

Over the years, researchers and public health authorities throughout the world have sought to identify food, nutritional or behavioural factors that are likely to play a role as either risk factors, or protective factors in the determinism of illness and health quality. Several studies developed on cellular, organ, healthy and unhealthy subject, or population models have been carried out during the last 30 years. If, in several cases, the existence of a link between “nutritional” exposure and certain illnesses cannot (for the moment) be asserted by the available arguments, in other cases, on the contrary, the convergence of arguments is such that a consensus can be reached.

The possible health benefits associated with a Mediterranean diet, based on epidemiological studies, were raised more than 15 years ago. Thus, in relation to cardio-vascular conditions, the famous Keys international study (1986) on 16 cohorts, throughout 7 countries, highlighted a lower cholesterol level and a lower cardio-vascular mortality rate in Mediterranean countries compared with countries in Northern Europe and America. The prospective MONICA study (1994) has shown a lower incidence of coronary conditions in the South of France and in the region of Barcelona (Catalonia, Spain). In relation to cancer, descriptive studies of mortality or incidence rates have also found lower rates in Mediterranean countries, notably in the case of colon cancer and breast cancer. Other conditions seem to benefit from food and nutrients contained in Mediterranean diets: osteoporosis, cataract, deterioration in cognitive functions as part of ageing. ... Finally, if one considers life expectancy beyond 65 years of age, 4 countries from Southern Europe are grouped together just behind Sweden, which benefits from high social standards: France, Greece, Italy and Spain.

The **EGEA International Conference**, organised this year in the beautiful city of Perpignan, is taking stock of the situation in relation to certain aspects of the health benefits associated with Mediterranean diet, by specifically taking an interest in obesity and diabetes, which also constitute a major public health problem. The world’s best specialists, from mecanistic research to epidemiological studies, have pooled together to paint a very comprehensive assessment of scientific knowledge in these domains, justifying the recommended basis that provides, or will provide, the platform for developed nutritional policy in several countries.

Above all, this Conference demonstrates that we now have at our disposal, a wealth of scientific data highlighting the fact that Mediterranean diet constitutes a set of balanced practices and behaviours that are very favourable to personal health, and which have the extraordinary advantage of associating health, pleasure and conviviality. A useful and superb model for public health managers !

Serge Hercberg

Directeur de l’U557 Inserm « Epidémiologie de la Nutrition » (UMR Inserm/Inra/Cnam), et de l’Unité de Surveillance et d’Epidémiologie Nutritionnelle (InVS/CNam), Paris, France.

Vice-Président du Comité Stratégique du Programme National Nutrition-Santé (PNNS).



EUROPEAN COMMISSION
HEALTH & CONSUMER PROTECTION DIRECTORATE-GENERAL

Directorate C - Public Health and Risk Assessment
C4 - Health determinants

The services of the European Commission regret that – contrary to their earlier commitment – they will not be able to participate in the International Conference “Health Benefits of the Mediterranean Diet” in Perpignan.

In fact, the conference coincides with the evaluation exercise for the projects received under the 2nd call for proposals of the Public Health Action Programme, and all Commission officials of the Public Health Directorate have been requested to cancel any other commitments for that week.

We sincerely regret the inconvenience caused by this for the organisers and the participants of the conference.

We are convinced that the conference will yield significant results on the important issues of obesity and type II diabetes prevention, and wish all the participants successful work and a pleasant stay in Perpignan.

Wilfried Kamphausen
Deputy Head of Unit

Commission européenne, L-2920 Luxembourg. Telephone: (352) 43 01-1.
Office: JMO C5-89. Telephone: direct line (352) 43 01-32488. Fax: (352) 43 01-34975.

Internet:
Wilfried.Kamphausen@cec.eu.int

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PROGRAMME

Wednesday, May 12th

17:00 **Registration**

17:30 **Official Opening**

Hosting local and European representatives and high-level officials

18:30 **Scientific Opening**

Obesity and type II diabetes prevention : What has been done ?
Where do we stand ? - *Ph. Vague - France*

Global dietary trends and the nutrition transition - *A. Drewnowski - USA*

20:00 **Opening Reception**



PROGRAMME

Thursday, May 13th

9:00	Session 1 : Obesity and diabetes : two multi-factorial diseases Presidents: E. Eschwege and Ph. Vague Introduction - <i>E. Eschwege - France</i>
9:15	The pandemic of obesity and type 2 diabetes - <i>J. Seidell – The Netherlands</i>
9:45	From obesity to type 2 diabetes : interplay between insulin resistance and impaired insulin secretion - <i>A.J. Scheen – Belgium</i>
10:15	Fruits & Coffee Break
10:45	Diet-genotype interactions in obesity development - <i>D. Lairon – France</i>
11:15	Prevention of type 2 diabetes - <i>Ph. Vague – France</i>
11:45	Diet and lifestyle in relation to obesity : Lessons from observational cohort studies - <i>T. Pischon – USA</i>
12:15	Discussion
12:45	Conclusion - <i>Ph. Vague - France</i>
13:00	Lunch
14:15	Workshop I: Mediterranean diet, fruits, vegetables, body-weight management and obesity prevention Presidents : B. Carlton-Tohill and A. Martin Introduction - <i>A. Martin - France</i>
14:30	The role of dietary lipids in obesity and health - <i>A. Trichopoulou - Greece</i>
15:00	Fruits, vegetables and body-weight management - <i>B. Carlton-Tohill – USA</i>
15:30	The role of fruit and vegetables in the fight against obesity <i>Ch. Remesy - France</i>
16:00	Conclusion - <i>B. Carlton-Tohill - USA</i>
16:15	CNIPT Special Session - <i>Ch. Remesy - France</i>
16:45	Refreshments

PROGRAMME

Friday, May 14th

9:00	Session 2 : Prevention of obesity and type II diabetes in children President : M.A. Charles <i>Introduction - MA. Charles - France</i>
9:15	The emergence of type 2 diabetes in children and adolescents as a consequence of the obesity epidemic in childhood <i>A. Fagot-Campagna - France</i>
9:45	Overweight and obesity in an atherosclerosis prevention trial starting in early childhood. The STRIP study - <i>H. Lagström - Finland</i>
10:15	Potential sensitive targets for the prevention of childhood obesity <i>C. Maffeis - Italy</i>
10:45	Conclusion - <i>MA. Charles - France</i>
10:55	Fruits & Coffee Break
11:15	Selected poster presentations - <i>President : A.J. Scheen</i>
11:45	Nutrition in transition : diet quality and diet costs <i>A. Drewnowski - USA</i>
12:15	Lunch
14:00	Workshop II : From overweight to obesity President : M. Piperno - France <i>Introduction - M. Piperno</i>
14:15	Overweight and obesity factors in a Mediterranean population <i>M. Gerber - France</i>
14:35	From being overweight to obesity : what treatment(s) ? <i>Th. Gibault - France</i>
14:55	Dieticians' practices : what are the solutions ? - <i>V. Liegeois - France</i>
15:15	General Discussion
16:00	Closing session
20:30	Gala dinner

PROGRAMME

Saturday, May 15th

9:00	Session 3 : Nutritional recommendations: from traditional Mediterranean diet to modern lifestyle adaptations President: E. Riboli Introduction - <i>E. Riboli - IARC-WHO</i>
9:10	The traditional Mediterranean diet recommendations <i>A. Trichopoulou – Greece</i>
9:30	The healthy eating pyramid : Empirical assessments of validity <i>WC. Willett – USA</i>
9:50	French nutritional recommendations - <i>A. Martin – France</i>
10:10	The Finnish recommendations and their application to prevention of type 2 diabetes - <i>J. Lindström – Finland</i>
10:30	General Discussion
11:30	Fruits & Coffee Break
11:45	Nutritional recommendations : population-wide or directed at high-risk individuals ? <i>P. Meneton - France</i>
12:15	Can individuals implement nutritional recommendations ? Mechanisms for change or mission impossible ? - <i>J. E. Blundell – UK</i>
12:45	Closing Conclusions - <i>Elio Riboli - IARC - WHO</i>
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OPENING LECTURES



Philippe Vague (France)

Professor of Nutrition

*Service de Nutrition-Endocrinologie-Maladies Métaboliques
CHU Timone*

264, rue Saint-Pierre

13385 – MARSEILLE Cedex 05

Phone : (33) 04 91 38 75 72

Fax : (33) 04 91 38 65 99

pvague@ap-hm.fr

Biographical Sketch

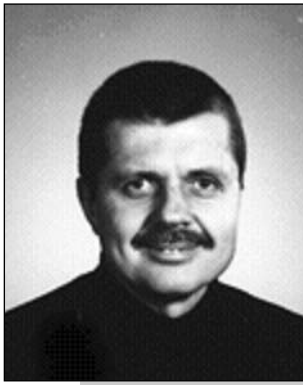
- MD, PhD.
- P. VAGUE, Head of Department of Metabolic syndrome Nutrition-Endocrinology-Metabolic Diseases at University Hospital of Timone in Marseille.
- His current research activity relates mainly to the metabolic syndrome, Mediterranean diet, the nutritional prevention of the complications of diabetes and the role sodium ATPase potassium in diabetes.
- Professor Vague was President of French language Association to study diabetes and metabolic diseases, person in charge for the congress scientific program of the Diabetes International Federation in 2003.

Recent publications

- Djemli-Shipkolye A, Raccach D, Pieroni G, Vague P, Coste TC, Gerbi A. ***Differential effect of omega3 PUFA supplementations on Na,K-ATPase and Mg-ATPase activities : possible role of the membrane omega6/omega3 ratio.*** J Membr Biol. 2003 Jan 1;191(1):37-47.
- Vincent S, Planells R, Defoort C, Bernard MC, Gerber M, Prudhomme J, Vague P, Lairon D. ***Genetic polymorphisms and lipoprotein responses to diets.*** Proc Nutr Soc. 2002 Nov;61(4):427-34.
- Vague P, Nguyen L. ***Rationale and methods for the estimation of insulin secretion in a given patient: from research to clinical practice.*** Diabetes. 2002 Feb;51 Suppl 1:S240-4.
- Tsimaratos M, Coste TC, Djemli-Shipkolye A, Vague P, Pieroni G, Raccach D. ***Gamma-linolenic acid restores renal medullary thick ascending limb Na(+),K(+)-ATPase activity in diabetic rats.*** J Nutr. 2001 Dec;131(12):3160-5.

Obesity and type II diabetes prevention : What has been done ? Where do we stand ?

*Philippe VAGUE, Department of Nutrition-Endocrinology-Metabolic Diseases, University Hospital of Timone ,
Marseille*



Adam Drewnowski (USA)

Professor of Epidemiology

University of Washington

School of Public Health and Community Medicine

Box 353410

Nutritional Sciences

Raitt Hall 305^F Seattle, WA 98195

Phone I: 206-543-8016

Fax : 206-685-1696

adamdrew@u.washington.edu

Biographical Sketch

- He obtained his PhD in Psychology at Rockefeller University in 1978
- Following postdoctoral training at the University of Toronto, he rejoined The Rockefeller University as Assistant Professor in the Laboratory of Human Behavior and Metabolism and became engaged in obesity research. He then moved to the University of Michigan, where he became Professor of Public Health, Psychology, and Psychiatry and headed the Program in Human Nutrition at the School of Public Health. He joined the University of Washington in 1998.
- In 1997, he was Chercheur Invité, Institut Scientifique et Technique de la Nutrition et d'Alimentation, Conservatoire National des Arts et Métiers, Paris, France.
- Research interests are in taste and food preferences, dietary choices, studies on obesity and eating disorders, new tools for assessing quality of the total diet, nutrition and cancer prevention.
- Dr. Drewnowski is the Director of the Nutritional Sciences Program. Since 2002 he is director of the Center for Public Health Nutrition at the University of Washington.

Recent publications

- ***Replacing fats and sweets with vegetables and fruit – a question of cost.***
Drewnowski A, Darmon N, Briand A. Am J Publ Health 2004 (in press).
- Drewnowski A, Specter SE. ***Poverty and obesity: diet quality, energy density and energy costs.*** Am J Clin Nutr 2004 (in press).
- ***Liquid calories and the failure of satiety: how good is the evidence?***
Almiron-Roig E, Chen Y, Drewnowski A. Obes Rev. 2003 Nov;4(4):201-12.
- ***Hunger, thirst, and energy intakes following consumption of caloric beverages.***
Almiron-Roig E, Drewnowski A. Physiol Behav. 2003;79(4-5):767-73.
- ***Nutrition transition and global dietary trends.***
Drewnowski A. Nutrition. 2000 Jul-Aug;16(7-8):486-7.

Global dietary trends and the nutrition transition

Adam Drewnowski, Center for Public Health Nutrition, University of Washington, Seattle

Trends in diets and lifestyles that result from economic development, globalization and trade have a significant impact on population health. As incomes rise and societies become more urban, nations enter different stages of what has been called the nutrition transition. Diets high in complex carbohydrates are gradually replaced by more meat and dairy products, more refined grains, more added sugars and added fats. As associated epidemiologic transition takes place as disease patterns shift away from undernutrition and infectious disease toward higher rates of obesity, type 2 diabetes, cardiovascular disease, and some types of cancer. The association between nutrition transition and higher rates of childhood obesity is already a major challenge to public health.

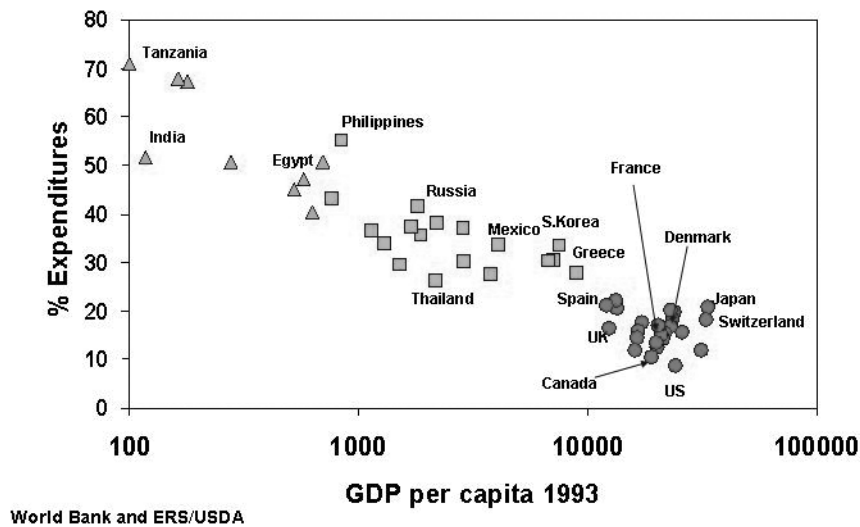
Whereas the term nutrition transition was initially reserved for developing countries, many of the same trends are observed in the industrialized world. The observed dietary trends in the US can be described as more calories, more refined grains, more added sugars, and more added fats. Of the estimated 300 kcal/day increase in total dietary intakes between 1985 and 2000, 46% was accounted for by refined grains, 24% by added sugars, 23% by added fats, and only 8% by vegetables and fruit. Meat and dairy did not contribute to this increase and together declined by 1%. Although fruit consumption did rise, the food supply provided only 1.4 servings of fruit and fruit juices per day. Of this amount, half was accounted for by oranges, apples and bananas, while the consumption of melons, berries, fresh grapes and other fruit remained low. Similarly, iceberg lettuce, potatoes (including French fries and potato chips), and canned tomatoes accounted for half of all vegetable servings. Dark-green leafy vegetables and deep yellow vegetables contributed only 0.4 servings per person per day. In contrast, added sugars and added fats contributed 40% of energy in the US diet.

Dietary trends of Mediterranean nations show much local diversity. Following rapid economic development, the cereals, grains and legumes of the traditional Spanish diet were replaced with more meat, milk and dairy products and with substantially more fruit. Dairy and fruit intakes in Spain are the highest in Europe as is the proportion of energy from fat. Almost as rich in fat, the French diet is characterized by a higher consumption of dairy products, vegetables and fruit and by lower red meat consumption, as compared to the US. Studies have shown that the French diet may also be more varied.

Although global economic development has led to a higher standard of living, longevity and better health, some negative consequences of the nutrition transition are beginning to be felt. That wealthier nations spend a lower proportion of income on food is known as Engel's law (see Figure 1). Refined grains, added sugars and added fats are associated with lower diet costs. The World Health Organization has voiced concern that shifting dietary patterns and growing consumption of energy-dense added sugars and fats may contribute to the global obesity epidemic. Obesity and associated chronic diseases are increasingly significant causes of disability and premature death in both developing and newly developed countries. One weapon in the battle against obesity is a varied and healthy diet.

Figure1 :

Spending on at-home foods (% of consumption expenditures) in relation to the per capita GDP (1993)



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3. Moreno LA, Sarria A, Popkin BM. *The nutrition transition in Spain: a European Mediterranean country. Eur J Clin Nutr* 2002;56:992-1003.
4. Putnam J, Allshouse, Kantor LS. *US per capita food supply trends: more calories, refined carbohydrates and fats. FoodReview* 2002;25(3):2-15.
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SESSION 1



Obesity and diabetes : two multi-factorial diseases

Presidents : E. Eschwege and Ph. Vague



Eveline Eschwege (France)

Senior Director of Research, Emeritus 2001

National Institute of Health and Medical Research (INSERM) U
258, Hôpital Paul Brousse
16, avenue Paul Vaillant Couturier
Villejuif, France
ef.eschwege@wanadoo.fr
eschwege@vjf.inserm.fr

Biographical Sketch

- Dr. Eschwege received her medical training (1956-1965) and a subsequent degree in epidemiology (1971). She has been responsible for courses in epidemiology, statistical methods, clinical trials and diabetology at both the undergraduate and graduate levels.
- She was former President of the European Study Group for the Epidemiology of Diabetes (1987-90) and President of the International Diabetes Epidemiology Group (1988-91). As a co-director of the WHO Collaborative Center on the Epidemiology of Diabetes since 1989 up to 2000, she has made important contributions to the international work in diabetes epidemiology.
- Dr. Eschwege was the Director of Unit 21, INSERM (1986-1998), dedicated to clinical and epidemiological research on metabolism and life-style. She works now in the Unit 258, INSERM, Cardiovascular and Metabolic Epidemiology.

Recent Publications

- Eschwege E. *The dysmetabolic syndrome, insulin resistance and increased cardiovascular (CV) morbidity and mortality in type 2 diabetes: aetiological factors in the development of CV complications*. Diabetes Metab. 2003 Sep;29(4 Pt 2):6S19-27.
- Liebl A, Mata M, Eschwege E *Evaluation of risk factors for development of complications in Type II diabetes in Europe*. Diabetologia. 2002 Jul;45(7):S23-8.
- Varroud-Vial M, Charpentier G, Vaur L, Attali JR, Balarac N, Cervantes P, Kleinebreil L, Levy-Marchal C, Preiss P, Weisselberg C, Eschwege E. *Effects of clinical audit on the quality of care in patients with type 2 diabetes: results of the DIABEST pilot study*. Diabetes Metab. 2001 Dec;27(6):666-74.
- Eschwege E, Charles MA, Simon D, Thibult N, Balkau B. *From policemen to policies: what is the future for 2-h glucose?* The Kelly West Lecture 2000. Diabetes Care 2001;24:1945-50.
- Eschwege E, Charles MA, Simon D, Thibult N, Balkau B. *Reproducibility of the diagnosis of diabetes over a 30-month follow-up: the Paris Prospective Study*. Diabetes Care. 2001 Nov;24(11):1941-4.

Obesity and diabetes : two multi-factorial diseases - Introduction

Eveline Eschwege, National institute of Health and Medical Research, Villejuif.



Jacob C. Seidell (The Netherlands)

Professor of Nutrition and Health

Free University of Amsterdam

Faculty of Earth and Life Sciences and VU University Medical Center (VUmc)

Van der Boechorststraat 7, 1081 BT Amsterdam

The Netherlands

Phone: INT-31-20-4446995

jaap.seidell@falw.vu.nl

Biographical Sketch

- He obtained his MSc (1983) and PhD (1986) at the Department of Human Nutrition at the University of Wageningen, The Netherlands
- He was awarded a senior research fellowship by the Royal Academy of Arts and Sciences (KNAW) for the period 1987-1991
- From 1992-2002 he was head of the Department for Chronic Diseases Epidemiology at the National Institute for Public Health and the Environment in Bilthoven, The Netherlands
- His main research interest is in the role of life-style factors in the prevention of chronic diseases but in particular the study of causes and consequences of obesity and body fat distribution.

Recent Publications

- Seidell JC. ***Obesity, insulin resistance and diabetes--a worldwide epidemic.*** Br J Nutr. 2000;83 Suppl 1:S5-8.
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The pandemic of obesity and type 2 diabetes

Jacob C. Seidell, Vrije Universiteit Amsterdam, Department of Nutrition and Health

Obesity is now commonly defined in adults as a BMI > 30 kg/m². The prevalence of obesity in established market economies (Europe, USA, Canada, Australia, etc) varies greatly but a weighed estimate suggests an average prevalence in the order of 15-20%.

The prevalence in these countries generally shows increasing trends over time.

Obesity is also relatively common in Latin America but much less so in sub-Saharan Africa and Asia where the majority of the world population lives. Nevertheless, obesity rates are increasing there as well and, more importantly, rates of diabetes increase even faster particularly in Asian countries. The risks of type 2 diabetes mellitus in these countries tend to increase sharply at levels of BMI generally classified as acceptable in European and North American white people. There have been suggestions to adopt specific classifications of obesity in Asians (e.g. BMI 23 for overweight and 26 kg/m² for obesity) and this will greatly affect the prevalence estimates of obesity world-wide (currently at about 250 million people). Particularly for health promotion purposes, BMI may be replaced by classification based on waist circumference but also their specific classifications for different ethnic groups may be necessary.

The number of diabetics has been projected to increase from 135 million in 1995 to 300 million in 2025. Much of this increase will be seen in Asia.

Both obesity and type 2 diabetes are common consequences of changing lifestyles (increased sedentary lifestyles and increase energy density of diets). Both are potentially preventable through life-style modification on a population level but this requires a coherent and multifaceted strategy. Such strategies are not developed or implemented. These developments point toward the great urgency for development of global and national plans for adequate prevention and management of obesity and type 2 diabetes mellitus.



André J. Scheen (Belgium)

Professor of Medicine

Faculty of Medicine

University of Liège, Belgium

Division of Diabetes, Nutrition & Metabolic Disorders

Department of Medicine

CHU Sart Tilman, Liège, B-4000, Belgium

Phone : +32 (0) 4 3667238

Fax : +32 (0) 4 3667068

andre.scheen@chu.ulg.ac.be

Biographical Sketch

- MD (1976), PhD (1991) – Faculty of Medicine, University of Liège.
- André J. SCHEEN is Professor of Medicine and of Clinical Pharmacology and Therapeutics at the Faculty of Medicine of the University of Liège, Belgium.
- He is also the Head of the Diabetes, Nutrition and Metabolic Disorders Unit, of the Division of General Internal Medicine and of the Clinical Pharmacology Unit, in the Department of Medicine at the Centre Hospitalier Universitaire Sart Tilman, Liège, Belgium.
- His main research interests include the assessment of insulin secretion and insulin sensitivity, the pathophysiology of obesity and type 2 diabetes as well as the clinical investigation of new treatments for the management of obesity, dyslipidaemias and diabetes mellitus.

Recent Publications

- Letiexhe MR, Desai C, Lefèbvre PJ, Scheen AJ. ***Intact cross-talk between insulin secretion and insulin action after post-gastroplasty recovery of ideal body weight in severely obese patients.*** Int J Obesity 2004, in press.
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From obesity to type 2 diabetes : interplay between insulin resistance and impaired insulin secretion

André J. Scheen, Division of Diabetes, Nutrition and Metabolic Disorders, Department of Medicine, CHU Sart Tilman, Liège.

A majority (> 80 %) of individuals suffering from type 2 diabetes are obese. The adipose tissue, especially intra-abdominal or visceral fat depot, plays a crucial role in the pathogenesis of the disease. The interactions of non-esterified fatty acids (NEFA) with glucose metabolism are well known as high NEFA levels contribute to enhance hepatic glucose output (exaggerated gluconeogenesis) and reduce muscular glucose uptake (so-called Randle effect). In addition, the deleterious role of ectopic triglyceride storage in the development of defective insulin action (muscles and liver) and insulin secretion (B cells) has been recently emphasized. Thus, lipotoxicity may play an important role in obese subjects, already at the initial stage of impaired glucose tolerance (IGT), while glucotoxicity plays a further role when sustained hyperglycaemia occurs later on. The concepts of glucose and lipid toxicity have important clinical and therapeutical implications.

Subjects with type 2 diabetes are characterized by both tissue insulin resistance and impaired insulin secretion. The development of diabetes requires the presence of these two fundamental defects, which disrupt the delicate balance by which insulin-target tissues communicate with the beta cells and vice versa. Numerous observations underscore the important interplay between insulin resistance and insulin secretion. Insulin resistance alone is, in most instances, insufficient to cause overt glucose intolerance. Type 2 diabetes occurs as a late phenomenon in obese subjects and is preceded by years of normal glucose tolerance or IGT. To observe the development of frank diabetes mellitus, a defect in insulin secretion must be superimposed on insulin resistance, and numerous observations suggest that this beta-cell defect might be genetically determined and worsen because of environmental factors.

Finally, the view of the adipocyte as a simply storage depot for fat is no longer tenable. Indeed, the role of adipose tissue as an endocrine organ capable of secreting a number of so-called adipocytokines or adipokines, is gaining appreciation. Indeed, besides NEFA, adipocytes secrete various cytokines, among which leptin, TNF- α , resistin and adiponectin. In contrast to other adipocytokines, adiponectin is characterized by lower (and not higher) circulating levels in presence of obesity. Its levels are reduced in type 2 diabetes and a strong positive relationship between insulin sensitivity and adiponectin levels has been described. Thus, low adiponectin levels could contribute to peripheral insulin resistance in type 2 diabetes leading to the potential therapeutic option to augment secretion of (with thiazolidinediones) or replace (with exogenous injection) adiponectin.

In conclusion, although the predominant paradigm used to explain the link between obesity and type 2 diabetes is the portal/visceral hypothesis giving a key role in elevated NEFA concentrations, two new emerging paradigms are the ectopic fat storage syndrome and the adipose tissue as endocrine organ hypothesis. These two paradigms constitute the framework for the study of the interplay between insulin resistance and beta-cell dysfunction in type 2 diabetes as well as between our obesogenic environment and diabetes risk in the next decade. Even though we are not yet able to pinpoint the primary defect in most patients with type 2 diabetes, there appears to be a counterproductive interplay between beta-cell inadequacy and insulin resistance, which leads to a vicious circle that perpetuates and aggravates the metabolic disorder. Based on our greater understanding of the relative roles of insulin resistance and beta-cell dysfunction in type 2 diabetes, we can anticipate

advances in the identification of genes contributing to the development of the disease as well as approaches to the treatment and prevention of type 2 diabetes.

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Denis Lairon (France)

Research Director

INSERM UMR-Unit 476

Human Nutrition and Lipids

Faculty of medicine

27 Bd jean Moulin

13385 Marseille cedex 05, France

Phone : 33 (1)4 91 75 86 00

Fax : 33 (1)4 91 75 15 62

Denis.Lairon@medecine.univ-mrs.fr

Biographical Sketch

- He is board certified in Biochemistry (Master, PhD, Doctorat ès-science Thesis).
- Since 1998 he is Research Director of the INSERM Research U476, working on human nutrition and lipids : bioavailability, metabolism and regulation.
- Dr. Lairon was member of the board (1992-98 then since 2000), and president (1995-98) of the French Nutrition Society, member of the Editorial board of the British Journal of Nutrition (1997-2003) and member of the scientific council of the French food safety Agency (AFSSA).
- He is head of INSERM U476 and co-manager of the project for a Human Nutrition Research Center-Mediterrane associating laboratories in Marseille, Montpellier & Nice (Research Ministry). Partner in FP6-EU research project on dietary lipids, metabolic syndrome and genetics (Lipgene)

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Diet-genotype interactions in obesity development

Denis LAIRON, UMR-476 INSERM/1260 INRA, Human Nutrition and lipids. Faculty of medicine, Marseille

Obesity is nowadays considered as a worldwide epidemic syndrome. It is obvious that the rapid and drastic changes in every-day way of life in industrialized countries as well as in favoured class in cities of developing countries is a key determinant of such a modern syndrome. Changes in dietary habits, especially in the ingestion of fats and rapidly digestible sugars, and reduced physical activity, are the two main components determining such a recent trend. The most important nutrients are all but differently involved in the regulation of appetite and dietary intake, fuel use and maintenance of energy balance and finally storage as fat depot in adipose tissue.

Evidence from both genetic epidemiology and molecular epidemiology studies suggests that genetic factors are involved in determining the susceptibility to gaining or losing fat in response to diet or the risk of developing some of the comorbidities generally observed in obese individuals (diabetes, cardiovascular disease, cancers). Nevertheless, monogenic forms of obesity are very rare and in the vast majority of cases, multigenic influences are involved.

Due to the lack of sufficient knowledge, the respective importance of genetic traits and dietary habits is still controversial. Sounded information has been gained from studies performed in twin pairs submitted to different environmental influences. Also comparison of responses to dietary changes in various ethnic groups clearly illustrates the influence of the genetic background. The genetic heritability of obesity is important and could amount up to 50%.

In more specific situations, it has been shown that groups of individuals with different well defined genotypes (in general SNPs) for a given gene controlling the expression of a specific protein involved in a key metabolic pathway, differently respond to dietary manipulations.

Nevertheless, up to now, a limited number of genes have been investigated for their role in the development of obesity and the response of obesity phenotypes to changes in diet. Additional important information is provided by animal models of diet-induced obesity that allow identification of new positional candidate genes. The most recent obesity gene map indicates that there are more than 100 genes or marker loci that have the potential to influence obesity.

From data of genetic epidemiology, different models have been proposed to describe how genetic factors could modulate the effects of dietary intake such as : a) genotype does not cause the disease directly but increases the expression of the risk factor, b) the genotype exacerbates the effect of the risk factor on the disease, c) the risk factor exacerbates the effect of the genotype and only the latter is required for disease expression, d) both the genotype and the risk factor are required to raise the disease risk level and e) the genotype and the risk factor each influence the risk of disease individually.

Recommended dietary intakes are the general basis for improving nutrition at the public health level. Nevertheless, it is more and more evident that these policies assuming that all individuals respond similarly to dietary intake or recommendation do not take into account the considerable interindividual differences in responsiveness. The key challenge in the near future will be to try to identify individuals or groups at high genetic risk and to adapt dietary recommendations to their specific genetic susceptibility.



Philippe Vague (France)

Professor of Nutrition

*Service de Nutrition-Endocrinologie-Maladies Métaboliques
CHU Timone*

264, rue Saint-Pierre

13385 – MARSEILLE Cedex 05

Phone : (33) 04 91 38 75 72

Fax : (33) 04 91 38 65 99

pvague@ap-hm.fr

Biographical Sketch

- MD, PhD.
- P. VAGUE, Head of Department of Metabolic syndrome Nutrition-Endocrinology-Metabolic Diseases at University Hospital of Timone in Marseille.
- His current research activity relates mainly to the metabolic syndrome, Mediterranean diet, the nutritional prevention of the complications of diabetes and the role sodium ATPase potassium in diabetes.
- Professor Vague was President of French language Association to study diabetes and metabolic diseases, person in charge for the congress scientific program of the Diabetes International Federation in 2003.

Recent publications

- Djemli-Shipkolye A, Raccach D, Pieroni G, Vague P, Coste TC, Gerbi A. ***Differential effect of omega3 PUFA supplementations on Na,K-ATPase and Mg-ATPase activities : possible role of the membrane omega6/omega3 ratio.*** J Membr Biol. 2003 Jan 1;191(1):37-47.
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Prevention of type 2 diabetes

Philippe VAGUE, Department of Nutrition-Endocrinology-Metabolic Diseases, University Hospital of Timone , Marseille

The prevalence of Type 2 Diabetes is increasing in conjunction with the sedentary nature of life and obesity.

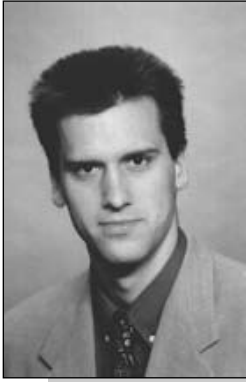
Indeed, long-term observation studies have shown that the risk of diabetes is inversely proportional to the level of usual physical activity, and that endurance sports offer more protection. The maintaining of a normal body weight is also a protective factor. In relation to diet, a low risk of diabetes is associated with a diet of high fibre, high in polyunsaturated fatty acids, rich in vitamin E, and with moderate consumption of alcohol and perhaps coffee.

Different prevention trials, three types, have taken place on this basis. The first type focuses on modifying lifestyles in order to lose weight and to increase physical activity. In three studies of populations at risk, the Da Qing study, the Finish DPS study and the American DPP study, the diabetes conversion rate during the three or four years studied, had reduced by 50 % among the group where lifestyle changes have occurred. The second type uses anti-diabetic medication to reduce insulin resistance: metformin or troglitazone. Here also, the risk of diabetes occurring has also been reduced. Another medication, which reduces postprandial hyperglycemia, acarbose, has been used in the Stop NIDDM trials with beneficial effects. The third type uses medication that is not anti-diabetic, and the occurrence of diabetes is reduced with anti-obesity medication, which facilitates weight loss, or with renin angiotensin system inhibitors.

A certain number of trials are currently ongoing.

These trials and their results may suggest that :

- The majority of trials aim to reduce insulin resistance by preventing weight gain and by increasing physical exercise and indeed, as the two determining factors in the progression of Type 2 Diabetes are the fragile capacity of insulin secretion and the increase in insulin requirements due to insulin resistance, we are currently only capable of working on the second determining factor. One will also note that effectiveness is even greater when the risk is high. Lifestyle changes, even if only minor, appear to be very effective. Thus priority should be given to lifestyle changes in the first instance, and medication should be kept for high-risk subjects.



Tobias Pischon (USA)

Research Associate

Departments of Nutrition and Epidemiology

Harvard School of Public Health

655 Hunting Avenue

Boston, MA 02115

Phone: 617-432-3466

tpischon@hsph.harvard.edu

Biographical Sketch

- MPH 2002, Technische Universität Berlin / Deutsches Institut für Ernährungsforschung (German Institute of Human Nutrition), Potsdam, Germany.
- Doctoral Degree 1999 (Dr. med.), Freie Universität Berlin, Germany.
- MD 1998, Freie Universität Berlin, Germany.
- Main research interests: Nutrition, Obesity, Metabolic Syndrome, Cardiovascular Disease.
- Association of diet and lifestyle factors with obesity and cardiovascular disease, and the biomarkers that may mediate these associations.

Recent Publications

- Pischon T, Hankinson SE, Hotamisligil GS, Rifai N, Willett WC, Rimm EB. ***Habitual dietary intake of n-3 and n-6 fatty acids in relation to inflammatory markers among US men and women.*** Circulation 2003; 108:155-60.
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Diet and Lifestyle in Relation to Obesity Lessons from Observational Cohort Studies

Tobias Pischon, Department of Nutrition and Epidemiology, Harvard School of Public Health, Boston.

Obesity is a risk factor for several chronic diseases and a major public health problem in most countries throughout the world. About two thirds of adults in the United States are overweight (BMI >25 kg/m²) and one third obese (BMI >30 kg/m²). The Center for Disease Control (CDC) recently announced that obesity, second only to smoking in causes of death, costs the United States over \$115 billion dollars yearly. On a simplistic level obesity is an imbalance of energy intake and energy expenditure. However, this imbalance is likely a complex interaction between genetic factors and environmental exposures such as lifestyle and dietary choices. Whereas genetic factors may influence which individuals within a population will develop excessive adiposity, diet and lifestyle factors clearly make critical contributions to the present high rates of obesity. Epidemiologic studies have shown that poor diet and physical inactivity are major determinants of overweight and obesity and there is consensus that increased energy intake contributes significantly to the growing prevalence of obesity. Although the percentage of energy from fat has decreased over the last several decades within the US, absolute intakes of carbohydrate and fat have increased. Epidemiologic cohort studies suggest that among macronutrients, high intakes of refined processed carbohydrates and trans fats, and among lifestyle factors lack of leisure time physical activity and increasing time of watching television are associated with significant weight and waist gain. Although the association between excess body weight and chronic disease incidence is well established, the mechanisms underlying this relationship are only partly understood. Recent studies suggest that the adipose tissue is actively involved in a network of endocrine, paracrine, and autocrine signals. Thus, adipose-derived cytokines and hormones, such as leptin, tumor necrosis factor- α , and adiponectin, have been shown to be implicated in the pathophysiology of obesity-related chronic diseases, like type 2-diabetes and coronary heart disease. Current research aims to examine the influence of genetic factors, lifestyle, and diet on these mediators to help gain a better understanding of the pathophysiology of obesity and its co-morbidities, and to find strategies for prevention and treatment.

WORKSHOP 1



Mediterranean diet, fruits, vegetables, body-weight management and obesity prevention

Presidents : B. Carlton-Tohill and A. Martin



Ambroise Martin (France)

Professor of Biochemistry and Nutrition

AFSSA/ DERNS (Direction for risk assessment for Nutrition and Food safety, French Food Safety Agency)

27-31 av du général Leclerc

BP 19 - 94701 Maisons-Alfort cedex

Phone : +33 (0)1 49 77 13 67

Fax : +33 (0)1 49 77 26 13

a.martin@dg.afssa.fr

Biographical Sketch

- He obtained his MD in 1978, his PhD in 1985.
- Dr. Martin is university Professor of biochemistry and nutrition at the faculty of Medecine in Lyon (France). He also heads the DERNS (Direction de l'Evaluation des Risques Nutritionnels et Sanitaires), the department in charge of the evaluation and food risks within the new French agency for food health security (AFSSA).
- His research activities as team leader at the INSERM 189 unit of the University of Lyon focused on the regulation, in particular nutritional regulation, of glycoprotein synthesis.
- Member of various scientific organisations, which are now included into Afssa : the French High Council of Public Hygiene (CSHPF), the Commission of products for special dietary purposes (CEDAP), the French National Food Council (CNA).
- Coordinator of the revision of the "Nutritional Recommendations for the French Population" (ANC).

Recent Publications

- Martin A [*management of food-related risk in children*] Arch Pediatr. 2003 May;10 Suppl 1:32s-33s.
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Mediterranean diet, fruits, vegetables, body-weight management and obesity prevention - Introduction

Ambroise Martin, Direction of risk assessment for nutrition and food safety, French Food Safety Agency, Maisons-Alfort



Antonia Trichopoulou (Greece)

Associate Professor of Preventive Medicine and Nutrition

*Medical School - University of Athens
Department of Hygiene & Epidemiology
75 Mikras Asias Str
GR-11527 Athens Hellas
Phone : + 20 210 746 2073
Fax : + 20 210 746 2079
antonia@nut.uoa.gr*

Biographical

- 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. Currently she is Associate Professor of Preventive Medicine and Nutrition and Director of the World Health Organization Collaborating Center for Nutrition at the Department of Hygiene and Epidemiology, School of Medicine, University of Athens.
- 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.
- Antonia Trichopoulou's research focuses on various aspects of nutrition and particularly issues concerning the Mediterranean diet.

Recent publications

- Trichopoulou A, Costakou T, Bamia C, Trichopoulos D. ***Adherence to a Mediterranean diet and survival in a Greek population.*** N Engl J Med. 2003;348:2599-608
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- Trichopoulou A, Gnardellis Ch, Laggiou A, Benetou V, Naska A, and Trichopoulos D. ***Physical activity and energy intake selectively predict the waist-to-hip ratio in men but no in women.*** Am J Clin Nutr 2001;74:574-578

The role of dietary lipids in obesity and health

Antonia Trichopoulou and Baibas N., WHO Collaborating Centre for Nutrition, Medical School, University of Athens.

The rise in obesity had reached epidemic proportions. It is not limited to any one country, or group of developed countries, but has escalated into a world problem. The basis for seeking solutions is that if current dietary guidance policies and messages had been successful, there would have been no surge in world obesity. As a result, new directions in dietary guidance policies are needed.

Dietary guidelines have been widely perceived as indicating that total fat should be reduced. Total fat however, is not a very useful term, because fats and oils are distinct categories in the broad group of lipids. For southern Europe fat means mainly olive oil, although for north and central Europe the world fat is associated with animal fat. By recommending “fat” reduction, we may have had, as a result, a reduction of olive oil consumption in southern Europe and a concomitant reduction of vegetable intake (vegetables are consumed as salads as well as main dishes cooked in olive oil). For this reason it has been advocated that the term «fat» should be replaced by the term «dietary lipids» which comprise both fats and oils. It is realized that for the North America and north and central European consumer, the term “fat” identifies animal fat, but for a document which addresses all people, including Europeans, subtle linguistic changes may have serious unintended consequences.

During the last 20 years, there has been an accumulation of scientific evidence about the different role of different types of “fat” and carbohydrates, on health and disease. The debate is still open, but cannot be ignored. Reducing “fat” intake and replacing it by carbohydrates might lead to the intake of a lot of starch which tends to increase post-prandial hyperglycaemia and its cascade of metabolic consequences. Another argument allegedly supporting “low fat” intake is that fat is conducive to obesity. For several decades it has been recommended that a healthy diet provides less than 30 % of total energy from lipids. Two schools of thought have expressed different views about the optimal level of overall lipid intake. It has been found that the proportion of lipids and carbohydrate in a fully-controlled energy-restricted diet does not materially affect weight loss and there are no conclusive findings from controlled studies on the appropriate amount of fat in the diet for long-term weight reduction and maintenance. It has been indicated that reduction of percent of energy from fat causes a small, short-term reduction in body weight but the data do not support superiority of low fat diets for weight loss in long term trials. Thus, additional research is needed in larger cohorts including multi-ethnic populations for extended periods of time¹.

Energy intake has occasionally been perceived by the public as adversely affecting health. In reality, when body mass index (BMI) is adjusted for, higher energy intake is associated with lower cardiovascular and total mortality – because, in this instance, energy intake equals energy expenditure, which is partially determined by physical activity. In fact, it is physical inactivity and obesity that adversely affect health, the former by increasing the risk of cardiovascular diseases, osteoporosis, colorectal cancer and possibly other forms of cancer, and the latter by increasing the risk of non-insulin depended diabetes mellitus, hypertension and dislipidaemias. Obesity is primarily a disorder of energy balance, rather than a consequence of “fat” intake. For the prevention of coronary heart disease the guidelines should emphasize reduction of saturated fat and for the prevention of obesity reduction of total energy intake. In both instances, and in several others, a central recommendation is to increase physical activity.

The evidence for the adverse health effects of dietary “fat” does not apply to olive oil and perhaps other types of plant oils. It appears that consumption of olive oil in conjunction with vegetables can convey a substantial degree of protection against a wide range of chronic diseases. The consumption of raw, steamed or boiled vegetables is not very attractive, especially if an objective of 300 g daily intake is to be met. It has been shown in Spain and Greece that consumers of large quantities of olive oil have low saturated fat intake and high consumption of vegetables and legumes². In any case, special emphasis should be given to the specific properties of various types of fat and oils and on how these should affect the recommended quantities.

Other studies suggest that insulin resistance was significantly less in people who used olive oil compared to those who used sunflower oil³. In another study a genomic explanation was considered for the benefits of the Mediterranean diet. This perspective invokes the influence of fatty acids on hormonal signaling events by modifying membrane lipid composition, and their direct influence on the molecular events that govern gene expression⁴.

The Mediterranean diet could offer a healthy alternative approach to low animal fat diet. Moreover its expanded range of options could promote adherence, particularly over the long term. Thus, the intense focus on total fat intake may have distracted people from lifestyle changes that can have real benefit.

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Beth Carlton-Tohill (USA)

Research Scientist / Epidemiologist

Centers for Disease Control and Prevention (CDC)

Chronic Disease Nutrition Branch

Division of Nutrition and Physical Activity

4770 Buford Highway MS-K26

Atlanta, GA 30341

office: 770/488.5157

bft4@cdc.gov

Biographical Sketch

- She completed her master's degree in international health at the University of Alabama in conjunction with service in the US Peace Corps as she spent 2 and half years in Guatemala conducting health and nutrition education to women's groups.
- Doctorate in international nutrition at the University of California, Davis.
- Dr. Tohill carried out extensive literature review of the epidemiological and intervention studies on fruit and vegetable consumption and weight management.
- She also provides technical input as lead scientist for nutrition related issues in Determinants of Energy Imbalance Workgroup of the Obesity Prevention Network.

Recent Publications

- Rolls BJ, Ello-Martin JA, and Tohill BC. ***What Can Intervention Studies Tell Us About The Relationship Between Fruit And Vegetable Consumption And Weight Management ?*** Accepted for publication in Nutrition Reviews.
- Tohill BC, Seynour J, Keetel-Khan L, Serdula M, and Rolls B. ***What Can Epidemiological Studies Tell Us About The Relationship Between Fruit And Vegetable Consumption And Weight Management?*** Submitted for publication.
- Tohill BC, Seymour J, Kettel-Khan L, Serdula M, Rolls BJ. ***What Epidemiological Studies Tell Us about the Relationship Between Fruit and Vegetable Consumption and Body Weight.*** In preparation.

Fruits, vegetables and body-weight management

Beth Carlton-Tohill , Centers for Disease Control and Prevention, Division of Nutrition and Physical Activity, Atlanta.

Several laboratory and clinical interventions have shown that consumption of fruits and vegetables affects satiety, food intake and body weight. Both fruits and vegetables are usually low in fat content and energy density (kcal/g) and high in water and dietary fiber. Adding fruits and vegetables to the diet can reduce overall energy density and allow consumption of satisfying portions while reducing calories. All of these properties can contribute to increased satiety and reduced food intake which may be beneficial for weight management.

Studies directly testing the effects of fruits and vegetables on satiety confirm findings from more basic research that the high fiber and water content and low energy density of these foods may promote satiety as measured by ratings of hunger and fullness. Studies in which the energy density of the diet was reduced by adding vegetables and fruits found that participants consumed a consistent amount of food per day. Because the energy density was lower, there was a spontaneous reduction in daily energy intake. Two studies demonstrate that when people are provided a low-energy dense diet to consume ad libitum, they spontaneously reduce their energy intake and lose weight. The increased intake of fruits and vegetables, however, may have aided in hunger control because participants could be satisfied with an amount of food similar to what they normally ate, while consuming less energy.

Studies that advised subjects to increase fruits, vegetables, and juices, but did not advise subjects on weight loss reported maintenance of body weight. The trials that combined advice to increase fruit and vegetable intake and decrease dietary fat but did not prescribe weight loss found that most participants maintained their body weight or spontaneously lost weight. Other trials show that advice to increase consumption of fruits and vegetables is a beneficial component of a weight management program. Interventions that increased consumption of fruits and vegetables and reduced fat intake were associated with weight loss and maintenance of weight loss.

Interventions that advise an increase in fruit and vegetable consumption along with a reduction in dietary fat show that even when there is no emphasis on body weight, some people spontaneously lose weight and most maintain their weight. It is possible that having no limitations on intake of fruits and vegetables enhances satiety and may help to avoid feelings of deprivation and hunger. More consistent weight loss and maintenance is seen when advice to increase consumption of fruits and vegetables is combined with advice to reduce intake of fat and energy.

It is also of interest to assess how the diet strategies shown to be effective in these trials apply in free-living populations. Although there was a tendency to find higher body weight associated with lower fruit and/or vegetable consumption among adult populations, the overall picture is not clear. Some association between higher intakes of fruit and/or vegetables and a lower BMI or overweight status have been reported in epidemiological studies. The direction and strength of the association did not seem to vary by category of exposure (total fruits and vegetables, vegetables only, fruit only) and was often found to be significant in one sex, but not the other.

Although the data are limited, and many of the reviewed studies were not designed to specifically test the effects of increased consumption of fruits and vegetables alone, these findings suggest that fruits and vegetables may play an important role in weight management. These studies show that a reduction in the energy density of the diet by the addition of fruits and vegetables, independent of changes in fat content, is associated with decreased energy intake.



Christian Remesy (France)

Research Director

*National Institute of Agronomic Research
Unit of Metabolic Diseases and Micronutrients
Theix 63122 St-Genès-Champanelle, France
Phone : +33(0)4 73 62 42 33
Fax : +33(0)4 73 62 46 38
remesy@clermont.inra.fr*

Biographical Sketch

- Dr Remesy has a PhD in Physiology (University of Clermont-Ferrand, 1973) and a State Doctorat in Biochemistry (University of Clermont-Fd, 1982). He joined INRA as a Research Scientist in 1972 and as Senior Research Scientist in 1983. In 1998 he was appointed Chief of the Unit of Metabolic Diseases and Micronutrients.
- Dr Remesy's research focuses on human preventive nutrition and particularly on metabolic and digestive effects of fibers, bioavailability of polyphenols and health effects of plant foods.
- He has published more than 150 original papers in peer-reviewed scientific journals and about 50 review papers. He is the author of 2 personal text books "Alimentation et Santé" 1994, and "Les bonnes calories", 1996.

Recent Publications

- Manach, C., Morand, C., Gil-Izquierdo, A., Bouteloup-Demange, C. & Remesy, C. (2003) ***Bioavailability in humans of the flavanones hesperidin and narirutin after the ingestion of two doses of orange juice.*** Eur J Clin Nutr, 57: 235-242.
- Felgines C, Talavera S, Gonthier MP, Texier O, Scalbert A, Lamaison JL, Remesy C. (2003) ***Strawberry anthocyanins are recovered in urine as glucuro- and sulfoconjugates in humans.*** J Nutr. 133:1296-301.
- Adam A, Crespy V, Levrat-Verny MA, Leenhardt F, Leuillet M, Rémésy C (2002) ***Bioavailability of ferulic acid is primarily governed by the food matrix rather than its metabolism in intestine and liver in rats.*** J. Nutr. 132, 1962-1968.
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The role of fruit and vegetables in the fight against obesity

C Rémésy and C Nicolle, National Institute of Agronomic Research, Unit of Metabolic Diseases and Micronutrients, Theix.

In a mostly sedentary society, when satiation control is not playing its role any more, whether due to insufficient digestive balast or to any other psychophysiological reasons, one of the main reasons for excess weight is the consumption of food with a very high caloric density (lipids or purified carbohydrates). Poor management of body weight is not only a matter of energy unbalance, it is also linked to metabolic deviation and poor management of appetite. Where a person's weight is stable, the fat provisionally stored will be released within hours, days or weeks following their storage. In contrast to this physiological control, which is thankfully effective for most individuals, certain people store lipids stored which are subsequently never fully mobilised. Therefore, adipose areas develop progressively due to the increase of the number of adipose cells (hyperplasia) and of their hypertrophy, in order to provide an ever-growing storage area. Excess energy intake from early childhood is generally linked to the development of obesity as an adult.

Everything takes place as if a series of unfavourable environmental conditions (sedentary way of life, high availability of energy foods, loss of reference points in relation to consumption markers and individual and social controls) has managed to disturb the physiological systems energy intake control. One could believe that only people with genetic predisposition, and who are endowed with storage genes, are likely to becoming obese in an environment that is favourable to this pathology. Yet, according to a more pessimistic hypothesis, the human phenotype evolves, in the long-term, towards a generalised state of excess weight in all the parts of the world where there is an abundance of food energy and a highly sedentary way of life.

It is particularly important to prevent obesity, since, once this condition is established, physiopathological deviation is very difficult to reverse.

Some eating habits and a less sedentary way of life can substantially facilitate the prevention of this pathology. Monitoring lipids or developing low fat products is not enough to create conditions that are favourable to the prevention of excess weight. Thus a series of more favourable environmental conditions and appropriate eating habits must be encouraged.

The problem for a sedentary person is to dispose of a diet covering nutritional requirements with a relatively low food intake. Under these conditions, it is understandable that food has to be of better quality, and must have a stronger nutritional density, i.e. has to provide more essential elements for a reduced calorie intake. Paradoxically, the contrary is actually happening, with many consumers, in order to keep slim, neglecting food acknowledged to be heavy, such as cereal products, wholemeal bread, pulses, potatoes, and consuming processed food which is often relatively fat and sweet, and therefore with a low nutritional density.

A diet rich in relatively unprocessed plant products (and in particular fruit and vegetables) completed with low fat animal food is well adapted to calorie intake control due to the satiation effect of these diets and to their high level of micro-nutrients. However, the obese patient, often used to consuming processed food, considers the adoption of a highly natural diet as a constraint and a source of suffering. Finally, obesity prevention could be greatly facilitated through the development of nutritional education and significant promotion of the benefits of fruit and vegetables.

Indeed, these foods allow caloric density to be reduced while exerting many digestive and metabolic effects that are favourable to both well being and health. Among digestive effects, their favourable role on digestive motility, and on the maintenance of symbiotic fermentation, should be cited. The development of lipogenesis requires a high insulin secretion (and therefore a high blood sugar load) as well as a sufficient availability of fatty acids. A diet rich in fruit and vegetables, inasmuch as these foods replace rapid carbohydrate intakes, is very efficient in the creation of a favourable situation against lipogenesis stimulation (be careful not to serve vegetables with too much lipids). In the long-term, complex plant products also enable the prevention of other physiological disturbances that accompany excess weight: insulin resistance, high blood pressure and dyslipemia. Fruit and vegetables, by their metabolic effects, facilitate food intake control as it has well been proven that the consumption of rapid carbohydrates, and more particularly of sweet drinks, perturbed appetite control.

The efficiency of fruit and vegetable against excess weight is well established but difficulties still remain for changing eating habits among high risks groups. Since prevention at an individual level seems to have a limited impact, it would be important to set up collective prevention programmes to facilitate the adoption of new eating habits by young people and those people who are most at risk.



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Christian Remesy (France)

Research Director

*National Institute of Agronomic Research
Unit of Metabolic Diseases and Micronutrients
Theix 63122 St-Genès-Champanelle, France
Phone : +33(0)4 73 62 42 33
Fax : +33(0)4 73 62 46 38
remesy@clermont.inra.fr*

Biographical Sketch

- Dr Remesy has a PhD in Physiology (University of Clermont-Ferrand, 1973) and a State Doctorat in Biochemistry (University of Clermont-Fd, 1982). He joined INRA as a Research Scientist in 1972 and as Senior Research Scientist in 1983. In 1998 he was appointed Chief of the Unit of Metabolic Diseases and Micronutrients.
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- He has published more than 150 original papers in peer-reviewed scientific journals and about 50 review papers. He is the author of 2 personal text books "Alimentation et Santé" 1994, and "Les bonnes calories", 1996.

Recent Publications

- Manach, C., Morand, C., Gil-Izquierdo, A., Bouteloup-Demange, C. & Remesy, C. (2003) ***Bioavailability in humans of the flavanones hesperidin and narirutin after the ingestion of two doses of orange juice.*** Eur J Clin Nutr, 57: 235-242.
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The relevance of potatoes as a source of complex carbohydrates and potassium in a Mediterranean Diet

Christian Rémésy, Agnès Narcy et Laetitia Robert

Unité des Maladies Métaboliques et Micronutriments, INRA Clermont/Theix

In a time where fruit and vegetables benefits on health are recognised, the exact status of potatoes in the dietary balance remains rather ambiguous. Considered for a long time as a starchy food without nutritional interest, potato consumption, as for bread, dramatically decreased during the last decades.

Yet, potato, as for cereals, fruits, vegetables and leguminous seeds, is one of the source of complex carbohydrates which participates in the balance of the Mediterranean diet. Contrary to cereal products, often consumed too refined, potato can be consumed without significant micro-nutrients loss, when cooking processes are adapted.

The health benefit of vegetables, essential to the supply of carbohydrates, depends on their nutritional density and on their digestive and metabolic effects. As for white bread, potato can have a too high glycaemic index when it is consumed as mashed potatoes with highly gelatinised starch. Cooked with skin, potato can exhibit a good glycaemic index, all the more it is consumed into complex meals. Potato is the adapted food for association with other foods. The richness of potato in potassium organic acids confers on it alkalinising properties which can neutralise acidifying effects of meats or other meat products rich in proteins. The richness in potassium of potato makes this food useful to balance the potassium/sodium ratio in numerous meals. Yet, the control of the potassium/sodium ratio is important to fight against hypertension. Potato also gained to be consumed in association with vegetables, allowing to have balanced preparations on an energetic level and nutrients density. The association potato/leguminous seeds is particularly balanced on the level of nutritional needs satisfaction, and it is commonly used in numerous Mediterranean-type meals.

In conclusion, potato has a poor nutritional image because it is associated in some food typologies to unbalanced or monotonous behaviours. It has, in fact, a remarkable nutritional potential, in particular when it is used with complementary foods, as in the case of the Mediterranean-type meal, rich in fruit and vegetables, also well balanced in fatty acids.

SESSION 2



Prevention of obesity and type II diabetes in children

President : M.A. Charles



M.A. Charles (France)

Research Director

INSERM U258

Cardiovascular and metabolic epidemiology

Paul Brousse Hospital

16 av Paul Vaillant Couturier

94807 Villejuif, France

Phone : +33 (0)1 45 59 50 98

Fax : +33 (0)1 45 59 51 52

charles@vjf.inserm.fr

Biographical Sketch

- Doctor of Medicine, University of Paris VI in 1989
- Since 2001 she is Research Director in the INSERM Research U258, "cardiovascular and metabolic epidemiology", directed by Pr P. Ducimetière.
- She is also Diabetologist in the department of Pr Grimaldi, Hospital Pitié Salpêtrière in Paris, former Intern of Paris hospital, former Chief clinic-Assistant and hold a MD of Statistics and Health.
- Between 1989 and 1992, Dr. Charles was "Research Fellow" in the section of diabetes epidemiology in National Institute of Health, Phoenix, Arizona.
- She is member of the office of biomedical research for INSERM since 1999.
- Her research interests are epidemiology of obesity, type 2 diabetes and insulin resistance adult and children.

Recent Publications

- Heude B, Lafay L, Borys JM, Thibult N, Lommez A, Romon M, Ducimetiere P, Charles MA. ***Time trend in height, weight, and obesity prevalence in school children from Northern France, 1992-2000.*** Diabetes Metab. 2003 Jun;29(3):235-40.
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Prevention of obesity and type 2 diabetes in children - Introduction

MA CHARLES, INSERM unit 258, Villejuif.

In France, the prevalence of childhood overweight rose almost fivefold between 1960 and 2000. Recent estimates of the prevalences of overweight and obesity according to the new international reference (1) are given in the following table

Study	Year	Age (yrs)	N	PREVALENCES	
				Overweight	Obesity
INCA (2)	1998-9	3-14	1018	11,6%	3,5%
OBEPI (3)	2000	2-17	6084	10,9%	2,4%
INVS (4)	2000	7-9	1582	14,3%	3,8%

Although these estimates are still lower than the figure for childhood overweight in the United States where it reached 25 % in the 1990s (5), the pace of progression is similar. The same phenomenon is observed in many countries. The developing world is not spared, especially in urban areas (5).

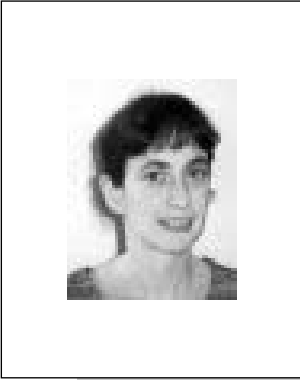
Except for extreme cases, the health consequences of childhood overweight are clinically non apparent. However several long term epidemiologic studies have documented that overweight children and adolescents exhibit a significant risk of early mortality in adulthood. The current childhood obesity epidemic may well have a profound impact on tomorrow's life expectancy. A first sign is the emergence in severely obese adolescents of type 2 diabetes, a disease considered until a few years as typical of late adulthood.

As for adult obesity, the causes of the epidemic are plural and one can only speculate about the relative contribution of changes in food intake, physical activity, development of sedentary activities, widespread genetic predisposition.

To face this alarming situation, the only solution is prevention. Identifying the best preventive measures is an urgent challenge. We need to learn from what has already been done, especially in the field of cardiovascular prevention. We also need to consider that during its growth, the child goes through different phases from in utero development to puberty and that, in each period, may correspond different risk factors for obesity and therefore different preventive measures. While research to better understand the factors promoting fat mass increase at each period of life is warranted, the time is also ripe to engage preventive interventions based on today's knowledge. However, recognizing the complexity of the problem, we have to plan with each intervention a way to monitor and evaluate its results both on the short and the long term.

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Anne Fagot-Campagna, (France)

Epidemiologist

Département des Maladies Chroniques et Traumatismes

Institut de Veille Sanitaire

12 rue du Val d'Osne, 94 415 Saint Maurice Cedex, France

Phone : 01 41 79 68 35

Fax : 01 41 79 68 11

a.fagot@invs.sante.fr

Biographical Sketch

- PhD in Public Health, Epidemiology. University of Paris XI, 1998.
- Board of Endocrinology, Diabetology, Nutrition. University of Paris V, 1995.
- Since 2001, Anne Fagot-Campagna is responsible for the diabetes program at the French Institute for health surveillance and is the principal investigator of the Entred study, a study of a French nationally representative sample of people with diabetes.
- Anne Fagot-Campagna trained at the French National Institutes for Medical Research (INSERM) and worked on lipid abnormalities within the insulin resistance syndrome in the Paris Prospective study. Her post doctoral work was performed at the National Institutes of Health (NIH) in Phoenix, USA, among Pima Indians. She then worked for 3 years at the Center for Disease Control (CDC) in Atlanta (USA) on the emergence of type 2 diabetes among children.

Recent Publications

- Venkat Narayan KM, Gregg EW, Fagot-Campagna A, Gary TL, Saaddine J, Parker C, Imperatore G, Valdez R, Beckles G, Engelgau MM. ***Relation between quality of diabetes care and patient satisfaction.*** J Nat Med Assoc 2003;95:64-70.
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The emergence of type 2 diabetes in children and adolescents as a consequence of the obesity epidemic in childhood

Anne Fagot-Campagna, Diabetes program coordinator, Department of Chronic Diseases and Injuries, Health Surveillance Institute, Saint-Maurice.

The first case series describing children with type 2 diabetes were published 15 to 20 years ago and involved only Native American and Canadian children [1]. Nowadays, while published series from the U.S. include children from all ethnic groups, similar descriptions appear from Asia, the Middle East, North Africa, and Western and Eastern Europe.

In the U.S., type 2 diabetes may represent about 8 to 45 % of diabetes cases currently diagnosed in large U.S. pediatric centers and this variation may be explained by the inclusion of different age and ethnic groups [1]. The highest prevalence is reported for Native Americans. Among Pima Indians who undergo systematic screening, about 5% of all adolescents aged 15 to 19 were diagnosed with type 2 diabetes between 1992 and 1996. In Manitoba, Canada, a screening program yielded a prevalence of 3.6 % among Ojibway Indian girls aged 15 to 19 in 1997. A pediatric center from Cincinnati, Ohio, reported an incidence of diagnosed type 2 diabetes of 7.2 per 100 000 children aged 10 to 19 in 1992.

High estimates are reported in Asia too. In Japan, a type 2 diabetes screening program yielded an incidence rate of 13.9 per 100 000 children aged 12 to 15 in 1995. In Taiwan, a similar screening program reported an incidence rate of 6.5 per 100 000 children aged 6 to 18 in 1999 [2]. It is noteworthy that these estimates approach or exceed type 1 diabetes estimates in those countries. So far in Europe, the figures look different as the disease is only now becoming noticeable. In the U.K., a national survey of pediatric centers found that, among 15 255 children with diabetes aged less than 16 years, 25 had type 2 diabetes (0.2% of the cases), while as many had a MODY form [3]. In France, 333 diabetes cases diagnosed in a large Parisian pediatric referral center between 1993 and 1998 were reviewed: 8 suspicious cases were reported, among which 4 (1% of the cases) were classic type 2 diabetes cases. The low European estimates are, however, likely to be underestimated, as type 2 diabetes may go unreported, undiagnosed, or misclassified as type 1, and is likely to rise.

The emergence of type 2 diabetes in children parallels the epidemic of obesity that is rising in all industrialized countries and more acutely in those undergoing rapid economic changes. In North America, the emergence of type 2 diabetes in children followed a steeper increase in childhood obesity documented during the period 1976-1991 [4]. A similar time trend was observed in Japan. Among Pima Indian children, the documented increase in type 2 diabetes prevalence was formally related to the increase in relative weight measured between 1967-1976 and 1987-1996. A similar phenomenon may be happening in European countries, where the prevalence of childhood obesity is rising while type 2 diabetes in children seems to have emerged more recently.

From a clinical perspective, children who have been diagnosed with type 2 diabetes are generally overweight, have a strong family history of type 2 diabetes and often show signs of insulin resistance, including acanthosis nigricans [1]. The majority belongs to ethnic groups with a high risk of type 2 diabetes. More girls than boys are diagnosed and the peak age is around 12 to 16 years. As follow-up data become available, it is more and more evident that young adults who develop type 2 diabetes

during childhood have a high prevalence of microvascular and macrovascular complications and early mortality [5].

With the obesity epidemic occurring in several industrialized or industrializing countries, and type 2 diabetes in children emerging or increasing, urgent preventative measures are required. As in the U.S., the recognition of type 2 diabetes in children as a current or potential public health problem may help focus on the obesity epidemic and on preventative measures at the societal level.

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Hanna Lagström (Finland)

Post doc Nutrition Reseacher

University of Turku, CAPC (Research Centre of Applied and Preventive Cardiovascular Medicine)

Kiinamylynkatu 10

FIN-20520 Turku, Finland

Tel (int): +358-2-333 7287

Fax (int): +358-2-233 1126

hanna.lagstrom@utu.fi

Biographical Sketch

- Master of Science in Food Science, University of Helsinki.
- Doctorate in Philisophy in 1999, University of Turku, STRIP Project. Studied nutrient intake and food choice in a child-targeted coronary heart disease prevention trial at Department of Medicine.
- Carried out project research work, planning further counselling of the project and expert lectures of children nutrition and cardiovascular disease.
- Responsible for coordination of clinical studied and taking part to clinical studies as a specialist of nutrition. Develop further clinical study activities for (functional) food development.

Recent Publications

- Simell O, Niinikoski H, Rönnemaa T, Lapinleimu H, Routi T, Lagström H, Salo P, Jokinen E, Viikari J. ***The Special Turku coronary risk factor intervention project for babies (STRIP).*** Am J Clin Nutr 2000 72:1316-31.
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Overweight and obesity in an atherosclerosis prevention trial starting in early childhood. The STRIP study.

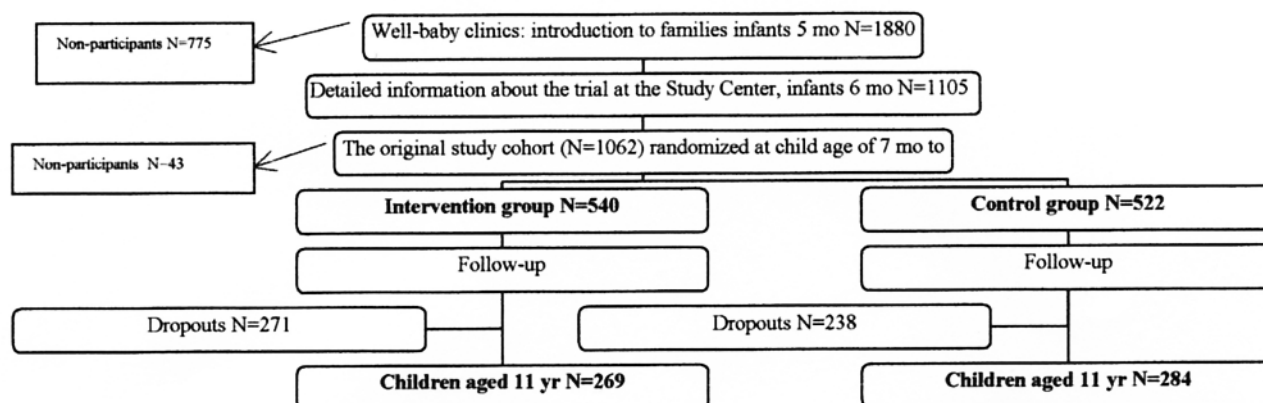
Hanna Lagström, Research Centre of Applied and Preventive Cardiovascular Medicine, University of Turku.

Coronary heart disease is a major health problem in Western countries. The most important risk factors of coronary heart disease (CHD) are hyperlipemia, obesity, hypertension, and smoking. The first morphological changes of this disease are visible already in early childhood even if the symptoms usually appear in middle age. Indeed, most of the risk factors of CHD are based on the way of living. Thus, any counseling aiming to prevent this disease should start long before any harmful dietary habits or way of living has been fastened. Life-style interventions are probably even more successful if implemented at a time when life-style patterns are formed, i.e., in childhood (Chandra 1992, American Academy of Pediatrics 1992).

Obesity in adulthood is strongly associated with a variety of serious diseases and an increased overall mortality rate (World Health Organisation 2003). Recent data indicate an increase in the prevalence of obesity even in school age children in western countries, and obese children tend to become obese adults (Chinn and Rona 2001). The main aim of this study was to evaluate the impact of individualized dietary counseling on e.g. growth during the first 11 years of life.

The STRIP study is a prospective randomized trial with onset in infancy aimed to reduce exposure to atherosclerosis risk factors. The trial comprised 1062 children when launched at the age of 7 months in the beginning of 1990s, and at the age of 11 years 542 children still remain in the study (Figure 1). After age of 7 months the intervention children (n=540) received biannually individualized dietary counseling focused on reduction in saturated fat and increase in unsaturated fat. With control group (n=522) dietary issues were discussed as in common Finnish health care. Growth was measured once a year.

Figure 1. Flow-chart of the STRIP -trial.



Serum cholesterol and LDL-cholesterol values of the intervention children have been significantly below those of the controls. Dietary fat intake of the intervention children is dominated by poly- and monounsaturated fats while the control children consume more saturated fats. These changes have occurred without changes in the growth of neurological development of the children (Lagström et al. 1997, Rask-Nissilä et al. 2000).

Through of the trial the mean heights, relative heights, weights and relative weights of the intervention and control boys, and also of the intervention and control girls were closely similar. The percentage of slim children was comparable in both groups. The percentage of overweight children was continuously higher in the control than in the intervention group. At the age of 11 years about 20% of control girls was classified as overweight and at same age 1.9 % of the intervention and 4.5% of the control children were truly overweight (obese).

Most powerful protector of overweight was belonging to the intervention group. On the contrary, increasing factors of overweight were child's age and mothers BMI.

Energy intake was closely similar of normal and overweight children, but overweight girls got 30% of daily energy intake of evening snacks. However, no differences were seen in the consumption of soft drinks, sweets or fruits between the normal and overweight children. The intake of energy yielding nutrients as percentage of energy did not differ between groups.

In conclusion, individualized dietary counseling seemed to decrease development of obesity in this atherosclerosis prevention trial.

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Claudio Maffeis (Italy)

Associate Professor of Pediatrics

Department of Pediatrics

University Hospital

10 Piazza LA Scuro

Verona, I - 37134

Phone: ++ 39 045 8074371

claudio.maffeis@univr.it

Biographical Sketch

- M.D., 1985, University of Verona Medical School.
- He postgraduated in Pediatrics in the same University in 1989 and in Gastroenterology in 1999
- Research fellow in Gastroenterology and Nutrition, Pediatric Gastroenterology and Nutrition Unit, Tufts University, Boston, 1993.
- Associate Professor, 2004, University of Verona Medical School, Pediatrics.
- Dr. Maffeis has focused much of his work on the aetiology of childhood obesity and the energy and nutrient metabolism in children.
- He had the chair of the Childhood Obesity Research Group of the Italian Society of Pediatric Endocrinology and Diabetology. He was also a member of the Childhood Obesity Group of the International Task Force for Obesity of the WHO.

Recent Publications

- Sun M, Schutz Y, Grezzani A, Clementi M, Gaudino R, Maffeis C. ***Body size and early growth in appropriate- and large-for-gestational-age infants.*** Acta Paediatr. 2003 Oct;92(10):1127-32.
- Maffeis C, Corciulo N, Livieri C, et al. ***Waist circumference as a predictor of cardiovascular and metabolic risk factors in obese girls.*** Eur J Clin Nutr. 2003 Apr;57(4):566-72.
- Maffeis C, Moghetti P, Grezzani A, Clementi M, Gaudino R, Tato L. ***Insulin resistance and the persistence of obesity from childhood into adulthood.*** J Clin Endocrinol Metab. 2002 Jan;87(1):71-6.
- Maffeis C, Schutz Y, Grezzani A, Provera S, Piacentini G, Tato L. ***Meal-induced thermogenesis and obesity: is a fat meal a risk factor for fat gain in children ?*** J Clin Endocrinol Metab. 2001 Jan;86(1):214-9.

Potential sensitive targets for the prevention of childhood obesity

Claudio Maffeis, Department of Pediatrics, University of Verona.

The reasons to prevent obesity in childhood are based on:

- a. the enormity of the epidemic;
- b. the evidence that treatment of obesity is ineffective in the long-term;
- c. the persistence into adulthood;
- d. the association with morbidity in childhood: cardiovascular risk factors, endocrine system disorders, psychological, pulmonary, orthopaedic and gastrointestinal/hepatic complications;
- e. the association with morbidity and mortality in adulthood;
- f. public health and socio-economic demand.

Different cognitive approaches have been tested for obesity prevention in children. Most of them were primarily education strategies focused on dietary education and physical activity promotion. A recent review of these interventions suggests that currently there is limited quality data on the effectiveness of obesity prevention programmes and as such no generalizable conclusions can be drawn. The need for well-designed studies that examine a range of interventions remains a priority. However, in spite of the modest experience accumulated on prevention of obesity, the size of the epidemic necessitates to use the best information available to face the problem and start the intervention.

Obesity is the result of the interaction between genetic, biological, psychological, socio-cultural, and environmental factors. Several well defined risk factors of obesity have been detected and may be proposed as sensitive target for intervention.

Age at risk

Critical periods of development for excessive weight gain in childhood have been identified : intrauterine life, the first year of life and puberty.

Objects of prevention

The increasingly “obesogenic” environments are probably the main driving forces for the obesity epidemic. Maternal/parental obesity, family and parental dynamics, low socio-economic state, TV viewing, having a TV in the bedroom, advertising, machines that promote physical inactivity, lack of safe places for physical activity, lack of consistent access to healthful food choices, etc. are environmental risk factors of obesity. All these factors affect self-regulation of energy and nutrient intake of the child, promoting a positive energy and fat balance and fat gain. Diet composition, energy density of the diet, portion size, patterns of energy and nutrient intake, food availability, sedentary lifestyle, etc. are the tools by which the risk factors of obesity promote obesity in the genetically predisposed individuals. All of them are potential objects of intervention.

Families, schools, communities, health care services are the key settings for interventions.

Transport and infrastructure sector, media and food sector are the key macroenvironments for interventions.

Identification of subjects at risk

High birth weight, rapid weight gain in the first months of life, maternal/parental obesity are important risk factors of obesity that may contribute to identify a subgroup of subjects at higher risk. Growth parameters of all these children have to be monitored at least twice a year. Rate of excessive weight gain relative to linear growth, detectable by changes in BMI percentile, allows to recognize overweight and to address it before children are severely overweight or obese. Treatment intervention before obesity has become severe is more successful (C.Maffeis, unpublished data).

Conclusion

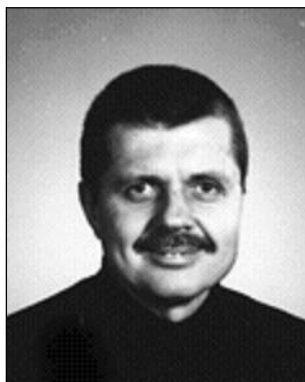
Prevention of obesity in childhood is justified by the evidence that health habits acquired in childhood tend to affect behaviour in adulthood and that nutrition and physical activity habits are associated with behaviours that are useful to the health of the individual.

The development of new techniques for promoting changes of nutritional and physical activity behaviour of the children is necessary.

Several barriers make difficult to build and apply obesity prevention programmes for children as well as adults. The most important is the scarce awareness that obesity epidemic is a real threat for the individual and the health care systems of the industrialized societies.

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Adam Drewnowski (USA)

Professor of Epidemiology

University of Washington

School of Public Health and Community Medicine

Box 353410

Nutritional Sciences

Raitt Hall 305^E Seattle, WA 98195

Phone I: 206-543-8016

Fax : 206-685-1696

adamdrew@u.washington.edu

Biographical Sketch

- He obtained his PhD in Psychology at Rockefeller University in 1978.
- Following postdoctoral training at the University of Toronto, he rejoined The Rockefeller University as Assistant Professor in the Laboratory of Human Behavior and Metabolism and became engaged in obesity research. He then moved to the University of Michigan, where he became Professor of Public Health, Psychology, and Psychiatry and headed the Program in Human Nutrition at the School of Public Health. He joined the University of Washington in 1998.
- In 1997, he was Chercheur Invité, Institut Scientifique et Technique de la Nutrition et d'Alimentation, Conservatoire National des Arts et Métiers, Paris, France.
- Research interests are in taste and food preferences, dietary choices, studies on obesity and eating disorders, new tools for assessing quality of the total diet, nutrition and cancer prevention.
- Dr. Drewnowski is the Director of the Nutritional Sciences Program. Since 2002 he is director of the Center for Public Health Nutrition at the University of Washington.

Recent publications

- ***Replacing fats and sweets with vegetables and fruit – a question of cost.***
Drewnowski A, Darmon N, Briand A. Am J Publ Health 2004 (in press).
- Drewnowski A, Specter SE. ***Poverty and obesity: diet quality, energy density and energy costs.*** Am J Clin Nutr 2004 (in press).
- ***Liquid calories and the failure of satiety: how good is the evidence?***
Almiron-Roig E, Chen Y, Drewnowski A. Obes Rev. 2003 Nov;4(4):201-12.
- ***Hunger, thirst, and energy intakes following consumption of caloric beverages.***
Almiron-Roig E, Drewnowski A. Physiol Behav. 2003;79(4-5):767-73.
- ***Nutrition transition and global dietary trends.***
Drewnowski A. Nutrition. 2000 Jul-Aug;16(7-8):486-7.

Nutrition in Transition : Diet Quality and Diet Costs

Adam Drewnowski, Center for Public Health Nutrition, University of Washington, Seattle.

Highest rates of obesity in the US occur among population groups with highest poverty rates and the least education. An analogous situation is observed in France and other countries of the European Union. The link between obesity and low incomes may be mediated, in part, by the low cost of energy-dense foods and reinforced by the high palatability of sugars and fats. The observed inverse relationship between energy density of foods (MJ/kg) and energy cost (\$/MJ) means that diets high in refined grains, added sugars and added fats represent the lowest-cost option to the consumer. Such diets are far more affordable than the recommended diets based on lean meats, fish, fresh vegetables and fruit. Paradoxically, attempting to reduce diet costs may lead to the selection of energy-dense foods, increased energy intakes and weight gain.

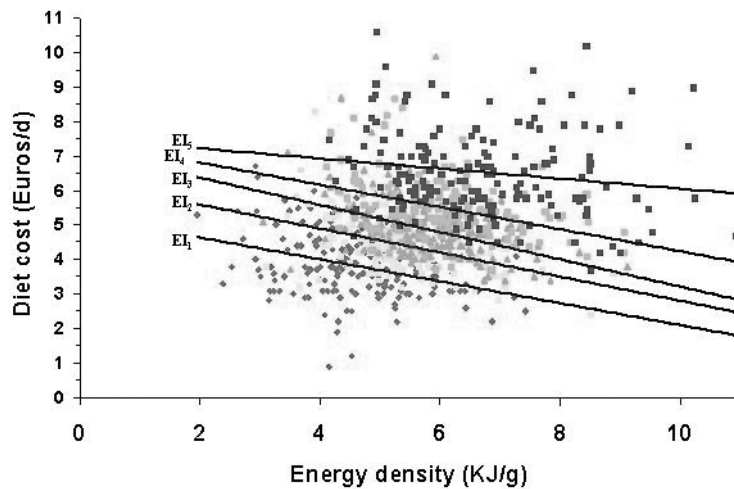
Evidence that energy diets are associated with lower diet costs is provided by analyses of the Val-de-Marne data set, an observational study of 837 French adults. Dietary intakes were assessed using a dietary history method and dietary energy density was calculated by dividing total energy by the edible weight of foods consumed. Daily diet cost in Euros/d was estimated using mean national food prices for 57 food items. The relationship between dietary energy density and diet cost at each level of energy intake was examined in a regression model, adjusted for gender and age. Energy-dense refined grains, fats and sweets provided energy at a lower cost than did lean meats vegetables and fruit. Within each quintile of energy intake, diets of lower energy density were associated with higher diet costs (see Figure 1). Each additional 100g of vegetables and fruit was associated with a net increase in diet costs of 0.18-0.29 Euros/d.

Replacing fats and sweets with lean meats, low-fat dairy products and fresh vegetables and fruit has become standard guidance for dietary change. However, studies show that healthier diets do, in fact, cost more. If higher food costs represent a perceived (and very real) barrier to dietary change, especially for lower-income families, then the ability to adopt healthier diets may have less to do with motivation or nutrition knowledge than with household economic resources and the food environment. Obesity in America is, to a large extent, an economic issue.

Current approaches toward promoting healthier diets no longer emphasize individual behavior change. As long as added sugars and fats remain cheaper and more convenient than nutrient-dense vegetables and fruit, the battle against low-quality diets will be lost. Rather, the current emphasis is on environmental and policy interventions that address accessibility and the affordability of foods. There is a need for more studies on diet quality, dietary energy density and food costs on which to base responsible nutrition interventions and policies for food assistance.

Figure1: Relationship between energy density and energy costs for each quintile of energy intake (EI).

At each level of energy intake, higher energy density was associated with higher costs (Euros/d)



Data from Darmon et al. 2004

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WORKSHOP 2



From overweight to obesity

President : M. Piperno



Michel Piperno (France)

Head of Endocrinology Department

*Centre Hospitalier Général
Service de Diabétologie et Endocrinologie
Avenue du Languedoc
66046 Perpignan, France
Tél +33 (0)4 68 61 67 71
Fax + 33 (0)4 68 61 67 66
mpiperno@club-internet.fr*

Biographical Sketch

- Diploma in Diabetologia (1976) and in Internal medicine (1976).
- Head of Department - Diabetology endocrinology - Hospital of Perpignan (France).
- Assistant Diabetologist CHU Lapeyronie (Pr. Monnier) Montpellier (France).
- Former Intern of hospital Montpellier (1968).
- Former head of private clinic/Assistant Hospitals of Montpellier.
- Former teacher at IUT of dietetic (Montpellier).
- Member of ALFEDIAM.
- Consulting physician Center of Malian Fight against Diabetes in Bamako (republic of Mali).

Recent Publications

- ***[Nutritional and medicaments primary prevention of atherosclerosis]***
Rev.Med.Int. 1999 ; 20 (suppl. 3) : 360-37.
- ***[Coronary disease and hyperglycemia; and if the presumption of culpability was already a proof].*** Revue du Praticien 2000 ; 50 : 933-936.
- ***[All the fat are they equal ?]*** Entretien de Bichat 2000 – Expansion scientifique Française (Paris) 2000 : 99-102.
- ***[The dietetic management of the cardiovascular risk]*** Entretien de Bichat 2002– Expansion scientifique Française (Paris) 2002: 90-92.
- ***[diabetes: multiple comorbidities and deficiencies, socio-economic cost.]*** lu : Diabète et Médecine Physique (Masson Eds Paris) 2001 : 1-7.

From overweight to obesity - Introduction

Michel Piperno, Department of Diabetology Endocrinology, Hospital of Perpignan.

Obesity, with its genetic predisposition, constitutes the greatest risk factor in relation to the development of DS2.

When diabetes is diagnosed (according to usual diagnosis criteria), at least 30% of patients already show degenerative complications, and pancreatic beta cell secretion is considered to be reduced by half. Subsequently this deterioration continues in a continuous and inevitable manner to such an extent that the patient becomes insulin dependant when the insulin-penia stage is reached per year (UKPDS).

Any weight loss, even moderate, can reduce blood sugar risk among overweight patients.

Obesity is one of the factors that can be acted upon. Obesity treatment and prevention should remain an essential preoccupation in the prevention of DS2 among high-risk subjects.

Indeed, as long as insulin resistance, an inherent factor in obesity, is well compensated by insulin hypersecretion, blood sugar remains normal. As soon as beta cells can no longer sustain their compensating hypersecretion, hyperglycaemia takes hold. Reducing insulin resistance slows down conversion intolerance of ordinary glucose into DS2.

But first weight must be lost in order to overcome insulin resistance.

Several studies have shown the effectiveness of a change in lifestyle (diet with weight loss, physical activity).

The recently published Xendos study is one of the most convincing studies, and it shows, in a very precise manner that weight reduction prevents or delays the appearance of DS2.

Patients, whose average BMI exceeds 30Kg/M², experience a reduction in their metabolic risk as soon as they lose weight. Thus, a decrease of 7kg results in a reduction in the relative risk of DS (- 37%).

Thus, it appears essential that everything possible should be done to reduce obesity, knowing that this path is strewn with difficulties. These difficulties can sometimes appear so difficult to overcome that if one wishes to obtain effectiveness in the medium and long-term, an overall treatment programme is required (medical, diet and psychological), in conjunction with physical activity.



Mariette Gerber (France)

Research Director

Research Center in Cancerology

INSERM-CRLC

Metabolic Epidemiology Group

34298 Montpellier Cedex 5

Phone : 33 4 67 61 30 050

Fax : 33 4 67 52 29 010

marietger@valdorel.fnclcc.fr

Biographical Sketch

- She has French MD and Sc.D degrees and an US PhD in Immunology and Tumor Biology. She is currently Head of a Research group on “risk factors of cancers”.
- Dr. Gerber realized analysis of diet in several sub regions of Southern France and analysis on determinants of obesity and alcohol consumption in Southern France.
- Also she coordinates epidemiological study on the interaction between environmental factors (including nutrition) and gene polymorphisms and on specific effect of fatty acids in breast cancer.
- One of her present research activities concern intervention trial with Mediterranean diet on subjects at risk for cardio-vascular diseases.
- She is an expert for the French Food Safety and Security Agency.

Recent Publications

- Scali J, Siari S, Grosclaude P, Gerber M. ***Dietary and socio-economic factors associated with overweight and obesity in a Southern French population.*** In press in Public Health Nutrition.
- Gerber M.. ***Biofactors in the Mediterranean diet.*** Clin Chem Lab Med. 2003 Aug;41(8):999-1004
- Siari S, Scali J, Richard A, Tretarre B, Daures JP, Padilla M, Grosclaude P, Gerber M. ***Subregional variations of dietary consumption and incidences of cancers in southern France.*** IARC Sci Publ. 2002, 156:127-9.
- Saintot M, Mathieu-Daude H, Astre C, Grenier J, Simony-Lafontaine J, Gerber M. ***Oxidant-antioxidant status in relation to survival among breast cancer patients.*** Int J Cancer. 2002 Feb 10, 97(5):574-9.

Overweight and obesity factors in a Mediterranean population

Mariette Gerber, Research Center in Cancerology INSERM-CRLC, Montpellier.

France is a country where the proportion of overweight and obesity is among the lowest among European countries ^{1,2}. Within France, women from Southern regions display the lowest percentage of overweight and obesity (F. Clavel, personal communication). However a recent report on young army recruits BMI showed that the prevalence of overweight and obesity was more rapidly increasing in those from the Mediterranean regions ³ compared with other French regions opening a debate on the relevance of Mediterranean diet as nutritional model.

In this study, conducted in French Mediterranean and Southwest regions, we focused on socio-economic and individual factors (diet and physical activity), and their potential relationship with overweight and obesity respectively using a cross-sectional analysis of socio-economic, life style and nutritional characteristics of a representative population sample. 1169 subjects (578 women and 552 men), aged 30 to 77 years, were part of the MEDHEA study, a randomly recruited population sample in Hérault and Tarn départements and Marseille and Toulouse cities ⁴. A questionnaire elicited information on anthropometric measurements, socio-economic factors, physical activity, tobacco use, alcohol and food intakes. Non-parametric tests, multilinear regression and correspondence factorial analyses (CFA) were used to estimate the association of the various factors with overweight and obesity

Age, and education were associated with overweight in both genders, reproductive factors in women, and tobacco use in men. Few dietary factors were identified (high energy intake and low intake of carbohydrates), but all these variables explain little of the variation (18.5% in women and 14.6% in men) (Table 1). The CFA further investigated the association of lifestyle and nutritional factors, giving more weight to nutritional behaviour for overweight men and women. Obesity factors differed from the overweight ones by being different in men and women, maybe related to psychological behaviour, and fewer suggesting an insufficient coverage by the usual questionnaires.

Overweight and obesity appears as 2 different entities. Energy imbalance induced by various lifestyle factors plays a major role in the development of overweight whereas obesity represents a more complex entity where psychological and genetic factors difficult to assess may be more important. General nutritional guidelines appear more adapted to prevention of overweight and individual counselling to that of obesity.

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4. Scali J, Siari S, Grosclaude P, Gerber M. Dietary and socio-economic factors associated with overweight and obesity in a Southern French population. *In press in Public Health Nutrition*

Table 1. Multiple regression models for BMI as the dependent variable and dietary factors and other non-dietary factors as independent variables in women and men.

	Age (years)	Age at menarche	OC	Carbohydrate (% of energy)	Marital status	Education	Smoking status	Protein (% of energy)	Physical activity at work	R ²
Women	11.4	2.1	0.9	1.9		2.2				18.5
	<0.0001	<0.0005	<0.05	<0.0005		<0.0005				
Men	6.4			3.6	1.7	1.0	0.8	0.6	0.5	14.6
	<0.0001			<0.0001	<0.01	0.01	<0.05	<0.05	<0.10	

Women Model: age (years), education (< high school degree, ≥ high school degree), age at menarche, parity, menopausal status (yes, no), oral contraceptive (yes, no), HRT (yes, no), fat % of energy, carbohydrate % of energy, protein % of energy

Men. Model: age (years), education, (< high school degree, ≥ high school degree), smoking status, (current, ex-, no-smoker), marital status: yes, fat % of energy, carbohydrate % of energy, protein % of energy, physical activity at work (MET), leisure physical activity (MET).



Thierry Gibault (France)

Hospital attached doctor

Hotel Dieu, service de nutrition

7 bis rue Le Sueur

75116 PARIS, France

Phone : 01 45 00 04 05

thierry.gibault@free.fr

Biographical Sketch

- Doctor in Medicine in 1988, specialized in Endocrinology metabolism in 1992 University of Paris V.
- University diploma in Human nutrition and therapeutic dietetics (Pr Debry, Nancy, 1992), in Endocrinology gynecology (Pr Kutten, Paris V, 2000) and artificial Nutrition (Pr Ricour, Paris V, 1998).
- Attached doctor in the department of Nutrition (Hôtel Dieu, Paris) and department of Diabetology (Pr Schaeffer, Hôpital Henri Mondor, Créteil) .
- Private consultation in nutrition and endocrinology.
- Medical journalist (French federation of cardiology).
- Member of Alfediam (French association to study diabetes and metabolic diseases), SFN (French society of nutrition), AFTCC (French association of behaviour and cognitive therapy).

Recent Publications

- ***Diététique du sportif*** Thierry Gibault,- Paris : Lec. : Hatier, 2001 - 71 p. : (Nutrition et santé).
 - Coeur et nutrition (Lec : hatier 1997).
 - Basdevant A, Cassuto D, Gibault T, Raison J, Guy-Grand B. ***Microalbuminuria and body fat distribution in obese subjects.*** Int J Obes Relat Metab Disord. 1994 ;18(12):806-11.
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-

From being overweight to obesity : what treatment(s) ?

Thierry Gibault, Hôtel Dieu Hospital, Nutrition Department, Paris.

Obesity and excess weight are increasing constantly. In France, in 2003, the percentage of overweight people was 30.3%, whereas this figure was only 28.5% in 1997. The figure in relation to obesity is 11.3%, whereas it was only 8.2% in 1997 (Obépi data, 2003).

In practice, there is a continuum between weight gain, excess weight and obesity. Therefore it is essential that individual precautions be taken to avoid weight gain, particularly in risky situations (stopping smoking, ceasing physical activity, depression, medicinal treatment, pregnancy, gynaecological surgery, changing lifestyles, psychological and social problems, ...) or among predisposed individuals (family history, past history of weight gain, repetitive diets and fluctuations in weight, ...).

From a prevention perspective, a rapid **weight gain** of more than 5% of body weight should attract attention. There is reason to search for the circumstances that trigger this condition and to correct them. Treating obesity induced complications is also of paramount importance.

In the case of **overweight** people (BMI of between 25 and 29.9) who are not obese, treatment relies, above all, on behavioural changes to achieve a balanced diet, to structure meal timetables, to promote physical activity in daily life, or even to change lifestyle. The first objective could be weight stability. However, in cases where there is a vascular risk factor, associated pathologies (hypertension, diabetes, ...) or excess abdominal fat deposition (synonymous with insulin resistance), weight loss is necessary and should be associated with the correction of vascular risk factors.

In the case of **obese** people (BMI greater than 30), the objectives are a moderate reduction in weight (i.e. 10 to 15%) and weight stability in the long-term.

In all cases, treatment relies on slightly restrictive dietary measures (encouraging a balanced diet, associating low energy density with high nutritional density, promoting vegetables, complex carbohydrate food while insisting on a reduction in lipid intake). In the case of obesity, medicinal treatment may be necessary. In the case of morbid obesity (BMI greater than 40) an eventual decision to undertake surgery could be prescribed, in the event of failure of well managed medical treatment.

Finally, it is essential that there is consistency in follow-up and subsequent consultations, in order to improve long-term weight prognosis.



Véronique Liegeois (France)

Dietician

17 avenue Gastellier

77120 Coulommiers

France

Veronique.liegeois@wanadoo.fr

Biographical Sketch

- Dietician since 1986.
- University diploma in Dietetics, University of Rennes, France.
- Consultation in private office, Seine et Marne, France.
- fellow lecturer at the university of Marne La Vallée (France), Faculty of STAPS (Faculté des Sciences du Sport et de l'Education Physique et Sportive).
- Collaboration to several general public magazines in dietetics and health.
- Collection director and author at Flammarion.

Recent Publications

- *Techniques culinaires*, Edition Lavoisier, 2001.
- *Le potager de la santé*, Editions de Vecchi, 2000.
- *Maigrir et garder son poids idéal*, Editions de Vecchi, 2000.
- *Collection cuisine santé*, Flammarion (à paraître en Septembre 2004).

Dietician's practice : what are the solutions?

Véronique Liegeois

Be it overweight, obesity, or just a simple desire to lose weight (with normal BMI), dieticians are confronted with diverse requests and needs, all with the same purpose: to lose weight.

It should be highlighted that patients in urban areas are motivated, since they take the initiative to consult and to pay their medical advice. Therefore, it is a voluntary initiative to change.

What do patients request ?

- Tangible results (loss of weight, improvement in biological parameters, reduction in pain experienced, ...)
- A diet that allows them to enjoy eating
- Solutions adapted to their lifestyle, to the pressures of everyday life, ...
- Long-term results

What are patients needs ?

The analysis of their actual requirements is sometimes out of step. Losing weight implies a real change in lifestyle and behaviour, giving up certain habits and getting into others.

It is unrealistic to solely focus on a new diet mode: it also requires more exercise, stress management, and the setting of reasonable and acceptable objectives.

The dietician can, through discussion and negotiation, encourage awareness and a review of objectives.

What are the solutions, from a diet point of view?

There is no miracle concerning diet, and moderate energy reduction remains the basis of diet control. Current orientation is towards a balanced diet, without any draconian restrictions and always based on lifestyle (staggered timetables, ...) and spontaneous dietary intake of patients (all patients are not voracious).

In particular, the following is readjusted:

- Fresh fruit and vegetable intake: nearly always insufficient, especially in relation to fruit and certain vegetables that are wrongly considered to be "too sweet" by many patients. Their particularly low energy contribution, associated with an abundance of protective micro-nutrients, make them pillars of low calorie diets.
- The quantity and quality of starchy foods: they are excessively consumed by certain patients, and have, on the contrary, practically disappeared from the menu of other patients who panic at the idea of eating carbohydrates.
- Control the intake of meat, fish and dairy products, which are essential for protein requirements.
- Better selection of fat sources in order to prevent cardiovascular disease.
- Reduce the occurrence of "empty calories" for the benefit of food with a high nutrition value.
- Maintain optimal body hydration.
- Maintain the so called "pleasure food" intake, in precise quantities and frequency, determined for each patient (sweets, chocolate, alcohol, ...)

Above all, it is important to adopt a healthy diet, based on unprocessed and home-made foods, whenever possible. Processed foods are easy to use and they can facilitate life, but their content should be checked (they usually have a poor nutritional density and a high salt content).

To help patients in losing weight, whether they are overweighed, obese or simply seeking to lose a few kilos, is not fundamentally different: it is mainly accompanying a change. Therefore, one applies oneself to fighting preconceived ideas, to make patients aware of the importance of setting a hierarchy for their objectives, to help patients regain an acceptable weight and better health, thanks to an adapted and pleasurable diet.

SESSION 3



Nutritional recommendations: from traditional Mediterranean diet to modern lifestyle adaptations

President : E. Riboli



Elio Riboli (France)

*International Agency for Research on Cancer
(IARC-WHO)*

*Unit of Nutrition and Cancer
150 cours Albert Thomas
69372 Lyon Cedex 08, France
Phone : +33(0)4 72 73 84 11
Fax : +33(0)4 72 73 83 61
riboli@iarc.fr*

Biographical Sketch

- Dr 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.
- In 1995 he was appointed Chief of the Unit of Nutrition and Cancer of IARC, whose main object will be follow-up of EPIC over the next decade and research into the role of nutrition, lifestyle, environment, genetics and metabolic and hormonal factors in cancer etiology.

Recent Publications

- Miller AB, Altenburg HP, Bueno-De-Mesquita B,... Riboli E, . ***Fruits and vegetables and lung cancer : Findings from the European prospective investigation into cancer and nutrition.*** Int J Cancer. 2004 Jan 10;108(2):269-276.
- Riboli E, Norat T. ***Epidemiologic evidence of the protective effect of fruit and vegetables on cancer risk.*** Am J Clin Nutr. 2003 Sep;78(3 Suppl):559S-569S.
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- Agudo A, Slimani N,... Riboli E. ***Consumption of vegetables, fruit and other plant foods in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohorts from 10 European countries.*** Public Health Nutr. 2002 Dec;5(6B):1179-96.

Nutritional recommendations : from traditional Mediterranean diet to modern lifestyle adaptations - Introduction

Elio Riboli, Unit of Nutrition and Cancer, IARC-WHO, Lyon.



Antonia Trichopoulou (Greece)

Associate Professor of Preventive Medicine and Nutrition

*Medical School - University of Athens
Department of Hygiene & Epidemiology
75 Mikras Asias Str
GR-11527 Athens Hellas
Phone : + 20 210 746 2073
Fax : + 20 210 746 2079
antonia@nut.uoa.gr*

Biographical

- 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. Currently she is Associate Professor of Preventive Medicine and Nutrition and Director of the World Health Organization Collaborating Center for Nutrition at the Department of Hygiene and Epidemiology, School of Medicine, University of Athens.
- 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.
- Antonia Trichopoulou's research focuses on various aspects of nutrition and particularly issues concerning the Mediterranean diet.

Recent publications

- Trichopoulou A, Costakou T, Bamia C, Trichopoulos D. ***Adherence to a Mediterranean diet and survival in a Greek population.*** N Engl J Med. 2003;348:2599-608
- Costacou T, Bamia C, Ferrari P, Riboli E, Trichopoulos D, Trichopoulou A. ***Tracing the Mediterranean diet through principal components and cluster analyses in the Greek population.*** Eur J Clin Nutr 2003; 57:1378-85
- Trichopoulou A, Gnardellis Ch, Laggiou A, Benetou V, Naska A, and Trichopoulos D. ***Physical activity and energy intake selectively predict the waist-to-hip ratio in men but no in women.*** Am J Clin Nutr 2001;74:574-578

The traditional Mediterranean diet recommendations

Trichopoulou Antonia, WHO collaborating Centre for Nutrition, Medical School, University of Athens.

In several studies, which evaluated the information accumulated over the last three decades, it became evident that the traditional Mediterranean diet meets several important criteria for a healthy diet. Direct evidence in support of the beneficial properties of the Mediterranean diet has also become available. The data were derived from studies which have used a diet score, devised a priori on the basis of desirable key features of the traditional diet common in the Mediterranean region 1,2,3,4,5. The desirable features (components of the Mediterranean diet) are the following.

- high olive oil consumption
- high consumption of legumes
- high consumption of unrefined cereals
- high consumption of fruits
- high consumption of vegetables
- regular consumption of fish
- moderate wine consumption during meals*
- moderate consumption of dairy products, mostly as cheese and yogourt
- low consumption of meat and meat products

An important question, however, has not been fully addressed: is the Mediterranean diet an integral entity or the sum of identifiable components that could be separately considered?

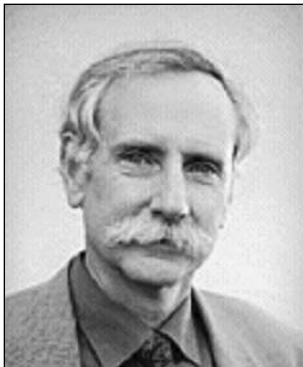
The milestone studies launched by Keys in the 50s, were occasionally interpreted as indicating that the Mediterraneans were privileged by having low rates of coronary heart disease, simply because they consumed diets with low saturated fat content. The argument of several scientists from Mediterranean countries, that the diet of their region is more than a low saturated fat diet and has implications for diseases other than CHD, has received limited attention by the wider scientific community. Olive oil and the Mediterranean dietary pattern as a whole remained in the shadow of the polyunsaturated fat-cholesterol debate.

Ongoing research will help elucidate why particular foods in the Mediterranean diet have beneficial effects, by pointing to additive or interactive effects of their constituent macronutrients and micronutrients, with special consideration of the possible role of antioxidant phytochemicals.

* variable according to religious and traditional norms

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Mediterranean diet pyramid: a cultural model for healthy eating. Am J Clin Nutr 61:1402S-6S.



Walter C. Willett (USA)

*Professor of Epidemiology and Nutrition
Professor of Medicine*

*Department of Nutrition
Building II, Room 311
655 Hunting Avenue
Boston, MA 02115
Phone: 617-432-4680
walter.willett@channing.harvard.edu*

Biographical Sketch

- M.D., 1970, University of Michigan Medical School.
- Doctorate in Public Health., 1980, Harvard School of Public Health, Epidemiology.
- Chair, 1991, Department of Nutrition, Harvard School of Public Health.
- Dr. Willett has focused much of his work on the effects of diet on the occurrence of major diseases. He is Principal Investigator of the Nurses' Health Study I and II, prospective cohorts investigations established in 1980 and 1989.
- Dr. Willett initiated in 1986 a parallel prospective study of diet in relation to cancer and cardiovascular disease among 52,000 men, the Health Professionals Follow-up Study.

Recent Publications

- Cho E, Spiegelman D, Hunter DJ, Chen WY, Zhang SM, Colditz GA, Willett WC. ***Premenopausal intakes of vitamins A, C, and E, folate, and carotenoids, and risk of breast cancer.*** Cancer Epidemiol Biomarkers Prev. 2003;12(8):713-20.
- Newby PK, Peterson KE, Berkey CS, Leppert J, Willett WC, Colditz GA. ***Dietary composition and weight change among low-income preschool children.*** Arch Pediatr Adolesc Med. 2003;157(8):759-64.
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The healthy eating pyramid : Empirical assessments of validity

Walter C. Willett, Harvard School of Public Health, Boston.

During the twentieth century, enormous progress was achieved in the identification of essential nutrients and the elimination of diseases specifically related to their deficiencies. Partly as a result of these successes, chronic diseases such as cardiovascular disease, cancer, and neurodegenerative conditions have become the dominant health concerns of most countries. International comparisons and studies of migrants indicate that these conditions are to a great extent preventable, and the identification of diets that could provide optimal health has become a major goal. Current dietary advice, represented by the USDA Food Guide Pyramid, has emphasized restricting all forms of fat and consuming large amounts of starch. Intake of fruits and vegetables and dairy products has been encouraged, and no distinction has been made among red meat, fish, poultry, nuts, and legumes as sources of protein. These recommendations appear inconsistent with metabolic studies that have shown important distinctions among various types of fat and forms of carbohydrates. During the last decade, large epidemiologic studies of diet and health have provided additional evidence that the type of dietary fat is extremely important; trans fatty acids are related to elevated risks of coronary heart disease and diabetes, and unsaturated fats are related to reduced risk when compared to carbohydrate. Also, higher intakes of refined starch and sugar predict greater risk of these diseases, whereas high-fiber cereal products are associated with lower risks. High intakes of fruits and vegetables have important benefits, but these appear greater for cardiovascular disease than for cancer. Many constituents of these foods likely contribute to reduced risks, and folic acid appears to be particularly important.

Because of concerns that current dietary recommendations were misleading, we used a scoring system developed by the USDA to measure adherence to the Food Guide Pyramid among over 100,000 men and women from whom we have repeatedly collected dietary data since the mid 1980's. With up to 14 years of follow-up, we found that adherence was not associated with appreciably lower over risk of major chronic disease. We therefore created an alternative index that emphasized healthy forms of fat, whole grains, and fish, poultry, nuts, and legumes as protein sources. Using the same population of men and women, we found that adherence to this alternative dietary index did predict lower risk of major chronic disease, including a 30 to 40% lower probability of cardiovascular disease. When combined with not smoking, regular physical activity, and avoidance of overweight, our data indicate that these dietary choices could reduce rates of coronary heart disease by over 80%, stroke by over 70%, type 2 diabetes by over 90%, and colon cancer by over 70%. While further research is needed to refine our understanding of diet and health and provide more focused advice, our present medical system fails to achieve the enormous improvements in health that can result from realistic, moderate changes in diet and lifestyle.

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Ambroise Martin (France)

Professor of Biochemistry and Nutrition

AFSSA/ DERNS (Direction for risk assessment for Nutrition and Food safety, French Food Safety Agency)

27-31 av du général Leclerc

BP 19 - 94701 Maisons-Alfort cedex

Phone : +33 (0)1 49 77 13 67

Fax : +33 (0)1 49 77 26 13

a.martin@dg.afssa.fr

Biographical Sketch

- He obtained his MD in 1978, his PhD in 1985.
- Dr. Martin is university Professor of biochemistry and nutrition at the faculty of Medecine in Lyon (France). He also heads the DERNS (Direction de l'Evaluation des Risques Nutritionnels et Sanitaires), the department in charge of the evaluation and food risks within the new French agency for food health security (AFSSA).
- His research activities as team leader at the INSERM 189 unit of the University of Lyon focused on the regulation, in particular nutritional regulation, of glycoprotein synthesis.
- Member of various scientific organisations, which are now included into Afssa : the French High Council of Public Hygiene (CSHPF), the Commission of products for special dietary purposes (CEDAP), the French National Food Council (CNA).
- Coordinator of the revision of the "Nutritional Recommendations for the French Population" (ANC).

Recent Publications

- Martin A [*management of food-related risk in children*] Arch Pediatr. 2003 May;10 Suppl 1:32s-33s.
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French Nutritional recommendations

Ambroise Martin, Direction of risk assessment for nutrition and food safety, French Food Safety Agency, Maisons-Alforts.

The revision of French nutritional recommendations concerning macronutrients and micronutrients has been published in 2001, in a full-length French version and a condensed English edition, after a 4-y work involving most of the French specialists. As demonstrated by comparative studies performed by social scientists between France, Japan and USA, French people display a food culture based on the pleasure of eating and on a global approach of a dietary pattern more than on a specific approach based on nutrients. In this context, it was important to verify that the recommendations made on a nutrient basis are coherent with more traditional dietary counselling or food-based dietary guidelines.

For this purpose, original works have been performed, using data from nationwide representative dietary surveys (ASPCC and INCA surveys) :

- study of diet diversity : according to the diversity index set forth by USDA, a diet is diversified if foods from 5 groups are consumed every day (meat-fish-eggs, milk and milk products, fruit, vegetables, cereals and cereal products) ;
- simulation studies : using representative data on dietary habits, it was possible to calculate the amounts - at the population level - of nutrients provided by following recommendations made by dieticians on type and frequency of principal food categories ;
- linear programming : these studies consist in the computerized building of diets using a food database, taking into account prefixed constraints such as diversity, portion size, respect of ANC and cost.
- study of consumer typologies : based on 44 food category consumption patterns, obtained using statistical techniques such as principal component analysis, five specific patterns have been obtained, leading to very different level of satisfaction of nutrient requirements.

All these studies are convergent and demonstrate that meeting requirements is possible using usual foods, by applying simple, food-based, recommendations of nutritionists. The satisfactory nutritional status of the French population however must not mask, the obvious existence of groups at risk of insufficient intakes and insufficiency diseases. Typology analysis is an interesting tool to better characterise these groups and define tools for correction.

Taken together, these studies constitute a part of the scientific basis for the development of the National Nutrition-Health policy which has been launched at the beginning of the year 2001. This policy highlights 9 quantitative objectives for the general population, concerning foods (especially fruits and vegetables), calcium, sugars, lipids, alcohol, three markers of nutritional status (blood cholesterol, arterial pressure, Body mass index) and physical activities. Six strategic axes have been implemented in various fields, including education and information, nutrition in the health care system, involvement of the food industry, research and evaluation of the results of the policy.



Jaana Lindström (Finland)

Research Nutritionist

*Diabetes and Genetic Epidemiology Unit
Department of Epidemiology and Health Promotion
National Public Health Institute
Mannerheimintie 166
00300 Helsinki, Finland
Phone: +358 9 4744 8635
Fax: +358 9 4744 8934
jaana.lindstrom@ktl.fi*

Biographical Sketch

- She completed her Masters Degree in nutrition at the University of Helsinki, Finland in 1990.
- Since 1992 she has been working in the National Public Health Institute as a research nutritionist and as the coordinator of the Finnish Diabetes Prevention Study (DPS)
- Since 1999 member of the Work Group for Prevention of Diabetes of The National Diabetes Prevention and Care Development Program (DEHKO)
- Member of WHO workshop group on Screening for Type 2 Diabetes (2002)
- She is currently a PhD student in the Doctoral Programs for Public Health

Recent Publications

- The Finnish Diabetes Prevention Study (DPS). ***Lifestyle intervention and 3-year results*** on diet and physical activity. *Diabetes Care* 2003; 26:3230-3236.
- ***The diabetes risk score : A practical tool to predict type 2 diabetes risk.*** *Diabetes Care* 2003; 26:725-731.
- ***The major diabetes prevention trials.*** *Curr Diab Rep.* 2003 Apr;3(2):115-22.
- ***The principal trials for prevention of type 2 diabetes have now confirmed that type 2 diabetes can be prevented by life style changes. Prevention of type 2 diabetes by life style*** [Article in French] *Journ Annu Diabetol Hotel Dieu.* 2003;:77-89.
- ***Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance.*** *New Engl J Med* 2001; 344:1343-1349

The Finnish recommendations and their application to prevention of type 2 diabetes

Jaana Linström, Department of Epidemiology and Health promotion, National Public Health Institute, Helsinki.

Type 2 diabetes mellitus is increasing worldwide, including Finland. Despite favourable changes in the Finnish diet during the last decades, there is an upward trend in overweight and obesity. The intake and energy proportion of fat has declined, but the absolute energy intake is in average higher than energy need, which in the long run leads to accumulation of excess body fat. Hours spent in leisure-time physical activities have increased, but also time spent physically inactive (watching TV, driving car, working with computer) has increased, which add up to decreased total energy expenditure. Increasing obesity and sedentary lifestyle have smoothed the way for the evident diabetes epidemic.

Until recently, it was not clear whether and to what extent type 2 diabetes might be prevented by lifestyle modification in high-risk subjects. The Finnish Diabetes Prevention Study (DPS) is the first individually randomised controlled clinical trial to test the feasibility and efficacy of such an intervention. We randomly assigned 522 (172 men, 350 women) middle-aged (mean age 55 years), overweight (mean body mass index 31 kg/m²) subjects with impaired glucose tolerance either to the lifestyle intervention or control group. Each subject in the intervention group received individualized dietary counselling aimed at reducing weight and intake of total and saturated fat and increasing intake of fibre and physical activity (1). The recommended diet was basically similar to the current recommendations (balanced nutrient intake, balance between energy intake and expenditure, an increased proportion of carbohydrates, a decreased intake of hard fat, moderate alcohol consumption) issued by the National Nutritional Council for the whole population (2). An oral glucose tolerance test was performed annually to detect incident cases of diabetes and to measure changes in metabolic parameters. The mean (\pm SD) weight reduction from base-line to year 1 and to year 3, respectively, was 4.5 ± 5.0 kg and 3.5 ± 5.1 in the intervention group and 1.0 ± 3.7 kg and 0.9 ± 5.4 in the control group ($P < 0.001$ between the groups). At the time of first analysis of the outcome data the mean duration of follow-up was 3.2 years. The absolute risk of diabetes was 32/1000 person-years in the intervention group and 78/1000 person-years in the control group. The effect of the intervention was rapid: the difference in incidence of diabetes between the groups was statistically significant already after two years. During the trial the risk of diabetes was reduced by 58 % ($P < 0.001$) in the intervention group compared with that in the control group (3). The reduction in the incidence of diabetes was directly associated with number and magnitude of lifestyle changes made. In conclusion, the DPS is the first controlled trial demonstrating that type 2 diabetes can be prevented by changes in lifestyle in high-risk subjects.

A corresponding upward trend was seen 50 years ago in Finland in cardiovascular disease (CVD) mortality, simultaneously with increasing wealth and changing lifestyle after the war. Thirty years ago Finland had the highest CVD mortality in the world. Accumulating evidence of importance of lifestyle risk factors for CVD evoked the launch of the North Karelia Project, a community-based program for the prevention of CVD, in 1972. From 1972 to 1992, the mean serum cholesterol concentrations in North Karelia province decreased from 6.78 to 5.90 mmol/l among men, and from 6.72 to 5.54 among women. The decline in serum cholesterol concentration can be attributed to decreased intake of saturated fats (from 21 to 16% of energy) and shift from boiled to filtered coffee. The reduction in ischemic heart disease mortality was 55% among men and 68% among women, during the same period (4). This encouraging experience shows that dietary changes are possible in community scale.

The post-hoc analysis of the DPS results indicates that the intervention effect on diabetes risk was the most efficient in subjects with lower initial body weight and blood glucose concentration. Therefore, lifestyle guidance should be directed to people at early stage of diabetes development, namely people with risk factors for diabetes, regardless of their blood glucose concentration. This approach has already been adopted in Finland, where a nationwide programme for the prevention of diabetes has been launched (5), as the first country in the world.

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Pierre Meneton (France)

Research Director

Institut National de la Santé et de la Recherche Médicale (INSERM)

U367, 17 rue du Fer à Moulin, 75005 Paris France

Phone +33 (0)1 45 87 61 13

Fax +33 (0)1 45 35 66 29

pmeneton@infobiogen.fr

Biographical Sketch

- PhD - Faculty of Science, University of Paris (1992).
- He completed his training during three years in the United States where he has developed genetically modified mouse strains for understanding the role of renal sodium and potassium transport systems in blood pressure control. He now holds a permanent research position at the Institut National de la Santé et de la Recherche Médicale (INSERM).
- He also collaborates with the Agence Française de Sécurité Sanitaire des Aliments (AFSSA) for setting the expertise and promoting the communication on public health issues related to dietary salt and sugar intakes.
- His current research projects are focused on the epidemiology and genetics of hypertension in human populations.

Recent Publications

- Meneton P, Ichikawa I, Inagami T et al. ***Renal physiology of the mouse***. Am J Physiol Renal Physiol 278(3): F339-51, 2000.
 - Meneton P, Bloch-Faure M, Hagege AA et al. ***Cardiovascular abnormalities with normal blood pressure in tissue kallikrein-deficient mice***. Proc Natl Acad Sci USA 98(5): 2634-9, 2001.
 - Arrighi I, Bloch-Faure M, Grahammer F et al. ***Altered potassium balance and aldosterone secretion in a mouse model of human congenital long QT syndrome***. Proc Natl Acad Sci USA 98(15): 8792-7, 2001.
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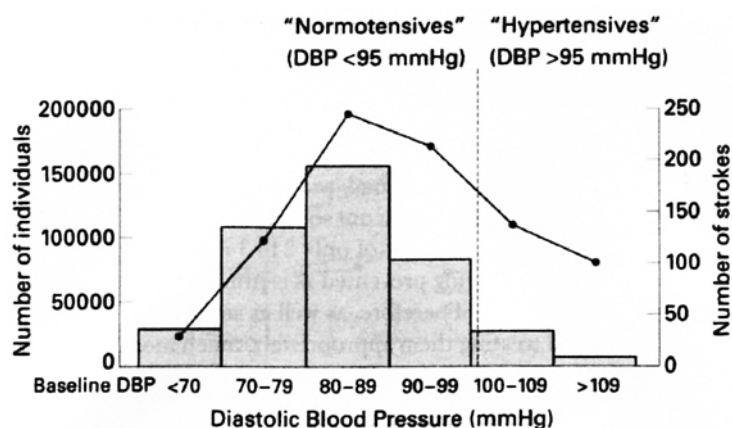
Nutritional recommendations : population-wide or directed at high-risk individuals ?

Pierre Meneton, Faculty of Medicine Broussais Hôtel Dieu, Paris.

During the past several years, many international and national organizations have emitted nutritional and behavioral recommendations in an effort for tackling the growing epidemic of non-communicable diseases in industrialized as well as developing countries. The nutritional recommendations insist on the necessity to act on global dietary patterns by reducing consumption of processed fatty, salty and sugary foods and promoting the intake of raw foods such as whole grains and fruits and vegetables. For implementing these recommendations, the organizations urge the countries to adopt policies and programs directed at the entire population and not only at the groups with highest risks (1). Although specific actions focusing on high-risk individuals can be valuable, it appears that population-wide preventive strategies are the most cost-effective ways for decreasing significantly the burden of chronic diseases. The reasons are well demonstrated and relatively simple to understand but are still largely ignored among the general public, politicians and health practitioners.

It is first important to realize that the dose-responses characterizing the relationships between risk factors and health outcomes are generally continuous and lack thresholds, suggesting that there is no rationale for the typical dichotomous categorization in “healthy” and “unhealthy” individuals (2). Following this line of thought, it is obvious that the “deviant” minorities (e.g. hypertensive, hypercholesterolaemic or obese individuals) who are considered to be at high risk are only part of a risk continuum, rather than distinct groups. This is clearly shown by the relationships between the relative risk of ischemic heart disease, hemorrhagic or ischemic stroke, diabetes, hip fracture or neural tube defects on the one hand and systolic or diastolic blood pressure, serum cholesterol, body mass index, bone mineral density or maternal plasma folate on the other hand. When plotted on logarithmic scales, lower systolic blood pressure (down to 110 mm Hg), diastolic blood pressure (down to 70 mm Hg), serum cholesterol (down to 4 mmol/l), body mass index (down to 20 kg/m²) or higher bone mineral density (up to 0.8 g/cm²) or maternal plasma folate (up to 20 mmol/l) are linearly associated with lower relative risks of health outcomes.

Combined with the fact that the distributions of risk factors in populations are bell-shaped, a major consequence of these continuous relationships is that there is a large number of people exposed to a small risk that generate many more health outcomes than the small number of people exposed to a high risk. For example, there are much more cardiovascular events in people with slightly raised blood pressure than in the hypertensive minority. The following figure illustrates this point:



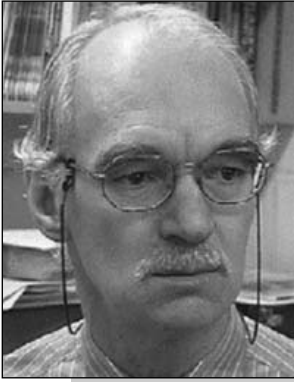
One can see that the greatest number of strokes occurs in those subjects with a diastolic pressure of 80-89 mm Hg, which is the upper range of normal blood pressure and that a slightly lower number of strokes occurs in those with a diastolic pressure of 90-99 mm Hg, which is a mild elevation of blood pressure. Far less strokes (only 25 % of the total) occur in individuals with severe hypertension (diastolic pressure above 100 mm Hg) because they represent only a small proportion of the overall population, although individually they have a much greater risk of developing the disease (3). A graded cumulative incidence of cardiovascular events can be observed in a 12-year follow-up of middle-age individuals without hypertension, according to their blood pressure levels at the base-line examination. The smaller incidence is observed in individuals with "optimal" levels (systolic pressure < 120 mm Hg or diastolic pressure < 80 mm Hg) and the highest incidence in individuals with "high normal" levels (systolic pressure between 130-139 mm Hg or diastolic pressure between 85-89 mm Hg) whereas an intermediate incidence is found in individuals with "normal" levels (systolic pressure between 120-129 mm Hg or diastolic pressure between 80-84 mm Hg) (4).

The same observations can be made with other risk factors and health outcomes. Thus, only 20 % of ischemic heart disease, diabetes and hip fracture occur in the 10 % of the population with the most extreme values of serum cholesterol, body mass index and bone mineral density (2). This means that generally speaking, a preventive strategy focusing on high-risk individuals will deal only with the margin of the problems and will not have any significant impact on the high number of cases occurring in the large proportion of people who are at moderate risk. While a high-risk approach may appear more appropriate to the individuals and their physicians, it can only have a limited effect at a population level. It does not alter the underlying causes of illness and requires continued and expensive screening for new high-risk individuals. In contrast, population-based strategies that seek to shift the whole distribution of risk factors have the potential to control population incidence and decrease dramatically the proportion of high-risk individuals. Thus, decreasing mean systolic pressure, serum cholesterol or body mass index from 150 to 120 mm Hg, 6 to 4 mmol/l or 27 to 21 kg/m² reduce the proportions of hypertensive (> 160 mm Hg), hypercholesterolaemic (> 7 mmol/l) or obese (> 30 kg/m²) individuals from 45 to 3 %, 20 to 1 % or 25 to 1 %, respectively (5).

The potential gains of the strategies that try to lower risks in the entire population by promoting healthy behaviors and dietary patterns are extensive, but the challenges are great as well. Indeed, a preventive measure that brings large benefits to the community but appears to offer little to each participating individual may adversely affect the motivation of the population at large. This is why it is particularly important that public health organizations and institutions launch large campaigns for informing and explaining the necessity of these global actions.

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John E. Blundell (UK)

Professor of Psychobiology

School of Psychology

University of Leeds, Leeds LS2 9JT, UK

Phone +44 (0)113 3435742

Fax +44 (0)113 3436674

J.E.Blundell@leeds.ac.uk

Biographical Sketch

- PhD - Faculty of Science, University of London (1970).
- John Blundell holds the Research Chair of PsychoBiology. He is the Director of the BioPsychology (Nutrition) Group and the Head of the School of Psychology.
- His early study was in Psychology and his later training was in Neuroscience at the Institute of Neurology in London. He has been active in research on the mechanisms of appetite control for more than 25 years.
- Recent projects have examined the characteristics of high and low fat consumers identified in the Leeds community (The Leeds High Fat Study), the role of dietary fibre in appetite control, role of serotonin in the control of fat intake, the effect of the amount and intensity of exercise on appetite control, and resistance and susceptibility to weight gain on the European diet.

Recent Publications

- Blundell JE, Stubbs RJ, Hughes DA, Whybrow S and King NA. ***Cross talk between physical activity and appetite control: does physical activity stimulate appetite ?*** Proc Nut Soc 2003, 62:651-661.
- Blundell JE, Cooling J, King NA. ***Differences in postprandial responses to fat and carbohydrate loads in habitual high and low fat consumers (phenotypes).*** Br J Nutr. 2002;88(2):125-32.
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Can individuals implement nutritional recommendations ? Mechanisms for change or mission impossible ?

John E. Blundell, Chair of PsychoBiology, University of Leeds.

The question of whether or not individuals can bring their patterns of eating behaviour into line with nutritional recommendations invokes biological, sociological, psychological and political issues. At the outset it should be recognized that habitual forms of human behaviour (eg : food choice, food selection, food habits) are particularly resistant to change. This may be especially so when the habit (persistent pattern of behaviour) is supported by psychological dispositions (traits), sensory preferences, biological mechanisms of reward, cultural values and an obesigenic environment. Over the last 10 – 15 years a large number of serious attempts have been made to encourage a change in the selection of foods, or the pattern of eating, that could bring about a reduction in body weight or an improvement in physiological health parameters.

Strategies have included interventions (of varying duration and intensity) that are community based, targeted on schools, colleges or universities, within the workplace, through canteens or catering outlets, via supermarkets or at the level of primary care. The main lesson from the outcomes of these interventions is that a huge amount of effort and organizational skill is required to bring about often rather small adjustments in actual eating behaviour. However, some interventions have clearly been successful. Considering the output, it is easier to induce a change in awareness or intention than it is to demonstrate a change in behaviour. There is a 'gap' between attitude/intention and behaviour.

One methodological difficulty, particularly apparent with the use of very large interventions, is measuring the outcome. Usually, self report methods are used, and these are known to be unreliable indicators of behaviour. Even so, with this provision in mind, successful interventions have been reported to change percent fat intake, increase consumption of low fat milk, and increase fruit and vegetable intake. The use of selective pricing and costing also shows some promise as a tool to promote behaviour change.

However, at the present time the sum total of interventions do not appear to be making a noticeable impact on the prevalence of overweight and obesity; the number of individuals who do manage to lose a few kilos are probably offset by those promoted to the rank of overweight from a BMI of less than 25. Why should behaviour be so resistant to change when the health benefits appear to be so obvious to those making the recommendations and establishing guidelines?

It is argued here that eating behaviour habits are different from other forms of habitual activities. First, it is now widely accepted that humans – as a species – are poorly adapted to function in an 'obesigenic' environment where the need for physical activity is minimized and the opportunities to gain pleasure from eating are maximized. However, within this general framework individuals can be identified who are either susceptible or resistant to weight gain; the susceptible ones easily outnumber the others. Some are characterized by specific genetic profiles (eg : MC4-R mutation), or by distinct psychological traits (eg : high TFEQ 'D' score), weaknesses in the operation of satiety mechanisms (eg : release of CCK or PYY), lack of compensatory capacity (due to insulin action), increased hedonic responsiveness (through possible dopaminergic or cannabinoid mechanisms), or a lack of willingness to engage in spontaneous physical activity. Populations of humans are characterized by diversity as

well as by commonalities. Identifying allelic (genetic) variation in a population that contributes to individual variability is now a major focus of research. Often, these 'intrinsic' dispositions are supported by legitimized social habits, culturally defined attitudes and moral values.

All of this contributes to the personal world of the individual (overweight/obese) person, or the person threatened by fear of weight gain. Using qualitative analytical methods, it can be shown that individuals susceptible to weight gain describe their eating and interactions with foods in quite different terms to individuals who are resistant. Their emotional relationship with food is different. Little of this individuality can be derived from very large scale epidemiological surveys, or targeted in large scale interventions. Do we need to know more about the 'meaning' of obesity and the priority afforded to eating and food choice at the individual level? It can be deduced that many people are battling to meet dietary recommendations against biological, psychological and sociological forces that make changes in eating habits extremely difficult. Is it possible to achieve change whilst preserving the freedom of food choice and maintaining eating as a moment of pure pleasure? Is it possible for strategies organized at the population (group) level (which is needed to combat the epidemic) to achieve this? Does one size fit all?

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Poster Abstracts

Individual changes in fruit and vegetable consumption between 2 and 16 years of age

DEHEEGER Michèle, ROLLAND-CACHERA Marie Françoise

U557 INSERM, UMR U557 Inserm/U1125 Inra/Cnam – ISTNA- CNAM, 2 rue Conté, 75003 Paris, France.
deheeger@cnam.fr

Objectives : to investigate the relationships between food (fruit and vegetable) consumed in early and late childhood.

Methodology : prospective cohort study conducted in healthy French children recruited among a population consulting for clinical examination in Public Health Centres for Children in Paris. Examinations were offered free of charge. The main motivation of families was to obtain a free check-up. From 1985, the dietician of the research team recorded nutritional intakes in children aged 10 months, 2 and 4 years using the dietary history method. When children were 6 year-old, the families were contacted to continue the follow up at home. At the age of 16 years, 92 children were still participating in the study.

Results : Table 1 shows changes in consumption of fruits and vegetables according to age and gender. In both sexes, the highest values were recorded at the age of 10 years. After the age of 14 years, girls ingested more fruit and vegetables than boys. This difference in consumption is consistent with differences in preferences. More girls than boys quoted fruits (32 vs 4%) or vegetables (43% vs 13%) as their favourite food. Correlation between consumption recorded at 2 year interval was high (Table 2). Between the ages of 2 and 16 years, the correlation is significant ($r=0.26$; $p=0.02$), mainly due to the contribution of fruit intake.

Table 1: Fruit and vegetable consumption (g) in the same children by sex and age

Age (years)	Boys (n=54)	Girls (n=38)	p
2	164 ± 66	168 ± 87	0.81
4	274 ± 86	278 ± 110	0.86
6	273 ± 100	264 ± 108	0.67
8	280 ± 102	276 ± 107	0.85
10	298 ± 117	294 ± 90	0.86
14	236 ± 106	286 ± 139	0.06
16	233 ± 115	289 ± 118	0.03

Table 2: Correlation between food consumption (fruit and vegetable) recorded at different ages (n=92)

Correlation between ages (years)	r	p
2 and 4	0.47	<0.001
4 and 6	0.38	<0.001
6 and 8	0.55	<0.001
8 and 10	0.56	<0.001
10 and 14	0.52	<0.001
14 and 16	0.25	0.03
2 and 16	0.26	0.02

Conclusion : Fruit and vegetable consumption varies according to age and gender. A high consumption of fruits in early childhood is associated with a high consumption in late childhood. As fruits and vegetables provide vitamins and fibres, this observation suggests that their consumption should be promoted early in life in order to maintain good habits.

Characteristics of compliers and non-compliers with population goals for fruit and vegetables ($\geq 400\text{g}$) and dietary fibre ($> 25\text{g}$) intakes in Irish adults.

COSGROVE Meadhbh and, KIELY Máiréad

Department of Food and Nutritional Science, University College Cork, Ireland.

Corresponding author: Meadhbh Cosgrove, Department of Food and Nutritional Science, University College Cork, Ireland, email m.cosgrove@ucc.ie

The intakes of fruit, vegetables and dietary fibre (DF) are low in Ireland (Galvin et al, 2001; O'Brien et al, 2003). Characteristics of compliers and non-compliers with both of the population goals for fruit and vegetables ($\geq 400\text{g}$) and DF ($>25\text{g}$) intakes were examined including anthropometric measurements, supplement use, smoking status, recreational physical activity and TV viewing. This study used data from the North/South Ireland Food Consumption Survey (Irish Universities Nutrition Alliance, 2001), which estimated habitual food intake using a 7-day food diary in a randomly selected representative sample of Irish adults ($n = 1379$) aged 18-64 years.

	Compliers (%)		Non-Compliers (%)	
	Men (n = 328)	Women (n = 293)	Men (n = 89)	Women (n = 224)
BMI Category				
Normal 18.5-24.9 kg/m ²	35.5	52.0	34.6	50.9
Overweight 25-29.9 kg/m ²	45.1	31.7	40.7	30.6
Obese ≥ 30 kg/m ²	19.4	16.4	24.7	18.5
Waist Action Level*				
Below Action Level	54.8	51.4	44.3	53.1
Action Level 1 ≥ 94 (80) cm	25.4	25.3	31.1	18.4
Action Level 2 ≥ 102 (88) cm	19.8	23.3	24.6	28.6
Waist Hip Ratio Risk*				
Normal Risk < 0.95 (0.8)	21.0	39.8	19.7	46.9
Increased Risk ≥ 0.95 (0.8)	79.0	60.2	80.3	53.1
Supplement User	19.8	40.3	10.1	24.6
Current Smoker	23.6	19.0	49.4	47.1
Takes part in recreational fitness ≥ 5.0 MET	87.0	90.2	88.5	72.7
TV viewing > 4 hours per day	14.6	10.5	25.3	24.1

* Risk of development of CVD risk factors, values in parenthesis are for women. MET = Metabolic equivalents.

Forty-five percent of Irish adults (53% men and 47% women) were compliers with both goals for fruit and vegetables ($\geq 400\text{g}$) and DF ($>25\text{g}$) intakes, while 23% (28% men and 72% women) were non-compliers. The mean BMI and waist circumference were 26.3 kg/m² and 87.5 cm respectively in compliers and 26.5 kg/m² and 85 cm respectively in non-compliers. Compliers were significantly ($p < 0.001$) more physically active in recreational pursuits than non-compliers (31.2 MET v 21.8 MET), while non-compliers spent significantly ($p < 0.001$) more time watching TV than compliers (19.8 hr v 17.4 hr), particularly in women. A significantly higher ($p < 0.001$) proportion of compliers were supplement users and a significantly lower proportion ($p < 0.001$) were smokers than non-compliers.

In this study, more time spent in recreational physical activity and less time watching TV was associated with compliance. Weight status (as BMI, waist circumference or waist to hip ratio) has no effect on compliance with the population goals for fruit and vegetables and DF intakes.

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The Mediterranean eating in scotland experience (MESE) project : Use of the Mediterranean diet score to evaluate dietary change in an internet-based, tailored intervention

PAPADAKI Angeliki¹, SCOTT Jane A

¹University of Glasgow, Division of Developmental Medicine, Human Nutrition Section, Scotland, UK

Corresponding author : Angeliki Papadaki, University Department of Human Nutrition, Glasgow Royal Infirmary, Glasgow, G31 2ER, Scotland, UK. E-mail : 9902409p@student.gla.ac.uk

The intakes of fruit, vegetables and dietary fibre (DF) are low in Ireland (Galvin et al, 2001; O'Brien et al, 2003). Characteristics of compliers and non-compliers with both of the population goals for fruit and vegetables ($\geq 400\text{g}$) and DF ($>25\text{g}$) intakes were examined including anthropometric measurements, supplement use, smoking status, recreational physical activity and TV viewing. This study used data from the North/South Ireland Food Consumption Survey (Irish Universities Nutrition Alliance, 2001), which estimated habitual food intake using a 7-day food diary in a randomly selected representative sample of Irish adults ($n = 1379$) aged 18-64 years.

Background : Tailored dietary and psychosocial interventions have proved to be effective in motivating dietary change and internet-technology interventions have shown promising results in encouraging weight loss and physical activity.

Objective : To evaluate the effectiveness of an internet-based nutrition intervention promoting the Mediterranean Diet using the Mediterranean Diet Score (MDS), a composite score based on median intakes of nine components of the traditional Greek diet.

Methodology : Intervention trial using a quasi-experimental design. Subjects received either tailored dietary and psychosocial feedback and internet nutrition information (intervention group, $n=53$) or minimal dietary feedback and general healthy eating brochures (control group, $n=19$). All subjects were recruited from the University of Glasgow (intervention) and Glasgow Caledonian University (control), and were all healthy female volunteers. Feedback provided to both groups was delivered via electronic mail. Dietary advice provided to intervention subjects via an innovative Mediterranean Eating Website focused on increased consumption of four components of the Mediterranean diet, namely vegetables, fruit, legumes and MUFA/SFA ratio. Subjects completed a 7d-estimated food diary at baseline and 6 months and intakes were energy adjusted to 2000 kcal. Dietary data were analysed to calculate the MDS for these four components and a score of 1 or 0 was given for each component depending on whether the cut-off point (median intake) was met or not.

Results : Forty one subjects in the intervention group and fourteen subjects in the control group completed both the baseline and 6-month dietary assessment. At the end of the 6-month intervention, the proportion of subjects in the intervention group achieving a score of 1 increased for 6 of the 8 dietary components and the increase was statistically significant for the legumes ($p=.012$) and MUFA/SFA ratio ($p=.039$) components. The proportion of subjects in the control group achieving a score of 1 increased for 4 components but these increases did not reach statistical significance. There was no significant difference in the proportion of subjects achieving a high MDS (≥ 4) at baseline compared to 6 months for either group. There was, however, a post-intervention significant increase in the mean MDS for the intervention ($p=.019$).

Conclusions : The MDS was able to detect dietary improvements in this group of healthy female volunteers. As information technology systems improve and general access to computers has increased, internet-based, tailored interventions that promote healthy eating in the context of the traditional Mediterranean diet have the potential to encourage greater consumption of plant foods in Scotland, in agreement with current dietary recommendations for health promotion and disease prevention.

The project was funded by the Greek State Scholarships Foundation.

Physiological effects of the potassium organic anions present in fruits and vegetables¹

SABBOH Houda, DEMIGNE Christian

Unité des Maladies Métaboliques et Micronutriments, INRA de Clermont-Fd/Theix, F- 63122 St-Genès-Champanelle.

e-mail : hsabboh@clermont.inra.fr

¹ supported by a grant from APRIFEL (60, rue du Faubourg Poissonnière, F-75010 Paris)

Organic anions are chiefly supplied by plant foods, especially fruits and vegetables, as partially neutralized K salts such as K citrate, K malate and to a lesser extent oxalate or tartarate salts. Animal products are also liable to supply K anions, essentially as phosphate. Failure to neutralise acidity generated by protein catabolism leads to low-grade metabolic acidosis, with possible long term deleterious effects on bone Ca status and protein status (since acidosis promotes Ca mobilization and proteolysis). This situation seems quite frequent with western diets and it may account for the relatively high incidence of osteoporosis and muscle protein wasting observed in ageing people. Providing a sufficient supply of K organic anions through fruit and vegetable intake (at least 3-4 g K daily) is recommended, fostering the actual incitative campaigns ('5-10 per day') launched to promote intake of plant foods rich in complex carbohydrates and various micronutrients.

To further document this topic, we have designed a rat model of low-grade acidosis of nutritional origin and tested the impact of alkalinizing K salts (KHCO₃ or K malate) vs. KCl. Urine pH (near 5 in rats fed the basal or KCl diets) rose up to 8 with the KHCO₃ or K malate diets and, in parallel, Mg and Ca excretion were markedly reduced. Citraturia, practically nil with the acidogenic diets, was dramatically increased with the KHCO₃ or K malate diets. Thus K malate (abundant in fruits and vegetables) appears as least as effective as KHCO₃ to reequilibrate acidogenic western diet.

We studied thereafter the effectiveness of organic anions with different carbohydrates supply (starch or sugars, namely fructose/glucose/sucrose). Sugars elicited a slightly greater excretion of urea, Ca, Mg and sulfate than starch. K citrate strongly reduced Ca, Mg excretion and to a lesser extent urea excretion and it restored citraturia (together with 2-ketoglutarate excretion). It appears thus that sucrose tends to slightly worsen the effects of an acidogenic diet, but alkalinizing K salts turned out very effective to counteract acidosis effects with starch as well as with sugars. This observations may thus be relevant for fruits.

In a third set of experiments, we have investigated the potency of K organic anions with two dietary protein levels : normal (13%) or hyperproteic (26%). In our rat model, it appears that acidic urine (pH around 5.5) was found with both dietary levels, suggesting that the lack of alkalinizing anions in the mineral moiety of the basal diets is an important factor of acidification. Logically, urea excretion was greater with the 26% than with the 13% protein diet, but K citrate elicited as large increase in urea excretion with both dietary protein levels and practically abolished ammonia excretion. Sulfate excretion was also slightly greater with the high-protein diets and is was not depressed by K citrate, whereas this salt markedly reduced the Mg and Ca excretion elicited by acidosis.

These experiments indicate that K malate or citrate, present in fruits and vegetable, are quite effective to counteract low grade metabolic acidosis. Several points deserve further investigations, such as the actual impact of K organic anions on amino acid catabolism (especially sulfur amino acids) and on various consequences of low K/acidifying diets on antioxidant protection or glucose tolerance for example. The possible interactions between K organic anions and fibers should also be examined.

Effect of preferences for, and consumption of, vegetables on lipid profile and some anthropometric parameters in women -preliminary study.

Katarzyna PRZYBYŁOWICZ¹, Beata MAJEWICZ², Roman CICHON³, Lidia WADOŁOWSKA¹

¹Institute of Human Nutrition, University of Warmia and Mazury, 10-718 Olsztyn, ul. Słoneczna 44a, Poland, lidiaw@uwm.edu.pl

²Non-Public Health Clinic in Olsztyn, Poland

³Department of Nutrition and Dietetic, Medical University, Bydgoszcz, Poland

Objective : The aim of the study was to determine the preferences in vegetable consumption and their effect on some anthropometric and biochemical parameters in peri-menopausal women.

Material and methods : The study was carried out in 2003-2004 among 50, 39-59 y.o. women from the province of Warmia and Mazury. The body composition was determined based on anthropometric parameters measured, including: body weight (kg), height (cm), thickness of four skin-fat folds (mm), waist (cm) and hip circumference (cm) and the resulting indices, including: BMI (kg/m²), body fat contents (%FM, %) and WHR index. The biochemical examination included the measurement of the total cholesterol - TChol, HDL and LDL fractions and triglyceride (TG) concentrations. The experimental women expressed their preferences of consumption of 30 selected vegetables with the use of a 5-point scale: "I hate it", "I dislike it", "I am indifferent", "I like it" and "I like it very much". An average value of these vegetable preferences was calculated. Consumption frequency was determined for the same 30 vegetables: "I don't eat it at all", "Seldom", "1-2 times a week", "3-4 times a week", "Every day" and an average consumption frequency was calculated. Based on the average values, two categories of vegetable consumption were determined: "average" and "high" and three categories of consumption frequency: "sporadically", "quite often" and "often". The analysed biochemical and anthropometric parameters between the experimental women with different vegetable preferences and consumption frequencies were compared with the use of the U Mann-Whitney test. Statistical analysis was carried out with the use of STATISTICA 6.0 PL software package at a significance level of $p \leq 0.05$.

Results and conclusions : The completed statistical analysis did not indicate differences in the majority of the analysed anthropometric parameters and lipid indices between the women with different vegetable preferences and consumption frequencies excluding the level of triglycerides. Evaluation of the lipid parameters in different preference categories and different consumption frequencies indicates that the entire population of the women had increased levels of total cholesterol, LDL and atherogenicity index HDL/Tchol and low level of HDL, which can be disturbing with respect to health risk [1]. The preliminary study is the first phase of further, more detailed studies.

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Development and validation of a new questionnaire of habitual physical activity and food consumption for children 7 to 10 years of age.

de Assis MAA¹, Barros MVG², Rolland Cachera MF³, Bellisle F⁴, Pires M⁵, Grosseemann S⁶, Vasconcelos FAG¹, Luna MEP⁸, Honda S⁹.

¹Department of Nutrition, Universidade Federal de Santa Catarina, Brazil; ²Universidade de Pernambuco (ESEF). Recife, PE, Brasil; ³Inserm Inra Cnam, Paris; ⁴Hôtel Dieu, Paris; ⁵Colégio de Aplicação, Universidade Federal de Santa Catarina, Brazil; ⁶ Department of Pediatrics, Universidade Federal de Santa Catarina, Brazil; ⁸Secretaria da Saude da Prefeitura Municipal de Florianopolis ; ⁹Núcleo de Pesquisa em Atividade Física e Saúde - Universidade Federal de Santa Catarina, Brazil.

Corresponding author: Maria Alice A. De Assis. 26 Rue des Ecoles, Paris,75005;

e-maildeassis@wanadoo.fr

Objective : To describe the development and assess the reliability and validity of the Childhood Activity and Food Intake Questionnaire (CAFIQ). CAFIQ is a tool designed to collect data about physical activity (PA) and food choices among children 7 to 10 years old.

Subjects : Parents and children (n=69) of one elementary school, in Florianópolis, South of Brazil.

Methods : CAFIQ was developed as a supervised classroom exercise to measure children's physical activities, food groups and foods items choices in a typical day of the week. It is an interviewer-administered structured questionnaire with 6 pages, 50 illustrations, a list of 11 choices of physical activity in three grades of intensities, 5 meals and 16 food groups. Reliability was measured through two rounds of data collection. Reference data for validation of the physical activity section (PAS) was a questionnaire completed by parents and teachers. Food section (FS) was validated against a 24-hour dietary recall administered individually to children. Analyses included intraclass (R) and Spearman correlation (rho), and adjusted kappa statistic (PABAK). Differences were examined using Wilcoxon, McNemar, and Kruskal Wallis tests.

Results : For the PAS, test-retest reliability range from rho=0.46 (transportation to the school) to rho=0.87 (PA attitude). The intraclass correlation was 0.85 for a general measure of PA. Using a proxy measure (parents and teachers report), the children were classified in three groups (low, medium, and high) according to the PA level. Scores obtained using CAFIQ appear to discriminate significantly (p<0.05) those groups. Regarding to the FS, the agreement between the two rounds was nearly 80%. None food item presented a PABAK coefficient lower than 0.3, suggesting a moderate to substantial level of reliability. The agreement between data obtained with CAFIQ and the reference method ranged from 42% for bread (afternoon period) to 92% for vegetables (morning). Substantial to moderate agreement was found for 17 food items, while it was poor for 15.

Conclusions : This questionnaire is a useful epidemiologic tool for surveillance, assessing broad intervention effects among groups or providing needs assessment data on selected nutrition and physical activity-related constructs. Despite the limitations of the present study, the results suggest that the questionnaire CAFIQ seems to generate reliable and valid data for both PA and food consumption.

Nutrient intake in a sample of pregnant women in Constantine area (Algeria)

Dj. *TOUATI-MECHERI*¹, A. *AGLI*¹, G. *POTIER DE COURCY*²

¹ Université MENTOURI, Faculté des SCIENCES, D.N.A.T.A.A 25000 Constantine –Algérie-
djamila_touati@yahoo.fr.

² Institut Scientifique et Technique de la Nutrition et l'Alimentation, CNAM, 2,rue Conté, F-75003, Paris -
France.

Food intake in pregnant women should be sufficient to meet energetic and nutritional needs linked to the physiological changes of the mother: increased blood volume and maternal tissues ; and normal development of the foetus.

The aim of this study was to investigate the nutrient intake of 142 Algerian pregnant women, using a dietetic interview during prenatal examination.

The quantity of foods was estimated by household units, converted into nutrient intake in order to compare with recommendations.

The frequency of food intake, in decreasing rank order is: cereals products (100%), milk (87,3%), dairy products (70%), animal products (57,1% including fish 25,2%), legumes (56%). Fresh vegetables and fruits consumption differently varied according to the price and season.

The results show a large interindividual variability among women in energetic and nutrient intakes. Energy intake was 2029 kcal. The contribution of starchy carbohydrates was 326.5g / day, of lipids 48.94g / day and of proteins 68,94g / day. Fruit and vegetable intake was rather low. Nutrient deficiency concerned some minerals (iron and Ca) and vitamins (A and D).

Nutritional models and dietary guidelines realization by the elderly living in north-eastern Poland

Roman CICHON^{1,2}, Małgorzata A. SŁOWIŃSKA¹, Lidia WADOŁOWSKA¹

¹Institute of Human Nutrition, University of Warmia and Mazury, 10-718 Olsztyn, ul. Słoneczna 44a, Poland, lidiaw@uwm.edu.pl

²Department of Nutrition and Dietetic, Medical University, Bydgoszcz, Poland

Objective : The aim of the work was to identify the characteristic nutritional models of the elderly and to compare them with dietary guidelines according to the healthy eating pyramid.

Materials and methods : The research included 354 people (76.9±1.63 years old) living in the North-Eastern Poland. The nutrients intake was specified by means of the 24-hour recall method [1], which, after having included losses, was compared with Poland's RDI at the safe level. For the characteristic nutritional models identification the factor analysis (the main components method) and the cluster analysis (grouping by the k-means method) was applied [2]. The diversity of the food rations nutrient value and products intake of people with different nutritional models was verified on the basis of the single-factor variation analysis (ANOVA) with the use of the STATISTICA v.6.0.

Results : In population 3 nutritional models were identified – low nutritive (LN, 56.5% of population), with the vegetable-fruits and vegetable fats domination (VFVf, 32.2% of population) and dairy-cereal and vegetable fats domination (DCVf, 11.3% of population). The significant differences in the nutrient value and products intake of the identified nutritional models were revealed ($p \leq 0.001$). The DCVf nutritional model intakes grainy products in the average amount of 10.1 portion/day, vegetables – 2.0 portion/day, fruits – 0.4 portion/day, dairy products – 3.2 portion/day, meat and protein substitutes – 2.1 portion/day, fats and sweets – 4.0 portion/day, the VFVf : 6.3 portion/day, 3.4 portion/day, 0.9 portion/day, 0.9 portion/day, 2.9 portion/day, 3.0 portion/day, respectively, and the LN : 5.2 portion/day, 1.3 portion/day, 0.4 portion/day, 1.2 portion/day, 1.0 portion/day, 1.7 portion/day, respectively.

Conclusions : The significant diversity in the nutrients intake by the elderly was revealed. The identified nutritional models characterized the nutrient value of elderly food well. No nutritional model was compatible with dietary guidelines according to the healthy eating pyramid.

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Reduction of risk factors in overweight subjects of the Medi-RIVAGE study, benefit of a Mediterranean diet

DEFOORT Catherine^{1,2}, *VINCENT Stephanie*¹, *GERBER Mariette*³, *BERNARD Marie-Christine*⁴, *PLANELLS Richard*¹, *VAGUE Philippe*⁴, *LAIRON Denis*¹

¹ UMR-U476 INSERM Human nutrition and lipids, Faculty of medicine, 27 boulevard Jean Moulin, 13385 Marseille Cedex 05, France.

² Analytical Chemistry Laboratory, Faculty of Pharmacy, Marseille, France.

³ Epidemiology Metabolic Group, Cancer Research Centre, INSERM-CRLC, Montpellier, France

⁴ Centre for Detection and Prevention of Arteriosclerosis, Timone University Hospital, Marseille, France. Catherine.Defoort@medecine.univ-mrs.fr

Objectives : Medi-RIVAGE (Vincent et al., 2004) was a primary intervention study undertaken with a Mediterranean diet-based nutritional approach. We present here the benefit of such a diet (MED) versus a low fat-low cholesterol diet : CDPA/AHA) in 150 overweight subjects.

Methodology : Beside a BMI>25 these volunteers presented at least another one risk factor (e.g; moderate untreated cholesterolemia, moderate hypertriglyceridemia...). Different parameters were measured at baseline and after 3 months dietary intervention.

Results : Surveys and nutritional markers allowed observation of an increase in % carbohydrates and decrease in % lipids along with higher MUFA (+1.5% TEI, p<0.05) and PUFA (+0.8% TEI, p<0.05) but lower SFA (-4.6% TEI, p<0.05) in MED arm. The same pattern was observed in CDPA/AHA arm except for MUFA (-0.8% TEI, p=NS).

Numerous nutrients and plasma fatty acids were also quantified to evaluate the good adherence to the diets. We observed an increase in total fibre intake (+11.9%, p<0.05 in MED arm vs +4.7%, p=NS in CDPA/AHA arm) and an increase in EPA and DHA (+50.0%, p<0.05 and +24.0%, p<0.05 respectively in MED arm vs +22.2%, p=0.07 and +11.5%, p<0.05 respectively in CDPA/AHA arm).

After 3 months diet and adjustment for age, sex and tobacco, BMI fell off 6% (p<0.05) in MED arm (vs 4.5%, p<0.05 in CDPA/AHA arm) and we observed beneficial effects of both diets on biological parameters such as total cholesterol (-6.1% vs -2.5% in MED and CDPA/AHA diets respectively), LDL-cholesterol (-8.1% vs -3.3% respectively), triglycerides (-11.7% vs -2.7% respectively), insulin (-19.3% vs -18.1% respectively), glucose (-3.8% in both diets).

Conclusion : In obese or overweight subjects, weight loss has to be associated with a reduction of risk factors commonly present, it seems that the Mediterranean diet followed by the overweight subjects of our study has improved essential metabolic parameters. The amplitude of these beneficial changes is less marked after a low fat-low cholesterol diet.

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Effects of Calcium supplementations on serum lipoproteins, Apo B-100 and blood pressure in hyperlipidemic obese man

SHIDFAR FARZAD¹, MOGHAYADI MELIKA², SHIDFAR SHAHRZAD³

¹Department of nutrition, School of Health, Iran university of medical Sciences, Tehran, Iran.

²Master of Nutrition, School of Health, Iran University of Medical Sciences, Tehran, Iran.

³M.D ,Memorial General Hospital,Worcester, Massachusetts, U.S.A

Address: Farzad Shidfar,Ph.D, Department of Nutrition, School of Health, Iran University of Medical Sciences, Tehran, P.O.Box 15875-4199, Iran. Fax: 0098-21-8779487

Email : farzadshidfar @ yahoo.com

Objectives : Control of hyperlipidemia and blood Pressure (BP) is vital in obese persons. Limited epidemiologic and experimental data support the possibility that dietary calcium intake play a role in body weight, serum lipoproteins and BP. This study was undertaken to determine and compare the effects of administration of elemental calcium (EC) on the serum levels of lipoproteins, apo B-100, BP and body weight in obese persons in Iran university of medical sciences, Tehran, Iran from 2003 to 2004.

Methodology : In a double-blind placebo trial of parallel design, 49 hyperlipidemic obese male [total cholesterol (TC) and triglyceride (TG) greater than 200 mg/dl] were randomly assigned to receive 1250 mg of EC or placebo (control) for 8 weeks. Fasting blood samples were collected at the beginning and at the end of the period. TG, TC, LDL-c and HDL-c were measured enzymatically, calcium colorimetrically, apo B-100, immunoturbidometrically. The pattern of food consumption, socio- economic and anthropometric indices were determined by valid questionnaires.

Results : There was a significant decrease in serum LDL-c (P=0.003), TC (P=0.001) , apoB (P=0.04), LDL-c / HDL-c (P=0.02), TC/ HDL-c (P = 0.01) and Systolic Blood Pressure (SBP) (P = 0.04) in calcium group compare to control group at the end of study but HDL-c, TG,dia-stolic blood pressure and body weight had no significant difference between two group at the end of study. There was no significant difference in daily dietary intake between two groups. A significant increase in serum calcium was observed in calcium group compare to control group (P = 0.02).

Conclusion : 1250 mg of EC for 8 weeks had beneficial effects on serum LDL-c, TC, apo B-100, LDL-c /HDL-c, TC/HDL-c and SBP in hyperlipidemic obese men and so may reduce the cardiovascular disease risk.

The study of functional characteristics of weighting (loaded) foot in the group of obese children and adolescents during reduction of weight

KOSTELNIKOVA Lenka, HLAVACEK Petr

Tomas Bata University in Zlin, Tomas Bata University, Faculty of Technology,
Nam. T. G. Masaryka 275, 762 72 Zlin, Czech Republic, Email : l_kostelnikova@ft.utb.cz

Objectives : This study is focused on finding the existence of changes in foot proportions and changes in the distribution of force in the sole during reduction of weight in obese children.

Methodology : Along of five-week weight loss courses for 39 children and adolescents (24 girls, 15 boys) between the age of 10 to 19 years, dynamic pressures were measured between the foot and footwear insoles using a Pedar instrument. The foot proportions were measured using the classical method and girth size was analysed the first in loaded and the latter in unloaded position (during sitting and standing). The results were evaluated with NovelWin software, which enables the establishment of maximum pressures at defined locations, the course of maximum force and centres of gravity. The measurement was conducted at the beginning of the course and after its completion.

Results : The average value of weight loss achieved 3.31 ± 1.85 kg (3.22 ± 1.74 kg for girls and 3.51 ± 2.18 kg for boys). From the extensive set of measured data, changes were analysed in values of maximum pressures in the frontal, arch and heel sections on the surface of the foot at the beginning of the experiment and at the end. The determined differences demonstrated that there is the dependence between the weight loss and the selected factors. Most significant was the relationship between the weight loss and girth changes at the metatarsophalangeal joint (toe joint area) (Fig. 1, 2). This determined dependency can be marked as highly significant in regard to the values known to increase the number of foot deformities and disease at the current child population.

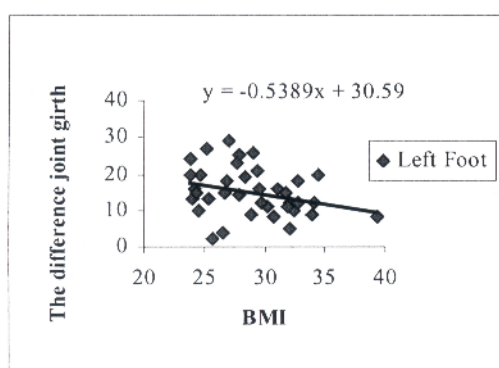


Fig. 1 The difference of joint girth in loaded and unloaded position dependence on BMI by left foot

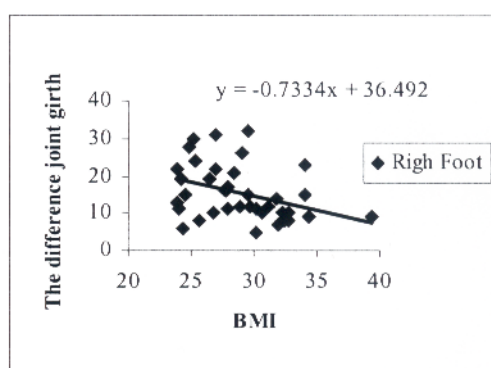


Fig. 2 The difference of joint girth in loaded and unloaded position dependence on BMI by right foot

Conclusion : The study proves that relatively small changes of weight had significant influence changes in width girth values. The data didn't prove a connection between obesity and foot deformities. A child's foot is evidently able to compensate for weight increases. Also the distribution of pressure on the foot indicates significant changes and this problem should be studied in detail.

Prevalence of overweight and obesity and associated factors in Languedoc-Roussillon, a French Mediterranean region

LE BIHAN Geneviève (1), DELPEUCH Francis (2), ROQUES Nathalie (1), LEDESERT Bernard (3), BROZZETTI Anne (4)

(1) CIHEAM/IAM : Institut agronomique méditerranéen de Montpellier (2) IRD : Institut de recherche pour le développement, UR106, (3) ORS : Observatoire régional de la santé, (4) CRES : Comité régional d'éducation pour la santé

Geneviève Le Bihan – lebihan@iamm.fr

CIHEAM-IAMM, 3191 route de Mende, F-34093 Montpellier cedex 5

Mediterranean countries are currently observing a rapid increase of overweight and obesity rates among their populations. Several factors including lifestyle and food habit changes seem to be associated with this growing concern.

As part of the National Health Barometer on nutrition conducted in 2002 by the INPES, the prevalence of overweight and obesity were measured, the food consumption and physical activity estimated and knowledge and perceptions assessed. A representative sample of 988 adults (18-75yrs) was interviewed by telephone in Languedoc-Roussillon, a French Mediterranean region. Body mass index (BMI) was calculated, based on declared weight and height. Overweight (OW) was defined as $25 \leq \text{BMI} < 30$ and obesity (OB) as $\text{BMI} \geq 30$. Dietary assessment was by means of a qualitative 24-hour recall.

The prevalence of overweight was 27,8% and of obesity 6,5%, close to national figures. Men were more likely to be overweight than women (37,3% vs 18,7%, $p < 0,001$) but both were equally concerned by obesity (6,7% vs 6,4%). The prevalence of overweight and obesity increased with age (OW: 14,3% in 18-29yr-olds vs 39,6% in 60-75yr-olds ; OB: 5,1% in 18-29yr-olds vs 9,4% in 60-75yr-olds, $p < 0,001$). Overweight was equally distributed within income or education level, but obesity was more prevalent in the population with low income and low education level: 62,3% of obese individuals had a monthly income $< 900\text{€}$ per consumption unit vs 42% in non obese individuals, $p < 0,01$; 84,1% of obese subjects did not have baccalauréat education vs 55,0% in the non obese group, $p < 0,001$). The number of meals/snacks eaten was the same between BMI groups but obese people ate more quickly than others (for lunch : $32\text{min} \pm 21$ for OB vs $39\text{min} \pm 24$ for OW and $37\text{min} \pm 21$ for others, $p < 0,05$). Whatever their BMI groups, individuals made similar food choices except for a few products. Obese people were more likely to watch TV, doing so longer than others per day ($176\text{min} \pm 99$ for OB, vs $128\text{min} \pm 81$ for OW and $125\text{min} \pm 87$ for others, $p < 0,001$). They also practised less sport: only 29,1% of OB vs 40,3% of OW and 48,8% of others ($p < 0,01$) had practised sport at least once during the last two weeks. However, they were more aware of the recommendation concerning daily physical activity: 54,8% of OW and 53,1% of OB vs 44,9% of others ($p < 0,01$) believed they have to practice at least 30 min per day to stay healthy. Furthermore, there were no differences with the knowledge score on nutrition between BMI groups. Obese and overweight individuals did not all have an accurate perception of their weight excess: 26,2% of OW and 4,7% of OB said that they had "the right weight" whereas 7% of OW and 40,6% of OB declared they were "too fat" ($p < 0,01$).

These discrepancies between relatively good knowledge and false perceptions are important to consider when implementing interventions aimed at managing overweight and obesity.

Study funded by Assurance Maladie, Conseil Régional Languedoc-Roussillon, DRASS-LR, FNMF, INPES, URCAM-LR

Obesity and atherosclerosis-possibility of prevention

Grujic-Ilic¹ Gordana., Pejic Ljiljana²

¹Health Centre Nis; Dept.Paediatrics; BB Vojvode Tankosica; Nis 18000, Serbia at Montenegro
email : ggoca@Eunet.yu

²Pediatric Clinic Nis 48 Brace Taskovic, Nis 18 000 , Serbia at Montenegro

Obesity is one of the atherosclerosis risk factor in children beside hypercholesterolemia and hypertension. Atherosclerosis starts in the early childhood and preventive measure should begin as early as possible.

The purpose of this study was to determine blood pressure, the lipoprotein profile, and total cholesterol/HDL-C (FR), and LDL-C/HDL-C (IA) relation in obese children and in non-obese children.

This study included 758 children aged 6-15 years who came in Cardiologic Counseling Office Health Center Nis. There were 93(12.27%) underweight, 514(67.81%) non-obese, and 151(19.92%) obese, (69(9.10%) with $P85 \leq BMI \leq P95$ and 82(10.82%) $BMI > P95$).

Each subjects* height and body weight were measured, and body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters. The data of BMI are those of NHANES I (Am J Clin Nutr. 1991; 53 : 839-46). Obese children have been considered if $BMI \geq P85$. Two categories have been defined. Children whose BMI are at the 85 the percentile or more, and less than the 95th percentile ($P85 \leq BMI < P95$), and children with BMI children with BMI at the 95 th percentile or more for age and sex ($BMI \geq P95$). Children non-obese with $P15 < BMI < P85$).

Systolic and diastolic blood pressures were measured in the right arm after the participant had been sitting for at least five minutes, 3 times in each subject with manometer.

Fasting plasma concentrations of total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and triglyceride were measured. non-HDL cholesterol (non-HDL cholesterol=TC-HDL), total cholesterol/HDL-C (FR), and LDL-C/HDL-C (IA) were calculated.

Results : Systolic and diastolic blood pressures were significantly higher in obese children than in non-obese children (104.57 mmHg, 69.40 mmHg; 98.32 mmHg, 65.14 mmHg; $p < 0.001$), and levels of TC, non-HDL-C, LDL-C, Tg, IA and FR were significantly higher in obese children (4.65 mmol/l; 3.33 mmol/l; 2.86 mmol/l; 1.05 mmol/l; 2.33; 1.31) than in non-obese children (4.35 mmol/l; 2.89 mmol/l; 2.49 mmol/l; 0.88 mmHg; 1.92; 3.24). The average HDL-C level was significantly higher in non-obese children (1.45 mmol/l) than in obese children (1.34 mmol/l)($p < 0.01$). There was not significant difference between blood pressures and lipoproteines in children with $P85 \leq BMI < P95$ and $BMI \geq P95$ ($p > 0.05$). Percentages of increased values TC(> 5.17 mmol/l), LDL-C (> 3.36 mmol/l) i Tg (> 1.14 mmol/l) and percentage of reduced values HDL-C > 0.9 mmol/l were in obese children (25.83%; 27.81%; 29.14%; 9.27%) higher than in non-obese children (11.09%; 10.12%; 17.32%; 6.42%).

Conclusion : It is very important to determine body mass index in children and detect obese children. Obese children should be early detected, inspected and controlled, and than they should be included in a diet or medicament treatment. Early discovery of obese children is one of the elements of atherosclerosis prevention.

Iron intake and status in relationship to the body mass index in adult Belgian women

PYNAERT Ilse, MATTHYS Christophe, DE HENAUW Stefaan

Department of Public Health, Ghent University, Belgium

Correspondence : Pynaert I, Department of Public Health, Ghent University, UZ - 2 Blok A, De Pintelaan 185, B-9000 Ghent, Belgium. E-mail: ilse.pynaert@ugent.be

Objective : To investigate the relationship between body mass index (BMI) and iron intake and iron status in Belgian women at reproductive age.

Population : Adult women (18-39 years) from the region of Ghent (n=726) were examined in the year 2002.

Methods : The iron intake was determined on the basis of a newly developed and validated computer-assisted iron intake assessment tool. The iron status was determined on the basis of the following indicators : haemoglobin, serum ferritin and soluble transferrin receptors (sTfR). Body height and weight were measured in a standardised way. Individuals were divided in 4 groups according to their BMI as follows : 1) BMI <20 (n=113), 2) BMI 20 - <25 (n=406), 3) BMI 25 - <30 (n=146) and 4) BMI \geq 30 (n=61). To compare the means in the different groups the Mann-Whitney-U test was used. Spearman's correlation coefficient was determined to investigate the relationship between BMI and iron intake respectively iron status.

Results : The median iron intake (mg/day) in the different BMI categories (1 – 4) was as follows: 10.39, 9.69, 9.93 and 9.40 mg/day. No significant differences between any of the categories were found. Median haemoglobin concentrations in the different BMI categories were: 13.40, 13.50, 13.55 and 13.70 g/dl. The median sTfR values were: 1.11, 1.08, 1.13 and 1.25 mg/l. Finally, for serum ferritin the median values were: 23.00, 26.30, 28.85 and 38.30 ng/ml. Only for sTfR and serum ferritin significant differences were found. Individuals with a low BMI (<20) had a significant lower value for sTfR and for serum ferritin than obese individuals (BMI \geq 30). Women with a normal BMI (20 - <25) had also a significant lower value for sTfR and serum ferritin than obese women (BMI \geq 30) and also a significant lower value for sTfR, but not for serum ferritin in comparison with overweight individuals (BMI 25 - <30). Finally, individuals with overweight (BMI 25 - <30) had a significant lower value for sTfR than obese persons (BMI \geq 30). Spearman's correlation coefficient for BMI and iron intake was -0.031, for BMI and haemoglobin 0.055, for BMI and sTfR 0.075 and for BMI and serum ferritin 0.126.

Conclusions : In general, iron status is considered to be negatively associated with sTfR and positively associated with serum ferritin. Our data suggest that the association between BMI and iron status is difficult to interpret, given that a comparison of different BMI categories results in lower values of sTfR accompanied by lower values of serum ferritin and vice versa. Further analyses are needed to explore these findings in more depth.

Obesity, nutrient intake and the time spent drinking tea in a group of Moroccan Sahraoui women

Mohamed RGUIBI, Rekia BELAHSEN

Training and Research Unit on Food Sciences. Lab. of Physiology Applied to Nutrition and Feeding. Chouaib Doukkali University. School of Sciences. El Jadida. Morocco.
e-mail address : rbelahsen@yahoo.com

Objectives : To study relationship between obesity, dietary intake and the length of time spent drinking tea daily.

Methods : Data were obtained on 249 urban women aged 15 and older not pregnant who live in Laayoune a city of Morocco. Only subjects identified as Saharan origin were eligible for this investigation. The following data were collected : Body weight, height, and waist circumference. Intake estimates were based on 24-hour recall interviews. Subjects completed also a questionnaire indicating their activities. This questionnaire served as a basis upon which subjects are grouped according to the time they spent drinking tea : those who spent less than 3h/d (group 1) and those who spent 3 or more h/d (group 2).

Results : The results showed that tea is the beverage most consumed by this population. The mean time spent in drinking tea is 3hours per day. Also Body mass index (BMI), WC and glucose Intake were significantly higher among group 2 than group1. Subject in-group 1 consumed more energy, protein, carbohydrate, Vitamin B1, fibre, Vitamin C, Magnesium and Zinc than those of group 2. Intake of fat is not significantly different in both groups.

Conclusion : The results show that in addition to promoting physical activity, it appears to be necessary also to control the composition of the diet in order to prevent obesity and its complication.

Obesity and central obesity among urban Sahraoui women of south Morocco

Mohamed RGUIBI, Rekia BELAHSEN

Training and Research Unit on Food Sciences. Lab. of Physiology Applied to Nutrition and Feeding. Chouaib Doukkali University. School of Sciences. El Jadida. Morocco.
rbelahsen@yahoo.com

Objective : To study the prevalence of obesity and central obesity in Moroccan Sahraoui women, and to examine the influence of age, calorie intakes, physical activity, marital status, education level and desire to lose weight on obesity.

Methods : We randomly selected 249 urban women aged 15 and older, not pregnant who live in Laayoune city of South Morocco. Only subjects identified as Sahraoui origin were eligible for this investigation. The following data were collected : Body weight, height, circumferences of waist and hip, calorie intakes, physical activity, marital status, education level, and desire to lose weight.

Results : The overall prevalence of overweight and obesity was respectively 30% and 49%. It was already very high at younger age. Central obesity also was very prevalent and increased with age. 68% of women had a WHR >0.85 and 76% had a WC ≥ 88 . Energy intake, intake of sugar, and the time spent in traditional sedentary occupation were positively correlated with obesity whereas the time spent in walking activity was negatively correlated with obesity. The prevalence of obesity was higher among married than unmarried women and was not influenced by the education level. Only a very small percentage of the female population expressed a desire to lose weight.

Conclusion : High prevalence of obesity, even in young adults, need immediate attention in terms of prevention and health education in the urban Sahraoui women.

Food habits and adherence to nutritional recommendations in older diabetics

BRICOUT Hélène¹, HELMER Catherine¹, GIN Henri², LARRIEU Sophie¹, BARBERGER-GATEAU Pascale¹

1: INSERM U593, ISPED, Université Victor Segalen Bordeaux2, 33076 Bordeaux cedex

2: Service de nutrition-diabétologie, CHU de Bordeaux, Hôpital du Haut-Lévêque, 33604 Pessac cedex

Corresponding author : Bricout Hélène, équipe PAQUID, INSERM U593, ISPED, Université Victor Segalen Bordeaux2, 33076 Bordeaux cedex, Helene.Bricout@isped.u-bordeaux2.fr

Context : The risks associated with ill-balanced diabetes are particularly important in the elderly, increasing their risk of morbidity and mortality. This balance requires an adapted diet.

Objective : To describe food habits of diabetic subjects aged 65 and over, comparatively to non-diabetic subjects of the same age, and to evaluate their adherence to the French nutritional recommendations emitted by the ANAES organization (Agence Nationale d'Accréditation et d'Evaluation en Santé) for diabetic patients.

Methods : Data resulted from the epidemiological « 3Cités-Bordeaux » study, in which a nutritional survey was carried out by dieticians at home. This investigation included a food frequency questionnaire and a 24-hour recall of food consumption. The subjects were considered as diabetics if they reported diabetes and / or if they used hypoglycemic agents.

Results : 157 diabetic subjects and 1381 non-diabetic subjects took part in this study. The proportion of men was greater in the diabetic group than in the non-diabetic one; mean age did not differ between groups. The body mass index (BMI) was significantly increased in the diabetic group, with an average BMI of 28.6 for the diabetics and of 26 for the non-diabetics. According to the 24-hour recall, we estimated that the amount of calories consumed per day was lower in the diabetic group than in the non-diabetic one, but significantly only for women. In proportion of total energy intake, diabetics ingested less carbohydrates than the non-diabetics, men compensating by an increase in proportion of proteins and lipids, and women only by an increase in proportion of proteins. Compared to the recommendation for diabetics to consume 50% carbohydrates, 35% lipids and 15% proteins, diabetics in our study consumed on average 44.4% carbohydrates, 34.6% lipids and 21% proteins. According to the food frequency questionnaire, fruit consumption did not differ between diabetics and non-diabetics; 15 diabetics (9.6%) ate less than one fruit per day on average (less than 5 fruits per week). Diabetics ate vegetables as often as non-diabetics, with an average frequency of 3 vegetables eaten per day. Fish consumption did not differ between the 2 groups with a mean frequency of fish consumption of twice a week. However, diabetics consumed more often meat than non-diabetics. Nibbling was relatively frequent in the diabetic group, since 32 of them (20.4%) reported nibbling sweets between meals at least 5 times per week.

Conclusion : These first results showed that the food behaviors of the old diabetics differed partly from those of non-diabetic subjects of the same age. Some discrepancies with the French nutritional recommendations for diabetics are highlighted.

Analysis of problems connected with wearing special prophylactic shoes for diabetics type II

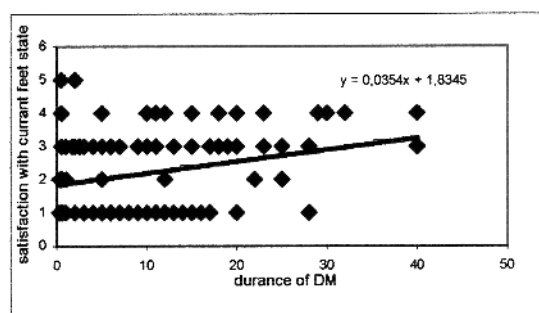
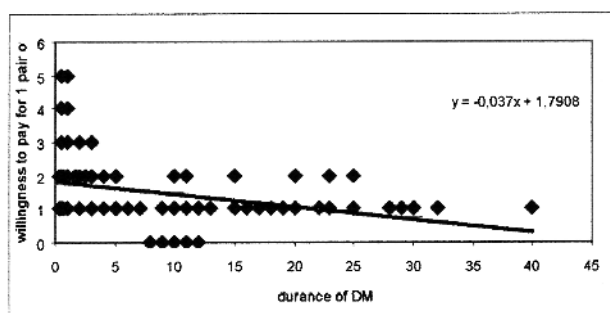
JANDLOVÁ Silvie, PODANÁ Michaela

Tomas Bata University in Zlín, Tomas Bata University, Faculty of Technology, Nam. T. G. Masaryka 275, 762 72 Zlín, The Czech Republic, Email : s_jandlova@ft.utb.cz

Objectives : The issue of diabetics footwear wearing has been systematically explored only in the last decade. The most important assertion was found, that the lesion (injury) on a diabetic's foot is related to wearing unsuitable shoes. In The Czech Republic the prophylactic footwear is offered to diabetics with the diabetic foot syndrome. This footwear is partly paid by insurance companies.

Methodology : In the Zlín region (CZ), marketing research was conducted with a focus on understanding the consumer behaviour of diabetics. The research (made by oral questionnaire) was pursued by means of the diabetological clinic with the diabetologist and was also supplemented by controlled interview with diabetics. Questionnaires were given to 158 diabetics of type II of whom 98 were women and 60 men in all age categories. 20 parameters were monitored. The goal was to determine the subconscious of diabetics about prophylactic footwear, how much are diabetics pliable to purchase one pair of shoes in relation to length of diabetes duration and current state of their feet. The investigation lasted 3 months and it hasn't been finished yet. It is presumed that 230 respondents will be addressed.

Results : Sufficient number of respondents allowed us to present following results. More than 76 % of diabetics were older than 50 years. The average length of diabetes duration was 7,25 years. Relatively high quantity of diabetics (63,3 %) is pliable to pay no more than cca. 30 EUR for 1 pair of prophylactic footwear and only 6,4 % took as the acceptable price in range from 43 to 57 EUR. Approximately, every third diabetic (37.6 %) told that they didn't buy prophylactic shoes because they were too expensive. Almost the same count of diabetics (38,6%) knew about prophylactic shoes and knew their advantages, but only 17,7 % of diabetics owned them. The biggest influence that affected diabetic purchase of special shoes was from their physician (41,7 %). Surprisingly, with the increasing length of diabetes mellitus duration the amount of money those diabetics are decided to pay for one pair of the special footwear decreases (fig.1) and the satisfactory with the state of their feet also declines (fig. 2).



Conclusion : By this research was found, that the diabetics understanding about the existence and advantages of prophylactic footwear are deficient. Dangerously there are a low number of diabetics that are willingness to protect their feet and to wear prophylactic shoes regularly. Thereafter there was proved that with increasing age the willing of diabetics to participate financially by purchasing of suitable prophylactic shoes declines even if they know that the state of their feet are getting worse.

Paradoxical effect of coronaropathy on n-3 docosahexanoic acid (DHA) levels in erythrocyte from diabetic patients in Marseille

EL MEJABER Wafaa¹, MIGUET Jean¹, GUTOWSKI Nicolas¹, GLEIZE Beatrice², PAYET Mariane², DURAN Marie Joe³, SENNOUNE Souad³, PAGANELLI Franck⁴, PIERONI Gerard⁵, MAIXENT Jean Michel^{1,6}

1. IUP - DESS Génie Physiologique Informatique, Faculté des Sciences Fondamentales et Appliquées Université de Poitiers
2. INSERM U476 Faculté de médecine Timone 27 Boulevard Jean Moulin 13385 Marseille CEDEX 05 FRANCE
3. Dept. of Physiology, Texas Tech University Health Sciences Center, 3601 4th Street, Lubbock, TX, 79430, USA.
4. Hôpital Nord-CHU, Université de la Méditerranée.13385 Marseille cedex 05. France.
5. UMR 6187-CNRS, Institut de Physiologie et Biologie cellulaires,Poitiers. Pôle Biologie Santé, Université de Poitiers, France

Corresponding author : Ms.Wafaa El Mejaber, IUP - DESS Génie Physiologique Informatique Faculté des Sciences Fondamentales et Appliquées, Université de Poitiers Bât. Botanique, 40, av du Recteur Pineau, 86022 POITIERS Cédex, e-mail : welmejaber@gphy.campus.univ-poitiers.fr

Background : Recent developments confirm and extend the concept that n-3 (omega 3) fatty acids are beneficial in the prevention of cardiovascular diseases and sudden cardiac death. Many reports have shown inverse positive correlation between n-3 polyunsaturated fatty acids (PUFA) and coronary artery disease (CAD). Our previous study with Mediterranean people (where diabetic patients were excluded) showed association between CAD and a decreased n-3 PUFA levels in erythrocyte phospholipids. In fact, diabetes is known to profoundly impair the omega 3 levels in practically all tissues but nothing is known about the n-3 PUFA status from diabetic patients with CAD.

Objective : To investigate the erythrocyte and plasma fatty acid patterns in diabetic patients with and without angiographic coronary stenosis.

Methods : A total of 20 consecutive patients with diabetes were included between June to august 2003. The erythrocyte membrane fatty acid patterns were analyzed by gas chromatography in 8 diabetic patients without coronary stenosis (Group D) and compared to 12 diabetic patients with coronary stenosis (Group D+CAD).

Results : Mean percentage (SE) of DHA (C22:6 n-3) in erythrocytes was 4.7 (0.3) in D and 6.6 (0.4) in D+CAD (P = 0.003). The values for the most abundant n-6 PUFA (arachidonic acid) in erythrocyte were 17.0 (0.9) in D and 17.7 (0.7) in D+CAD, (P = 0.3). The n-3/n-6 PUFA balance from diabetic patients with CAD is similar to control patients without diabetes or CAD (data not shown). This study shows for the first time that the well known alteration in n-3 PUFA levels induced by diabetes is not found in erythrocytes or plasma from diabetic patients with CAD.

Conclusion : This effect seems a paradox. Explanations of this paradox could be various for example : nutritional changes in consumption habits, increased conversion to long chain PUFA, decreased metabolism of n-3 PUFA, etc...

Improvement of type 2 diabetes and metabolic syndrome after weight loss following bariatric surgery in severely obese subjects

A.J. SCHEEN, I. NEVEN, K. TRICHES, J. DEFLINES, F.H. LUYCKX, C. DESAIVE

Departments of Medicine, Clinical Chemistry and Surgery, CHU Liège, Belgium.
Andre.Scheen@chu.ulg.ac.be

Background and Aims : Obesity is strongly associated with type 2 diabetes mellitus and the metabolic syndrome (especially dyslipidaemia and arterial hypertension). Achieving and maintaining weight loss with life-style changes in severely obese diabetic patients remains a real challenge so that bariatric surgery may be proposed in well-selected patients with severe refractory obesity. We compared the efficacy of two surgical approaches, either gastroplasty (GP : vertical-banded gastroplasty or adjustable silicone banded gastroplasty) or gastric bypass (GB : “Roux en Y” technique), with the results obtained with classical medical approaches, on body weight loss and related metabolic changes in severely obese patients with type 2 diabetes.

Material and Methods : In a first short-term evaluation, results of weight loss, blood glucose control, lipid profile and blood pressure were compared 29 ± 9 months after medical treatment (n = 14), 28 ± 4 months after GP (n = 24) and 28 ± 14 months after GB (n = 14). In a second long-term evaluation, results were compared 79 ± 30 months after medical treatment (n = 14) and 105 ± 31 months after GP (n = 17) (no available long-term data with GB).

Results : In the short-term evaluation, no significant changes were observed with medical treatment regarding body weight (body mass index or BMI : from 40.8 to 41.0 kg/m²), as well as fasting blood glucose concentrations, HbA_{1c} levels, lipid parameters and systolic/diastolic blood pressure. In contrast, significant (p < 0.05) reductions were observed after GP regarding BMI (from 44.8 to 33.3 kg/m²), fasting glycaemia (from 8.6 to 5.8 mmol/l) and HbA_{1c} (from 8.3 to 5.6 %). Similar results were observed after GB with significant reductions in BMI (from 41.8 to 29.2 kg/m²), fasting glycaemia (from 8.9 to 6.1 mmol/l) and HbA_{1c} (from 8.7 to 6.2 %). Similar reductions in triglycerides (from 2.6 to 1.4 mmol/l with GP and from 3.6 to 1.3 mmol/l with GB) and arterial pressure (from 167/98 to 137/78 mm Hg with GP and from 166/95 to 133/79 mm Hg with GB) were observed with the two surgical methods. In contrast, the decrease in total cholesterol was greater with GB than with GP (- 16 % versus - 6 %, p < 0.05), presumably because of partial fat malabsorption associated with GB. In the long term, BMI was almost stable with medical management (BMI from 40.8 to 40.3 kg/m²) and pharmacological treatments should be intensified in order to keep almost similar metabolic control. Interestingly, after GP, BMI significantly decreased from 42.7 to 33.5 kg/m², fasting glycaemia from 9.4 to 7.8 mmol/l, HbA_{1c} from 8.2 to 6.9 %, total cholesterol from 6.2 to 5.4 mmol/l, triglycerides from 2.9 to 1.8 mmol/l, and arterial pressure from 163/87 to 143/78 mm Hg. In contrast to patients receiving medical treatments, patients treated with GP or GB obtained better metabolic results in both short- and long-term in spite of significant reductions of antidiabetic (insulin, sulfonylureas and/or metformin), antihypertensive and lipid-lowering pharmacological agents. No serious side effects were observed in the two surgical groups throughout the study.

Conclusions : As compared to classical medical treatment, bariatric surgery results in better short-term and long-term control of blood glucose and other cardiovascular risk factors related to the metabolic syndrome in severely obese patients with type 2 diabetes. Because of the poor overall prognosis of such patients, bariatric surgery should be considered as a valuable alternative after failure of medical approaches, but always after a careful initial evaluation and under strict medical supervision by a multidisciplinary team.

Xylooligosaccharide improves blood glucose independent of BMI in type II diabetic patient

Huang Yan Jiun¹, Chang Ya Han¹

¹Department of Food and Nutrition, Providence University
200, Chung-Chi Road, Shalu, Taichung, 433 Taiwan, R.O.C. e-mail : yjhuang@pu.edu.tw

Xylooligosaccharide is a prebiotic and beneficial to decrease blood lipids and blood pressure. Our previous studies showed xylooligosaccharide alleviated hypertriglyceridemia, prevented postprandial hyperglycemia and decreased body fat in fructose induced endogenous glucose intolerance animal model.

Objectives : This study was to evaluate the effect of xylooligosaccharide supplementation on blood glucose and body mass index in type II diabetic patients.

Methodology : Subjects with type II diabetes were recruited from local clinics. Food frequency questionnaire was finished with the instruction of professional dietitian in the beginning of the study. The diet and medication was maintained as usual except 2g per day xylooligosaccharide were given in the 8 weeks experimental duration. Body mass index, blood glucose, insulin, lipids, blood pressure, and urine were assayed in the beginning and final. Casual blood glucose and urine test were preceded every two weeks. Patient's health status was monitored by physician during the whole experimental period.

Results and conclusions : Xylooligosaccharide 2g per day improves HbA1c and blood glucose independent of BMI in type II diabetic patient.

Time		Xylooligosaccharides— 2g		
Assay		0 week (%)	8th week (%)	
	BMI<18.5	0	0	
BMI	18.5<BMI<24	33.3	16.7	
	24<BMI<27	50.0	66.7	
	BMI>27	16.7	16.7	
HbA1c	< 7 %	0.0	16.7	
	> 7 %	100.0	83.3	
Assay	Time	2 nd week (%)	4 th week (%)	6 th week (%)
Casual Plasma Glucose	< 200 mg/dl	33.3	33.3	66.7
	> 200 mg/dl	66.7	66.7	33.3

Procyanidin extract (PE) modulation of Cu/Zn-superoxide dismutase expression in non-diabetic and streptozotocin-induced diabetic rats

Puiggròs F. ; Gracia J. ; Blay M. ; Fernández J. ; Bladé C. ; Ardévol A. ; Arola L. ; Salvadó M.J.

Francesc Puiggròs Llavines PhD Student, Dpt. Biochemistry and Biotechnology
Universitat Rovira i Virgili, PI?a Imperial tarraco n 1/4 1 PC 43005 Tarragona
(francesc.puiggròs@estudiants.urv.es)

Free radicals and oxidative stress have been implicated in the aetiology of diabetes and its complications. Glucose oxidation is believed to be the main source of free radicals, particularly superoxide anion radicals. Given the powerful antioxidant activity described for PE, we hypothesized that PE supplementation would normalize the changes in oxidative stress markers caused by the hyperglycemic state of diabetes.

This in vivo study has examined whether acute administration of grape seed-derived procyanidin extract (PE) modifies the hepatic gene expression of Cu/Zn-superoxide dismutase (Cu/Zn-SOD), the principal superoxide scavenging enzyme in normal and streptozotocin-induced diabetic rats.

Diabetes was induced in male Wistar rats by a single injection of streptozotocin (70mg/kg body weight) resulting in polyuria, glycosuria and hyperglycemia (≈ 20 mM) 2-3 days post-induction. All studies were carried out one week after STZ had been injected. Normal and diabetic rats were treated with an oral gavage of PE (250mg/Kg body weight).

Although hyperglucemia-associated diabetes may induce a stress response mechanism, we found no differences in the enzymatic activity of Cu/Zn-SOD between diabetic and non-diabetic control rats. We observed that the effect of PE was similar in diabetic and non-diabetic rats. PE treatment did not change either mRNA or protein levels of Cu/Zn-SOD although the enzyme activity was observed to increase slightly (about +20%) with respect to PE non-treated animals.

This is an agreement with previous results from our group, which showed mainly post-translational regulation of Cu/Zn-SOD by PE in rat hepatoma cells (Fao). These results support that procyanidins act post-translationally on Cu/Zn-SOD expression to exert their protective effect.

Effects of a fructose-enriched diet on antioxidant status and antioxidant enzyme expression in spontaneously hypertensive rats

GIRARD Aurélie¹, MADANI Sihem¹, BOUKORTT Farida², BELLEVILLE Jacques¹ & PROST Josiane¹

¹UPRES Lipides et Nutrition, 6 boulevard Gabriel, 21000 Dijon, France.

²Laboratoire de Nutrition Clinique et Métabolique. Faculté des Sciences. Université d'Es-Sénia, 31000 Oran, Algérie.

Corresponding author: Aurélie Girard UPRES Lipides et Nutrition, 6 boulevard Gabriel, 21000 Dijon, France. Email : aurelie.girard@u-bourgogne.fr

Fructose consumption by Wistar and Sprague-Dawley rats induces type 2 diabetes resulting in hyperglycaemia, hyperinsulinaemia and antioxidant status alteration. No similar experiment has ever been carried out with hypertensive rats.

Twenty spontaneously hypertensive rats (SHR) were divided into two groups and fed a 60%-fructose diet or a control diet (60% starch). Blood and liver lipid peroxidation and antioxidant status were studied after 3 months. The Elisa method was used for insulinaemia determination. Whole blood, erythrocytes, plasma and liver antioxidant status was determined by a KRL™ test: red blood cells (RBC) were subjected to free radical generator, RBC antiradical resistance was expressed by the time to reach 50% haemolysis. Lipid peroxidation was measured by thiobarbituric acid-reactive substance (TBARS). The antioxidant enzyme activities [superoxide dismutase (SOD) and glutathione peroxidase (GPx)] were measured with biochemical methods and their expressions were studied by semi-quantitative and Real time PCR.

Compared with the starch diet, the fructose diet induced hyperglycaemia and hyperinsulinaemia. Moreover, the fructose diet diminished the whole blood antioxidant status. This is associated with an increase in plasma TBARS concentrations and a decrease in erythrocyte GPx activity and glutathione concentrations. The fructose diet, however, improved liver antioxidant status by increasing SOD and GPx activities. GPx mRNA in liver tissues in the fructose fed rats showed a decrease, while little changes were observed in SOD mRNA in this organ. These findings suggest that the fructose diet increases peroxidative damage in whole blood and not in liver, and leads to hyperinsulinaemia associated with hyperglycaemia, therefore type 2 diabetes.

Diabetic angiopathy. Structural survey of the aortic atherosclerosis among the diabetic sand rat

EL AOUI Salima⁽¹⁾, GENDRE Philippes⁽²⁾ and MARQUIE Georges⁽¹⁾

⁽¹⁾Laboratoire de Physiologie Métabolique et de la Nutrition, Faculté des Sciences Biologiques, USTHB BP N° 31 ; Dar El Beida Alger. E-mail : bmaouche@usthb.dz

⁽²⁾Département de Microscope Electronique, Université de Bordeaux I, Talence, France.

Introduction : The type 2 diabetes mellitus is emerging as a threatening public health problem in Algeria. The toxic effects of chronic hyperglycemia induce a large number of alterations in vascular tissue that potentially promote accelerated atherosclerosis.

The pathogenesis of the diabetic syndrome (DS) is not been yet fully elucidated so a better understanding of its onset and progress to the aorta tissue level of a particularly auspicious animal : 'natural' *Psammomys obesus* (NPO) can help us to identify some agents likely to inhibit human angiogenesis.

Objectives : Through a study of NPO population our aim is to show a direct relationship between a relatively high energy diet and the DS regardless of any other etiological factor. Then to outline on the morphological and ultrastructural levels any impact of such DS on aorta arterial wall at different development stages of the diabetes.

Material and method : Our study was conducted over 62 NPO of the both sexes, caught in South west of Algeria divided into 2 groups. A first one of 24 was kept as 'witnesses' group and was fed on Sahara halophile plants. As to the second group of 38 animals were on a standard laboratory diet program. The experimentation period lasted 12 months. Animals were regularly followed on both ponderal and biochemical levels throughout the DS development. Sacrifices were done every three months.

Results : The morphological and histo-enzymological aspect showed an alteration of the elastic fibers of the media and enrichment in collagen and in glucosaminoglycans. Enzyme's activity linked to the parietal lipolyse (esterase, cholinesterase) decreased strongly among the diabetics; correlatively the neutral lipids accumulate in the intima and in the internal part of the media. At the ultrastructural level deep changes of the aortic wall were observed : the conjunctive tissue was altered and disorganized, the elastic fibers were thinned, numerous ruptures were observed, and the internal elastic limit was fragmented. The development of the collagen tissue entails a real fibrosis. Deep degenerative changes affected the smooth muscular cells : inflation of the mitochondria's, vacuolization of the cytoplasm and denaturation of the nuclear substance. These cells ended up necrotizing and one could observe many cellular remnants in the affected zones. The arterial lesions were especially frequent to the last stage of the illness where animals became insulin dependant.

Conclusion : It was shown that we could induce a DS on NPO through a relatively strong caloric diet and that a direct relationship exists between diabetes and cardiovascular complications of the aorta regardless of any other etiological factor. This animal is definitely a suitable model for induced diabetes study since its phenotype in case of angiopathy is similar to what is observed on humans. Recent study have come to the same results confirming NPO is a model suitable for research works on angiopathy pathogenesis and for identification of inhibitors of the proteic glycation at the human population.

Phenotypic frequencies HLA DR and genetic risk of type 1 diabetes in the area of Tlemcen (West-Algeria)

Mourad ARIBI¹, Soraya MOULESSEHOUL²

¹Department of Biology, Faculty of Sciences, University Djillali Liabes National Research Center (NRC) Sidi Bel Abbès 22 000, Algeria

² Department of Biology, Faculty of Sciences, University Djillali Liabes National Research Center (NRC) Sidi Bel Abbès 22 000, Algeria
(E-Mail : s.moulessehoul@univ-sba.dz)

Background : The principal genomic region controlling the predisposition to the Type 1 insulin dependent diabetes (type 1 IDD), is that of the major complex of histocompatibility (HLA) of class II. Besides, the types of HLA associated with it vary according to studied populations. Jointly, we tried to measure the phenotypic frequencies of associations of HLA class II DR3 and/or DR4 antigens, detected by serologic method of microlymphocytotoxicity, in diabetic and nondiabetic (ND) subjects originating from the area of Tlemcen (West-Algeria). Specifically, we tried (aim) to decode HLA DR molecules of greater susceptibility to the genetic risk to develop the disease in this area. In this respect, we randomly recruited ninety-one related subjects, thirty-nine type 1 IDD and fifty-two ND controls, at the Board of Internal Medicine of the University Medical Center of Tlemcen (West-Algeria), for a case-control retrospective study.

Results : Singularly, the frequencies of DR3 antigens were comparable between the type 1 IDD and the ND and do not show association with the disease ($p = 0.9180$, $OR < 1$, $\log OR < 0$) ($p < 0.05$ was considered significant). But, DR4 and DR3DR4 antigens were associated with susceptibility to the development of type 1 IDD ($OR > 1$, $\log OR > 0$, that is respectively OR confidence interval 0.73-6.11 and 0.38-4.00, 95% CI) (so, there is susceptibility). No incidence was related to the sex for the frequencies of DR3 ($p = 0.2646$) or DR3DR4 molecules ($p = 0.0699$). However, significant differences in HLA DR4 frequencies were related to the sex between the type 1 IDD and ND ($p = 0.0085$).

Conclusion : Altogether, the strongest association with the Type 1 IDD was noticed in HLA DR4 antigens followed by the DR3DR4. This study revealed a ethnic characteristic of the area of Tlemcen that interminably witnesses a history of consanguinity marriages. Irrefutably, the studies of associations between the disease and genetic polymorphisms must be contributed in the absence of consanguinity to eliminate ambiguities in interpretation of the results.

Validation of dairy products intake frequency questionnaire ADOS-Ca used for osteoporosis risk by evaluation of calcium intake and estimation of calcium deficiency risk

Ewa J. SZYMELFEJNIK¹, Lidia WADOŁOWSKA¹, Roman CICHON^{1,2}, Juliusz PRZYŚLAWSKI³, Izabela BOLESŁAWSKA³

¹Institute of Human Nutrition, University of Warmia and Mazury, 10-718 Olsztyn, ul. Słoneczna 44a, Poland, lidiaw@uwm.edu.pl

²Department of Nutrition and Dietetic, Medical University, Bydgoszcz, Poland

³Chair and Department of Bromatology and Human Nutrition, Medical Academy, Poznan, Poland

Objective : Validation of dairy products intake frequency questionnaire ADOS-Ca, worked out as a diagnostic test for quantitative calcium intake assessment and estimation of its deficiency risk taking into consideration osteoporosis risk.

Materials and methods : In the work the compatibility of calcium intake estimation obtained according to ADOS-Ca test with the evaluation obtained by 24-hour recall method, repeated for 7 following days [1]. The research was carried out among 90 students aged 21-26. On the basis of the questions included in the questionnaire, concerning the amount and the frequency of 11 dairy products intake during a week and the agreed indices of frequency intake, the mean Ca/person/day intake ($x \pm SEM$) was assessed. For comparisons the mean calcium intake from dairy products were used, obtained from the 24-hour recall method, repeated 7 times. In the statistical analysis the T test and tau-Kendall correlation coefficient (r), with $p \leq 0,05$ were used. Test ADOS-Ca diagnostic accuracy was determined by sensitivity, specificity and Youden ratio [2].

Results : There were no differences in intake of calcium between the value obtained according to diagnostic test and the 24-h recall method (women $p=0.156$; men $p=0.684$). The average consumption of calcium assessed by the diagnostic test ADOS-Ca in comparison to that of 24-h recall method amounted for men to 619 ± 54.6 mg and stated 92.5% of the calcium amount assessed by means of the 24-hour recall method, and for women 434 ± 33.0 mg and 96.4% ($r=0.64$), respectively. The sensitivity ratio amounted for men to 78% and for women to 90%, the specificity ratio to 74% and 62%, respectively, and the Youden ratio to 64.6% and 70.6%, respectively.

Conclusions : The results permit for a satisfactory evaluation of the diagnostic test as a simple tool for quantitative estimation of calcium intake.

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The work was accomplished within the KBN research subjects no 3 P06T 039 22

A new anti-atherogenic mechanism of plant sterols : The reduction of oxysterols in human plasma

M. KOZŁOWSKA-WOJCIECHOWSKA¹, M. NARUSZEWICZ^{1,2}

¹ National Food and Nutrition Institute, Warsaw, Poland

² Pomeranian Academy of Medicine, Szczecin, Poland

Address: National Food and Nutrition Institute 02-903 Warsaw, Powsinska Str. 61/63, Poland

e-mail: mkozłowska@izz.waw.pl

Objectives : Many studies indicate that an increased level of oxysterols in the serum and in the vascular wall plays a fundamental role in the pathogenesis of atherosclerosis. Moreover, oxysterols may induce the processes of apoptosis, necrosis, and inflammation. So far we have proved that plant sterols contained in fat spreads not only lower LDL-cholesterol, but also reduce the levels of C-reactive protein and anti-ox-LDL antibodies.

Methodology and results : In the present studies we tested the hypothesis that plant sterols may exert an effect on the level of oxysterols in plasma. 42 young male volunteers participated in the experiment. They were randomized to two groups : one consumed margarine supplemented with PUFA omega-6, and the other consumed fat spread enriched with plant sterols. After 4 weeks of the study, in both groups a significant reduction in LDL-cholesterol was found (6,7% in PUFA group and 11% in sterols group), but in the sterols group, significant (ANOVA and TUKEY Test) reductions in hCRP by 23,2% and 7-ketocholesterol levels by 14,3%, and 7 β -hydroxycholesterol levels by 15,8% were observed.

In an independent experiment we have also demonstrated that plant sterols significantly inhibit the absorption of oxysterols studied (7-ketocholesterol and 7 β -hydroxycholesterol) from egg powder during postprandial lipaemia.

Conclusion : In conclusion, our studies indicate that plant sterol may have also preventive action in cardiovascular disorders by inhibiting the absorption of oxysterols from food.

Six weeks consumption of olive phenols increased urinary phenol concentration without affecting measures of oxidative damage in humans

ROODENBURG, Annet J.C. ; LEENEN, Rianne ; SCHUURMAN, Caroelien R.W. ; VAN DE PUT, Frans H.M.M. ; TIJBURG, Lilian B.M. ; VAN HERPEN-BROEKMANS, Wendy M.R. ; WISEMAN, Sheila A.

Unilever Health Institute, Unilever Research & Development Vlaardingen, The Netherlands

Corresponding authors: Dr Annet JC Roodenburg/Dr Rianne Leenen; Unilever Health Institute; Unilever Research and Development; P.O. Box 114 ; 3130 AC; Vlaardingen; The Netherlands; Phone +31 10 4606467; email: Annet.Roodenburg@unilever.com; Rianne.Leenen@unilever.com

Objective : To determine whether 6 weeks consumption of olive oil phenols with or without vitamin E improves measures of oxidative damage in humans.

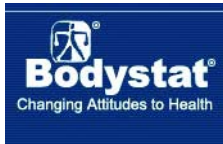
Methods : In a parallel study design, 60 volunteers aged 45-70y were randomized into four groups of 15 persons. Body weight was equally distributed among the groups. All volunteers consumed daily 30 g of margarine for 6 weeks. The four groups received either a control margarine; a margarine fortified with a phenol rich olive extract (about 100 mg phenols) ; a fortified margarine with 100 mg of vitamin E or a fortified margarine with a phenol rich olive extract (about 100 mg phenols) plus 100 mg vitamin E. Fasting blood samples were taken before and after the intervention period for analysis of measures for oxidative damage. At the end of the study, 24h urine was collected from the control group and the group receiving the margarine with the phenol-rich olive extract, to measure olive phenols and phenolic metabolites.

Results : Consumption of olive phenols for 6 weeks resulted in increased urinary hydroxytyrosol and its oxidation product 3,4'-dihydroxyphenylacetic acid, but did not affect measurements of oxidative damage. Consumption of vitamin E protected against oxidative stress as demonstrated by an increased lag-time of *ex vivo* LDL oxidizability, a reduced maximal LDL oxidation rate and a reduced lipid oxidation measured as plasma F2-isoprostane levels.

Conclusion : Six weeks consumption of olive phenols increased phenol concentration without affecting measures of oxidative damage in humans. Consumption of vitamin E, however, reduced lipid oxidation, measured as increased resistance of LDL to oxidation and reduced plasma F2 isoprostane concentration.

ACKNOWLEDGMENTS

EGEA II, «International Conference on Health Benefits of Mediterranean Diet» would like to acknowledge the support of the following companies and organisations :



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 ALVADO M.J. P22
 ARDEVOL A. P22

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