Last minute changes

Last minute changes

Please note:

May 5th, 16:30-18:30	**Official Opening** **Ana Troncoso,** Representative of the European Presidency, is kindly replacing **Roberto Sabrido Bermúdez**
May 6th, 16:00-17:30	**Session 4, Translating evidence to policy** **Robert Fraser** is kindly replacing **Fiona Ford** *UK: Effectiveness of the Healthy Start Program*
May 7th, 14:30-16:30	**Session 7, Round table: Addressing inequalities in diet in Europe** **Archie Turnbull** is kindly replacing **Monika Kosinska**

OPENING SESSION

Ana TRONCOSO
Chief Executive Officer
Spanish Food Safety and Nutrition Agency

BIOGRAPHICAL SKETCH

Ana Troncoso was appointed Chief Executive Officer of the Spanish Food Safety and Nutrition Agency (Agencia de Seguridad Alimentaria y Nutrición, AESAN) on August 2008. Born in Cádiz 1957, she graduated from the University of Pharmacy of Seville where she also achieved her PhD and she is Chair of Nutrition and Food Science at the same university. Ana Troncoso has a long research career focussed in the field of the Enology. Throughout her career she has held several academic positions; vice-dean of the Pharmacy University in Seville, Director of the Research Management office and Director of the Research Secretariat at the University of Seville. Since 2005 she was also in charge of the management of the Agency for Quality Assurance in Higher Education and Research of Andalusia (AGAE) from that autonomous region. She has published over one hundred peer-review scientific papers and collaborated in several book specialized in the field of food technology and food analysis.

Session 4

TRANSLATING EVIDENCE TO POLICY

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Robert FRASER

Reader in Reproductive and Developmental Medicine
University of Sheffield

Address: Academic Unit of Reproductive Medicine
Jessop Wing, Tree Root Walk
Sheffield S10 2SF, UK

Email: g.m.burkinshaw@sheffield.ac.uk

Phone: +(44) 114 2268537

BIOGRAPHICAL SKETCH

QUALIFICATIONS: MBChB
MD (Sheffield)
FRCOG
DCH

Robert Fraser is Reader in Reproductive and Developmental Medicine in the University of Sheffield UK. He is a Consultant in Obstetrics and Gynaecology in the Sheffield Hospital Group. Before this appointment he was a Lecturer in Obstetrics and Gynaecology in the University Nairobi, Kenya.

His thesis was on Carbohydrate Metabolism in Pregnancy, and he has maintained a research programme in scientific and Public Health aspects of Nutrition in Human Pregnancy.

He was a Director, with his colleagues Fiona Ford and Theodora Mouratidou, of the research programme about the UK Department of Health's introduction of the 'Healthy Start' scheme. This study was independent of the Department of Health and funded by a research grant from the charitable Leverhulme Foundation.

Most recently Robert Fraser was the Chair of the Guidelines Development Group for the Clinical Guideline 'Diabetes in Pregnancy' for the UK National Institute for Health and Clinical Excellence (NICE).

Session 7

ROUND TABLE:

Addressing inequalities in diet in Europe

Archie TURNBULL

President of the European Public Health Alliance

BIOGRAPHICAL SKETCH

Archie Turnbull is President of the European Public Health Alliance (EPHA). He was the Executive Director of the European Respiratory Society (ERS) and the International Union Against Cancer (UICC). He commenced his career in banking and investment fund management, and has extensive experience in the fields of finance, development, including microlending, management of NGOs and public health, particularly Tobacco Control.

May 5-7 2010 - Brussels - Belgium

European Commission - Centre Albert Borschette
rue Froissart, 36 - 1040 Brussels, Belgium

EGEA
6th EDITION

Social and Health Benefits of Balanced Diet:
The role of Fruit and Vegetables

Co-chairs of the conference:

I. Elmadfa - Univ. of Vienna
L. Hoelgaard - EC - DG AGRI

ABSTRACTBOOK

With the support
of the European Commission
and the French Ministry of Food,
Agriculture and Fisheries

LE MINISTÈRE DE VOTRE ALIMENTATION

FranceAgriMer

aprifel
agence fruits
et légumes frais

www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com
www.egeaconference.com

aprifel
agence fruits
et légumes frais

60, rue du Faubourg Poissonnière 75010 Paris - France
Tel. : +(33) 1 49 49 15 15
www.aprifel.com

Preface

Ibrahim ELMADFA
Director of Institute of Nutritional Sciences, University of Vienna

This year's EGEA conference, the sixth in a successful series that started in 2003, addresses the Social and Health Benefits of Balanced Diets with special focus on The Role of Fruit and Vegetables.

The important role of food, particularly fruit and vegetables, when it comes to health and wellbeing is widely recognised not only by scientists and physicians but also among the general population. Associations have been repeatedly found between a high consumption of fruit and vegetables and lower risks of obesity and several diseases such as diabetes mellitus type 2, cardiovascular diseases, or certain types of cancer. Recent insights into these effects will be presented at this conference.

However, implementation of this knowledge in everyday life is still going slowly. Thus, while the populations of Europe and other industrialised countries fortunately do no longer suffer from severe hunger, undernutrition - especially with regard to certain micronutrients - is still an issue in vulnerable groups, among them lower social classes. Indeed, in the latter, financial constrains appear as a major obstacle to increasing consumption of fruit and vegetables as well as other nutrient-dense foods that would contribute to a healthy nutrition. At the same time, this population group is also at high risk of overweight and obesity with the associated non-communicable diseases. Limited access to nutrition education and information aggravate the problem.

Improving the diets of low-income groups should therefore be given more attention in public health and nutrition policy programmes. Steps in this direction have already been taken and some results will be presented during this conference.

Children are another important target group for nutritional intervention as nutritional habits are broadly adopted in childhood. Moreover, they present a population group that is particularly sensitive to nutritional shortcomings. Part of this conference will be dedicated to experiences from kindergarten and school food programmes that are in place in many countries and aim at increasing children's fruit and vegetables consumption.

As can be seen from this short overview, the presentations of this conference cover a broad field of research relevant to the subject and again many esteemed colleagues have paid heed to our invitation. Their contributions make this conference a promising event.

Programme/Table of contents

Programme/Table of contents

Opening session

Registration

Poster display

Official opening

I. Elmadfa
Director of Institute
of Nutritional Sciences
University of Vienna

S. Barnat
EGEA Coordinator
APRIFEL Scientific Director

L. Hoelgaard
Deputy Director General
EC - DG Agri

I. de la Mata
Principal Adviser for Public Health
Representative of DG Sanco

R. Sabrido Bermúdez
AESAN President
Representative
of the European Presidency

M.T. Sanchez-Schmid
Member
of European Parliament

Scientific opening keynote lecture:

Evidence-based promotion of fruit and vegetable consumption: The importance of socio-economic determinants

J. Brug
Director EMGO Institute for Health and Care Research

Opening cocktail

At Sofitel Hotel (next to the Borschette): "le Foyer" 1st floor
Hosted by Freshfel and Areflh

OPENING SESSION

Ibrahim ELMADFA

Director of Institute of Nutritional Sciences, University of Vienna

President of International Union of Nutritional Sciences (IUNS)

ADDRESS: Institute of Nutritional Sciences
University of Vienna
Austria

EMAIL: ibrahim.elmadfa@univie.ac.at

PHONE: +(43) 1 4277 54911

BIOGRAPHICAL SKETCH

- Director of Institute of Nutritional Sciences, University of Vienna
- Chairman of examination committee (1990-2003) and Study Dean (2004-2009) for Nutritional Sciences
- President of Austrian Nutrition Society, Former President of the European Academy of Nutritional Sciences (EANS), Vice-President of the World Public Health Nutrition Association (WPHNA).
- Author/co-author of several books in human nutrition, food science and health monitoring (the "Austrian Nutrition Report" 1998, 2003 and 2008; the European Nutrition and Health Report 2004 and 2009) and more than 300 publications in international scientific journals and many submissions to scientific conferences.
- Editor of Annals of Nutrition and Metabolism and the book series "Forum of Nutrition" (formerly Bibl. Nutritio et Dieta).

Training: Nutritional Sciences (Giessen, Germany, 1968) and Food Science (Assiut, Egypt, 1966), PhD in Human Nutrition (1970), DSc. (1975). Full Professor 1980-1990 in Giessen and since 1990 in Vienna.

Fields of expertise / main research subjects

Teaching: Establishment and coordination of the study of Nutritional Sciences at the University of Vienna (under- and postgraduate).

Research: Nutrient requirements in health and disease (→Nutrient based dietary guidelines for Central European countries). Monitoring of nutrition and health status. Bioavailability of Nutrients. Nutrition and immune function. Food safety and quality. Nutrition information and communication. Cooperation with various academic institutions worldwide.

Scientific advice Codex Alimentarius Austriacus Commission since 1994, advisor to the European Commission as member of the Scientific Committee on Food (vice president) from 1995-2000, working groups: nutrition and dietetic foods (chair until December 2000), novel food, upper safe limits, flavourings. Member of Joint FAO/WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition (2008) and of National Childhood Obesity Foundation NOCF, Marblehead, MA, USA (2009).

Lars HOELGAARD

Deputy Director General Directorate General Agriculture and Rural Development

Responsible for Directorates C and D

ADDRESS: European Commission
Directorate General Agriculture and Rural Development
B-1049 Brussels - Belgium

EMAIL: Lars.hoelgaard@ec.europa.eu

PHONE: +(32) 2 296 33 14

BIOGRAPHICAL SKETCH

Lars Hoelgaard is Deputy Director General at the Directorate General for Agriculture and Rural Development. He is responsible for Directorate C "Economics of agricultural markets and common market organisations (CMO)", including the CMO for fruit and vegetables, and Directorate D "Direct support, market measures and promotion", which includes promotion of fruit and vegetables.

Prior thereto, he was Director for markets in livestock products, specialised crops and wine and headed up the task force for the implementation of CAP reform decided in Luxembourg in June 2003.

Before joining the European Commission in 1989 as Director responsible for veterinary, phytosanitary, feed stuff, seeds and pesticide legislation, Lars Hoelgaard was Assistant Secretary in the Danish Ministry of Agriculture.

OPENING SESSION

Isabel de la MATA
Principal Adviser for Public Health
Directorate SANCO – Health & Consumers

ADDRESS: European Commission - DG SANCO
Jean Monnet Building
L-2920 Luxembourg
EMAIL: isabel.delamata@ec.europa.eu
PHONE: +(352)-4301-31454

BIOGRAPHICAL SKETCH

- Isabel de la Mata was born in Bilbao (Spain). She graduated in Medicine at the University of Basque Country in 1983 and holds post-graduate degrees from the University of Leuven and Paris VI.
- She is specialist in Preventive Medicine and Public Health.
- She worked at the Ministry of Health of Spain and at the Regional Departments of Health in the Basque Country and in Madrid. She has an experience working with International Organisations, such as the WHO, Pan American Health Organisation and Inter-American Development Bank.
- From 2004 until February 2008 she worked at the Permanent Representation of Spain to the EU.
- Since 1 March 2008 she works as Principal Adviser for Public Health at Directorate SANCO – Health & Consumers.

Roberto SABRIDO BERMÚDEZ
President of the Spanish Food safety and Nutrition Agency (AESAN)

ADDRESS: Spanish Food Safety and Nutrition Agency
Ministry of Health and Social Policy
Despacho / Office 110
C/ Alcalá, 56 - 28071 - Madrid - Spain
PHONE: + (34) 91 338 00 57
FAX: + (34) 91 338 00 73

BIOGRAPHICAL SKETCH

M.D. University Complutense of Madrid, MBA Master in management and administration of Sanitary Services, qualifications on Health and Hospital Management. Previously to the nomination as AESAN's President he was the Regional Ministry of Health on the Autonomous Community of Castilla-La Mancha. He has several awards from his work in the health field from European and national institutions.

OPENING SESSION

Marie-Thérèse SANCHEZ-SCHMID
Member of the European Parliament
Member of the Culture and Education Committee

ADDRESS: 60 rue WIERTZ B-1047
BRUXELLES
BELGIUM
EMAIL: marie-therese.sanchez-schmid@europarl.europa.eu
PHONE: +(32) 28 45783

BIOGRAPHICAL SKETCH

- Member of the European Parliament

Committees at the European Parliament:

- Member of the Culture and Education Committee
- EPP vice-coordinator of the Culture and Education Committee
- Substitute member of the Regional Development Committee

Parliamentary Delegations at the European Parliament:

- Member of the Delegation for relations with South Africa
- Substitute member of the Delegation for relations with the Mashreq countries

Substitute member of the Delegation to the Euro-Mediterranean Parliamentary Assembly :

- Councillor of the city of Perpignan
- Deleguate at the « Europe » committee

Chairman of the « Europe » committee of Perpignan

Member of the agglomeration community « Perpignan Méditerranée »

Deputy mayor of Perpignan in charge of education and childhood, public and international relations from 1993 to 2009

- Bachelor in English.
- Qualified english teacher from 1979 to 2009
- Chargé de mission of the Ministry of National Education for the cultural development of high schools from 1996 to 2009

OPENING SESSION - SCIENTIFIC OPENING KEYNOTE LECTURE

Johannes BRUG

Director EMGO Institute for Health and Care Research, Chair of Division VI, VU University Medical Center, Professor of Epidemiology and head of the department of Epidemiology & Biostatistics

ADDRESS: VU University Medical Center,
v/d Boechorststraat 7,
1081 BT Amsterdam
The Netherlands

EMAIL: j.brug@vumc.nl

PHONE: +(31)-20-4448180

BIOGRAPHICAL SKETCH

• Brug received a Master of Science degree in human nutrition from Wageningen University and a Master of Science in Epidemiology from the Dutch Epidemiology Institute. He obtained his PhD (Public Health) at Maastricht University.

• Johannes Brug is director of the EMGO Institute for Health and Care Research and professor of epidemiology at the VU University Medical Center in Amsterdam. The EMGO Institute's mission is to initiate, conduct and report excellent research in public and occupational health, primary care, rehabilitation and long-term care. Brug is honorary professor at the School of Nutrition and Exercise Sciences of Deakin University, Melbourne Australia.

• Brug worked for the Dutch TNO Nutrition Institute, the Dutch Cancer Society, the School of Social Sciences of the Netherlands Open University (as dean of education), for the Faculty of Health Sciences at Maastricht University (as professor of Nutrition Education and director of education), and for the Erasmus University Medical Center (as professor of Determinants of Population Health).

• Brug's main research interests are the development and evaluation of health education and health promotion interventions, with a special interest in behavioral nutrition and physical activity. His research covers the scope from studies on the determinants of health behaviors, small-scale experimentation with innovative health education interventions, and larger-scale field experiments in which the efficacy and external validity of health promoting interventions are tested. Brug is or has been a member of the grant panels of the World Cancer Res earch Fund, the Netherlands Organization for Health Research and Development's prevention program, and (as vice chair) healthful nutrition program, and the Netherlands Heart Foundation's epidemiology and prevention program. Brug is a past president of the International Society of Behavioral Nutrition and Physical Activity. He was a member of the Netherlands Health Council committees on obesity, on health promotion campaigns, and on the association between obesity prevention and eating disorders. Brug is the editor of the Dutch handbook on health education and health promotion, and a member of the editorial boards of the International Journal of Behavioral Nutrition and Physical Activity, the Journal of Nutrition Education and Behavior, the Journal of Human Nutrition and Dietetics and the American Journal of Health Promotion. He co-authored more than 250 international scientific publications. Brug is coordinator of two European Commission framework program projects on obesity prevention across Europe.

• For additional information, please visit: http://johannesbrug.blogspot.com/ and http://www.emgo.nl/personal_pages/profile/index.asp?id=476&page=1

Evidence-based promotion of fruit and vegetables consumption: the importance of socio-economic determinants

Johannes BRUG

Epidemiological studies have shown an association of adequate intake of Fruit and Vegetables (F&V) with decreased risk for cardiovascular diseases, obesity, hypertension and type 2 diabetes mellitus. The WHO and FAO have made promoting the intake of F&V a global priority, and promoting F&V is part of health promotion efforts across Europe. The WHO recommends a daily intake of at least 400 grams of F&V per day and most countries across Europe have adopted similar recommended intake levels. However, most people across Europe eat too little F&V, and effective promotion of adequate intake levels is therefore required.

In order to promote F&V insight is needed in the population groups most at risk for low intakes and into the important and modifiable determinants of intake levels because interventions and policies to promote F&V intakes need to be targeted to these groups and tailored to such behavioural determinants.

Based on European Commission funded research projects such as the Pro Children and Pro Greens projects as well as other studies, in this presentation an overview will be provided of the evidence showing that across the life course, people of lower socio-economic positions are more likely to eat too little F&V. Furthermore, evidence-based information will be presented on personal and physical, socio-cultural, economical and political environmental factors that may explain these lower intake levels. Finally, examples will be presented of F&V promotion interventions and policies that may contribute to higher intake levels among the populations at risk.

Session 1

Preventing Chronic Disease
The role of Fruit and Vegetables

Chairman: **Ibrahim ELMADFA**

A healthy diet: What is likely to be included and what is not?

Ibrahim ELMADFA

Attitudes of consumers (children and adults) towards Fruit and Vegetables consumption

Maria Daniel VAZ DE ALMEIDA

Diversity of Fruit and Vegetables to achieve a healthy diet

Verena NOWAK

Nutrition and low-income population

Mona VINTILA

SESSION 1

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

The role of Fruit and Vegetables in healthy diets

Ibrahim ELMADFA
Director of Institute of Nutritional Sciences

BIOGRAPHICAL SKETCH

Footnote on page 8

A healthy diet: What is likely to be included and what is not?

Ibrahim ELMADFA

The impact of food and drinks on health and wellbeing is not a recent discovery. The knowledge about the effects and occurrence of food components together with modern food production and storage technologies overall greatly facilitate the adherence to a healthy diet. On the other hand, the easy access to food abets the development of overweight and obesity that are steadily increasing not only in industrial but also in developing and transition countries. With the wide choice and deeper insights in the effects of different food components, defining healthy nutrition becomes more complex. A multitude of tools to assess diet quality have been proposed mostly in the form of indices taking into account certain critical food groups and/or nutrients as well as diversity each with their advantages and disadvantages.

The basics of a healthy diet

The backbone of a healthy nutrition is nevertheless widely agreed upon: Fruits and Vegetables (F&V) are rich in micronutrients and, in most cases, low in energy and fat. Thus, leafy green vegetables and citrus fruit are major sources of folic acid, whose intake is considered insufficient in most population groups. Moreover, they contain a variety of secondary plant compounds for which a number of health-promoting effects have been described. These bioactive substances are also found in whole grain cereals that also provide complex carbohydrates as the main energy source in human nutrition. Considering the importance of fat quality and fatty acid pattern, plant oils, nuts, and seeds also have their place in a healthy diet. Generally, plant foods should account for the greater part of the diet, but animal foods are not less important especially with regards to critical nutrients like iron, iodine and long-chain n-3 polyunsaturated fatty acids. For the latter two, fish is the best if not the exclusive natural source. Milk and milk products, although only used by a minority of the world population, represent an important source of protein, calcium, and, to a less extent, many other micronutrients.

Critical diet components

The quality of a diet is often measured by its content of energy, refined sugars and saturated fatty acids. Regarding the latter, consumption of high-fat meat and dairy products should be reduced. Highly processed foods have a lower health value not only due to their lower micronutrient contents, but also the possible formation of potentially hazardous substances such as trans-fatty acids, polycyclic aromatic hydrocarbons or acrylamide. Particularly deep-fried, smoked and cured foods should be consumed only occasionally.

Individualised diets

With the emergence of nutrigenetics and new insights in the processes of ageing and certain diseases, nutrition is becoming more individualised. Thus, while the basal constituents of a healthy nutrition may be the same for all population groups, special requirements must be considered in different groups, namely children, the elderly, pregnant and lactating women, and persons affected by certain diseases.

Basically, a healthy diet should be diverse, based on plant-derived foods with plenty of F&V, including whole grain cereals and regular contributions of milk products and fish.

SESSION 1

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

The role of Fruit and Vegetables in healthy diets

Maria Daniel VAZ DE ALMEIDA
Professor

ADDRESS: Faculty of Nutrition and Food Sciences of Porto University
FCNAUP. R. Dr. Roberto Frias
4200 Porto - Portugal
EMAIL: mdvalmeida@fcna.up.pt
PHONE: +(351)225074320
FAX: +(351)225074329

BIOGRAPHICAL SKETCH

- PhD Human Nutrition, King's College, London (1989); BSc Human Nutrition, University of Porto (1978).
- Professor of Public Health Nutrition/ Community. Nutrition at the Faculty of Nutrition and Food Sciences, University of Porto.
- President of the Directive Council, Faculty of Nutrition and Food Sciences, University of Porto
- President of the Portuguese Society of Nutrition and Food Sciences.
- Founding member of the World Public Health Nutrition Association (October 2007).

Main areas of research: Determinants of food consumption, Consumer attitudes, Food intake

Portuguese Leader of several European Projects, namely:

- Consumer trust in food. A European study of the social and institutional conditions for the production of trust;
- Youth, Fruits and Vegetables - Promoting and sustaining health through increased vegetable and fruit consumption among European schoolchildren (2002-2006);
- The European food availability databank, based on household budget surveys - the DAFNE IV project;
- Choosing foods, eating meals: sustaining independence and quality of life in older people – Senior Food Quality (2003-2005).
- European Nutrition and Health Report I and II
- Diet, genomics and the metabolic syndrome. An integrated nutrition, agro-food, social and economic analysis (LIPGENE).
- Eating Out: Habits, Determinants, and Recommendations for Consumers and the European Catering Sector (HECTOR).
- PRO GREENS – promotion of fruit and vegetable consumption among schoolchildren in Europe
- ANEMOS - Expansion and update of existing nutrition monitoring systems

Attitudes of consumers (children and adults) towards Fruit and Vegetables consumption

Maria Daniel VAZ DE ALMEIDA

Food habits are shaped in childhood through the socialization process, in which learning to like/dislike foods occurs. Acceptance of vegetables, especially those with a bitter or sour taste, requires repeated exposure in childhood whereas children easily like fruits, often sweet. Family rules and norms as well as self-efficacy have been found to influence children's Fruit and Vegetables (F&V) consumption. For adults, the concept of healthy eating often includes "eating more F&V" and in general women are more health conscious and have a higher F&V consumption than men. Moreover, F&V may be regarded as "feminine" foods, which may decrease men's motivation to eat them. For public health nutrition purposes it is crucial to identify the factors that influence consumption, either by constituting barriers or, on the contrary, by promoting access and intake. Both, barriers and promoters differ depending if the analysis is focused only on "fruits" or on "vegetables" or on "F&V combined". Local availability and accessibility as well as socio-demographic aspects influence consumption of F&V. F&V have been included in Human's diet worldwide since pre-historic times being eaten raw and/or cooked, as part of complex meals or eaten as single food items. In research, F&V are often regarded as a single food group, due to their high nutrient density, low energy density and health benefits. However an enormous diversity of foods can be found within these two entities, as botanically these may be fruits, seeds, stems, roots, leaves, bulbs and flowers. Some eaten as vegetables are indeed fruits and therefore the culinary use of such foods overrides the botanical classification in epidemiological analysis (WCFR/AICR Diet and Cancer Report, 2009). In various population groups, consumption of F&V is found to be below 400 g/day, the minimum recommended intake. Therefore various programs to promote F&V consumption have been developed with a motto as straightforward as "5 a day". However, if the concept of "F&V" is not clear for consumers, recommendations maybe difficult to understand and put into practice. This presentation will present data on consumer's attitudes towards F&V consumption by children and adults.

SESSION 1

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

The role of Fruit and Vegetables in healthy diets

Verena NOWAK
Professor of Internal Medicine

ADDRESS: University of Vienna,
Department of Nutritional Sciences
Althanstrasse 14
1090 Vienna
Austria

EMAIL: verena.nowak@univie.ac.at
PHONE: +(43) 1 4277 54912
FAX: +(43) 1 4277 9549

BIOGRAPHICAL SKETCH

Verena Nowak received her master of sciences from the Universty of Vienna, Institute of Nutritional Sciences, in 2006. For her master thesis she analyzed data from the Austrian sample of the project Pro Children. Currently she is PhD student at the Department of Nutritional Sciences, University of Vienna. She was responsible for conducting the Austrian Study on Nutritional Status – Children 2007 which was part of the Austrian Nutrition Report 2008.
Since 2007 she is project co-worker at the University of Vienna in several projects such as ENHR II, HECTOR eating out, and EuroFIR and she is a member of the EFSA Food Consumption Data Expert Group. She is also lecturerer in dietetics and nutritonal status assessment.

Diversity of Fruit and Vegetables to achieve a healthy diet

Verena NOWAK

There is no doubt about the health benefits of a diet including high amounts of Fruit and Vegetables (F&V). In addition to the amount, the diversity of F&V has also been shown to be associated with positive health outcomes, e.g. lower cancer incidence. Furthermore, a varied diet is associated with nutrient adequacy, where the definition of "varied diet" plays a crucial role for the strength of the association.

In a cross-sectional survey of 741 Austrian school children aged 10.7 ± 2.1 years (mean ± SD, min-max = 6-15) and a study on 421 older adults aged 75 ± 9.4 (mean ± SD, min-max = 56-100), the association between F&V variety and nutrient intake was assessed. Data were collected using 3 day food records. F&V variety was determined by counting all different F&V consumed during 3 days; the daily intake of each sort had to be 20g or more to account for variety.

F&V variety ranged from 0-12 in children as well as in elderly. For further analyses, individuals with a F&V variety of 0 were excluded and the sample was divided into quartiles of F&V variety. In multiple linear regression models, associations between F&V variety and intake of energy and 33 nutrients were tested, adjusting for total energy intake, total amount of F&V intake, sex, body mass index, and age.

F&V variety was associated with a significant increase of intake of energy and 23 nutrients from quartile 1 to 4 (Q1-Q4) in children and energy, and 25 nutrients in elderly, respectively. For example, in the elderly beta-carotene increased by 30%, folate by 19%, dietary fibres by 17%, and calcium by 12%; in children beta-carotene increased by 61%, folate by 15%, dietary fibres by 25%, and calcium by 9%. Energy intake increased by 12% in elderly, but only by 8% in children. In children, no significant increase of fat (%E), saturated fatty acids (SFA) (%E), mono unsaturated fatty acids (MUFA) (%E), cholesterol, total carbohydrates (%E), sucrose (%E), and protein (%E) could be observed, whereas in elderly F&V variety was associated with significant higher intake of fat, SFA, and MUFA and significant lower intake of carbohydrates.

Conclusion:

F&V variety can be considered as a measure of diet quality. A diet including a variety of F&V has positive effects on micronutrient intake independently from the amount of total F&V intake and total energy intake. As folate and calcium, for example, are considered to be critical nutrients in the Austrian population, a diet diverse in F&V may be useful both for diet recommendations and as an indicator for a healthy diet.

SESSION 1

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

The role of Fruit and Vegetables in healthy diets

Mona VINTILA
Professor

ADDRESS: West University of Timisoara
Take Ionescu, No.19, Ap. 8,
300063, Timişoara
Romania

EMAIL: mona.vintila@socio.uvt.ro

PHONE: +(40)722 -684236

BIOGRAPHICAL SKETCH

Professor Mona Vintilă is a physician and has a PhD in Medicine with the thesis "The evolution and long term psycho-intellectual performances of premature infants". She is Professor at the Faculty of Sociology and Psychology from the West University of Timisoara, Psychology department, where she teaches undergraduate and master students. She is a systemic family and couple therapist.

She has performed researches published on national and international level, on topics like health psychology, behavioural problems in adolescence and its significance for the society, family and couple psychology:

- Mona Vintilă, R. Hasson, (2006), Health reflection of work stress- intercultural study, Psychology and Health, Vol. 21, p.159.
- Mona Vintilă, R. Hasson, (2006) The impact of masculine role perception on the couple relationship-intercultural study, Psychology and Health, Vol. 21, p.159.
- Voracek, M., Loibl, L. M., Swami, V., Vintila, M., Kölves, K., Sinniah, D., Pillai, S. K., Subramaniam, P., Sonneck, G., Furnham, A., & Lester, D. (in press, 2008). The Beliefs in the Inheritance of Risk Factors for Suicide Scale (BIRFSS): Cross-cultural validation in Estonia, Malaysia, Romania, the UK, and the USA. Suicide and Life-Threatening Behavior, Vol. 38, nr. 6.
- Eglīte Aija, Vintila Mona, Anda Grīnfelde, Ingrīda Kantiķe, Healthy Lifestyle in the Elderly's View in Romania and Latvia, International Scientific Conference Economic Science for Rural Development, Jelgava, 23-24 april, 2009, pp.97-102.
- Mona Vintilă, CHANCE – Community Health Management to Enhance Behaviour, The 19th International Congress of Nutriţion, Bangkok, 4-9 octombrie, 2009.

She coordinated several projects at national and international level:

- Community Health Management to Enhance Behavior, 2007-2009, EU project, local coordinator.
- Sharing our common environment: learning outdoors in Europe, 2008 –2010.
- POSDRU, 2009-2011, Skills of graduates and employers needs. A research-action for labor market integration.

She published several books and studies on Health Psychology, Neuropsychology, Mental Health.

Nutrition and low-income population

Mona VINTILA

Objective: There is a need for innovative strategies in health promotion in low-income countries, such as Romania. Social factors such as social cohesion, the role of the voluntary services and social engagement cannot be influenced by traditional preventive and health promotion initiatives.

Methodology: The results we are about to present were collected during 2007-2009 in the frame of a European project financed by the European Union. The idea has arisen of starting a multinational project to develop new solutions to the problem of implementing healthy lifestyles in the local communities of different countries. The project involved 10 partners from six countries: Germany, Great Britain, Sweden, Austria, Latvia and Romania. In every country involved in the project, 200 households were investigated quantitatively and 20 qualitatively. Each country focused on a disadvantaged group. For Romania, Sweden and Latvia this group was the elderly.

Results: Romanian rural areas are proverbial for their plentiful food but unhealthy diet, for the sedentary life-style of residents and for their lack of preventive health care behaviour. Unhealthy eating habits have been the rule here for many years and we can observe that these patterns are not changing. To back up these statements we can point to the high number of deaths caused by cardiovascular diseases, in which unhealthy eating habits represent an aggravating factor.

We will refer to some comparative results between Romanian and Swedish study groups. In Romania the level of information on health and interest in health and how to maintain it are all at a lower level than in Sweden. This may be due to the lower standard of living, the lower socio-economic level, but also because of lack of education and of health information programs. However, both groups consider that they were well-informed about health. Referring particularly to the level of information on healthy nutrition, statistical data do not indicate significant differences between the two groups ($\chi 2(2)=0.798$, $p>0.05$). These results are unexpected considering the fact that a significantly larger number of information and education campaigns about healthy nutrition are organised in Sweden. The lower interest in health among the elderly in Romania reflects the problems of the national health system. Household structure and the level of social network development in the neighbourhoods studied also have an impact on how people get health information. Low life expectancy, decreasing self esteem, the feeling of being useless, the lack of encouraging social contacts, the lack of the will to live affect greatly their health state.

The results show that a larger part of the Swedish sample (52%) than the Romanian (33.8%) has a BMI within the normal range.

The study also highlighted significant differences in the eating habits of the investigated subjects. In the Romanian sample more than 50% of the

.../...

SESSION 1

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

The role of Fruit and Vegetables in healthy diets

Nutrition and low-income population

Mona VINTILA

.../... people questioned seldom or never eat whole grain bread, cereals, oil, butter, organic products, or mineral or vitamin supplements. Only 19% of the Romanian elderly people reported eating oily fish several times per week, while most of them (39%) seldom or never eat this kind of fish. A large proportion of the Romanian sample (more than 50%) reported consuming unhealthy products such as margarine and cakes every day.

Regarding the consumption of Fruit and Vegetables (F&V), over 50% of both groups said that they consumed these kinds of products daily. More Romanian subjects 84% compared to 59% Swedish subjects do not eat F&V several times a day.

An interesting aspect of the consumption of F&V is that although Romania has not had "5-A-Day" campaigns, more of the Swedish elderly people than the Romanian elderly people said that they did not know what this phrase meant ($\chi 2(4)=13.113$, $p<0.01$). However, we can see that although they think they are more informed on this subject, the Romanian elderly gave more wrong answers than the Swedish elderly.

A comparison between knowledge of the campaign "5 a day" and the consumption of F&V in both Sweden and Romania show with significant difference that there is a connection. In the group with respondents who has knowledge of "5 a day" more people eat F&V several times daily than in the group who doesn't know about the campaign.

The results of the study provide very important information about the need for health education in Romania. We consider it a priority to develop and implement a health education program which can encourage personal involvement in self health care in a way that takes realistic account of the low level of social cohesion.

Session 2

Increasing consumption of Fruit and Vegetables in preventing chronic diseases

Chairman: **Elio RIBOLI**

Diet and obesity: focus on Fruit and Vegetables
Thorkild I.A. SØRENSEN

Dietary patterns and cancer
Teresa J. NORAT SOTO

Dietary habits and risk of cardiovascular diseases
Salvatore PANICO

Diet and cognitive function in older adults
Pascale BARBERGER-GATEAU

Elio RIBOLI
Professor of Cancer Epidemiology and Prevention

ADDRESS: School of Public Health - Faculty of Medicine
St Mary's Campus, Norfolk Place
London W2 1PG - UK
EMAIL: e.riboli@imperial.ac.uk
PHONE: +(44) 207 594 1913

BIOGRAPHICAL SKETCH

Prof. Riboli is Director of the School of Public Health at Imperial College London, rated one of the top two epidemiology and public health submissions to the UK's Research Assessment Exercise (RAE) in 2009. He holds an M.D. degree (1977, State University of Milan), a Master of Public Health (1980, Milan) and a Master of Science in Epidemiology (1982, Harvard University). Professor Riboli is a Registered Physician (General Medical Council, UK, 2005) and an Honorary Fellow of the Royal College of Physicians (2008).

From 1983 to 2005 Professor Riboli was based at Lyon's the International Agency for Research on Cancer (IARC), where he developed new research projects in the areas of nutrition, nutritional status and cancer. In 1989 he initiated the European Prospective Investigation into Cancer and Nutrition (EPIC), which sampled data from 500,000 subjects across 26 centres in ten countries. He was Head of the Nutrition and Hormones Group of IARC from 2004 to 2005.

Professor Riboli has co-authored over 310 peer-reviewed publications and over 100 book chapters and books and serves on editorial boards of major journals on nutrition, cancer and epidemiology.

In 2005 he joined Imperial College London as Professor of Cancer Epidemiology; in 2006 he was appointed Divisional Head of Epidemiology, Public Health and Primary Care, and became Director when the School of Public Health was established in January 2010.

SESSION 2

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

Increasing consumption of Fruit and Vegetables in preventing chronic diseases

Thorkild I.A. SØRENSEN

Institute Director, Professor of Clinical Epidemiology

ADDRESS: Institute of Preventive Medicine
Øster Søgade 18, 1, DK-1357 Copenhagen K
Denmark

EMAIL: TIAS@ipm.regionh.dk

PHONE: +(45) 33 38 38 60

FAX: +(45) 33 32 42 40

BIOGRAPHICAL SKETCH

Thorkild I.A. Sørensen, born in 1945, became MD in 1971 and achieved the doctoral degree (Dr Med Sci) in 1983 at the University of Copenhagen. He received his clinical training at several university hospitals in Copenhagen, and became chairman of the department of emergency admissions and chief physician at the department of hepatology at Hvidovre University Hospital in 1988. In 1989, he received a 5-year position as MRC professor of clinical epidemiology, and in 1994, he was appointed as full professor of clinical epidemiology at the University of Copenhagen in combination with a position as chief physician in clinical epidemiology at the Copenhagen Hospital Corporation. In 1993, he became Director of the Institute of Preventive Medicine. He was Dean of the Faculty in 1995-96. He has published more than 400 papers in international peer-reviewed journals with several papers in high-impact journals (see link or PubMed 'Sorensen TI'). The main topics of his research have been various aspects of obesity, alcohol drinking, liver and gastrointestinal disorders, addressed by methods in clinical, genetic and general epidemiology. He is coordinator of several national and international research projects and networks. He has been and is advisor, supervisor or reviewer of multiple doctoral and PhD dissertations, and has served as scientific advisor or reviewer for many different national and international institutions, organisations and journals.

Diet and obesity: focus on Fruit and Vegetables

Thorkild I.A. SØRENSEN

The prevailing belief is that a relatively high intake of Fruits and Vegetables (F&V) will prevent weight gain and eventual development of obesity. It has, however, been surprisingly difficult to provide convincing evidence for this contention. A recent systematic review of the literature by Summerbell et al. (IJO 2009; 33: S13-S27) concluded that 'the epidemiological evidence shows that fruit and (non-starchy) vegetables are not associated with levels of subsequent excess weight gain and obesity'. This conclusion was based on three prospective cohort studies in adults (one study was conducted in the United States in women, one in men and women in Denmark, and the third in Spanish men and women) and one prospective cohort study in children from United States. A number of important quality issues for interpretation of the evidence were raised; measurement of exposure, ascertainment of outcome, populations studied, sample size, adjustment for appropriate confounders. Recently, studies based on the EPIC cohorts (European Prospective Investigation of Cancer) conducted with the frame of the EU FP6 project, DIOGENES (see www.diogenes-eu.org) have suggested weak inverse associations between intake of F&V and weight gain, especially pronounced among individuals who stopped smoking, and between intake of fibers from F&V and increase in waist. In addition to the methodological issues addressed by Summerbell et al., there are also several fundamental problems generally related to the study of diet and obesity which must be considered to improve our understanding of the relation between dietary intake and obesity; applicability of the energy balance equation, time lag between exposure and effect when the theory implies immediate effects, reverse causality, confounding by weight and dietary history, common underlying causes, genetic background (both in body weight regulation in general, in food choices, and in interactions between foods and nutrients and body fat accumulation), exposure heterogeneity and limited range, interactions between dietary components, and heterogeneity of the obesity phenotype with respect to different adipose tissue depots and their respective function, including susceptibility to change. Finally, the clinical and public health relevance of the usual obesity phenotype may be questioned based on the finding that the accumulated triacylglycerides as such are biologically inert.

SESSION 2

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

Increasing consumption of Fruit and Vegetables in preventing chronic diseases

Teresa J. NORAT SOTO
Epidemiologist

ADDRESS: Department of Epidemiology and Biostatistics
School of Public Health, Imperial College,
St Mary's Campus
Norfolk Place
London, W2 1PG
UK

EMAIL: t.norat@imperial.ac.uk
PHONE: +(44) 20 7594 3454
FAX: +(44) 20 6667 7850

BIOGRAPHICAL SKETCH

- 1983-1988: Biostatistician, National Institute of Sport Medicine, Havana, Cuba.
- 1988-1991: Epidemiologist, Diabetes Epidemiology Unit, National Institute of Endocrinology, Havana, Cuba.
- 1991-1998: Chief of the Clinic Research Unit, National Institute of Cancerology and Radiology, Havana, Cuba.
- 1998-2006: Epidemiologist, Nutrition and Cancer Unit, International Agency for Research On Cancer, IARC, Lyon, France.
- 2006-: Principal Research Fellow, Department of Epidemiology and Biostatistics, School of Public Health, Imperial College, UK.

Dietary patterns and cancer

Teresa J. NORAT SOTO

Despite considerable research, the relationship of nutritional factors with cancer risk is still open to discussion. An extensive literature on studies examining the role of foods, single micronutrients, macronutrients, foods, energy, and alcohol intake has been produced. However, with the exception of the protective effect of physical activity on colon cancer, lactation for breast cancer, and the risk increase related to alcohol intake for cancers of the upper aero-digestive tract, colorectal and breast cancer and of body fatness with the risk of several cancers, most of the evidence on the association of nutritional-related factors and cancer is still not convincing[1].

Because of the complexity of diet and the potential for interactions among dietary components, the approaches that focus on individual foods or nutrients may miss information on the role of diet in disease etiology. Dietary patterns might be considered a valuable alternative to single food/nutrient approaches, due to their ability to capture the variation in overall food intake in a given population. On the other hand, by characterizing a healthy diet in a defined population, dietary patterns are intuitively practical tools for dietary recommendations for disease prevention.

Several studies have derived various types of "a posteriori" dietary patterns from dietary intake information, mainly using principal component factor analysis, exploratory factor analysis and cluster analysis and their association with cancer risk have been investigated. However, a recent review of the literature on dietary patterns showed that few published papers revealed strong and consistent associations between risk of cancers and dietary patterns[2]. This has given support to the idea that studies based on previous findings and biological hypotheses are more likely to obtain stronger and significant results, compared to those purely explorative studies on large populations[3].

In an "a priori" approach, dietary patterns are defined as indices built upon scientific evidence or hypotheses for specific diseases and, generally, include foods or food groups, nutrients or a combination of nutrients and foods, supported by current nutrition recommendations or a specific combination considered healthful such as the Mediterranean diet. Current evidence suggest that "Mediterranean"-style diets, characterised by high consumption of cereals, fruits, vegetables, olive oil and low consumption of meat, may protect against the risk of some cancers. Its potential protective effect on cancer risk has been investigated in some prospective studies. Mortality from cancer has been found inversely related to higher adherence score for Mediterranean diet in a European elderly cohort study[4] and in a large prospective North-American study[5]. A higher degree of adherence to Mediterranean diet was related to decreased incidence of cancer overall in a general population sample of 25,623 participants of the Greek segment of the European Prospective Investigation into Cancer and nutrition (EPIC)[6]. Studies of scores of Mediterranean style in relation to cancers of colon and rectum, breast, prostate, pancreas and on colorectal adenomas are still sparse and inconclusive.

Although "a priori" methods have the limitation that scores are defined on current knowledge and thus reduced to the existing evidence and the understanding of the diet-cancer association, "a priori" dietary patterns vary across studies as well as posterior dietary patterns, resulting in indexes that potentially measure different definitions of healthful behavior. Dietary patterns can complement nutritional epidemiologic studies on nutrients and foods, and an integrated evaluation of all the available evidence is required for the definition of dietary recommendations for cancer prevention.

REFERENCES

1. WCRF/AICR. Food, Nutrition, Physical activity and the Prevention of Cancer: a Global Perspective. Washington DC: AICR, 2007
2. Kant AK. Dietary patterns and health outcomes. J Am Diet Assoc. 2004; 104:615–615
3. Edefonti V, Randi G, La Vecchia C, Ferraroni M, Decarli A. Dietary patterns and breast cancer: a review with focus on methodological issues. Nutr Rev. 2009 Jun; 67(6):297-314.
4. Knoops KT, de Groot LC, Kromhout D, Perrin AE, Moreiras-Varela O, Menotti A, van Staveren WA. Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: the HALE project. JAMA 2004; 292(12):1433-9.
5. Mitrou PN, Kipnis V, Thiébaut AC, Reedy J, Subar AF, Wirfält E, Flood A, Mouw T, Hollenbeck AR, Leitzmann MF, Schatzkin A. Mediterranean dietary pattern and prediction of all-cause mortality in a US population: results from the NIH-AARP Diet and Health Study. Arch Intern Med. 2007 Dec 10; 167(22):2461-8
6. Benetou V, Trichopoulou A, Orfanos P, Naska A, Lagiou P, Boffetta P, Trichopoulos D; Greek EPIC cohort. Conformity to traditional Mediterranean diet and cancer incidence: the Greek EPIC cohort. Br J Cancer. 2008 Jul 8; 99(1):191-5.

SESSION 2

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

Increasing consumption of Fruit and Vegetables in preventing chronic diseases

Salvatore PANICO
Professor of Internal Medicine

ADDRESS: Department of Clinical and Experimental Medicine Federico II University
Via Pansini 5
80131 Naples
Italy

EMAIL: spanico@unina.it

PHONE: +(39)081.7463687

FAX: +(39)081.5466152

BIOGRAPHICAL SKETCH

Prof. Panico has been actively involved at the international forefront in research on the epidemiology and prevention of chronic disease (particularly metabolic and cardiovascular disease); the focus has been on lifestyle associated risk factors, including dietary habits. Transferring research findings derived from the main research focus to clinical and population settings has been another feature of his professional life.
Prof. Panico has been PI of many observational studies on etiology of chronic disease, mainly population-based cohorts with special respect to female individuals. At the international level he has been involved in several collaborative studies since the early eighties. Among them: KNOW YOUR BODY, a program of health education for prevention of cardiovascular disease in 15 countries; INTERSALT, a classical study on the role of salt intake on blood pressure carried out across three continents; EURALIM, a study on prevalence of risk condition associated to lifestyle across seven major European big cities; EPIC (European Investigation into Cancer and Nutrition), a study on etiology of cancer based on the observation of more than 500,000 individuals all over Europe; EPIC-HEART, cardiovascular component of the EPIC Study. He is part of the Coordination Team of a national pooling study in Italy on etiology of cardiovascular disease (Progetto CUORE) whose results have been appreciated at the international level, with special respect to the preparation of risk-charts and risk-scores for the Italian population. Currently he is responsible of a new observational study on life-style and genetic etiology of CVD in the Italian EPIC cohorts (EPICOR Study). He is Professor of Internal Medicine at the University of Naples Federico II and Research Professor (HS) of Social and Preventive Medicine, Department of Social and Preventive Medicine, State University of New York at Buffalo, USA.

Dietary habits and risk of cardiovascular diseases

Salvatore PANICO

Scientific literature largely confirms that there is a great potential for prevention of cardiovascular disease in promoting protective life-styles, characterized by the adoption of a healthy dietary pattern, non-sedentary habits, body weight control, together with quitting smoking.

Dietary habits have shown important changes in populations in the last years. Therefore, the current information on the role of dietary patterns in influencing cardiovascular disease frequency and risk is quite interesting. Mediterranean European countries have changed their dietary habits toward a less healthy pattern; however some of the traditional protective dietary components are still consumed by individuals. Recent observational investigations indicate that a pattern inspired to the use of those traditional foods still have a protective role. This finding is consistent with the observation that in non Mediterranean countries some patterns, including a number of foods which are part of a protective pattern in Mediterranean populations, also have a protective role. Consistently food of vegetable origin appears as the protective part of those dietary patterns. The recent evaluation of regional Mediterranean indexes in prospective cohorts as indicators of healthy traditional pattern are quite in line with this piece of knowledge.

Prevention of cardiovascular disease may rely on current patterns based on food items that include products of vegetable origin.

SESSION 2

PREVENTING CHRONIC DISEASE - THE ROLE OF FRUIT AND VEGETABLES

Increasing consumption of Fruit and Vegetables in preventing chronic diseases

Pascale BARBERGER-GATEAU
Doctor

ADDRESS: Research centre INSERM U897,
team "Nutritional epidemiology"
University of Bordeaux
146 rue Léo-Saignat
33076 BORDEAUX CEDEX
France

EMAIL: Pascale.Barberger-Gateau
@isped.u-bordeaux2.fr

PHONE: +(33) 5 57 57 15 96

FAX: +(33) 5 57 57 14 86

BIOGRAPHICAL SKETCH

MD, Ph D in Epidemiology, is Associate Professor in Epidemiology and Public Health since 1985 at the University of Bordeaux, France. She is presently head of the team "Nutritional epidemiology" at the INSERM Research Center U897 « Epidemiology, Public Health and Development" in Bordeaux.Her main research field concerned the epidemiology of aging for more than 20 years, with a particular interest in Alzheimer's disease and its consequences on Activities of Daily Living. She now develops an original research on nutritional protective or risk factors of Alzheimer's disease based on the French PAQUID and Three-City cohort studies. She is the coordinator of the COGINUT (COGnition, anti-oxidants, and fatty acids: Interdisciplinary approach of the role of Nutrition in brain aging) research program funded by the French National Agency for Research. Among her main findings is the evidence of a protective association of regular fish, fruits and vegetables consumption with decreased risk for dementia, Alzheimer's disease, and depressive symptoms.

She is a member of the scientific board of the Carnot Institute LISA (Lipids for Industry and Health).

Diet and cognitive function in older adults

Pascale BARBERGER-GATEAU
and L. Letenneur

With the aging of the population, pathological brain aging has become a major public health concern. More than 5% of the population aged 65 and over suffer from dementia and its prevalence steadily increases with aging. Alzheimer's disease (AD) is the most frequent cause of dementia, accounting for 50–60% of all cases. AD places a considerable socio-economic and psychological burden on families and society. Unfortunately, there is presently no causal treatment of AD and its main risk factor, beside age, is genetic since possession of the 4 allele of the apolipoprotein E (ApoE4) gene increases the risk of late-onset AD. There is therefore a need to identify environmental risk factors on which we could act to decrease the risk of AD. As neuro-degeneration in AD is estimated to start 20–30 years before clinical onset, there is a large window for prevention in order to slow down the pathological process or reinforce non specific neuro-protection.

As a major environmental factor, nutrition offers promising perspectives for the prevention of AD and, more generally, cognitive decline. The aging brain is particularly susceptible to oxidative stress because of, on one hand, its high content in easily peroxidizable long-chain poly-unsaturated fatty acids, and on the other hand, the high level of in-site production of free radicals. In AD patients, the accumulation of the β-amyloid protein, the hallmark of the disease, is associated with increased free radical production and increased lipid peroxidation. Important oxidative damage has also been observed in subjects with mild cognitive impairment, suggesting an early role of oxidative stress. Fruits and Vegetables (F&V) are major providers of anti-oxidant compounds. Several cohort studies have recorded dietary behaviour and then documented cognitive decline and incidence of dementia through repeated neuropsychological testing over many years of follow-up. They have yielded increasing evidence for a protective role of dietary anti-oxidants (vitamins E, C, carotenoids, polyphenols) and homocysteine-related vitamins (vitamin B12 and folate) against AD and cognitive decline. Several observational epidemiological studies have evidenced an inverse association between higher consumption of vegetables and lower risk of cognitive decline or dementia, whereas the association with fruit was less consistent. However, intervention studies of the prevention of cognitive decline with anti-oxidant supplements or folic acid, most of which were at very high dosages, have shown disappointing results. These results emphasize the synergistic role of nutrients at dietary doses such as those found in F&V for the prevention of cognitive decline in older persons.

Session 3

Policy in action
The European "School F&V Scheme; SFVS"

Chairman: **Lars HOELGAARD**

A fruit for snack at school:
How to stimulate new practices and overcome old views?

Laure SOULIAC

The Norwegian School Fruit Programme:
From parental subscription to national legislative action

Knut-Inge KLEPP

School Fruit Scheme in Slovenia

Mojca Gabrijelčič BLENKUŠ

The U.S. Fresh Fruit and Vegetable Program:
Benefits to students, schools and Public Health

Lorelei DISOGRA

SESSION 3

TRANSLATING EVIDENCE TO POLICY

Policy in action - The European "School F&V Scheme; SFVS"

Laure SOULIAC

Head of the office of nutrition
Ministry of food, agriculture and fisheries

ADDRESS: Ministry of food, agriculture and fisheries
251 rue de Vaugirard
75015 PARIS
France

EMAIL: laure.souliac@agriculture.gouv.fr

PHONE: +(33) 1 49 55 59 28

BIOGRAPHICAL SKETCH

Laure Souliac is an agronomist. She has always worked for the ministry of food, agriculture and fisheries. She has been involved in residues of pesticides in foodstuff and water resources, in promotion of wines under appellation d'origine contrôlée, in regulatory affairs and biotechnology. Now she is head of the office for nutrition and valorisation of the food quality. In this frame, she manages a task force to improve accessibility to fruit and vegetable and she oversees the french program called « a fruit for recess »

A fruit for snack at school: How to stimulate new practices and overcome old views?

Laure SOULIAC

The French school fruit scheme began in France in 2008 for an experimental phase and concerned 92,000 children from 3 to 11 years old who received one fruit per week throughout the year. Mayors must enroll schools depending on their city. People in charge of canteens, producers and retailers help the ministry of food, agriculture and fisheries to conduct the call for tender. After one year, we can conclude that:

• It was very difficult to raise awareness about this programme, even after sending letters from the Minister to mayors' representatives, after the information is published in different professional newspapers read by teachers and mayors and a hot line for subscription offered. So we decided in 2009 to appoint an ambassador to personify the programme, and to reinforce the promotion of the programme.

• Big cities hesitated more than rural ones, because the cost seemed to them very high, we haven't totally solved that problem. We have given more flexibility, now mayors can subscribe only for one school term and to be more incentive, it will be given to Paris and its suburban cities a gift for each subscription.

• Some medical staff feared that such fruit distribution might increase obesity if it is not done at lunch time. To address that concern, we are modifying the call for tender to be stricter, so that the fruit will be given at the arrival in the morning or when children leave the school, in fact the best way would be to distribute the fruit in recreation centers closely linked to the schools but it will limit the number of beneficiaries.

• Producers faced difficulties in selling their fruits to canteens even to those belonging to cities that had signed-up and that were consequently listed on our web site. Mayors probably don't know they may give preference to producers to buy locally if the price and the service are the same.

Moreover, an evaluation was done by Ms Padilla from the international center for Mediterranean and agronomical high studies (CIHEAM). In one hand, her report enlightens positive outcomes of the programme: 62% of children would like to eat fruit at school more often (3 times per week), 90% of parents and 94% of teachers are satisfied. When children are involved in the programme, their parents go more frequently to the market to buy fruits.

We can assess children's knowledge, satisfaction and practices and also teachers' difficulties. The results are not always those expected:

• Children don't like kiwis and don't like fruit early in the morning because they complained that there was a negative interaction with the taste of their tooth-paste.

• Children think that a tart, an ice cream or a yoghurt with a fruit aroma is also a fruit, they don't know how to classify these processed foods but with the programme they have learnt about seasonality.

• When the fruit is given during the recess, children don't eat cakes but when they return home they don't change their habits and eat the same things as usually, so it's necessary to inform parents, post a message in the tag board and organize meetings with parents.

• Documents intended to accompany the measures must be downloaded by teachers, but they didn't always have an access to the Internet. In fact, we should prepare a kit of educational material for each school and the costs should be borne by the European Union.

SESSION 3

TRANSLATING EVIDENCE TO POLICY

Policy in action - The European "School F&V Scheme; SFVS"

Knut-Inge KLEPP
Director General, Division of Public Health

ADDRESS: Division of Public Health
Norwegian Directorate of Health/
Department of Nutrition
Faculty of Medicine, University of Oslo
P.O. Box 1046 Blindern
N– 0316 Oslo
Norway

EMAIL: k.i.klepp@medisin.uio.no

PHONE: +(47) 95 76 07 16

BIOGRAPHICAL SKETCH

Knut-Inge Klepp, Ph.D, MSc, MPH is the Director General of the Division of Public Health at the Norwegian Directorate of Health. In this capacity he has responsibilities regarding implementation of Norwegian diet and nutrition policies. Klepp is also an adjunct professor at the University of Oslo. His research interests are linked to studies of health behaviour among children and adolescents and policies and interventions to promote health. He has served as principal investigator on a number of studies investigating the effects of promoting fruit and vegetables among school children in Norway, and he coordinated the EU funded project "Promoting and Sustaining Health through Increased Vegetable and Fruit Consumption among European School children". Klepp has served as Chair of the Norwegian National Council on Nutrition, and he is President-Elect of the International Society of Behavioural Nutrition and Physical Activity.

The Norwegian School Fruit Programme: From parental subscription to national legislative action

Knut-Inge KLEPP
and Elling Bere

In Norway, there has been a deliberate effort to increase school children's Fruit and Vegetables (F&V) intake at school over the past several years. A subscription programme for grades 1-10 was initiated in 1996 and made nation-wide in 2003 in collaboration with the Norwegian Marketing Board for F&V. In this programme, schools opt to participate or not, and then parents with children at participating schools decide whether to subscribe or not. The cost to the parents is currently NOK 2.50 per school day (approximately EUR 0.30). Subscribing pupils receive a piece of fruit or a carrot each school day, usually at lunch time. The programme is subsidized by the Norwegian government with NOK 1.00 per pupil per school day.

The subscription programme and a pilot version of the same programme with no parental payment were evaluated during the school year 2001-02 with long-term follow-ups until the school year 2004-2005. The results clearly demonstrate that both programmes increased the students' overall reported F&V intake, but that the programme without parental payment was much more effective than the subscription programme (effect sizes were 0.9 and 0.2 portions/day on F&V intake at school, respectively, compared to control schools). Furthermore, participating for one year in the school fruit programme with no parental payment had a positive long term effect on the adolescents' F&V intake both one and three years following the end of the free fruit intervention (effect sizes on F&V intake all day were about 0.5 and 0.4 portions/day, respectively, compared to control schools). The subscription programme tended to increase social disparities while the free fruit pilot programme was effective in increasing F&V intake among all groups including boys and children of parents without higher education. Thus, the school fruit programme with no parental payment is seen as an effective means of achieving the goal of reducing social inequalities related to diet since all children attend school at least through grade 10.

As of the school year 2007-2008, an official free school fruit programme (without parental payment) has been in place in all secondary elementary schools (grades 8-10) and all combined elementary and secondary schools (grades 1-10) in Norway. This programme is now supported by legislation making it part of the legal obligation for local municipalities to provide school fruit for their pupils. However, the subscription programme, including parental payment, still runs in elementary schools (grades 1-7).

This presentation will provide an overview of the research conducted in order to evaluate the Norwegian School Fruit Programme. Furthermore, the barriers to achieve complete coverage of the programme with no parental payment, as well as experience with its implementation to date will be discussed.

SESSION 3

TRANSLATING EVIDENCE TO POLICY

Policy in action - The European "School F&V Scheme; SFVS"

Mojca Gabrijelčič BLENKUŠ
Doctor

ADDRESS: National Institute of Public Health Slovenia
EMAIL: mojca.gabrijelcic@ivz-rs.si
PHONE: +(386) 1 2441 406
FAX: +(386) 1 2441 535

BIOGRAPHICAL SKETCH

- Medical doctor
- Specialist in public health
- Special interest nutrition and in health promotion in general
- Head of the Health Promotion Centre at the National Institute of Public Health of the R of Slovenia
- Lecturer at the Medical Faculty at the University of Ljubljana
- WHO national counterpart for nutrition for Slovenia

School Fruit Scheme in Slovenia

Mojca Gabrijelčič BLENKUŠ

Low consumption of Fruit and even lower consumption of Vegetables (F&V) is detected in population of children and adolescent in Slovenia (HBSC 2002 and 2006, Progreens, national studies). Evaluation of the health impacts of agriculture and food policy upon joining the Common Agriculture Policy (CAP) after the accession of Slovenia to EU (http://www.mz.gov.si/fileadmin/mz.gov.si/pageuploads/javno_zdravje_09/Ocena_vplivov_prehranske_in_kmetijske_politike_ang.pdf) has shown that by increasing the consumption of F&V to the recommended value, in Slovenia we could reduce the morbidity of cardiac ischemia by 10%, while the morbidity of cerebrovascular insult and of certain cancer types could be reduced by at least 6% each.

Slovene National School Meal Program is providing primary school children with up to four meals a day, which are in accordance with guidelines composed of F&V, too. Additional to this institutionalized measure free School Fruit Scheme (SFS) could be used as a tool for increasing popularity and availability of F&V for (low consuming) children in schools.

Slovene pilot project "Apple", 2006-08, 25 primary and 25 secondary schools involved, gave the information how best to implement free SFS. Main outcomes of Apple project were: increased consumption of apples and increased awareness of the importance of healthy diet among pupils, popularity of apples grew higher; apples occasionally replaced unhealthy foods; inter-subject links and cross-curricular links were observed; awareness of importance of the inclusion and cohesion of all actors increased. As "side effect" of the project we could observe the following results: recognizing the importance of local production, biodiversity and environment protection, increasing knowledge about sustainable development, better waste management. In 2008 project was stopped because of the lack of funding and at the same time chance to apply for CAP SFS appeared.

In pilot phase of the CAP's SFS implementation in Slovenia (in school year 2009/10) 73 % of all Slovene primary schools are involved. Schools are providing free F&V for all children from 1st to 9th grade. All involved schools are obliged to prepare plan of activities with some indicative measurable outcomes (most at the process and outcome level). They have to set specific goals and provide adequate supply and offer of F&V. Beside that they have to define additional activities and cooperation of pupils, teachers, parents and also farmers and local community. Most of the schools plan to distribute F&V once a week, at different times of the day, as part of broader activities. Main objectives defined by schools are: stimulation of F&V intake; improvement of eating habits and eating culture; education on importance of F&V intake for health; better knowledge on F&V production and processing; obesity, overweight and KND prevention; connecting schools with local farmers. Productive partnership was built among three sectors at the national and regional levels, too, based on the interests of each of the sectors, for agriculture sustainable F&V market as the opportunity for farmers, for education getting new opportunities for school work, and for health increasing F&V consumption.

SFS are likely to improve public health outcomes, reduce health and social inequalities and improve F&V intake over adult life. Three sectors, agriculture, education and health working together, based on the institutionalized and regularly financed measure, with strong regional and local implementation support could give promising results.

With many thanks to Tanja Polak Benkič, Ministry of Agriculture, Forestry and Food, Slovenia, Alenka Pavlovec, Ministry of Education, Slovenia, and Rok Poličnik, Ministry of Health, Slovenia, among many valuable others.

SESSION 3

TRANSLATING EVIDENCE TO POLICY

Policy in action - The European "School F&V Scheme; SFVS"

Lorelei DISOGRA
Vice President

ADDRESS: Nutrition and Health United Fresh Produce Association
1901 Pennsylvania Avenue, #1100,
NW Washington, DC 20006
USA

EMAIL: ldisogra@unitedfresh.org

PHONE: +(1)202 303-3403

BIOGRAPHICAL SKETCH

Lorelei DiSogra, Ed.D., R.D., is Vice President, Nutrition and Health, at United Fresh Produce Association headquartered in Washington, D.C. Dr. DiSogra, one of the founders of the 5 A Day Program in the U.S., is an advocate for eating a diet rich in fruits and vegetables to promote good health and prevent chronic disease.

In her present position she is responsible for nutrition policy, specifically reshaping federal policy to drive environmental changes that increase children's fruit and vegetable consumption consistent with the Dietary Guidelines for Americans.

Recently Dr. DiSogra played a leadership role in:

• Securing $1.2 billion for national expansion of the Fresh Fruit and Vegetable Snack Program in the 2008 Farm Bill

•Ensuring that the new WIC food packages include vouchers for fresh fruits and vegetables

• Securing $100M for cafeteria equipment to improve the quality of school meals to meet the Dietary Guidelines for Americans.

Currently, she is engaged in the reauthorization of the Child Nutrition Act with the goal of increasing fresh fruits and vegetables in school meals, promoting a salad bar in every school, increasing federal reimbursement rates for school meals, increasing funding for cafeteria equipment, and increasing fruits and vegetables in WIC program.

From 2001-2005, Dr. DiSogra served as Director of the National 5 A Day Program at the National Cancer Institute(NCI), National Institutes of Health. Prior to joining the NCI, she was Vice President of Nutrition and Health at Dole Food Company. She holds a Doctoral Degree in Nutrition Education and Masters Degrees in Public Health Nutrition and Nutrition Education from Columbia University

The U.S. Fresh Fruit and Vegetable Program: Benefits to students, schools and Public Health

Lorelei DISOGRA

In the U.S., the Fresh Fruit and Vegetable Program (FFVP) is very popular with students, families, schools and public health community. The goal of the FFVP is to increase children's consumption of Fruits and Vegetables (F&V) by providing a fresh fruit and/or vegetable snack every day at school to all students for free. First started as a pilot in 2002, the 2008 Farm Bill provided $1.2 Billion to expand the program nationally to all 50 states. The FFVP has been implemented nation-wide for the past 2 years. For school-year 2010-11, more than $101million is available; this will reach/benefit 2 million students every day. The federal funding increases significantly each year to reach more children. The $150 million funding for school-year 2011-12 is projected to reach 3 million children. To help children develop healthier eating habits, the FFVP operates only in elementary schools and is targeted to schools with a high proportion of low-income students.

The FFVP is administered by the U.S. Department of Agriculture (USDA) and each state's Child Nutrition Division. Each state receives a yearly funding allocation for the FFVP based on student population. Interested elementary schools apply to the State for funding; schools receive $50-75 per student per year to provide the fresh F&V snack daily to all of their students. Each school decides what specific fresh F&V to serve and where to purchase them. The U.S. Congress provided $3 million for a national evaluation; USDA has recently contracted with ABT Associates with results expected by late 2011 or early 2012.

Over the last eight years the FFVP has proven to be a school-based model for increasing children's consumption of fresh F&V, decreasing their purchase of soda, chips and candy, and a catalyst for creating healthier school food environments. Also, participating schools report increased consumption of F&V in the lunch program. Children experience the great taste of a wide variety of fresh F&V, start to eat more, and begin to positively influence their family's eating habits. Schools and parents often report that the FFVP results in almost immediate behavior change. Schools serve a wide variety of nutrient dense fresh F&V as snacks. Frequently served fresh fruits include: Apples, Fresh-cut Apple Slices, Asian Pears, Bananas, Blueberries, Cantaloupe, Fruit Trays, Grapefruit, Grapes, Green Plums, Honeydew, Kiwi, Mango, Oranges, Papaya, Pears, Persimmons, Pineapple, Fresh-cut Pineapple Spears, Plums, Pomegranates, Raspberries, Strawberries, Tangelos, Tangerines, and Watermelon. Frequently served vegetables include: Asparagus, Avocado, Baby Carrots, Broccoli, Cauliflower, Celery, Cherry Tomatoes, Cucumbers, Mushrooms, Peppers, Sugar Snap Peas, and Vegetable Trays.

An environmental change, the FFVP increases the availability of fresh F&V in the school environment and increases student's consumption. The FFVP is often cited as a key school-based program to reduce childhood obesity and improve child nutrition. Congressional champions are committed to expanding the FFVP to all elementary school students within the next 10 years.

Session 4

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Chairmen: **: Mickaël HUEBEL, Lluís SERRA-MAJEM**

UK: Effectiveness of the Healthy Start Program

Fiona FORD

U.S.A.: Impact of Providing Fruits & Vegetables in the WIC Program

Douglas A. GREENAWAY

Effect of vouchers to increase Fruits and Vegetables consumption in a deprived population: a randomized trial

Hélène BIHAN

Policies promoting Fruit and Vegetables consumption in Europe

Lluís SERRA-MAJEM

Mickaël HUEBEL
Head of Unit

ADDRESS: European Commission
Rue Alcide de Gasperi - HTC 01/165
L-2920 Luxembourg
EMAIL: Michael.Huebel@ec.europa.eu
PHONE: +(352) 4301 34023
FAX: +(352) 4301 34975

BIOGRAPHICAL SKETCH

Primary and secondary education in Germany and the United States.
Studies of Political Science (major), Public Law and History in Bonn/Germany and Canberra/Australia.
Work in different German youth and social welfare organisations.
1989-1995 - German Red Cross, Headquarters, Social Welfare Division, initially in the Social Policy Unit, then European Representative of the German Red Cross.
Since 1995 - European Commission, initially in DG V (Employment and Social Affairs); since 2000 DG Health and Consumer Protection, Public Health Directorate. Until 2003 in policy analysis and development, working on general health policy.
Since September 2003 in the Health Determinants unit, with responsibility for social and environmental determinants.
June 2004 – Deputy Head of Unit
November 2005 – Head of Unit (responsibilities include nutrition and physical activity, mental and sexual health, addictions (tobacco prevention, alcohol and drugs), and wider determinants of health).

SESSION 4

TRANSLATING EVIDENCE TO POLICY

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Fiona Ann FORD
Research Dietitian

ADDRESS: Academic Department of Reproductive Medicine
Jessop Wing Tree Root
Walk Sheffield S10 2SF
UK

EMAIL: f.a.ford@sheffield.ac.uk

PHONE: +(44) 11 422 68532

BIOGRAPHICAL SKETCH

Qualifications:
- MSc Health Services Res, University of Sheffield 1997
- Diploma Dietetics Leeds Metropolitan University 1978

Fiona Ford is a co-director of the Centre for Pregnancy Nutrition (CPN), Department of Reproductive Medicine, University of Sheffield. The national 'Eating for Pregnancy Helpline' and web site based at the CPN, has been running for more than 15 years and has achieved considerable success in disseminating education about nutrition before, during and after pregnancy, at a national and local level to women who are pregnant or planning to be, health care practitioners and the media. The CPN's model is now firmly established within the NHS choices, Food Standards Agency, Babycentre, Gurgle and RCOG web sites. Recently her main area of work has been on maternal and child nutrition and specifically the impact of a new food support benefit 'Healthy Start' for low income mothers and their young children.
Fiona has actively supported many statutory and voluntary sector programmes and groups at a local, regional, national level to share her experience and expertise about the far reaching influence and importance of food and nutrition for mothers and their young children. She actively contributes to increasing awareness, development and promotion of strategies in the field of nutrition and wider public health. She is a member of the NICE PHCC group producing guidelines on maternal and infant nutrition, gestational weight gain and postnatal weight loss, the recently formed maternity MEND group and a spokesperson for media queries for the British Dietetic Association.

UK: Effectiveness of the Healthy Start Program

Fiona Ann FORD

The Welfare Food Scheme (WFS), a food benefit support scheme, was established in the UK in 1940 and provided tokens that could be exchanged for liquid cow's milk, infant formula, and vitamin supplements for pregnant women, nursing mothers and children under the age of 5 years, in families receiving qualifying benefits. In November 2006, 'Healthy Start' (HS), replaced WFS in the UK. HS provides monetary vouchers that can be exchanged for fresh Fruit and Vegetables (F&V) as well as cow/s milk and infant formula. HS is also intended to be an agent for nutritional intervention and give low-income mothers and families the opportunity to access good-quality information and advice, including diet in pregnancy, breast-feeding, stopping smoking, and the roles of milk, fresh F&V and vitamins in the diet.

In this presentation, we report dietary intakes and eating patterns of F&V of low-income, Caucasian pregnant and postnatal women in Sheffield, before and after the introduction of HS to evaluate the short-term effect of the new food-provision benefit on these behaviours. Dietary intakes and eating patterns were measured using a 62 item validated semi-quantified Food Frequency Questionnaire (FFQ)

Pregnant HS women consumed a mean of 3.3 portions of F&V per day compared with 2.5 for WFS women ($P<0.004$) and 15% of pregnant HS women met the recommended 'five a day' compared with 2.4% of the WFS women. Postnatal HS women consumed a mean of 3.3 portions of F&V per day compared with 2.7 for WFS women ($P<0.023$) and 19% of pregnant HS women met the recommended 'five a day' compared with 11.5% of the WFS women ($P<0.262$). National surveys in the UK indicate that a high proportion of young women of childbearing age consume fewer than the recommended portions of F&V each day. The Low Income Diet and Nutrition Survey (2008) showed that women had a mean intake of 2.5 portions of F&V per day and only 9% of women met the 'five-a-day' target. The 2008 Health Survey for England reported F&V consumption (mean number of portions) in young women fell in 2008 from previous year fell from 3.2 to 3.1.

The preliminary results of this study suggest that pregnant and postnatal HS women increased their food consumption, and a higher proportion of them than the earlier WFS scheme, met dietary recommendations, but improved nutrient intakes in HS women were associated with significantly increased energy intakes. Although HS was associated with improved maternal prenatal and postnatal diets, only 60% of eligible women were beneficiaries and HS vitamin supplements were not available.

Designing supplemental food packages which optimise the potential benefit for long-term health poses mixed challenges. Problems of malnutrition for energy and essential nutrients must be addressed in the context of the current high prevalence of overweight and obesity in the UK. Health professionals advising women in their care about food support schemes should have sufficient nutritional skills to advise them competently about the foods to include to improve nutrient intakes and also in compensation the foods that should be decreased, to reduce the risk of excess energy intakes.

SESSION
4

TRANSLATING EVIDENCE TO POLICY

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Douglas A. GREENAWAY
President & CEO

ADDRESS: National WIC Association
2001 S Street, NW, Suite 580
Washington, DC
USA

EMAIL: douglasg@nwica.org
PHONE: +(1)202.232.5492
FAX: +(1)202.387.5281

BIOGRAPHICAL SKETCH

Since 1985, Fr. Greenaway has served as an advocate and government affairs specialist in Washington, DC. As President & CEO for 20 years, of the NATIONAL WIC ASSOCIATION, NWA, the nonprofit voice of the over 9.2 million mothers and young children and the over 12,200 service provider agencies and clinics of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), he is responsible for directing the Association as well as representing the WIC community's interests to the White House, Congress, the US Department of Agriculture, and other federal agencies and departments.

Fr. Greenaway was Ordained to the Holy Order of Priests in the Anglican/Episcopal Diocese of Washington where he serves as Priest Associate at St. Paul's Rock Creek Parish. He holds a Master of Divinity from Wesley Theological Seminary and a Master of Architecture from the Catholic University of America, in Washington, DC, as well as a Bachelor of Arts in Political Science/Sociology from Carleton University, Ottawa, Canada. He is pursuing a Doctor of Ministry degree at The Catholic University of America in Liturgical and Pastoral Studies.

Fr. Greenaway previously worked for Leo A. Daly Architects, Engineers, Planners, and the Research Office of the Official Opposition in Canadian Parliament. A resident of Washington, DC, he was born in Bellville, Ontario, Canada.

U.S.A.: Impact of Providing Fruits & Vegetables in the WIC Program

Douglas A. GREENAWAY

The presentation will discuss the core elements of the U.S. preventative public health nutrition program – the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), including nutrition education and the use and availability of supplemental foods to help mothers and young children consume more nutritious foods. Emphasis will focus on the newly available Fruit and Vegetable (F&V) cash value vouchers and the influence, legislative and regulatory processes implemented to achieve F&V cash value voucher implementation success.

WIC has a scientifically demonstrated track record of improving at-risk children's health, growth and development, and preventing health problems for 35 years. WIC children enter school ready to learn, showing better cognitive performance. WIC serves over 9.2 million mothers and young children, over half of all America's infants and one-quarter of its children 1–5 years of age. Families turning to WIC for nutrition assistance are vulnerable and at-risk. Economic crises compound their vulnerability. WIC food packages and the nutrition services that accompany them ensure that WIC mothers and young children stay healthy. WIC caseload has grown by more than 17% between fiscal years 2004 and 2009. Quality nutrition services are the centerpiece of WIC: nutrition and breastfeeding education, nutritious foods, and improved healthcare access for low and moderate income women and children with, or at risk of developing, nutrition-related health problems including overweight, obesity, and type-2 diabetes. WIC's committed, results oriented, entrepreneurial staff stretch resources to serve the maximum numbers of women, infants, and children and ensure program effectiveness and integrity.

After 35 years, without F&V, WIC's new food packages provide for the availability of fresh F&V through cash value vouchers in denominations of $10 per month for women and $6 per month for children. Inclusion of F&V in the new WIC food packages involved 10 years of grassroots advocacy, demonstration pilots, partnership and coalition building, legislative and regulatory initiatives to achieve implementation success.

SESSION 4

TRANSLATING EVIDENCE TO POLICY

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Hélène BIHAN

Doctor

ADDRESS: URENN, U557 Inserm,
SMBH-Université de Paris
13, 74, rue Marcel Cachin
93017 Bobigny Cedex
France

EMAIL: h.bihan@uren.smbh.univ-paris13.fr

PHONE: +(33) 1 48 38 89 32

FAX: +(33) 1 48 38 32 31

BIOGRAPHICAL SKETCH

1998-2003: Medical Doctor, specialization in Endocrinolgy (APHP, Paris)
2002: Master of Endocrinology and Cellular Interactions, Dr MANTEL INSERM U341 Laboratoiry , Pr REACH, Hôtel-Dieu.
2003: Speciality in Endocrinology
2004: University Diploma in Pituitary Disease
2003-2007: Assistant in Endocrinology-Internal Medicine, Pr KRIVITZKY, Avicenne Hospital, BOBIGNY
2007: Hospitalo University Physician, Department of Endocrinology, Diabetology et Metabolic Diseases, Pr REACH, Avicenne Hospital
2007: Doctoral fellow at the UREN (Nutritional Epidemiology Research Unit), Pr Hercberg, Thesis Title : « Precarity, alimentation and prevention of diabetes ».

Effect of vouchers to increase fruits and vegetables consumption in a deprived population: a randomized trial

Hélène BIHAN
and C. Mejean, S. Peneau, K. Castetbon, P. Galan, H. Le Clesiau, S. Hercberg

Objective: Determinants of Fruit and Vegetables (F&V) consumption, including affordability and attitudes, have been poorly investigated in European deprived populations. Interventions to improve F&V consumption are needed. The present study investigated whether nutritional information plus an incentive intervention using vouchers exchangeable for fresh F&V is more effective than diet advices alone, in order to increase daily consumption of F&V and vitamin levels in a low-income population.

Design and setting: Deprived subjects were recruited for a controlled intervention study. At baseline, 3 months, 9 and 12 months, they underwent clinical, blood examinations and filled in questionnaires with evaluation of daily consumption of F&V (frequency food questionnaire). Determinants of consumption of less than one F&V per day were analyzed at baseline. After randomisation, subjects received dietary advices (advices group) or subjects received dietary advices and vouchers exchangeable for fresh F&V (vouchers group). At each trimester assessment, plasma carotenoids, vitamin C, alpha-tocopherol, vitamin B-12, folate and homocysteine levels were investigated.

Results: At baseline, mean daily consumption of F&V was 2.13 ± 1.57 times/day. Nearly 30% of the sample did not eat F&V every day (low consumers). Determinants of low F&V consumption were: age younger than 55 years, education level lower than tertiary (compared to primary or secondary level) and perception of lack of financial means for buying F&V daily. Other determinants were affordability (whether interviewed people felt that F&V are affordable, or felt that lack of money prevents healthy diet) and attitudes (perception on whether one's own diet is healthy, whether or not F&V improve health, whether eating F&V is a pleasure). At 3 months, 135 subjects (62 in the advices group, 73 in the vouchers group) were followed-up and 76 at 9 months. At 3 months, mean consumption of F&V was 2.19 ± 1.1 in the advices group avec 2.93 ± 1.40 in the vouchers group, without significant difference between the two groups (p = 0.09). For subjects who did not consume F&V each day, vouchers delivery had a significant effect (5.5 % of low consumers in the vouchers group at 3 months vs. 25.8 % in the advices group, p = 0.0009). Plasmatic levels of vitamins were comparable in both groups, with no change at 3 months.

Conclusion: Determinants of low consumption of F&V in this deprived population are numerous, with a great impact of financial difficulties, as the perception of affordability of F&V. This first randomized nutritional trial concludes that vouchers delivery during 3 months in deprived population could limit the proportion of individuals consuming less than one F&V per day.

SESSION 4

TRANSLATING EVIDENCE TO POLICY

Addressing inequalities in health and diet - policies and programmes that target F&V consumption in low socioeconomic groups

Lluís SERRA-MAJEM
President Mediterranean Diet Foundation

ADDRESS: Mediterranean Diet Foundation,
Barcelona Science Park
Baldiri Reixac 4
Torre D, 4ª planta,
08028- Barcelona
SPAIN

EMAIL: presidente@fdmed.org
PHONE: +(34) 934 034 541
FAX: +(34) 934 034 543

BIOGRAPHICAL SKETCH

· Medical doctor with a Ph.D. specialising in Preventive Medicine and Public Health.

· He has served as President of the Mediterranean Diet Foundation since 1996. He collaborates in studies on the Mediterranean Diet such as the Spanish Ministry of Health's Thematic Networks of Cooperative Health Research (RETICs): Healthy eating and the prevention of chronic diseases: the Predimed Network, and the "Effect of the Mediterranean Diet on primary Prevention of Cardiovascular Disease". He has presided and published Congress Proceedings for 7 editions of the Barcelona International Congress on the Mediterranean Diet. He has played a key role in establishing the Mediterranean Diet Surveillance System and presenting the Nomination for the inscription of the Mediterranean Diet in UNESCO´s Representative List of Intangible Cultural Heritage of Humanity.

· Full Professor of Preventive Medicine and Public Health at the University of Las Palmas de Gran Canaria, where he holds the UNESCO Chair for Research, Planning and Development of Local Health Systems as well as serving as the Director of the Department of Clinical Science.

· In 1989 he founded the Spanish Society of Community Nutrition, of which he served as President from 2000 to 2006, and also created in 1994 the Spanish Journal of Community Nutrition. He is President and founder of the Nutrition Research Foundation (since 1997) as well as the NGO Nutrition without Borders (2005). He is the Director of the Community Nutrition Research Centre of the University of Barcelona Science Park and President of the Spanish Academy of Nutrition and Food Science (since 2008).

· Director of Nutrition Surveys in Catalonia, the Canary Islands, the national ENKID Study and the Andorra Nutrition Survey. He has led key activities in European Projects such as: EURRECA, BENERIS, PIPS, ENHR I & II, EXPOCHI, PlantLIBRA.

· He has authored more than 635 publications, a total of 222 referenced publications, with an accumulated Bibliometric Impact Factor of 417.7 and more than 2000 citations. He has written or edited 62 books on topics in his field and produced more than 220 chapters and editorials, prologues and presentations.

· He has a leading role both nationally and internationally in research and promotion of the Mediterranean Diet as well as in the field of public health nutrition. He organised and chaired the First World Congress of Public Health Nutrition in September 2006.

Policies promoting Fruit and Vegetables consumption in Europe

Lluís SERRA-MAJEM

The European Nutrition and Health Report II (ENHRII) is an EC funded project with the aim of gathering information on food consumption data, health indicators and food policies across Europe, and providing recommendations to harmonize methods for data collection and monitoring of relevant health indicators. The objective of this report was to summarize ongoing Food and Nutrition Policies (FNP) in selected countries participating in the ENHRII.

Twenty five European countries participated in the project. A questionnaire was sent to collect available information on country-specific FNP, food fortification programmes and Food Based Dietary Guidelines (FBDG). The information was completed with information on initiatives from the European Community and WHO/EURO.

Twenty one partners answered the questionnaire (Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, and the Netherlands). Regarding the promotion of Fruit and Vegetables (F&V) consumption, some of the countries that answered the questionnaire reported having implemented the following actions: to promote and facilitate in a certain way the production and availability of F&V, to provide certain types of incentives or subsidies for the promotion of fruits at schools (in Denmark) or for the promotion of F&V at the population level (in Greece and Poland). In accordance with the EC recommendation to increase F&V consumption, certain countries (Denmark, Portugal and Italy) reported including a fruit break at schools.

In Spain the MDF together with the Spanish ministry of Agriculture and several autonomous regions have developed a comprehensive nutrition education programme to promote F&V consumption at school level.

FBDG comprised the principal communication and information tool to disseminate FNP information/contents to the population in all countries except in Slovenia. Only two countries (Austria and Spain) included all the target population groups in their FBDG (general population, children, adolescents, pregnant women, adults, elderly and immigrants). In addition, consumer education campaigns were the strategies used in certain countries to promote and inform about the benefits of F&V consumption.

One of the issues specifically outlined to assure the success of a FNP is, according to the WHO recommendations, to elaborate intersectoral collaborations among institutions involved in the development, coordination and implementation of the policy. Not all the respondent countries had developed such a strategy. Some of them did not involve all the sectors responsible for assuring adequate F&V availability. Others did not have a coordinating system to check the adequate implementation of the policy.

In view of the trends on F&V consumption in Europe, it is necessary to unite efforts to assure proper F&V availability so as to improve the dietary habits of the population, covering all levels and especially those most vulnerable to nutritional risks.

Session 5

Promoting healthy diets in the European Union

EU projects

Chairmen: **Ibrahim ELMADFA, Ingrid KELLER**

Dearth in abundance – Characteristics of the current European diets - ENHR II

Ibrahim ELMADFA

Socio-economic status, dietary behaviour and Fruit and Vegetables consumption in European children from the IDEFICS study

Wolfgang AHRENS

PERISCOPE: how to help young children to improve their eating habits?

Margherita CAROLI

EU action on inequalities in health

Charles PRICE

Ingrid M.C. KELLER
Programme Coordinator-Health

ADDRESS: Executive Agency for Health and Consumers
DRB A03/018
L-2920 Luxemburg
EMAIL: ingrid.keller@ec.europa.eu
PHONE: +(352) 4301-35330
FAX: +(352) 4301-30359

BIOGRAPHICAL SKETCH

Ingrid M.C. Keller studied nutrition and consumer sciences at the Justus Liebig University Giessen/Germany and at the University of Idaho/USA. She earned a Master in Public Health from the Medical School in Hannover/Germany and a Master in Food Policy from City University in London/UK. She worked for the Andalusian School of Public Health in Granada/Spain and the German Agency of Technical Co-operation (GTZ) in Colombia before joining the World Health Organization (WHO) as an Associated Professional Officer with the Ageing and Health Programme in1999. From 2002 she worked as a Technical Officer in WHO's Primary Prevention of Chronic Diseases Unit on the development and implementation of the Global Strategy on Diet, Physical Activity and Health. Since May 2006 she work for the Executive Agency for Health and Consumers of the European Commission in Luxemburg, first as a Project Officer managing European projects in the area of nutrition, physical activity and tobacco and since January 2009 as the Coordinator for the Health Programme executing the calls for proposals and tenders under this Programme.

EGEA VI - **abstract**book # p. 37

Session 5

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Promoting healthy diets in the European Union – EU projects

Ibrahim ELMADFA
Dorector of Institute of Nutritional Sciences

BIOGRAPHICAL SKETCH

Footnote on page 8

Dearth in abundance – Characteristics of the current European diets ENHR II

Ibrahim ELMADFA
and A.L. Meyer

The increasing prevalence of overweight and obesity in many parts of the World is the most obvious manifestation of unfavourable dietary patterns; however, an excessive intake of energy, fat and sugar does not preclude deficiencies in essential micronutrients as repeatedly evidenced by nutritional surveys. Monitoring the population's nutritional intake and status is important to define critical nutrients and find starting points to improve nutritional behaviour.

The European Nutrition and Health Report 2009 (ENHR II)

A major objective of the European Nutrition and Health Report, first published in 2004, was to give an overview of the nutrition and health situation in Europe by compiling data from individual countries. Main sources were the Food Balance Sheets (FBS) of the FAO providing data on food supply obtained through the same methods since 1961, thus also allowing analysis of trends, data of the EU-supported Data Food Networking (DAFNE) project on food availability at household level derived from Household Budget Surveys, and the Concise Food Consumption Database from the European Food Safety Authority (EFSA) as well as national dietary surveys.

European diets

Over the past decades, an increase in the supply of red meat, poultry, milk products, vegetable oils, but also Fruit and Vegetables (F&V) can be observed. In turn, there was a decline for pulses, potatoes, and, to a lesser extent, for cereals. Overall, the proportion of plant and animal products remained relatively stable in most regions. Only the South did the latter markedly increase.

Some regional characteristics emerged from all data sources such as the high contribution of milk products to the Northern diet, in which F&V were less represented. Supply, availability, and consumption for fish were also high in this region and even more so in the South. For F&V, highest average levels were reached in the South with equally high consumption levels in the Central-East. In this latter, cereals and potatoes also play an important role and it also showed high availability and consumption of meat.

Health implications

Despite some favourable trends like a decrease of animal fat and an increase in F&V and fish supply, the European diets still leave room for improvement. Only in four countries, three of which were located in the Central-Eastern region, the consumption of F&V reached the 400 g recommended by the World Health Organization. Accordingly, mean intakes of dietary fibre and β-carotene, for which F&V present an important source, were highest in this region. In turn, folate intakes were lowest in the Central-East and South and highest in the North. The latter, especially the Scandinavian part, also showed the highest mean calcium intakes, reflecting the high consumption of milk products.

Overall, a high variability was encountered concerning the intake of macro- and micro-nutrients, but carbohydrate intake tended to be higher in the North and Central-East. The Southern region showed both, the highest and lowest intake levels of total fat. Energy intake was mostly below or within the reference levels of the German speaking countries and comparable between the regions.

SESSION
5

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Promoting healthy diets in the European Union – EU projects

Wolfgang AHRENS
Research Associate Deputy Director

ADDRESS: Bremen Institute for Prevention Research and social Medicine, University Bremen
Linzer Str. 10 - D-28359
Bremen - Germany

EMAIL: ahrens@bips.uni-bremen.de

PHONE: +(49) 421 59596-12

FAX: +(49) 421 59596-65

BIOGRAPHICAL SKETCH

Position and scientific career: Prof. Dr. Wolfgang Ahrens is Deputy Director of the Bremen Institute for Prevention Research and Social Medicine (BIPS), University of Bremen. Since 2003 he is the head of the department Epidemiological Methods and Etiologic Research. Having finished his biology studies in 1985 he worked as scientific assistant in numerous epidemiologic studies with focus on work- and environment-related cancer. In the years 1995-1998 he established the working group Epidemiology at the Institute for Medical Informatics, Biometry and Epidemiology, University Clinic Essen. After having earned his doctorate with a dissertation on "Retrospective assessment of occupational exposure in epidemiological case- control studies" he established the cross sectional division Epidemiological Methods and Field Work at the BIPS. From 1998-2003 he was Head of the division. In 2000 he qualified as professor for Epidemiology and Public Health. In 2003 he was offered a W3-professorship for Epidemiological Methods at Bremen University. His research activities centre on the field of aetiology of cancer focusing on environmental factors and occupational exposures. In recent years he has widened his spectrum of research to the use of secondary data in research of pharmaceutical drug safety as well as primary prevention and evaluation. Currently he co-ordinates the largest Europe-wide intervention study on overweight, obesity and further health effects in children induced by diet, lifestyle and social factors (www.idefics.eu).

Current Projects:
IDEFICS - Identification and prevention of dietary- and lifestyle-induced health effects in children and infants.
Nested case-control study on testicular cancer in metal workers.
Cooperating epidemiological research in Lower Saxony and Bremen as part of the national cohort (referred to as "Helmholtz-Cohort") - pilot study.
Interdisciplinary consortium on obesity prevention in children and adolescents (National Competence Network Obesity).

Socio-economic status, dietary behaviour and Fruit and Vegetables consumption in European children from the IDEFICS study

Wolfgang AHRENS
and I. Pigeot, on behalf of the IDEFICS consortium

Introduction: The European prospective IDEFICS study identifies the risk profiles regarding overweight, obesity and related disorders and evaluates primary prevention strategies in children. We analyzed dietary factors in relation to indicators of Socio-Economic Status (SES).

Methods: 16,188 children aged 2-8 years and their parents were recruited in eight European countries in 2007/08. They participated in an extensive protocol where parents reported socio-demographic, behavioral, medical, nutritional and other lifestyle data about their children and the families. Examinations included anthropometry, blood pressure, physical fitness, accelerometry, DNA and physiological markers in blood and urine. Usual frequency of consumption of selected food items was reported by parents in a self-completion questionnaire. Self-reported income level was classified as low, medium and high using country-specific cut-offs.

Results: The proportion of children reporting daily fruit consumption varies significantly with weight status: 56.3%, 56.1%, 54.4%, and 53.1% in thin, normal weight, overweight and obese children, respectively. The weekly frequency of Fruit and Vegetables (F&V) consumption varied from 17.7 times in low-income groups to 18.0 times in high income groups. The respective frequency of consumption of foods rich in fibers was 21.2 and 23.9 times. Gender differences were marginal but frequencies differed markedly by country as did associations between frequency of consumption and income. Frequency of the consumption of junk foods decreased with increasing income level in almost all countries. The overall frequency per week was 11.8, 9.1 and 7.3 times in low, medium and high income groups, respectively. The association of income level with the consumption of sugar sweetened drinks was even stronger. These were consumed 15.9 times in low-income groups as opposed to 11.8 and 6.9 times in medium and high income groups. This trend was similar in all countries although the frequencies varied by a factor of up to six between countries. Independently of income level, the frequency of junk food consumption was positively associated with TV consumption while the association with frequency of F&V consumption was negative.

Conclusion: Dietary behaviours differ substantially by SES and by country. The frequency of F&V consumption shows only a weak positive association with income level overall and a substantial variation by country but no marked difference by sex. Associations of SES with the consumption of junk food and sugar sweetened drinks are stronger and appear consistently in almost all countries. The relationship between TV consumption and frequency of consumption of certain food items, which was not explained by SES, may offer an interesting avenue for future prevention efforts. However, these results need cautious interpretation as self-reported food frequency data may be affected by a social desirability bias.

Funding: Research relating to this abstract was funded by the EC, FP 6, Contract No. 016181 (FOOD).

SESSION
5

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Promoting healthy diets in the European Union – EU projects

Margherita CAROLI
Head of the Nutrition Unit, ASLBR

ADDRESS: Nutrition Unit Department of Prevention
Azienda Sanitaria Locale Brindisi
Via per Ceglie
72021 Francavilla Fontana Brindisi, Italy
EMAIL: mcaroli@libero.it
PHONE: +(39)0831851270/+(39)3284504945
FAX: +(39)0831851222

BIOGRAPHICAL SKETCH

Degree in Medicine and Surgery Università di Napoli with maximum (1978)
Residence in Pediatrics Università di Napoli with maximum cum laude (1981)
Residence in Nutrition Università di Napoli with maximum cum laude (1986)
Ph D in Paediatric Nutrition Università di Perugia (1994)
Head of Nutrition Unit – Department of Prevention ASL Brindisi since 1998 up to now.
Research on: epidemiology, development, treatment, and prevention of childhood obesity; the development of eating habits with specific focus on mass media role; community intervention to promote healthy life style in children.
Scientific Coordinator of the national project on survey of nutritional status of Italian children financed by the Italian Ministry of Health 1998-2001.
Member of the Italian National Committee on obesity prevention (Ministry of Health)
Member of the Italian National Committee "OKkio alla salute" survey on the Italian children nutritional status.
Member of the Italian Health Ministry Committee for school meals provision.
Scientific Coordinator of the field testing of the WHO Child Growth standards in Italy.
Scientific Coordinator for Southern Europe of the project "European Mapping of Obesity Best Practice" (EMOB) financed by EU Commission DG SANCO.
Scientific Coordinator of the project "Pilot European Regional Interventions for Smart Childhood Obesity Prevention in Early Age (PERISCOPE)" financed by the EU Commission DG SANCO
From July 2007 President of the European Childhood Obesity Group.
From March 2008 Member of the Prevention and Public Health Task Force (EASO)

PERISCOPE: How to help young children to improve their eating habits?

Margherita CAROLI
and BE. Mikkelsen and E. Malecka-Tendera.

Childhood obesity has reached epidemic levels in most of the European countries, especially in low Socio-Economic Status (SES) families. Nowadays obesity develops in earlier ages and shows higher severity. A strong preventive action in early ages is thus required.

At the age of 2-6 years eating habits and food preference develop, and, as this age children spend several hours a day in kindergartens, this can be considered a very convenient setting where performing activities to establish positive live styles.

PERISCOPE is a pilot study conducted in Denmark, Italy, and Poland aimed to assess early obesity determinants and to test new methods to prevent obesity development in preschool children.

PERISCOPE's baseline survey showed that preschool children do not use to eat fruit and vegetables according the WHO and international recommendations, and this unhealthy habit can favour obesity development.

This age children choose food to eat only if they like it, and they like what they are used to see and eat. Thus, in the intervention phase of the project, to improve children's eating habits in the 3 countries, the same following strategies, developed for this specific age, with small changes due to the different needs of each country, have been used.

1. A specific and new "taste shop's" protocol based on a very friendly, joyful methodology was developed to encounter young children's cognitive and language abilities.

2. The aesthetic of kindergarten meals and all the elements having to do with the "pleasure" aspects of eating, in terms of food taste and presentation (mixing different color foods, adding decorations, etc.) have been improved, as psychological and sensorial aspects of food are important aspects of food acceptance in children and, thus, of positive eating patterns and habit development.

3. The most often disliked foods (vegetables, legumes, fruit, etc.) have been introduced to children through short tales book in which foods and/or nutrients, actors of short stories, are positive agents to reach good health or other positive aims. In the same book a different chapter on nutrient content, adequate serving size, and other simple food health related information has been dedicated to parents and kindergarten teachers.

The book follows the same model of food advertising communication used by food industries: only taste and positive social information on foods to children, and specific nutritional and technical information to adults. The whole approach aimed to empowering children and parents in their personal actions to get good health through active choice.

The intervention efficacy has been evaluated by comparing initial and final data for each country and each kindergarten unit; as well as through cross-analysis among the 3 countries, so as to assess not only the effectiveness of the intervention itself, but also its impact in countries with different traditions and lifestyles.

The acceptance of kindergarten meals, and in particular of the healthy food such as vegetables, whole cereals, and fruit, has been evaluated through the amount of these specific foods left over and the percentage of children eating/not eating them, while the impact of the intervention on family meals through a questionnaire filled by the parents.

The analysis has shown a significant improvement of fruit, vegetables and legumes intake in Italian and Polish children attending the intervention kindergartens, while children attending kindergartens which served as control groups, did not show any improvement. Danish children's eating habits, already very healthy since the first survey, did not improve.

PERISCOPE project shows that it s necessary to start obesity prevention in very early age and that preventive activities, adequate to the children's age, can give positive results.

SESSION
5

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Promoting healthy diets in the European Union – EU projects

Charles PRICE

ADDRESS: European Commission
Health Determinants
Unit, SANCO C4, HTC 01/168, L2920
Luxembourg

EMAIL: charles.price@ec.europa.eu

PHONE: +(352) 4301 33541

BIOGRAPHICAL SKETCH

Charles Price is policy officer for social determinants and health and health inequalities at the European Commission. He previously worked in Health Policy and Urban Health at the World Health Organization Regional Office for Europe and was a Director of Public Health in Sheffield.

EU action on inequalities in health

Charles PRICE

In October 2009 the European Commission set out the actions it will take to help reduce health inequalities in the EU. Diet and physical activity are potentially important areas for action. This presentation will give an overview of Commission policy on health inequalities and refer to selected work on diet.

Differences in health between people living in different parts of the EU and between the most advantaged and most disadvantaged sections of the population remain substantial and in some instances have increased. Between EU Member States there is a 5-fold difference in deaths of babies under one year of age, a 14 year gap in life expectancy at birth for men and an 8 year gap for women. Large disparities in health are also found between regions, rural and urban areas and neighborhoods.

Throughout the EU a social gradient in health status exists where people with lower education, a lower occupational class or lower income tend to die at a younger age and to have a higher prevalence of most types of health problems.

Health inequalities are due to systematic differences between population groups in a wide range of factors which affect health. These include: living conditions; health related behaviors including diet and physical activity as well as education, occupation and income; health care, disease prevention and health promotion services as well as public policies influencing the quantity, quality and distribution of these factors.

EU action aims to support Member States and other stakeholders and to develop the contribution of EU policies to reduce health inequalities. In 2010 a jointly funded action by the EU Health programme and member states will take forward work on health inequality policy audit; support a regional and scientific network and stakeholder initiatives. A call for proposals under the PROGRESS programme is expected in the spring which will include support for MS to develop health inequality strategies. An expert review is being undertaken on indicators for monitoring health inequalities at the level of the EU. Health inequalities will be an issue in the Roma summit and the European year for combating social exclusion 2010.

A call for research proposals relating to health inequalities under the 7th Framework Programme is expected in the summer. The Commission is also expected to bring forward an initiative on the EU role in global health.

Session 6

Making the healthy choice the easy choice: the role of environmental change

Chairman: **Johannes BRUG**

Fruit and Vegetables consumption of food insecure people in France

Nicole DARMON

How important is the neighbourhood food environment in influencing Fruit and Vegetables intakes? An Australian perspective

David CRAWFORD

Food advertising to children – who wants tougher regulation?

Andrea AIKENHEAD

Vegetable consumption: what makes the difference, education of geography?

Ritva PRÄTTÄLÄ

SESSION 6

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Making the healthy choice the easy choice: the role of environmental change

Nicole DARMON
Senior Research Engineer

ADDRESS: UMR INRA 1260
Universités AIX-MARSEILLE I & I
Faculté de Médecine de la Timone,
Marseille
FRANCE

EMAIL: nicole.darmon@univmed.fr

PHONE: +(33) 4 91 29 40 97

FAX: +(33) 4 91 78 21 01

BIOGRAPHICAL SKETCH

Nicole Darmon works at the Joint Research Unit INRA/University "Lipid Nutrients and Metabolic Disease Prevention » in Marseille, France. She has conducted nutritional surveys in vulnerable populations, such as homeless and food aid recipients, and she has developed innovative approaches to study the impact of cost constraints on food choices. Based on population diet modelling, she has studied the feasibility of nutritional recommendations, their cost, and their implications in terms of food choices. She is currently developing new tools, such as individual diet modelling and nutrient profiling, to increase the quality of individual diets and to assess the nutritional quality of individual foods and their contribution to healthy diets.

Nicole Darmon has published over 50 papers in nutrition and public health peer-reviewed journals. She is doing lecturing for schools of Agriculture and Food Industry Engineering, and for Public Health and Nutrition Departments of Universities. She has been involved in the definition of the French Nutritional Recommendations, the French National Programme for Nutrition and Health, the French Food Security Programme, and the French Nutritional Recommendations or School Meals in France. As an expert of food poverty in industrialized countries or as an expert of diet optimization and nutrient profiling approaches, she is frequently invited to participate in national and international expert committees (AFSSA, EFSA, WHO).

She has received grants from the French Ministry of Health to evaluate the nutritional quality and economic value of Food Aid in France and the cost of the Nutritional Recommendations for School Meals. She was a team investigator of the French national research programme Pol-Nutrition, focused on the economic analysis of food and nutrition policies in France, and she is now involved in the Alim-Info program, aimed at analysing the impact of nutrition information on food choices and food prices. Nicole Darmon is also involved in the Euro-Prevob project, aimed at tackling the socioeconomic determinants of obesity and at developing tools to assist obesity policy analysis in Europe.

Fruit and Vegetables consumption of food insecure people in France

Nicole DARMON

The USDA Food Sufficiency Indicator[1] was used to assess the prevalence of food insecurity in France. Thus, individuals from the national dietary survey INCA2 who declared that, in their household, they had enough but not always the kinds of foods they want to eat, or that they had sometimes or often not enough to eat for financial reasons were classified as living in a "Food Insecure" (FI) household. FI adults were then compared to adults living in a Food Secure (FS) household, stratified by four levels of income (FS1 to FS4).

In 2006-7, 12% of adults lived in a FI household in France. The socio-demographic profile of people living in FI households was distinct from that of people who lived in a food secure but low-income household (FS1). Both FI and FS1 individuals did not eat much Fruit and Vegetables (F&V) compared to FS individuals with higher incomes (FS2, FS3 and FS4). However, FI individuals ate even less fruit and less vegetables than FS1 individuals (114 vs. 121 g/d of fresh fruits and 116 vs. 130 g/d of vegetables in FI vs. FS1, respectively). Both FI and FS1 individuals had a high consumption of cheap food sources of calories. However within these cheap foods, FS1 individuals preferentially consumed refined cereals, whereas FI individual households were characterised by a high consumption of sweet products. The table shows that, among the five categories of population studied, FI individuals had the diet with the lowest nutrient content and the highest energy density. The table also shows that the poor nutritional quality of FI individuals was mainly due their low consumption of F&V.

Mean Adequacy Ratio (MAR)[1] and mean Energy Density (ED)[2] of the diet of normo-reporters adults (18-79 y) from the INCA2 survey, depending on food insecurity (FI) and income (FS1 to FS4) levels of their households

N = 1591	FI	FS1	FS2	FS3	FS4	P
adjusted for age, sex and energy intake						
Fruit & Vegetables (g/day)	275.4	320.3	336.2	351.4	387.3	<0.01
MAR (% per day)	79.5	81.2	82.4	82.6	83.8	<0.001
ED (kcal/100 g)	173.6	167.3	165,3	166,4	164,2	<0.01
adjusted for age, sex, energy intake and for fruit and vegetable intake						
MAR (% per day)	81.1	81.7	82.7	82.7	83.1	<0.01
ED (kcal/100 g)	166.4	164.4	163.9	166.6	167.7	0.18

[1] MAR based on 16 nutrients; [2] ED based on the consumption of solid foods only

Actions aimed at increasing the consumption of F&V should be focused in food insecure and low income populations. The delivery of F&V vouchers could be tested. However, such an intervention should not be implemented through food aid organizations only, because, although they encompass an increasing number of people, they do not connect with the 12% of food insecure adults in France.

REFERENCE

1. Radimer KL. Measurement of household food security in the USA and other industrialised countries. Public Health Nutr. 2002;5:859-864.

SESSION 6

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Making the healthy choice the easy choice: the role of environmental change

David CRAWFORD

Director, Centre for Physical Activity and Nutrition Research, Deakin University

ADDRESS: Centre for Physical Activity and Nutrition Research 221 Burwood Highway
Burwood
3125 Australia

EMAIL: dcraw@deakin.edu.au

PHONE: +(61)-3-9244-6091

FAX: +(61)-3-9244-6017

BIOGRAPHICAL SKETCH

Professor David Crawford has almost 30 years experience in population health research, having previously worked with the CSIRO Division of Human Nutrition, and the National Centre for Epidemiology and Population Health in Australia, and the Division of Epidemiology at the University of Minnesota, USA. He is currently the Head of the School of Exercise and Nutrition Sciences and Director of the Centre for Physical Activity and Nutrition Research at Deakin University, Melbourne Australia. Professor Crawford also holds honorary positions with the EMGO Institute at the VU University, Amsterdam, and with the Cancer Council of Victoria. He is a past Vice-President of the Australasian Society for the Study of Obesity, a Co-Director of the Australian Childhood and Adolescent Obesity Research Network, and Editor-in-Chief of the International Journal of Behavioral Nutrition and Physical Activity. His research focuses on the behavioural, social and environmental influences on nutrition and physical activity, the epidemiology of overweight and obesity, and development and evaluation of obesity prevention strategies for children and adults. Professor Crawford has published over 170 papers these topics and has edited a major text on obesity prevention.

How important is the neighbourhood food environment in influencing Fruit and vegetables intakes? An Australian perspective

David CRAWFORD
and K. Ball, A. Timperio and L. Thornton

While a considerable body of research has examined the influence of personal factors (e.g. knowledge, attitudes, beliefs, preferences) and social factors (e.g. social support by family and peers) on Fruit and Vegetables (F&V) intake, less work has focused on factors in the local neighbourhood environment (e.g. access, availability, cost) that might impact on consumption. This is despite the fact that the environment is a potentially strong determinant of eating behaviours.

We have conducted a number of population studies in Victoria, Australia that have examined the association of environmental factors with F&V consumption among women and children. This paper will present findings from the HEAPS study (800 children), the SESAW study, (1500 women; in HEAPS and SESAW participants were selected from neighbourhoods across the socioeconomic spectrum), and the READI study (4300 women living in disadvantaged neighbourhoods). Each gathered sociodemographic, behavioural and other data on individual and social variables, and used Geographic Information Systems to objectively assess each participant's neighbourhood food environment. In the SESAW study we also gathered information on the availability and price of F&V in stores.

Analyses of the HEAPS data on children showed that the more fast food outlets and convenience stores there were close to home, the lower was the likelihood of consuming fruits two or more times/day. There was also an inverse relation between density of convenience stores and the likelihood of consuming vegetables three or more times/day. The likelihood of consuming vegetables three or more times/day was greater the further away children lived from a supermarket or a fast food outlet.

In READI we examined whether poorer access to major supermarkets, smaller supermarkets and F&V stores in local neighbourhoods was associated with lower intakes of F&V. Six variables were used to assess access. None of our measures of access were associated with vegetable intake, and only one (greater distance to the nearest F&V store) was associated with lower fruit consumption.

In the SESAW study we examined the role of individual, social and neighbourhood factors as mediators of the relation between Socio-Economic Status (SES) and F&V consumption. We found that while a number of the individual and social variables partly explained SES differences in consumption, store density did not mediate the relation between SES and F&V intakes.

In the SESAW study we also considered whether differences in intake across socioeconomically diverse neighbourhoods could be explained by the availability and price of F&V in those neighbourhoods or by store opening hours. Fruit intake did not vary by neighbourhood, while vegetable intake was lower among women living in disadvantages neighbourhoods. However the availability and price of vegetables and store opening hours did not explain neighbourhood differences in vegetable intake.

These findings, along with those from other studies conducted internationally, highlight the complexity of understanding the role of neighbourhood food environments as a determinant of F&V consumption. Future research, and policies and programs aimed at understanding and influencing the food environment, need to consider a broader range of contextual factors that impact on food choice and to better understand the ways in which individuals interact with their local environments.

SESSION
6

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Making the healthy choice the easy choice: the role of environmental change

Ange AIKENHEAD

Researcher, International Association for the Study of Obesity

ADDRESS: International Association for the Study of Obesity
28 Portland Place
London UK, W1B 1LY - UK

EMAIL: aaikenhead@iaso.org

PHONE: +(44) 7467 9613

FAX: +(44) 7636 9258

BIOGRAPHICAL SKETCH

- MSc Public Health Nutrition; London School of Hygiene & Tropical Medicine, UK
- BComm; Queen's University, Canada

Ange is a Researcher at the International Association for the Study of Obesity.

Food advertising to children – who wants tougher regulation?

Ange AIKENHEAD

Introduction

Obesity is a rapidly growing threat to public health in Europe, and marketing of potentially unhealthy food products is recognized as a possible factor in child obesity. Systematic reviews conducted in the UK in 2003[1], and a review undertaken for the European Parliament[2], concluded that, despite substantial gaps in the evidence, advertising had a sufficient effect on child obesity to warrant action.

In 2005 the EU Health Commissioner issued a call for the food industry to regulate itself, followed in 2007 by the Commission's White Paper on obesity which noted the need for action in this area and, while supporting voluntary initiatives, promised a review in 2010 to determine whether other approaches are required[3].

PolMark stands for Policies on Marketing foods and beverages to children. The project is designed to provide intelligence on opportunities for policy development to support the Commission's 2010 review and to provide information to the WHO European Network on marketing to children and the WHO headquarters' consultation on recommendations on marketing to children.

Methods

Face-to-face, semi-structured, digitally-recorded interviews were conducted between July 2008 and February 2009 with stakeholders from 8 different categories (including industry representatives, academics, consumer groups, public health advocates, government officials and children's organizations). Between 13 and 30 stakeholders were interviewed from each category for a total of 169 interviews across 11 EU countries. Stakeholder recruitment was conducted to reflect a broad range of relevant viewpoints from senior, national representatives in each sector. Interview questions were designed to investigate stakeholders' views of different regulatory approaches, explore whether stakeholders believe there is a relationship between marketing and obesity, assess if stakeholders are aware of the importance of obesity in their country, and examine what role stakeholders see themselves as having in influencing marketing policy.

Results

Two-thirds of interviewees believed that the current controls in their country were not sufficient: this was reflected across all stakeholder groups except for the food industry and advertising agencies. Statutory regulations were the preferred option for controlling advertising across all stakeholder groups with the exceptions of government officials and the food industry, where opinions were evenly divided, and for advertising agencies who felt strongly that self-regulation was best. Stakeholders from wealthy and influential organizations tended to believe that advertising had little impact on children, did not affect consumption and that there was too much regulation – in contrast smaller and less influential organizations tended to believe that advertising had a major influence, influenced consumption and that regulation needed to be strengthened.

Conclusion

Policy-makers need to appreciate that there is unlikely to be a satisfactory middle path between voluntary or self-regulatory controls on the one side and well-enforced statutory controls on the other. Any attempt to introduce new policies should recognize the political influence held by the commercial and economic interest on the one side, and the substantial public trust held by consumer, health and family organizations on the other.

Conflict of interest: None disclosed.

Funding: Research was supported by the European Commission's Executive Agency for Health and Consumers, the Norwegian Health Directorate, and the UK National Heart Forum European Union.

REFERENCES

1. Does Food Promotion Influence Children? A Systematic Review of the Evidence Food Standards Agency, London 2003.
See http://www.food.gov.uk/news/newsarchive/2003/sep/promote
2. Advertising and marketing practices on child obesity DG Internal Policies, European Parliament, Brussels, 2008. IP/A/ENVI/NT/2007-20 & 21. (PE 400.989)
3. A Strategy for Europe on Nutrition, Overweight and Obesity related health issues. COM(2007) 279 Page 6. Brussels.

SESSION 6

EUROPEAN PUBLIC POLICIES FOR LOW-INCOME POPULATION

Making the healthy choice the easy choice: the role of environmental change

Ritva PRÄTTÄLÄ
Senior Researcher

ADDRESS: National Institute for Health and Welfare
PO Box 30
00271 Helsinki
Finland

EMAIL: ritva.prattala@thl.fi

PHONE: +(358) 206108631

BIOGRAPHICAL SKETCH

Ritva Prättälä works as a senior researcher at the National Institute for Health and Welfare (earlier National Public Health Institute) in Helsinki, Finland since 1995. She is the leader of a team on health lifestyles and inequalities and vice director of the Department of Health, Functional Capacity and Welfare.

Ritva Prättälä got her doctoral degree at the University of Helsinki in 1989, Department of Nutrition. Her doctoral thesis dealt with food consumption patterns of Finnish adolescents and was among the first Finnish studies combining nutritional sciences and sociology. She has published some 120 scientific articles.

Ritva Prättälä's current research projects focus on:

- the contribution of health behaviors on health inequalities
- the impact of work and socioeconomic circumstances on physical activity
- trends and socio-economic variations in food habits and meal patterns
- health behaviors and self-assessed health in Finland and the Baltic countries

Vegetable consumption: what makes the difference, education of geography?

Ritva PRÄTTÄLÄ

People with a higher educational level or occupational status eat vegetables more often than those in lower socio-economic groups. The educational differences seem to be more systematic in Northern than in Southern Europe but little is known about the background of the varying educational patterns.

We examined the relationship of socio-economic position and vegetable consumption in nine European countries. The aim was to analyse whether the pattern of socio-economic variation in regard to vegetable consumption is similar in countries with high vs. low vegetable availability and affordability.

According to Food Balance Sheets from 1993 to 2003, the Southern European countries, France, Italy and Spain, showed high availability. In Finland, Denmark, Germany and the Baltic countries, the availability was lower but increased more than in the South. The relative prices were lowest in the Mediterranean countries and Germany and highest in the Baltic countries.

Individual level data on vegetable consumption was obtained from national surveys conducted in Finland, Denmark, Germany, Estonia, Latvia, Lithuania, France, Italy, and Spain in 1998 or later. These surveys included comparable data on the frequency of consumption of vegetables.

The pattern of socio-economic variation in relation to vegetable consumption differed by country. The most obvious difference was observed between the Mediterranean and the Northern European countries. In France, Spain and Italy, educational level had a weak effect on the use of vegetables: after adjusting for place of residence and occupation those having a higher educational level were found to consume slightly less vegetables than those with a lower educational level. In the Nordic and Baltic countries, the educational differences were greater and their direction was different: those with a higher educational level were more often daily users of vegetables.

Our results support the assumption that a positive association between educational level and vegetable consumption is related to the availability and affordability of vegetables. The positive association is observed in countries with a low availability and high prices, as compared to countries where the availability and affordability are higher.

Availability and affordability cannot be the only explanations for the varying educational patterns in regard to vegetable consumption. Cultural factors expressed in dietary traditions can also have an impact. In the Mediterranean countries, local production of vegetables has a long history. Local products were available throughout the year and therefore even the lower socio-economic groups could adapt them as an essential part of everyday cooking. In Northern Europe, vegetables were available only during summer, while in spring and winter imported products would occasionally be available but at a high price. Therefore, Northern Europeans have not developed a tradition of using vegetables on a daily basis. When more vegetables entered the market, the higher socio-economic groups were the first to buy them.

Both education and geography make the difference in vegetable consumption. In order to increase the use of vegetables among the lower socio-economic groups multiple measures reaching from price policies to nutrition education are needed.

Session 7

Round table: Addressing inequalities in diet in Europe

Animated by **Tim Lang**
Professor of Food Policy
City University

Participants:

J.J.R. Da Silva Breda
Senior Technical Officer
WHO

J. Brug
Director EMGO
Institute for Health and Care Research

P. Bruni
President
COGECA

I. Elmadfa
Director of Institute of Nutritional Sciences
University of Vienna

L. Hoelgaard
Deputy Director General
EC - DG Agri

I.M.C. Keller
Programme Coordinator Health
Executive Agency for Health and Consumers

M. Kosinska
Secretary General
EPHA

P. Testori Coggi
Director-General for Health and Consumers
EC - DGSanco

L. Serra-Majem
President
Mediterranean Diet Foundation

H. Verhagen
Professor
National Institute for Public Health and the Environment (RIVM)

Introductory presentation:
Quantifying health effects of not consuming Fruits and Vegetables: H. VERHAGEN

Specific questions:
1. Are voluntary measures effective enough, or would legislation be more cost-effective?
2. How do we build public support for measures that address health inequalities?
3. Is a framework agreement that addresses inequalities in nutrition policy an effective tool for Member States working with low income groups?
4. Is more research necessary, or is evidence sufficient for action?

Conclusion and final remarks

SESSION 7

ROUND TABLE:
Addressing inequalities in diet in Europe

Tim LANG
Professor of Food Policy

ADDRESS: Centre for Food Policy
City University, Northampton Square
London EC1V 0HB
UK

EMAIL: t.lang@city.ac.uk

PHONE: +(44)20-7040-8798

BIOGRAPHICAL SKETCH

Tim Lang has been Professor of Food Policy at City University's Centre for Food Policy since 2002. He was a hill farmer in Lancashire in the 1970s and for the last 30 years has engaged in public and academic research and debate about food policy. He was appointed a Commissioner on the UK Government's Sustainable Development Commission in 2006 and to the Council of Food Policy Advisors in 2008. His latest book, written with City colleagues David Barling and Martin Caraher is Food Policy: integrating health, environment & society (Oxford University Press, 2009).

João Joaquim Rodrigues Da SILVA BREDA
Senior Technical Officer

ADDRESS: WHO Regional Office for Europe
Scherfigsvej 8
DK-2100 Copenhagen
Denmark

EMAIL: JBR@euro.who.int

PHONE: +(45) 39 17 1620

FAX: +(45) 39 17 1818

BIOGRAPHICAL SKETCH

João Joaquim Rodrigues da Silva Breda, born January the 16th of 1967. Graduate in Nutritional Sciences by the Oporto University in 1991. Master in Public Health by the Medical Sciences Faculty of the Universidade Nova de Lisboa in 1996. Doctorate student at the Nutritional Sciences Faculty of the Oporto University and MBA in from the European University.

Senior Officer Noncommunicable diseases (Regional Adviser) Nutrition at WH Euro.

He was the Portuguese representative in the WHO-Europe for the area of Nutrition and Physical Activity and in the European Union is also the focal point from Portugal in the European Network on Nutrition and Physical Activity, at the High Level Group on Nutrition & PA and the European Platform on Diet, Nutrition and Physical Activity of the EU.

First and former Coordinator of the National Platform against Obesity under the Portuguese Ministry of Health.

Worked as a Public Health Nutritionist at the General Health Directorate in the Portuguese Ministry of Health.

As a graduate student participated in several courses, namely: Health Perspectives in the World, WHO – Copenhagen; Advanced Course in Nutritional and Lifestyle Epidemiology, Wageningen Agricultural University; Summer Course of Alcohol and Drug Studies, Rutgers University - State University of New Jersey; Erasmus Summer Programme. Erasmus University – Roterdam (advanced courses in epidemiology and biostatistics); Training the Trainees Course by the Portuguese Employment and Professional Training Institute in cooperation with the Tourism National Institute; European Educational Programme in Epidemiology – Florence. Food Habits, in Faculdade de Ciências da Nutrição e Alimentação – Oporto University; Mediterranean School of Biostatistics and Epidemiology, Calabria; Health Services Management – Harvard School of Public Health. .

Published in scientific journals and presented in national and international congresses, several dozens of papers and also published six original books.

He was Professor of Nutrition at the Universidade Atântica and course director of the Nutritional Sciences Degree, at the Hospitality School and Tourism of Coimbra and a Professor at the Faculty of Agriculture Faculty of Coimbra teaching Nutrition and Dietetics.

SESSION 7

ROUND TABLE:
Addressing inequalities in diet in Europe

Paolo BRUNI
President of COGECA

EMAIL: toso.s@confcooperative.it
PHONE: +(39) 0532 904520

BIOGRAPHICAL SKETCH

Since 2007, he has been first Vice-President of Cogeca, the General Confederation of Agricultural Cooperatives in the European Union, with headquarter situated in Brussels and in December 2009, he was elected President of COGECA.

He is member of the EPG Business Chamber of the European Union and of the High level group on the competitiveness of agrifood industry promoted by EU

He is President of the transnational firm at European level F.I.N.A.F. (First International Associations Fruit) and President of Conserves France, an industrial canned and preserved goods firm based in Nimes, France.

From 2003 to 2009, he was President of Fedagri-Confcooperative which, out of the whole agri and agri-food cooperative sector, is the largest Italian organisation in terms of cooperatives and number of members.

He holds the position of President of Apo Conerpo, the biggest european fruit and vegetable producer organisation, which brings together 10,000 farms through a cooperative system mainly from Emilia-Romagna, Tuscany and Puglia.

He is President of the C.S.O. - Centro Servizi Ortofrutticoli -, a company that deals with statistics and market observatory, promotion and valorisation and monitoring on legislation and certification systems of the fruit and vegetable sector.

He is Vice-President of Conserve Italia, a business comprising the brands Yoga, Derby, Valfrutta, Cirio-De Rica. He is a board member of the cooperative Patfrut which gathers over 1,000 agricultural producers.

He has been an adviser to the Banca Popolare di Roma.

Since 1991, he has been commander of the Equestrian Order of the Holy Sepulchre of Jerusalem.

During recent years, he has been committed to promoting agri-food cooperatives as an eminent representative taking the image of the agri-food sector to uppermost heights, thanks to several interviews during TV emissions devoted to agriculture, appearing on programmes such as Porta a Porta, Uno Mattina or even Linea Verde, to name but a few.

Monika KOSINSKA

ADDRESS: EPHA
Rue de Treves 49-51
1040 Brussels - Belgium
EMAIL: monika@epha.org
PHONE: +(32) 2 230 30 56

BIOGRAPHICAL SKETCH

Monika Kosińska is the Secretary General of the European Public Health Alliance (EPHA). She has wide range experience in managing teams, networking and advocacy in the public and private sectors, and extensive knowledge of public health issues at EU and national level. Her previous employments include representing regional health bodies in Brussels, government relations for a major retail group, and interim director for an alliance on health and ageing. Monika holds a Bachelor of European Studies from the University of Liverpool, and a Masters degree in International Peace and Security from King's College, University of London.

SESSION 7

ROUND TABLE:
Addressing inequalities in diet in Europe

Paola TESTORI COGGI

Director General of the Directorate General for Health and Consumers

BIOGRAPHICAL SKETCH

Academic qualifications:

- 1976-1978: Master degree in Ecotoxicology at the University of Milan, Italy
- 1972-1976: University Degree in Biological Sciences, University of Milan, Italy

Other qualifications

- 2008: Doctor Honoris Causa in Veterinary Medicine at the University of Cluj, Romania

Professional experience in the European Institutions:

- April 2010 to date: Director General of the Directorate General for Health and Consumers
- August 2007 – March 2010: Deputy Director General of the Directorate General for Health and Consumers
- April 2000 – July 2007: Director for Food Safety in the Directorate General for Health and Consumer Protection.
- September 1999 – March 2000: Adviser in the Directorate General Health and Consumer Protection.
- February 1997 - September 1999: Adviser in the Cabinet of Commissioner Bonino, responsible for consumer health and food safety.
- December 1996- February 1997: Head of Unit "Administrative co-ordination and general affairs" in the Joint Research Centre (JRC)
- January 1993-December 1996: Assistant to the Director General of the Joint Research Centre.
- September 1990-December 1992: Member of Cabinet of Vice President Pandolfi, responsible for the R&D programmes.
- June 1983-August 1990: Administrator, Directorate General for Environment, Division "Environmental control of products, industrial installations and biotechnology".
- September 1982-May 1983: Auxiliary agent, Directorate General for Environment, Division "Prevention and reduction of pollution".

Professional experience before joining the European Institutions:

- September 1981-August 1982: Administrator of Regione Lombardia, detached as national expert to the European Commission Directorate General for Environment
- September 1980-August 1981: Administrator, Ecology Department, Regione Lombardia
- September 1978-August 1980: Researcher at the Institute for Water Research, Consiglio Nazionale delle Ricerche, Milano, Italy

SESSION 7

ROUND TABLE:
Addressing inequalities in diet in Europe

Hans VERHAGEN

Professor

ADDRESS: National Institute for Public Health and the Environment (RIVM)
PO Box 1 - 3720 BA
Bilthoven
The Netherlands

EMAIL: Hans.Verhagen@rivm.nl

PHONE: +(31) 30 274 3391

BIOGRAPHICAL SKETCH

Prof. Hans Verhagen (1957) studied chemistry at the Universities of Nijmegen (NL) and Paris (FR). He did his PhD on food toxicology at the University of Maastricht (NL; thesis in 1989). From 1990-2000 he worked at the TNO Nutrition and Food Research Institute in Zeist (NL). From 2000-2005 he worked for Unilever in Vlaardingen (NL). Since May 2005 he is Head of the Centre for Nutrition and Health at the National Institute for Public Health and the Environment (RIVM), Bilthoven, NL (www.rivm.nl/en). He is frequently asked to lecture and chair at international scientific meetings. He is a regular member of international scientific committees and is editorial board member of various scientific journals. From 1999-2004 he was editor-in-chief of "Food & Chemical Toxicology" (http://www.elsevier.com/locate/foodchemtox). He is a board-certified nutritionist (since 2005) and a board-certified toxicologist (since 1990). Since July 2006 he is a member of the EFSA-NDA panel (European Food Safety Authority: Nutrition, Dietetic products and Allergies; http://www.efsa.europa.eu/EFSA/ScientificPanels/efsa_locale-1178620753812_NDA.htm). Current scientific interests are scientific substantiation of health claims, integrated benefit-risk assessment, novel foods, nutritional safety, food fortification, biomarkers, antioxidants. Since 2009 he holds an honorary position at the University of Maastricht (NL). Since November 2009 he is a visiting professor at the University of Ulster (UK).

Quantifying health effects of not consuming Fruit and Vegetables

Hans VERHAGEN
and D. van der A, F. Büchner, B. Bueno-de-Mesquita, H. Hendriks, J. Hoekstra, H. Peppelenbos, J. van Raaij, C. van Rossum, R. Witkamp, E. Woltering, F. van Duijnhoven

The health benefits of a diet rich in Fruit and Vegetables (F&V) is well recognized. F&V consumption has been associated with decreased risks for a variety of chronic diseases, such as cardiovascular diseases, diabetes, obesity, and certain types of cancer. Exactly how high the consumption of F&V must be in order to achieve these reductions in risk is not clear. Nevertheless, given the mounting evidence suggestive of a potential benefit, recommendations for the consumption of F&V have been issued by most national and international health agencies. As a population-wide intake goal, the WHO recommends the consumption of a minimum of 400 grams of F&V a day[1]. In the Netherlands, less than 25% of the population meets these recommendations[2].

The health effects of not consuming the recommended intake of F&V can be quantified by model simulations, in which the actual consumption (0-scenario) is compared with the recommended scenario. This has been calculated in depth for The Netherlands[3]. In comparison with the recommended situation, the life expectancy of newborns is 0.41 years shorter for a low vegetable consumption (Table 1). In addition, 34,000 number of deaths and 0.5 billion euros (net present value) of health care costs in the next 20 years are attributable to a low consumption of vegetables. For fruit consumption, the numbers are even larger: the life expectancy of newborns is 0.47 years shorter and a low consumption of fruits will result in 60,000 deaths and 1.9 billion euros in health care costs over the next 20 years. It should be kept in mind, however, that these numbers are based on models using certain conditions and assumptions.

The health loss due to not consuming the recommended intake of F&V is considerable and is many times greater than that attributable to food that is unsafe due to health-threatening substances[2] (Table 2). In other words, much greater health gains are to be made through encouraging a healthy diet than through improving food safety.

The greatest effects on public health are expected from policy geared towards an integrated strategy, in which both the supply side as well as the consumer and his or her environment is addressed. Therefore, a major challenge for the authorities, the food industry, science and the consumer lies ahead. This challenge may be tackled by joint programming, in which science and technology join forces to contribute more to large social themes, such as a healthy diet for a healthy life. In the Netherlands, such integrated approach is already taking place: the Ministry of Health, Welfare and Sport and the Ministry of Agriculture, Nature and Food Quality have aligned the programming of their respective research and knowledge institutes [National Institute for Public Health and the Environment (RIVM), TNO Quality of Life (TNO) and Wageningen University and Research Center (WUR)] in the area of F&V as well as food reformulation.

Table 1. Health loss in life expectancy, number of deaths and health care costs in the Netherlands due to a low consumption of F&V (0-scenario versus recommended scenario)[3].

Factor	Life expectancy for newborns (years)	Number of deaths next 20 years	Health care costs in next 20 years (net present value; euros)
Fruits	- 0.47	60,000	1.9 billion
Vegetables	- 0.41	34,000	0.5 billion

Table 2. Comparing estimated health loss and potential health gain by healthy diet and unsafe food in the Netherlands[2].

Factor	Number of deaths / year	DALYs* / year
Diet composition in total#	13,000	245,000
- of which fruits	5,000	95,000
- of which vegetables	2,500	47,000
Bodyweight	7,000	215,000
Foodborne infections by known pathogens	20-200	1,000-4,000
Chemical constituents	100-200	1,500-2,000
Food Safety in total	120-400	2,500-6,000

* DALYs = Disability Adjusted Life Years
# Diet composition of 5 factors (fruits, vegetables, fish, saturated fatty acids and trans fatty acids)

REFERENCE

1. World Health Organization. Diet, nutrition and the prevention of chronic diseases - Report of the joint WHO/FAO expert consultation. WHO Technical Report Series, No. 916 (TRS 916), 2003. http://www.who.int/dietphysicalactivity/publications/trs916/en/index.html

2. Kreijl CF, Knaap AGAC, van Raaij JMA, (eds). Our food, our health - Healthy diet and safe food in the Netherlands. RIVM report 270555009, 2006. http://www.rivm.nl/bibliotheek/rapporten/270555009.html

3. Buchner FL, Hoekstra J, van den Berg SW, Wieleman F, van Rossum CTM. Quantifying health effects of nutrition (in Dutch). RIVM report 350080001, 2007. http://www.rivm.nl/bibliotheek/rapporten/350080001.html

EGEA 2010 Poster Awards

To young and Senior researchers will be delivered by:

B. PITON, Chair of the Agency for Research and Information in Fruits and Vegetables: **APRIFEL**

L. Disogra, on behalf of the International Fruit and Vegetable Alliance: **IFAVA**

Y. Desjardins, Chair of the International Society for Horticultural Science: **ISHS**

G. Fayard, General Manager of the European Fruits and Vegetables Cluster: **PEIFL**

M. Gerber, Delegate of the Executive and Scientific Councils of French Nutrition Society: **SFN**

Poster abstracts

Themes

Poster abstracts

Observational studies: Fruit and Vegetables nutrition in different age groups

P01 FOOD HABITS OF AN IMMIGRANT GROUP FROM SPAIN

CORRESPONDING AUTHOR:
Susana DEL POZO DE LA CALLE
FEN.
c/ General Álvarez de Castro, 20, 1ª pta, 28010 Madrid
EMAIL: susanadelpozo@fenorg.es

ÁVILA, José Manuel[1], DEL POZO, Susana[1]; CUADRADO Carmen[1], GARCÍA Vanesa[1], MOREIRAS Olga[1], RUIZ Emma[1], VALERO, Teresa[1], VARELA Gregorio[1, 2]
1. Spanish Nutrition Foundation (FEN)
2. CEU San Pablo University

Spanish society is undergoing a major transformation, due to the percentage of immigrant population, which hasn´t been linked to knowledge about the eating habits of this group.

The aim of this paper is to study the feeding habits of the immigrant population, with particular attention to the consumption of vegetables and fruits, and if necessary develop strategies to improve these habits.

A study was conducted between Ministry of Environment and Rural and Marine Affairs and FEN (2009) on the dietary pattern of the immigrant population, resident in Spain, from Eastern Europe, Africa, Central and South America and Asia.

The consumption of fruits and vegetables is lower than recommended. Specifically, people from Africa, was the population who made a less consumption of these food groups.

Probably one of the causes of this low intake may be the ignorance of fruit and vegetables from the country of destination.

	Recommended	Eastern Europe	Africa	Central and South America	Asia
Vegetables servings/day	≥2-3	1.13	0.83	1.11	1.18
Fruits servings/day	≥2-3	1.16	1.16	1.20	1.00

Don`t cover the recommended intake of some nutrients found primarily in fruits and vegetables.

Adjustment to the daily recommended intake (%)

	Eastern Europe		Africa		Central-South America		Asia	
	Men	Women	Men	Women	Men	Women	Men	Women
Magnesium	122	134	120	119	132	138	131	103
Vitamin A	66	82	69	82	58	78	69	65
Folic acid	88	93	80	75	85	89	102	86
Vitamin C	349	345	328	303	302	334	406	360

We need to develop campaigns in order to improve the consumption of fruits and vegetables in low-income population, as immigrants.

These campaigns should be focused on fomenting the country's food of destiny, in order to avoid malnutrition, for not finding foods of native land and teach the positive effects of fruits and vegetables on health.

P02 COMPLIANCE WITH WHO DIETARY GOALS IN PORTUGAL - 1961 TO 2003

CORRESPONDING AUTHOR:
Sara RODRIGUES
Faculty of Nutrition and Food Sciences, Porto University Frias Roberto
Str, 4200-465 Porto, Portugal
EMAIL: saraspr@fcna.up.pt

CRUZ Graça, RODRIGUES Sara
Faculty of Nutrition and Food Sciences, Porto University

Introduction: Epidemiological research has accumulated evidence to support the consistent role of diet in the development of a range of chronic non communicable diseases. Population goals consistent with its prevention have been set by several entities. Evaluating attainment to these recommendations is thus essential to assess population's threat.

Objectives: To evaluate along time Portuguese's compliance with WHO population dietary goals for the prevention of diet-related chronic diseases.

Methodology: The Portuguese FAO food balance sheets (FBS) data from 1961 to 2003 (a 42 years period) were used. An adjusted version of the Healthy Diet Indicator (HDI) diet-quality index was applied. With a possible range from 0 to 7, HDI components included compliance with WHO goals for total fat, protein, carbohydrates, sugars, fruit/vegetables, pulses/nuts and alcohol. To assess association between HDI (or each component values) and time Spearman's (or Pearson's) correlation was used.

Results: Along time, HDI significantly decreased (r=-0.916; p=0.0001); its values varied from 3 (in 1989 and 2003) to 6 (from 1961 to 1964). In the studied period the availability of sugars, pulses/nuts and alcohol significantly decreased. On the contrary, total fat, protein and fruit/vegetables significantly increased. Furthermore, fruit/vegetables supply has always been superior to the minimum of 400g/person/day proposed by WHO.

Conclusion: Despite their methodological constraints, FBS are the only available data allowing the study of so long time trends in Portugal. Although a general decrease in diet-quality was observed, fruit/vegetables availability has shown a positive trend. However, individual based nationally representative studies to clarify dietary intake, namely fruit/vegetables, are still missing for the Portuguese population.

P03 ESTIMATED INTAKE OF PHYTOESTROGENS FROM VEGETABLES IN THE DIET OF SPANISH WOMEN

CORRESPONDING AUTHOR:
Fatima OLEA-SERRANO
Department of Nutrition and Food Science, University of Granada
Campus de Cartuja s/n
18071 Granada, Spain
EMAIL: folea@ugr.es

HERNÁNDEZ-ELIZONDO Jessenia[1, 2], MARISCAL-ARCAS Miguel[2], MONTEAGUDO Celia[2], RIVAS Ana[2], MURCIA MªAntonia[3], OLEA-SERRANO Fatima[2]

1. School of Physical Education and Sports. University of Costa Rica.
2. Department of Nutrition and Food Science, University of Granada, Campus de Cartuja s/n, 18071 Granada, Spain
3. Department of Food Science, Veterinary Faculty, Campus de Espinardo, University of Murcia, Apdo. Correos 4021, E-30008-Murcia, Spain

Phytoestrogens are natural compounds that form part of numerous foods of vegetable origin, and nutritional epidemiological studies have suggested that they might lower the risk of coronary or hormone-dependent diseases. The Mediterranean diet has also been proposed to reduce the prevalence of cardiovascular diseases and cancer, among other chronic conditions. All 120 women studied completed a food frequency questionnaire containing 144 food items, including all foods with known concentrations of phytoestrogens. The mean phytoestrogen intake was 0.80 (0.85) mg/day (calculated in daidzein-equivalent values). The total isoflavone intake was 0.273 mg/day and lignan intake was 1.09 mg/day. Linear regression analysis was applied to estimate the total intake of phytoestrogens (referred to daidzein) from the daily intake (in g) of food groups that potentially supply phytoestrogens, obtaining R=0.918 and F= 24.448 (p=0.001). In this study of Spanish women, the mean phytoestrogen intake was similar to findings in other Western populations. In conclusion, the estrogenic activity of vegetables and other phytoestrogen-rich foods (pulses, spinach, parsley, saffron, coriander, fennel, etc) may contribute to the protective effect attributed to the Mediterranean Diet.

P04 MEAN FRUIT AND VEGETABLE CONSUMPTION OF ANDALUSIAN SCHOOLCHILDREN AND ESTIMATION OF ITS CONTRIBUTION TO DAILY MICRONUTRIENT REQUIREMENTS

CORRESPONDING AUTHOR:
Fatima OLEA-SERRANO
Department of Nutrition and Food Science, University of Granada
Campus de Cartuja s/n
18071 Granada, Spain
EMAIL: folea@ugr.es

MARISCAL-ARCAS Miguel[1], HANDAM May[1], MONTEAGUDO Celia[1], MARTIN VILLO Carmen[1], LORENZO M Luisa[1], LÓPEZ MARTINEZ C[2], OLEA–SERRANO Fatima[1]

1. Department of Nutrition and Food Science
2. Department of Chemistry and Physic. University of Granada, Campus de Cartuja s/n, 18071 Granada, Spain

The consumption of Fruit and Vegetables (F&V) is of great importance in the Mediterranean Diet, occupying the second level of the Mediterranean food pyramid. The supply of micronutrients from F&V can be decisive in the total daily intake, and a low F&V consumption can result in a reduced intake of certain vitamins and minerals. The objective was to estimate the frequency of F&V consumption in a population of children and adolescents aged 6-17 years (n=3190) from Southern Spain and to evaluate its contribution to the total supply of daily required nutrients. We used a questionnaire previously validated by our group that contains specific items on the daily consumption of F&V and their amount and type. The mean daily consumption by the study population was 3.18 portions of F&V, containing 171.75 g of fruit and 207.74 g of vegetables. These values are below the recommended 5 portions/day and the mean daily intake of 420-520 g of F&V estimated for the Spanish population in 2009 (http://www.agrovia.com). The frequency of F&V consumption was higher at lunch than at the evening meal. We highlight that F&V consumption contributes 81.37% of the total daily folic acid intake and 68.94% of the vitamin C intake. It also contributes at least 50% of the daily requirement for the other minerals and vitamins considered. These schoolchildren appeared to be aware of the value of F&V consumption, which most of them consumed every day. However, the intake of each food group was well below recommendations.

P05 TRENDS IN FRUIT AND VEGETABLE CONSUMPTION AMONG NORWEGIAN ADOLESCENTS FROM 2001 TO 2008

CORRESPONDING AUTHOR:
Marit HILSEN
Address1: University of Agder, Faculty of Health and Sport, Serviceboks 422
4604 Kristiansand, Norway
Address 2: University of Oslo, Department of Nutrition, Postboks 1046 Blindern
0316 Oslo, Norway
EMAIL: marit.hilsen@uia.no

HILSEN Marit[1, 2]; KLEPP Knut-Inge[2]; BERE Elling[1]
1. Faculty of Health and Sport, University of Agder, Norway
2. Department of Nutrition, Faculty of Medicine, University of Oslo, Norway

Purpose: To compare the Fruit and Vegetable (F&V) intake among Norwegian 6th and 7th graders in 2001 and in 2008 in relation to gender and socioeconomic status. Potential mediators (accessibility and preferences) were also assessed.

Methods: The baseline questionnaire survey for the FVMM cohort project was conducted in September 2001 at 38 randomly chosen schools in two Norwegian counties. A second survey was conducted at the same schools in September 2008. A total of 27 schools participated in both surveys (2001 n=1488, 2008 n=1339). F&V intake was measured by four food frequency questions (times/week). Socioeconomic status was based on parents' reports of their own educational level (dichotomised). Data were analysed with multilevel regression models (MIXED procedure in SPSS 14).

Results: A decrease in F&V intake from 14.2 to 13.9 times/week among 6th and 7th graders at the 27 schools was observed from 2001 to 2008 ($p<0.001$). The year*parental educational level interaction was significant ($p=0.01$). The F&V intake decreased among pupils of parents without higher education (13.9 vs. 12.6 times/week in 2001 and 2008, respectively), but increased among pupils of parents with higher education (14.8 vs. 15.0 times/week, respectively). When including preferences and/or accessibility in the model, the year*parental educational level interaction was no longer significant. The year*sex interaction was not significant ($p=0.54$).

Conclusion: This study shows an increase in socioeconomic disparities in 6th and 7th graders F&V intake from 2001 to 2008, partly mediated by accessibility and preferences.

Keywords: Fruit and vegetable intake, time trends, gender, socioeconomic status

P06 FRUIT AND VEGETABLE CONSUMPTION AND ITS CONTRIBUTION TO FOLATE INTAKE IN THE DIET OF AUSTRIAN ELDERLY

CORRESPONDING AUTHOR:
Katharina MAIERHOFER
Department of Nutritional Sciences - University of Vienna, Althanstrasse 14, 1090 Vienna Austria.
EMAIL: katharina.maierhofer@univie.ac.at

MAIERHOFER Katharina, ELMADFA, Ibrahim
Department of Nutritional Sciences, University of Vienna, Austria.

Objectives: The objective was (1) to describe the fruit and vegetable consumption in the Austrian elderly population and (2) to assess the association between the food group consumption and the dietary folate intake.

Methods: Representative fruit and vegetable consumption data were assessed by 3-d-food records of 423 Austrian (302 female, 121 male) non-frail elderly (56–100y), living in private households (PH) and nursing homes (NH). The calculation of nutrient intake and food group consumption was based on the German nutrient database (BLS II.3). Fruit and vegetable consumption was correlated with dietary folate intake of the elderly.

Results: The elderly consumed 141g/d vegetables on average. Elderly living in PHs (151g/d) ate 13% ($p<.001$) more vegetables than elderly living in NHs (116g/d). The mean fruit consumption was 230g/d. Elderly living in NHs (246g/d) consumed ($p<.05$) more fruits than those in PHs (223g/d); particularly men in NHs ate 30% more fruits ($p<.001$) than men in PHs. The mean dietary intake of folate was 173µg/d. The sample was divided into quartiles of fruit and vegetables intake (Q1: 0-106 g, Q2: 107-216 g, Q3: 217-339 g, Q4: 340-489 g); mean folate intake in Q1, Q2, Q3, and Q4 was 125, 157, 187, and 221 µg, respectively.

A significant association between the folate intake and both fruits (rsp=.45) and vegetables (rsp=.55) was found. Fruits contributed to folate intake to14%, vegetables to 20%.

Conclusion: In the diet of Austrian elderly fruits and particularly vegetables contributed to folate intake up to one fifth. Folate has also been identified as a nutrient at risk in the Austrian elderly population. Results showed potential for increase in folate consumption, especially through vegetable consumption.

P07 COMPARISON AND EVALUATION OF RELIABILITY OF DIFFERENT INDEXES OF ADHERENCE TO THE MEDITERRANEAN DIET

CORRESPONDING AUTHOR:
Josep Lluis CARRASCO
Biostatistics, Department of Public Health
University of Barcelona
Spain
EMAIL: jlcarrasco@ub.edu

MILÀ Raimon[1], BACH Anna[2], PUIG Josep[1], PUCHAL Anna[3], FARRAN Andreu[4], SERRA-MAJEM Lluis[2, 5], CARRASCO Josep Lluis[1]

1. Biostatistics, Department of Public Health, University of Barcelona, Spain.
2. Mediterranean Diet Foundation, University of Barcelona Science Park, Spain.
3. Center for superior studies on human nutrition and dietetics (CESNID) University of Barcelona.
4. Department of nutrition and bromathology. University of Barcelona, Spain.
5. Department of Clinical Sciences, University of Las Palmas de Gran Canaria, Spain.

Introduction: There are several indexes assessing the adherence to Mediterranean diet. These indexes summaries the diet by means of a single score that results from a function of different components, such as food, food groups or a combination of foods and nutrients.

Objectives: The aim of this study was to compare and evaluate the reliability of different indexes that measure adherence to the Mediterranean dietary pattern.

Material and methods: The target population of the survey was the human and nutrition student population of the University of Barcelona, Spain (n=324). The ten indexes considered for the analysis were: MDS[1], MS[2], DS[3], Med-DQI[4], MDP adherence index[5], MAI[6], MSDPS[7], MeDiet- PREDIMED study[8], rMED[9] and Cardioprotective Mediterranean diet index[10]. The association among the indexes was assessed applying the Spearman's coefficient of correlation. A factor analysis was carried out using the correlations among indexes. All analysis were done using the statistical package SAS v 9.1.

Results: The highest correlations were observed between MDS-rMED (0.83), MDP adherence index-MAI (0.82), MAI-MSDPS (0.80) and Med_DQI-MAI (0.70). The remaining correlations were fair (0.5-0.7) or poor (<0.5). Factor analysis showed a hidden common factor that explained more than 70% of the variability (71.03%). This factor can be understood as "Adherence to the Mediterranean Diet", and the indexes that correlated more with this factor were Med-DQI (0.85), MDS (0.83), rMED (0.82), MAI (0.80) and MDP adherence index (0.76), showing a good level of reliability on measuring the adherence to the Mediterranean diet. Moreover, there is a second common factor that explained 18% of the variability. This second factor is related to dairy products, saturated fatty acids and poultry and game meat which are those food components that had have different treatment between indexes.

Conclusions: In general, the indexes perform quite well in measuring the adherence to Mediterranean diet. However, the lack of high correlation among them indicates the need of a better agreement about the components involved in the Mediterranean diet pattern and specifically the dairy products, saturated fatty acids and poultry and game meat.

BIBLIOGRAPHY:

1. Trichopoulou A et al. (2005) British Medical Journal 330 991 – 7
2. Goulet J et al. (2003) Atherosclerosis 170 115 – 24
3. Panagiotakos D et al. (2004) Medical Science Monitor 10 193 – 8
4. Gerber M (2006) Public Health Nutrition 9 147 – 51
5. Sanchez-Villegas A et al. (2002) European Journal of Nutrition 41 249 – 57
6. Alberti-Fidanza A et al. (1999) European Journal of Clinical Nutrition 53 854 – 60
7. Marcella E et al. (2009) J Nutr. 139: 1150-1156.
8. Sanchez-Taınta A et al. (2008) European Journal of Cardiovascular Prevention and Rehabilitation 15:589–593
9. Buckland G et al. (2009) American Journal of Epidemiology. 170:1518–1529
10. Martınez-Gonzalez MA et al. (2004) European Journal of Clinical Nutrition. 1–3

P08 IMPACT OF CONSUMPTION OF FRUIT AND VEGETABLES ON MICRONUTRIENT STATUS IN PREGNANT AUSTRIAN WOMEN

CORRESPONDING AUTHOR:
Petra RUST
Department of Nutritional SciencesUniversity of Vienna,
Althanstrasse 14
1090 Vienna, Austria.
EMAIL: petra.rust@univie.ac.at

RUST Petra, ELMADFA Ibrahim
Department of Nutritional Sciences, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria

In recent years, a large number of studies have examined the role of the mother's diet during pregnancy on health in later stages of life. Thus, it is very important to place emphasis on pregnant women's diet in ensuring foetal and maternal health. One of the relevant nutritional factors during pregnancy is the intake of specific micronutrients such as folate, vitamin C, and carotenoids. These are plentiful in fruit and vegetables. We hypothesized that increased intake of fruit and vegetables would promote status of these specific micronutrients.

Altogether 1580 pregnant women took part in a representative survey on nutrition and health behavior, within a subsample (n= 133) of expecting women blood samples were analyzed. 69 of child-bearing women were Austrian and 44 had an immigration background. 82% of the women took vitamins and minerals.

On average pregnant women consume 2.02±0.98 times a day vegetables, 2.23±1.14 portions of fruit and 0.76±0.51 times per day fruit or vegetable juice. No significant differences between Austrian and women with immigration background were observed. Almost half of the women achieved the recommendation of "5aday". The mother's origin had no impact. No differences of folate, vitamin C, and carotenoid plasma concentrations were noticed between women who reached 5aday and those with lower intake, however. Information about the specific needs during pregnancy didn't influence the intake of fruit and vegetables.

Consumption of fruit and vegetables had no impact on specific micronutrient concentrations in plasma but could improve mother's health by other possible bioactive constituents of plants, such as phytochemicals.

P09 DIFFERENCES IN DIETARY INTAKE AND FRUITS AND VEGETABLES CONSUMPTION PATTERNS BETWEEN ISRAELI IMMIGRANTS FROM THE FORMER USSR AND NATIVE ISRAELI POPULATION

CORRESPONDING AUTHOR:
Abraham The S. Daniel International Center for Health and Nutrition, Ben-Gurion University, Israel
(WP2.3.2-Partner 18)

Shahar DR, Manof A, Vardi H, Fraser D
The S. Daniel Abraham International Center for Health and Nutrition

Background: Israel is a typical nation of immigrants, characterized by a multi-ethnic society. The largest ethnic group is from the former USSR (13%). In the south, this group comprises approximately 25% of the population. These immigrants are characterized by high prevalence of overweight and chronic diseases and their traditional diet is high in refined carbohydrates, meats and dairy products, and low in vegetables and fruits.

Objective: To compare the dietary intake, particularly fruits and vegetables as well as the prevalence of selected chronic diseases of immigrants from the former USSR with those of native Israelis.

Methods: We surveyed a random sample of adults, age 35 and older in Southern Israel. Participants were interviewed for dietary intake using a 24-hour food questionnaire with additional questions regarding health and eating habits. Dietary intake was compared between the former USSR immigrants (migrated after 1970) and native Israelis.

Results: A total of 1017 people were interviewed for the current study, 254 (25%) were immigrants from the former USSR and 764 (75%) native Israelis. The immigrant group had significantly higher BMI (27.6 ± 5.0 vs. 26.5 ± 4.7) despite lower reported daily energy intake (1547.8 ± 683.7kcal vs. 1714.4 ± 781.9kcal). They reported significantly less frequently 'good' health status (51% vs. 74%), higher prevalence of heart disease (17% vs. 9%) and of hypertension (37% vs. 24%). The immigrants consumed significantly less vitamin C, D and E, folate, B6, calcium, iron, selenium, zinc and magnesium but had a higher intake of beta carotene. The immigrants tended to consume less vegetables, with significantly lower daily intake of green vegetables (43.3 ± 78.8g vs. 58.5 ± 102.3g) and higher intake of potatoes (21.3 ± 65.0g vs. 14.2 ± 54.6g). In a multivariate analysis to predict the prevalence of at least one chronic disease, only age and percent protein intake came out significant (OR=1.07, CI: 1.05-1.09 for age and OR=1.05, CI: 1.01-1.1 for percent protein intake). No association was shown between immigration status and chronic diseases.

Conclusion: In this comparison of dietary intake between immigrants from the former USSR and native Israelis we found that immigrants had a higher BMI and higher prevalence of chronic diseases. They tended to consume less vegetables and had a lower intake of vitamins and minerals compared with native Israelis. Russian immigrants should be encouraged to consume more vegetables in order to increase their vitamin and mineral intake and improve their diet quality.

Funding acknowledgements This work was completed on behalf of the EuroFIR consortium and funded under the EU 6th Framework Food Quality and Safety Programme (FOOD-CT-2005-513944) and supported by the S. Daniel Abraham International Center for Health and Nutrition, Ben-Gurion University of the Negev.

Conflict of interest: None

P10 RAISING FRUITS AND VEGETABLES UP TO 400G PER DAY IMPROVES THE OVERALL PROFILE OF NUTRIENT INTAKES BUT IS NOT SUFFICIENT TO FULFIL REQUIREMENTS, EVEN FOR FRUIT AND VEGETABLES-SPECIFIC

CORRESPONDING AUTHOR:
Florent VIEUX
U476/INRA 1260
Faculté de médecine la Timone
27 Bd Jean Moulin
13385 Marseille Cedex 05 - France
EMAIL:
florent.vieux@etumel.univmed.fr

VIEUX Florent[1], MAILLOT Matthieu[1], SOLER Louis Georges[2], AMIOT Marie Josèphe[1], DARMON Nicole[1]
1. INSERM U476/INRA 1260, Faculté de médecine la Timone, Marseille
2. INRA 1303 - Aliss (Alimentation et Sciences Sociales)

Aim: To quantify the variation in nutrient intakes induced by increasing fruit and vegetables (FV) consumption up to 400g/d, as recommended.

Materials and method: Dietary data (7-day records) of adults from the French INCA2 survey who consumed less than 400g/d of FV (N=929 among 1918 participants) were used. Starting from each observed diet, a modelled diet that contained 400g/d of FV (including nuts and processed FV) was designed. Deviation from each individual food intake pattern was minimized and the energy content was set equal to the observed intake. To compensate for the increase in energy from FV, a reduction of high-fat high-sugar foods (namely animal fat, salted aperitif-foods and/or sweets) was allowed.

Results: To raise the FV content of each diet up to 400g/d while keeping total energy constant, a mean decrease of 67 kcal from high-fat high-sugar foods was needed. Energy density (solid foods) decreased from 185 to 164 kcal/100g and the mean adequacy ratio for 22 nutrients increased from 78.8 to 81.9%. Intakes were improved for most nutrients but this was not sufficient to fulfil the estimated average requirements (EAR). For instance, the percentage of modelled diets fulfilling the EAR for vitamin C (>85 mg/d) only increased from 23% to 46%.

Conclusion: Increasing the intake of FV up to 400g/d is likely to improve the overall pattern of nutrient intakes but is not sufficient to fully optimize nutritional quality. A recent study suggests that a higher level (approx. 550 g/d) should be recommended (Maillot et al, AJCN, 2010).

Poster abstracts

Produce and Process

P11 HOW MUCH IS LEFT OF VITAMIN C IN VEGETABLES PROCESSED BY METHODS USED IN CATERING AND FOODSERVICES?

CORRESPONDING AUTHOR:
Pernille BAARDSETH
Nofima Mat AS, Osloveien 1,
NO-1430 Ås,
Norway
EMAIL:
pernille.baardseth@nofima.no

BAARDSETH Pernille
Nofima Mat AS, NO-1430 Ås, Norway, & President of Norwegian Nutrition Society adhering body to IUNS and FENS

Objectives

Many vegetable are consumed fresh, but others are blanched and frozen, and further processed to various extents in the catering and foodservice industries prior to consumption. Vitamin C is water soluble and sensitive towards heat and oxygen. The vitamin is the least stable among nutrients in vegetables and is thus often used as an indicator of the strain nutrients are exposed to during processing. Healthcare providers use nutrient data standards provided by various national and international government and nongovernment agencies. Physicians, dieticians and menu planners relay on these values for nutritional therapy. This is emphasised by the fact that many hospitalised patients today have inadequate intakes of nutrients like water-soluble vitamins. Thus, to ensure the nutritional quality of diets for healthy persons as well as for therapeutic use, it is crucial to know how the various processing steps contribute to the levels of nutrients at the time of consumption.

Examples – hospitals and catering

Peas served to patients showed degradation of vitamin C at various stages of processing (frozen, steamed, trayline and delivery) at two New Jersey hospitals, and it was significant less than compared with the published standards values at both hospitals (Feldman et al. 2006). Carrots, peas, potatoes were treated through the hospital cook-chill plate system. Raw vegetables contained 6 – 10 mg vitamin C/100g and at the end of the food service cycle the vitamin C was reduced to 1.7 – 5.8 mg/100g (mash potatoes 76% and peas 42%) causes an insubstantial presence of ascorbic acid in the food served to hospitalised patients (McErlain et al. 2001). Green beans and swede rods were heat treated in three different ways (traditional in water, boil-in-bag and sous vide) and the vitamin C retention was 50%, 80% and 70% green beans, and 34%, 80% and 53% swede rods, respectively. Warm-holding should be avoided (Baardseth et al. 2010).

REFERENCES

Baardseth, P et al. J. Sci Food & Agric (In press)
Feldman C et al. (2006) J Foodservice 17:135-142.
McErlain L et al. (2001). Int J Food Sci Nutr 52:205-211.

P12 NEW GENERATION FUNCTIONAL APPLE PRODUCTS: A NEW CHOICE FOR CONSUMERS

CORRESPONDING AUTHOR:
Ronan GORMLEY
UCD Institute of Food and Health
University College Dublin
Belfield, Dublin 4
Ireland
EMAIL: ronan.gormley@ucd.ie

GORMLEY Ronan[1], RÖSSLE Christian[2], KEENAN Derek[2], BRUNTON Nigel[2], BUTLER Francis[1]
1. UCD Institute of Food and Health, University College Dublin, Dublin 4, Ireland
2. Ashtown Food Research Centre, Teagasc, Ashtown, Dublin 15, Ireland

Fruits are beneficial for health and contribute minerals, vitamins, dietary fibre and bioactive compounds to the diet. Fruits are low in calories, and may displace more calorific items in the diet. Providing a choice of fruit/fruit products is key to increased consumption. R & D at Ashtown Food Research Centre has focused on developing functional apple products by including (i) probiotics and prebiotics in fresh-cut apple wedges, and (ii) prebiotics and apple pomace (an antioxidant dietary fibre) in sous-vide processed apple puree/wedge desserts. Lactobacillus rhamnosus (L-rham) was introduced to fresh-cut apple wedges (cv. Braeburn) by a dipping process. An L-rham content >108cfu/g was achieved which is adequate for a probiotic effect; a content >108cfu/g was maintained during wedge storage at 2-4˚C/10d. This product has excellent sensory and physico-chemical properties and is ideal for persons allergic to dairy products. Ongoing work is focusing on developing synbiotic apple wedges containing L-rham (probiotic) and oligosaccharide/inulin (prebiotic); results to date are promising. Apple desserts (cv. Bramley's Seedling) containing functional ingredients were formulated and processed by sous-vide. Oligosaccharide inclusion (Beneo HSI; 8% of apple weight) gave a sensorically acceptable puree dessert. Oligosaccharide retention during product storage (2-4ºC/30d) was >90% indicating minimal hydrolysis of the prebiotic. Tests with apple pomace indicated that sous-vide puree apple desserts accommodated up to 5% pomace (based on apple weight) without affecting sensory or physicochemical properties. The apple pomace (cv. Shampion) had a high dietary fibre content (46%) and total antioxidant capacity {0.73 (g/L)-1(DPPH)}. It is concluded that the new generation attractive functional apple products have application to obese persons and also to the general population. Commercialisation of the products is underway. This research (ISAFRUIT project) was part-funded by the European Commission [Thematic Priority 5 (Food Quality and Safety), 6th Framework Programme of RTD (Contract No. FP6-FOOD 016279)].

P13 EFFECT CHEMICAL FERTILIZER AND VERMICOMPOST AND INTERACTION ON SWEET PEPPER (CAPSICUM ANNUM L.) CALIFORNIA VARIETY

CORRESPONDING AUTHOR:
n.c.

A.D. Hernández-Fuentes[1], S. Hernández-Viana[2], F. Enyanche-Velazquez[2], P. Díaz-Vargas[2], J.M. Pinedo-Espinoza[3]

1. Centro de Investigación en Ciencia y Tecnología de los Alimentos-Instituto de Ciencias Agropecuarias-Universidad Autónoma del Estado de Hidalgo. Av. Universidad km 1, Rancho Universitario, Tulancingo Hidalgo México, CP 42000. Apartado postal No. 32 almadhf@yahoo.com.mx.
2. Universidad Autónoma Chapingo, Chapingo, Estado de México.
3. Unidad Académica de Agronomía, Universidad Autónoma de Zacatecas, Zacatecas, Zacatecas. México.

The present experiment was to set up on the integral farm of intercropping in Tezontepec of Aldama, Hidalgo, at May 18th to September 26th of 2009, with the object to study the effect chemical fertilizer and vermicompost (V) and its interaction on sweet pepper (Capsicum annun L) California variety. The treatments design was a factorial 32 distributed on blocks entirely at random. The treatments were: control, 50 g of V, 150 g V, 70-30-85 de N, P y K respective, 70-30-85+50 g of V, 70-30-85+ 150 g of V, 210-90-255, 210-90-255+50 g of V, 210-90-255+150 g de V. The measured variables were plant height, stem diameter, length and diameter of fruit, root bulk, yield and chlorophyll. For the variable plant height and yield was found significance difference in treatment with 50 g de V. it didn't to observe significance differences and other variables studied, although, was observed a tendency of treatment effect 2 (50 g of V), was greater on the measure variables. The interactive between its factors in its different levels (chemical fertilizer and vermicompost) non-showed positive effect on the measure variables on growing. The Land Equivalent Ratio was of 0.76 for intercropping. The fruits of plants to applied the T6 (70-30-85+150 g of V) showed more shelf life at 5 °C after 20 days.

Keys words: intercropping, peach tree, organic, vegetable, mineral-organic

P14 PROPERTIES NUTRITIONALS IN HUITLACOCHE (USTILAGO MAYDIS (D.C.) IN HYBRID MAICE QPM, TIGER AND BENGALA

CORRESPONDING AUTHOR:
n.c.

A.D. Hernández-Fuentes[1]; J.M- Pinedo-Espinoza[2]; R. Campos-Montiel[1]; A. Trapala Islas[1]

1. Centro de Investigación en Ciencia y Tecnología de los Alimentos-Instituto de Ciencias Agropecuarias-Universidad Autónoma del Estado de Hidalgo. Av. Universidad km 1, Rancho Universitario, Tulancingo Hidalgo México, CP 42000. Apartado postal No. 32 almadhf@yahoo.com.mx.
2. Unidad Académica de Agronomía, Universidad Autónoma de Zacatecas, Zacatecas, Zacatecas. México.

Huitlacoche (Ustilago maydis (D.C.), "Caviar Azteca" is an important food in the diet of the habitants of Mexico for its taste and properties nutritional. The objective in this work was to identify the quality of huitlacoche in hybrid maice QPM, Tiger and Bengala. The measured variables in postharvest were: Visual changes of appearance, Color, Weight, Total Soluble Solids, Titratable Acidity, Ascorbic Acid (Vitamin "C"), content of Lysine, Thyptopham and Index of Quality. Huitlacoche in maice QPM, Tiger and Bengala there was no major change in Total Soluble Solids, Titratable Acidity and Ascorbic Acid (Vitamin "C"). The weight was of 529.6 g for QPM and 430.0 g for Tiger and 321.5 g for Bengala. Huitlacoche in maice Bengala sowed higher content of Nitrogen and Protein, while QPM showed higher content of Thyptophan, and Index Quality, and Tiger higher content of Lysine

Key words: huitlacoche, properties nutritionals, postharvest.

P15 THE IMPACT OF 1-MCP TREATMENT ON MAL D 1 SYNTHESIS DURING STORAGE OF APPLE FRUIT

CORRESPONDING AUTHOR:
Daniela KIEWNING
Auf dem Hügel 6
EMAIL: kiewning@uni-bonn.de

KIEWNING Daniela, MATTHES Anne, SCHMITZ-EIBERGER Michaela
INRES-Horticultural Science, Bonn University, Auf dem Hügel 6, 53121 Bonn, Germany.

The in Central Europe and North America most important apple allergen is Mal d 1, a protein which belongs to the so called pathogenesis-related proteins (PR-10), subgroup 10. PR-10 are synthesized in response to environmental stress, pathogens and wounding. Several studies investigated a higher allergenicity of apple fruit after storage, which is due to higher Mal d 1 concentrations. For climacteric fruit, such as apple fruit, ethylene is a key regulatory molecule for ripening and senescence. The higher allergenicity might be related to ethylene action during storage. Synthetic cyclopropenes, like 1-methylcyclopropene (1-MCP), are inhibitors of ethylene action. The commercial use of 1-MCP has the potential to extend storage periods and quality of plant products, if applied in an optimal stage of ripeness. The aim of the study was to evaluate if 1-MCP application can decelerate Mal d1 synthesis during storage. Therefore fruits of 4 cultivars were stored for 8 and 12 weeks in a cold chamber (2°C) and under controlled atmosphere conditions. Half the fruits were treated with 1-MCP, for evaluating the influence of this ethylene inhibitor on Mal d 1 synthesis.

1-MCP treatment decelerated the Mal d 1 synthesis in stored fruit of different cultivars. This could especially be seen during the first 8 weeks of storage. Mal d 1 synthesis started again if fruits were further stored. This may be due to the synthesis of ethylene receptors.

P16 EVALUATION OF COCONUT WATER PRESERVED BY DIFFERENT PROCESS

CORRESPONDING AUTHOR:
Virgínia MATTA
Av. das Américas
29501, Guaratiba
Rio de Janeiro/RJ
Brazil. 23020-470
EMAIL: vmatta@ctaa.embrapa.br

LEAL JR. William[1], NAKANO Lucas[2], CABRAL Lourdes[1]; PENHA Edmar[1], MATTA Virgínia[1]
1. Embrapa Food Technology
2. Federal Rural University of Rio de Janeiro

Coconut water is much consumed in Brazil due to its refreshing and tasteful characteristics. It presents a good balance on sugar and acid contents, which attracts consumers, and contains minerals and phenolics compounds, being a natural healthy drink. Its industrialization faces some challenges due to the presence of polyphenoloxidase (PPO) and peroxydase (POD) enzymes that cause its color change. The objective of this work was to evaluate the differences in coconut water characteristics according to their conservation process. Raw materials were fresh coconut water, directed extracted from the fruit, and two commercial samples, acquired in regular market: a bottled cold preserved coconut water and an ultra-high temperature (UHT) preserved water, containing preservatives. Enzyme activities were determined (PPO and POH), besides of phenolics, pH, soluble solids and acidity. Soluble solids content of coconut water was 6.4, 6.0 and 5.9ºBrix, in fresh, cold and UHT preserved sample, respectively, which is probably more function of variety and harvest time than processing method. Acidity and pH variation may be caused by processing as it is usual to add acidulants due to the high natural pH of this product (5.35 for fresh water against 5.00 of cold preserved and 4.70 of UHT preserved). Enzyme activity was also probably inactivated by processing, particularly PPO, which was not detected in the two processed samples, being 0.08 U/mL in fresh water. The POD activity was 0.80 U/mL in fresh water, 0.53 U/mL in cold processed one and was not detected in sterilized water. On the other side, phenolics content varied considerably in processed samples, from 5.31 mg/100g in fresh water to 0.95 and 0.51 mg/100g in cold and UHT preserved water, respectively. The results suggests that usual conservation processes are effective for inactivating enzymes although they need to be optimized for preserving coconut water characteristics.

P17 EVALUATION OF ASCORBIC ACID CONTENT IN DIFFERENT PROGENIES OF CAMU-CAMU FROM BRAZILIAN GERMOPLASM BANK

CORRESPONDING AUTHOR:
Rafaella MATTIETTO
Trav. Dr. Enéas Pinheiro s/n
CEP 66095-100
Belém – Pará
Brazil.
EMAIL:
rafaella@cpatu.embrapa.br

MATTIETTO Rafaella[1], CARVALHO Ana Vânia[1], MATTA Virgínia[2], RIBEIRO Sydney[1]
1. Embrapa Amazônia Oriental, Belém – Pará, Brazil
2. Embrapa Agroindústria de Alimentos, Rio de Janeiro – RJ, Brazil

Camu-camu (Myrciaria dubia), a native species of Amazon, is the known fruit with the highest vitamin C potential and naturally occurs in Brazil. Even without official production data, camu-camu has conquered the external market with its pulp being used as food ingredients, medicines and cosmetics. Its high vitamin C content is it great appeal, as natural sources of vitamin C are demanded all over the world due its role in human metabolism. Researchs have been done about Myrciaria dubia domestication through a genetic improvement program for cultivation in land areas. The camu-camu Germoplasm Bank (1°28′S e 48°29′W), from Embrapa Eastern Amazon, in Belém, Pará, keeps a plant collection totalizing 15 populations of natural occurrence in Amazon and Pará states. The objective of this work was to evaluate the ascorbic acid content of camu-camu pulp in 13 progenies derived from those populations. Camu-camu pulp from fruits in mature degree of ripeness (intense red) was obtained by conventional extraction method using a depulper with 0.6 mm sieve mesh. Ascorbic acid was determined using official titration method with oxalic acid as extractor solvent. Results showed significant variation (Tukey test at p≤0.05) among the progenies, with values varying from 859.8 to 1790.5 mg/100g of ascorbic acid in mature camu-camu pulps. The obtained results permit to identify the progenies with higher nutritional potential and support the camu-camu genetic improvement program, which will contribute for the identification of superior genotypes, with good productivity and higher nutritional quality. The higher vitamin C content observed represents, in 100 grams, almost 40 times more than the Recommended Daily Allowances for healthy and normal adults, according to Brazilian legislation.

Acknowledgments: To PAVUC Project 15279.

P18 EFFECT OF INTAKE OF A FUNCTIONAL VEGETABLE SOUP ON SERUM CONCENTRATIONS OF CAROTENE AND FOLATE AND MARKERS OF OXIDATIVE STRESS IN HEALTHY MEN

CORRESPONDING AUTHOR:
Francisca PÉREZ-LLAMAS
Physiology department,
University of Murcia
Espinardo Campus 30100
Murcia
Spain
EMAIL: frapella@um.es

MARTÍNEZ-TOMÁS Rebeca[1], LARQUÉ Elvira[1], BURGOS María Isabel[2], AVILÉS Francisco[2], GONZÁLEZ Daniel[1], SÁNCHEZ-CAMPILLO María[1], GARCÍA Manuel[1], WELLNER Anna[3], BIALEK Lucy[4], PARRA Soledad[2], ALMINGER Marie[3], PÉREZ-LLAMAS Francisca[1]
1. Physiology department University of Murcia, Spain.
2. Hospital Virgen de la Arrixaca, Murcia, Spain.
3. Chalmers University of Technology, Göteborg, Sweden.
4. Unilever Discover R&D, Netherlands.

Objective: The aim was to determine whether 4 weeks consumption of an optimised vegetable soup has a beneficial effect on serum concentrations of β-carotene, lycopene and folate and on markers of oxidative stress.

Methodology: The subjects (n=14) consumed daily 300 ml of a tomato/carrot/broccoli soup, formulated and produced to obtain a product with enhanced bioavailability of micronutrients. Each serving of the soup provided: 3.9 mg ß-carotene; 4 mg lycopene; 52 µg of folate. Blood and urine samples were collected before the study (baseline samples), after 3 and 4 weeks consumption of the soups and after a 4-week wash out period, to follow the change in serum concentrations of ß-carotene, lycopene, folate and homocysteine and other haematological parameters. Markers of oxidative stress (glutathione peroxidase, superoxide dismutase, isoprostanes, carbonyl groups and 8-OH-guanosine), were analysed to evaluate antioxidative properties of the soups.

Results: Compared with the baseline values, consumption of the soups significantly increased the serum concentrations of ß-carotene, lycopene and glutathione peroxidase enzyme (P<0.001) but did not significantly affect other biochemical parameters or markers of oxidative stress. After 3 weeks both ß-carotene and lycopene concentrations were increased by 114%, after 4- week ß-carotene and lycopene were enhanced by 141% and 132%, respectively. A four-week wash-out period significantly decreased serum concentrations of carotenoids and glutathione peroxidase (P<0.001). Serum concentrations of folate increased during the 4 weeks of soup consumption and decreased during the wash of period, but without significant differences compared with baseline values.

Conclusions: This limited study suggest that 4 weeks consumption of an optimised vegetable soup can significantly modulate carotene levels in the blood stream and may provide protection from in vivo oxidative damage. The results indicate that optimised fruit and vegetable products containing different phytochemicals can provide good dietary sources of bioavailable ß-carotene and lycopene.

The work described here has received funding from the European Community's Sixth Framework Programme under grant agreement FOOD-023115, Healthy Structuring.

P19 METHOD TO EVALUATE IN VITRO ANTIOXIDANT EFFECT OF POSTPRANDIAL CAROTENOID ENRICHED CHYLOMICRONS ON HUMAN HEPATOCYTES

CORRESPONDING AUTHOR:
Francisca PÉREZ-LLAMAS
Departamento de Fisiología,
Facultad de Biología
Universidad de Murcia
Campus de Espinardo 30150,
Spain.
EMAIL: frapella@um.es

SÁNCHEZ-CAMPILLO María[1], GONZÁLEZ Daniel[1], MARTÍNEZ-TOMÁS Rebeca[1], BURGOS María Isabel[2] LÓPEZ José Ángel[1], CASCALES Ana Isabel[1], AVILÉS Francisco[2], WELLNER Anna[3], PARRA Soledad[2], BIALEK Lucy[4], ALMINGER Marie[3], LARQUÉ Elvira[1], PÉREZ-LLAMAS Francisca[1]

1. Physiology department. Universidad de Murcia, Spain
2. Servicio de Análisis Clínicos. Hospital Virgen de la Arrixaca, Murcia, Spain.
3. Chalmers University of Technology, Göteborg, Sweden.
4. Unilever Discover R&D

The preventive effects of consumption of fruit and vegetables on the development of chronically diseases have been associated with a reduction in oxidative stress. To bridge the gap between human studies and in vitro models a complementary method to evaluate the antioxidant effect of food products has been developed. The antioxidant status of HepG2 cells was evaluated after incubation with human postprandial chylomicrons collected from human subjects after intakes of a vegetable product.

Three subjects consumed in a breakfast 600 ml of a tomato, carrot and broccoli soup containing 8.4 mg of beta-carotene and 9 mg of lycopene. Five hours later the same subjects consumed a meal without carotenoids, in order to release the carotenoids that could be retained in enterocytes. Blood samples were collected at basal time and every hour during 9 h using an indwelling venous line; plasma chylomicrons were isolated by ultracentrifugation and used to stimulate HepG2 cells. Antioxidant effect on the cells was evaluated by a flow cytometric assay using 2', 7'-diclorofluorescein diacetate. Carotenoid concentrations were determined using HPLC analysis in the postprandial chylomicron samples.

Chylomicron response in the subjects followed an inter-individual and bimodal carotenoid response with peaks at 3h and 6h after intake of the breakfast. A significant antioxidative effect on HepG2 cells was observed after incubation with chylomicron samples collected at 3 h (19.39 ± 1.78 fluorescent channels) during the postprandial study, compared with the baseline (23.35 ± 2.19) and at final time (22.3 ± 1.13), $P < 0.05$. HPLC analysis of chylomicrons samples revealed that the highest carotenoid concentration was obtained in samples collected also at 3 h.

The results suggests that a cell based assay using HepG2 cells and postprandial human chylomicron samples can be a useful method to evaluate antioxidant effects of fruit and vegetable products (in a biological system).

The work described here has received funding from the European Community's Sixth Framework Programme under grant agreement FOOD-023115, Healthy Structuring

P20 THE ANTIOXIDANT ACTIVITY OF DEHYDRATED CONDIMENTS AND READY-TO-EAT SOUPS AND PUREES

CORRESPONDING AUTHOR:
M. Antonia MURCIA
EMAIL: mamurcia@um.es

MARTÍNEZ-TOMÉ Magdalena[1], MARISCAL Miguel[1], JIMÉNEZ MONREAL Antonia M.[1], GÓMEZ-MURCIA Victoria[1], GARCÍA-DIZ Luis[2], MURCIA M.Antonia[1]

1. Department of Food Science, Veterinary Faculty, Campus de Espinardo, University of Murcia, Apdo. Correos 4021, E-30008-Murcia, Spain
2. Department of Nutrition and Food Science I. Pharmacy Faculty. University Complutense of Madrid

The antioxidant activity of dehydrated condiments (tablet form) and ready-to-eat soups and purees (tetrapack) was assessed by reference to their ability to scavenger lypoperoxyl and hydroxyl radicals and Trolox-equivalent antioxidant capacity. The dehydrated condiments (dehydrated vegetable concentrated with olive oil, garlic dehydrated condiment) showed higher antioxidant activity than the ready-to-eat soup ("gazpacho", vegetable puree). Garlic dehydrated condiment is very high antioxidant (87.9% for lipid peroxidation, 66.4% for hydroxyl radical scavenging, 9.7 for TEAC assay), while dehydrated vegetable concentrated with olive oil is only high antioxidant (76.7% for lipid peroxidation, 90.8% for hydroxyl radical scavenging, 5.8 for TEAC assay). Vegetable puree has medium antioxidant activity (54.1% for lipid peroxidation, 78.9% for hydroxyl radical scavenging, 8.5 for TEAC assay). Finally, "gazpacho" shows low antioxidant activity (33.3% for lipid peroxidation, 77.8% for hydroxyl radical scavenging, 9.7 for TEAC assay). The enrichment of stews and casseroles, with dehydrated vegetable tablets, and the consumption of soup or vegetable purees represent an increase antioxidant intake in our diet. Also, ready-to-eat vegetable soups show antioxidant activity after they have been submitted to heat treatment to increase their shelf-life.

P21 THE ANTIOXIDANT ACTIVITY OF VEGETABLES SUBJECTED TO MINIMAL PROCESSING IN MAP

CORRESPONDING AUTHOR:
M. Antonia MURCIA
EMAIL: mamurcia@um.es

MURCIA M.Antonia[1], MARISCAL Miguel[1], JIMÉNEZ MONREAL Antonia M.[1], GÓMEZ-MURCIA Victoria[1], GARCÍA-DIZ Luis[2], MARTÍNEZ-TOMÉ Magdalena[1]

1. Department of Food Science, Veterinary Faculty, Campus de Espinardo, University of Murcia, Apdo. Correos 4021, E-30008-Murcia, Spain
2. Department of Nutrition and Food Science I. Pharmacy Faculty. University Complutense of Madrid

The antioxidant activity of vegetables ("4 season salad", mixed salad) subjected to minimal processing in MAP (Modified Atmosphere Packaging) was assessed by reference to their ability to scavenger lypoperoxyl and hydroxyl radicals and Trolox-equivalent antioxidant capacity. The MAP vegetables measurements were repeated during eight days of storage in a domestic refrigerator. The mixed salad exhibited a high peroxyl scavenging capacity (77.6% for day 0 and 76.6 for day 8) while "4 season salad" showed medium antioxidant activity (65.3%, for day 0 and 69.3%, for day 8). The hydroxyl scavenging capacity during their shelf-life period pointed to very high and no change in activity during the 8 days. The TEAC assay showed very high antioxidant activity for mixed salad (9.5 and 9.3, for day 0 and 8 respectively). However, the TEAC results for "4 season salad" were only high antioxidant (8.2 and 6.2, for day 0 and 8 respectively). MAP vegetables had a good or very good antioxidant capacity, and showed no significant loss of antioxidant activity or scavenging capacity compared with fresh vegetables.

P22 NUTRITIONAL VALUE OF THE GALIA (CUCUMIS MELO) MELON AND ITS MOST SIGNIFICANT QUALITY PARAMETERS

CORRESPONDING AUTHOR:
Eduardo ORTEGA
Edaphology Department
School of Pharmacy
Campus de Cartuja
s/n, 18071, Granada
Spain
EMAIL: eortega@ugr.es

ORTEGA Eduardo[1], ASENSIO Carlos[1], NAVARRO Eva[1], DE LA TORRE Amelia[2], RIVAS Ana[2], LORENZO MªLuisa[2]

1. Edaphology Department, School of Pharmacy
2. Department of Nutrition and Food Science, University of Granada, Campus de Cartuja s/n, 18071 Granada, Spain

Important changes during maturation of the Galia melon are evaluated by using internal quality parameters related to the final nutrient content. At the end of the maturation period, there is a reduction in carotenes and pulp colour and an increase in sugar content (up to 97% of soluble solids). Saccharose represents >50% of these carbohydrates. Ascorbic acid tends to increase during the maturation. The nutritional value and commercial quality of the fruit are assessed by studying factors related to the type of soil and the characteristics of the fruit. Cultivation practices have an impact on production and a positive effect on the quality of the fruit.

The objective was to determine the influence of different soil texture classes on the quality characteristics of the Galia melon in order to support an improvement in quality and the corresponding marketing advantages. This experimental study was carried out in greenhouses in Southern Spain through the controlled modification of soil composition

It was found that soil containing 35% sand produced melons with a smaller diameter and soil with 40% sand yielded the largest melons and the highest acidity category, while soil with 45% sand produced fruit with lesser acidity. The heaviest soils corresponded to intermediate sweetness values. Soils with lower sand content produced melons with maximum outer firmness, which tended to be lesser in lighter soils. Control of the soil composition permits regulation of the composition and hence nutritional value of Galia melons and similar fruit.

P23 A FUZZY COGNITIVE MAP TECHNIQUE TO DESIGN A LONG TERM POLICY FOR INTERDISCIPLINARY RESEARCH ON FUNCTIONAL FOODS

CORRESPONDING AUTHOR:
Maurizio PROSPERI
Assistant Professor
Dept. PrIME
University of Foggia
Via Napoli 25, 71122 Foggia
Italy
EMAIL: m.prosperi@unifg.it

PROSPERI Maurizio[1], LOPOLITO Antonio[2], STASI Antonio[2], NARDONE Gianluca[1]

1. Bioagromed, University of Foggia, Via Napoli 52, 71122 Foggia (Italy)
2. Dept. PrIME, University of Foggia, Via Napoli 25, 71122 Foggia (Italy)

Objectives. Research on functional foods could be of success if consumers' and producers' needs are met. While recent trends show that consumers are orienting their choices towards healthier and more convenient foodstuff (easy to use), food processors are struggling in the competitive market, in which product differentiation could allow maintaining market shares, gain profits and be more competitive. In this context, functional foods represent an opportunity that meets modern consumers' preferences and food firms that want to diversify their supply.

Methodology. This analysis adopts a "farm to fork" approach in order to design a research system in which "functionality" is intended as a qualitative attribute embedded into food products that originates at farm-level not only at processing level. In fact, soil, climate, breeding, agro-techniques and technologies are crucial aspects for having desired characteristics into the final product. To this purpose, an integrated interdisciplinary research system is the hypothesized approach that could allow achieving the objective of enhancing the natural properties of agricultural crops. The challenge of this study is to design a research system capable of exploiting the synergies deriving from a multidisciplinary networking. The analysis, referred to the Apulia Region (Italy) is based on the application of a Fuzzy Cognitive Maps (FCMs).

Results. FCMs allow rationalizing qualitative information provided by the stakeholders involved in the process of functional food design, processing and marketing, such as scientists, institutions, technological transfer agencies, firms, and consumers. From the cognitive map, the method identifies the most suitable public policy mix aimed at enhancing the different research domains involved in the development of functional food.

Conclusions. The study presents an approach for defining a policy mix based on stakeholders' expectations. The method allows overcoming disciplinary and cultural barriers, and exploits the advantages of an integrated knowledge of experts playing a direct role in the research on functional foods.

P24 CAN HIGH PRESSURE HOMOGENIZATION BE USED TO IMPROVE THE IN VITRO BIOACCESSIBILITY OF LYCOPENE AND ß-CAROTENE?

CORRESPONDING AUTHOR:
Cecilia SVELANDER
Dept. of Chemical and Biological Engineering, Food Science,
Chalmers University of Technology
412 96 Göteborg, Sweden
EMAIL:
cecilia.svelander@chalmers.se.

SVELANDER Cecilia[1], LOPEZ-SANCHEZ Patricia[2], KRONA Annika[3], BIALEK Lucy[2], SCHUMM Stephan[2], LANGTON Maud[3], ALMINGER Marie[1]

1. Food Science, Chalmers University of Technology, Göteborg, Sweden
2. Unilever R & D, Vlaardingen, The Netherlands
3. SIK, Structure and Material Design, Göteborg, Sweden.

High intakes of vegetables and fruits rich in the carotenes lycopene and ß-carotene are associated with a lower risk for a variety of chronic diseases. However, the bioavailability of carotenes from fresh plant foods is often remarkably low. Processing, such as mechanical homogenization and heat treatment, has the potential to enhance the bioavailability of carotenes, possibly due to disruption of cell walls and other structures.

We have investigated whether high pressure homogenization (HPH) can be used to thoroughly disrupt the microstructure of puré de tomato and carrot, and whether this in turn will increase the carotene bioaccessibility. The purées were subjected to three different HPH-treatments in the presence of 5% (w/w) olive oil; A) one passage at 100 bar, B) ten passages at 100 bar and C) one passage at 1000 bar. The release and micellar incorporation of carotenes was estimated during simulated in vitro digestion. The microstructure was examined with different techniques including CLSM, LM, cryo-SEM and Raman spectroscopy.

For carrot, HPH increased the in vitro release of ß-carotene from 38% to around 60%, and 69-95% of the released ß-carotene could be detected in the micellar fraction. Treatments B and C resulted in a more complete disruption of the cells, but did not further improve the accessibility.

In spite of an almost complete disintegration of the tomato cells by HPH, the in vitro release of lycopene was still around 20%. In addition, only 10% of the released lycopene was incorporated into micelles.

We conclude that HPH could be a means to increase the in vitro accessibility of ß-carotene from carrot, but not of lycopene from tomato. The low micellar incorporation of lycopene suggests that solubility, rather than the intactness of the food matrix, may be a limiting factor.

The project has received financial support from the European Commission (FOOD-023115-Healthy Structuring).

Poster abstracts

Determinants of Fruit and Vegetables consumption

P25 RELATIONSHIP BETWEEN EMOTIONAL INTELLIGENCE, THE CONSUMPTION OF FRUIT AND VEGETABLES, AND NUTRITIONAL STATUS IN A YOUNG ADULT GROUP

CORRESPONDING AUTHOR:
Leticia COELLO
Fundación INGEMA
San Sebastián
Spain
EMAIL: leticia.coello@ingema.es

COELLO Leticia, GALDONA Nerea, ITURBURU Miren, LASKIBAR Iker, URDANETA Elena, YANGUAS Javier

{leticia.coello; nerea.galdona; miren.iturburu; iker.laskibar; elena.urdaneta; javier.yanguas}@ingema.es
Fundación INGEMA. San Sebastián (Spain)

In recent years, there has been an increasing interest in how Emotional Intelligence affects both physical as well as psychological health. In terms of health-promoting behaviours, the Emotional Intelligence measures have been found to correlate with healthier dietary strategies (Saklofske, Austin, Galloway & Davidson, 2007). This study assesses the way that Emotional Intelligence is implicated in the Nutritional Status in a young adult group.

One hundred and fifty-nine people, (48% men and 52% women) aged between 20 and 30 with an average age of 24, participated in this study. Emotional Intelligence was evaluated by the Trait Meta Mood Scale-24 (Fernández-Berrocal, Extremera and Ramos, 2004), a tool which evaluates Attention, Clarity and Mood Repair. Nutritional Status was evaluated by Mini Nutritional Assessment (Guigoz, Vellas & Garry, 1996), it is an 18-item tool used to assess nutritional risk; it includes anthropometric measurements (body mass index, mid-arm and calf circumferences, and weight loss), a dietary questionnaire (number of meals consumed, food and fluid intakes, and feeding autonomy), global assessment (lifestyle, medication, and mobility), and subjective perception of health and nutrition.

Results showed significant differences in Emotional Attention, between people who did and people who did not consume fruits or vegetables at least 2 times a day. That is, those who did not consume fruit or vegetables at least twice a day, obtained higher scores on Emotional Attention ($p= 0.028$; N=159). Furthermore, negative correlations were found between Emotional Attention, subjective perception of health and nutrition measured by Mini Nutritional Assessment ($p= 0.031$; N=159) and Mini Nutritional Assessment total score ($p=0.024$; N=159).

In summary, it can be said that consumption of fruit and vegetables in younger people is associated with lower scores on Emotional Attention, being Nutrition an important factor of Emotional Intelligence in this group.

P26 FRUIT AND VEGETABLE CONSUMPTION OF AN ELDERLY EUROPEAN POPULATION

CORRESPONDING AUTHOR:
Cecília de MORAIS
University of Porto
Faculty of Nutrition and Food Sciences
Rua Dr. Roberto Frias,
4200 – 465 Porto, Portugal
EMAIL: ceciliamorais@fcna.up.pt

de MORAIS Cecília[1], AFONSO Cláudia[1], OLIVEIRA Bruno[1], RAATS Monique[2], LUMBERS Margaret[2], de ALMEIDA Maria Daniel[1] and the Food in later life Project team

1. University of Porto, Faculty of Nutrition and Food Sciences, Rua Dr. Roberto Frias, 4200 – 465 Porto, Portugal
2. University of Surrey, Guildford, Surrey, GU2 7XH, United Kingdom

Introduction: The health benefits of fruits and vegetables (FV) are well documented and enhance the protective effect in several chronic diseases that are common in older age. In spite of the recommended intake for FV has been established by several Health Organizations, research focused that large population groups eat far less than the recommended amount. The aim of this study was to identify differences between European countries and socio-demographic characteristics on the daily consumption of FV.

Population and Methodology: This project was carried out within the European Project "Food in Later Life", under the leadership of the University of Surrey and with financial support of the 5th EU Framework Programme. The sample included 644 European citizens aged 65+ years from 8 EU countries and was quota-controlled by these groups: sex (male/female), age (65 – 74; ≥ 75 years) and living circumstances (living alone/with others). Data was collected by 7 days food record diaries. Descriptive statistics and univariate analysis was performed according to the purpose of this study using SPSS 14.0.

Results: The analysis revealed significant differences on the mean average number of FV events per day for socio-demographic characteristics such as age, gender and country. Participants from the older group had a significantly lower mean average ($p=0.001$) than the younger; this value was also significantly higher for women comparing to men ($p=0.016$); and there were significant differences between the countries ($p<0.001$)

The Mean ± Standard Deviation (SD) of FV average events per day was lower for Denmark (0,9 ± 0,9) which was significantly different from all other countries; followed by Sweden (1,8 ± 1,1) which was significantly different from all other countries but from Germany (2,2 ± 0,95); and the higher values were found for Italy (3,3 ± 0,84), Poland (3,3 ± 1,1), United Kingdom (3,1 ± 1,2), Spain (2,9 ± 1,0) and Portugal (2,8 ± 1,1), which were only significantly different from Denmark, Sweden and Germany.

Conclusion: There are differences on the daily FV consumption events, according to socio-demographic characteristics. Also, the highest mean average of FV found in this analysis was only of 3 events per day, which is still very far from the "5 a day" recommendation. More specific strategies are needed to promote FV consumption among the elderly population of the European countries.

P27 SOCIO-ECONOMIC DIFFERENCES IN FRUIT AND VEGETABLE CONSUMPTION OF CHILDREN IN THE NETHERLANDS. DUTCH NATIONAL FOOD CONSUMPTION SURVEY – YOUNG CHILDREN 2005/2006

CORRESPONDING AUTHOR:
Heidi FRANSEN
PO Box 1
3720 BA Bilthoven
The Netherlands
EMAIL: Heidi.Fransen@rivm.nl

FRANSEN Heidi, BUCHNER Frederike, VAN ROSSUM Caroline, OCKE Marga, VAN DER A Daphne
National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

Background: Fruit and vegetables are important components of a healthy diet. For young children in the Netherlands, a fruit consumption of 150 grams/day and a vegetable consumption of 50-100 grams/day for 1-3 year olds and of 100-150 grams/day for 4-8 year olds are recommended. These recommendations are not reached by most children. Knowledge of the characteristics associated with low fruit and vegetable consumption can assist policy makers in developing strategies and programs targeted at specific social groups, areas and/or settings for increasing the consumption of fruits and vegetables among young children.

Objectives: To elucidate socio-economic differences in fruit and vegetable consumption and to identify dietary characteristics associated with a higher consumption of fruits and vegetables.

Methods: Using data from the Dutch Food Consumption Survey in 1,279 children 2-6 year old, we examined the consumption of fruit and vegetables in different socio-economic groups (SES). SES was based on income or educational level of head of household. Furthermore we performed a cross-sectional analysis on the association between dietary characteristics and fruit or vegetable consumption.

Results: Children with a lower SES have a lower vegetable consumption, have less consumption moments for vegetables and consume less fresh vegetables. The total consumption of fruit did not differ between children from different SES groups, although the proportion of fresh fruit was lower in children with a low SES. Children who consume fruit and vegetables at home as well as outside home, or during main meals and in-between meals have a higher total consumption than those who did not.

Conclusions: Socio-economic differences as well as differences in dietary characteristics were found for fruit and vegetable consumption in young children. Policy measures should focus on encouraging more consumption moments of fruits and vegetables. Particularly for vegetables the children with lower SES should be targeted.

P28 FRUIT AND VEGETABLE CONSUMPTION AMONG BRITISH INDIANS IN THE UK

CORRESPONDING AUTHOR:
Santosh KHOKHAR
University of Leeds
Leeds UK, LS2 9JT
EMAIL:
S.Khokhar@food.leeds.ac.uk

GARDUÑO-DIAZ Sara Diana, KHOKHAR Santosh
School of Food Science and Nutrition

Background and objectives: It has been estimated by the World Health Organization that low fruit and vegetable (FV) consumption contributed to 2.7 million deaths from chronic diseases worldwide. The aim of this study was to investigate the consumption of FV among ethnic groups living in the UK.

Methodology: A pilot study was carried out using a semi-quantitative food record kept by participants during a 3 day period and was further validated by the 24 hour recall method. Level of consumption was established by the number of portions reported per day (one single fruit equivalent to the size of a medium apple or a handful of smaller fruit, one glass of juice maximum). Portions were then converted to average weight in order to estimate consumption in grams per week. Foods eaten both at home and away from home were considered for analysis although no correction was made for non-edible parts. Potatoes were not considered vegetables.

Results: Data was collected from participants (n=35) ranging in age from 20-83yrs. Mean consumption was 2.6 portions of FV per day with a higher intake of fruits than vegetables among the younger age group (<30yrs); older age groups consumed more vegetables than fruits. There was no intake difference observed neither between genders nor between vegetarians and non-vegetarians; however differences were observed according to family structure, years of formal education, occupation and area of residence.

Conclusion: Indians living in the UK consumed 2.6 portions compared to the recommended 5-a-day. Although effort is being made to increase consumption of this specific food group at a national level through campaigns such as 5-a-day it is highly likely that ethnic-specific public awareness programs are required. In addition, social aspects related to food security must be addressed to improve FV intake.

P29 UNDERSTANDING SCHOOL CHILDREN'S PREFERENCES FOR APPLE VARIETIES IN ORDER TO PROVIDE VARIATION AND PROMOTE CONSUMPTION OF NORWEGIAN APPLES

CORRESPONDING AUTHOR:
Sveinung GRIMSBY
Nofima Mat, N-1430 Ås
EMAIL:
Norway. sveinung.grimsby@nofima.no

GRIMSBY Sveinung[1], UELAND Øydis[1], SEGTNAN Anne[1], TOMIC Oliver[1], KIGEN Alf[2], ANGELSEN Tore[3]

1. Nofima Mat, N-1430 Ås, Norway
2. Økofrukt DA, 3683 Notodden, Norway
3. OFG, Norwegian School Fruit Scheme, N-0510 Oslo, Norway

Objective: To encourage consumption of local apple varieties and at the same time provide fruits in the schools that children prefer and will eat, a hedonic consumer test using an interactive response system was conducted.

Methods: A sensory descriptive test of 10 apple varieties (3 imported, 4 Norwegian conventional and 2 Norwegian organic) was performed by a trained sensory panel. The apples represented varieties with different sensory profiles. A consumer test was conducted at two different schools with a total of 244 children aged 10-16 yrs. The apples were divided into wedges and served one by one. The samples were served in randomized order between classes. The children scored the apples on a scale from 1 (super bad) to 6 (super good) by using an interactive audience response system. Each school class got the results graphically presented immediately after giving the last vote. Preference mapping were used to interpret the results.

Results: There were no significant differences for sex and age on liking of apples. The best liked apples in order of preference were 'Golden Delicious', 'Granny Smith', 'Royal Gala', 'Ingelin' -organic and 'Katja'. While 'Åkerø', 'Your choice'-organic, 'Rød Gravenstein', 'Summer Red', and 'Discovery' were significantly less well liked. Preference mapping showed that sensory characteristics of the best liked apples were sweet, juicy and fruity. Furthermore, the apples should be crispy. Apples which were bitter and not crispy were less popular.

Conclusion: New organic varieties were liked in the same way as imported and traditionally grown conventional apple varieties. An interactive response system is a good way of collecting data during a consumer test for school children.

P30 GENETIC AND ENVIRONMENTAL INFLUENCES ON INTAKE OF FRUIT AND VEGETABLES

CORRESPONDING AUTHOR:
Ann Louise HASSELBALCH
Institute of Preventive Medicine, Copenhagen Capital Region, Copenhagen University Hospitals, Centre for Health and Society, Oester Soegade 18,1, 1357 Copenhagen, Denmark.
EMAIL: awj@ipm.regionh.dk

HASSELBALCH Ann Louise[1], HEITMANN Berit L[2], KYVIK Kirsten O[3], SØRENSEN Thorkild IA[1]

1. Institute of Preventive Medicine, Copenhagen Capital Region, Copenhagen University Hospitals, Copenhagen, Denmark.
2. Research Unit for Dietary Studies at the Institute of Preventive Medicine, Copenhagen University Hospitals, Copenhagen, Denmark
3. Institute of Regional Health Services Research and the Danish Twin Registry, University of Southern Denmark, Odense, Denmark.

Objectives: We estimated the contribution of genetic and environmental influences on intake of fruit and vegetables as well as intake of fruit and vegetable juice in large population-based sample of healthy twins.

Methodology: Data originated from a cross-sectional study of 600 male and female healthy adult twin-pairs with self-reported consumption frequency of fruit, vegetables and juices by a validated questionnaire with 247 foods and recipes. Estimates of relative proportion of genetic, shared environmental, and unshared environmental effects on intake frequency of fruit, vegetables and juices were obtained by quantitative genetic modelling of twin data based on linear structural equations.

Results: Women had a higher intake of vegetables and fruit than men. For intake of fruit no genetic influence was found in men and women whereas for intake of vegetables significant genetic influence were found in both men and women with heritability estimates of 0.24 and 0.14, respectively. For both intake of fruit and vegetables a significant influence of the shared environment were detected in both sexes. The magnitude of shared environmental influence ranged from 0.40 to 0.46. For intake of juices significant genetic influences were found in both men and women, with heritability estimates of 0.36 and 0.61, respectively, but no effect of the shared environment was found. For intake of fruit, vegetables and juices a significant effect of the non-shared environment was found.

Conclusion: These results provide evidence of both genetic and shared environmental effects on vegetable intake, shared environmental effects on fruit intake and genetic effects on intake of juices. Although the remaining non-shared environmental effects include measurement errors, there appear to be considerable potential for individually modifiable effects.

P31 "CHANCE" FOR A HEALTHIER LIFE

CORRESPONDING AUTHOR:
Petra RUST
Department of Nutritional Sciences
University of Vienna
Althanstrasse 14
1090 Vienna, Austria
EMAIL: petra.rust@univie.ac.at

HÖLD Elisabeth, RUST Petra, ELMADFA Ibrahim
Department of Nutritional Sciences, University of Vienna, Althanstrasse 14, 1090 Vienna, Austria

During the last decades, an increase of the prevalence of non communicable diseases was observed, although the information about healthy nutrition and food quality has been improved. Especially, the consumption of fruit and vegetables has an impact on disease's risk.

Nevertheless, frequently released nutrition reports observed that the mean consumption of fruit and vegetables does not meet the evidenced-based recommendation. Moreover, public health sciences consider the socio-economic status and living situation as the most important influencing factors on health information access. The knowledge of a balanced diet leads to healthier individual eating patterns including an adequate consumption of fruit and vegetables.

The aim of the EU-project CHANCE, Community Health Management to Enhance Behaviour, was to examine the impacts of different neighbourhoods with its special living situation and health offers on health and nutrition behaviour. In Austria 254 residents of a disadvantaged community in one district of Vienna were evaluated. According to the consideration of the participant`s knowledge on fruit and vegetables (knowledge of the meaning of "5aday") significant differences in socio-economic parameters like education level ($p=0.003$) and immigration background ($p=0.001$) were observed. Although immigrants showed the same mean education level as Viennese ($p=0.673$) their knowledge on "5aday" was worse. Contrary to these findings immigrants consumed more fruit ($p<0.001$) and vegetables ($p=0.001$) than Austrians. Independently from the participant's origin elderly drank more fruit juice and nectar ($p=0.035$).

To increase the consumption of fruit and vegetables cooperation with local stakeholders and engagement of multipliers within the disadvantaged groups are necessary to implement scientific outcomes into people's daily life.

P32 DIFFERENTIAL SPATIAL PROXIMITY BETWEEN FAST FOOD AND SCHOOLS IN NEW YORK CITY

CORRESPONDING AUTHOR:
Naa Oyo A KWATE
Department of Sociomedical Sciences
Mailman School of Public Health
Columbia University
722 W. 168th St., 5th floor,
New York, NY, 10032
USA

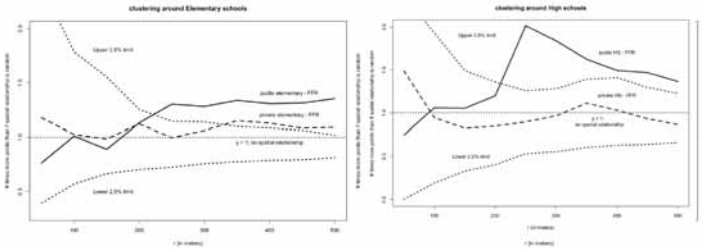
KWATE Naa Oyo A.[1], LOH Ji-Meng[2]
1. Columbia University, Dept. of Sociomedical Sciences
2. Columbia University, Dept. of Statistics

Objective: Residential segregation is a critical factor in exposure to health-related resources, including food environments. Differential spatial patterning of fast food around schools has significant import for youth, as fast food in close proximity is likely to decrease the amount of fresh fruits and vegetables youth consume. We examined whether: 1) Fast food restaurants clustered around schools in the five boroughs of New York City (NYC); and 2) Clustering varied as a function of school type, school racial demographics, and area racial and socioeconomic demographics.

Method: We used the NYC Department of Health and Mental Hygiene's on-line directory (2006) of restaurant inspections to study national chains and local fast food establishments (N=817). School listings for public and private elementary and secondary schools for the academic year 2004-2005 (N=2096) were obtained from the NYC Departments of Education and City Planning. We geocoded fast food locations with ArcGIS and a point process model (inhomogeneous cross-K function) examined spatial clustering.

Results: A minimum of 25% of schools had a fast food restaurant within 400m. School characteristics associated with greater clustering were: high schools (compared to elementary); public schools (compared to private); and proportions of Black students. The area characteristic associated with greater clustering was proportion of Black residents in census block groups. In the figures below, the y axis shows the number of times more restaurants than would be expected if spatial proximity was random. When there is no spatial relationship between schools and fast food restaurants, the y-axis value = 1.

Conclusion: The results suggest that the geography of opportunity as it relates to school food environments is unequal in New York City. Black and public school youth in NYC are therefore disadvantaged in obtaining a balanced diet with a focus on fruits and vegetables.



P33 FACTORS ASSOCIATED WITH DIVERSITY IN COOKED VEGETABLES CONSUMPTION

CORRESPONDING AUTHOR:
Marie-Christine BOUTRON-RUAULT
Nutrition, Hormones and Women's Health, Centre for Research in Epidemiology and Population Health (CESP)
UMRS 1018, Team 9
Institut Gustave Roussy
Espace Maurice Tubiana,
39, rue Camille Desmoulins,
94805 VILLEJUIF CEDEX, France.
EMAIL: boutron@igr.fr.

MOROIS Sophie[1, 2], PERQUIER Florence[1, 2], CLAVEL-CHAPELON Françoise[1, 2], BOUTRON-RUAULT Marie-Christine[1, 2]

1. Nutrition, Hormones and Women's Health, Centre for Research in Epidemiology and Population Health (CESP), U1018, Inserm, Institut Gustave Roussy, F-94805 Villejuif, France
2. Université Paris Sud 11, UMRS 1018, F-94805 Villejuif, France

Background: Independently of quantities, diversity in fruit and vegetables has been suspected to have a beneficial impact on health, because of the variety in micronutrient intake.

Method: We scored diversity in cooked vegetables, raw vegetables, or fruit, according to the number of different items consumed, in 54,144 women of the French E3N cohort who filled in the 1993 qualitative part of a diet history questionnaire. Logistic multivariate regression models were used to estimate associations between diversity scores, and socio-economic, lifestyle and nutritional variables.

Results: All diversity scores were positively associated with physical activity practice, quantities of cooked vegetables, raw vegetables, fruit, and fish, and none was associated with body mass index. Age was positively associated with cooked vegetables and fruit scores, but inversely associated with raw vegetables diversity. Being employed was positively associated with fruit diversity, inversely with cooked vegetables and not with raw vegetables diversity. Diversities in raw and cooked vegetables were associated with not living alone, whereas fruit score was independent of marital status. Education was positively associated with fruit score, inversely with raw vegetables score, and not with cooked vegetables score. Living in Southern France was positively associated with cooked vegetables and fruit scores, but inversely associated with raw vegetables score, while living in Western France was associated positively with raw vegetables, and negatively with cooked vegetables and fruit scores. Smoking was positively associated with raw vegetables diversity, inversely with fruit diversity, and not with cooked vegetables diversity. Energy intake was positively associated with raw vegetables and fruit scores, and inversely with cooked vegetables score. Alcohol was positively associated with raw vegetables score only.

Conclusion: Socio-economic and dietary determinants of diversity in fruit, and in raw and cooked vegetables should be considered as potential confounders in etiological studies, and when planning nutritional advice.

P34 IS PARENTAL CARE A MODERATOR FOR THE ASSOCIATION BETWEEN PARENTING PRACTICES AND FOOD BEHAVIOURS OF CHILDREN AGED 10-11 IN FINLAND

CORRESPONDING AUTHOR:
Carola RAY
Folkhälsan Research Center
Paasikivenkatu 4
0025 Helsinki
Finland
EMAIL: ray.folkhalsan@folkhalsan.fi

RAY Carola[1, 2], KALLAND Mirjam[1], ROOS Eva[1, 2]

1. Folkhälsan Research Center, Helsinki, Finland
2. Hjelt Institute, Department of Public Health, University of Helsinki

Purpose: Parenting style, including parental care, is a general interaction between parent and child, whereas through parenting practices parents perform their parental duties like having practices about meal time. Parenting practices have been associated with more favourable health behaviours among children. The aim is to examine whether parental care is a moderator for the association between parenting practices and children's health behaviours. Our hypothesis is that parenting practices have a stronger association with children's healthy food behaviour if children perceived parental care compared to no care.

Methods: Cross-sectional study in Helsinki region in 2006. 1271 children aged 10-11 (response rate 79%) and 816 parents (64%) answered questionnaires. 801 matching child parent pairs were used in analysis. Children were asked about food frequency intake and meal pattern, parenting practices and parental care. Parents reported additional parenting practices. Logistic regression was used in analyses.

Results: Interaction analysis between parenting practices and parental care for children's food behaviour showed no interactions. Stratified analyses showed a tendency; the amount of practices increased the odds of having a higher intake of nutrient dense food and a regular meal pattern if children perceived parental care, but not when children did not perceived care.

Conclusion: Stratified analyses gave some support for our hypotheses that parenting practices are more strongly related to food behaviour when children perceived care at same time. Further studies in a larger population are needed to confirm this hypothesis.

P35 PARENT'S MOTIVES UNDERLYING THE SELECTION OF FOOD FOR FAMILY AND CHILDREN'S FOOD INTAKE

CORRESPONDING AUTHOR:
Eva ROOS
Folkhälsan Research Center
Paasikivenkatu 4
0025 Helsinki
Finland
EMAIL: eva.roos@folkhalsan.fi

ROOS Eva[1, 2], RAY Carola[1, 2], LEHTO Reetta[1]
1. Folkhälsan Research Center, Helsinki, Finland
2. Hjelt Institute, Department of Public Health, University of Helsinki

Background: Children's food intake is determined by many factors. Parent's behaviours and other family factors are relevant. Parents have different motives for food choice. The Food Choice Questionnaire (FCQ) (Steptoe et al. 1995) is a measure of motives related to food choices. The scale includes nine different dimensions of motives; health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern.

Objectives: To study the relationships between parents' motives related to food choices for the family with children's self-reported intake of vegetables, fruits, soft drinks, and sweets.

Methodology: Cross sectional. In 2008, 1,035 children 10-12 year old children (response rate 65%) in southern Finland, in a classroom situation, filled in a short food frequency questionnaire. Parents, 581 (response rate 56%), filled in the FCQ modified for family food (FFCQ). Matching data was found from 561 child-parent pairs. Analysis of variance was used to analyze relationship between FFCQ and children's food intakes. The analyses were corrected for gender of child, school grade and gender of answering parent.

Results: Children with parents reporting health as an important motive for food choices were more likely to report higher intakes of vegetables, fruits and lower of soft drinks. Natural content was associated with higher intakes of vegetables, and fruits. Ethical concern was associated with higher intake of vegetables and fruits and lower of soft drinks. Convenience was associated with lower intake of vegetables. Mood was associated with lower intake of sweets. Sensory appeal was associated with higher intake of vegetables and lower of soft drinks. Familiarity was associated with higher intake of sweets.

Conclusions: Several underlying motives for food choices for family, especially health, natural content, ethical values, were associated with children's self-reported intake of vegetables, fruits, soft drinks and sweets. Neither price nor weight was associated with children's food intake.

P36 DETERMINANTS OF FRUITS LIKING IN CHILDREN: A REVIEW

CORRESPONDING AUTHOR:
Bérengère RUBIO
EMAIL: berengererubio@yahoo.fr

RUBIO Bérengère
Université Paris Ouest Nanterre la Défense

Within the framework of obesity epidemic growth, the knowledge of eating habits determinants in childhood is a major issue. Dietary patterns with high intakes of Fruit and Vegetables (F&V) have been associated with multiple health benefits. However, in most Western countries, children's intakes of F&V do not reach the recommended amounts. Then, many works have been carried out on fruit to:

- describe taste of children for fruit,
- highlight mechanisms of taste acquisition.

Regarding fruits, it appears that liking is an important factor of its consumption in children (Rasmussen et al. 2006). Other criteria of fruit have been identified to explain fruit liking: energy density (Gibson & Wardle 2003), organoleptic features (Monneuse 1995, Birch 1979) and familiarity (Skinner et al., 2002).

Several individual factors are related to fruit reluctance as low social conditions (Gibson et al. 1998), low preference to acidity (Liem et al., 2006), strong selectivity and neophobia (MacNicol et al. 2003), negative attitude toward food (Cooke and al. 2003) and low self-efficacy feeling (Reinaerts et al. 2007).

The two most important determinants involved in learning process of fruits liking in children are food experiences and parenting practices. Exposition and variety of fruits enable a significant progress in liking (Cullen et al., 2000). Parenting practices based on positive socio-affective relationships seem to be determining factors (Patrick et al., 2005).

Some studies suggest that liking and willingness to taste F&V in children may be influenced by early experience (< 4 years old). More longitudinal studies are needed to confirm and understand this interesting influence.

P37 SHOULD WE TAKE A SOURPUSS AND SOMEONE WHO HAS A SWEET TOOTH WITH A GRAIN OF SALT? FRUIT CONSUMPTION AND BASIC TASTE PREFERENCES.

CORRESPONDING AUTHOR:
n.c.

S. J. Sijtsema, M. Reinders, S.R.C.H. Hiller (LEI Wageningen University & Research Centre) and Dolors Guardia (IRTA, Spain)

There is a growing concern that the dietary patterns of Western societies need improvement (Allen et al., 2008). To increase healthy food consumption it is important to have insight in consumers' consumption and preferences of fruit and other types of snacks. Wansink et al. (2006) present the 'sweet tooth' hypothesis, which implies that people who consume more sweet snacks also consume more fruit. The aim of this study was to better understand how fruit consumption is determined by means of exploring the relationship between the consumption of different types of snacks and consumers' basic taste preference (sweet, salty and sour).

In total, 2083 respondents from Poland, Greece, Spain and the Netherlands filled in an online questionnaire in which consumption of fresh fruit, sweet snacks, salty snacks, freshly squeezed orange juice and dried fruit was measured.

29% of the total sample preferred a salty taste, 21.5% preferred sweet and 10.5% preferred a sour taste, 39% did not prefer a specific taste. We found that people who prefer sweet taste consume more chocolate bars, people who prefer salty taste consume more crisps and people who prefer sour consume more apples, peaches, orange juice and dried fruit. In addition, consumers who prefer a sweet taste health as a product characteristic is more important compared to sour preferring consumers. In addition, salt and sweet preferring consumers show a higher importance of taste.

In contrast with what was expected that sweet preferring people consume more fruits, our study shows that the sour preferring group consume more fruits and fruit products.

Taste might be an interesting characteristic to take into consideration while the sweet and salt preferring consumers say taste is more important to them than the sour preferring consumers. Our present findings may have implications for promotion activities to increase healthy fruit consumption.

P38 SOCIOECONOMIC STATUS AND INTAKE OF FRUIT AND VEGETABLES IN PREGNANT WOMEN

CORRESPONDING AUTHOR:
Karin WAGNER
University of Vienna,
Department of Nutritional
Sciences, Althanstrasse 14,
1090 Vienna
EMAIL: k.wagner@univie.ac.at

WAGNER Karin, ELMADFA Ibrahim
University of Vienna, Department of Nutritional Sciences, Althanstrasse 14, 1090 Vienna, Austria

Introduction: Fruit and vegetables are major components of a healthy diet. It is even more important for pregnant women to have an appropriate diet, which may have positive effect on mental and physical development of the foetus.

Objective: To analyze dietary patterns of pregnant women living in Austria. Furthermore the association between food choice and socioeconomic status were examined.

Methods: The study sample included 261 healthy pregnant women which had completed 21st week of gestation. Data were collected in 2001. Dietary intake was measured with a 24-h-recall; socioeconomic status, which includes education, household income and occupation, and anthropometric data were assessed with a self administered questionnaire. Mean and standard error was estimated. Differences in food intake were determined by using the Mann-Whitney-U or Tukey´s test.

Results: Compared to recommendations given by the German Nutrition Society (250g fruit and 400g vegetables per day) fruit intake (380g ± 20.5) was satisfying but if juices were excluded the intake was below the recommendation (229g ± 11.8). The vegetable intake (166g ± 8.6) was insufficient.

Women with lower education had statistically significant lower intake of fruit (juices excluded), and vegetables compared to more educated women; vegetable intake, for example, was 138g ± 12.1 for lower educated women and 204g ± 20.9 for higher educated women ($p<0.05$). Women with a low household income consumed statistically significant less vegetables (144g ± 14.1) compared to women with higher household income (184g ±18.5) ($p<0.05$). Data analysed according to women's position showed that housewives ate statistically significant less vegetables (118g ± 19.6) compared to non manual workers (170g ± 14.4) and self-employed persons (189g ± 31.4) (<0.05).

Conclusion: Results showed that food choice is related to socioeconomic status in Austrian pregnant women, especially regarding vegetable intake. Pregnant women with low education, low household income, and housewives showed lower fruit and vegetable consumption.

P39 ENERGY DENSITY, ENERGY COSTS, AND INCOME – HOW ARE THEY RELATED?

CORRESPONDING AUTHOR:
Wilma E WATERLANDER
VU University Amsterdam,
Faculty of Earth and Life
Sciences, Institute of Health
Sciences
De Boelelaan 1085 -1081 HV
Amsterdam
The Netherlands

WATERLANDER Wilma[1], DE HAAS Wendy[1], VAN AMSTEL Inge[1], SCHUIT Albertine[1, 2], TWISK Jos[1], VISSER Marjolein[1], SEIDELL Jacob[1], STEENHUIS Ingrid[1]

1. Department of Health Sciences and the EMGO Institute for Health and Care Research, Faculty of Earth and Life Sciences, VU University Amsterdam
2. National Institute for Public Health and the Environment

Objectives: 1) To examine the association between energy density and energy costs in single food items and composed diets; 2) to explore differences in energy density and energy cost between income levels.

Methods: We conducted a cross-sectional study using data from two Dutch cohort studies and recent national food prices. Data on dietary intake were measured in a sample of 373 young adults from the Amsterdam Growth and Health Longitudinal Study (AGHLS, measured using a computerized face-to-face interview in 2000), and a sample of 200 community-dwelling elderly from the Longitudinal Aging Study Amsterdam (LASA, measured using 24h-recalls in 2007). Food prices were retrieved from the two market leader supermarkets.

Results: We found significant inverse associations between energy density and energy costs in single food items ($r = -.436$; $p<.01$), and composed diets (AGHLS men $r = -.505$, women $r = -.413$, $p<.001$; LASA men $r = -.559$, women $r -.562$, $p<.001$). Furthermore, we found that people stratified in higher energy density quartiles consumed significantly more energy per day; less fruits and vegetables; and had significant lower diet costs. Explorative analyses on income did not reveal significant differences regarding energy density; costs; or fruit and vegetable intake.

Conclusions: Also in the Netherlands it is cheaper to select a diet high in energy density and low in fruit and vegetables compared to a more nutrient-rich and less energy-dense diet. This complicates dietary advice aiming on the substitution of sugar and fat rich food items with fruits and vegetables, since it might result in higher diet costs. However, we could not find differences in energy density or costs between income levels. Future research, using precise food expenditures, is of main importance in studying the economics of obesity and in the run of making the healthier choice easier.

Poster abstracts

Interventions with Fruit and Vegetables

P40 VEGETABLES BUDDIES – AN EDUCATIONAL PROJECT

CORRESPONDING AUTHOR:
Bela FRANCHINI
Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto,
Rua Dr. Roberto Frias,
4200-465 Porto
Portugal
EMAIL: belafranchini@fcna.up.pt

ALVIM Alda J R, FRANCHINI Bela, VAZ de ALMEIDA Maria Daniel
Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal

Increasing vegetable consumption among children, known to be lower than recommended, is presumed to result in higher consumption at older ages.. Our objective was to promote the consumption of vegetables among children (4-10 years old) attending seven pre and primary schools of the city of Vila Nova de Gaia, Portugal.

Around 1200 children participated in the project. Several sessions were organized and carried out in the classroom by one of the team's nutritionists and by final year nutrition students. We aimed the children to become familiar with several vegetables, to learn how to value them, to taste them as well as to improve their knowledge about these foods. Each "vegetable buddy" was introduced to the children, namely its lifecycle from agricultural production to transformation and distribution along the food chain. Botanical characteristics and health benefits were also presented. Several practical activities took place in the classroom in which the children were encouraged to use their senses (sight, smell, touch and, taste) to become familiar with each vegetable buddy. The broad school community (staff, parents, caregivers, local institutions) was involved. Teachers were encouraged to organize activities in and out the classroom, concerning the vegetables. Parents were motivated to participate by shopping and cooking with their children and by bringing recipes to school.

An exhibition of the children's activities was organized at the public library, the booklet "Amigos hortícolas" was published in paper and later as an e-book. A Congress to celebrate the World Food Day in which the children were the speakers was organized at the city cultural centre. A considerable amount of motivating educational material was developed. We will present the several phases of the project, samples of the children's work and part of the outcome educational material.

Acknowledgment: The project was sponsored by the Parents Association and local public institutions.

P41 THE TREND OF FRUIT AND VEGETABLE INTAKE AND THEIR DETERMINANTS AMONG 11-YEAR-OLD SCHOOLCHILDREN MEASURED IN 2003 AND 11-YEAR-OLDS MEASURED IN 2009

CORRESPONDING AUTHOR:
Saskia TE VELDE
EMGO+ institute, room D429,
VU University Medical Center,
Van der Boechorststraat 7,
1081 BT Amsterdam
The Netherlands
EMAIL: S.tevelde@vumc.nl.

FISCHER Claudia[1, 2], BRUG Johannes[1], TAK Nannah[1], TE VELDE Saskia[1]
1. EMGO institute for Health and Care Research and the Department of Epidemiology & Biostatistics, VU University Medical Center, Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands.
2. Institute for Health Science, VU University Amsterdam, De Boelelaan 1085, 1081 HV Amsterdam

Objectives: Fruit and vegetable intake in children is inadequate in the Netherlands. Recurrent appraisal of intake levels is of great importance for evaluating past intervention efforts and direction of future programs. Therefore, the aim of this present study was to study the trend in fruit and vegetable intake and its possible determinants in 11-year-old Dutch schoolchildren, by comparing two school cohorts in 2003 and 2009.

Methodology: For 1105 children of the Pro Children study in 2003 and 584 children of the Pro Greens study in 2009 complete data on intake and determinants was available. The self-administered questionnaire included questions on children's origin, usual fruit and vegetable intake, mother's educational level, and important potential determinants of fruit and vegetable intake. Multiple regression analysis was applied to test for differences in intake and determinants between study groups, to adjust for potential confounders and to look for effect modification by gender, educational level or origin.

Results: In 2009, more children complied with the WHO recommendation (17.5%) than in 2003 (12.2%, p< 0.001). For Dutch male schoolchildren fruit consumption was significantly higher in the 2009 cohort than in the 2003 cohort (difference = 44.4 (18.3-70.4) grams/day). Girls from mothers with low educational levels tended to report lower fruit intakes in 2009 than in 2003 (difference = -33.5 (-76.6- 9.6) grams/day). However, vegetable intake remained stable among boys and girls. Significantly more children agreed on that they bring fruit and vegetables with them to school and that they are provided at school, too.

Conclusion: The findings emphasize that vegetable intake is hard to increase among Dutch school children. Although boys reported higher fruit intake in 2009, girls of mothers with lower education fell behind, which must be taken into account in future programs.

P42 PROMOTION OF F&V CONSUMPTION AT SCHOOL IN FIVE ITALIAN REGIONS

CORRESPONDING AUTHOR:
Mariano V. GIACCHI
53100 Siena, Italy,
Via A. Moro, 1.
EMAIL: giacchi@unisi.it

GALEONE Daniela[1], BALOCCHINI Emanuela[2], SCOTTI Maria T.[1], MENZANO Maria T.[1], GIANNONI Annamaria[2], GIACCHI Mariano V.[3], and the Regions Research Group

1. Dept. of Prevention, Italian Health Ministry
2. Dept. of Public Health, Tuscany Region
3. Dept. of Public Health, Siena University

Objectives: Following the strategy "Gaining Health" adopted in Italy, on 2009 the Italian Ministry of Health launched the project with the aim to promote fresh fruit and vegetables consumption at school in five Regions, making more easy the access to F&V and the healthy choices. The Regions participant are: Tuscany (co-ordinator), Apulia, Campania, Marche and Sicily. The main objectives are: to increase the frequency of school children who eat at least one portion of fruit and one portion of vegetable a day; to evaluate the behaviour changes over time.

Methodology: Primary school: in ten intervention schools of each Region fresh fruit is distributed free of charge three days a week for three months and teachers start a specific educational program. Questionnaire on F&V consumption is administered before the intervention, at end and four months late. In other ten control schools of each Region only the questionnaire is administered three times without intervention. The students involved are on the whole Regions 2.000 (1.000 intervention; 1.000 control).

Results and Conclusion: The project is undergoing, so we can illustrate the results and the conclusion in the poster.

P43 DEVELOPING A SCHOOL- AND COMMUNITY-BASED INTERVENTION PROGRAM TO INCREASE FRUIT AND VEGETABLE CONSUMPTION AMONG DANISH TEENAGERS: THE BOOST PROJECT

CORRESPONDING AUTHOR:
Rikke KRØLNER
National Institute of Public Health,University of Southern Denmark, Øster Farimagsgade 5A, 2nd floor
DK-1399 Copenhagen K
Denmark
EMAIL: rkr@niph.dk.

KRØLNER Rikke, AARESTRUP Anne Kristine, JØRGENSEN Thea Suldrup, DUE Pernille
National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark

Objectives: The purpose of this poster is to present the development and design of the Boost Project. The objectives of the Boost project are to develop, implement and evaluate a school- and community-based intervention which promotes increased Fruit and Vegetable (FV) consumption among school children and has a positive effect on their academic achievement and well-being. Secondly, to develop and test strategies that will reach subgroups with low FV intake (boys and low social class).

Methodology: Selection of target group and development of the intervention was guided by the intervention mapping protocol, the Pro Children study and systematic reviews of determinants of FV consumption and intervention studies. The intervention will be tested employing a cluster-randomized trial design where a random selection of 40 Danish schools (≈4000 students) is randomly allocated to an intervention- and control group. The intervention will run from August 2010-May 2011. Baseline, 1st and 2nd follow-up surveys will be conducted in August 2010, May 2011 and May 2012. The implementation of the intervention will be monitored by a thorough process evaluation.

Results: The need assessment identified 13-year-olds as target group. Program activities were organized within three levels: School: Daily provision of free FV in schools for 9 months; guided classroom activities integrated in different school subjects; computer tailored messages for 13-year-olds; one-day-course for teachers. Families: guided student-parent activities; newsletters. Local area: guided student visits in grocery stores; field work strategies to increase access to healthy food in sport clubs.

Conclusion: The project will provide new insights on effective strategies to increase FV intake among teenagers in general and in specific risk groups, on factors influencing implementation of these strategies and opportunities for including the local community in interventions.

P44 INCREASING FRUIT AND VEGETABLE CONSUMPTION AMONG KINDERGARTEN CHILDREN - DEVELOPING TASTE AWARENESS USING THE SAPERE METHOD

CORRESPONDING AUTHOR:
Sanne LARSEN
EMAIL: spla@plan.aau.dk

LARSEN Sanne, BRANDHØJ Mia, MIKKELSEN Bent Egberg
Aalborg University, Denmark. Research group Food, People & Design
Lautrupvang 2 DK- 2750 Ballerup, Denmark

Objectives: The objective of the study was to test the Sapere-method as a method to develop taste awareness for fruits and vegetables among kindergarten aged children. The study aimed at linking consumption of F&V to knowledge and awareness of different senses such as taste and texture. It was also intended to increase the children's courage to taste new types of F&V and consumption of F&V by putting taste into words through food exposure.

Methodology: Results from the baseline study in the Periscope project on habitual dietary intake among 360 children, aged 3-6 years, in 14 different kindergartens showed limited variation in F&V intake. The Sapere-method was developed further and refine based on prior studies among 11-12 year old Swedish school children. A five day taste workshop in a selected kindergarten was developed and 12 children and two pedagogues participated. The workshop activities included specific tastings, sense-games and baking and the children were encouraged to share and talk about the different taste experiences, the children were supported to taste the disliked F&V again.

Results: The children responded positively to the taste workshop. The children's uncertainty of the connection between food and the singularly tastings in the beginning of the study were turned into awareness of different tastes in the food. Unfamiliar food were connected with familiar food through specific recognized tastes and thereby slowly accepted. Taste experiences were spontaneously put into words and shared among the children during the meals.

Conclusion: The study suggest that by strengthening kindergarten pedagogues' knowledge of the Sapere method, it is possible to increase children's awareness of senses related to food, physically and verbally. The study suggests that this can be a way to reduce food neophobia and increase food courage. However controlled studies among kindergarten aged children are needed to verify the findings.

P45 PUBLIC HEALTH POLICY DEVELOPMENT AND THE ROLE OF NGOS – THE EXAMPLE OF COORDINATED ADVOCACY EFFORT IN ESTABLISHING A FREE SCHOOL FRUIT PROGRAM

CORRESPONDING AUTHOR:
Kaja LUND-IVERSEN
Kaja, Norwegian Cancer Society,
Pb 4 Sentrum
0101 Oslo
Norway
EMAIL: kaja.lund-iversen@kreftforeningen.no

LUND-IVERSEN Kaja[1], ALM Carina Søderblom[2], HANSEN Kathrine Hestø[3], GRØTTUM Helle[4], DUFSET Laila[5].

1. Norwegian Cancer Society, Pb 4 Sentrum, 0101 Oslo, Norway
2. Norwegian Health Association, Pb 7139 Majorstuen, 0307 Oslo, Norway
3. The Norwegian Diabetes Association, Pb 6442 Etterstad, 0605 OSLO, Norway
4. Norwegian Asthma and Allergy Association, Pb 2603 St.Hanshaugen, 0131 Oslo, Norway
5. Norwegian Association of Heart and Lung Patients, Pb 4375 Nydalen, 0402 Oslo, Norway

Objective: To provide an example of how coordinated NGO advocacy can influence public health policy development.

Methods: The current national action plan on diet (2007-2011) consists of more than 100 measures. One of these measures is to establish a school fruit program that reaches all pupils in primary and secondary school, in order to reduce social inequalities caused by differences in diet among school aged children. Free serving of fruit to all school children is proven to be socio-economically cost-effective. To be realised, this measure needs considerable financial resources allocated in the national budget. Concerted advocacy efforts seem required to get it realised. Five major Norwegian health NGOs established in 2004 the coalition Kostforum in order to collaborate on policy issues related to diet and public health in general, and on the school fruit program in particular. The main strategies to influence policy development are meetings with politicians, media sensitization and increased public awareness through internet and new social media.

Results: Media monitoring show that the members of Kostforum have contributed to a number of articles in media. Kostforum and the member organisations have had several meetings with politicians. Several organisations communicate the same message alone or together in a range of deliveries to the political system. A Facebook Page has recently been published to build support among pupils, parents and the public in general.

Conclusion: NGOs can play a major role in pushing public health policy forward using several strategies. Coordinated advocacy efforts and communication of one main message through many channels may be crucial to influence the political system to implement effective public health measures. However, if we have succeeded in contributing to the realisation of a universal free school fruit program is yet unknown.

P46 FRUIT AND VEGETABLES IN HOSPITAL

CORRESPONDING AUTHOR:
Marie-Laure MARTIN
EMAIL:
marie_laure.martin@laposte.net

MARTIN Marie-Laure[1], VIGIER Valérie[2], POULAIN Jean-Pierre[3]

1. M2 Sciences Sociales Appliquées à l'Alimentation, CETIA-Université de Toulouse 2
2. Chargée de mission, DGAL, Ministère de l'Alimentation, de l'Agriculture et de la Pêche
3. Professeur de sociologie, Universités, Toulouse 2

This pilot project aimed at improving access to fresh fruit and vegetables within hospitals and the pleasure patients take in eating. The project took place at the hospital Saint-Jean in Perpignan, from June 9 to August 31 2009. Patients from maternity and endocrinology services have benefited individual box of fresh fruit, distributed with the lunch tray and left to them until evening.

The project was evaluated qualitatively and quantitatively taking into account the perceptions of staff and patients: individual interviews and focus groups for the staff; individual interviews and questionnaires administered to 300 patients hospitalized in both services objects experience and 2 control services.

The evaluation revealed a positive reception of the experiment. Providing fruit for patients gives a better picture of the hospital, allows the staff work to be emphasized and the food to reach the rank of therapeutic leverage. For patients, the possibility of having fruit available throughout the afternoon and the option of splitting the food according to appetite, improves their well-being. The fruit box had a positive influence on patients who feel better concerned. It is the object of rituals of ownership and opening of a larger space of freedom: the patient can decide how and when he will eat the fruit. The project also improves the perception of meals by patients, particularly in terms of variety, nutritional balance, quality and presentation trays. The experiment has thus proved itself a success, and a larger scale version has been planned, aiming toward a widespread application.

The project was initiated and co financed by Interfel, Legumes de France, FranceAgriMer, and Ministère de l'Alimentation, de l'Agriculture et de la Pêche

P47 STRATEGY FOR A LOCAL INTERVENTION AIMING THE PROMOTION OF FRUIT AND VEGETABLES CONSUMPTION

CORRESPONDING AUTHOR:
Virgínia MATTA
Av. das Américas,
29501, Guaratiba,
Rio de Janeiro/RJ,
Brazil. 23020-470
EMAIL: vmatta@ctaa.embrapa.br

OLIVEIRA Silvana (*In memorian*)[1], FARIAS Silvia[2], GOES Hellen[3], CASTRO Fernanda[3], SILVA Amanda[2], GOMES Fabio[4], TABAI Katia[3], WOLKOFF Daisy[2], COUTO Sueli[4], CASTRO Ines[5], CASTRO Luciana[2], MONTEIRO Rodrigo[1], PENHA Edmar[1], SILVA Soraya[1], ROCHA João[1], MENDES Luciana[1], MATTA Virgínia[1]

1. Embrapa Food Technology
2. Rio de Janeiro State University
3. Federal Rural University of Rio de Janeiro
4. National Cancer Institute of Brazil
5. Annes Dias Nutrition Institute

This project aims the development of strategies in order to promote Fruits and Vegetables (FV) consumption in three poor communities of the West region of Rio de Janeiro city, Brazil, using a local approach. The targets were nursery, schools, worksites, small FV shops and families assisted by the Family Health Program. The project was divided in three steps: pre-intervention evaluation, intervention implementation and post-intervention evaluation. The first step started in October 2007, when it was evaluated the determinants of cultivation, acquisition, consumption and selling of fruits and vegetables. The results of the initial diagnosis for each group were tabulated, analyzed and presented to communities' members. Based on the obtained data and on the discussions and needs of each segment, the actions of intervention were defined. They started in 2008, by training community health agents, teachers and school cookers (as multiplying actors for children and families), as well as specific training to the owners of the FV shops. Health fairs were organized by each community with support of the project team. In the worksites the activities were driven to the employees with presentations focusing the relationship between low FV consumption and cancer, supplying of healthy-breaks in meetings, an activity that simulate the act of shopping food called Grocery of Health, among others. The project logo was created containing the three axes of the actions: cultivation, cooking and consumption. Diagnosis results and guide documents, receipts, FV information, magnets and others were elaborated and distributed to the different groups after discussions about their objectives and ways of use. Data from the final step are now being analyzed, which will enable to evaluate the intervention effectiveness on promoting fruits and vegetables consumption.

P48 PRO GREENS INTERVENTION IN PORTUGUESE SCHOOLS

CORRESPONDING AUTHOR:
Bárbara PEREIRA
Faculty of Nutrition and Food Sciences, Porto University
Roberto Frias Str
4200-465 Porto
Portugal
EMAIL: barbarapereira@fcna.up.pt

PEREIRA Bárbara, FRANCHINI Bela, ALVIM Alda, VAZ DE ALMEIDA Maria Daniel
Faculty of Nutrition and Food Sciences, Porto University

The Pro Greens project is a health promotion project funded by DG SANCO. Eleven countries collaborate in this project, which began in August 2008 and is planned to be finished in July 2011.

Pro Greens aims to develop and test effective strategies to promote fruit/vegetables consumption in school children.

Participants were 1008 children aged 11-13 years old from 5 Portuguese schools (2 intervention, 3 control). Fruit/vegetables consumption was assessed by a self-administered questionnaire including a 24h-recall and a short food frequency. Afterwards, a school based intervention was implemented. It consists of different components: (1) classroom (a set of guided activities worksheets with emphasis to taste sessions carried out by nutritionists that aimed to encourage children to use their senses to become familiar with a wide variety of fruit/vegetables; a weekly fruit/vegetables break); (2) school (educational sessions with children/teachers; development of a blog entitled City of Greens); (3) family (involving carriers in children's homework assignments; educational sessions to give tips to encourage their children to eat more fruit/vegetables). At the end a new assessment of children's fruit/vegetables consumption will be performed.

The intervention started in November 2009 and will be finished in May 2010. For this reason, only the project design and preliminary results from component (1) will be explored: the association between preference and frequency of consumption of the fruit/vegetables used in the taste activities (evaluated by a self-administered questionnaire applied to children after the sessions); the proportion of children adhering to the weekly break as well as the type of fruit/vegetables consumed will also be presented.

P49 EFFECTS OF THE DUTCH INTERVENTION SCHOOLGRUITEN

CORRESPONDING AUTHOR:
Nannah I. TAK
VU University Medical Center,
Van der Boechorststraat 7
1081 BT Amsterdam
The Netherlands
EMAIL: n.tak@vumc.nl

TAK Nannah I., TE VELDE Saskia J., BRUG Johannes
Department of Epidemiology & Biostatistics and the EMGO Institute for Health and Care Research

Objective: To evaluate the effects of the Dutch Schoolgruiten Project, a primary school based intervention providing free Fruit and Vegetable (F&V).

Methods: Participating schoolchildren (mean age 9.9 years at baseline) and their parents completed parallel questionnaires at baseline, at one-year and at two-year follow-up. The questionnaire included questions on usual F&V intake of the child, potential behavioural determinants (knowledge of daily recommendations, availability & accessibility of fruit), appreciation for a F&V promotion project, mid-morning break snacks, and general demographics. Primary outcome was usual F&V intake as reported by the parent and the child. Multi-level linear regression analyses were used to assess differences at first and second follow-up adjusted for baseline values between control and intervention group and to explore potential mediators.

Results: Short-term evaluation showed positive mixed results, namely a significant higher vegetable intake (20.7 gram/day, 95%CI 7.6; 33.7) for children of non-Western ethnicity (N=287) than their peers from the control schools. The Dutch children (N=519) from the intervention schools reported significantly higher fruit intake (0.23 pieces/day, 95%CI 0.07; 0.39) than the Dutch children from the control schools. No significant effects based on parents' reports were observed.

At two-year follow-up, both child (N=771) and parent reports (N=435) indicated that the intervention group had significantly higher fruit intake (0.15; 95%CI 0.004; 0.286 and 0.19; 95%CI 0.030; 0.340 pieces/day, children and parent reports respectively). No significant effects on vegetable intake were observed. Significant positive intervention effects were also found for knowledge of fruit recommendations among boys. Additional analyses showed that appreciation for a F&V promotion intervention and knowledge of fruit recommendations partially mediated the effects on fruit intake. Furthermore, results indicated that children in the intervention group brought F&V snacks more often and unhealthy snacks less often from home to school to consume in the morning break at school.

Conclusion: The Schoolgruiten Project was effective in increasing children's fruit intake.

P50 EFFECTIVENESS OF SCHOOL-BASED INTERVENTIONS IN EUROPE TO PROMOTE HEALTHY NUTRITION IN CHILDREN AND ADOLESCENTS: SYSTEMATIC REVIEW OF PUBLISHED AND 'GREY' LITERATURE

CORRESPONDING AUTHOR:
Eveline VAN CAUWENBERGHE
Watersportlaan 2
9000 Ghent
Belgium
EMAIL:
eveline.vancauwenberghe@ugent.be

VAN CAUWENBERGHE Eveline[1], MAES Lea[2], SPITTAELS Heleen[1], VAN LENTHE Frank[3], BRUG Johannes[4], OPPERT Jean Michel[5], DE BOURDEAUDHUIJ Ilse[1]

1. Department of Movement and Sport Sciences, Ghent University, Belgium
2. Department of Public Health, Ghent University, Belgium
3. Department of Public Health, Erasmus University Medical Centre Rotterdam, The Netherlands
4. EMGO Institute for Health and Care Research, VU University Medical Centre, The Netherlands
5. Université Pierre et Marie Curie, Department of Nutrition, Pitié-Salpêtrière Hospital (AP-HP), Human Nutrition Centre Ile-de-France (CRNH-IdF), France

The objective of the present review was to summarise the existing European published and 'grey' literature on the effectiveness of school-based interventions to promote a healthy diet in children (6–12 years old) and adolescents (13–18 years old). Eight electronic databases, websites and contents of key journals were systematically searched, reference lists were screened, and authors and experts in the field were contacted for studies evaluating school-based interventions promoting a healthy diet and aiming at primary prevention of obesity. The studies were included if they were published between 1 January 1990 and 31 December 2007 and reported effects on dietary behaviour or on anthropometrics. Finally, forty-two studies met the inclusion criteria: twenty-nine in children and thirteen in adolescents. In children, strong evidence of effect was found for multicomponent interventions on fruit and vegetable intakes. Limited evidence of effect was found for educational interventions on behaviour, and for environmental interventions on fruit and vegetable intakes. Interventions that specifically targeted children from lower socio-economic status groups showed limited evidence of effect on behaviour. In adolescents, moderate evidence of effect was found for educational interventions on behaviour and limited evidence of effect for multicomponent programmes on behaviour. In children and adolescents, effects on anthropometrics were often not measured, and therefore evidence was lacking or delivered inconclusive evidence. To conclude, evidence was found for the effectiveness of especially multicomponent interventions promoting a healthy diet in school-aged children in European Union countries on self-reported dietary behaviour. Evidence for effectiveness on anthropometrical obesity-related measures is lacking.

Poster abstracts

Fruit and Vegetables in the pathogenesis of diseases

P51 DIETARY PATTERNS AND BREAST CANCER RISK: A CASE CONTROL STUDY AMONG A POPULATION IN SOUTHERN FRANCE

CORRESPONDING AUTHOR:
Faïza BESSAOUD
Registre des tumeurs de l'Hérault
Parc Euromedecine
208, rue des apothicaires
34298 Montpellier Cedex 5, France
EMAIL: faiza.bessaoud@laposte.net

BESSAOUD Faïza[1], GRAS-AYGON Claudine[1], TRETARRE Brigitte[1], DAURES Jean Pierre[1], GERBER Mariette[2]

1. Registre des tumeurs de l'Hérault – Parc Euromedecine 208, rue des apothicaires - 34298 Montpellier Cedex 5, France.
2. Centre régional de Lutte contre le Cancer – Centre de recherche en Cancérologie 208, rue des apothicaires - 34298 Montpellier Cedex 5, France.

A case-control study (437 cases/922 controls) examined association between dietary patterns and Breast Cancer (BC) risk.

Diet was assessed by a validated food frequency questionnaire. Dietary patterns were identified using two statistical methods "Principal Component Analysis" (ACP) and "Ascendant Hierarchical Clustering" (AHC). OR were computed across levels of consumption identified by a free knot spline for logistic model.

APC identified 3 major dietary patterns and 3 clusters of foods were selected for AHC. A "Western" pattern (cereals, processed meats, eggs and sweets) was revealed by ACP and AHC, which was associated with a non significant increase in BC risk. ACP identified a meat/alcohol pattern, which significantly increased BC risk above the spline knot 1.5 (OR =2.56 [1.54, 4.26]). ACP identified a "Mediterranean" pattern (fruits, vegetable, fish and olive oil). No association with BC risk was observed (≥ vs. < spline knot 0.7: OR =1.03 [0.71, 1.44]).

The AHC revealed two parts of the "Mediterranean pattern" as identified by ACP: "Vegetables & olive oil" and "Fish". "Vegetables & olive oil" cluster was associated with a non significant increase in BC risk (≥ vs. < spline knot 0.4 OR =1.30 [0.95, 1.08]). "Fish" cluster was associated with a non significant decrease in BC risk (> vs < spline knot -0.4 (OR=0.95 [0.8, 1.05].

ACP and AHC were different but complementary: the results from AHC might explain the absence of relationship between BC and Mediterranean pattern as identified by ACP , since it revealed 2 components with opposite effects. The negative effect of a high consumption of the cluster "Vegetables & olive oil" might be related to an excess of olive oil consumption through an elevated caloric intake.

P52 QUANTITY AND VARIETY OF VEGETABLE AND FRUIT CONSUMPTION AND THE RISK OF BLADDER CANCER IN THE EUROPEAN PROSPECTIVE INVESTIGATION INTO CANCER AND NUTRITION (EPIC)

CORRESPONDING AUTHOR:
Frederike BÜCHNER
PO Box 1
3720 BA Bilthoven
The Netherlands
EMAIL: Frederike.Buchner@rivm.nl

BUCHNER Frederike[1, 2], BUENO-DE-MESQUITA Bas[1], ROS Martine[1, 2], KAMPMAN Ellen[2], KIEMENEY Bart[2, 3, 4] on behalf of the EPIC bladder cancer working group

1. National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands
2. Department of Epidemiology, Biostatistics and HTA, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands
3. Department of Urology, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands
4. Comprehensive Cancer Center East, Nijmegen, The Netherlands

Recent research does not show an association between fruit and vegetable consumption and bladder cancer risk. None of these studies looked at the variety in fruit and vegetable consumption, which may capture different aspects of fruit and vegetable consumption. We investigated whether the quantity and the variety in vegetable and fruit consumption are associated with bladder cancer risk in the European Prospective Investigation into Cancer and Nutrition study.

Data on food consumption and complete follow-up for cancer occurrence was available for 478,533 participants, who were recruited in 10 European countries. After a mean follow-up of 8.7 years, 1015 participants were diagnosed with bladder cancer. Diet Diversity Scores (DDSs) were used to quantify the variety in fruit and vegetable consumption. Multivariable Cox proportional hazard models were used to assess the effect of fruit and vegetable consumption and DDSs on bladder cancer risk.

Increments of 100 gram/day in fruit and vegetable consumption did not affect bladder cancer risk (calibrated hazard ratio 0.98; 95%CI: 0.95–1.01). A slightly stronger, although statistically non-significant, inverse association was observed among non-smokers (calibrated HR=0.92; 95%CI: 0.79–1.06 with increments of 100 g/day). Unexpectedly, more variety in fruit and vegetable products consumed increased bladder cancer risk (HR=1.30 95%CI=1.00-1.69 highest versus lowest tertile), which was strongest among never smokers (HR=1.72; 95%CI: 1.00-2.97). The continuous HR estimates did not reach statistical significance (HR=1.02; 95%CI: 0.99-1.06; HR never smokers=1.04; 95%CI 0.98-1.11 per 2 products increment).

We conclude that in EPIC quantity of vegetable and fruit consumption is not associated with bladder cancer risk. Variety in fruit and vegetable consumption possibly increases bladder cancer risk; however findings are not supported by statistically significant continuous risks estimates and may therefore be due to chance. Our overall results provide further evidence that fruit and vegetable consumption does not strongly alter bladder cancer risk.

P53 DIETARY FIBER CONSUMPTION AND CARDIOVASCULAR DISEASE RISK FACTORS IN MOROCCAN WOMEN

CORRESPONDING AUTHOR:
Rachida CHABIR
EMAIL: rachidachabir@yahoo.com

CHABIR Rachida[1], BORGHOS Lamyae[1], AGUENAOU Hassan[2], MOKHTAR Najat[2]
1. Université Sidi Mohamed Ben Abdellah, Faculté de Médecine et Pharmacie, Fès, Morocco.
2. Université Ibn Tofail, Faculté des sciences de Kenitra, Maroc.

Increased consumption of dietary fibre is widely recommended to maintain or improve health, but knowledge of the relation between dietary fibre and cardiovascular disease risk factors is limited.

Objective: We examined the relation between the dietary fibre intake and cardiovascular disease risk factors in Moroccan women at procreative age.

Design: In a cross-sectional study, quintiles of fibre intake were determined from dietary records, separately for 987 women. Age- and multivariate-controlled logistic models investigated the odds ratios of abnormal markers for quintiles 2-5 of fibre intake compared with the lowest quintile.

Results: The highest total dietary fibre intakes were associated with a significantly (P<0.05) lower risk of obesity and elevated waist-to-hip ratio, blood pressure, cholesterol, triglyceride. Conclusion: Dietary fibre intake is inversely correlated with several cardiovascular disease risk factors, which supports its protective role against cardiovascular disease and recommendations for its increased consumption.

Keywords: cardiovascular fibre women at procreative age obesity blood pressure.

P54 TOTAL DIETARY ANTIOXIDANT CAPACITY AND LUNG FUNCTION IN THE ITALIAN POPULATION

CORRESPONDING AUTHOR:
Licia IACOVIELLO
EMAIL:
licia.iacoviello@rm.unicatt.it

DI GIUSEPPE Romina[1], ARCARI Antonella[1], SERAFINI Mauro[2], DI CASTELNUOVO Augusto[1], ZITO Francesco[1, 3], DE CURTIS Amalia[1], SIERI Sabina[4], KROGH Vittorio[4], PELLEGRINI Nicoletta[5], SCHÜNEMANN Holger J[6], DONATI Maria Benedetta[1], DE GAETANO Giovanni[1], IACOVIELLO Licia[1], on behalf of the Moli-sani Project Investigators

1. Laboratory of Genetic and Environmental Epidemiology, "RE ARTU" Research Laboratories, "John Paul II" Centre for High Technology Research and Education in Biomedical Sciences, Catholic University, Campobasso, Italy,
2. Antioxidant Research Laboratory, Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione, Rome, Italy,
3. San Timoteo Hospital, Termoli, Italy,
4. Nutritional Epidemiology Unit, National Cancer Institute, Milan, Italy,
5. Department of Public Health, University of Parma, Parma, Italy
6. Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Ontario, Canada.

Background: A link between oxidative stress and lung function has been suggested.

Objective. We investigated the association between the Total Antioxidant Capacity (TAC) of the diet and pulmonary function.

Design. Healthy women (5,898) and men (5,893), randomly recruited from the general population in the framework of the Moli-sani project were investigated. The European Investigation into Cancer and Nutrition Food Frequency questionnaire was used for dietary assessment. Pulmonary function was measured by trained technicians, according to the American Thoracic Society criteria, by using V-Max Encore 22D Spirometers equipped with plethysmographyc autobox. Dietary TAC, assessed as TEAC, TRAP and FRAP was energy-adjusted according to the residual method (22) and categorized into quintiles on the basis of sex-specific distribution or reported as means ± STD.

The association between quintile of dietary TAC, regressed on total energy intake according to residual methods, and pulmonary indexes was assessed by using a multivariable mixed model with fixed effects separately for men and women.

Results. In women pulmonary function was associated with dietary ferric reducing-antioxidant power (FRAP), the better predictor of pulmonary function. Compared to the first quintile of FRAP, those in the fifth quintile had a +37 ml higher Forced Expiratory Volume in the first second (FEV1), +51mL higher Forced Vital Capacity (FVC) and +121 mL/s higher Peak Expiratory Flow (PEF), after adjustment for confounders (P<0.01 for all). A significant interaction was found with smoking habits and menopausal status, being the association present only in non smoker/premenopausal women (P<0.001 for all). In the latter group the increment in pulmonary function was equivalent to an improvement in pulmonary age of ~3 years. In men only PEF was significantly associated with dietary FRAP (P=0.024).

Conclusions. Dietary TAC may play a role in respiratory health, with a more evident effect in premenopausal, no smoker women.

P55 HISTOCHEMICAL AND HISTOENZYMOLOGIC STUDY OF DIET-INDUCED LIVER INJURIES IN DIABETIC SAND RAT *PSAMMOMYS OBESUS*

CORRESPONDING AUTHOR:
Salima EL-AOUFI
EMAIL: smelaoufi@yahoo.fr

EL-AOUFI Salima[1], MAOUCHE Boubekeur[2], SENNOUNE Souad[3]

1. Laboratoire de Biologie et de Physiologie des Organismes/Nutrition, Métabolisme, Faculté des Sciences Biologiques, USTHB, Alger - Algérie.
2. Laboratoire de Physicochimie Théorique et de Chimie Informatique ; Faculté de Chimie, USTHB, Alger, Algérie.
3. Department of Physiology; Texas Tech University Health Sciences Center ; Lubbock, Texas - USA.

Introduction: Liver disease is an important cause of death in type 2 diabetes. As with human diseases driven by diet, fatty liver in rodents is also diet-inducible. High-Fat Diets (HFD) are well-known to increase liver fat levels quite rapidly before significant increases in peripheral fat deposition occur. Such rapid liver fat accumulation is associated with a deep dysfunction of the enzymatic system and a serious alteration of the hepatocytes, which induce severe liver diseases.

Objectives: Our aim is to examine the long-term effects of a HFD on the development of diet-induced fatty liver diseases in Psammomys obesus and to evaluate the histochemical and histoenzymologic changes in the hepatic tissue during obesity and diabetes evolution.

Material and methods: 10 Wistar rats and 62 mature Psammomys of both sexes are divided in 2 groups: 29 controls and 43 treated animals. The experiment lasted 15 months and 20 enzymatic activities and 5 molecular substances have been investigated.

Results: Histological analysis revealed that islets of all Psammomys in HFD were enlarged and had variable insulin granulation. The most notable difference between healthy Psammomys and rodents in HFD was the marked hepatosteatosis produced by the fat diet and the widespread of microvesicular fat accumulation with a loss of PAS-positive glycogen in the fat-filled hepatocytes. In the healthy Psammomys group the hepatocytes present a natural deficiency in glucose 6-phosphate (G6P) which worsens during HFD. The enzymes phosphorylase and uridine diphosphate glucose-glycogen glucosyl transferase (UDPG-synthetase) active in the obese Psammomys, are absent in the diabetics. In the IDDM state, we observe lysosomal enzymes hyperactivity and the growth of the alkaline phosphatase which is the marker of cellular necrosis.

Conclusion: The liver of Psammomys obesus in HFD undergoes deep pathologic modifications diet-induced. The histochemical reactions and the histoenzymologic modifications observed are in perfect correlation with the analytic results. The perturbations of the hepatocytes are similar to those observed in the human diabetes. Our polygenic animal seems to be an excellent model, naturally adapted to research on the interactions between environment, diet and endocrine dysfunctions.

P56 BENEFICIAL HEALTH EFFECTS OF STRAWBERRIES: IN VITRO STUDY USING INTESTINAL FUNCTIONAL CELL MODEL

CORRESPONDING AUTHOR:
CENCIČ Avrelija
Faculty of Agriculture and Life Sciences, University of Maribor, Pivola 10, Hoče
Slovenia
EMAIL: avrelija.cencic@uni-mb.si

KRAJNC Sara[1], LANGERHOLC Tomaž[1], CENCIČ Avrelija[1, 2]

1. Dept.of Microbiology, Biochemistry, Molecular Biology and Biotechnology, Faculty of Agriculture and Life Science, University of Maribor, Slovenia
2. Department of Biochemistry, Faculty of Medicine, University of Maribor, Slovenia

Strawberries are a rich source of antioxidants, especially of vitamin C and phenolic compounds. They protect body from harmful free radicals and prevent oxidative stress in cells, which are recognized as the major cause for development of tumour malignancies or cell death due to apoptosis.

At the University of Maribor we developed functional intestinal cell models of human and animals. They consist of growing intestinal epithelial cells on a microporous membrane underlied with macrophages, similar to the in vivo situation. We use only cell lines of non-cancerogenic origin that were prepared in our laboratory. To evaluate potential influence of strawberries (Fragaria ananassa) we prepared water and ethanolic extracts and they were tested in pig and human intestinal cell models for cytotoxicity, cell vitality (MTT) and proliferation effects along with protection against some common pathogens.

We found strawberry's ethanolic extract to confer protection to all tested cell lines against detrimental effects of toxic ethanol. More, cells stayed more viable and proliferative in the presence of ethanolic extract than the control. Activity of strawberries against common intestinal pathogens is limited and is bacterial and viral species specific.

In conclusion, inclusion of strawberries in a diet confers some health beneficial effects as measured in our intestinal cell models.

P57 COMPARATIVE STUDY OF PROTEIN GLYCATION OF ENDOTHELIAL CELLS, BY GLUCOSE, ASPARTAME AND STEVIOL. MECHANISM OF ACTION OF METFORMIN, PYRIDOXAMINE AND L-CARNITINE AS INHIBITORS OR BREAKER OF AGES.

CORRESPONDING AUTHOR:
Boubekeur MAOUCHE
EMAIL: bbkmaouche@yahoo.fr

MAOUCHE Boubekeur[1], EL-AOUFI Salima[2], OUSMAAL Mohamed[3], IKHLEF Davila[4]

1,4. Laboratoire de Physicochimie Théorique et Chimie Informatique, Faculté de Chimie, USTHB, Alger, Algérie.
2,3. Laboratoire de Biologie et de Physiologie des Organismes/Nutrition, Métabolisme, Faculté des Sciences Biologiques, USTHB, Alger - Algérie.

Introduction: Glucose is the main energy source for living organisms, but persistent hyperglycaemia leads to the major clinical complications observed in patients with type-2 diabetes. Clinical observations show that the increased incidences, and the accelerated rate, of coronary artery, cerebrovascular and peripheral vascular diseases are directly related to the degree of hyperglycaemia and to Advanced Glycation Endproducts (AGEs). So lowering blood sugar level to normal ranges is an absolute necessity. One of the main sugar substitutes used by diabetics is Aspartame, but some recent studies concluded that Aspartame is a toxic poison unfit for human consumption. Other studies claimed that Stevia can be a part of a healthy diet since it is not believed to raise blood sugar level.

Objectives: This theoretical study is to describe the molecular mechanisms of glycation of glucose, aspartame and steviol and then to give an insight of the mode of action of three inhibitor or breaker of AGEs : Metformin, Pyridoxamine and L-Carnitine.

Methods: The calculations were carried out using quantum mechanics and molecular modelling software packages as implemented in TITAN99, MOPAC 2002 V-1.33 and Gaussian(R) 03 program.

Results: All the active sites of the molecules considered have been determined using the global and local Fukui indices of reactivity. We describe the glycation mechanism of Aspartame and Steviol and the mechanism of antidiabetic action of Metformin, L-Carnitine and Pyridoxamine at the main stages of the Maillard reaction (MR). We show that Metformin acts as an 'inhibitor of AGEs' because it freezes, at the early stage of the MR, all the active sites of glucose with which it forms a complex [Met-Gluc] thermodynamically very stable and that Pyridoxamine and L-Carnitine act as 'breakers of AGEs' because they react with the toxic Amadori carbonyl groups and ∂- dicarbonyl compounds.

Conclusion: We show here that the Aspartame toxicity is not only due to the weakness of some methyl alcohol bonds that can be easily broken by heat in the blood stream and then lead to cataract development, but also by its ability to bind to amine endings of endothelial cell proteins leading to AGEs formation as do glucose. The HSAB theory and the Fukui indices of reactivity, at the DFT level, are very pertinent tools to understand the molecular mechanisms underlying the metabolic dysfunctions in the diabetes induced by some common nutrients, and to predict new possible inhibitors or breakers of AGEs.

P58 FRUIT AND VEGETABLE CONSUMPTION AND OBESITY IN PARIS METROPOLITAN AREA: AN ANALYSIS OF SIRS COHORT IN 2005

CORRESPONDING AUTHOR:
n.c.

Martin J.[1, 2], Grillo F.[1, 2], Chauvin P,[1, 2, 3]
1. INSERM, U707, Research team on the social determinants of health and healthcare, Paris, France
2. Université Pierre et Marie Curie-Paris6, UMR-S 707, Paris, France
3. AP-HP, Hôpital Saint Antoine, Unité de santé publique, Paris, France

Introduction. In Western countries the prevalence of obesity is growing, which represents a major public health problem. Our objective was to explore the determinants of obesity in the Paris metropolitan area, in particular association between consumption of fruits and vegetables and adult obesity.

Methods. The SIRS cohort study is a socio-epidemiological longitudinal study of the general population the Paris area. It entails a 3-stage cluster random sample of 3,023 adults, stratified according to the socioeconomic status of neighbourhoods. Obesity and overweight was estimated by the BMI using self-reported data. Logistic regression models, explored for men and women separately, the association between obesity and consumption of fruits and vegetables, after adjustment on socio-economic characteristics. Fruit and vegetable consumption was coded in two categories: consuming crude fruits and vegetables daily or almost vs consuming crude fruits and vegetables more rarely or never.

Results. After adjustment on age, educational level, income, having children and physical activity, the results are very different by gender. For women, those who don't consume fruits and vegetables daily have an increased risk of being obese (IMC≥30) - OR = 1.53; IC95 % = [1.04-2, 27]. For men, obesity is associated with the fact of having children, with practice of a physical activity and with low educational level, but it is not significantly associated to consumption of fruits and vegetables.

Conclusion. Women who eat daily fruit and vegetables are more likely to be obese, once adjusted on demographic, socio-economic factors, and physical activity. For men consumption of fruits and vegetables is not associated to obesity. Further analyses are needed to better understand the role of cultural factors and in healthy attitudes towards health construction and the choice of "ways of life" in both sexes. These disparities deserve to be taken into account in programmes for the prevention of obesity, particularly in large urban areas.

P59 FRUIT AND VEGETABLE CONSUMPTION, SOCIAL GRADIENT, AND 15 YEAR RISK OF MAJOR CHRONIC DISEASE IN THE WHITEHALL II STUDY

CORRESPONDING AUTHOR:
Gabriel MASSET
Department of Epidemiology
& Public Health
UCL, 1-19 Torrington Pl.
London WC1E 6BT
UK
EMAIL: g.masset@ucl.ac.uk.

MASSET Gabriel[1], RAYNER Mike[2], SCARBOROUGH Peter[2], MISHRA Gita[1], BRUNNER Eric[1].
1. Department of Epidemiology & Public Health, UCL, London, UK.
2. British Heart Foundation Health Promotion Research Group, Department of Public Health, University of Oxford, Oxford, UK.

Background. There is little population-scale evidence about the separate roles of fruit and vegetable intake in chronic disease. Consumption is socially patterned and thought to explain part of socioeconomic inequalities in chronic disease.

Aim. (i) To assess the impact of Fruit, nuts and Vegetable (F&V) consumption, separately and in combination, on incident fatal and non-fatal coronary events (CHD), cancer, diabetes and all-cause mortality. (ii) To assess the extent to which F&V consumption explains the social gradient in health.

Method. Prospective analysis was conducted among 7945 participants with a mean age of 50y at the time of dietary assessment (127-item food frequency questionnaire). Energy-adjusted residuals of intake were used in the analyses. 15y follow-up of incident CHD and diabetes was verified by record tracing and oral-glucose-tolerance tests. Incident cancer cases were notified by NHS cancer registries. Social class was measured by Civil Service employment grade.

Results. (i) Intake of fruit & nuts (F&N) and F&V combined was associated with CHD risk reduction (table). Combined F&V consumption was associated to decreased risk of cancer in the base model (n=7945), Hazard Ratio (95% CI) was 0.89 (0.75; 0.98). Adjustment for smoking, physical activity and BMI attenuated the association by 28% (n=7211). F&V consumption was not associated with future risk of diabetes or all-cause mortality.

(ii) The social gradient in CHD was attenuated by 16% after adjusting for F&N intake. Attenuation was minor for diabetes and all-cause mortality (2.3% and 4.5%, respectively). Overall, incident cancer rates were not associated with employment grade.

Hazard ratios for CHD for trends of fruits, nuts and vegetables intakes

Outcome and exposure	Base model Hazard Ratio (95% CI)	+ smoking, physical activity, BMI Hazard Ratio (95% CI)	+ intake from other food groups Hazard Ratio (95% CI)
CHD (207 events/7213 participants)			
Fruit & nuts	**0.83 (0.73; 0.94)**	**0.85 (0.75; 0.97)**	**0.86 (0.75; 0.99)**
Vegetables	0.99 (0.87; 1.13)	0.99 (0.87; 1.12)	1.00 (0.88; 1.14)
F&V combined	**0.84 (0.75; 0.96)**	**0.86 (0.75; 0.97)**	0.89 (0.78; 1.02)

Base models were adjusted for sex, age, ethnicity and employment grade.

Conclusions. F&N consumption appeared to drive the association between combined F&V intake and CHD risk, and explained part of the socioeconomic inequalities. Combined F&V consumption may be important with respect to cancer risk. Confirmation of these results using alternative dietary assessment methods and other datasets are needed.

P60 RAW AND PROCESSED FRUIT AND VEGETABLE CONSUMPTION AND 10-YEAR STROKE INCIDENCE IN A POPULATION-BASED COHORT STUDY IN THE NETHERLANDS

CORRESPONDING AUTHOR:
Linda M OUDE GRIEP
Wageningen University,
Division of Human Nutrition,
P.O. Box 8129
6700 EV Wageningen
The Netherlands
EMAIL: Linda.oudegriep@wur.nl

OUDE GRIEP Linda M.[1], VERSCHUREN W.M. Monique[2], KROMHOUT Daan[1], OCKÉ Marga C.[2], GELEIJNSE Johanna M.[1]

1. Division of Human Nutrition, Wageningen University, The Netherlands
2. National Institute for Public Health and the Environment, Bilthoven, The Netherlands

Background Prospective cohort studies have shown that high fruit and vegetable consumption is related to a lower risk of stroke. Whether processing affects this association is unknown.

Objective To evaluate the associations of raw and processed fruit and vegetable consumption with 10-year incident stroke and stroke subtypes in a population-based study in the Netherlands.

Design Prospective population-based cohort study, including 20,069 men and women aged 20 to 65 years and free of cardiovascular diseases at baseline were enrolled between 1993-1997. Diet was assessed using a validated 178-item food frequency questionnaire. Hazard ratios were calculated for total, ischaemic and haemorrhagic stroke using Cox proportional hazards models adjusted for age, gender, energy intake, alcohol intake, smoking status, educational level, dietary supplement use, family history of MI before 60, body mass index, and dietary fiber intake from other sources, fish, saturated fatty acids, and depending on the exposure variable for raw or processed fruit and vegetables.

Results During a mean follow-up time of 10.3 y, 233 incident cases of stroke were documented (139 ischaemic strokes, 45 haemorrhagic strokes and 49 other, unspecified strokes). The risk of total stroke incidence was 36% lower for subjects with a high intake of raw fruit and vegetables (≥262 g/d; HR: 0.64; 95% CI: 0.43-0.95) compared to subjects with a low intake (<92 g/d). High intake of raw fruit and vegetables was inversely associated with ischaemic stroke incidence (HR: 0.69; 95% CI: 0.48-0.99; for ≥150 vs <150 g/d;) and inversely related to haemorrhagic stroke incidence, however, this was not statistically significant (HR: 0.76; 95% CI: 0.41-1.43). Processed fruit and vegetable consumption was not associated with stroke incidence (≥233 g/d vs <113 g/d; HR: 1.11; 95% CI: 0.76-1.63).

Conclusion High intake of raw fruit and vegetables may protect against incident stroke.

P61 SOFT DRINKS: ARE YOU DRINKING FRUITS OR EATING SUGAR? ORAL CONSEQUENCES

CORRESPONDING AUTHOR:
Thomas TRENTESAUX
Faculté de Chirurgie Dentaire
place de Verdun
59000 LILLE (France).

TRENTESAUX Thomas, CATTEAU Céline, DELFOSSE Caroline, TERNOIS Matthieu, ROUSSET Monique-Marie

Faculté de Chirurgie Dentaire, Université de Lille 2, France.

Objectives: French dietary guidelines, published in 2001, recommend to daily consume five portions of fruits or vegetables. Despite these advices, the consumption of fruits in the North of France is low whereas sale of 100% fruit juices, fruit drinks and fruit-flavored beverages is increasing. Fruit juices may contribute to only one portion towards the recommended five a day. This is because it does not contain all the beneficial nutrients and fibres that whole fruits do. Moreover, fruit drinks are high in energy. The impact of contemporary changes in beverage patterns on dental caries is less reported than the impact on childhood obesity. Nevertheless, the cariogenic potential of soft drinks is known. Drinking fruit juices, fruits drinks or fruit flavored beverages over a long period and continuous sipping can therefore be harmful for teeth. This study describes the sugar content of such beverages in order to inform consumers about the oral consequences.

Methodology: A sample of concerned beverages was selected in supermarkets. Their sugar contents were studied by analyzing labels and compared to those of fresh fruits.

Results: The sugar content of 100% fruit juices varies from 75,5g/L (grapefruit) to 151g/L (grapes). The mean of sugar content is respectively 100g/L and 43g/L for fruit drinks and fruit-flavored beverages.

Conclusion: Dental caries is a chronic disease of childhood which has common risk factors with obesity. Dieticians and dentists have to work together in order to provide preventive guidance. Health promotion programs should emphasize the caries risk associated with consumption of soft drinks, including fruit juices. Fruit juices intake has to be limited and other beverages restricted to occasional use. The sugar substrates in 100% fruit juices are primarily fructose and glucose, whereas the substrate in other soft drinks is sucrose which has a higher cariogenic potential. Labels should better inform consumers on the sugar content.

P62 PHENOLIC COMPOUNDS AS POTENTIAL NATURAL PREVENTION FOR OBESITY?

CORRESPONDING AUTHOR:
Julie WINAND
EMAIL: Julie.winand@uclouvain.be

WINAND Julie, VANDERSTRAETEN Jessica, BEGUIN Pauline, JOLY Aurélie, DUPONT Isabelle, SERGENT Thérèse & SCHNEIDER Yves-Jacques
Institut des sciences de la Vie & UCLouvain, Croix du Sud, 5, B-1348 Louvain-la-Neuve

Obesity is growing worldwide, resulting from an excessive calorie intake as lipids and carbohydrates. To prevent this situation, one strategy could target the inhibition of the food enzymatic digestion and the uptake of lipidogenic nutrients by enterocytes and adipocytes. Phenolic compounds (PCs) from different sources have been reported to inhibit digestive enzymes as well as glucose uptake and fat accumulation, and could thus represent a natural alternative approach to anti-obesity drugs.

Various PCs were screened for a pancreatic lipase (PL) inhibition, using an enzymatic assay, i.e. the hydrolysis of 4-methylumbelliferyl-oleate in the presence of porcine PL. EGCG, quercetin and kaempferol, were detected as potent PL inhibitors, with IC50 calculated from initial rates of 0.8, 21.5 and 13.4 µM, respectively.

PCs were also assayed in an in vitro model of simulated intestinal fat digestion, based on the hydrolysis of synthetic triolein, in the presence of porcine bile extract and pancreatin, with detection of released oleic acid by gas chromatography. 100 µM EGCG and quercetin decreased the triolein digestion to ± 50% of the control, which suggests that these flavonoids are effective PL inhibitors, but could also interact with other digestive enzymes.

Experiments are in progress to evaluate, in this in vitro model of simulated digestion, the effect of PCs and plant extracts on starch digestion.

We are also investigating whether PCs could act at another level. A model of intestinal absorption based on human Caco-2 cells allows evaluating the PCs effect on glucose and fatty acids/monoacylglycerol absorption. Another model mimicking the adipose tissue is used to precise whether PCs could also prevent fat accumulation and adipocytes differentiation.

In conclusion, PC could be interesting candidates for prevention of obesity by acting at different levels.

P63 EXPERIMENTAL APPROACH TO TEST EX-VIVO THE PROTECTIVE EFFECT OF FRUITS AND VEGETABLES: EXAMPLE OF THE TOMATO AND PROSTATE CANCER

CORRESPONDING AUTHOR:
Edmond ROCK
EMAIL:
edmond.rock@clermont.inra.fr

YAKOUB Sadok, TALVAS Jérémie and ROCK Edmond.
Unité Nutrition Humaine Centre de Recherche en Nutrition Humaine d'Auvergne
Centre Clermont-Theix 63122 Saint Genès Champanelle

Numerous epidemiological studies have demonstrated the role of fruits and vegetables in the prevention of nutritional pathology. Recent studies suggested a protective effect of tomatoes and deleterious effect of fatty diets on prostate cancer. Tomatoes and tomato products are the major source of dietary lycopene, a carotenoïd which imparts the red colouration to tomatoes. Therefore, it has been hypothesized that lycopène is responsible for the health benefits of tomato. The aim of this work was to differentiate the effect of tomato from that of lycopene in an ex-vivo model by using yellow tomato, a tomato variety devoid of lycopene.

Nutritional supplementation to the diets with red tomato (TR), yellow tomato (TJ) or lycopene (LY) generated sera enriched in their respective metabolites. The effect of these sera was studied on the prostate cancer cell lines (LNCaP). The proliferation and the variation of expression of target genes of prostate cancer were investigated. For conclusion, red or yellow tomato supplementation enriched the plasma micronutrients which caused cell cycle arrest in cancer cells (via decreased cyclin D1), and a pro-apoptotic effect (via increased Bax/Bcl2). Supplementation of lycopene without a food matrix induced a pro-carcinogenic effect (increase of c-fos and uPAR). Finally tomatoes containing or not lycopene have a higher anticancer potential than lycopene alone. Further, supplementation in lycopene without food matrix would be pro-carcinogenic. A similar approach will be used to test the effect of fat diets supplemented with TR or TJ on mice prostate epithelial cells (MPE) whose lxr (liver X receptor) gene has been inactivated. This gene codes for a nuclear receptor which is activated by oxysterols and regulate the expression of genes involved in lipid homeostasis.

Notes

EGEA VI - abstractbook # p. 97

Partners

Organizing Partners

Others Partners

Say Oui to
the true taste!

fresh' attitude
by Interfel