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connected and promote evidence based practice**

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CONTENTS

- The impact of food labeling on the dietary choices of older adolescents aged 16 – 17 years: an exploratory study..... **6**
- Eating behavior aspects of children on the autistic spectrum in comparison with neurotypically developing peers and potential correlations between diet and intestinal microflora **8**
- Survey of nutritional status and nutritional habits in office workers**10**
- Relationship between nutritional knowledge and hypercholesterolemia on Portuguese adults **12**
- Potential role of carotenoids on vascular inflammation and diabetes. Study on cultured human umbilical vein endothelial cells (HUVECS).....**14**
- Evaluation of food intake in elderly hospitalized patients – nutritional status, food choices, energy intake, food waste and associated factors**16**
- Evaluation of the relevant strategies counteracting obesity from hungary and the European Union – the opinion of students from the Semmelweis university, Hungary**18**
- The effect of exercise on the accuracy and reliability of bodpod™ and skinfold calipers in the assessment of athlete body composition: a pilot study**20**
- Vitamin d intake and adequacy in an adolescent population in rural North Wales, UK.....**22**
- An evaluation of the intake and knowledge of folic acid amongst pregnant women in the UK..... **24**
- The effects of riboflavin supplementation on blood pressure in hypertensive patients with the c677t polymorphism in the enzyme methylenetetrahydrofolate reductase (MTHFR)**26**
- The soybean. A potent and versatile nutritional contribution to disease prevention and health? **28**
- Assessment of bioelectrical impedance analysis in lung cancer patients during nutritional support **30**
- Assessment of residents’ supply with food in social care institutions**32**
- Review of nutrients and biomarkers in patients with rheumatoid arthritis**34**
- Decomposition of the meddietscore’s components in estimating the likelihood of breast cancer’ s presence: discriminant analysis**36**
- The association of foods rich in fatty acids with breast cancer development: a case-control – study..... **38**
- Similarities and differences in eating behaviour and gut microbiota between autistic children and their typically developing siblings**40**

- Is there association between nutritional status and pancreatic or pulmonary functions in cystic fibrosis portuguese patients?**42**
- The effect of sound environment on the energy intake of overweight subjects.....**44**
- Influence of bioactive food extracts on pc-3 prostate cancer cells**46**

Editorial

It gives us great pleasure to write the very first editorial and welcome to the DIETS Student e-journal. This journal was first conceived for three reasons. First because dietetic students asked how can we know what other students are researching into in Europe. Secondly, because dietetics professes to be evidence based profession and where better to look for evidence of future potential than in our Higher Education Institutions where students are developing their expertise. And, finally, because dietetics and future dietitians do have a significant contribution to make to improve the food choice and nutritional health of European citizens and this needs to be acknowledged and shared.

We have been delighted at the response to calls for projects completed within the past year by undergraduate and students working at master's level. The diversity is quite outstanding with contributions from Austria, Greece, Hungary, Italy, Lithuania, Northern Ireland, Portugal, Slovenia and the United Kingdom. Topics cover a wide range of nutrition and dietetics science, from clinical, including reference to genetic variants, in vitro techniques, to social care and soybeans to vitamin requirements during life years. Students undertake a variety of projects, but all designed to help them understand the principles of research methodologies and bioethics.

Each submission has been reviewed by, members of the editorial team, and external reviewers and we are grateful to them for their commitment to careful reading and subsequent feedback to the students and their supportive academic teams. The e-journal signifies commitment and, also, acknowledges the research expertise of academic staff that supports their students and the willingness to engage in driving up standards through peer review.

Finally acknowledgment must be made to the EU funded Thematic Network DIETS2, its partners and their commitment to one of its aims to '*strengthen the research capability and capacity in new graduates ensuring development of a knowledge triangle in dietetics*'. The future plan is to have two issues a year of the DIETS Student e-journal and to go onto encouraging students of dietetics (of which all of us are to some extent) to continue to share their interests and expertise.

We hope you enjoy, find encouragement and stimulation in this first edition.

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THE IMPACT OF FOOD LABELLING ON THE DIETARY CHOICES OF OLDER ADOLESCENTS AGED 16-17 YEARS: AN EXPLORATORY STUDY.

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Introduction: Nutrition information on food labels is considered to be a tool that helps reduce obesity risk by nudging people away from poor dietary habits towards healthy food choices. To work it needs to be available when food is purchased, it has to be clear, easily understood and consumers need to use it. This study explores determinants of label use, lifestyle and dietary habits of 16-17 year old adolescents, and evaluates whether food labelling is an effective vehicle for promoting healthy food choice in this underrepresented age group.

Methods: Cross-sectional survey using a validated questionnaire (Mackison et al., 2010) adapted for use with 16-17 year old adolescents (n=179) from a comprehensive high school in Cheshire, UK. All pupils present on the day (n=132; male: 63, female: 67) completed the questionnaire. Data was analysed using SPSS v20.0. Between group differences of demographic and lifestyle factors were determined for interest in healthy eating (independent-samples t-test and one-way independent analysis of variance), and label understanding (Kruskal Wallis and Mann-Whitney U tests). Categorical data was explored using chi-squared test for independence. A significance level of $p < 0.5$ was used.

Bioethics: The project was risk assessed and ethical approval granted by the Department of Clinical Sciences Ethics Committee at the University of Chester.

Results: Food labels were considered important by 87% of participants but less than one third, 32% selfreported frequent use of labels when buying food. Nearly three quarters (71%) answered more than half of the label understanding questions correctly; just over half (59%) had a high interest in healthy eating. Label understanding scores were lower for those with: lower GCSE grades in maths ($p < 0.001$) and English ($p = 0.03$); lower frequency of family meals ($p = 0.04$); and higher frequency of fast food consumption ($p = 0.03$) and snacking ($p = 0.005$). Lower interest in healthy eating was associated with male gender ($p = 0.004$), less physical activity ($p = 0.04$), and more frequent snacking ($p < 0.001$) and fast food consumption ($p < 0.001$).

Discussion: A unique aspect of the study was the use of a census type approach that avoided self-response bias and allowed the views of males, females, and those with various levels of interest to be equally represented. Those at increased risk of obesity due to dietary and lifestyle choices were found to be less likely to benefit from food labels as they have less interest in healthy eating (a marker for actual in store label use), and lower label understanding and self-reported usage. The association between low GCSE grades and low label understanding highlights a barrier to effective use. The low levels of interest and usage

amongst the males raises a question about whether the introduction of energy labelling in catering outlets could actually increase energy consumption in this group. In conclusion, food labelling may enable those desiring to eat healthily to exercise that choice but has limited impact on the dietary choices of those at increased risk of obesity.

Conflicts of interest & Acknowledgements:

The author declares no conflicts of interest.

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Key Words: food labels, comprehension, adolescents

Contributors: Dionne Mackison (permission to use and adapt validated questionnaire)

EATING BEHAVIOR ASPECTS OF CHILDREN ON THE AUTISTIC SPECTRUM IN COMPARISON WITH NEUROTYPICALLY DEVELOPING PEERS AND POTENTIAL CORRELATIONS BETWEEN DIET AND INTESTINAL MICROFLORA.

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Introduction: Autism spectrum disorders (ASD) are a group of neurodevelopmental disorders characterized by impairments in communication, reciprocal social interaction and restricted repetitive behaviors or interests. The incidence of autism spectrum disorders is increasing. Though there is ample scientific evidence pointing out that autism is associated with problematic dietary habits and behavior, as well as dysfunction of the bowel and / or disorder of the intestinal microflora, there is no scientific convergence on the degree and extent to which these factors affect or contribute to the disease of autism. The aim of this research work is to search out and examine eating behavior aspects of children on the autistic spectrum in comparison with neurotypically developing peers and to investigate potential correlations between diet and intestinal microflora. To that end, food environment of eating episodes such as place, dinner guests and parallel activity is taken into consideration. Physical activity and frequency of gastrointestinal symptoms are also examined. The above factors are further explored for potential association with parameters of intestinal microflora.

Methods: A total of 46 children with mean age 6.7 years (SD=2.4), participated in this study, 23 diagnosed with ASD and 23 healthy controls. Dietary data and information of eating behavior were collected through 3-day food diaries, while physical activity and characteristics of evacuations were assessed through questionnaires. Stool samples were analyzed using culture methods. Interfamilial factors were explored for all of the above. Means were compared using the Student t-test and Mann-Whitney U test, eating behavior aspects were emerged using logistic regression while Partial Correlation was performed for potential association with parameters of intestinal microflora.

Bioethics: This thesis was approved by the Ethics Committee of the Harokopio University Of Athens.

Results: Data analysis revealed that children with ASD consume more servings of juice, eat mostly at home, alone and with restlessness while eating. Moreover, autistic children seem to spend more time in sedentary activities, such as television, than typically developing children. Furthermore, it appeared that children with autism have greater number of Clostridia spp. and Candida spp. populations than typically developing children. Finally, certain species of intestinal microflora seem to be associated mainly with the food environment of eating episodes, such as the degree of concern during meal.

Discussion: Differences were indicated, regarding eating behavior and intestinal microflora, between autistic and typically developing children, while they seem to be pronounced when examined without the influence of typically developing siblings. Further studies are imperatively needed in order to find if the autistic population differs and in what extent from typically developing children of the same age.

Conflicts of interest & Acknowledgements: The author declares there are no conflicts of interest & acknowledgements.

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Key Words: autism, autistic children, intestinal microflora, eating habits, eating behavior

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SURVEY OF NUTRITIONAL STATUS AND NUTRITIONAL HABITS IN OFFICE WORKERS.

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Introduction: In this study the nutritional status and nutritional habits of 103 office workers were surveyed.

Methods: Two different types of measurements, the BMI (Body Mass Index) and the body fat percentage were used to determine the nutritional status of the office workers. For the evaluation of nutrient intake and food consumption a SFFQ (Semi-quantitative Food Frequency Questionnaire) was used. For the examination of the nutritional habits an individually assorted questionnaire was applied. 2010 version of Microsoft Excel program was used for the descriptive statistical analysis.

Bioethics: The study procedures were in accordance with the ethical standards of the responsible committee on human studies and with the Helsinki Declaration as revised in 1983. The participants in the survey were coded in regard to their anonymity, privacy and personality rights.

Results: 54,37% of the participants were in the normal, 33,01% in the overweight, 8,74% in the obese and 1,94% in the underweight BMI-category. According to the Bioelectrical impedance analysis 32,04% of the participants were in the normal, 36,89% in the high and 26,21% in the very high body fat percentage category. According to the analysis of energy and macronutrient intake energy intake did not reach the recommended values, whereas percentages of macronutrient intake didn't meet the requirements of the recommended values, since consumption of carbohydrate was low (45% of energy), protein was close to the upper limit (17%), while intake of fat was significantly more (40%), although added sugar was within the recommended values (9 E%). According to the SFFQ analysis participants average consumption was less than half of the recommended daily intakes for all edibles, apart from meat and meat products. Fibre intake was below the recommended value (19 g), whereas mean sodium intake was twice the advised amount (4.159 mg). Assessment of the participants' meal habits showed on average three meals per day. The 78% of the sample reported lunch as the biggest meal, 72% of them dine at the same time, 57% pays attention to something else also during the meal and 15% eat sweets every day. The majority of the participants chose to use the elevator instead of the staircase, but 83% of them exercised more than 30 minutes per day.

Discussion: There was a difference between the BMI and the body fat percentage results. From the difference between the results of the two measurements it was found that part of the people in the normal BMI category were rated in an unfavourable group due to another method. Therefore it is necessary to use other methods of determining nutrition status

besides the most common body mass index. The participants' nutrient intake and eating habits were not complying with the healthy nutritional recommendations; however participants showed a great interest in forming healthier body weight and healthy eating habits (data not shown). United health promoting programs for office workers would therefore be useful.

Conflicts of interest & Acknowledgements: There was no conflict of interest or ethical issue.

Key References:

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Key Words: Nutritional status, nutritional habits, anthropometry, office workers

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RELATIONSHIP BETWEEN NUTRITIONAL KNOWLEDGE AND HYPERCHOLESTEROLEMIA ON PORTUGUESE ADULTS

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Introduction: Studies about nutritional knowledge reveal that there is a relation between eating attitudes and behaviors. Being hypercholesterolemia one cardiovascular risk factor influenced directly by food habits and with high prevalence, an efficient intervention is crucial. The nutritional factors with higher impact on serum cholesterol are fat, fiber, cholesterol and phytosterols. This study's goal was evaluate nutritional knowledge on fat, fiber, cholesterol and phytosterols and the relationship with cholesterolemia.

Methods: 265 individuals were recruited on a cholesterolemia screening held on 4 portuguese cities. Questions related with the intended nutritional factors were selected and adapted from Parmenter & Wardle's Nutritional Knowledge Questionnaire (1999) and a pre-test was held. This questionnaire was applied by interview, and cholesterolemia assessed with Accutrend® Plus. The nutritional knowledge were divided in sufficient and insufficient, globally and by dimension, and cholesterolemia in normal (<190mg/dl) and hypercholesterolemia (≥190mg/dl). For its statistics analysis, Statistical Package for Social Sciences (SPSS®) for Windows (version 17.0) was used –Pearsons's correlation to relate global nutritional knowledge with cholesterolemia and age with cholesterolemia; Spearman's correlation to relate nutritional knowledge by dimension with cholesterolemia and educational level with nutritional knowledge; T test for independent samples for comparison between nutritional knowledge and hypocholesterolemic medication.

Bioethics: Informed consent was requested to individuals participating in the study.

Results: 40,3% of the individuals was taking hypocholesterolemic medication, 51,9% had basic school level, being the age average of the inquiries 54 years old. 62% showed sufficient global nutritional knowledge and 56,3% hypercholesterolemia. For fat, fiber and cholesterol dimensions, nutritional knowledge were shown – 88%, 61% and 72% respectively. On phytosterols' dimension, 63% had insufficient nutritional knowledge. Global nutritional knowledge and on dimensions fat, fiber and cholesterol did not showed any correlation with cholesterolemia level ($r=-0,075$; $0,029$; $-0,084$; $-0,006$, $p>0,05$). Lower nutritional knowledge on phytosterols showed correlation with cholesterolemia ($r=-0,256$, $p<0,017$). Higher nutritional knowledge on fat presented correlation with nutritional knowledge on fiber ($r=0,260$, $p<0,05$). Age ($r=0,435$; $p<0,05$) and educational level ($r=-0,227$, $p<0,05$) showed correlation with nutritional knowledge. Non-medicated individuals presented higher nutritional knowledge ($p<0,05$).

Discussion: It is proven that higher nutritional knowledge enhance the relevance of health on nutritional attitudes and behaviors. However, other studies proved that there is no direct

link between nutritional knowledge and eating behaviors. Hypercholesterolemia prevalence resultant was similar to the one assessed on other studies held in Portugal (56%). Between dimensions, the trend of higher knowledge on fat and its positive link with fiber knowledge had already been observed, suggesting a greater exposure of each individual to nutritional information on these dimensions. The insufficient nutritional knowledge on phytosterols suggests a lower exposure. The link between nutritional knowledge with age and educational level had already been demonstrated, suggesting that older people with lower educational level have been less exposed to nutritional information or have less comprehension of this nutritional information. The lower knowledge on hypocholesterolemic medication may show that these individuals treatment may not consider dietetics and nutritional education.

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Key words: Nutritional Knowledge, Hypercholesterolemia

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POTENTIAL ROLE OF CAROTENOIDS ON VASCULAR INFLAMMATION AND DIABETES. STUDY ON CULTURED HUMAN UMBILICAL VEIN ENDOTHELIAL CELLS (HUVECs).

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Introduction: Cardiovascular disease (CVD) and diabetes are associated with chronic inflammation and alterations of vascular oxidative balance. Endothelial dysfunction is correlated with the reduction of Nitric Oxide (NO) bioavailability, increased expression of endothelial adhesion molecules and recruitment of monocytes, thus promoting the atherosclerotic process. Interestingly, latest studies indicate increased release of endothelial microparticles (MPs) as potential biomarkers of cardiovascular complications in diabetes. Recently, although the mechanisms have not been elucidated, it has been demonstrated that a diet rich in carotenoids is associated with a reduction of cardiovascular risk and incidence of diabetes.

Purpose: To investigate the potential capability of carotenoids either in the reverting or preventing Tumor Necrosis Factor- α (TNF- α) triggered inflammatory response in cultures HUVECs obtained from umbilical cord vein of women affected by gestational diabetes (GDHUVECs) and their controls (C-HUVECs).

Methods: Both serum starved HUVEC cultures were incubated for 16 h with TNF- α (1 ng/mL) and then treated with 2.5 μ mol/L β -carotene (BC) and lycopene (Lyc). After 2 hours expression of endothelial adhesion molecules (VCAM-1 and ICAM-1) was evaluated by Western Blot analysis and consequent adhesion of human monocytes to endothelium. The carotenoid's activity on MPs release was assessed by flow cytometry. The results were presented as mean \pm standard deviation (SD). Significance of differences between treatments for each treatment time was evaluated by ANOVA. Data were considered to be significant if $p < 0.05$. Statistical analysis was performed using the XLStat2007.1 (Microsoft,USA) software.

Bioethics:Control and GD-umbilical cords were obtained from randomly selected healthy mothers delivering at Chieti and Pescara University Hospital. All procedures were in agreement with the ethical standards of the Institutional Committee on Human Experimentation (Reference Number: 1879/09COET) and with the Declaration of Helsinki Principles. After approval of the protocol by the Institutional Review Board, signed informed consent form was obtained from each participating subject.

Results: VCAM-1 and ICAM-1 expression induced by TNF- α was significantly greater in GD- than in C-HUVECs. Interestingly, BC and Lyc, significantly decreased TNF- α induced VCAM-1 and ICAM-1 increased expression both in C- and GD-HUVECs. In parallel, carotenoids preincubation significantly reduced the monocyte-HUVEC interaction in both cell cultures. Moreover, preliminary data indicate that the stimulus with BC or LC clearly reduces the

release of MPs induced by TNF- α in both C- and GD-HUVECs, indicating a potential role of carotenoids in the regulation of their production.

Discussion: Our observations provide background for a novel mechanism for carotenoids' vascular antiinflammatory activity in diabetes and may contribute to a better understanding of the protective effects of carotenoid-rich diet against CVD risk. Notably, the carotenoid concentrations employed in our study was similar to those occurring in the vessels of subjects consuming a "Mediterranean" diet. Thus, providing a robust evidence of potential anti-inflammatory and anti-oxidant properties of carotenoids in diabetes.

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Key Words: Carotenoids / Inflammation / Nitric oxide / Reactive oxygen species / Microparticles

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EVALUATION OF FOOD INTAKE IN ELDERLY HOSPITALIZED PATIENTS – NUTRITIONAL STATUS, FOOD CHOICES, ENERGY INTAKE, FOOD WASTE AND ASSOCIATED FACTORS.

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Introduction: The geriatric population is more susceptible to malnutrition, either by health changes or by factors that condition their food eating. The goal of this study was to analyze food intake and food choices, evaluate the real energy intake, calculate food waste and identify their associated factors in elderly patients, hospitalized in medical-surgical and trauma units on Lusíadas Hospital.

Methods: Transversal observational study, elaborated during the period of 26/06/2012 to 31/08/2012. Sample of 36 hospitalized patients ≥ 65 years, selected by convenience, according to the desired criteria. To evaluate their nutritional status, the Body Mass Index (BMI) and Mini Nutritional Assessment (MNA) were applied. The following cut-off points for BMI were used: $<22 \text{ kg/m}^2$ for underweight, $22\text{-}27 \text{ kg/m}^2$ for normal weight and $>27 \text{ kg/m}^2$ for overweight. For the analysis of food choices, the elder's daily request and diet administered by the hospital, were recorded. As for the energy intake, food was weighed both before and after the meal consumption, in order to record the patients' real intake, after which the energy value of each meal eaten was calculated. Evaluation of food waste was obtained by the percentage of waste produced (Waste Indicator, WI), considering food intake. Factors related to food waste, mentioned by the elders were also evaluated.

Bioethics: The study was approved by the ethics committee of the Lusíadas Hospital. The participants were informed about the goals and methods of the study by signing a Statement of Informed Consent in accordance with the Helsinki Declaration, as revised in 2008.

Results: According to BMI cut-offs, the 11% of the study sample was underweight, 50% were normal weight and 39% were overweight. According to the MNA evaluation, 28% of people were undernourished, 50% at risk of malnutrition and 22% normal. The analysis of food choices revealed that soup is often chosen instead of the main course, meat was more frequently selected than fish and dessert preferences (sweet and fruit) were mostly selected. Moreover, 72% of elders did not meet the recommended energy allowances, verifying a lower intake in lunches and dinners. By the calculation of food waste the average WI was 30%. The most frequented causes for food waste, as reported by the patients, were the decrease of appetite due to mechanical difficulties (dysphagia) and the absence of small food portions offered.

Discussion: The results of the present study underline the importance of early nutritional risk identification and nutritional status evaluation, in hospitals. The elder's energy intake was insufficient compared to their daily needs, underlining the need of implementing measures

that can improve food intake of hospitalized patients, contributing to a decreased food waste production.

Key References:

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Key Words: Food choices; energy intake; food waste; elders

Contributors: Vânia Costa, Ana Rita Lopes.

EVALUATION OF THE RELEVANT STRATEGIES COUNTERACTING OBESITY FROM HUNGARY AND THE EUROPEAN UNION – THE OPINION OF STUDENTS FROM THE SEMMELWEIS UNIVERSITY, HUNGARY.

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Introduction: In the past decades obesity has reached higher and higher rates all over the world. Many strategies have been born to stop the increasing trend. This paper is examining the policies from Hungary and the European Union that are aimed to stop the spread of obesity. The research was carried out with the help of the innovative Multi Criteria Mapping method, which was developed by the University of Sussex, and is used during decision making processes. This programme combines the advantages of the qualitative and quantitative survey methods.

Methods: According to the methodology of MCM, I conducted interviews with 10 chosen participants who were senior students of different majors from the medical and the health science faculties of the Semmelweis University. The participants had to evaluate 9 options in the fight against obesity with the help of 6 different criteria. Both the options and the criteria were chosen in view of my previous research in the topic. Each of the 9 options represented one planned or ongoing Hungarian or European policy or action against obesity, such as the taxation of junk foods, direct financial subsidies for healthy food products, reforming the school canteens or the regulation of the food marketing techniques for children, etc. My goal was to find out how the young, soon-to-be graduated healthcare professionals understand and evaluate the problem of obesity and the possible counteractions.

Bioethics: During my research I have evaluated the opinion of healthy individuals. The interviewees volunteered to take part in the research. After I had described the process to them they signed a consent to take part in the interviews.

Results: The research indicates that the most favourable options were the two that promote the enhancement of public health education, as the interviewees consider this option to serve as a foundation of every other strategy against obesity. The most pessimistically evaluated option was the taxation of unhealthy food products ('junk food'). According to the participants, this kind of fiscal policy is very unlikely to achieve deep and enduring changes in the eating habits of the population. As opposed to this, the students thought that the subsidies of healthy foods could be a very effective tool in stopping the spread of obesity. The participants were most uncertain regarding the option promoting physical activity by using active transport methods (walking, cycling, etc.). During my research it was also found that the students of different majors had a similar, unified way of thinking about obesity. Most of them emphasized prevention, and although they disagreed on a number of questions during the interviews, most of them had the same principals when it came to

counteracting obesity.

Discussion: While conducting the interviews it was found that some of the participants had little knowledge about the policy options and their background (economic, political, etc.) counteracting obesity. In my opinion the education programmes should put a greater emphasis on the multi-sectorial approach, therefore young healthcare professionals would possess wider knowledge regarding the effects of various counter-obesity strategies. Multi Criteria Mapping method has proven to be a great tool in using a multi-sectorial view. Students could benefit a lot from this way of thinking, therefore the MCM method should be used more widely in the education of healthcare professionals.

Conflicts of interest & Acknowledgements: No conflicts of interest have arisen.

I would like to thank my fellow students of the Semmelweis University, who have helped performing my research during the interviews.

Key References:

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Key Words: Obesity, Prevention, Policy option

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THE EFFECT OF EXERCISE ON THE ACCURACY AND RELIABILITY OF BODPOD™ AND SKINFOLD CALIPERS IN THE ASSESSMENT OF ATHLETE BODY COMPOSITION: A PILOT STUDY.

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Introduction: Analysis of athlete body composition often forms part of team/squad selection, and inaccurate measurements could have huge implications for teams and individuals. Currently there is no standard procedure for assessing athlete body composition and assessment days are often based around training sessions. The influence of body temperature and moisture has been demonstrated to impact upon the accuracy of the BodPod™, and the appropriateness of BodPod™ for assessing athletic populations has previously been identified as an area for further investigation. There is very little published research into the influence of exercise on the validity of skinfold calipers (SFC). However, issues with inter-rater reliability may be of great significance in assessing athletes who may only show very small changes in body composition. The aim of this study was to investigate the effects of exercise on the accuracy reliability of BodPod™ and SFC in assessing body composition, to identify whether there is a need for the development of a standard protocol.

Methods: Members of University sports clubs were invited to participate in the study. The final sample comprised two males and four females. Body fat percentage of the participants was assessed using BodPod™ and 4-site skinfold measurements, before and following a cardiovascular exercise session. 4-site skinfolds were used rather than 7-site due to time constraints in both training the researchers in taking skinfold measurements, and on the assessment days. Data was compared using t-tests to identify any differences between methods, between measurements taken before and after exercise, and inter-rater differences. Only P values <0.05 were considered significant. Pearson's correlation coefficients were used to assess the correlation between the two methods. Only P values < 0.01 were considered significant. A Bland-Altman plot was used to assess agreement between the two methods.

Bioethics: This study was approved by University of Nottingham Medical School Ethics Committee.

Results: Neither BodPod™ or skinfold measurements were significantly different before and after exercise. The two assessment methods were significantly correlated before ($r=0.945$, $P<0.01$) and after ($r=0.945$, $P<0.01$) exercise. Significant inter-rater differences in skinfold measurements were seen before ($t=2.922$, $P<0.05$) and after ($t=2.810$, $P<0.05$) exercise, and specifically at the bicep and tricep sites. These significant differences were not seen in the more lean subjects.

Discussion: The results suggest that the accuracy and reliability of both BodPod™ and SFC are

unaffected by exercise, and so assessment days involving the use of either of these techniques can be set around training sessions without compromising the accuracy of the measurements. SFC may be most appropriate in very lean athletes, possible because larger SFC measurements are associated with greater levels of technical error. Whenever possible the same assessor should measure an athlete over a period of time to minimise the risks of inter-rater differences. The study is greatly limited by the small sample size and short time-frame, and so no conclusive findings can be taken from the study. Further research is required, and this should include subjects from a wider variety of sports of differing body composition. In particular, research is needed into SFC equations for female athletes.

Conflicts of interest & Acknowledgements: None

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Key Words: body composition, athlete, exercise, skinfold, BodPod™

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VITAMIN D INTAKE AND ADEQUACY IN AN ADOLESCENT POPULATION IN RURAL NORTH WALES, UK.

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Introduction: Vitamin D deficiency is widespread worldwide with cases of rickets reported from 60 countries in the last 25 years (Thacher, Fischer, Strand & Pettifor, 2006). Recent studies have shown adolescents/young adults to be at risk of vitamin D deficiency (van Schoor & Lips 2011), and hypovitaminosis D could prevent laying down of peak bone density (Lehtonen-Veromaa et al., 2002) at this crucial developmental stage. The aim of this cross sectional study was to investigate dietary habits and sunlight exposure in a cohort of adolescents (12-18 years, n=74) in Ruthin, a rural town in North Wales, UK (53.1°N) in comparison to similar worldwide studies and data from national surveys.

Methods: Participants (n=74) were recruited through a bi-lingual secondary school with the headmistress' agreement for pupils to complete a questionnaire. Validated food frequency questionnaires (FFQ) (Taylor et al., 2009) and validated sun exposure records (Hanwell et al., 2010) were used to assess dietary intake of vitamin D and time spent outdoors respectively. Data were analysed using SPSS and comparisons made using one sample t-tests to compare means.

Bioethics: Ethical approval was obtained from the Department of Clinical Sciences and Nutrition Ethics Committee at The University of Chester and parental consent was obtained from each participant.

Results: Adolescents from this population showed significantly higher levels of dietary vitamin D intake (females, $p < 0.0001$, males, $p = 0.001$) in comparison to national levels. They showed significantly higher ($p < 0.0001$) mean daily intakes (193 ± 155 IU) in comparison to studies in Denmark (116 ± 80 IU), Brazil (124 ± 28 IU) and Spain (113 ± 130 IU) but significantly lower ($p < 0.0001$) levels in comparison to studies in Canada (300 ± 8 IU) and Finland (268 ± 220 IU). Their mean weekly consumption of oily fish was 100.5g (± 152.4), and when tuna was included this level increased to 157g (± 192.5), both significantly higher ($p < 0.0001$) than NDNS data ($21g \pm 77$), but intake of meat showed no significant difference. A medium, inverse correlation was found between age and exposure to sunlight, ($r = -.393$, $p < 0.001$).

Discussion: This study of adolescents showed significantly higher levels of dietary intake of vitamin D in comparison to national levels. It also showed significantly higher intake in comparison to some worldwide studies conducted amongst similar populations. This suggests there may be specific dietary/lifestyle factors, possibly linked to oily fish intake, in rural adolescent populations, which may naturally help to increase serum 25(OH)D concentrations. Further research could establish whether UK adolescent populations eating

levels of red meat in line with the national average (64g/day), but significantly higher ($p < 0.0001$) levels of oily fish (including tuna) do have higher serum levels of 25(OH)D. Determining beneficial levels for adolescents and ensuring they attain this level via normal diet or via fortification of foods/provision of supplements could have major long term health and cost benefits. Red meat ($< 0.1\mu\text{g}$) and tuna ($3.3\mu\text{g}$) are lower in vitamin D per 100g when compared to oilier fish such as mackerel ($8.4\mu\text{g}$) (Food Standards Agency, 2006). In conclusion, the higher levels of dietary intake of vitamin D shown in this study suggest these food sources should be considered, and promoted, as an important source of vitamin D.

Conflicts of interest & Acknowledgements: No conflicts of interest. Acknowledgements to Dr Sohail Mushtaq (supervisor), Catherine Taylor et al., 2009, for allowing use of their validated food frequency questionnaire, also to Heather Hanwell et al., 2010, for use of their validated sun exposure questionnaire. Mrs Eleri Jones, the headmistress of Ysgol Bryn Hyfryd, Ruthin for allowing pupils to participate.

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Key Words: Vitamin D, adolescents, deficiency, at risk

Contributors: -

AN EVALUATION OF THE INTAKE AND KNOWLEDGE OF FOLIC ACID AMONGST PREGNANT WOMEN IN THE UK.

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Introduction: Despite established evidence showing that an adequate intake of folic acid is critical in preventing neural tube defects there is continued poor compliance of pregnant women with the government recommendations. This research project evaluated the intake and knowledge of folic acid amongst pregnant women.

Methods: Study design was a cross-sectional observational study using questionnaires. A convenience sample of thirty pregnant women was recruited from 2 antenatal sessions in Cheshire, UK and a baby scanning clinic in Glasgow, UK. The study population had a mean (\pm S.D.) age of 28.72 (\pm 8.82), were either in their second trimester (40%, n=12) or their third trimester (60%, n= 18) and the median number of previous pregnancies was 0. The participants completed a self-administered non-validated questionnaire. The data was analysed using the software package SPSS version 18. Descriptive statistics and Pearson's Chi Squared tests were performed and thematic analysis was used to explore phenomena.

Bioethics: All subjects gave their informed verbal consent to participate in the study. The project underwent full ethical scrutiny and all procedures were risk assessed and approved by the Department of Clinical Sciences Ethics Committee at the University of Chester. As all women were recruited outside of the National Health Service, it was not essential to obtain NHS ethics.

Results: A high proportion, 80% (n=24), reported taking folic acid during pregnancy and 50% (n=12) of these participants used it periconceptional with only 1 participant not taking it before the 6th gestational week. Factors significantly associated with supplement uptake were employment ($p=0.005$), high adherence to nutritional advice in pregnancy ($p=0.049$), planned pregnancy ($p<0.001$), being informed about nutrition in pregnancy ($p=0.008$), pregnancy advice including folic acid information ($p=0.003$) and knowledge of the benefits of folic acid pre-pregnancy ($p=0.005$). The modal source of information on folic acid was jointly GP and midwife (n=13) and the level of knowledge on folic acid was assessed to be low in 70% (n=21) of the subjects. No factors were found to be associated with knowledge and there were no significant relationship between knowledge level and intake of folic acid.

Discussion: The compliance to folic acid supplementation recommendations was in agreement with figures in previous studies of 83% (Neill, 1999), 88% (Sen et al., 2001) and 84% (McNulty et al., 2011). The significant association between planned pregnancy and use of folic acid supplements suggested that interventions are needed to address the folic acid intake of women in child-bearing age, who could conceive, due to 50% of pregnancies being unplanned. The influence of nutritional pregnancy advice on adherence to guidelines

suggested that greater compliance could be achieved by improving deliverance and access to information. The current "GO FOLIC!" campaign is attempting to address some of the factors identified in this study, so a review in a few years would be beneficial.

Conflicts of interest & Acknowledgements: There were no conflicts of interest. I would like to acknowledge countless members of University staff, especially my supervisor, Dr. Sohail Mushtaq, the antenatal/scanning clinics and the study volunteers.

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Key Words: Folic Acid, periconceptual, neural tube defects, pregnant

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THE EFFECTS OF RIBOFLAVIN SUPPLEMENTATION ON BLOOD PRESSURE IN HYPERTENSIVE PATIENTS WITH THE C677T POLYMORPHISM IN THE ENZYME METHYLENETETRAHYDROFOLATE REDUCTASE (MTHFR)

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Introduction: Hypertension is a major risk factor for cardiovascular conditions, with approximately one billion pounds spent in 2006 on the management of elevated blood pressure (BP) in the UK. A common polymorphism (677C→T) in methylenetetrahydrofolate reductase (MTHFR), a folate metabolising enzyme has recently been associated with hypertension. Approximately 10% of the UK population are homozygous (TT genotype) for this polymorphism. The B-vitamin riboflavin is an essential as a co-factor for MTHFR. Previous studies at this centre have reported that intervention with riboflavin lowers BP in premature cardiovascular patients with the TT genotype. It is unclear however, whether this BP-lowering effect is limited to high-risk patients. The aim of our study was to investigate the effect of riboflavin supplementation on BP in hypertensive adults with the TT genotype.

Methods: Hypertensive patients who had previously participated in an observational study at the centre and who had been identified as having the TT genotype were recruited to the intervention. Participants were stratified by baseline BP and subsequently randomised within each stratum to receive either riboflavin (1.6mg/d) or placebo for 16 weeks. Participants attended two appointments where general health, medication and lifestyle information was gathered, anthropometric measurements were taken and BP was recorded. 30ml blood samples were collected, to measure riboflavin status using the functional marker erythrocyte glutathione reductase activation coefficient (EGRac). Statistical analysis was performed using Statistical package for Social Sciences, Version 15.0.

Bioethics: Ethical approval was granted by the Office for Research Ethics Northern Ireland, Altnagelvin and Antrim Area Hospitals 09/NIR01/68. Work was conducted in accordance with the Research Ethics and Governance Policies and Procedures and other Research Policies and Procedures at the University of Ulster including the Code of Practice for the Professional Integrity in the Conduct of Research.

Results: Baseline results ($n = 87$) reported that almost 92% of participants were taking antihypertensive medication, and 64% were found to be clinically hypertensive (systolic BP > 140mmHg). Responses to intervention were examined by gender. A significant improvement in riboflavin status in both genders was observed. Supplementation resulted in a lowering of 8mmHg ($P = 0.01$) in systolic BP in males ($n = 7$) however no significant change was noted in females. When the response was investigated by age, a significant lowering of 9.35mmHg in systolic BP was reported in the younger group ($n = 10$) compared to an increase

of 2.46mmHg in the older group (n 12) of this cohort ($P=0.04$).

Discussion: These reductions in BP were both statistically significant and clinically important. This study has, for the first time, demonstrated that BP response to riboflavin intervention in TT patients seems to be strongly determined by age and gender. The results appear to show a more significant response in younger male participants. Significant reductions were reported even though over 75% of males in the subgroup were taking antihypertensive medication. Further work is required to confirm these findings, which were limited by the numbers investigated. If confirmed, the results could have significant implications for the prevention and treatment of this major health and economic burden.

Conflicts of interest & Acknowledgements: This study was supported by funding from Department of Employment and Learning, Northern Ireland and DSM Nutritional Products, Switzerland

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Key Words: Blood Pressure: Hypertension: Methylenetetrahydrofolate Reductase: Riboflavin: Antihypertensive Medication.

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THE SOYBEAN. A POTENT AND VERSATILE NUTRITIONAL CONTRIBUTION TO DISEASE PREVENTION AND HEALTH?

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Introduction: Legumes have lost their role as staple foods, even though they would provide numerous nutrients. Especially the soybean has been widely discussed as a valuable source of nutrients. At the same time concerns have been raised about its nutritional physiology, leading to uncertainty regarding its consumption. This thesis therefore deals with the multifunctional properties of soy and the question, whether soy can contribute to disease prevention and health. The purpose of this paper is to evaluate the soybean regarding its nutritional physiology, composition, and effects on human disease prevention and health in order to identify whether an increased or specific consumption should be applied and recommended in dietetic counselling and treatment.

Methods: To find conclusive answers, an extensive literature search was conducted, consulting literature from libraries and scientific journals as well as studies from scientific databases such as "PubMed" and "Medline". Results were chosen according to the following criteria: recent data, reliability of the source of information, number of probands and the trial and study type, preferring reviews and meta-analyses. In total, 30 studies and trials from scientific journals and 24 other literary sources were consulted.

Bioethics: -

Results: The spectrum of the soybean's nutrients is rather broad. Soy not only contains a considerable amount of protein and dietary fibre, but is also rich in unsaturated fatty acids. With a protein digestibility-corrected amino acid score of 1.0, soy protein is of extraordinary quality and provides an ideal protein source for human nutritional needs. In terms of cardiovascular health, various studies, meta-analyses, and reviews have shown that soy protein makes a significant protective contribution to human health. Soy fibre has been proved to have a hypocholesterolaemic effect, which can prevent diseases such as diabetes or colon cancer. Soy contains, amongst others, polyphenols, saponins, phytosterols, and phytic acid. Research has shown that phytoestrogens can reduce the risk of death in breast cancer patients. A safe application of isoflavones with no adverse effect on breast tissue in healthy women can also be ensured. All these findings suggest a targeted use of such nutrients in a balanced and adequate diet.

Discussion: Currently available data dealing with soybean nutrients and their effects on disease prevention and health often is rather contradictory. Owing to a lack of comparable

studies regarding any negative effects of soy and soy products on human health, and the guidelines restricting the length of this thesis, only the health benefits have been treated here. In general, it is questionable, whether studies with animals can be used as a reference for the mechanisms of soy. The significance of various studies is also questionable, as they often make a statement for only one parameter and neglect other factors. With several studies it was not really clear which type of soy product was used. This could also bias the result in an unwanted way. In conclusion, all these considerations make the soybean a field of research which leaves many questions open and gives room for more extensive study in the interest of human health.

Conflicts of interest & Acknowledgements: -

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Key Words: Soy nutrients, Soy health benefits, Cardiovascular disease, Cancer, Menopause

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ASSESSMENT OF BIOELECTRICAL IMPEDANCE ANALYSIS IN LUNG CANCER PATIENTS DURING NUTRITIONAL SUPPORT.

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Introduction: Lung cancer causes more deaths than any other type of cancer. An important reason for the poor survival of these patients is cachexia with its metabolic changes and involuntary weight and muscle loss. Since the main goal of nutritional support therapy is to prevent or reduce changes in body composition due to cachexia, we wanted to see if a high-protein nutritional support therapy would prevent or slow down the process of muscle and weight loss.

Methods: Twenty lung cancer patients, who were receiving chemo and /or radiotherapy and were simultaneously treated at outpatient clinic for nutritional support due to unintentional weight loss were included in the study. A retrospective analysis of changes in body weight was performed, as well as bioelectrical impedance body composition analysis (BIA), from which the fat free mass index (FFMI- assessment of lean body mass), illness marker (ratio between impedance values measured at different frequencies), and phase angle (relation between the two vector components of impedance (resistance and reactance) were calculated. Patients received a high-protein nutritional support therapy and after three weeks from the first visit they were re-evaluated in terms of body weight and BIA. For statistical analysis, SPSS 20 was used, and the analysis of variance (ANOVA) for repeated measurements and post-hoc Bonferroni test were applied. Level of statistical significance was set at less than 0.05.

Bioethics: -

Results: Our patients lost on average 8.5 kg, from the diagnosis until the first visit to a dietitian. A statistical insignificant raise of average body weight, lean body mass, and FFMI occurred while phase angle dropped by 0.2° ($p=0.085$) after three weeks of high-protein nutritional support therapy (Table 1).

Discussion: It should be noted that our sample was small, as it was composed of only twenty patients, thus the present study is a pilot for a future research. However, small increases in FFMI at only three weeks of intervention indicate that nutritional support, as part of multimodal therapy, at lung cancer patients reporting unintentional weight loss, could help in slowing down catabolic processes, which otherwise lead to death these patients.

Table 1: Differences in weight and bioimpedance analysis measurements at lung cancer patients during nutritional support

	BIA 1*	BIA 2**	p
Body weight (kg)	62.783	64.100	0.165
Fat mass (%)	26.2	25.050	0.197
Fat free mass (%)	73.825	74.950	0.197
Total body water (%)	59.350	60.025	0.501
Extracellular water (%)	26.558	27.416	0.244
Intracellular water (%)	30.791	30.350	0.531
Illness marker	0.8398	0.848	0.376
Body mass index (kg/m ²)	21.583	21.991	0.218
Fat free mass index (kg/m ²)	15.941	16.516	0.062
Phase angle (°)	4.491	4.225	0.085

BIA 1* body composition measured at baseline by bioelectrical impedance analysis

BIA2** body composition measured at three weeks of intervention by bioelectrical impedance analysis

Conflicts of interest & Acknowledgements: -

Key References:

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Key words: lung cancer, cachexia, weight loss, fat free mass, nutritional support.

Contributors: Data were collected by dietitians at Institute of Oncology Ljubljana

ASSESSMENT OF RESIDENTS' SUPPLY WITH FOOD IN SOCIAL CARE INSTITUTIONS.

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Introduction: Theme of research - evaluation of food supply to residents in social care institutions in Lithuania - is very relevant to recent situation in Lithuania. Slightly less than one third of Lithuanian population consists of senior citizens. Majority of them, who cannot take care of themselves, live in social welfare institutions. The goal of these institutions is to ensure seniors to live their lives in dignity; this could be achieved by providing them with moral, spiritual and physical support. Top priority of the social care institutions - to provide residents with adequate everyday nutrition. The goal of the research - to evaluate quality level of food provision to residents in social care institutions. The goal was achieved by completing following tasks: to review concepts of social care and food supply; to discuss nutritional problems, including nutritional condition, of social care institutions' residents; to evaluate nutrition of residents in social care institutions, to carry out analysis of food menu in social care facilities and prepare recommendations.

Methods: The object of the research - the quality of food provision to the residents in social care institutions. The methods used during the research: questionnaire, statistical analysis of results (received research data was analysed and summarized with Statistical Package for Social Sciences programme SPSS 17. Only statistically significant and reliable results were presented in the research report (significance level $\alpha < 0,05$)); studies of relevant literature as well as the analysis of the food menu in the social care institutions. In total 75 residents of social care institutions have participated in the research – 53 % of women and 47 % of men. In order to evaluate nutrient needs' fulfillment of residents, the amount of nutrients calculated by analyzing the food menu in the institutions was compared to the actual needs of nutrients. The calculations were made using MS Office EXCEL as well as www.megaukismaistu.lt calculator.

Bioethics: -

Results: It was concluded that residents of social care institutions have following nutritional problems: chewing and swallowing disorders, bad eating, smell and taste changes, also too low weight and body mass index. Nutrition of social care institutions' residents is inadequate. Although there is a compliance with a constant feeding regime, but seniors receive too high in calories and nutrients food, consume too little amount of liquids as they should. Menus are not set up properly. Food portions are too large and the liquid supply is not enough. All residents get the same, repetitive meals, regardless to diets and diseases, physiological changes of the residents. Menus are not guided by technological production descriptions.

Discussion: In social care institutions in Lithuania: arrangement of menus should be done taking into consideration nutrient needs of residents and following recommendations of diet therapy; dishes and food portions should be chosen with regard to the physiological changes of residents; the method of food preparation should be chosen adequately; producing dishes, course production technological descriptions should be followed; the diversity of dishes should be enhanced; adequate daily liquid amount to residents should be ensured, distributing it evenly during the day, or providing a larger share in the first half of the day.

Conflicts of interest & Acknowledgements: -

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<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2670252/?tool=pubmed>

Key Words: residents of social care institutions; adequate nutrition; nutritional assessment; food supply; social care

Contributors: -

REVIEW OF NUTRIENTS AND BIOMARKERS IN PATIENTS WITH RHEUMATOID ARTHRITIS.

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Introduction: The aim of this survey was to assess rheumatoid arthritis (RA) patients' energy and nutrients intake values and to assess dietary intake in terms of food frequency consumption. Furthermore biomarkers relating to RA and nutrition were analyzed.

Methods: Twenty two RA patients treated at Revita Rheumatology Clinic in Budapest, Hungary participated in the study. Blood samples were taken by a registered nurse for measuring the following biomarkers: uric acid, iron, albumin, calcium, vitamin D, CRP at a certified laboratory. Patients' 24-hour dietary recalls were recorded and NutriComp nutrient calculator software was used for analyzing the nutrients intake. FFQ (Food Frequency Questionnaire) was used to assess dietary intake in terms of food frequency consumption. 2010 version of Microsoft Excel program was used for the statistical analysis.

Bioethics: The study procedures were in accordance with the ethical standards of the responsible committee on human studies and with the Helsinki Declaration as revised in 1983. Patients signed a consent form to participate in the study. The patients were coded for protecting their privacy and personality rights.

Results: The patients' mean serum iron level was 10,5 $\mu\text{mol/l}$, mean calcium level was 2,4 mmol/l, mean uric acid level was 266,8 $\mu\text{mol/l}$ and mean albumin level was 43,2 g/l. The patients' mean serum vitamin D level was 19 ng/mL (normal range 20-120 ng/mL). The mean percentage of protein consumption was 18% of the daily energy intake, with animal protein percentage exceeding the recommended. Mean carbohydrate intake was 44% and of fat 38%. Within the daily fat consumption the mean SFA (Saturated Fatty Acid) ratio was 12%, the mean MUFA (Monounsaturated Fatty Acid) ratio was 12%, the mean PUFA (Polyunsaturated Fatty Acid) ratio was 8%. The mean PUFA/SFA ratio was 2,08. The mean omega-6:omega-3 fatty acid ratio was 9:1, far from the ideal 4:1 ratio (Rodler, 2006). The mean calcium intake was 607 mg and the mean daily vitamin D intake was 3,89 μg . About 50% of the RA patients didn't consume dairy products at all, except from fatty cheese which was consumed on a weekly basis by half of the patients. Approximately 40% of the patients consumed fish 1-3 times per month, while 30% of the patients reported eating fish less than once a year.

Discussion: Considered to be a favourable result, the patients' serum calcium, uric acid, albumin and iron levels were within the normal values. The survey confirmed the typically low serum D-vitamin level of the RA patients. According to the analysis of the dietary intake, percentages of macronutrients intake did not meet the recommended daily energy and

nutrient intake of the Hungarian population according to Bíró, Lindner, 1995. A dominance of animal protein intake was recorded as well as, increased SFA consumption, whereas the PUFA/SFA and omega-6:omega-3 fatty acid ratios were unfavourable. The intake of calcium, omega-3 fatty acid and vitamin D is significantly low in patients with RA. According to the FFQ, intakes of dairy products and fish were insufficient in patients with RA. This study would like to draw attention to the importance of individual dietetic therapy in people with rheumatoid arthritis. RA patients should receive dietary counseling.

Conflicts of interest & Acknowledgements: There was no conflict of interest or ethical issue.

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Key Words : Nutrients, biomarkers, diet, rheumatoid arthritis

Contributors: Erzsébet Pálfi, Regina Cseuz

DECOMPOSITION OF THE MEDDIETSCORE'S COMPONENTS IN ESTIMATING THE LIKELIHOOD OF BREAST CANCER'S PRESENCE: DISCRIMINANT ANALYSIS.

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Introduction: This study aimed at determining the correlation between the degree of the adherence to the Mediterranean dietary pattern, assessed by the dietary index MedDietScore, as well as each of the 11 different components of this index and the presence of breast cancer.

Methods: Between February 2011 and May 2012, 207 Greek women (55 ± 11 years) recently diagnosed with breast cancer for the first time and 193 randomly selected healthy Greek women (56 ± 12 years) from the basin Attica were included in this epidemiological case-control study. Information from the questionnaire "Environment, lifestyle and cancer in women" which referred to nutritional data was used. This questionnaire examines, overall, socio-demographic characteristics, anthropometric data, gynecology and medical history, lifestyle habits, smoking habits, psychological status, eating habits through FFQ and adoption of the Mediterranean diet, assessed by the MedDietScore. The statistical analysis was based on descriptive measures, multiple logistic regression and discriminant analysis. The results are presented with the level of statistical significance (p).

Bioethics: The study was carried out in accordance to the Declaration of Helsinki (1989) of the World Medical Association. Prior to the collection of any information, participants were informed about the aims and procedures of the study and provided their signed consent.

Results: According to the discriminant analysis, the interpretation of breast cancer's presence using the MedDietScore is 9,7% (Wilk's Lambda = 0,903, $p < 0,001$). Similarly, statistically significant results were obtained regarding the components "whole grains" (Wilk's Lambda = 0,950, $p < 0,001$), "Fruit" (Wilk's Lambda = 0,962, $p < 0,001$) and "Vegetables" (Wilk's Lambda = 0,967, $p < 0,001$). After having controlled for confounders, multiple logistic regression showed that increasing the MedDietScore by 1 unit, from a total of 55, is associated with a 8,8% reduced possibility (95% D. E = 0.869-0.958) of having breast cancer. Similarly, the components "Whole grains", "Fruits", "Vegetables" and "Pulses" were associated with decreased likelihood of the disease's presence.

Discussion: The adoption of Mediterranean dietary pattern, as measured by the index MedDietScore, was inversely related to the presence of breast cancer. The components of MedDietScore can be classified as follows: "Whole grains", "Fruits" and "Vegetables". Consequently, an emphasis on the adherence to the Mediterranean dietary pattern as well as on food groups corresponding to the components with the greatest interpretive ability may be protective against breast cancer. In addition, the index MedDietScore, as it is

described above, could evolve to a new one. This new index could possibly be a better indicator of a woman's possibility to be diagnosed with breast cancer according to her nutritional habits and, especially, her degree of adherence to the Mediterranean diet.

Conflicts of interest & Acknowledgements: No one declared a conflict of interest.
Acknowledgements to the Study's participants.

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Key Words: breast cancer, mediterranean diet, discriminant analysis

Contributors: C. Papavangelis, N. Mourouti

THE ASSOCIATION OF FOODS RICH IN FATTY ACIDS WITH BREAST CANCER DEVELOPMENT: A CASE-CONTROL STUDY

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Introduction: Dietary fat contributes more than 30% of daily energy intake in Western world. Fatty acids are present in everyday consumed food. Breast cancer, a leading cause of death in developed world, has been associated with dietary fat consumption and perhaps with specific fatty acids; but the results are still inconsistent. The ratio of ω -6/ ω -3 dietary fatty acids has been proposed to have a positive association with breast cancer risk. The aim of this work was to examine the association of the consumption of different foods rich in fatty acids with the likelihood of breast cancer in women.

Methods: A case-control study was conducted from February 2011 up to May 2012. Cases were recruited through visits to selected hospitals of Athens, Greece. The study included 250 women with first-diagnosed breast cancer (55 ± 11 years old) and 250 healthy women (56 ± 12 years old). Sociodemographic characteristics, anthropometric data, gynecological and medical history, general lifestyle, smoking and drinking habits were measured through a validated questionnaire ("Environment, lifestyle and cancer in women"). Food habits were assessed through a validated Food Frequency Questionnaire. In this work only foods rich in fatty acids (i.e. full-fat & skimmed dairy and cheese, fatty fish, eggs, poultry, red meat and bacon, mayonnaise, sweets, snacks such as croissants, biscuits, cakes, chips, ready to eat meals such as burgers, pizza and fried food) were studied. Use of olive oil during and after cooking and during eating as well as use of seed oils (e.g. sunflower oil, corn oil), butter, fat from bacon and margarine after cooking and during eating were also studied. Associations between consumption of foods, rich in fatty acids and breast cancer development were assessed using Pearson chi-square test, and multiple logistic regression analyses, adjusting for age, quality of diet, Body Mass Index and family history of cancer. $P < 0.05$ was regarded as a statistically significant difference.

Bioethics: The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration as revised in 1983. Furthermore, all participants were informed about the aims of the study and signed an informed consent.

Results: Cases reported increased consumption of full-fat cheese ($p < 0.001$), whole milk ($p < 0.04$) and animal bowels, such as liver ($p < 0.019$), as compared with the controls. Controls reported increased consumption of skimmed ($p < 0.001$), semi-skimmed milk ($p < 0.007$) and nuts ($p < 0.047$). Peanut butter (OR: 0.602, 95% CI: 0.404-0.896) and non-chocolate sweets (OR: 0.857, 95% CI: 0.750-0.979) were associated with decreased likelihood of having breast cancer. Olive oil in cooking (OR: 1.147, 95% CI: 1.059-1.242) and animal bowels (1.510, 95%

CI: 1.076-2.121) were associated with increased likelihood of breast cancer. None of the other foods studied, rich in fatty acids, were associated with breast cancer.

Discussion: No clear association was found between consumption of foods, rich in dietary fatty acids, and breast cancer. Further studies should focus on dietary patterns rich in fatty acids and their association with the risk of breast cancer in women. Conflicts of interest & Acknowledgements: No one declared a conflict of interest.

Acknowledgements to the participants of the study.

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Key Words: fatty acids, breast cancer, women, sensitivity, specificity

Contributors: C. Papavangelis, N. Mourouti

SIMILARITIES AND DIFFERENCES IN EATING BEHAVIOUR AND GUT MICROBIOTA BETWEEN AUTISTIC CHILDREN AND THEIR TYPICALLY DEVELOPING SIBLINGS.

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Introduction: Autism Spectrum Disorders (ASD) is a group of neurodevelopmental disorders that are characterized by communication and social deficits, as well as, stereotypical behaviours. These characteristics affect different aspects of children's life, including eating choices and behaviours. The etiology of autism is still unknown, but it is believed that gut microbiota is an important factor that may explain the symptomatology of ASD. Eating habits and intestinal bacteria are strongly affected by family environment; similarities are observed between the members of the same family, especially among siblings. The aim of this study is to compare eating behaviour, physical activity, gastrointestinal symptoms and gut microbiota between autistic children and their typically developing siblings.

Methods: Of the total sample of 46 children, data for 9 autistic children and their 9 typically developing siblings, as well as 14 typical children with typically developing sibling were used for the analysis. One more comparison between all the autistic children (n=23) and the typically developing ones excluding one child of every sibling pair (n=11), was carried out. The data collection about food habits and behaviour during the meals resulted from a 3-day food diary. Information about physical activity and gastrointestinal symptoms was obtained from questionnaires and microbiological stool analysis was carried out. The collected data was analyzed using SPSS 20.0 for Windows. Comparison of variables was performed with t-test for independent samples or nonparametric Mann-Whitney U test and bivariate correlation was carried out to calculate Pearson's and Spearman's correlation coefficient between gut microbiota and food behaviour variables.

Bioethics: The study was approved by the Bioethics Committee of Harokopio University of Athens.

Results: Autistic children seem to consume more servings of juices per day, (M=1.24, SD=1.47 vs M=0.38, SD=0.579; p<0.05), more meals being isolated (M =2.44, SD=1.85 vs M=1.43, SD=1.03; p<0.05) or seated with restlessness (M=0.68, SD=0.81 vs M=0.03, SD=0.09; p<0.01), compared to unrelated, typically developing children. Additionally, the time spent in sedentary activities (M=105.2, SD=82.7 vs M=55.6, SD=43.3; p<0.05), as well as the bacterial count of Clostridium (M=5.70, SD=1.15 vs M=5.021, SD=0.58; p=0.05) and Candida spp. (M=3.38, SD=0.87 vs M=2.43, SD=0.46; p<0.05) were higher in the group of autistic children. When autistic children were compared to their typically developing siblings, all these differences became non-significant. Moreover, differences between typically developing children with siblings with ASD and those with siblings without ASD had also no

statistical value, except from the time spent in sedentary activities (M=165.00, SD=90.98 vs M=57.05, SD=40.62 respectively; $p < 0.05$).

Discussion: From the results of this study, it is concluded that there are many similarities in food choices, eating behaviour, physical activity and gut microbiota between autistic children and their typically developed siblings. Common family environment and interaction among siblings are two possible reasons for these findings. However, more studies are necessary, in order to become clear if the main reason of these similarities could be attributed to the influence of the autistic children on their typically developing siblings, family factors and the environment generally or the existence of some kind of unknown disorder in autistic children's siblings.

Conflicts of interest & Acknowledgements: I certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Key Words: Autism, siblings, gut microbiota, diet, gastrointestinal problems

Contributors: E. Kapiri, E. Mitsou, A.Kyriacou, M. Yannakoulia

IS THERE ASSOCIATION BETWEEN NUTRITIONAL STATUS AND PANCREATIC OR PULMONARY FUNCTIONS IN CYSTIC FIBROSIS PORTUGUESE PATIENTS?

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Introduction: Cystic fibrosis (CF) is an autosomal recessive genetic disease. Pancreatic insufficiency is the most common gastrointestinal manifestation in CF, and the severity varies over the course of the disease compromising the nutritional status^{1,2}. There is also a link between pulmonary function and nutritional status with pulmonary function strongly linked with adequate nutrition³. Our aim was to assess nutritional status and to evaluate the potential relationship with pancreatic and pulmonary function in a sample of Portuguese patients with CF.

Methods: We evaluated the nutritional status of 29 patients (age 2-26 years) based on energy intake, body mass index (BMI) and body composition measurements: triceps skinfold thickness (TST), subscapular skinfold thickness (SST) and mid-arm muscle area (MUAC). Energy intake was assessed by 24 hours recall, and compare to RDA⁴. All nutritional status measures were performed by the same investigator according to standardized techniques⁵. Undernutrition was classified according to BMI or body composition^{5,6,7}. Pancreatic function was assessed by monoclonal fecal elastase ($\mu\text{g/g}$) and pulmonary function by spirometry (using FEV₁ or FVC values). Both were assessed at time of evaluation. Genotype was assessed by Real time PCR. We used Mann-Whitney for comparisons between groups and Spearman's analysis for correlation. The level of significance was set at $p < 0.05$.

Bioethics: A signed certificate of consent was obtained for each participant or legal representative.

Results: According to BMI classification 5 (17.2%) were below 5th percentile and 4 patients had energy intake below RDA^{4,6,7}. Prevalence of undernutrition ranged from 27.6% by MUAC classification to 10.3% by SST. Pancreatic deficiency was present in 16 (55.2%), while pulmonary evaluation deficiency was present in 8 (27.8%). Genotype *_F508/_F508* was present in 15 patients (51.7%). According to pulmonary function classification, no differences were found in nutritional status parameters, but in patients with pancreatic deficiency fat mass, assessed by TST ($p < 0.001$) and SST ($p < 0.001$) show inferior values comparing to the patients with normal pancreatic function. We found positive correlation between pancreatic function and TST ($R = 0.671$; $p < 0.001$) or SST ($R = 0.604$; $p = 0.001$).

Discussion: Undernutrition show higher prevalence in muscle assessment MUAC with higher prevalence of undernutrition found on fat free markers, linking reduce pulmonary capacity to lower muscle capacity. Fat tissue measurements (TST and SST) were correlated with the pancreatic function relating the low energy intake due to malabsorption of fat to lower fat tissues. Undernutrition was associated to pancreatic deficiency but not with pulmonary

deficiency. Nutritional interventions should focus on improvement of pancreatic function as a way to accomplish an adequate nutritional status.

Conflicts of interest & Acknowledgements: There are no conflict of interests

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Key Words: cystic fibrosis, nutrition, pancreatic function, pulmonary function

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THE EFFECT OF SOUND ENVIRONMENT ON THE ENERGY INTAKE OF OVERWEIGHT SUBJECTS.

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Introduction: An association between sound environment and eating behavior has been shown by previous studies. Although overweight people appear to be affected by environmental factors regarding their energy intake, there are limited studies regarding the effect of environmental sound or sound intensity on their energy intake. The increasing trend of the overweight phenomenon in such percentages that characterize an epidemic, underlines the necessity of studying the factors that lead to an increase of positive energy balance in overweight people. The aim of this study is to investigate the effect of music and music intensity on the energy intake of overweight subjects.

Methods: It was a randomized crossover study that involved 20 healthy male volunteers, 5 with BMI >25 kg/m² (Overweight & Obese) and 15 with BMI <25 kg/m² (Normal Weight). Assessment of the energy intake (by food weighing), was done during an *ad libitum* pasta meal of standard composition under three sound conditions (instrumental music of 60 dB, 90 dB and no music:control condition during the whole meal). Moreover, the dietary intake of the previous day and the rest of the testing day were recorded. For the statistical analysis, a Two-Way analysis of variance (ANOVA) was applied to test the effect of Sound, BMI and the interaction between Sound and BMI in the total group of subjects. Also, One-Way Anova was applied separately in the Overweight and the Normal Weight groups, to test the significance of the Sound effect (SPSS 20.0, $p \leq 0.05$).

Bioethics: The procedures followed were in accordance with the ethical standards of the Bioethics committee of Harokopio University on human experimentation and with the Helsinki Declaration as revised in 1983.

Results: The *ad libitum* energy and macro-nutrients intake did not differ between overweight and normal weight subjects ($p>0.05$) nor was there any significant difference between the Sound trials ($p>0.05$). Overweight subjects had a significantly higher water intake during the rest of the day of the trial ($p=0,001$), lower liking of the *ad libitum* meal ($p=0,05$), lower appetite before the meal ($p=0,05$), lower desire for food consumption after the meal ($p=0,03$) and systematic absence of a third serving. However, after the interaction of Sound x BMI the findings were not significant ($p>0.05$).

Discussion: The energy intake of our overweight subjects was not found to vary as a result of exposure to music or due to the music intensity (music of 60 dB, 90 dB or no music). The non-significant effect of the sound environment in both, previous and our study is likely due to

the fact that the overweight itself is a powerful determinant of energy intake. The influence of genetics, hormones and eating behaviors of individuals possibly outweigh the presence of music. Further research investigating the possible effects of music chosen by the subject or music of different tempos on energy intake, would be of interest.

Conflicts of interest & Acknowledgements: There was no conflict of interest.

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Key Words: sound, overweight, music

Contributors: Eleni Karfopoulou, Eirini Mamalaki, Konstantina Zachari

INFLUENCE OF BIOACTIVE FOOD EXTRACTS ON PC-3 PROSTATE CANCER CELLS

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Introduction

Prostate cancer is the most common malignancy among men and is the second highest cause of cancer death among men of all races. Experimental and epidemiological studies have shown that antioxidant polyphenols, present in food rich in fruits vegetables and seeds can act as chemopreventive agents against numerous diseases including prostate cancer.

Methods

Cabernet Sauvignon-(CS), Rombola-(R) wines and pumpkin seeds were extracted with different methods in order to obtain either different lipid fractions (total, polar, neutral) or several fractions containing different classes of phenolic compounds (FI: Anthocyanins, FII: Procyanidins, catechins, flavonols, FIII: Phenolic acids, quercetin 3-O-glucuronide, FIV: The rest phenolic components and as for pumpkin W: water extract, M: methanol extract, Ac: acetone extract, EtAc: thylacetate extract and PL: polar lipid extract). PC-3 cells were treated with the extracts or standard compounds (resveratrol, quercetin, gallic acid, tyrosol) (1-1000 μ g/mL) and the inhibition of cell proliferation was evaluated by the MTT assay. Cell cycle distribution was assessed by flow cytometry. Finally the activity of glutathione peroxidase and the levels of glutathione were measured in PC-3 cells, with and without administration.

Bioethics: -

Results

All extracts inhibited PC-3 proliferation in a dose-dependent manner. The most potent compounds of each group [CS-FII, R-FII, Resveratrol, PL and W] were selected to be further tested. The cell cycle distribution revealed that treatment of the PC-3 cells with 150 μ g/mL of CS-FII for 24h and 48h or R-FII for 72h marginally increased the cell distribution in S phase, while resveratrol (15 μ g/mL) increased the distribution of cells in G0/G1 phase. Moreover, treatment with 150 μ g/mL of PL for 48 hours increased the cell distribution in S phase, while treatment with 200 μ g/mL of W did not alter cell distribution. Finally, by measuring the levels of glutathione, it was found that GSH levels were significantly decreased in resveratrol and CS-FII extracts whereas significantly increased in PL extracts. As for the activity of glutathione peroxidase, it was not detected at measurable levels.

Discussion All extracts studied, strongly inhibit PC-3 cell proliferation. The most potent compounds moderately influence the cell cycle and affect the intracellular glutathione levels. Our data are very promising, regarding the application of these extracts in the field of prostate cancer.

Conflicts of interest & Acknowledgements: -

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Key Words: prostate cancer, bioactive extracts, pumpkin, wine, glutathione

Contributors: R. Tenta, E. Fragopoulou, T. Nomikos, M. Xanthopoulou, H. Pratsinis, D. Kletsas, S. Antonopoulou

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