INTERNATIONAL CONFERENCE

THE ROLE OF FRUIT AND VEGETABLES IN THE FIGHT AGAINST OBESITY

17-19 APRIL 2007, BRUSSELS

17-18 APRIL 2007

EUROPEAN COMMISSION

The Borschette Centre, Room 0A
Rue Froissart, 36
1040 Brussels, Belgium

19 APRIL 2007

SOFITEL BRUSSELS EUROPE

Place Jourdan, 1
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Conference organised by Aprifel with the support of DG SANCO, DG AGRI and the EU Platform for Diet, Physical activity and Health

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Preface by Markos Kyprianou

It is a pleasure for me to introduce this book of abstracts for the EGEA conference entitled «The Role of Fruit and Vegetables in the Fight Against Obesity». Fruit and vegetable consumption is a key facet of a balanced diet, which is important not only for the prevention of obesity but a range of other serious illnesses as well. We need to find new and innovative solutions to improving the consumption of fruit and vegetables, and I am confident that an event such as this will contribute to new thinking in this area.

As the Commissioner for Health, I have been observing the worsening in the diet of Europeans in all countries in the recent decades with regret. I believe that it is important for society to support individuals and families in the quest to eat well. It is clear to me that we must be proactive in Europe if we are to turn around the frightening trends we are witnessing.

With the widespread rise in obesity, there is a renewed public focus on diet and health. As major stakeholders in the debate – be it as public health policy makers, food producers and retailers, academics or doctors – it is for us to capitalise on this public awareness as an opportunity to reinforce healthy behaviours.

For the European Commission, 2007 is an important year for nutrition and physical activity. The EU Platform for Action on Diet, Physical Activity and Health will complete its second year of work.
This year will also see the adoption of a White Paper on nutrition and physical activity. This White Paper will set out the role that the Commission can play to support Member States in the prevention of ill health caused by poor diets and low levels of physical activity.

I welcome the decision of the conference organisers to focus on this topic, and I am sure that – given the excellent standard of the abstracts – the conference will contribute positively to our knowledge and ideas on the subject, and act as an inspiration to policy development.

Markos Kyprianou
European Commissioner for Health

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Tuesday 17 April 2007

14:00	**Registration** At the Sofitel Hotel
15:30	**Official welcome opening** At the Albert Borschette Conference Centre
16:00 - 16:30	**Official welcome** *Mariann Fischer Boel*, The European Commissioner for Agriculture and Rural Development
16:30 - 18:00	**Official opening** **Welcome:** *Elio Riboli* and *Martine Laville*, EGEA Co-Presidents **Keynote:** The multiple factors implicated in obesity prevention, *Philip James (UK)*
18:00	**Opening cocktail** At the Sofitel Hotel

Programme

Wednesday 18 April 2007

FRUIT AND VEGETABLES AND THE PREVENTION OF OBESITY AND ITS ASSOCIATED DISEASES
at the Albert Borschette Conference Centre

8:30 - 9:00 — **The position of the European Commission on obesity and F&V consumption**
Robert Madelin (DG Sanco)

9:00 - 11:00 — **Session 1**
Obesity
Chairman: *Martine Laville*

. The real cost of obesity: *A. Drewnowski (USA)*
. Natural history of the disease: *A Basdevant (FR)*
. Obesity related diseases: *E. Riboli (UK)*
. Treatment of obesity: Place of the dietary recommendations in the global approach: *M. Laville (FR)*

11:00 - 11:30 — **Poster exhibition**
Fruit and coffee break sponsored by *Dole*

11:30 - 13:30 — **Session 2**
Fruit and vegetables
Chairman: *Elio Riboli*

. The components of a healthy diet: comparison across the world: *A. Trichopoulou (GR)*
. Why F&V are considered healthy? Epidemiologic overview: *T. Norat (UK)*
. Latest evidence on the health-promoting effects of F&V constituents: *B. Watzl (DE)*
. Fruit and vegetables for health - WHO initiative to promote fruit and vegetables: *U. Trübswasser (WHO)*

13:30 - 14:30 — **Poster exhibition**
Buffet lunch

14:30 - 16:00 — **Session 3**
F&V and obesity: potential mechanisms of prevention
Chairman: *Bernhard Watzl*

. What do we know about the relationship between fruit and vegetable consumption and body weight (satiety, eating patterns)? *H. Blanck (USA)*
. Dietary fibre and body weight regulation: *M. Bes-Rastrollo (ES)*
. Exercise alone is not enough: a healthy diet is also needed: *J. Blundell (UK)*

16:00 - 16:30 — **Poster exhibition**
Fruit and coffee break sponsored by *Dole*

16:30 - 18:00 — **Session 4**
The special case of childhood
Chairman: *Tim Lobstein*

. Childhood obesity: When and how to react? *ML. Frelut (FR)*
. Childhood obesity and the early metabolic process leading to atherosclerosis: a protective role of fruit and vegetable consumption: *C. Maffeis (IT)*
. Early childhood development of taste for F&V as the basis for liking and consumption in later life: *S. Issanchou (FR)*

18:05 - 18:35 — **Mini symposium for all organised by AREFLH**

20:00 — **Congress dinner**
Congratulations to the 2007 EGEA Poster Award Winner

Programme

Thursday 19 April 2007

FOCUSING ON PROMOTING FRUIT AND VEGETABLES INTAKE, A KEY COMPONENT OF OBESITY PREVENTION
at the Sofitel Brussels Europe

9:00 - 12:30 — **Session 5**
What are the barriers to reaching the recommendations for f&v, in the context of obesity prevention?
Chairman: *John Blundell* and *Adam Drewnowski*

9:00 - 10:30
. Pesticides residues and the risks to consumers: *B.A. Ames (USA)*
. Price of F&V a barrier to consumption: Reality or myth? *P. Combris (FR)*
. Marketing impact on food consumption: *T. Lobstein (UK)*

10:30 - 11:00 — **Poster exhibition**
Fruit and coffee break sponsored by *Fruit Logistica*

11:00 - 12:30
. Efficiency of marketing actions on increased fruit and vegetables consumption (case study by major retailer): *L. Damiens (FR)*
. Availabilty and access to healthy food in areas of disadvantage: *E. Dowler (UK)*
. Public initiatives to overcome barriers to dietary change: *A. Drewnowski (USA)*

12:30 - 14:30 — **Poster exhibition**
Buffet lunch

POLICIES AND POLITICAL COMMITMENTS TO INCREASE F&V CONSUMPTION WITHIN AN OBESITY PREVENTION STRATEGY

14:30 - 17:30 — **Session 6**
Report by *A. Drewnowski* and *J. Blundell* on barriers to fruit and vegetable consumption
Round table: The challenges to increase f&v consumption

Chairman: *Tim Lang (UK)*
Animated by *Tim Lang*

Panellists to include representatives of:
European Commission (EU Platform Members)
- DG AGRI, *Lars Hoelgaard*
- DG Research, *Antonio di Giulio*
- DG SANCO, *Robert Madelin*

European Parliament, *Beatrice Patrie*
European Food Safety Authority (EFSA), *Pilar Rodriguez Iglesias*
EGEA scientists, *Philip James*
European consumer's organisation, *Jim Murray*
National Center of Public Health, *Liselotte Schäfer Elinder*
Stakeholders (EU Platform Members):
- AREFLH, *François Lafitte*
- European Vending Association (EVA), *Jan Marck Vrijlandt*
- EuroCommerce, *Bernard Bruyère*

17:30 — **Closing session**
Elio Riboli

OFFICIAL WELCOME OPENING

Official welcome by:

Mariann Fischer Boel

The European Commissioner for Agriculture and Rural Development

Official opening by:

Elio Riboli

Egea Co-president

Imperial College London
Professor of Cancer Epidemiology (UK)

Martine LAVILLE

Egea Co-president

Professor of University (Nutrition)
Medical doctor (France)

Philip JAMES

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BIOGRAPHICAL SKETCH

Professor James, a medical physiologist, spent 3 years in paediatrics in Jamaica and a year at Harvard before returning to the London School of Hygiene and Tropical Medicine.

In 1974 he became Assistant Director, MRC Dunn Nutrition Unit, Cambridge and then Director of the Rowett Research Institute, Aberdeen, a large biological nutrition research institute relating to the whole food chain.

He chairs the International Obesity TaskForce, responsible for global initiatives relating to food and health with particular emphasis on the pandemic of obesity. He chairs a Presidential Council of 5 WHO related medical NGOs for cardiology, diabetes, paediatrics, nutrition and obesity operating globally to stem the pandemic of adult chronic disease. He chaired and wrote the UN Millennium Commission Report on global issues relating to nutrition up to 2020, wrote Blair's plans for the UK Food Standards Agency and those for a new EU Food and Health Authority.

He currently operates globally, focusing on creating National Councils to prevent childhood obesity and persuading governments to change their policies.

RECENT PUBLICATIONS

> James WPT, Leach R, Rigby N. Under- and overnutrition: a global perspective. Nestle Nutr Workshop Ser Clin Perform Programme. 2004;(9):1-12; discussion 13-7.
> James WPT and Rigby NJ. Nutrition policy: national strategies for dietary change. In: Coronary Heart Disease Epidemiology. From etiology to public health, 2nd edition. (Eds. Marmot M and Elliott P). Oxford University Press, Oxford, 2005, pp 805-818
> Haslam DW, James WP. Obesity. Lancet. 2005 Oct 1;366(9492):1197-209. Review.
> James WP. Assessing obesity: are ethnic differences in body mass index and waist classification criteria justified? Obesity Rev. 2005 Aug;6(3):179-81
> Zimmett P and James WPT The unstoppable obesity and diabetes juggernaut. What should politicians do? Medical Journal of Australia 2006; 185(4):187-8
> James WPT Nutrition and human development. Introduction to Marabou Symposium Nutrition Rev. 2006, 64: No. 5, Part II, S1-11.2006

The multiple factors involved in obesity prevention

Philip JAMES
London School of Hygiene and Tropical Medicine (LSHTM) and IOTF / IASO, London, UK

Obesity prevention involved advice to change eating habits and exercise with 30 min moderate activity on 5 or more days weekly. Despite this consistent advice for decades millions of Europeans failed to lose weight for cosmetic or medical reasons and became progressively more obese. This wrongly implies that the 20% of children and 70% of adults who are overweight/obese are either badly educated or without sufficient self - control to remain at normal weight!

Our new analyses of activity requirements for weight maintenance, accepted by WHO, the US Institute of Medicine and others, specify the need for 60-90 min extra activity daily which should clearly apply to everybody from the age of 5 to 85years! This is unrealistic and intervention studies and other analyses show the impracticality of relying on leisure activity to achieve this on a population basis. Yet the major economic drivers of inactivity - transport, mechanical aids at home and work and computer technology are irreversible and almost eliminate the need for physical activity for economic benefit. This implies the need to induce spontaneous walking into daily routines by transforming public transport, creating pedestrian and cycling as preferential activities in towns and altering urban design and planning requirements on supermarket locations and urban sprawl.

A fundamental shift to encompass the major societal drivers of excess intake is also crucial with substantial reductions in the energy density of all current national diets in Europe through substantial changes in the price, availability and marketing of inappropriate foods. These are the responsibility of the EU and governments/local communities and not individuals.

The two principal contributors to high energy density foods are fat and free sugars with sugary drinks an additional problem. European and US policies have induced the preferential cheapening of meat, milk fats and sugar so now there are massive industrial pressures to market intensely branded very cheap unhealthy products. Not only is CAP reform long overdue but also the removal of all the direct and indirect subsidies (e.g. for export to reduce the world food prices). Global industries are now entrenched with understandable primary aims to sell more at progressively greater profit. This is helped by an incomprehensible food labelling system which is scientifically fundamentally flawed in relation to energy balance and obesity.

An EU traffic light labelling scheme could dramatically improve consumers' confused purchasing habits. Abolishing the commercialisation of children (never permitted by any previous civilisation) through regulatory measures is essential because no previous voluntary agreement which limits big industrial profits in the short term has ever worked. Additional EU interventions should transform the availability and relative cost of vegetables and fruit to shift eating patterns back towards the renowned and now lost Mediterranean diet. Introducing the Finnish practice of providing a meal's vegetables within the price of the main course and offering an unpriced buffet salad could emulate the tripling in Finnish consumption. These radical steps are needed to cope with the supposed 100kcal daily «gap» underlying European weight gains.

Fruit and vegetables and the prevention of obesity and its associated diseases

Session 1
Obesity

Session 2
Fruit and vegetables

Session 3
F&V and obesity: potential mechanisms of prevention

Session 4
The special case of childhood

Robert MADELIN

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BIOGRAPHICAL SKETCH

Robert Madelin has worked for the European Commission since 1993. He served in a variety of postings (1997-2003) as a Director in the Directorate-General for Trade. Prior to this, he was Deputy Head of Cabinet to Sir Leon (now Lord) Brittan, European Commission Vice-President.

Robert Madelin was born in 1957. He married Marie-Christine Jalabert in 1990. He was educated in England, at the Royal Grammar School, High Wycombe, and at Magdalen College, Oxford. He was in the British Civil Service from1979 to 1992, serving mainly in London and Brussels. He studied at the Ecole Nationale d'Administration, Paris in 1983-4.
For further information:
Website: http://europa.eu.int/comm/dgs/health_consumer/index_en.htm

The position of the European Commission on obesity and F&V consumption

Robert Madelin will review the strategic framework for Community action in the field of nutrition and physical activity, and set out criteria for action based on both feasibility and appropriateness. Against this context, he will look at fruit and vegetable policies and the extent to which different criteria apply. In doing so, he will describe the opportunities for Community action in this field, and also their limitations. Finally, he will also set out the range of policy tools available at this level, including those focused on partnership approaches such as the EU Platform for Action on Diet, Physical Activity and Health, and other tools such as regulatory approaches, and the relevant Community sectoral policies.

Session 1

Obesity

Chairman
M. Laville

Adam DREWNOWSKI

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BIOGRAPHICAL SKETCH

BA, MA in Biochemistry, Oxford University, UK,
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Postdoctoral training, University of Toronto, Toronto, Ont. Canada.
Assistant Professor, The Rockefeller University, New York
Professor of Public Health, Psychology, and Psychiatry; Director Program in Human Nutrition at the School of Public Health, University of Michigan
Research interests include studies on obesity and health disparities, the relationship between diet quality and diet cost, definitions of nutritious foods using a novel nutrient density standard, and studies on sweet taste, fat texture, appetite and satiety as they relate to obesity. ECOR's mission is to address the obesity epidemic, focusing on the environment, economics and policy.

RECENT PUBLICATIONS

> Drewnowski A, Rolls BJ. How to modify the food environment. J Nutr 2005;135:898-899.
> Drewnowski A, Darmon N. Food choices and diet costs: an economic analysis. J Nutr 2005; 135:900-904.
> Rolls BJ, Drewnowski A, Ledikwe JH. Changing the energy density of the diet as a strategy for weight management. J Am Dietet Assoc 2005; 105(Suppl 1):S98-103.
> Drewnowski A, Darmon N. The economics of obesity: dietary energy density and energy cost. Am J Clin Nutr 2005; 82(Supp) 265S-273S.
> Drewnowski A. Concept of a nutritious food: toward a nutrient density score. Am J Clin Nutr 2005;82; 721–2.
> Darmon N, Darmon M, Maillot M, Drewnowski A. A nutrient density standard for vegetables and fruits: nutrients per calorie and nutrients per unit cost. J Am Dietet Assoc, 2005; 105:1881-1887.

The real cost of obesity

Adam DREWNOWSKI
Center for Public Health Nutrition, School of Public Health and Community Medicine, University of Washington, Seattle, USA

The highest rates of obesity in the US and other industrialized nations occur among population groups of limited social and economic means. Individual and area-based measures of poverty, deprivation, and limited access to healthy foods predict high obesity rates among children, adolescents, and adults. Food prices and diet costs may explain why obesity rates follow a socioeconomic gradient. Because refined grains, added sugars and added fats are affordable, enjoyable, and readily accessible they are preferentially selected by lower-income groups. Such foods tend to provide the most dietary energy – but least nutrients – per unit cost (€/MJ). In contrast, the recommended and more healthful diets are associated with higher diet costs and are selected by the more affluent consumer. However, the inexpensive subsidized calories involve hidden costs to society, since the consumption of energy-dense diets has now been linked to higher rates of obesity, type 2diabetes, and the metabolic syndrome. The impact of socioeconomic factors on obesity rates may therefore be explained in terms of the prevailing food and agricultural policies, food prices, food subsidies, and diet costs. The observed inequities in access to healthy foods raise the issue whether obesity prevention should continue to be addressed through motivation, education, or individual behavior change? Or are the causes of the obesity epidemic to be found among the current economic policies, employment practices, imports, tariffs and trade? The present emphasis on the food environment has led to legislative and policy measures to improve nutrition in workplaces, neighborhoods, and in schools. Public health policies for the prevention of obesity increasingly call for improving access to healthier foods by minorities and the working poor.

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BIOGRAPHICAL SKETCH

Prof. Arnaud Basdevant is Professor of Nutrition at Université Pierre et Marie Curie, Paris 6., and member of the Inserm Unit U 755 « Nutriomic ». He is ahead of a clinical unit involved in medical and surgical management of severely obese patients and genetic obesities. He participated actively to the development of the French «National Nutrition and Health Program ».

He is also Director of the Department of "Endocrinology-Diabetes-Nutrition- Prevention", Hôpital Pitié Salpêtrière, Paris.

RECENT PUBLICATIONS

> Cancello R, Tordjman J, Poitou C et al. Increased infiltration of macrophages in omental adipose tissue is associated with marked hepatic lesions in morbid human obesity.Diabetes. 2006;55:1554-61.

> Lubrano-Berthelier C, Dubern B, Lacorte JM et al . Melanocortin 4 receptor mutations in a large cohort of severely obese adult.J Clin Endocrinol Metab. 2006 M;91(5):1811-8.
de Lauzon-Guillain B, Basdevant A, Romon M et al . Is restrained eating a risk factor for weight gain in a general population?Am J Clin Nutr. 2006;83(1):132-8.

> Taleb S, Lacasa D, Bastard JP et al. Cathepsin S, a novel biomarker of adiposity: relevance to atherogenesis.FASEB J. 2005;19(11):1540-2.

Natural history of the disease

Arnaud BASDEVANT
Department of Nutrition, Hôtel-Dieu, Paris

Whether obesity is a disease, a risk factor or a mere adaptation to the evolution of life style and environment is debated. From a medical standpoint, obesity is a chronic disease with serious health consequences and alterations of the quality of life due to physical, psychological and social impact. Obesity is a heterogeneous disease both in terms of determinants and consequences. The natural history of the disease is divided in different stages: phase of weight gain phase of stabilisation and "chronicization", and therapeutic attempts. Initial weight gain is related to behavioural and environmental factors acting on a biological (mainly genetic) predisposition. Progressively, these behavioural factors lead to biological alteration in the adipose tissue and other organs including the brain. The evolution of the disease is characterized by the development of an inflammatory organ disease that involves the adipocytes and other adipose tissue components. These alterations lead to various clinical complications and to a progressive resistance to treatments. Major complications are metabolic and cardiovascular (ie ischemic heart disease, hypertension, diabetes, dyslipidemia), mechanical (sleep apnea synomre, urinary incontinence), inflammatory (asthma) and cancers. Obesity is the archetype of modern chronic disease related to behaviours and the environment. Obesity shares with such diseases the necessity to adapt the treatment to the stage of development of the disease, to the prevalent determinants (behaviroal, environmental, biological). Prevention of obesity relies on behavioural and environmental changes. Both individual and community responsibility is involved in prevention strategies. Obesity is a societal disease; prevention of obesity is a societal issue.

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BIOGRAPHICAL SKETCH

Prof. Riboli has an M.D. degree (1977, Milan), a Master of Public Health (1980, Milan) and a Master of Science in Epidemiology (1982, Harvard, Boston, USA).

In 1983 he moved to IARC-WHO in Lyon, where he undertook the task of developing new research projects in the area of nutrition, nutritional status and cancer. In 1989 he initiated the European Prospective Investigation into Cancer and Nutrition (EPIC), which eventually included 26 centres in 10 European countries. Questionnaire data on diet and lifestyle have been obtained from about 500,000 study subjects, and blood samples from most of them.

He was Head of the Nutrition and Hormones Group of IARC from 2004 to 2005.

In 2005 Prof Riboli moved to Imperial College, London, where he is Professor of Cancer Epidemiology and Head of the Epidemiology, Public Health and Primary Care Division.

RECENT PUBLICATIONS

> Gonzalez CA ……., Riboli E. Meat intake and risk of stomach and esophageal adenocarcinoma within the European Prospective Investigation Into Cancer and Nutrition (EPIC). J Natl Cancer Inst. 2006 ;98(5):345-54.
> Hunter DJ, Riboli E, et al; National Cancer Institute Breast and Prostate Cancer Cohort Consortium. A candidate gene approach to searching for low-penetrance breast and prostate cancer genes. Nat Rev Cancer. 2005 5(12):977-85.
> Bingham S, Riboli E. Diet and cancer--the European Prospective Investigation into Cancer and Nutrition. Nat Rev Cancer. 2004;4(3):206-15.
> Boeing H, ….Riboli E. Intake of fruits and vegetables and risk of cancer of the upper aero-digestive tract: the prospective EPIC-study. Cancer Causes Control. 2006;17(7):957-69.
> van Gils CH, …..Riboli E. Consumption of vegetables and fruits and risk of breast cancer. JAMA. 2005 12;293(2):183-93.
> Jenab M, Riboli E, et al. Plasma and dietary carotenoid, retinol and tocopherol levels and the risk of gastric adenocarcinomas in the European prospective investigation into cancer and nutrition. Br J Cancer. 2006;95(3):406-15.

Obesity related diseases

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BIOGRAPHICAL SKETCH

Professor Laville is a Medical Doctor (1985) and a Physical Doctor (1993).

She is a Professor of Nutrition at the University (Hospital E Herriot), a Medical doctor the department of Endocrinology-Diabetology-Nutrition, and she is Director of the Rhône-Alpes Human Nutrition research Centre (CRNHRA).

Prof. Martine Laville has participated in several scientific societies.

She has been President of AFERO (French society for the study of obesity).

She is a member of l'ALFEDIAM, SFN, EASD, EASO, ICO, and a Scientific expert at AFSSA (the French agency for food security).

RECENT PUBLICATIONS

> Laville M. Could glycaemic index be the basis of simple nutritional recommendations? Br J Nutr. 2004 ;91(6):803-4.

> Laville M, Romon M, Chavrier G, et al. Recommendations regarding obesity surgery. Obes Surg. 2005;15(10):1476-8.

> Petruzzo P, Badet L, Lefrançois N, ..., Laville M. Metabolic consequences of pancreatic systemic or portal venous drainage in simultaneous pancreas-kidney transplant recipients. Diabetic Medecine. 2006;23(6):654-9

> Nazare JA, Brac de la Perriere A, Bonnet F, Desage M, Peyrat J, Maitrepeirre F, Louche-Pelissier C, Bruzeau J, …, Laville M. Daily intake of conjugated linoleic acid-enriched yogurts: effects on energy metabolism and adipose tissue gene expression in healthy subjects. British Journal of Nutrition. 2007;97:273-280.

Treatment of obesity: Place of the dietary recommendations in the global approach

Martine LAVILLE
Hospital E Herriot, Lyon, France

Obesity is increasing at high rate affecting adults but also adolescent and children. Obesity is associated to many complications: metabolic diseases like diabetes dyslipidemia, hypertension with an increased risk in cardiovascular diseases, mechanical diseases with arthrosis, dyspnea, sleep apnea syndrome and also with increased cancer frequency. Obesity and its related complications require a global therapeutic approach. This approach includes body weight management but also specific prevention or treatment of complications. Dietary recommendations are the cornerstone of this approach. To decrease body weight, we obviously need to negative the energy balance and thus, even if increasing physical activity should be promote, to decrease energy intake. The caloric approach allows pointing high density food as promoting obesity. Thus general dietary recommendations are to decrease the amount of fat to 35% of total caloric intake while increasing complex sugar and fruit and vegetable consumption. Addition of fruit and vegetable to diet, although bringing few calories because of their low energy density, help to increase palatability and variety of the regimen and even to increase satiety. Moreover they bring fibres, vitamins, micronutrients and antioxidants that will help to prevent or to treat obesity-related disorders. It is difficult to identify a specific compound that is involved in the benefit effect of fruit and vegetable and it is probably the association of all these elements that are benefit. Recently the possible benefit effect of a new compound of fruit and vegetable: the osmotin has been highlight by the team of Kadowaki. Kadowaki was at the origin of the discovery of the adiponectin, an adipokine that is able to increase insulin sensitivity in obese. He has shown that the osmotin which is found in different fruit and vegetable was able to bind the adiponectin receptors, possibly explaining part of the benefit effect of fruit and vegetables.

Thus, there is no doubt that increasing fruit and vegetable of the diet is a cornerstone of the global approach in the treatment of obesity and related disorders. The specific effects of their different compound deserve still future researches.

Session 2

Fruit and vegetables

Chairman
E. Riboli

Antonia TRICHOPOULOU

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BIOGRAPHICAL SKETCH

Antonia Trichopoulou is a Medical Doctor with State Certification in Biopathology (Laboratory Medicine) and has a Master in Public Health and a PhD in Nutrition and Biochemistry. She is currently Director of the World Health Organization Collaborating Center for Nutrition at the Department of Hygiene and Epidemiology, School of Medicine, University of Athens. Professor, National School of Public Health, and University of Athens Medical School, Emeritus.

She was President of the Federation of the European Nutrition Societies.

She has received numerous honors and awards, including the Corato award (2001) and the IV Grande Covian Award (2002) for her studies concerning the health effects of Mediterranean diet. In 2003 she was decorated by the President of the Greek Republic with the Golden Cross of Honor.

Dr Antonia Trichopoulou's research focuses on various aspects of nutrition and particularly issues concerning the Mediterranean diet.

RECENT PUBLICATIONS

> Linseisen J, Rohrmann S, …, Trichopoulou A, ... Dietary intake of different types and characteristics of processed meat which might be associated with cancer risk--results from the 24-hour diet recalls in the European Prospective Investigation into Cancer and Nutrition (EPIC). Public Health Nutr. 2006;9(4):449-64.
> Boeing H, Dietrich T, … Trichopoulou A, ... Intake of fruits and vegetables and risk of cancer of the upper aero-digestive tract: the prospective EPIC-study. Cancer Causes Control. 2006;17(7):957-69.
> Jenab M, Riboli E, … Trichopoulou A, ... Plasma and dietary carotenoid, retinol and tocopherol levels and the risk of gastric adenocarcinomas in the European prospective investigation into cancer and nutrition. Br J Cancer. 2006;95(3):406-15.
> Pischon T, Lahmann TH, … Trichopoulou A, ... Body size and risk of colon and rectal cancer in the European Prospective Investigation Into Cancer and Nutrition (EPIC). J Natl Cancer Inst. 2006;98(13):920-31.

The components of a healthy diet: comparisons across the world

Antonia TRICHOPOULOU
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Considering the scientific uncertainties and the variation of diets around the world, one cannot but agree with the prudent recommendations for adults, as defined by a joint WHO/FAO consultation (World Health Organization 2003)

The report concludes that a diet low in saturated fats, sugars and salt, and high in vegetables and fruits, together with regular physical activity, will reduce morbidity and mortality.

Until further evidence becomes available these recommendations provide a valuable yardstick in selecting diets that are compatible with the promotion of good health. Today, only a minority of people in the world are eating in accordance with these recommendations, with adverse socio-economic conditions further hindering adherence to healthy nutrition principles.

Confronting the global burden of chronic diseases through better nutrition, however, requires better collaboration between those involved in health research and care and those responsible for the agriculture and industrial sectors at national and regional levels.

Teresa J. NORAT SOTO

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BIOGRAPHICAL SKETCH

1983-1988: Research in Biostatistics in the National Institute of Sport Medicine, Havana, Cuba.

1988-1991: Research in Epidemiology, 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.

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RECENT PUBLICATIONS

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Why fruits and vegetables are considered healthy? epidemiological overview

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The health benefits of a diet rich in plant foods have been recognized for some time. In epidemiological studies, high fruit and vegetable consumption has been found in association with decreased incidence of and mortality from a variety of chronic diseases, such as cardiovascular diseases, stroke, hypertension, diabetes, obesity, and certain types of cancer. Here we review the results of epidemiological studies on the relationship of consumption of fruits, vegetables and risk of several chronic diseases.

The most consistent evidence provided by epidemiologic studies is for a protective effect of fruit and vegetables on cardiovascular disease, the leading cause of death in most countries. An inverse association between intake of fruit and vegetables and the risk of cardiovascular disease and mortality has been shown in several studies (1, 2). In a recent meta-analysis of nine prospective studies, the risk decrease of ischemic heart disease was estimated as 4% for each additional portion of vegetable intake and 7% for each additional portion of fruit intake (3). Hypertension is the main risk factor for cardiovascular disease. Some observational studies indicate that high fruit and vegetables intake can modulate the risk of hypertension and in the Dietary Approach to Stop Hypertension (DASH) study, systolic and diastolic blood pressure was lowered in individuals following a diet rich in fruits and vegetables (4).

The evidence relating diet and cancer comes mainly from case-control studies. The prospective studies do not provide strong support for a protective association between fruit and vegetable intake and cancer. A review of the epidemiological literature on possible cancer-preventive effects of the consumption of fruits and vegetables in humans concluded that there is limited evidence for a cancer-preventive effect of the high consumption of fruits and vegetables for cancer of the mouth and pharynx, oesophagus, stomach, colon-rectum, larynx, lung, ovary (vegetables only), bladder (fruit only), and kidney and that the evidence of a cancer-preventive effect of high consumption of fruits and vegetables for all other sites is insufficient (5). It is known that the assessment tool used to measure diet in epidemiological studies -usually food-frequency questionnaires – is subject to substantial error. Improvement of the measurement of dietary variables in observational studies, including the use of biological markers of intake, is needed to better assess the relationship between diet and cancer.

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1988	PhD in Human Nutrition, University Giessen, Germany

RECENT PUBLICATIONS

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Latest evidence on the health-promoting effects of F&V constituents

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Epidemiological studies suggest that a high intake of F&V is inversely associated with risk of cardiovascular diseases (CVD), stroke, some cancers, diabetes type 2 (DT2), osteoporosis, cataract formation, and chronic obstructive pulmonary disease. Experimental data from animal and human dietary intervention studies further indicate that specific F&V constituents affect biological functions such as detoxification enzymes, blood pressure, immunological processes, and cholesterol levels. Health-promoting effects of F&V constituents are in part mediated by nutrients, but non-nutritive constituents further contribute to these effects. Health-promoting F&V constituents include vitamins, minerals, trace elements, dietary fibre and prebiotics, proteins, and a currently unknown variety of phytochemicals, which can have complementary and overlapping mechanisms of action.

F&V are major contributors to the intake of vitamin C, folic acid, and potassium. A low dietary intake of these micronutrients results in the impairment of a number of biological processes required for normal metabolic functions. About half of the daily dietary fibre intake comes from F&V. Inadequate dietary fibre intake is associated with an increased risk of certain cancers, CVD, DT2, and obesity. Dietary fibre including prebiotics from F&V may affect the metabolic activity of the intestinal flora contributing to intestinal and overall health. Although F&V provide small amounts of protein, data from recent prospective studies suggest that vegetable protein intake is linked to lower blood pressure. Thousands of phytochemicals occur in F&V and research on their physiological effects just started within the last decade. At present, only a few phytochemicals have been well characterized for absorption, bioavailability, metabolism and biological activity. Health-promoting aspects of phytochemicals include antioxidative, antigenotoxic, cholesterol-lowering, pro-apoptotic and antibacterial effects. Currently, there is hardly any information on whether additive or synergistic effects are induced by combining specific constituents as they occur in F&V.

Besides an approach based on the specific activity of F&V constituents, health effects induced by F&V as whole foods are also well described, but the underlying mechanisms as well as the active constituents are not well-known. These effects refer to antigenotoxic, immunomodulatory, anti-inflammatory, antibacterial and hormone influences. The high health-promoting potential of F&V suggests that additive and/or synergistic effects of nutrients and non-nutritive constituents in F&V may occur, because no single F&V constituent alone exerts similar beneficial effects. In addition, a greater botanical diversity of the diet resulting in the intake of a higher variety of chemically different F&V constituents is accompanied by a stronger biological effect. This means that consuming a broader variety of F&V adds further health benefits. On the other hand, there is no epidemiological evidence to suggest any adverse effects of F&V constituents when consumed as part of a mixed diet. Overall, a high intake of different F&V varieties provides humans with a unique spectrum of bioactive constituents. This complex mixture seems to promote health and, in the long-term, to prevent or delay the onset of chronic diseases.

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Since Aug 2005 Technical officer at the World Health Organization, Regional Office for Europe; Areas of work: evaluation and analysis of nutrition policies, second European Action Plan for Food and Nutrition policy; fruit and vegetable promotion and micronutrient deficiency prevention.

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Feb - Jun 2003; Research fellow at the General Hospital Vienna, Division of Immunology, Allergy and Infectious Diseases; Areas of work: bone metabolism, diet and nutritional status of HIV patients

RECENT PUBLICATIONS

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Fruit and vegetables for health - WHO Initiative to promote fruit and vegetables

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Up to 2.7 million lives could be saved annually with sufficient fruit and vegetable (F&V) consumption. Low F&V consumption is estimated to cause about 31% of ischaemic heart disease, 11% of stroke, 5-12% for all cancers and up to 20-30% upper gastrointestinal tract cancers worldwide. In the World Health Report 2002, low F&V intake was among the 10 top selected risk factors for global mortality. However, current data shows that F&V consumption globally is below the recommended levels [1, 2].

A Joint WHO/FAO Expert Consultation on diet, nutrition and the prevention of chronic diseases[3] recommended the intake of a minimum of 400g of F&V per day (excluding potatoes and other starchy tubers) for the prevention of chronic diseases and for the prevention and alleviation of several micronutrient deficiencies, especially in developing countries.

The Global Strategy on Diet, Physical Activity and Health, endorsed at the 57th World Health Assembly in May 2004, actively promotes an increase in F&V intake for populations worldwide. In order to ensure integrated and sustainable promotion of F&V from production to consumption, WHO has formed a partnership with FAO - "WHO/FAO Fruit and Vegetable Promotion Initiative".

The main pillars of this joint initiative include: to promote production and consumption of F&V so as to promote and improve health and to help prevent chronic and other diseases or nutritional deficiencies; and to advance science in the areas of F&V production, distribution, increased consumption, and benefits for health.

In September 2004 the first Joint WHO/FAO Workshop on Fruit and Vegetables for Health was held in Kobe, Japan. This workshop brought together more than 50 experts from the fields of health, nutrition, agriculture and horticulture, mainly from developing countries that developed a framework to promote fruit and vegetables at national level. This framework constitutes a WHO useful tool to be used by national governments when they're starting or continuing F&V promotion activities.

The framework includes general principles and examples of possible interventions for various consumer groups (ranging from subsistence farmers to the market dependent consumer) in order to appropriately tailor fruit and vegetable promotion programmes to the target group(s) - children at school, women farmers' groups, employees at worksites, shoppers in supermarkets etc.

WHO facilitates the implementation of this framework through regional training workshops where relevant stakeholders, especially from developing countries, have an opportunity to discuss this tool and how can it be implemented in their country. Since its publication in 2005, training workshop have been held in: Lisbon, Portugal, for Portuguese speaking countries; Durban, South Africa; Maputo, Mozambique; Guymallen, Argentina, for Latin American countries; etc. The next workshop will be held in Yaoundé, Cameroon, in April 2007 for African French speaking countries.

For further information on workshops, meetings, background papers on F&V or other activities carried out by WHO as part the F&V initiative please check: http://www.who.int/dietphysicalactivity/fruit/en/index.html

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Session 3

F&V and obesity: Potential mechanisms of prevention

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1999-2001, Epidemic Intelligence Service Officer, CDC, Atlanta GA

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RECENT PUBLICATIONS

> J.E. Kimmons, H.M. Blanck, B.C. Tohill, et al. Associations Between Body Mass Index and the Prevalence of Low Micronutrient Levels Among US Adults. Medscape General Medicine, 2006; 8(4):59.
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What do we know about the relationship between fruit and vegetable consumption and body weight?

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Achieving and maintaining a healthy body weight can be challenging. To lose weight, many individuals need to be more active and consume less energy. On a day-to-day basis, people tend to eat a fairly consistent volume of food, regardless of the energy content of the foods consumed. Therefore, the quantity of energy in a particular amount of food—or the food's energy density (kcal/g)—has an impact on daily energy intake. In general, foods with a lower energy density tend to have a high amount of water and fiber which increase the volume (i.e., broth-based soups, fruits, vegetables). Incorporating fruits and vegetables (F&V) in the diet can thus reduce overall dietary energy density, promote satiety, decrease energy intake, and coupled with advice to decrease energy intake, may be part of an effective strategy for weight management (1).

Although, low-energy-dense foods are being encouraged for weight management there has been scant information on the specific food choices made by free-living individuals with a low-energy-dense diet. Recent findings from a nationally representative survey of US adults indicate that people consuming a lower-energy-dense diet were more likely to consume nutrient-dense foods, including citrus fruit, juice, apples, bananas, melon/berries, lettuce, green beans, dark green/yellow and other vegetables, nonfat/skim milk, yogurt, fish, and legumes (2). Consumers also ate greater quantities of these foods. These choices led to higher intakes of fiber, vitamin A, vitamin C, and folate. In this same survey, normal-weight persons had diets with a lower energy density than did obese persons. Persons with a high F&V intake had the lowest energy density values and the lowest obesity prevalence (3).

Eating plans that reduce energy consumption while enhancing satiety and allowing individuals to consume adequate amounts of food may improve long-term weight loss and adherence. A recent intervention study tested the effects of two strategies to reduce the energy density of the diet on weight loss with 71 obese women (4). One group was counseled to decrease dietary energy density by choosing reduced-fat foods and increasing consumption of water-rich foods, such as F&V. The second group was counseled to eat less fat; neither were given limits for energy intake. At 1 year, those counseled to eat more F&V and reduce fat had a greater reduction in dietary energy density and lost 23% more weight (7.9 vs. 6.4 kg) than those counseled to eat less fat. The group encouraged to eat F&V reported consuming an average of 25% more food by weight and reported less hunger than comparison participants. Another study suggests that consumption of a low energy dense diet can help people maintain weight loss. Two years after participation in a weight loss program that encouraged consumption of low energy dense foods, researchers found that persons who maintained weight loss had a lower energy dense diet than those who regained ≥5% of body weight (5). In summary, recent research supports the hypothesis than an inverse relation exists between consumption of a lower-energy-dense diet and obesity and provides evidence of the role of F&V consumption for healthy weight management.

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Dr Maira Bes-Rastrollo. Phd in Pharmacy (University of Navarra, Spain). In her doctoral dissertation she analyzed the epidemiological effect of the Mediterranean dietary pattern on the obesity and weight gain through a prospective dynamic Spanish cohort: the SUN study.

She has published several nutritional epidemiological papers related to this topic.

She received a fellowship from the Spanish Epidemiological Society to attend to the European Educational Programme in Epidemiology, as well as, different awards for poster presentations. She is a member of the International Epidemiological Association.

Currently, she is a Research Fellow at Harvard School of Public Health with a fellowship of the Spanish Ministry of Education in the program MEC/Fulbright.

RECENT PUBLICATIONS

> Bes-Rastrollo M, Sabate J, Gomez-Gracia E, Alonso A, Martinez JA, Martinez-Gonzalez MA. Nut consumption and weight gain in a Mediterranean cohort: the SUN Study. Obesity 2007;15:107-16.

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Fibre and body weight regulation

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According to the World Health Organization (WHO) obesity has reached epidemic proportions. The prevalence of obesity is increasing throughout the world's population, 1.6 billion adults and at least 20 million children under the age of 5 being overweight. Europe is not and exception. Obesity has tripled in the past two decades. It is estimated that excess body weight is responsible for more than a million deaths a year in the WHO's European region. Currently, the cost of obesity to a country's health service is estimated between 7% and 9%.

According to the World Health Report 2002 reduced intakes of complex carbohydrates and dietary fibre are included among the underlying determinants for the epidemic of major chronic diseases including obesity. In fact, the last published WHO/FAO expert consultation report recommends as a population-wide intake goal the consumption of a minimum of 25 g of dietary fibre per day and 400 g of fruits and vegetables (excluding the category of tubers like potatoes) for the prevention of the chronic diseases.

There are several pathways in which dietary fibre may regulate body weight. Because of their bulk and relatively low energy density, high-fibre foods may promote satiation (duration of a meal and/or size of a meal) and satiety (longer duration between meals), leading to decreased energy intake.

Fibre also increases chewing, which limits intake by promoting the secretion of saliva and gastric juice, resulting in an expansion of the stomach and increased satiety.

The fibre content of a food affects how quickly the carbohydrates in food raise blood sugar, due to the viscous gel-like properties that can delay gastric emptying and/or intestinal absorption. For this reason, rich-fibre foods such as fruits and vegetables are often characterized by low glycaemic index and glycaemic load that improve insulin sensitivity. Decreased glycaemic and insulinemic responses may also reduce hunger and subsequent energy intake. Another reported mechanism is the inhibition of hepatic fatty acid synthesis mediated by products of anaerobic bacterial fermentation in the colon, such as acetate, butyrate and propionate. Fibre may also affect secretion of gut hormones, including prolonged increases in circulating cholecystokinin, independent of glycaemic response, that may act as satiety factors or alter glucose homeostasis.

Indeed, populations reporting higher-fibre diet intake demonstrate lower obesity rates. Moreover, dietary patterns characterized by high-fibre have been associated with lower weight gain. Several prospective studies have reported an inverse association between fibre intake and weight gain in different populations including Europe. Two reviews about dietary fibre and weight gain showed that the majority of the studies supported a beneficial effect of dietary fibre on weight gain. One of them concluded that increased dietary fibre intakes have been associated with a body weight loss of 1.9 kg over 3.8 months.

Related to the fibre supplements, the evidence is less clear, but the results seem that they were not efficacious for weight loss in short-term randomized trials, suggesting that the long-term benefits seen in epidemiologic studies may be due to the combined effects of multiple components of the foods rather than to fibre alone. Different biological effects of fibre from foods and fibre from supplements are also possible.

Overall, the evidence is convincing that a high dietary fibre intake, with a lot of fruit and vegetables consumption, helps to protect against obesity and weight gain.

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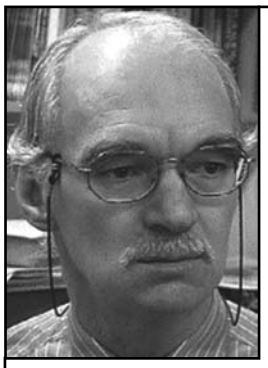

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BIOGRAPHICAL SKETCH

John Blundell holds the Research Chair of PsychoBiology and is Founder and Director of the Human Appetite Research Unit at the University of Leeds. He has been active in research on the mechanisms of appetite control for more than 25 years. John is currently a member of the UK Department of Health – Obesity Social Marketing Programme Expert Review Group. He is also Chair of the Expert Group of the ILSI (Europe) Appetite Regulation Task Force. Research is funded by the BBSRC, MRC-Case, and industrial partners in the nutrition and pharmaceutical sectors.

Current research projects include the 'Characterisation of individuals (phenotypes) susceptible or resistant to weight gain on high fat diets', the 'Impact of Physical activity on appetite control and weight regulation', and the 'Role of CB1 receptors in appetite and body weight'. John is a member of the Board of Scientific Governors of the British Nutrition Foundation, a member of the Ethical Committee of the International Association for the Study of Obesity (IASO), and has been on the organizing committees of many International conferences. He is an enthusiastic runner and has competed in races in UK, USA, Netherlands, Sweden and Switzerland.

RECENT PUBLICATIONS

> Blundell J.E.., Stubbs, R.J., Golding, C., Alam, R., Whybrow, S., Lawton, C.L. Resistance and Susceptibility to weight gain: Individual variability in response to high fat diet. Physiology and Behaviour. 2005; 86: 614 - 622.

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Exercise alone is not enough: a healthy diet is also needed

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It is widely agreed that in those countries in which the environment can be regarded as 'obesogenic', both sedentariness and overconsumption contribute to weight gain and obesity. Consequently recommendations to combat the obesity epidemic include a requirement to increase physical activity and to reduce food consumption. A reduction in body weight and the maintenance of weight loss are extremely difficult to achieve – even within the constraints of a controlled experimental trial. Outside of such trials attempts to maintain a negative energy balance appear to be having very limited effects. It is debatable whether an increase in physical activity is easier to achieve than a reduction in energy intake; however, it is frequently observed that exercise results in less weight loss than expected, and in some people exercise can be counterproductive (for weight loss). One reason for the weakness of exercise (physical activity) in reducing body weight is that the energy cost of exercise is low in comparison with the energy tariff of attractive food items. In other words the energy expended in a hard session of exercise can be nullified by the rapid intake of high energy dense food. Indeed, physical activity in combination with a high fat diet can generate a positive energy balance (King and Blundell, 1995). An exceptionally high level of physical activity is required to overcome the effects of a high fat diet (Stubbs et al, 2004a), and becoming sedentary has the same effect as changing to a high fat diet (Stubbs et al, 2004b). A recommendation to perform exercise but with a permissive 'ad libitum' diet produces disappointing outcomes. Exercise can be optimally effective for weight control in combination with a low fat (low energy) diet (King, Tremblay and Blundell, 1997).

In addition, it is observed that some people actually gain weight when prescribed an exercise regime (Donnelly et al, 2000), and this occurs even when the exercise is enforced and monitored (Caudwell et al, 2006). This approach has identified people who are either responders or non-responders in their weight loss response to exercise. Interestingly, the non-responders compensate for the energy expended in exercise by involuntarily increasing their food intake. Significantly, the responders (who lose weight with exercise) eat more fruit than non-responders, and increase their fruit and vegetable intake during the exercise period (12 weeks) whilst the non-responders show a decrease. Consequently an optimal strategy for combating obesity appears to be a serious regime of daily exercise in combination with a high intake of fruits and vegetables which contributes to a healthy low energy dense diet.

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Session 4

The special case of childhood

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BIOGRAPHICAL SKETCH

Dr ML Frelut is a Medical Doctor in charge of the Reference Center for Pediatric Obesity in the Endocrinology department at Saint Vincent de Paul Hospital (AP-HP, Paris) and Assistant in charge of the Obesity Unit of the Pediatrics Therapeutic Center, Margency (France).

She has worked as a national and international expert with the AFERO (French association for the Research and Studies on Obesity), on the"Curative and preventive treatment of pediatric obesity"(in "Recommendations for the diagnosis treatment and prevention of obesity", 1998), " The Tracking and prevention of pediatric obesity ", "Public health policies and obesity prevention"(INSERM , France, 2000 and 2005) on "Carbohydrates and health : Inventory, evaluation and recommendations " (French Agency for Food Safety (AFSSA), 2004) and at the WHO on "Health inequalities" in 2005 and at the international conference on "Counteracting obesity" in 2006. She is also a permanent expert at the European Medicines Agency (EMEA).

Dr Frelut was a founding member and past president of the European Childhood Obesity Group(ECOG).

She currently is a member of the Nutrition Committee of the French Pediatric Society , of the European Committee for the teaching of obesity (SCOPE), of the European Association for the Study of Obesity (EASO) and of the scientific committee of the AFERO (2002).

RECENT PUBLICATIONS

> Cortese S, Isnard P, Frelut ML, et al. Association between symptoms of attention-deficit/hyperactivity disorder and bulimic behaviors in a clinical sample of severely obese adolescents. Int J Obesity 2007;31(2):340-6.
> Frelut ML. Management of childhood obesity. Arch Pediatr. 2006;13(6):643-5.
> Rigal N, Frelut ML, et al. Food neophobia in the context of a varied diet induced by a weight reduction program in massively obese adolescents. Appetite. 2006;46(2):207-14.
> Frelut ML, Emery Fillon et al. Alanine amino transferase concentrations are linked to folate intakes and methylenetetrahydrofolate reductase polymorphism in obese adolescent girls. J Pediatr Gastroenterol Nutr 2006;43(2):234-9.

Childhood obesity: When and how to react?

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Saint Vincent de Paul Hospital, Paris, France

Preventing or treating childhood obesity requires an in-depth understanding of its specificity in early life. Childhood obesity is determined by the genetic background and the environment which a child is sharing with his parents. At population levels, the environment explains about 70% of the differences in fat mass between individuals. Obesity is also a tracking phenomenon which means that the negative effects are going to cumulate all over life. During pregnancy, the nutritional status of both the mother and the father through complex genetic and epigenetic mechanisms, will markedly affect birth weight and body composition. Folate consumption, the main source of which, are fruits and vegetables, seem to be of particular importance. Children of obese mother or born from mothers who gain weight in excess during pregnancy are twice as risk to be fat babies at birth and to remain so later on. During early infancy, changes in body composition leading to lean children at around 6 years of age need to take place. A good balance between a balanced nutrition and energy expenditure is therefore essential to establish at a period of life where the consequences of the expression of the genetic background reach an acme while behaviour and learning process that will last all life long are implementing. Since children are characterized by both their learning capabilities and trustful behaviour, it is quite easy to misguide them and abuse their innate vulnerability through several processes that include advertising. Since the variety of the diet before the age of 3 year has been shown to be predictive of food choices in early adulthood, introducing and educating children in that respect too from the weaning period onward is a major milestone.

The prevention of childhood obesity is therefore a lasting process that should be adapted to each step in life, starting with pregnancy and should include a wide range of means, far beyond the field of medicine. In Europe, all countries have approved in November 2006 a Chart of the World Health Organization (WHO) in which they approve and claim the need for an urgent and wide prevention of childhood obesity.

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BIOGRAPHICAL SKETCH

Education: Degree in Medicine, Ph.D. in Pediatrics; Ph.D. in Gastroenterology

Postdoctoral training University of Lausanne (CH), Institute of Physiology, Tufts University, Boston (USA), Dept. of Gastroenterology & Nutrition

Appointment: Associate Professor of Paediatrics at the University of Verona (I)

Publications: > 100 articles on peer reviewed journals; 30 book chapters.

Professional Societies: European Society of the Study of Obesity, European Childhood Obesity Group, European Society of Pediatric Endocrinology, Italian Society of Pediatrics
Italian Society of Pediatric Nutrition; Italian Society of Pediatric Endocrinology and Diabetology, Italian Society of Obesity (Council)

Present Research Interests: Energy and nutrient metabolism in children. Aetiopathogenesis of childhood obesity and associated disorders.

RECENT PUBLICATIONS

> Maffeis C, et al. Nutrient oxidation during moderately intensity exercise in obese prepubertal boys. J Clin Endocrinol Metab 2005;90:231-6.
> Maffeis C et al. Prevalence of overweight and obesity in 2- to 6-year-old Italian children. Obesity (Silver Spring) 2006;14(5):765-9.
> Sbarbati A, Maffeis C, et al. Obesity and inflammation: evidence for an elementary lesion. Pediatrics. 2006;117(1):220-3
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Childhood obesity and the early metabolic process leading to atherosclerosis: a protective role of fruit and vegetable consumption

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Obesity has a relevant impact on health. The disability and shortened life span associated with obesity are consequences of morbid conditions, including insulin resistance, type 2 diabetes, atherosclerotic heart disease, non-alcoholic fatty liver disease, hypertension and hyperlipidaemia. Excess of fat accumulation often precedes the development of insulin resistance, hypertension and dislipidemia, which have been clearly identified as cardiovascular risk factors and promoters of the atherosclerotic process (3).

Consisting evidence is available that the atherosclerotic cardiovascular disease has a long preclinical phase characterized by the progressive development of arteries wall damage already in childhood well before the clinical manifestations of disease later in adulthood. Childhood obesity predicts the risk of developing a constellation of metabolic, haemodynamic and inflammatory disorders associated with the cardiovascular disease. Moreover, an association between childhood obesity and the Metabolic Syndrome in adulthood as well as between early onset obesity and mortality in adulthood, independently from body size in the maturity, was reported.

Childhood obesity is associated with a low grade inflammation, as suggested by CRP, TNFalpha, IL-6 circulating levels, higher in obese than in non obese individuals. The causes of the inflammation in obesity are not known although it has been recently demonstrated an early elementary lesion in the adipose tissue of obese children, in which macrophage infiltration is the main feature. Both macrophage and adipocyte secrete cytokines and inflammatory mediators which are potentially involved in the lipotoxic perturbations of liver, pancreas, and skeletal muscle as well as in endothelial cell dysfunction.

Dietary patterns high in fruit and vegetable (F&V) content were generally found to be associated with lower prevalence of metabolic syndrome. Moreover, longitudinal data from the Boyd Orr cohort showed that there was a relationship between vegetable intake in childhood and adult mortality for stroke.

A high F&V diet may affect cardiovascular risk factors with several potential mechanisms, which need to be further investigated. One of these is the potential anti-inflammatory property of the diet. Recent results of the Multi-Ethnic Study of Atherosclerosis (MESA) reported that whole grain, fruit, nuts, and green leafy vegetables were inversely associated with CRP, IL-6, homocysteine, and sICAM-1. Fish, dark-yellow, cruciferous, and other vegetables were inversely related to IL-6. These relationships were independent from ethnicity, demographics, and lifestyle factors. Moreover, a recent study (2) demonstrated that F&V intake was inversely associated with plasma CRP concentrations. Moreover, after controlling for potential confounders, persons in the highest quintiles of F&V intake had a ≈ 30% lower chance of having the metabolic syndrome than did those in the lowest quintiles. Finally, the results of the Coronary Artery Risk Development in Young Adults (CARDIA) Study, demonstrated that plant food intake (whole grains, refined grains, fruit, vegetables, nuts, and legumes) was inversely related to elevated blood pressure after adjusting for several confounder factors.

Although it is likely that the association between diet composition and low-grade inflammation as well as cardiovascular risk factors may be similar in young adults and children, further studies are needed to confirm such a relationship and to elucidate the mechanisms by which F&V intake *per se* reduces the cardiovascular risk.

In spite of further proves are needed to substantiate the benefits on the cardiovascular risk factors induced by F&V intake in children, available evidence justifies to promote the consumption of F&V in children as one of the components of the strategy to prevent obesity and cardiovascular risk in the population.

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BIOGRAPHICAL SKETCH

Dr Sylvie Issanchou has an Engineer degree from ENSBANA (Dijon, France) (1979) and a PhD on psychophysics of odorant binary mixtures (1984). At the same time she has implemented a sensory laboratory and has started research activities in sensory evaluation at the National Institute for Agronomic Research (INRA Dijon, France).

After a sabbatical period in 1986 at Utrecht University with Pr Köster, she has extended her research activities to the domain of food preferences.

Dr Issanchou has worked since 1996 in collaboration with economists to develop approaches combining the sensory techniques and experimental economic methods.

Her research interest include the role of food-related sensory experiences and of the context of these experiences on flavour preferences and on food choices.

She is a Member of ESN, an European network on sensory analysis since 1989, a Member of the Editorial Board of Journal of Food Quality since 1996 and an Associate Editor of Food Quality and Preference since 2002.

RECENT PUBLICATIONS

> Combris P., Lange C., Issanchou S. Assessing the effect of information on the reservation price for Champagne: What are consumers actually paying for?. J.Wine Econ. 2006 ;1, 75-88.
> Engel E. Martin N., Issanchou S. Sensitivity to allyl isothiocyanate, dimethyl trisulfide, sinigrin, and cooked cauliflower consumption. Appetite. 2006; 46, 263-269.
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Early childhood development of taste for F&V as the basis for liking and consumption in later life

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It is currently agreed that most flavour preferences are acquired. Such learning can start during intra-uterine life. It has been shown that the nature of the pregnant woman's diet influences the later preferences of the child just after birth (1) and even until weaning (2). The chemosensory exposure related to the mother's diet continues after birth through breast milk. This postnatal exposure influences preferences in the infant (2). Besides these specific learning effects, breastfeeding seems to have a more general effect. Indeed, it has been shown that, during the weaning period, breastfed infants accepted more easily new vegetables than formula-fed infants (3; 4). This effect could be related to the larger diversity of the sensory experiences brought by the breast-milk in comparison to the formula milk; moreover it cannot be excluded that mothers who breastfed and those who did not displayed different behaviours related to feeding their infant.

The start of weaning also appears to be a key period for learning to like foods. The variety of foods received in the first weeks of weaning can influence acceptance of new foods over the next few days (5) and several weeks later (4).

Repeated exposures to a given food induce a greater acceptance of this food, even when it was an initially disliked vegetable (6). However, while this last study shows it is necessary to persist for at least 8 subsequent meals, it was observed in two European towns that if the infant refused a new food, mothers rarely offered it at more than 2-3 meals before giving up and deciding that her child did not like it (7).

At the age of 2 to 3 years, children avoid vegetables. However, there is a high individual variability in vegetable preferences (8) which could be related to previous food experiences. It was also observed that variety of food choices increased with duration of breastfeeding (9). Examining the preferences at a later age (between 4 and 22 years old), it was found that preferences for vegetables were related to early preference in girls (10) and the larger the number of vegetables consumed at 2-3 year, the larger the number of vegetables consumed later (11). Other authors also observed a link between liking for vegetables at different ages: during childhood (12; 13; 14), during adolescence (15), and from adolescence to adulthood (16; 17).

In conclusion it seems that early food context can have an impact on food acceptance in infancy and even later in life. However, the importance of individual sensitivity to specific flavours in the initial acceptance and its relative weight compared to the other factors (mother's diet and practices, early exposure) is not yet known.

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Focusing on promoting fruit and vegetables intake, a key component of obesity prevention

Session 5

What are the barriers to reaching the recommendations for F&V, in the context of obesity prevention?

Chairmen

J. Blundell

A. Drewnowski

Bruce AMES

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BIOGRAPHICAL SKETCH

Dr. Ames is a Professor of Biochemistry and Molecular Biology and Director of the National Institute of Environmental Health Sciences Center, University of California, Berkeley.

He is a member of the National Academy of Sciences and he was on their Commission on Life Sciences. He was a member of the board of directors of the National Cancer Institute, the National Cancer Advisory Board, from 1976 to 1982. He was the recipient of a leading award for cancer research, the General Motors Cancer Research Foundation Prize (1983), a leading award in environmental achievement, the Tyler Prize (1985), the Gold Medal Award of the American Institute of Chemists (1991), the Glenn Foundation Award of the Gerontological Society of America (1992), and the Lovelace Institutes Award for Excellence in Environmental Health Research (1995), the Achievement in Excellence Award of the Center for Excellence in Education (1996), the Honda Prize of the Honda Foundation, Japan (1996), the Japan Prize, (1997), and the Kehoe Award, American College of Occup. and Environ. Med. (1997), the Medal of the City of Paris (1998), the Joseph Priestley Award (1998), and the U.S. National Medal of Science (1998).

His over 500+ publications have resulted in his being among the few hundred most-cited scientists (in all fields).

RECENT PUBLICATIONS

> Ames BN. (2005) DNA and Mitochondrial Damage from Inadequate Micronutrient Intake In: The Textbook of Functional Medicine, eds. D.S. Jones and S. Quinn, The Institute of Functional Medicine. Washington 397-412.

> McCann JC, Hudes M, Ames BN. An Overview of Evidence for a Causal Relationship Between Dietary Availability of Choline During Development and Cognitive Function in Offspring. Neurosci Biobehav Rev. 2006;30:696-712.

> Ames BN, Suh J, Liu J. (2006) Enzymes Lose Binding Affinity (increase Km) for Coenzymes and Substrates with Age: A Strategy for Remediation. In: Nutritional Genomics: Discovering the Path to Personalized Nutrition. Kaput, J. and Rodriguez, RL. (Eds). John Wiley and Sons, Inc., Hoboken, NJ. 277-91.

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Pesticides residues and the Risk to consumers

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Children's Hospital Oakland Research Institute (CHORI), Nutrition and Metabolism Center
University of California, Berkeley, Biochemistry and Molecular Biology Department

The major causes of human cancer are: smoking, unbalanced diets, chronic infections; minor causes are: occupational exposure excess exposure to the sun, excess alcohol. Pollution appears to account for less than 1% of human cancer; yet public concern and resource allocation for pesticide residues and chemical pollution are very high, in good part because of animal cancer tests. My passion is preventing cancer and optimizing health, particularly in the poor. Scares about tiny traces of synthetic chemicals, such as pesticides, are a distraction from important risks.

Animal cancer tests, which are done at the maximum tolerated dose (MTD), are being misinterpreted to mean that low doses of synthetic chemicals and industrial pollutants are relevant to human cancer. Half of all chemicals tested, whether synthetic or natural, are carcinogenic in rodent tests. A plausible explanation for this high frequency is that the MTD causes chronic cell killing and consequent cell replacement, a risk factor for cancer that can be limited to high doses. Ignoring this greatly exaggerates risks. Toxicologists are identifying many chemicals with effects at high dose that are not relevant at low dose.

The vast bulk of chemicals ingested by humans is natural. For example, 99.99% of the pesticides we eat are naturally present in plants to ward off insects and other predators. Half of these natural pesticides tested at the MTD are rodent carcinogens. Reducing our exposure to the 0.01% of dietary pesticides, that are synthetic, is very expensive and will not reduce cancer rates. On the contrary, fruits and vegetables are among our most effective dietary cancer fighters, and making them more expensive, e.g. organic food, by reducing synthetic pesticide use will likely increase cancer. Humans also ingest many natural chemicals from cooking food. Over a thousand natural chemicals have been reported in roast coffee: more than half of the 32 tested are rodent carcinogens.

Animals and humans are well protected by many general defense enzymes, most of which are inducible (i.e., whenever a defense enzyme is in use, more of it is made). The enzymes are equally effective against natural and synthetic reactive chemicals.

The amounts of pesticide residues ingested are so small, relative to levels that have been shown to have toxicological effects, that they are toxicologically implausible as health risks. Regulatory standards have been based on a number of worst case assumptions. I view pesticide scares as distractions from dietary imbalances and smoking which really matter in improving people's health. Pesticides are a major advance for health because they lower the price of fruits and vegetables, a major benefit for the poor. I have reviewed the evidence on why lack of essential vitamins and minerals are likely to be a major contributor to cancer and other late-onset diseases. There is no convincing evidence from epidemiology that pesticides are a significant risk for cancer or disease. Scaring people about hundreds of minuscule or implausible risks, makes cancer prevention more difficult, because the public no longer knows what is important.

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BIOGRAPHICAL SKETCH

Economist, graduated from Essec (Ecole supéreiure des Sciences Economiques et Commerciales) and Paris IX University.

Research Director at the French Agronomic Research Institute (INRA).

Research interests : Food economics, applied demand analysis, experimental economics.

Member of the French National Council for Food (Conseil National de l'Alimentation).

Administrator of the French Institute for Nutrition (Institut Français pour la Nutrition).

RECENT PUBLICATIONS

> Combris P., Lange Ch., Issanchou S. «Assessing the Effect of Information on the Reservation Price for Champagne: What are Consumers Actually Paying for?". Journal of Wine Economics. 2006; Vol. 1(1): 57-71.

> Mannell A., Brevard P., Nayga R., Combris P., Lee R., Gloeckner J. «French consumers' use of nutrition labels», Nutrition and Food Science. 2006; 36(3):159-168.

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The price of fruit and vegetables is a barrier to consumption: reality or myth?

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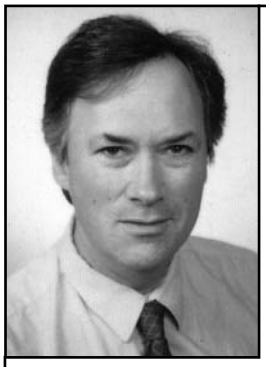
Nutritionists have called our attention to the fact that fruit and vegetables (F&V) are, by far, the most expensive source of calories. Data from France and the UK have shown that diets high in F&V are associated with higher diet costs. In line with both these observations, F&V appear as the group where consumption inequalities are at their highest level compared to other food groups (such as bread and cereals, meat and dairy products). Low-income households tend to consume much less F&V than higher-income households, and French data illustrate the continuous increase of F&V purchases over the whole range of the income distribution.

Thus, converging evidence highlights price of F&V as the main obstacle to consumption and, maybe, as one of the factors leading to poor diets and increasing prevalence of obesity in low income groups. However USDA studies have shown that consumers could meet the dietary recommendations for F&V without excessive expenditure, a conclusion that holds as well for fresh F&V and low-income households. Several studies also suggest that low-income consumers are not very sensitive to F&V price variations, which means that cost is not the only factor limiting consumption.

Many factors other than price clearly have a high impact on F&V consumption, for example taste, convenience, and education to name just a few among the most salient. It is nevertheless important to recognize that all these factors include an economic component making fresh F&V the often less preferred option. For example, trend data clearly show that the price of fresh F&V has increased much more than most food prices during the last decades. Nevertheless it appears that other food products (for example processed) appear cheaper and more attractive and besides their lower prices, often correspond to consumers' preferences and constraints.

Tim LOBSTEIN



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BIOGRAPHICAL SKETCH

Dr Tim Lobstein is co-ordinator of the Childhood Obesity Programme at the International Obesity TaskForce, London. The TaskForce is a component of the International Association for the Study of Obesity, which has over 50 national and regional member organisations representing over 10,000 researchers and health professionals concerned with obesity.

Dr Lobstein is also European Coordinator of the International Association of Consumer Food Organizations. He has helped to compile reports on food policy for the World Health Organization, the European Commission and several consumer and health NGOs. He has recently been appointed a Research Fellow at the Science Policy Research Unit at the University of Sussex, UK.

RECENT PUBLICATIONS

> Lobstein T. Commentary on «Food, the law and public health». Public Health. 2006;120 Suppl:40-1.
> Lobstein T. The prevention of obesity in children. Pediatr Endocrinol Rev. 2004;1 Suppl 3:471-5. Review.
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Marketing impact on food consumption

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IASO – IOTF, London, UK

Dr Lobstein's presentation will review the recent evidence from the US Institute of Medicine and the UK Food Standards Agency which confirms the assumption that advertising has a specific effect on people's food choices and especially on children's dietary preferences. He will also show evidence of a link between the amount of TV marketing of foods and child overweight prevalence which appears to be specific to the type of foods being marketed. Dr Lobstein will then outline some of the unusual and exploitative new forms of marketing being used to sell directly to children, and will describe the recent moves to introduce regulatory controls on marketing in order to protect child health.

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BIOGRAPHICAL SKETCH

Dr Laurent Damiens obtained in 1985 a Master of Business Administration in the University of Paris 9 Dauphine, and then a PhD in strategy, marketing and communication on " post-modern marketing" in the University of Paris 9 - Dauphine.

In 1986 he started working for Cartier in New-York (USA) in charge of marketing development and strategic communication.

In 1992 he started a new position for Sopexa, the French agency in charge of promoting the French food & wine all over the world. He was in charge of the fruit & vegetable sector for more than 4 years and then took the challenge to promote the French art of eating into Japan, and moved to Tokyo.

Since1999, he is the general director of Aprifel, the agency for research & information on fruit & vegetables, based in Paris. He developed the "fresh'attitude" concept, and created the "10 a day" strategy to promote the consumption fruit & vegetables. He also opened in 2001 an art gallery in Paris, la galerie fraich'attitude, centred into the concept of the eat art movement. The Gallery Fraich'attitude is now well recognised and proposes to the public exhibitions on specific artists or food themes, food design and contemporary creation. In 2006, he developed a new concept: "half of the plate" (F&V). He recently opened the fraîch'attitude kitchen, which propose many practical and greedy workshops around the fresh fruit and vegetables.

Laurent Damiens is a fast&junk food fighter, and is dedicated to promoting a neo-vegetarianism lifestyle to interrupt the industrial abuse in our food, a tendency which has accelerated greatly in the past ten years. Giving meanings back to our foodstuffs, with the individual's total implication as a creator of emotions, through the daily act of cooking at home. Rethinking the way we eat, stimulating emotion through the use of cooking, creating, through taste, forms, textures, senses, colours and odours : rediscovering rich, deep sensations, as when one is creating and feeling, through the act of eating.

Efficiency of marketing actions on increased fruit and vegetable consumption (case study by major retailer)

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Modern marketing tools such as packaging, advertising and promotion at points of purchase have had an enormous impact on consumer choice for processed food items. Over the last four decades those tools have been so powerful that they have changed consumer food purchasing behaviours. Consumers now buy products depending on their level of advertising, the quality of packaging and the amount of promotion offered.

Modern marketing tools also work for promoting fresh fruit and vegetables, though they are seldom used.

A pilot has been developed in France by a big retailer, proposing to the consumer a promotion on sales of fruit and vegetables. The offer was to get a €1 return on a €5 purchase of fresh fruit and vegetables. The results were hugely successful, with the best promotion action ever realized for any kind of product in this retail chain. There was a significant increase in sales – both in terms of volume and euros – even though the retail chain lost €1 per purchase.

Modern marketing promotion actions may even be more effective on fresh fruit and vegetables than on processed items. Unfortunately in the fresh fruit and vegetable sector, the difficulty in getting marketing power is a strong barrier to make produces more desirable and more purchased.

A new strategy for promoting fresh fruit and vegetable consumption could be developed to include actions on the part of retailers, collective communication plans, social marketing, as well as public-private partnership; these would all work together to make the difference regarding consumer choices, and to counter-balance the huge marketing investments of the biggest food companies.

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Dr Elizabeth Dowler is a Reader in Food and Social Policy. She is a Registered Public Health Nutritionist and has worked in many parts of the world, though now mostly in UK/Europe, as researcher or consultant on policy and politics of food and nutrition.

She is a member of the Food Ethics Council, National Heart Forum, Sustain's Food Access Network, and the PDG Maternal and Child Nutrition Public Health Programme Guidance for the National Institute for Health and Clinical Excellence (NICE). Her recent research includes poverty and inequalities, food, nutrition and public health; evaluating food/nutrition policy and local initiatives; and people's views of risk in food and the benefits of 'alternative' food economies.

In 2005-6 she was a member of the panel evaluating 10 years of the Scottish Diet Action Plan, and is leading a mid-term evaluation of Food and Wellbeing Wales.

RECENT PUBLICATIONS

Recent publications include: Dowler & Spencer (eds) (forthcoming) Challenging Health Inequalities, Bristol: Policy Press; Thorogood, Simera, Dowler, Summerbell, Brunner (in press) A systematic review of population and community dietary interventions to prevent cancer. Nutrition Research Reviews; Dowler, et al (2006) Assessing Public Perception: Issues and Methodologies. in: Dora (eds) Health, Hazards and Public Debate: Lessons for risk communication from the BSE/CJD saga, WHO:Copenhagen; Dowler & Jones Finer (eds) 2003, The Welfare of Food: rights and responsibilities in a changing world, Oxford: Blackwells; Mosley & Dowler (eds) 2003 Poverty and Social Exclusion in North and South, Routledge: London; Dowler & Turner with Dobson 2001 Poverty bites: food, health and poor families, Child Poverty Action Group: London.

Availabilty and access to healthy food in areas of disadvantage

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During the last two decades research and policy has begun to address the wider, structural dimensions to food choice, particularly for low income households. Problems of physical and economic access to a suitable range of appropriately priced produce, especially fruit and vegetables, have been documented in North America and the UK, and are beginning to emerge in other industrialised nations. The evidence, both that such problems can be demonstrated in large cities and that addressing them through retail planning improves healthy food intakes among lower socio-economic groups, has been contested. The paper will engage with these debates, examining their explanatory capacity, and will discuss attempts to improve availability and access by the public sector at national and local levels. Initiatives to overcome the demise of local retailing and the needs of particular, marginalised groups, will also be reviewed.

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Professor of Public Health, Psychology, and Psychiatry; Director Program in Human Nutrition at the School of Public Health, University of Michigan.
Research interests include studies on obesity and health disparities, the relationship between diet quality and diet cost, definitions of nutritious foods using a novel nutrient density standard, and studies on sweet taste, fat texture, appetite and satiety as they relate to obesity. ECOR's mission is to address the obesity epidemic, focusing on the environment, economics and policy.

RECENT PUBLICATIONS

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Public initiatives to overcome barriers to dietary change

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The provision of affordable nutritious foods to all segments of the community is a major goal of public health nutrition. However, consumers who try to adopt healthier diets face a number of barriers, notably taste, cost, time, convenience, and ease of access. Fresh fruits and vegetables are not always readily available or accessible to populations at greatest need. The more healthful diets cost more per MJ (though not per nutrient package) than energy-dense diets high in added sugars and fat. In several studies, dietary energy density has been linked to higher rates of obesity, diabetes and the metabolic syndrome. Promoting the consumption of low-energy density high quality diets has therefore a major importance for public health. Since many of the barriers are beyond individual control, public initiatives and strategies are needed to help consumers make healthier choices. Such initiatives many include economic intervention to lower the cost of fresh produce through subsidies, reduced taxes or increased budgets for promotion. They may also include interventions to improve availability and access of vegetables and fruit through broader distribution channels, improved marketing, farmers markets, and fiscal incentives for retailers, especially those located in lower income areas. Public initiatives may also include better promotion and communication strategies aimed at emphasizing the nutritional value of vegetables and fruit. A focus on quality, taste and enjoyment will help position vegetables and fruit among the key components of a health diet. Such strategies currently discussed both in France and in the US, require public health champions as well as political will. A combination of health research and policy action is the right way to address major challenges in public health.

Policies and political commitments to increase F&V consumption within an obesity prevention strategy

Session 6

Round Table:
The challenges to increase F&V consumption

Chairman
T. Lang

Panellists and tasks:

Lars Hoelgaard:	Encouraging consumption of fruit & vegetables - how can the CAP (Common Agricultural Policy) contribute?
Antonio di Giulio:	F&V consumption and research
Robert Madelin:	Role of fruit and vegetable strategies within a comprehensive nutrition and physical activity approach at European level
Beatrice Patrie:	Subsidies for F&V producers
Pilar Rodriguez Iglesias:	F&V and health claims
Philip James:	Governmental mechanisms which change fruit and vegetable consumption
Jim Murray:	The price of F&V for consumers
Liselotte Schafer Elinder:	Social marketing strategies to increase fruit and vegetable consumption
François Laffitte:	Taste aspects of F&V
Jan Marck Vrijlandt:	Accessibility of F&V through vending machines
Bernard Bruyere:	Availability and marketing strategies to promote F&V

Governmental mechanisms which change fruit and vegetable consumption

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World agriculture prioritized cheap meat, milk, fats and sugars for decades with a focus on food security and rural poverty. This continues in most countries so consumption patterns are changing dramatically in lower income countries as the availability and marketing of fast foods, oils and sugars by international companies intensifies to ensure rising global profits for feed, food and supermarket companies. Europe, the US and Japan also safeguard their farmers' incomes at the expense of the developing world and dump fats and sugars on world markets. Highly successful trillion dollar subsidies by the EU and US have selectively reduced the price of fats and oils but increased the relative price of vegetables. A low strategic priority is attached to vegetable consumption accounting for its progressive lower intake for some decades. The challenge is not only to counteract/ eliminate these economic distortions but compensate for decades of direct or indirect governmental price manipulations which clearly altered consumption inappropriately.

An unsustainable global diabesity epidemic is inevitable without novel regulatory approaches. Numerous studies show the importance of price elasticity; vegetables and fruit are more price sensitive than fats and oils. Standards for all public sector catering need to follow the Finnish experience of automatic salad bars and vegetables included in the price of the meal. This induced the greatest rapid intake change in a commodity ever recorded. Compulsory international nutritional signposting of all food products could dramatically help consumers now totally confused by incomprehensible food labelling. Novel approaches by agriculture, trade and the treasury ministries with collaborative business and supermarket developments could transform vegetable consumption but not if reliance is placed on health educative messages. Fiscal policies e.g. differential taxes on fats/sugars with revenue neutral subsidies of vegetables could dramatically alter the food consumption patterns of the poor who are in greatest need.

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Tim Lang is Professor of Food Policy at City University, London.

He specialises in how policy affects the shape of the food supply chain, what people eat and the societal, health, and environmental outcomes. He is a Fellow of the Faculty of Public Health, and was chair of Sustain, the UK NGO alliance (1999-2005).

Since 1999, he has been a Vice-President of the Chartered Institute of Environmental Health.

He is a frequent advisor / consultant to the World Health Organisation.

He has been a special advisor to four Commons Select Committee inquiries, most recently in 2003-04, to the UK Parliamentary Health Committee Inquiry into Obesity.

He is co-author, with Erik Millstone, of The Atlas of Food (Earthscan, 2003) and, with Michael Heasman, Food Wars (Earthscan, 2004).

In June 2006, he was appointed a Commissioner on the Sustainable Development Commission.

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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.

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Dr. Antonio Di Giulio started his professional career as an agricultural economist with the United States Foreign Agricultural Service- Department of Agriculture, (FAS/USDA) in Rome, Italy, working primarily on commodity and food products market analysis as well as on scientific and regulatory aspects including food safety and WTO trade issues.

Prior to his post with the European Commission, he was Principal Administrator with the International Centre for Advanced Mediterranean Agronomic Studies, (CIHEAM) a Paris based inter-governmental organisation, linked to the OECD, where he worked on policies and research programmes on agricultural and food production systems of the Mediterranean region. His duties included the co-ordination of research programmes, and the supervision of CIHEAM Annual report on "development and agri-food policies in the Mediterranean region", and he was also part of CIHEAM senior management committee.

He holds Masters degrees in Agricultural sciences and Rural development, Programmes and projects, respectively. He has a Doctoral degree in Agri-food economics.

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Robert Madelin has worked for the European Commission since 1993. He served in a variety of postings (1997-2003) as a Director in the Directorate-General for Trade. Prior to this, he was Deputy Head of Cabinet to Sir Leon (now Lord) Brittan, European Commission Vice-President.

Robert Madelin was born in 1957. He married Marie-Christine Jalabert in 1990. He was educated in England, at the Royal Grammar School, High Wycombe, and at Magdalen College, Oxford. He was in the British Civil Service from1979 to 1992, serving mainly in London and Brussels. He studied at the Ecole Nationale d'Administration, Paris in 1983-4.
For further information:
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Beatrice PATRIE has a Law degree (1977); a Master's degree in law (1978), a Diploma to practise as a lawyer (1978), and a National College for Judicial Officials (1979).

She has been an Examining judge at the Senlis High Court (1981), Magistrate, at the Court of Justice central administration (1983), Judge at the Paris High Court (1989), President of the Saint-Quentin High Court (1997), Secretary-General of the Judiciary Association (1990), and President of the Judiciary Association (1992).

Beatrice PATRIE was a member of the administrative council of European Judicial Officers for Democracy and Freedom from 1990 to 1994.

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Pilar Rodríguez Iglesias, M.D. Ph.D., is Head of the European Food Safety Authority's Unit on Dietetic Products, Nutrition and Allergies. She joined the EFSA at its inception in 2002 as the Scientific Co-ordinator of the Scientific Panel on Dietetic Products, Nutrition and Allergies (NDA). The NDA Panel is in charge of providing scientific advice at European level on nutrition matters related to Community legislation.

She is a medical doctor (gastroenterologist) by training and joined the EU food safety area 6 years ago as secretariat of the previous EU Scientific Committee on Food.

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Professor James, a medical physiologist, spent 3 years in paediatrics in Jamaica and a year at Harvard before returning to the London School of Hygiene and Tropical Medicine.

In 1974 he became Assistant Director, MRC Dunn Nutrition Unit, Cambridge and then Director of the Rowett Research Institute, Aberdeen, a large biological nutrition research institute relating to the whole food chain.

He chairs the International Obesity TaskForce, responsible for global initiatives relating to food and health with particular emphasis on the pandemic of obesity. He chairs a Presidential Council of 5 WHO related medical NGOs for cardiology, diabetes, paediatrics, nutrition and obesity operating globally to stem the pandemic of adult chronic disease. He chaired and wrote the UN Millennium Commission Report on global issues relating to nutrition up to 2020, wrote Blair's plans for the UK Food Standards Agency and those for a new EU Food and Health Authority.

He currently operates globally, focusing on creating National Councils to prevent childhood obesity and persuading governments to change their policies.

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Jim Murray was the Director of Consumer Affairs and Fair Trade in Ireland from 1979 to 1990. Prior to that he was, for seven years, the Director of the National Social Service Council (now the National Social Service Board) in Ireland.

Mr Murray is a qualified lawyer (Barrister at Law) and has a degree in Physics and Mathematics. He is also the holder of a Post Graduate Diploma in European Law.

In 1990 Mr Murray took up the post of Director of BEUC, the Bureau Européen des Unions De Consommateurs. BEUC is a Brussels-based organisation representing the independent consumer associations from the fifteen Member States of the EU and elsewhere in Europe. The primary task of BEUC is to promote the interests of the consumer at all levels of the EU, to act as a strong consumer voice in Brussels.

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Until 1998 Liselotte Schäfer Elinder worked primarily in laboratory research carrying out studies in the field of nutrition, cancer and dermatology. After that she joined the Swedish National Institute of Public Health (NIPH). Since 2002 she has worked on health impact assessment of the EU Common Agricultural Policy and other investigations in the field of obesity, nutrition, physical activity and public health policy.

At the Stockholm Centre for Public Health she is presently involved in obesity research and prevention.

Liselotte Schäfer Elinder has been representative for the Swedish government in the European Commission's (DG SANCO) expert group on diet and physical activity from 2001-2006.

She has been a temporary advisor for WHO during the development of the Global Strategy for diet, physical activity and health, the Ministerial conference on counteracting obesity and the Second food and nutrition action plan for the WHO European region from 2005-2007.

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François LAFITTE is Vice-Chairman of the BIK (Bureau Interprofessionnel du Kiwi 'Interprofessional Kiwi Desk') since 1982, Chairman of the Regional and National Kiwi Sections of the Economic Committee of Aquitaine (France) since 1993, and Chairman of the Economic Committee of the French South West region (BGSO) since 1998.

He was Chairman of INTERFEL (The French Interprofessional Association of Productors and Distributors of F&V) from 2000 to 2003.

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Jan Marck Vrijlandt holds a degree in Economics from the University of Frankfurt.

He works for Selecta since 1995 and he is responsible for Marketing, Sales & Purchase in Europe, since 2004. In this role, he was responsible for leading the relaunch of Selecta's consumer identity in 2005.

During his 11 years with Selecta, he has previously held the positions of CFO Germany, Manager Mergers & Acquisitions Central Europe and Country manager Netherlands and Belgium.

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Mr Bernard Bruyere has spent his entire career with the Casino Group where he has successively occupied the following responsibilities : Head of Department, Director of Supermarkets, Director of Hypermarkets, Director of the Fresh and Processed products for the Languedoc region of France, and currently Head of the south-eastern region for fruit and vegetables.

Bernard Bruyère also represents French distribution at INTERFEL.

POSTER ABSTRACTS

P01

Coronary heart disease and consumption of fruit and vegetables

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Introduction: A high consumption of fruit and vegetables is of basic importance in the prevention and treatment of cardiovascular diseases.
Design: Cross-sectional design. Between 1998 and 2000, standard frequency questionnaires on coronary risk factors and nutritional aspects were completed by 300 general practitioners sampled at random. Questionnaires had to be completed for consecutive patients, attending general practitioners' practices, irrespective of the underlying motive for attendance.
Subjects: 592 men and 763 women were included, aged 35 years or more.
Method: One portion of fruit was defined as the equivalent of a mean apple, and one portion of vegetables was defined as ¼ of a dish. The total number of patients with a consumption of two or more portions of vegetables and two or more portions of fruit was summed. Stratification was done for diabetes (n=122), post-infarct (n=60), treated and untreated hypertension (n=383), angor (n=121), treated and untreated hypercholesterolemia (n=934) and post-cerebrovascular accident (n=59).
Results: A high consumption of fruit and vegetables was present in only 15% of diabetic patients, 17% of post-infarct patients, 17% of patients with hypertension, 23% of patients with angor, 18% of patients with hypercholesterolemia and 20% of patients after a cerebrovascular accident. Only 22% of patients who received nutritional recommendations from general practioners or dietitians had a high consumption of fruit and vegetables.
Conclusion: In the non-pharmaceutical prevention and treatment of coronary heart disease, less than 20% of the patients follow the basic recommendations to consume two or more portions of fruit and vegetables a day. Surprisingly, nutritional advice, either given by a general practitioner or dietitian, did not result in an increased intake of fruits and vegetables.

Dietary fiber intake, obesity and serum lipid profiles in childbearing age women

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Objectives: The objectives of this study were to investigate the status of body mass index (BMI), waist to hip ratio (WHR), serum lipid profiles [total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C)], daily total dietary fiber intake and their relationship in childbearing age women.
Methods: One hundred- sixty healthy non pregnant-non lactating women with a mean age of 32.94 ± 5.24 years who attended health centers were recruited. Serum lipid profiles and anthropometric measurements were carried out. For assessing daily total dietary fiber intake 24-hour recall method (3day) was used. Data analyzed using student t-test, One-Way ANOVA, and Pearson correlation test.
Results: The mean BMI was 27.39 ± 4.58 kg/m^2, and 41.7% and 27.1% of subjects were overweight or obese, respectively. The mean of WHR was 0.82 ± 0.06 cm and 61% of subjects had abdominal obesity. Mean daily total dietary fiber intake was 13.44 ± 6.52 g. The mean serum TG in obese subjects and TC and LDL-C levels in both obese and overweight subjects were significantly higher than that of women with normal BMI ($p<0.05$). Significant positive correlation between TC and TG with BMI ($r=0.2$, $p<0.03$ and $r=0.3$, $p<0.005$, respectively) and TG with WHR ($r=0.2$, $p<0.02$) were observed. There were significant negative correlation between WHR and HDL-C ($r= -0.2$, $p<0.03$) and between BMI and total dietary fiber intake ($r= - 0.3$, $p<0.001$).
Conclusion: Overweight and obese women had low fiber intake and risk of high serum lipid profiles. Considering the importance effects of enough dietary fiber intake on health, serum lipid profiles and prevention of obesity, promoting adequate consumption of fruits and vegetables which are the main dietary sources of fiber should be one of the most health priorities in our society.

P03

Traditional spoon sweets

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Introduction: Sweets are not an essential element of a traditional diet and their consumption is mainly connected to the festivities and religious holidays. Nevertheless, spoon sweets, were directly related to the seasonal agricultural production and due to the excess availability of seasonal fruits and vegetables, in conjunction with their extended time of preservation, spoon sweets were prepared in satisfactory quantities and consumed all year round. Consequently, they had a higher consumption than other traditional sweets and were intertwined with the traditional diet of Greece.
Objectives: Spoon sweets are based on the conservation of fresh fruit or vegetables and nuts, after having been boiled in a sweetening substance, namely honey, molasses from must or sugar. The recipes, which varied depending on the production of each region, were transmitted from mother to daughter. Therefore, the study of Greek spoon sweets not only preserves important elements of the cultural inheritance but may also elucidate their role in the beneficial traditional Greek diet.
Methodology: In the context of the systematic investigation of traditional Greek foods we studied two typical spoon sweet recipes: the quince spoon sweet in Nemea (Peloponnesus) and the watermelon peel spoon sweet in Nea Karvali (Kavala – northern Greece). The recipes were prepared by elderly residents and their nutritional composition was determined by chemical analyses.
Results: Part of the nutritional composition of the studied spoon sweets are presented below. Since they are based on fruits boiled in syrup, they present a low lipid content which virtually derives from the nuts included in the recipe. Moreover, they provide dietary fibre and vitamins depending on the type of fruit or vegetable used.

Food (100g)	Water (g)	Proteins (g)	Lipids (g)	Carbohydrates (g)	Dietary fibre (g)	Energy (Kcal)
Quince spoon sweet	19.1	0.6	2.9	75.1	2.3	379
Watermelon peel spoon sweet	22.6	2.6	0.3	70.5	3.4	295

Conclusion: Today, after so many centuries, the tradition of spoon sweets is still alive and perpetuating. Scientific evident supports that they may be incorporated into the habitual diet as they are savoury no cholesterol sweet desserts with a negligible amount of fat.

This research was co-funded by the Hellenic Secretariat of Research and Technology and the European Union.

Fruits and vegetables consumption in the prevention of weight gain- Results of a Mediterranean cohort: the SUN study

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Although fruits and vegetables have been consistently associated with lower risk of cardiovascular disease, longitudinal data on the long-term relationship between fruit and vegetable (F&V) consumption and changes in body weight are limited.
The aim of this study was to examine the association between F&V consumption and changes in body weight in a free-living Mediterranean cohort. We followed-up for an average of 28 months a Spanish dynamic cohort composed of 8,899 university graduates (the SUN study): Mean age was 38 years, 60% of participants were women. F&V consumption was assessed with a previously validated semi-quantitative food-frequency questionnaire. Self-reported weight was validated in a subsample of the cohort. We used linear regression models to estimate the association between baseline F&V consumption (quintiles) and weight change during follow-up. Most participants tended to gain weight during follow-up. Those in the upper quintile of baseline F&V consumption exhibited 347g (95% confidence interval (CI): 614 to 79) less weight gain than those who were in the lowest quintile of F&V consumption after adjusting for potential confounders. Considering changes in F&V consumption during follow-up, participants with medium F&V consumption at baseline who increased their F&V consumption during follow-up experienced the lowest weight gain, with an adjusted difference of -535 g (95% CI: -847 to -223) versus those with the lowest baseline consumption and a consistent or reduced F&V consumption during follow-up. These results add evidence to support the recommendation of replacing other food items with F&V in order to tackle the obesity epidemic.

P05

Promoting fruit and vegetable intake: need for motive-related health audience segmentation

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Objectives and method: Based on the domain-specific application of a general taxonomy of consumer motives in the context of health motivation, a heterogeneous health audience (*N*=615) was segmented according to people's health-related motive orientations, *i.e.* relatively enduring beliefs that people hold about the fundamental meaning of health. After identifying consumer segments and assessing differences in fruit and vegetable consumption among these segments, the major aim was to explore the effectiveness of different motive-related health advertisements to motivate each of the segments to increase fruit and vegetable intake.
Results: The results of a two-step cluster analysis revealed five different health segments for which health has another distinct meaning, named Energetic Experimenters, Harmonious Enjoyers, Normative Carers, Rationalists and Conscious Experts. Significant differences were found between the health segments with regard to category-specific fruit and vegetable consumption (e.g. bananas, potatoes, cooked vegetables), which indicates that different (fruit and vegetable) product features and/or health-related benefits are likely to be instrumental to achieve different health-related motive orientations. In addition, significant differences existed between the segments with regard to their reactions toward fruit and vegetable health advertising. Compared to the other segments, all health audience segments responded more positively toward the advertisement that was hypothesized and designed to be most responsive to their health-related motive orientations. Moreover, when comparing the most appropriate motive-related advertisement to a general advertisement, a segment's reactions toward the motive-related advertisement were significantly more positive than its reactions toward the general advertisement.
Conclusions: These findings provided a test of the proposition that targeted or segment-specific motive-related health advertising is likely to be more effective than a general message. Based on the results of this study, practical suggestions and recommendations were offered for health communicators to use when developing motive-related health advertisements in the context of fruit and vegetable intake promotion.

Organizing and evaluating F&V consumption in a worksite canteen intervention

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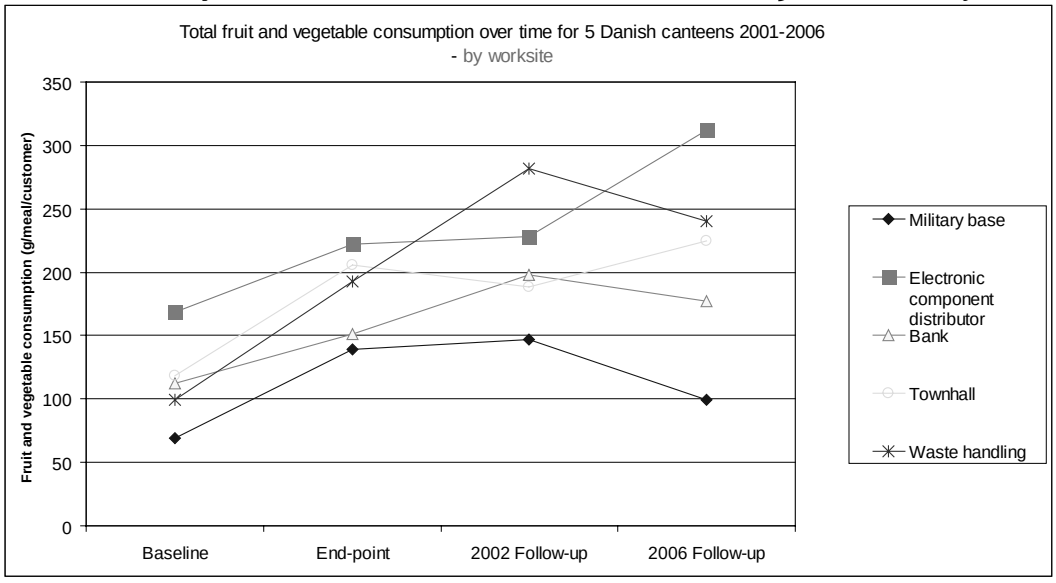
Objectives: The objective of the study is to analyze the long term sustainability of a worksite canteen intervention of serving more fruit and vegetables (F&V).
Methodology: In the so-called 6-a-day project, having 600g F&V consumption-a-day as target, 5 worksites canteens increased the F&V lunchtime consumption significantly based on a worksite canteens intervention. In this 5 year follow-up study the F&V-consumption at lunchtime was analysed in the original 5 canteens. Data was likewise the original study collected by the canteen staff themselves during a 3 week continually period. The daily F&V-intake was measured by weighing fruits and vegetables served subtracting waste. The results were analysed and compared to the data at baseline before intervention, after intervention and a one-year follow-up to evaluate the sustainability of the intervention.
Results: The 5 year follow-up data collection shows that 4 of the 5 worksite canteens were able to either maintain the intervention or even increase the consumption of F&V by using different strategies (the development in total F&V for each canteen is seen in the figure).
The method developed during the canteen intervention focused on co-operation between a consultant and the canteen personnel and management in defining, planning and implementing the F&V-intervention. The method developed also focused on providing ideas for increased F&V for lunch, making environmental changes in the canteens by giving access to tasteful and healthy food choices and reducing availability of unhealthy options.
Conclusion: Worksites seem to be a promising setting for promoting healthier eating if the canteen manager and staff are given the right tools and conditions. From a public health perspective the worksites address a large number of individuals including many unlikely to engage in preventive health behaviours.
This study shows that future worksite canteen interventions should be based on: participatory approach, long-term intervention, environmental change, dialogue with suppliers and networking among worksite canteens.

Keywords: Sustainability of intervention, Worksite canteens, Fruit and vegetables

The figure shows the development in total F&V for each of the 5 canteens. The measurements are taken continually over a 3 week period (number of days n=15), from before intervention (baseline), after intervention (end-point) to 1 year follow-up and 5 year follow-up. To avoid seasonal changes baseline and the follow-up measurements are all taken within the same 3 weeks of the year for each canteen.



P07

Consumption of fruits and vegetables and nutritional transition in Algeria

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The nutritional transition is a phenomenon present in Algeria. It is characterized by a modification of the diet and the emergence of no transmissible chronic diseases related to the diet. The progressive modification of the structure and the balance of the food ration reflect this change.
In Algeria, in 2001, the Food Energy Availabilities were of 3 010 kcal per capita/day. The structure of the energy contribution changed in 1965 to 2000, in particular by a reduction of carbohydrate intake. FAO estimates the availabilities of fruits and vegetables per capita at 368 g/day and their food energy availability at 6% (2000-2002).
According to study "STEP WISE WHO Algeria 2003" carried out with persons aged between 24 and 64 years in *Sétif* and *Mostaganem*, the mean fruit consumption observed was 2.5 days per week and that of vegetables 5 days per week.
Among the 84.1% of the persons who consume less than 5 portions of fruits/day, women (55-64 years), in urban environment, of high socio-economic level, are most numerous. The 80.4% who consume less than 5 portions of vegetables/day are in rural area and have low socio-economic level. The study shows prevalence of 26% of HTA, 14.6% of obesity and 2.5% of diabetes. In the group of person with chronic diseases, the prevalence of fruit and vegetable consumption of less than 5 portions is 55.3%
A national program against the non transmissible diseases was elaborated in 2003 but is not launched yet. These diseases have multiple causes and any adequate approach must be coordinated by the various actors. Suitable policies and interventions are necessary in Algeria to limit the negative effects of the transition and to build a durable food and nutritional system by developing the local products. The promotion of the consumption of fruits and vegetables and its accessibility seems essential.

Fresh fruit and vegetables consumption in overweight Bulgarians at high cardio-vascular risk

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Purpose: There is compelling evidence of protective role of diet rich in fruits and vegetables on lowering the risk of heart disease and stroke. We aimed to examine the patterns of fruit and vegetables intake in overweight Bulgarians at high cardio –vascular risk.
Methods: 530 adults, aged 40 – 75 years, with average BMI 29 ± 11 were randomly selected to participate in a survey. Anthropometric status was measured with standardised scales. Food frequency questionnaire comprised by 50 food items was applied to measure participant's usual food intake during the winter and summer season of the previous year. For each food item, participants were asked to indicate their usual consumption, choosing from 5 frequency categories ranging from "*never or less than once/month*" to "*3 or more times per day*".
Results: There is a pronounced seasonality of fresh fruit and vegetables consumption in the studied population. 75% of all subjects do not consume any fresh vegetables in winter compared to 5 % in summer. Fresh fruits are consumed every day by 15% of the subjects in winter, while by 65 % in summer. The intake of preserved fruits and vegetables is traditional for the Bulgarians and is reported to be high in winter. Significant differences in dietary patterns are observed by place of residence (urban/rural), age, gender and Body Mass Index status. Men, rural and obese subjects prove to have the most unfavourable diet, respectively the lowest fresh fruits and vegetables intake.
Conclusions: The results underline the presence of seasonal variations in fresh fruit and vegetables consumption in overweight Bulgarians at high risk for cardio-vascular mortality. Further targeted research is needed to explain the specifics of the observed seasonality. Health education interventions should focus on men, rural and overweight people not just the population as a whole.

P09

Consumption of fruits and vegetables and plasma levels of antioxidant vitamins

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Aim: To assess the relationship between fruit and vegetable consumption and vitamin plasma antioxidant levels. The importance of specific groups of fruits and vegetables is evaluated.
Method: A total of 3,521 subjects (1,487 men and 2,034 women), aged 35-60 years, who participated in the SU.VI.MAX cohort were included in this study. Blood samples of volunteers were analysed for beta-carotene, vitamin C, alpha-tocopherol and retinol. Each subject had completed at least 6 dietary records during the first 2 years of the study.
Results: Women had higher mean beta-carotene and vitamin C plasma levels than men, but lower alpha-tocopherol and retinol plasma levels. Plasma beta-carotene and vitamin C levels were correlated with consumption of vegetables+fruits+juices, with vegetables alone and with fruits alone, as well as with most of the food groups tested. These relationships persist after adjustment for confounding factors. Regression analysis showed a linear dose response relationship.
Conclusion: In our study population, plasma concentrations of beta-carotene and vitamin C were associated with fruit and vegetable intake whereas alpha-tocopherol and retinol were not. Root vegetables and citrus fruits were shown to be specifically associated with beta-carotene plasma status as were citrus fruits with vitamin C plasma status.

Relationship between fruit and vegetables consumption and 4-year change in weight in middle-aged adults participating in the SU.VI.MAX (SUpplémentation en VItamines et Minéraux AntioXydants) Study (1996-2000)

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Objectives: Intervention studies showed that advice to increase fruit and vegetable consumption and decrease dietary fats is an effective strategy for weight management. The purpose of this prospective observational study was to examine the relationship between consumption of fruits and vegetables and change in weight over a 4-year period.
Materials and Methods: The SU.VI.MAX study included middle-aged adults (45-60 years) who were followed for an 8-year period. Every two years, participants underwent a clinical examination, including anthropometric measurements. All subjects were invited to complete a 24h records every two months. We selected subjects who completed at least 6 dietary records between 1996 and 2000 (provided that at least 3 dietary records were completed in 1996-1998 and 1998-2000) with no missing covariates. We examined the relationships between weight change and consumption of fruits (including fruit juice) and vegetables (excluding potatoes) separately, fruits/vegetables combined and soups. Consumption (g/day) was divided into sex-specific quartiles. Analyses were performed by sex comparisons were adjusted for age, education, tobacco use, total energy intake, physical activity, television watching and body mass index in 1996.
Results: The sample consisted of 1761 adults (985 men, 776 women). In men, combined fruit and vegetable consumption in the top quartile (i.e. 7 servings/day) was associated with a lower mean weight gain compared to the first quartile (1.5 *vs.* 2.3 kg, p=0.04). When analyzed separately, weight change was related to fruit consumption only (p=0.01). Heavy soup consumers compared to occasional or non-consumers have a mean weight gain of 1.41 *vs.* 2.19 kg (p=0.01). No significant associations were found in women.
Conclusion: Heavy consumers of fruits or soups had a lower mean weight gain in men in the SU.VI.MAX study. Further analyses on the association of dietary patterns and fruit and vegetable consumption are needed.

P11

Relationship between dieting practices, body mass index and consumption of fruit and vegetables in a group of Croatian university students

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Behaviours on fruit and vegetables consumption and dieting practices are not completely understood. Since university students are in a period of heightened concern over obesity, this study aimed to assess the dieting practices among underweight, normal weight and overweight students and to examine the related fruit and vegetables consumption.

Dieting practices were examined among 602 Croatian university students (143 males, 459 females) with average age of 22.6±1.19 years and average BMI of 21.63±2.71 kgm^{-2}. Study included specially designed survey questionnaire consisted of demographic variables, questions on recent dieting practices and quantified food frequency questionnaire. Descriptive statistics and parametric variables were analysed using Student's t-test, ANOVA and Pearson's *r* correlations coefficients.

During the survey, 29.2% of students reported dieting while 70.8 % of students were classified as non-dieters. Among dieters, 1.7% were underweight, 85.2% were normal weight and 13.1% were overweight. Among non-dieters the mentioned distributions according to BMI were 7.7%, 83.8% and 8.5%, respectively. According to dieting practices, significant differences were observed among underweight groups in BMI ($p<0.000$), while among those with normal weight differences were established in intake of energy ($p<0.03$), polyunsaturated fatty acids ($p<0.02$) and cereals ($p<0.04$). Food group analysis showed that dieting practices were inversely correlated to consumption of vegetables ($r=-0.32$, $p<0.44$), nuts ($r=-0.40$, $p<0.32$), citrus fruits ($r=-0.03$, $p<0.45$) and other fruit ($r=-0.6$, $p<0.09$). Statistically significant difference was observed in consumption of potatoes ($r=-0.10$, $p<0.01$).

Conclusively, results indicated differences in food habits according to dieting practices but they were not related to overall amounts of fruit and vegetables consumed. However gender specific differences were observed. Female dieters reported less consumption of legumes and potatoes ($P< 0.05$) while males dieters reported fewer consumption of fruit ($P< 0.05$) compared to non-dieters.

Assessment of obesity and overweight status with consumption pattern of fruit and vegetable in Iranian households

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Introduction: Obesity is a condition caused by many factors. Fruits and vegetables are naturally low in calories, and may be an important way to prevent and treat obesity. Diets that are high in fiber are associated with lower body weight.
The purpose of this study was to assess obesity and overweight status with consumption pattern of fruit and vegetable in Iranian households.
Methodology: We used data of national comprehensive study on household food consumption pattern and nutritional status Iran (2001-2003).Dietary pattern of 7158 households chosen by a systematic stratified sampling design was assessed. Data on food consumption were collected by a combination of weighing and recall method for three consecutive days. Mean weighted average intakes were calculated. Obesity and overweight were defined as BMI>27.
Results: The prevalence of obesity and overweight in Iran were 42%. Mean daily per capita intake of total fruit and vegetable in Iran was 371 g consisting of 142g fruit (range 65 to 187g) and of 229g vegetable (range 166 to 277g). Fruit and vegetable contribution to total intake of food basket (1384g) were 27%.
Conclusion: Based on findings, total intake of fruit and vegetable were less than WHO recommendation (400g/day) and prevalence of obesity and overweight were high in Iran. Thus, there is a need to apply useful strategy to encourage Iranian to consume more fruit and vegetable.

P13

Comparison of consumption pattern of fruit and vegetable and fat intake in overweight and obese households with normal households

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Introduction: Fruits and vegetable are a major component of a healthy diet and adequate daily intake can help prevent chronic disease such as obesity. It is recommended to eat daily a minimum of 5 (which is equivalent to approximately 400 grams) to 10 servings of fruit and vegetable. The purpose of the present study was to compare consumption pattern of fruit and vegetable and fat intake in overweight and obese households with normal households.

Methods: We used data of national comprehensive study on household food consumption pattern and nutritional status Iran (2001-2003). Dietary pattern of 7158 households chosen by a systematic stratified sampling design was assessed that 3301 households had overweight and obese subjects and 3857 households had normal subjects. Data on food consumption were collected by a combination of weighing and recall method for three consecutive days. Mean weighted average intakes were calculated. Obesity and overweight were defined as BMI>27.

Results: Mean daily per capita consumption of fruit and vegetable in normal households were131.6 and 217.6 g and in obese households were 153 and 242 g, respectively. Mean daily total energy intakes in normal and obese households were 2615 and 2660 Kilocalories. The contribution of fat to total energy intake in normal and obese households was 24.3% and 24.7%, respectively.

Conclusion: Consumption of fruit and vegetable in obese households is higher than normal households but their total energy intake and portion of fat intake is almost equivalent. So we should develop more effective interventions for increasing fruit and vegetable consumption and simultaneously decreasing fat intake which may help to avoid weight gain.

Fruit and vegetable intake amongst fitness clients in different stages of fitness behaviour

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Objectives: Some health behaviours and health behaviour changes seem to be related. It was the aim of our study to evaluate the willingness to change eating habits in subjects in different fitness behaviour stages (action- versus habituation phase). We focussed on fruit and vegetable intake since they are important components of a healthy nutrition.
Methods: In 8 fitness clubs 201 subjects were contacted (107 females and 94 males), ranging from 16 to 63 years of age. All of them completed a questionnaire concerning their intention towards behavioural changes for nutrition, fitness behaviour, and a food frequency questionnaire concerning fruit and vegetable intake.
Results: Of the female subjects 44% were in the action phase of fitness behaviour compared to 33% for the male subjects. The rest of the female and male subjects were in the habituation phase. Concerning nutritional habit changes 57% of the females were in the precontemplation phase, 17% in the contemplation phase and 26% in the action and/or habituation phase. For the males these percentages were respectively 64%; 18% and 18%. More subjects in the fitness action phase considered changes in nutritional behaviour compared to those in the habituation phase. Having healthy eating habits was the reason for not considering changes in such behaviour for 35% of the females and 32% of the males. Fruit intake reached the recommendations of 250 g/day for 40% of the females (mean intake 211 ± 173g) and 43% of the males (mean intake 248 ± 244 g). Only 8% of the females (mean intake 138 ± 108g) and 5% of the males (mean intake 121 ± 80g) reached the recommended vegetable intake of 300g/day. When comparing fruit and vegetable intake in contemplators and subjects in the action phase with precontemplators no differences were found for the fruit and vegetable intake. Fruit and vegetable intake differed significantly when comparing the self reported healthy eaters with the rest of the group: respectively for fruit 258 ± 219 g versus 178 ± 232g ($p = .003$) and for vegetables 145 ± 109g versus 91 ± 82 g ($p = .013$).
Conclusion: More subjects in the fitness action phase show willingness to change their eating habits compared to subjects in the habituation phase. No differences were found for fruit and vegetable consumption between subjects changing or not their eating habits. Hence, we may assume that other components of the intake were changed.

P15

Fruit and vegetable intake in adolescent sprint athletes

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Introduction: The contribution of fruit and vegetables in a qualitative and quantitative balanced diet for health and performance is well documented. The aim of the present experiment was to estimate fruit and vegetable intake and their respective contribution to several macro- and micronutrients in adolescent sprint athletes.
Subjects and methods: Twenty-three sprint athletes (11 boys aged 15.1 ± 1.4 yrs and 12 girls aged 14.1 ± 1.5 yrs) volunteered. During 7 consecutive days they completed a food diary and activity questionnaire. The BECEL program Bins3.0 was used for analysis of all food diaries. Energy expenditure was estimated using the metabolic constants of seven different activity levels.
Results: In spite of a mean fruit intake of 333 ± 237 g/day, only 14 out of 23 subjects reached the RDI of 250 g/day. Mean vegetable consumption of 150 ± 90g/day was beneath the RDI of 300g/day ($p < .05$) with only 1 subject reaching the RDI. Fruit and vegetables contributed for 13.4 ± 8.9% of total fluid intake (2185.6 ± 486.5 ml) which was lower ($p < .01$) than the recommended intake (2944,3 ± 307,9 ml). Total energy intake covered total energy expenditure (2483.2 ± 392.3 vs. 2520.9 ± 207.5 kcal/day).
For all subjects, total intake of fibre and Ca was too low, only for girls Fe intake did not reach RDI with values respectively 50, 22 and 34% beneath the RDI.
Conclusion: Although mean fruit intake was acceptable, several subjects did not reach the RDI. Only one subject reached the RDI for vegetables. These results advocate for an individual nutritional advice. Since the water content of fruit and vegetables is high and they are equally rich in minerals and vitamins, an augmentation of fruit and vegetable intake may result in a better nutritional status and water balance.

Beneficial effects of mixture flax and pumpkin seeds on lipid parameters and lipid peroxidation in rats fed high-cholesterol diet

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Objectives: The potential health benefits of various dietary seeds and oils in relation to cardiovascular diseases and cancer are currently receiving considerable attention. This study investigated the effects of diet enriched with mixture seeds (flax and pumpkin), on plasma and liver total lipids, plasma lipid parameters and lipid peroxidation in rats.
Methodology: Thirty male Wistar rats (SIPHAT, Tunisia) were fed, *ad-libitum* for four weeks. They were divided into three groups of ten animals each: The first one the control group (CD) consumed standard diet, the second one high-cholesterol group (1% cholesterol) (CD-chol) and the third group fed with high-cholesterol diet supplemented (33% w/w) with mixture of flax and pumpkin seeds at a ratio 5/1 of omega 6/omega 3 fatty acids (MS-chol). At the end of the feeding period, the rats were sacrificed after anaesthesia, blood and liver samples were analyzed for total lipids, plasma triglycerides (TG), total and HDL-Cholesterol (TC and HDL-C), and malondialdehyde (MDA).
Results: In hypercholesterolemic group, we have observed a significant increase in total plasma and liver lipids by +65 % and +41% respectively compared to those of control group, whereas the supplementation of seeds' mixture to diet induced a decrease in total plasma and liver lipids of (MS-chol) group by -12% and -15% respectively compared to (CD-chol) group. The plasma total cholesterol and triglyceride levels were significantly higher (+55% and +57%) in (CD-chol) group than those of controls, whereas we have observed a significant decrease in plasma total cholesterol and triglyceride levels by (-7% and -39 %) in (MS-chol) group compared to (CD-chol).
Evaluated lipid peroxidation by MDA considered as an indicator of tissue oxidative stress showed a significant increase in plasma and liver levels by 80% and 51% respectively in (CD-chol) group compared to (CD); Mixture seeds have provoked a significant decrease in plasma and liver levels by -27% and -25% respectively compared to controls.
Conclusion: Feeding diet supplemented with mixture of flax and pumpkin seeds rich on PUFAs improve plasma and liver lipid profile and lipid peroxidation.

Key words: Flax, Pumpkin, Lipid profile, Lipid peroxidation

P17

Influencing fruit and vegetable purchasing decisions

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Promoting fruit and vegetable (F&V) consumption is a key goal of cancer organisations around the world. F&V may be directly protective against cancer and are essential for a healthy weight, with obesity being a convincing risk factor for a range of cancers. The Cancer Council underwent a rigorous planning process to develop an intervention program for promoting F&V consumption. The behaviour to be influenced as part of the program is the purchase of F&V.

Four focus groups were held in regional Australia with parents who have responsibility for family shopping. Barriers to F&V purchasing and participant reaction to intervention strategies were explored.

Many factors influence parents' decisions about what foods to buy. Convenience is often the most critical, with parents keen to choose meals and snacks that are easy and quick to prepare. Other factors identified in the research were habit, budget, and children's preferences. Few participants mentioned nutrition as a factor which influences their food purchasing decisions.

To bring about the behaviour change of increased purchase of F&V, it will be important to create motivation to purchase more F&V, minimize the impact of other obstacles which stand in the way of F&V consumption, and also impart practical skills. Strategies, such as signage and brochures on the health benefits of F&V consumption, will be more effective at increasing awareness of the importance of consuming F&V to a broad audience. Strategies which are most likely to overcome key barriers, such as inconvenience of preparing F&V, and children's resistance, are signage and brochures containing practical tips, recipe leaflets, and cooking classes. The strategies which are most likely to build cooking skills, and developing budgeting and shopping skills, are cooking classes, recipe leaflets and supermarket tours.

The results of the focus groups, as well other research, will be developed into an implementation plan for the intervention program.

Manitoba School Nutrition Policy Intervention

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With the goal of improving access to nutritious food choices in schools, the Manitoba provincial government requires that all publicly funded schools develop and implement a written school nutrition policy beginning in the 2007-08 school year. To assist schools in doing this, and following a consultation process to identify opportunities and challenges, government developed a School Nutrition Handbook which includes Guidelines for Foods available in K-12 Schools – based on a serve more often / serve less often system, sample policy statements, a guide to the school nutrition policy development process and other tips and tools. A food in schools website has also been created to provide more detailed information such as fact sheets, food ideas for special events, and as a forum for schools to exchange success stories. Further support is offered through a toll-free school nutrition phone line and workshops for educators and dieticians. To enhance student involvement, a Student Leadership Award scheme: 'Taking Action for Healthy Food in Schools', was designed to encourage youth to take leadership action on promoting healthy eating in schools and improving school food environments. To date, nineteen schools have received awards and have undertaken a variety of food and nutrition related projects. Options for a school fruit and vegetable program are now under consideration. While it is too early yet to assess the initiative, program evaluation tools include an annual school report on policy implementation, and a baseline survey of school nutrition practices and food environment that was conducted in May 2006 and that will be repeated following the policy intervention to gauge changes at a policy and school environment level.

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Differences at acceptance of sweet potatoes dumplings and cakes among different weight categories of pre-school children

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Obesity is connected with a large scale of serious medical conditions including premature death, type 2 diabetes, hearth diseases, stroke, sleep apnoea, osteoarthritis, gallbladder diseases, asthma, cancer, and depression. It is important to start prevention measures at the earliest age because the obesity in earliest childhood and adolescence is the strongest predictor for obesity later in life. Intake of fruits and vegetables among children is lower than among adults. Therefore, the aim of this study was to explore the acceptance of new food in pre-school children: sweet potatoes dumplings and cakes. This root vegetable can be classified as an antioxidant, anti-inflammatory and anti-diabetic food. The facial hedonic 7-point scale was used to determine the acceptance level for this new food. In this study 158 pre-school children had participated (75 girls and 83 boys, 2–6 yr). The mean hedonic score for all children was 5.49 and 3.02 for dumplings and cakes, respectively ($p<0.001$). Although hedonic score for dumplings acceptance (5.41, 5.55 and 5.77 for healthy weight, at risk of overweight and overweight, respectively) nor for cake acceptance (3.20, 2.77 and 2.46 for healthy weight, at risk of overweight and overweight, respectively) did not have any statistically significant difference, for cakes was found certain negative trend between acceptability and BMI of children. This study did not affirm the hypothesis that the overweight children have better acceptance for new food such as sweet potatoes dumplings and cakes.

Fruit and vegetable intake in relation to BMI of adults in rural areas of capital city (Tehran)

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Introduction: Obesity is one of the major health problems of the present century and different dietary patterns have been studied to prevent obesity. This survey conducted to evaluate fruit and vegetable intake of rural population of Tehran in relation to their weight.
Methods: 278 subjects (80 men and 198 women) aged 19-75 years were studied. Data on fruit and vegetable intake were assessed using a 24 hour food recall. Weight and height were measured by standard methods. BMI was calculated and subjects were divided into four groups; underweight (BMI<19), normal (19>BMI<25), overweight (25>BMI<30) and obese (BMI<30).
Results: Based on BMI, 7% were underweight, 40% normal, 32% overweight and 21% obese. Total mean ± SD of fruit and vegetable intake was 412.74±369.5 g daily. A significant positive pearson correlation was observed between weight and vegetable intake ($r=0.124$, $p<0.05$). Mean daily fruit and vegetable intake in g underweight group, g normal weight group, g overweight group and g obese groups were 259.7±217.5, 416.6±337.6, 452.6±419.7, and 399.3±382.1gr respectively. Fruit and vegetable intake showed no significant difference in four groups.
Conclusion: Fruit and vegetable intake in obese and overweight subjects were similar to the normal group which is less than five a day. It seems that the contribution of fruit and vegetable to total weight of food basket in obese and overweight subjects is lower than the normal group.

P21

Dietary nutrient intakes and skin ageing appearance among middle-aged American women

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Background: Different nutritional factors have been found to play a relevant role in the normal functioning of the skin. However, little is known about the effects of the diet on skin ageing appearance.
Objectives: Our objective is to calculate the potential effects that diet has on skin ageing appearance in middle aged women.
Methods: Using data from the First National Health and Nutrition Examination Survey (NHANES I), associations between nutrient intakes and signs of skin ageing were examined in 4025 women aged 40-74 years. Nutrients were estimated from a 24-hr recall. A clinical examination of the skin was carried out by trained dermatologists to determine three independent conditions of skin ageing: a wrinkled appearance, senile dryness and skin atrophy.
Results: Women with a wrinkled appearance and senile dryness had significantly lower vitamin C intakes and women with senile dryness and skin atrophy had significantly lower linoleic acid intakes. An increase of vitamin C intake was associated with a significantly lower likelihood of having a wrinkled appearance (OR 0.76, 95% CI 0.64-0.91) and senile dryness (OR 0.84, 95% CI 0.71-0.98). Furthermore, an increase of linoleic acid intake was associated with a significantly lower likelihood of having senile dryness (OR 0.51, 95% CI 0.36-0.72) and skin atrophy (OR 0.48, 95% CI 0.29-0.81). These effects were independent of age, race, education, history of sunlight exposure, total family income, menopausal status, BMI, supplement use, and levels of daily physical activity and total energy intake.
Conclusion: There might be a beneficial role for diets higher in vitamin C and linoleic acid on skin ageing appearance. Since the main dietary sources of these nutrients are fruit, vegetables and nuts, the current dietary recommendations may have benefits for skin appearance in addition to other health outcomes.

Income inequalities and their effect on the distribution of fruit and vegetable consumption in Poland

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The results of the country wide, representative household budget surveys carried out in 2004 showed that 20% of the households with the highest incomes concentrated 42% of total income of all households represented in the surveys while the share of those with the lowest incomes amounted to only 6%. In view of the positive relationship between the income level and the fruit and vegetable consumption the subject of the study was to examine its distribution with regard to the percentage shares of the quintile groups in the total amounts of these food products consumed by the entire household sample.

It was showed that the 20% of the households with the highest incomes consumed 32% of the total household fruit consumption while 20% of the households with the lowest incomes were able to consume only 11%. These inequalities varied depending on the fruit types and were the most drastic in the case of the imported citrus fruits: 37% of total consumption vs. 8%. Inequalities were less evident in the distribution of the apple consumption, where the relative shares of the highest and the lowest quintile amounted to 25% and 15%, respectively.

Income level affected vegetable consumption also but the positive relationship between these variables was weaker in comparison to fruits. Thus, inequalities in the quantities consumed and in the consumption distribution were less pronounced. It was showed that 20% of the households representing the highest quintile consumed 25% of the total vegetable quantity while those representing the lowest quintile- 15%. That reflected relatively weak effect of the income on the consumption of such vegetable types as beets, cabbages, carrots and onions, and a stronger one with regard to tomatoes. Due to it, the shares of the opposite quintiles in the total tomato consumption were 30% and 13%, respectively.

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A two-dimensional system to characterise the nutritional quality of individual foods

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Objective: Each individual food contributes to the overall quality of the diet. Nutrient profiling is aimed at categorizing foods according to their nutritional quality and their contribution to a healthy diet. Most existing systems are based on i) the healthy aspects of foods only; ii) the unhealthy aspects only; or iii) a composite index of both. We propose a two-dimensional system providing quantitative information on both aspects.
Methods: The "healthy" indicator is the nutrient density score (NDS), i.e. a mean percent nutrient adequacy per 100 kcal of food. A 15 nutrients-score was selected, because of a better accuracy than a 5 nutrient score and easier implementation from nutritional databases than a 23 nutrient score. The "unhealthy" quality indicator is the restricted nutrient score (RNS), calculated as the mean percent of maximal recommended values for added sugar, saturated fats and sodium per 100g. The scoring system was applied to 619 foods from a French food composition database.
Results: An individual food with a very high content in few nutrients scored as well as a food with an intermediate content in most nutrients. The system favoured energy-dilute nutrient-dense foods, such as sea-food, fruit and vegetables, but was not adapted for foods such as soft drinks and added fats. A graphic representation, using threshold values for NDS and RNS, was developed to show the distribution of foods within 4 categories (high NDS-low RNS, high NDS-high RNS, low NDS-high RNS, low NDS-low RNS). Specific recommendations could be proposed for each of those categories.
Conclusions: The proposed system should be used for non-enriched foods only. It seems to take into account the well-known complementation between different foods to satisfy nutritional requirements. Its ability to discriminate foods according to their contribution to nutrient adequacy of diets is currently under evaluation.

Nutrient-dense foods of vegetable origin are needed to improve the nutritional quality of food aid in France

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Objective: There is a high prevalence of obesity, hypertension and nutrient deficiencies among food aid recipients in France and their diets are virtually devoid of fruits and vegetables. The objective of the present study was to assess the nutritional quality of food bank delivered food aid, in France and to identify practical modifications to improve it.
Methods: The nutrient content of food aid distributed by French food banks in 2004 was estimated and it was compared with French nutritional recommendations for adults. Starting with the actual donation and allowing acceptable new foods into the food aid donation, linear programming was used to identify the minimum number of changes required, in the actual donation, to achieve the recommendations.
Results: Food bank delivered food aid did not achieve the recommendations for fibre, ascorbic acid, vitamin D, folate, magnesium, omega-3 fatty acids and % energy from saturated fatty acids. Linear programming analysis showed that these recommendations were achievable if more fruits, vegetables, legumes and fish were collected and less cheese, refined cereals and foods rich in fat, sugar and/or salt. In addition, new foods were needed particularly nuts, wholemeal bread and rapeseed oil. These changes increased the edible weight (42%) and economic value (55%) of the food aid donation, with 33% of its edible weight coming from fruits and vegetables, 33% from staples (of which > 50% were unrefined staples), 25% from dairy products (of which < 10% were cheese) and approximately 10% from meat/fish/eggs (of which > 25% were fish).
Conclusion: We convinced the French Food Banks to adopt these percentages as actual recommendations within their network. However, their implementation will require important changes in the types and amounts of food collected.

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More foods of vegetable origin and less foods of animal origin are needed to obtain a nutritionally adequate diet at a minimal cost

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Objective: To identify food selection changes required, in low cost diets, to increase levels of dietary quality and palatability.
Methods: Linear programming was used to select 21 isocaloric diets of lowest cost (minimised), for each gender, which differed in the nutritional (3 sets) and palatability (7 sets) constraints used. Nutritional constraints ensured achievement of macronutrient recommendations (1st set), macro- and micronutrient estimated average requirement levels (2nd set) or macro- and micronutrient recommended dietary allowance levels (3rd set). Increasingly stringent levels of diet palatability were achieved via sets of constraints on specified food groups, sub-groups or families. The models' food list (n=619 foods) and palatability constraint levels were defined using dietary data collected in the latest French national food consumption survey (INCA 1; n=562 men; n=696 women). Diet costs were based on mean retail food prices.
Results: 1.The cost (minimized) of modelled diets increased from 1.30 €/d and 0.45 €/d (at the lowest nutritional quality and palatability constraint levels) to 3.37 €/d and 3.04 €/d (at the highest nutritional quality and palatability constraint levels) for men and women, respectively. 2. Both the number of foods selected and their total weights increased as the levels of nutritional quality, in the modelled diets, increased. 3. Modelled diets with the highest nutritional quality and palatability contained more energy from staples, fruit and vegetables and less energy from meat/fish/eggs, dairy products and sweets and salted snacks than was observed in the mean French diet.
Conclusions: 1) Both food habits and nutritional quality affect diet cost, 2) For low cost diets, good nutritional quality is associated with low energy density and high levels of food diversity, 3) For men or women on low food budgets, more foods of vegetable origin and less foods of animal origin are needed to achieve a nutritionally adequate diet.

Working in public private partnerships to create sustainable environmental change - a review of evidence from five-a-day school fruit projects

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An increased intake of fruit and vegetables among young people is called for in many nutrition policies and strategies across Europe and especially the school is a preferred setting for the promotion of an increased intake. Where as such strategies traditionally rely mostly on public agencies, modern public health nutrition strategies seems to be heavily influenced by modern governing principles in which public private partnerships plays a central role. In such partnerships also NGO's and the market are involved in decision making processes as well as in carrying out practical policy measures. Evidence on the impact of such programmes on the health behaviour of individuals are quite strong but in contrast papers dealing with the process evaluation and formative aspects of the development and maintenance of partnership approaches to school fruit programmes are scarce. Although partnerships as a generic approach to promotion of healthy eating has been strongly advocated for in policy papers little is known about which types of partnerships are effective and which are not. The aim of this paper is to review the evidence of the effectiveness and process requirements of working in public private partnerships in five-a-day school fruit projects. It is based on desk review of literature on 5 a day school fruit partnership working as well as on a soft system methodology based interview with key stakeholders in American and European school fruit programs. The paper concludes that following process requirements are essential: documentation and consensus among stakeholders, understanding political decision-making and the use of different kinds of evidence, the development of a simple and clear idea, a common understanding of goals as well as possible barriers and possibilities, organizational readiness among partners, fair ownership management, availability of resources, leadership and know-how, comprehensive evaluation of process and outcome and acceptance of conflicts of interests.

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Fruit and vegetables consumption in the context of the Spanish Mediterranean Diet: trends during the past two decades

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Objectives: The objective of this study is to describe the specific contribution of Fruit and Vegetables (F+V) to the MD adherence, and to analyse F+V consumption trends in Spain during the past two decades.
Methodology: Food availability trends data was obtained from household food consumption surveys conducted by the Spanish Ministry of Agriculture, Fisheries and Food. The sample consisted of 2.500 households in 1987 and increased to 6.200 in 2005. A variation of the Mediterranean Adequacy Index (MAI), a quotient resulting from dividing the calories provided by Mediterranean foods by the calories provided by non-Mediterranean food items, was used to measure the MD pattern adherence. In order to measure the specific contribution of F+V to the index, an adapted MAI without fruits and vegetables was also applied. The significance of the analysed trends was evaluated using regression models.
Results: A significant decrease in the MAI from 1987 until the end of the 1990s was observed, and appears to have stabilised from then on. When analysing the household availability of fruits and vegetables together (in g/person/day), and of fruits and vegetables separately, the trend remains somewhat similar: there is a significant decrease in consumption from 1987 until the late 90s, and significantly recovering from subsequently. Fruit-and-vegetable-specific MAI (the difference between applying MAI with or without F+V) followed a similar pattern during this time period. Fruit consumption and fruit-specific MAI trends were more prominent when compared to the vegetable trend. Separate fruit-and-vegetable-specific weights on the index remained stable during the studied period. However, there was a significant increase in the F+V specific weight (relative difference, %) on the index during the past two decades.
Conclusion: Even though there is a significant increase of 4.3% along the period in the specific F+V contribution to Mediterranean products consumption, community measures aimed at preserving the best of the traditional Spanish dietary pattern are needed.

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Gender differences in response to treatment of obesity in adolescents

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Introduction: A prospective descriptive cohort study was designed in order to study gender differences in obese adolescents in response to the same residential multicomponent treatment. Based on 1600 kcal daily diet, an according to Belgian recommendations, a daily intake of fruit (250g) and vegetables (300g) is offered. Practise and study shows us that this is the most difficult part of the therapy.
Population: Twenty boys (15.3 yrs±1.4; BMI 34.4 kg/m²±5) and 19 girls (15.2yrs±1.4; BMI 34.7 kg/m²±4.4), starting residential treatment of obesity in September 2003 entered the study. Both groups were comparable regarding age, Tanner stage of puberty, BMI of parents, and adjusted BMI at start of treatment. One girl and 5 boys left residential treatment after 6 months, because of normalising their BMI.
Method: Weight and height were recorded at start, 3, 6 and 9 months. Body composition (fat-mass and fat-free-mass) was determined using bioelectrical impedance analysis. Dietary intake over a 4-week period was calculated thrice from food diaries and menus. Nature and duration of physical activities were noted.
Results: Boys lost significantly more weight than girls during all phases of treatment. Boys versus girls lost a comparable amount of fat mass (-13kg), but significantly more fat-free mass (-13kg versus -3kg). Energy intake was higher in boys (1425Kcal/d versus 1273Kcal/d), but energy intake/theoretic needs was higher in girls (55% versus 60%). Duration of physical activities was comparable, but boys spent more time on activities of high intensity.
Conclusion: Despite comparable dietary intake and physical activity, boys lost more weight than girls. Boys lost comparable amounts of fat mass compared to girls, but girls conserved fat-free mass better. Ongoing study should show us in the future the absence of fruit and vegetables in the diet of extreme obese adolescents.

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A community intervention to improve eating habits in children

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Aim: To improve the eating habits of the primary school children in Brindisi, a town in southern Italy, where the excess weight rate in 8-9 year old children is 38%.
Methodology:
First part. In April 2005, 4500 pamphlets were distributed in all public primary schools in town. The pamphlet was divided in 3 parts: 1) a short story of a thin child (Maz) and a fat one (Oby), 2) a short questionnaire on the eating habits and leisure activities of the child, and 3) a blank story with Oby and Maz to be written by the children. 1659 children returned the filled questionnaires.
Results: 90% of children reported eating breakfast at home. School snacks consisted mostly of foods rich in fat, salt, or sugar; 80% of leisure activities were sedentary.
Second part. From September 2005 to April 2006 meetings with parents, children and teachers were held to show the results and to discuss eating habits and leisure activities of the children stressing the need to improve their life style.
Results: Vegetables and legumes were the most disliked foods. 600 children and their parents decided to write a recipe book on their less preferred foods. Mothers and children worked together creating, writing and designing recipes for disliked foods. The new recipes had funny names and looks, and used positive cooking techniques replacing the less adequate ones. Mothers reported that the project was effective in promoting the consumption of previously disliked foods. A committee of mothers, teachers, and experts selected some recipes based on originality and difficulty of preparation. The book was published and distributed to all the primary schools in Brindisi.
Conclusions: The approach of actively involving children, parents, and teachers seems to give positive results as evidenced by the consumption of previously disliked foods. The results are difficult to be objectively judged since a universal approach was used, but the high number of subjects reached and the high rate of active participation give stimulus to continue in this direction.

School snack: how to increase fruit intake among primary school children

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Background: In the Italian primary school system children consume a snack brought from home during a midmorning break. Previous research has shown that the most represented snacks consisted in foods rich in fat, salt and/or sugar with high calorie content.
Aim: To increase the use of healthful foods as school snack among this age group.
Methodology: 2 groups of children (age range 6-11 years) attending 2 public primary schools in two different towns of the Region of Puglia.
Intervention group: 351 children, control group: 615 children.
Class teachers reported children's school snacks in October 2006 and in January 2007. Intervention group: planning and implementation of a weekly snack menu: 2 days fruit, 1 day yoghurt, 2 days bread or similar products, 1 day free choice. Children were allowed to choose one food of the day group. No education or information was given to children, their families, or teachers. Control group no intervention at all.
Statistical analysis: t-test, χ^2 test.
Results:

	Intervention Group		Control Group	
	Initial %	Final %	Initial %	Final %
Junk food	72.2	44.1	66	58
Bread and vegetables	6.1	8.3	3	4
Bread similar products	13.6	39.9	27.2	34
Yoghurt	1.7	3.5	1.3	1.3
Fruit	0.3	4.2	2.3	2.3

No difference between the two groups before the intervention; after 4 months of weekly menu the rate of children consuming healthful snacks was significantly higher in the intervention group ($p<0.0001$).
Discussion: A very simple approach such as a planned weekly menu including fruit two days a week is an efficient tool to increase the number of children who spontaneously brought fruit as snack during the free day. Such results confirm the nutritional education rule that a more frequent contact and consumption increases the preference for a specific food and thus its choice by the subject. A planned weekly menu is a useful, costless tool to positively modify children's school snack and can be implemented as a reinforcement tool after other more active interventions.

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The taste shop: how to sell new flavors to children

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Aim: To encourage primary school children to eat fruit as school snack.
Methodology: Four third year primary school classes. Two classes, 48 children, as intervention group, two classes, 44 children, as control group.
The teachers of four classes reported the snacks brought by the children the week before, one month, one and two years after the intervention.
Intervention: During a two hours taste shop, children meet 4 different kinds of fruit. Using the five senses, the children describe the texture, smell, sound, shape, and flavour of each fruit introduced. At the end they rate their fruit preference.
Statistical analysis: t-test, t-paired test.
Results: Before the intervention none of the children brought fruit to school for a snack.
Intervention group: After one month almost 21% of children (p=0.0001) consumed fruit; after one and two years respectively 12.5% (p=0.013), and 10.4% (p=0.024) of children still had fruit-snacks two- three times a week.
Control group: no variation after one month and one year; only at the two years report two children out of 42 brought fruit twice a week (p=ns). The two groups showed a significant difference at one month (p=0.0001), and at one year (p=0.012), but not at two year follow-up.
Conclusions: The taste shop can be considered a useful tool to encourage children between the ages of 8 and 10 to increase their fruit intake and change their habits, accustomed to fatty, sugared or salty foods.
The taste shop is a nutritional socio-educational instrument through which children learn how to use their five senses to gain personal knowledge and appreciation of specific foods, eliminating negative values coming from economical, advertising, familiar, and social factors.
The absence of statistical difference between the two groups at the year follow-up highlights that nutrition education interventions cannot be of short duration and need the followed up of reinforcing tools to maintain the positive behavior over time.

Macronutrient and micronutrient indicators for fruit and vegetable intake in matched groups of vegetarians versus non-vegetarians

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Introduction: It is well accepted that a vegetarian diet can have several health advantages. A well planned and qualitative vegetarian diet implies the consumption of considerable amounts of fruits and vegetables. However, health advantages may partly be explained by other health related behaviours. It was the aim of the present study to compare the macro- and micronutrient indicators for fruit and vegetable intake in vegetarians versus non-vegetarians.
Subjects and methods: Hundred and six vegetarians (V) were compared with 106 non-vegetarians (NV). V&NV were properly matched for the following characteristics: gender, age, BMI, physical activity, smoking behaviour and alcohol consumption. The BECEL program was used for analysis of all 3-day food diaries. The following nutrients originate mainly from vegetable sources: carbohydrate, fibre, ß-carotene, vitamin C and folic acid while fat, cholesterol and vitamin A were mainly from animal sources.
Results: Macronutrient intake (E%) significantly ($p<.05$) differed when comparing V&NV, with intakes closer to the recommendations for the V: fat (V:29±7E%, NV:34±7E%; ref:15-30E%), cholesterol (V:122±90mg/d, NV:222±101mg/d; ref:<300mg/d), protein (V:13±2E%, NV:16±5E%; ref:10-15E%), carbohydrate (V:55±8E%, NV:47±8E%; ref:55-75E%) and fibre (V:33±13g/d, NV:18±7g/d; ref:33g/d). Moreover, V had higher calcium, zinc, iron and a lower sodium intake compared to NV. The ß-carotene (V: 3034±2334µg/d, NV: 520±650µg/d) intake was higher in the V while the vitamin A intake (V: 850±430µg/d, NV: 3330±8440µg/d; ref: 600µg/d) was higher in NV. The folic acid (plant origin) intake was much higher in the vegetarian group, whereas the vitamin C intake (V: 110±98mg/d, NV: 99±84mg/d; ref: 70mg/d) was comparable.
Conclusion: The nutrient analyses indicate higher fruit and vegetable intake in the V compared to the NV. The comparable vitamin C intake indicates equally a high fruit intake in the NV. The latter finding may be an indication that the reference group was also health conscious.

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Food consumption frequency and BMI of children

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Obesity and also childhood obesity is getting to be a more prevailing disease all over the world. This study was performed to find out any relation in between food consumption frequency and BMI, of 11-14 yrs old children in Sivas (Turkey) province. Height and weight of 2701 children were measured and their food consumption behaviour was inquired through face to face interviewing. BMI values higher than 85 percentile were accepted as overweight and those <3 percentile as underweight. Meat, fish, chicken, milk, yogurt, cheese, egg, fruit, vegetable, bread, rice, lentil, pastry, chocolate, toast, potato, sugar, jam, tea, beverages, nut consumption patterns were compared by the BMI classification of the children. At the end, no relationship was found in between BMI and food consumption frequency except the beverages and yogurt consumption pattern.

Key words: food consumption frequency, childhood, obesity, BMI

A procedure to measure 'liking' and 'wanting' for fruit and vegetables

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We have developed a methodological platform (Finlayson et al, 2007) that can be used to evaluate preferences for fruits and vegetables compared with preferences for other food categories. The procedure can be used to assess baseline preferences and to monitor changes in preferences over time. The procedure makes use of a package of photographic stimuli comprising fruits, vegetables and less healthy options in the savoury and sweet snack categories, and can also be adapted to include different food items of interest and importance. The examination of preference towards the target stimuli is configured using software that will allow testing to be carried out using a PC and is also appropriate for smaller-screen, portable systems such as palm-tops or PDAs for use in the field. The experimental presentation of foods is programmed automatically, with on-line data capture and storage. The procedure is part of a 'hedonic toolbox' and measures explicit (overt, conscious, declared) liking and wanting for fruits and vegetables using rating scales, and implicit (covert, underlying) wanting using a forced-choice procedure in which fruits and vegetables are compared against other snack food items. The procedure is largely non-verbal and can be used to assess preferences, liking and wanting across cultures and with children. The procedure has the capacity and flexibility to be able to collect data from small groups of carefully monitored subjects in laboratory conditions, and from large groups of subjects at a distance.

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Finlayson G, King N & Blundell J 2007. Is it possible to separate liking and wanting in humans? A novel experimental procedure. Physiol Behav, 90, 36-42.

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How can we increase fruit and vegetable consumption in Europe: what interventions are effective?

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Objectives: International recommendations advise increasing intakes of fruit and vegetables (FV) to help reduce the burden of chronic diseases worldwide. In the EU we estimated that the burden of ischaemic heart disease and stroke could be reduced by up to 17% and 10% respectively in the old EU-15 countries, and by 24% and 15% respectively in the EU-10 countries if FV intake increased [1]. But what projects or policies are effective at increasing consumption?
Methodology: We systematically reviewed evidence on the effectiveness of interventions and programmes promoting fruit and/or vegetable intake in adults and children worldwide[2,3].
Results: The results indicate that small increases in FV intake are possible in various population subgroups, and that these can be achieved by a variety of approaches (individual-level, population-level and "upstream" macro-level policy and environmental interventions). In school-aged children, no studies were detrimental and 78% of school based projects increased intake significantly. Certain intervention components are associated with successful results and the more students are exposed to fruits and/or vegetables (through various approaches) the more consumption patterns improve.
The review of 44 studies of interventions in adults found that none led to reduced FV intake in the target populations, and most led to increased intake compared with control groups. In the general population, increases ranged from about +0.1 to +1.4 servings/day. Behavioural, worksite, community and national interventions were assessed. Relatively greater effects were seen in those studies involving face-to-face counselling interventions, but there was no consistent change in intake related to the intensity of contact.
Conclusions: While many FV promotion programmes have been conducted or initiated worldwide, our review indicated that the study design used was often suboptimal to assess effectiveness, particularly in national and community projects. The observation that interventions employing a more personal approach appeared slightly more effective seems intuitive. However, this must be balanced against the higher cost and the greater resource demands that this approach would require. This does not seem to be a cost effective or feasible whole-population approach for the European Union compared with interventions in schools or other similar community settings.

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Increased fruit and vegetable consumption is associated with improved exercise-induced weight loss

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An increase in healthy food consumption combined with an increase in energy expenditure will certainly prevent a worsening of the current obesity epidemic. This aimed to determine how changes in fruit and vegetable consumption improved the efficacy of exercise to induce successful weight loss. 38 overweight and obese men and women (age; 38.7±10.3 yrs, BMI; 31.5±3.9) took part in a 12 week exercise intervention to expend 500kcal per exercise session, 5 times per week at 70% HR max. 24hr energy intake was measured at weeks 0 and 12 using *ad libitum* test meals in the research unit and 3 day food dairies for measuring intake under free-living conditions. Mean weight loss for the whole group was 3.7±3.6kg. However, there was large variability within the group of -14.7 to +1.7kg. Using individual exercise-induced energy expenditures, the group was divided into good (GR) and poor responders (PR) depending on participants' actual relative to their predicted weight loss. GR ate significantly more fruit and vegetables at week 12 compared to the poor responders in both the free-living situation and in the research unit test meals (4.2±1.4vs. 2.4±1.8 portions per day, t= 3.43, df = 36 p = 0.002). The PR did not significantly increase overall food intake (2295 ± 696 kcal at wk0 vs. 2408 ± 780 at wk12, t = 0.689, df = 19, p = 0.50). However, they significantly increased the proportion of energy intake from fat (31.3±5.6 vs. 35.1±7.4% fat, t = 3.02, df = 19, p = 0.007). These data suggest that improving the quality of nutrient intake via fruit and vegetable consumption contributes to improved exercise-induced weight loss.

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Differences in consumption of fruits and vegetables among normal and overweight participants estimated by 24-hours recall

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Dietary patterns abundant in fruits and vegetables are associated with reduced risk of chronic diseases, but their intake in most of the countries is usually insufficient. There is also evidence that substitution of high energy foods for fruits and vegetables can be very effective strategy for weight management. The aim of this study was to compare the total daily energy intake and fruits and vegetables consumption, for normal and overweight (BMI ≥ 25) participants. In this study 120 healthy volunteers had participated, age 19–54 yr (36 overweight; BMI 28.1 kg/m^2 and 84 normal weight participants; BMI 21.7 kg/m^2). Method of 24-hour recall was used to determine the dietary intake of total energy and fruits and vegetables consumption, and was repeated 10 times during one year. Both groups had almost the same average daily energy intake (2022.4 kcal/day and 1962.7 kcal/day for overweight and normal weight participants, respectively). The results for the mean daily consumption of fruits and vegetables (without potatoes), 409 g for overweight and 393 g for normal weight participants, are in agreement with recommendations. In comparison with normal weight participants, overweight had higher fruits consumption (210 g and 156 g, $p<0.05$). In conclusion, equal intake of energy and a higher fruits consumption of overweight than normal weight participants, can be justified with underreporting of consumption for some food groups, especially high energy foods, by one part of overweight participants.

Greek traditional tomato paste

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Introduction: Although tomato (*Lycopersicon esculentum*) was not systematically cultivated and consumed in Greece prior to the 20th century, it is nowadays considered as one of the most important elements of the Greek cuisine. A number of empirical methods have been developed in order to facilitate its usage in cookery also during the winter months, when fresh tomatoes were traditionally unavailable.
Objectives: During summer, the preparation of tomato paste was one of the most common practices to preserve the excess family tomato production. However, this does no longer apply for the contemporary Greek household, where the industrial analogues are offered in abundance and in a ready-to-use form. Even in rural and remote areas of Greece the traditional preparation of tomato paste is now rarely applied and is thus endangered to be totally abandoned. It is thus important to preserve our cultural inheritance and also to elucidate the role of individual traditional foods on the favourable health impact of the traditional Mediterranean diet.
Methodology: In the context of the systematic investigation of traditional foods we visited the village Filaki in the island of Crete, to study the traditional preparation procedure of tomato paste as still applied by local inhabitants. All technological aspects of the production were studied. The nutritional composition of the final product and the primary ingredients used was also determined via chemical analyses.
Results: Part of the nutritional composition of the traditional tomato paste is presented below. Although the overall preparation procedure was time consuming (8 days), the final product may be preserved out of the cold chain, despite that no thermal treatment was applied.

Food (100g)	Dietary fibre (g)	Vit. B6 (mg)	Niacin (mg)	Thiamin (mg)	Riboflavin (mg)
Traditional Tomato Paste	3.5	0.07	1.19	0.47	0.06

Conclusion: Given that tomato and its products are abundantly used in the cotemporary Greek cuisine, and in view of an increased demand for natural food products, the traditional preparation procedure of tomato paste may provide a prosperous developmental suggestion for the food industry. A pilot study on the potential industrialization of the traditional tomato paste is currently underway.

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Consumption of fruits, vegetables and legumes and health status of an adult population living in a low socio-economic area in Istanbul

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Purpose: This study is done to determine Body Mass Index (BMI), consumption of vegetables, fruits and legumes and prevalence of several diseases of the adults of low socio-economic areas
Material and method: The study area is Basıbuyuk, district of Maltepe which is one of the socio-economically undeveloped and immigration area and where we are conducting "The social development and the improvement of health" Project.
A questionnaire was applied by face to face interview technique to one member of each family, randomly selected from 4000 houses. A number of 342 men and 1367 women were interviewed. Dietary habits, including the frequency of vegetables, fruits and legume consumption of the members of the family was asked, as well as the prevalence of several diseases. We assessed the consumption of pastry (borek, macaroni rice-bulgur pilafs) and bread (~1-2 bread for each person in a day) to eat one's fill, according to the focus group interviews. The questionnaire included also height and weight (measured in a health institution within one month). BMI was calculated. In total, the data of 2106 men and 2332 women over 18 years old (total 4438 people) were obtained by these interviews.
Findings: The mean age of the participants were 37.26±11,8 years in female 41.2±11.92 years in male. In the study population, 17% of female and 44.1% of male were smokers Diagnosed hypertension was reported by 351 women (%15.1) and 134 men (%6.4), cardiac disease by 134 women (%5.8) and 94 men (%4.5), diabetes by 142 women (%6.1) and 80 men (%3.8). High total cholesterol level was reported by 5.8% of the women and 4.5% of male. Based on the BMI, 35,2% and 36,2% of the female and male population over 18 years were overweight, and 21,8% and 19,7% respectively were obese. When we evaluated dietary habits, the percentage of study participants that consume daily fruit and vegetables was only 44.9%; legumes was consumed only once in a week in 49.4% of the participants.
Results: In this population, where bread and pastry are the main food sources, the prevalence of overweight and obesity is very high, the consumption of vegetables and fruits is inadequate. The frequency of legume consumption is higher than that of meat. These results indicate that health improvement should include actions to modify dietary habits in this population.

Evaluation of a school-based intervention to promote fruit intake

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Objective: Tutti Frutti is an intervention aimed at increasing the consumption of fruit in young people by offering fruit on a weekly basis in their school environment. We want to assess the impact of this school-based project.
Methods: The study used a post-test design. 2761 primary and secondary school pupils, as well as 1867 parents of nursery and primary school pupils were questioned. Comparisons are made between (a) pupils participating in the program for 1 year, (b) pupils participating in the program ≥ 2 years and (c) pupils receiving no intervention.
Results: The intervention groups show a higher intention to eat fruit compared to the control group. Thus the pupils participating in the project are more likely to eat fruit than pupils of the control group.
Primary school pupils lack the ability to convert their intentions of fruit consumption into actual behaviour. Secondary school pupils do have the skills and aptitude to convert their intentions into behaviour.
Parents of the intervention groups report a more positive attitude towards fruit and fruit consumption than parents of the control group.
Conclusion: The intervention has a positive effect on the fruit consumption of pupils. Extra attention should be made to increase skills and handle obstacles concerning fruit consumption, especially in primary school pupils. So schools should be encouraged to use the corresponding educational materials that are especially developed for this initiative. The project also has a positive influence on the home environment.

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Role of Jerusalem artichoke as a lipid lowering dietary agent

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Jerusalem artichoke is a well known vegetable which has been a part of the French Cuisine used in delicious preparations for long time. Moreover the tubers of Jerusalem artichoke are useful as weight reducing diet in the fight against obesity because of its particularly low calorie value and its high content of dietary fibre, soluble (FructoOligoSaccharides FOSs and inulin) as well as insoluble (cellulose).

The tubers can be easily processed by dehydration and made available throughout the year independent from seasons. The water free product contains the same composition of soluble and insoluble carbohydrates as is present in the fresh tubers and can be applied in a broad range of meals in a reduction diet with a high prebiotic effect.

FOSs and inulin are not digested in the human intestine, only fermented in the colon and thus can be designated as soluble dietary fiber. The fermentation of FOSs and inulin in the colon causes additional effects like reduction of lipids and cholesterol as well as an enhanced availability of minerals (Ca, Mg…).

Physiological investigations on rats fed with Jerusalem artichoke powder substituting for a part of diet indicate significant reduction of glucose as well as cholesterol and triglyceride concentrations in blood serum. Weight (bodymass) of these rats decreased significantly compared to those of control group.

Additionally, inulin has been reported for increasing the bioavailability of Ca, Mg. In the present study inulin-fed rats compensated a 75% mineral deficiency observed in the control group rats. Along with that no bone porosity was observed and subsequently liability to fractures was reduced.

The high amount of dietary fibre as well as the heath promoting effect provides sufficient evidence for Jerusalem artichoke to have antiobesity attributes.

A way out of obesity through participatory action

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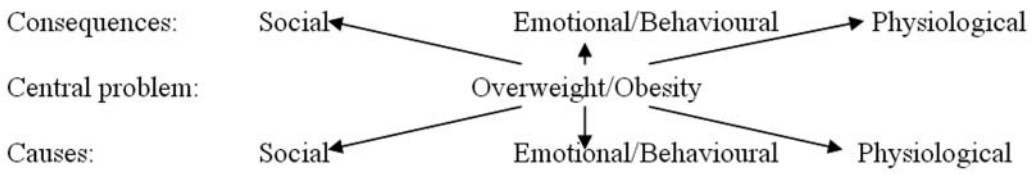
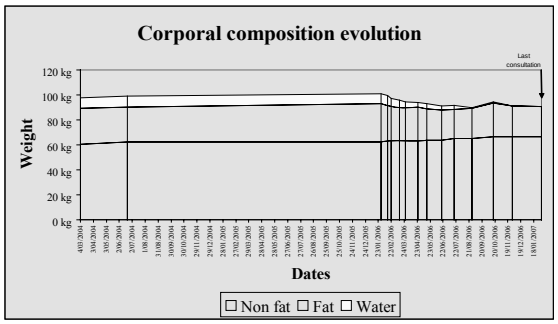
In a poor area of Mouscron, a CBO* manages to gather people who used to live with very little contact with others. Those persons frequently present serious chronicle overweight and obesity problems ("when I feel down, fruits and vegetables go off in my fridge"…).
Our intervention dealt with food habits and other health determinants. The group identified the overweight as central problem for further discussion and action. The objective of the workshops was, thus, with the patients themselves, to find a way out of the different so called 'vicious circles' maintaining them in obesity and its collateral damages.
We went through a process of thinking with the patients on causes and consequences of the overweight for them, explaining them the different steps of the 'problem tree', and giving them explanations on food habits as required. The problem tree ended as follow, in a very summarised way:



The patients understood, in this exercise, that the only way to solve their overweight / obesity problems and related diseases was to go down to the root causes of their obesity and bring a solution to these, in the three roots. They also identified by themselves a vicious circle in each 'sector': loneliness/isolation in the social side, depression in the emotional side and lack of physical activity in the physiological one. The way out of this vicious circle requires a solution to the problems deeper in the root causes.



Some patients made their way down to those root causes and have reached sustainable improvement in their health condition (significant diminution of their overweight); they are undergoing a psychological and medical work and manage to improve and sustain their food habits. Social interaction is under development.

This exercise shows that fighting obesity and overweight requires a wider view to the problems the patients face: what we call lifestyle diseases factors (above identified as 'root causes of obesity').

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Trends and specificities of fruit and vegetable consumption in Poland

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The aim of the study was to evaluate the changes in fruit and vegetable consumption in Poland (1996-2006) based on three sources of information: balance sheets, household budget surveys and questionnaires. Primary research was undertaken among selected two groups of consumers: women and school-children. Seasonal variations in fruit availability were also calculated and the determinants of consumer behaviour investigated.

The per capita supply of fruit in Poland is lowest in comparison to other EU countries, however shows a systematic growing trend. The observed increase is due to high supply of imported fruits, such as citrus and grapes. In the case of vegetables the supply is similar to EU-average level, but is characterised by poor diversification: onions, cabbage and carrots dominate in the diet.

The conducted primary studies showed that Polish consumers in general are not aware of nutritional recommendations regarding fruits and vegetables. The main determinants of food choice are: freshness, sensorial properties (taste, smell etc.) and price. Survey-based research showed that children do not have sufficient access to vegetable-based products and meals in schools. Women living in urban households declared that they purchase fruit mainly for their children. The consumption of fruit and vegetables in Poland is characterised by high seasonal fluctuations resulting from changes in price, supply level and habits. Seasonality of consumption has decreased in the last decade due to the development of foreign trade and changes in consumer preferences.

The studies proved the necessity to undertake activities aimed at increasing the consumption through education and promotion of fruit and vegetables, especially in the off-season months. Interventions could be focused on women and children, who know that these products are healthy, but are not aware of the fact, that they are eating them in too small quantities.

Adiponectin is positively regulated by vitamin E

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In several studies performed in human (Mayer-Davis *et al.* 2002; Manning *et al.* 2004) or in animal models (Laight *et al.* 1999), it has been reported a positive effect of vitamin E on insulin resistance. Because adiponectin is one the major actors involved in this physiopathological process, we evaluated the ability of vitamin E to regulate adiponectin expression, which could provide a molecular basis for the reported observations.

3T3-L1 differentiated cells have been treated with vitamin E within physiological concentration range. Mice were force fed for 4 days with gamma–tocopherol. Transient transfections of the human adiponectin promoter were performed in Cos-1 cells using JetPEI transfection mix. Gene expression has been evaluated by qPCR. Protein expression levels were quantified by ELISA.

Adiponectin mRNA levels were induced by vitamin E (both alpha and gamma-tocopherol) in 3T3-L1 cells. These effects were shown to be time-dependant. During transient tansfections in Cos-1 cells, both alpha and gamma vitamers were able to induce the luciferase gene reporter under control of human adiponectin promoter, confirming thus the transcriptional origin of this regulation. This effect seems to be PPARgamma-dependant since the transactivation of luciferase reporter required PPARgamma expression vector co-transfection. Finally this regulation was confirmed *in vivo*, where gamma-tocopherol force feeding for four days in mice resulted in an induction of adiponectin at mRNA and protein levels, supporting thus the physiological relevance of this regulation.

Vitamin E appears to be able to up-regulate adiponectin expression. This could be molecular basis for positive effect of this vitamin on insulin resistance, previously reported in several studies.

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Fruit and vegetable consumption, obesity and socio-economic environment in a country in food transition: The case of Algeria

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Objectives: Linking the consumer environment to fruit and vegetable intakes and obesity rates
Method: 4,818 households were surveyed in June 2005 (TAHINA project) out of which one adult per household (35-70 years) was randomly drawn. Body height and weight were measured and a 24-hour food list and a weekly food frequency questionnaire of 15 items were completed.
At the socio-economic level, a composite index composed of the population structure, sanitary conditions and ways of life was set up. This indicator of Sanitary and Social Development (IDSS) allowed a seven-category classification of region. Within each region, the environment is homogeneous.
Results: The vegetable consumption and fruit consumption frequency is below the recommended level (5 a day): it is respectively 0.83 and 0.53 per day globally, the highest frequency is in the South (1.20 and 0.85) and the lowest one in rural area (0.77 and 0.50).
The overall prevalence of overweight is 57.4% and of obesity 22.1%. Overweight is higher in the Tell Atlas than in the Plateau area and the South (respectively 59.3%, 55.9% and 47.4%).
The food consumption structure in the Tell Atlas is westernizing with higher intakes of manufactured food-product leading to obesity rates close to European ones. In the Southern region, food consumption remains traditional although fat-rich. Obesity rates increase in the Plateau area despite low food diversity. A mapping of these data is provided.
Crossing data on consumption frequency, obesity rates with the IDSS allows to observe an negative correlation between fruit and vegetable consumption and obesity rates. But it's essential to take into account the "confounding factors" such as ways of living and socio-economic aspects to explain this correlation.

Variation of the liver enzymatic activities during a hypercaloric diet

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Introduction: From its chronicity and the gravity of its complications, diabetes (D-2) is an extremely expensive and dramatic disease particularly for the Third World countries. The threat exerted D-2 on the heart is well known but we know more and more that it constitutes also a threat for the liver.
Aim: Through study of a Psammomys obesus (P.os) population, we show that serious abnormalities of the enzymologic activities of the liver are induced by a high calorie diet. The current observation shows that there is a direct interaction between the hepatic metabolism, and the glucose homeostasis. A study of the nutri-induced dysfunction of liver can be a good indicator in the study of the pathogenesis of intolerance to glucose in hepatic affections and in the diabetes itself.
Methods: In this contribution we have used 10 Wistars (*Rattus norvegicus*), 10 gerbils (Gerbillus gerbillus) and 69 P.os. The Wistars and gerbils were fed with laboratory chow pellets (hypercaloric diet; 10 g/day (equivalent to 32.5 cal/day and salty water, NaCl 0.9 %, *ad libitum*). The 69 P.os were divided into three groups: 24 controls were fed with the naturally occurring hypocaloric diet (based on halophiles, *Suaeda mollis,* plants (50 g/day which is equivalent to 20-22 cal/day), 38 treated animals were fed with a high-calorie diet, 32.5 cal/d and salty water (0.9%) *ad libitum* and 7 P.os received a hypocaloric diet, 10 cal/d. essentially made up of spinach. The experiment lasted 15 months. Nine experimental studies were carried out and the activity of 20 enzymes investigated.
Results: The healthy P.o group presents extremely weak activities of lipolytic enzymes. The natural deficiency in G6P worsens during the HCD by the increase in G6Pase which increases the rate of glucose in the blood. The phosphorylase and UDPG-synthetase, active in the obese P.os are absent in the diabetics. For the P.os in IDDM state we note a hyperactivity of lysosomal enzymes and growth of the alkaline phosphatase which indicates the presence of hepatocellular necrosis.
Conclusion: The liver of the P.os in HCD undergoes major pathological modifications. The enzymologic disturbances of the hepatocytes are similar to those observed in human D-2. This study reinforces the idea that the endocrine disorders may actually cause a lot of liver diseases and that there is a reciprocal link between liver diseases and diabetes. Our polygenic animal reproduces this correlation and seems to be an excellent model naturally adapted to research on the interactions between environment, diet, endocrine diseases and their pathological consequences.

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