of knowledge about the value of fish meat.

Although fish production in 2000 has been retained the level of 1,990 of approx. 1,900 tons, numerous factors were obstacle to reach planned production of 5,000 tons. However, in last few years numerous initiatives for increasing of fish production have been noticed, over application of modern technologies and developing of private sector.

The main obstacles for the development of fish production in Macedonia are: 1. Drought in last 15 years; 2. During the 90’s, because of various economical, political and other reasons, Macedonia has lost more than a half of its GDP; 3. Process of ownership transformation is still not finished; 4. Non-stable and non-standardized production of fish young; 5. A production of fish food is low and its quality is not satisfied; 6. A consequence of inadequate ransom is low exploitation of capacities that leads to expensive production; 7. A negative credit politics in the sphere of animal production; 8. Substitution of consumption has been occurred as a result of low purchasing power of consumers, with increasing portion of cheaper carbohydrate – plant products. Also, domestic animal products can not parry on competition from abroad; 9. Poor export results due to the low production.

The previous data reveal the need of serious access in finding the measures for improvement of all subjects, working in fishery and fish production. It comprises the following activities: 1. Privatization of the existing capacities and stimulation of the construction of new
objects in private sector; 2. Establishing a net of distributors and fish stock market on the state level; 3. Modern marketing strategy; 4. Improvement of fish breeding (based on rational using of water and maximal increasing of fish density); 5. Introduction of new fish species, in the beginning experimentally; 6. Improving the quality of fish and their products and opening a fish processing plant; 7. Efficient health protection; 8. Organization of fish producers in special organizations, societies etc.

**PS.P41**

**Improving Quality of Wine by Blending**

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Blending of wines different grape varieties has a long tradition in many wine growing regions. Blending is used to achieve a desired product, the continuity of quality, to enhance complexity, improve overall quality, balance components, and bring the final product within legal or operational specification. It leads to an improvement in the sensory quality of wine, which results of an increased refinedness and complexity of the aroma of blend wines. Malvasia istriana is a domestic and widespread sort of white cultivars in Istrian wine region of Croatia. In the process of ageing, Malvasia istriana loses very fast its aroma and hence it is usually consumed as young wine. Therefore, blending is used in order to improve the quality of Malvasia istriana wine, enrichment of its aroma and prolongation of the consumption period with maintaining varietal recognizability. Malvasia istriana base wines were used in the blending with 85% portion, as well as Chardonnay, Sauvignon, Pinot white, Prosecco and Muscat white all made of grape varieties grown in the Istrian region. The change in volatile compounds of the blendeds was observed throughout the year by using headspace-solid phase microextraction (SPME) and static headspace (HSS) coupled with gas chromatography (GC-FID and GC-MS). The obtained results were analysed by multivariate analysis. Based on the analyses of volatile compounds, sensory evaluation of wine quality and statistical analysis, the best result was obtained by blending Malvasia istriana, Sauvignon and Pinot white. Chardonnay, Sauvignon, Pinot white and Prosecco proved to be suitable for blending with Malvasia istriana. Muscat white wine was unsuitable for blending due its specific Muscat aroma which dominates over the base wine aroma in the blend. Blending Malvasia istriana with other selected wines produced wines of better sensory quality and richer in volatile compounds, which justifies the implementation of blending.

**PS.P42**

**Vitamin A and D Fortification of Margarines Across the Countries of the European Union**

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Currently, the legislation of margarine fortification with vitamin A and D differs greatly within the countries of the European Community. This is due to different views on the public health benefit and risk of mandatory or voluntary addition of these vitamins. While adding vitamin D is prohibited in some countries (e.g. Denmark, France) it is mandatory in others (e.g. Sweden, United Kingdom). Vitamin A fortification is not prohibited in any of the European countries, but nevertheless the quantity of added vitamin A shows a great variability between countries.

To our knowledge, an up-to-date overview of the legislation on margarine fortification is not available. Therefore, we will review this information together with the reported vitamin A and D intakes and status in European countries.

For food fortification, it is of paramount importance to ensure that the level of nutrient additions is safe for consumers. Thus special attention is given to safety issues. In addition, the consequences of dietary and lifestyle trends, as well as interactions with disease prevention recommendations (e.g. fat-reduced diet, use of sunscreen) are illustrated.

The different legislation within the European community may be a barrier for a European harmonisation of the addition of nutrients to foods.*

*Preliminary Draft Proposal SANCO/329/03 for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the addition of vitamins and minerals and of certain other substances to foods.

**PS.P43**

**Phenolic Acids in Ready-to-Eat Cereal Based Foods**

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Antioxidant substances present in foods have in recent years been the object of several investigations in consideration of their potential role in preventing the harmful effects of reactive oxygen species and other radicals formed in human cells as a consequence of normal metabolic processes and environmental stresses. Antioxidant compounds present in plants include a variety of structural types with different activities and they can be subdivided into lipid soluble and water soluble.

Phenolic acids are common hydrophilic antioxidants that are ubiquitous in fruits, vegetables, legumes and grains. Cereals are the basis of the daily diet of most of the world population and especially in Italy where bread and pasta consumption are amongst the highest in the world. Italy is also amongst the major rice producers in Europe.
Within the frame of a research project financed by the Italian Ministry for Agriculture and Forestry aimed at investigating antioxidants in foods typical of the Mediterranean countries, a whole sub-project was devoted to the study of cereals and derived products. The role of genetic traits, cultivation practices, environmental conditions and processing were assessed in previous studies.

The aim of the present work was to assess the influence of cooking, which is a necessary step in the preparation of many cereal based foods such as pasta and rice, on phenolic acids which represent the main group of antioxidant substances in cereals, in order to assess the effective levels of antioxidants in ready-to-eat products. For this reason the levels of insoluble bound phenolic acids were determined by HPLC in commercial samples of dried pasta, ordinary and parboiled rice and in the corresponding cooked samples.

PS.P44  
**Dried Fruit Nutritive Bars**  
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The nutritive energy bars are nowadays well represented in human nutrition. At the moment, there are lot of manufacturers present at Croatian market, but neither one is domestic.

This work is an attempt to create such a product based on dried fruit and nuts for which Croatia has great agricultural conditions. So, the aim was to produce first ‘made in Croatia’ product of such type.

After choosing the optimum combination of ingredients and preparing a product under laboratory conditions, the product was stored at two different temperatures. The aim was to determine shelf-life of the product and changes in basic ingredients as well as microbiological and health validity of the product.

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**PS.P45  
Pasta-Products Enriched with Immature Wheat Grain: Technological and Nutritional Properties**  
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The basic composition and functional properties of mature grains of cereals have been extensively studied. The search for new potential and economic opportunities for novel uses of cereal grains has focused research on immature grains.

Cereal grains harvested at early stages of kernel development appear to be an interesting raw material for functional foods, containing fructooligosaccharides (FOS), well-known prebiotic compounds, in quantities 2–3 times higher than mature grains.

Pasta samples were obtained from semolina mixed with increasing rates of immature wheat grain (IWG) meal of two different cultivars.

The integration with IWG meal shows no relevant changes in cooking quality, but promotes interesting differences in carbohydrate digestibility. In particular, in vitro starch digestion of cooked pasta decreases with increasing IWG meal content, probably because of a protective effect exerted by dietary fibre and a different starch structure in IWG enriched pasta.

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**PS.P46  
Effect of Freeze Drying on the Qualitative Characteristics of Iranian Saffron**  
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National Nutrition and Food Technology Research Institute, Tehran, Iran

The traditional way of drying (under uncontrolled condition) has adverse effects on the quality of Saffron. Since it dries in shade and in uncontrolled condition. This research is carried out to determine the effects of freeze drying process on the quality parameters of Saffron and compare with the traditional method. The methodology of the research was experimental.

The fresh Saffron stigmas dried both in traditional condition (R.T and shade) and freeze dryer condition (freezing time 5 and 40 hours, drying condition temp –18°C, chamber pressure 0.5 mmHg and time 20 hours. Quality attributes of dried Saffron were determined with chemical, microbial and sensory tests.

Results, indicated that, the amount of crocin and Picrocrocin was higher in freeze dried samples (P < 0.05). And safranal was high in traditional samples. The data on sensory (aroma and color), for aroma (dried and solution), There were no significant difference between samples, for color there were significant difference between all dried samples (P < 0.000), but for solution samples there were no significant difference between all samples (P < 0.05). The result of microbial tests *E. coli* was negative, and the number of coliforms, molds and yeasts were low in freeze dried Saffron.

Since dried stigmas of Saffron is a very high value material due to its application in foods, as a result, freeze drying can be used as one method to produce Saffron with acceptable quality.
Assessment of the Agronomic, Technological and Nutritional Characteristics of New Genotypes of Triticum Turgidum ssp dicoccum with Sensorial Evaluation of Pasta Dried at Two Different Temperatures

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Recently, ease of cultivation, cropping performance together with good organoleptic and nutritional properties, have aroused a renewed interest in farro. The farro, T. turgidum ssp dicoccum, rich in starch, fiber and poor in fats has been recognised as a very healthy cereal and is recommended in some gastro-intestinal disorder and lipids dismetabolism.

In light of the increased demand, the evaluation of the composition and technological characteristics of farro and the adoption of suitable transformation processes, is of paramount importance.

In this work we present agronomic, technological and nutritional data obtained examining six new lines of farro produced by crossing the T. turgidum ssp dicoccum c.v. Molise with T. turgidum ssp durum c.v. Ofanto.

All new genotypes of T. turgidum have given rise to a higher production than the farro parent, while for only three lines, the yield/ha has been higher than durum wheat.

The technological data concerning the gluten quality and quantity show that exist a certain variability level between new lines. The value of the gluten content ranging from 8.8 to 12.2% of the total protein.

The gluten quality of new lines is low as it is typical of old T. turgidum populations (sticky and poor visco-elastographic characteristics). However, new lines have shown a better gluten quality than farro parent, though poor respect to durum wheat.

Pasta produced from new lines of T. turgidum has been dried at two different temperatures (50 e 90°C). From the organoleptic point of view, pasta dried at higher temperature had a better taste.

As for the nutritional aspect, data on the in vitro starch digestibility obtained from semolina and pasta showed the presence of a good amount of resistant starch which made this cereal an interesting source of ‘prebiotic’ substrata for trophism of intestinal bacteria.
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The safety and quality of food products are a high relevant topic, which is necessarily invoked also for novel foods, that more and more take place on the shelves of the supermarkets. Among them, the field of alimentary fats shows a wide range of innovative products, that should be better monitored from chemical and nutritional point of view; this is of the highest importance if we consider the competition due to the globalisation of the markets. We are referring in particular to Turkish hazelnut oil, which has been attempting, for a long time, on the genuineness of our olive oil.

According to this, the aim of the work is, on the one hand, to launch the Corylus avellana national production, that is supplied for approximately 50% by Campania region, and, on the other hand, to assess the feasibility of a local production of hazelnut oil. We have then focused our attention on setting up a technical card of recognition, which provides evidences of the genuineness and quality of the product.

In order to this, we have performed exane extraction of oil from Corylus avellana varieties sampled in Campania region (Mortarella, San Giovanni, Tonda di Giffoni), followed by the determination of the volumetric mass, refracration index, acidity, number of saponification, peroxide number, iodine value, smoke point and impurities (chemical-physical constants of vegetable oils), as well as the evaluation of organoleptic characters (flavour, colour, taste) and spectrophotometric UV values.

Such parameters have been compared not only with data available on Turkish and foreign literature, but also with those relative to our olive oil cited above, thus providing a solid base in favour of this new production.

Sous vide products are typically heated at relatively mild temperatures (65–95°C) for a long period of time. The mild heat treatments applied to these products do not prevent the survival of microorganisms, particularly bacteria. This fact, together with the extended shelf life of these products, have raised some concern about the microbial safety of sous vide food for the consumers. Some spore-forming bacteria are well-known agents of outbreaks of foodborne poisonings.

This work evaluates the sporeforming bacteria in rainbow trout processed by the sous vide method under different time/temperature conditions and stored at 2°C and 10°C. Of the isolates identified, the aerobic sporeforming species were predominant. The most frequent species found were B. cereus, B. alvei, B. brevis, B. megaterium, B. mycoides, B. pumilis and B. subtilis.

None of the heat treatments applied was able to inactivate the Bacillus spp. Isolates depend on heat treatment and storage temperature.
Sous vide cooking or vacuum cooking is defined as: 'raw materials that are cooked under controlled conditions of temperature and time inside heat-stable vacuumized pouches'. One of the principal advantages of this system is that allows the finished product to have a longer shelf-life under chilled storage than conventional chilled meals. The purposes of this work were to study i) the acceptability of diets containing sous vide cooked and stored salmon by the rat; ii) the dietary effects in rats of a oily fish cooked by sous vide method and stored on the following: body weight gain, dietary and protein efficiency ratios and apparent digestibility coefficient.

The rats were fed from weaning with the experimental diets, containing roughly 10% protein, 8% fat. Food intake was checked daily and body weight variations were measured on alternate days. Feces were dried, weight and homogenised and the nitrogen content was measured by the Kjeldahl procedure. Water and food were provided ad libitum over the experimental period (two weeks).

Food intake, body weight gain, dietary and protein efficiency ratios (DER and PER), and apparent digestibility coefficient (ADC) of rats fed experimental diets containing casein (C), sous vide processed salmon stored at 2°C during 3 (SV3), 21 (SV21) and 45 days (SV45) were not affected during the storage. The sous vide processed salmon stored on the following: body weight gain, dietary and protein efficiency ratios and apparent digestibility coefficient.

No significant differences were found between the intakes of the experimental groups suggesting that the smell and taste of samples were not affected during the storage. The sous vide processed salmon stored for 3, 21 and 45 days had the same effect than the reference on the studied parameters in the rat.

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<th>C</th>
<th>SV3</th>
<th>SV21</th>
<th>SV45</th>
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</thead>
<tbody>
<tr>
<td>Food intake</td>
<td>41.78</td>
<td>40.17</td>
<td>42.49</td>
<td>41.52</td>
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<tr>
<td>Body weight</td>
<td>5.57</td>
<td>10.34</td>
<td>9.29</td>
<td>8.07</td>
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<tr>
<td>DER</td>
<td>0.22</td>
<td>0.27</td>
<td>0.23</td>
<td>0.20</td>
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<tr>
<td>ADC</td>
<td>99.06</td>
<td>98.98</td>
<td>99.03</td>
<td>98.99</td>
</tr>
<tr>
<td>PER</td>
<td>2.20</td>
<td>2.63</td>
<td>2.23</td>
<td>1.92</td>
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Values are mean ± standard deviation of 7 rats.
purees was different depending on the dehydration process and kind of sugar used. This study gives further insight into the mechanisms concerning different sugars, especially trehalose, application as flavouring additive, due to its ability to retain and preserve the fruit volatiles responsible for the characteristic flavour of fresh fruits during dehydration processes, which enables the development of new processes to maximise this effect and to produce superior dried products.

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**PS.P56**

**Microwave System and Method for Pest Control and Improvement of Preservability of Vegetal Foodstuffs**

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An Italian SME with a twenty-year background in the field of electromagnetic energy applications is studying, in cooperation with noteworthy Italian Universities, an innovative disinfection system for vegetal foodstuffs, particularly grain, seeds, wheat, legumes, flour, dried fruit and similar.

It is an effective and ecological alternative to the chemical methods currently employed in the food industry. Pest control is nowadays generally performed with chemical products that can arouse significant problems of environmental pollution during treatment and toxic residues in foodstuffs destined both to animal and human feeding.

Since most pests do not survive over a certain temperature termed ‘Lethal Temperature’ (50–60°C for insects and 70–80°C for moulds), we developed a microwave system able to:

1. Raise the body temperature of the pests over their Lethal Temperature (LT), while preserving all the characteristics of the foodstuffs.
2. Knock down the moisture content of the flour as to improve the preservability of the product from a hygienic-sanitary point of view by extending the preservation time.

This process can be applied just before storage in silos and its introduction does not change nor modify the pre-existing mechanical structures.

The improvements that this technology introduces in comparison to the typical characteristics of the chemical pest control and desiccation treatments are:

- **Ecological advantages:** total absence of pollution, since the microwaves energy is confined inside the shielded area with no residues in the environment nor on the foodstuffs;
- **High quality** of the foodstuffs after treatment;
- **Economic advantages:** the microwaves system is ‘in series’ in the phase of loading, therefore there are no stops in the productive chain. The treatment time is very short;
- **Rapidity** of the treatment (few minutes only);
- **Immediate disposability** of the product at the end of the process;
- **Full effectiveness** of the treatment on insects in all vital stadiums (eggs, larvae, pupas and adults), and on bacteria and mould;
- **Knocking down of moisture content of flours** up to about 12–13% in order to improve the preservability of the flour by extending the preservation time from 6 months to 1 year, independently of the storage conditions.

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**PS.P57**

**Quercetin, Myricetin, Kaempferol, Luteolin and Apigenin Content of 122 Edible Plants**

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Flavonoids has nutritional, biochemical and pharmacological effects which includes anti-oxidative, anti-inflammation, anti-platelet, anti-thrombotic action and anti-allergic effects. The natural occurrence of 5 flavonoids namely quercetin, myricetin, kaempferol, luteolin and apigenin in 122 edible plants were determined using Reverse-Phase High Performance Liquid Chromatography. All the samples tested contained significant amount of these nutrients and showed significant differences (p < 0.05) in their flavonoid content. The highest flavonoid content was in onion leaves, (1,497.5 mg/kg quercetin, 391.0 mg/kg luteolin and 832.0 mg/kg kaempferol), followed by ‘Semambu’ leaves (2,041.0 mg/kg), bird chili (1,663.0 mg/kg), black tea (1,491.0 mg/kg), papaya shoots (1,264.0 mg/kg) and guava (1,128.5 mg/kg). The major flavonoid in these plant extracts is quercetin, followed by myricetin and kaempferol. Seventy percent of the plants tested contained significant amounts of quercetin especially in ‘jering’ (1.4 g/kg), sapodilla (0.44 g/kg), ginger (*Zingiber officinale*), (0.39 g/kg) and guava leaf (0.33 g/kg). Luteolin was detected in broccoli (74.5 mg/kg dry weight), green chili (33.0 mg/kg), bird chili (1,035.0 mg/kg), onion leaves (391.0 mg/kg), ‘belimbi’ fruit (202.0 mg/kg), ‘belimbi’ leaves (464.5 mg/kg), French bean (11.0 mg/kg), carrot (37.5 mg/kg), white radish (9.0 mg/kg), local celery (80.5 mg/kg), ‘limau purut’ leaves (30.5 mg/kg) and dried ‘asam gelugur’ (107.5 mg/kg). Apigenin was only found in Chinese cabbage (187.0 mg/kg), bell pepper (272.0 mg/kg), garlic (217.0 mg/kg), ‘belimbi’ fruit (458.0 mg/kg), French peas (176.0 mg/kg), snake gourd (42.4 mg/kg), guava (579.0 mg/kg), wolfberry leaves (547.0 mg/kg), local celery (338.5 mg/kg), ‘daun turi’ (39.5 mg/kg) and ‘kadok’ (34.5 mg/kg). In vegetables, quercetin glycosides predominate, but glycosides of kaempferol, luteolin and apigenin are also present. Fruits almost exclusively contain quercetin glycosides, whereas kaempferol and myricetin glycosides are found only in trace quantities.