Glycaemic index of different types of bread

Prof. Dr. Angel Gil

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The promotion of healthy lifestyles is one of the major goals of governments and international agencies all over the world. Whole grain cereals are rich in nutrients and many phytochemical compounds, with recognized benefits for health, including dietary fibre, a number of phenolic compounds, lignans, vitamins and minerals and other bioactive components. Several studies show consistently that subjects who ingest three or more portions per day of foods based on whole-grain cereals have a 20-30% lower risk of cardiovascular diseases than subjects who ingest low quantities of cereals; this level of protection is not observed with the ingestion of refined cereals, these being even higher than with the intake of fruits and vegetables. Likewise, high intake of whole-grain cereals and their products, such as whole-wheat bread, is associated with a 20 to 30% reduction in the risk of type 2 diabetes. Finally, protection against the risk of colorectal cancer and polyps, other cancers of the digestive tract, cancers related to hormones, and pancreas cancer has been associated with the regular consumption of whole-grain cereals and derived products. Hence, the regular intake of whole-grain cereals can contribute to reduce risk factors related to non-communicable chronic diseases (1).

The major compound in bread is starch. Starch is classified into rapidly resistant digestible starch (RDS), slowly digestible starch (SDS), and resistant starch (RS)(8) according to the rate of glucose release and its absorption in the gastrointestinal tract. SDS, which leads to a slower entry of glucose into the blood stream and a lower glycaemic response, is digested completely in the small intestine at a lower rate as compared to RDS, while RS is the starch portion that cannot be digested in the small intestine, but is fermented in the large intestine. Bread has a variable proportion of SDS and of RS, according to the variety of grain. In white breads, the proportion of RS is high, reaching 5.6-8.1% due to the incomplete gelatinization of the starch in the crust. Some varieties of French bread (the traditional baguette) have been reported to lower insulinaemic index in healthy subjects, and lower glycaemic index in type 2 diabetic subjects, compared with other bread varieties and it has been suggested that these results might be due to bread processing difference rather than fibre content. Indeed, we have carried out a study in healthy subjects to evaluate the glycaemic index (GI), glycaemic load (GL) and insulinemic index (InI), as well as and their effects on the control of satiety and satiation, of six varieties of Spanish bread differing in their composition and manufacturing processing (White breads: Fresh, Candeal, Precooked, and Alfacar; Wholemeal breads: Fresh with added bran, and Organic wholemeal bread). The lowest GI was found for the organic bread followed by Alfacar and fresh breads. Significantly lower GL and InI were found for all types of essayed breads, excepting for that made with refined wheat flour added with bran. InI ranged 74-78% compared with glucose. With regards to gastrointestinal hormones ghrelin, GLP-1, and pancreatic polypeptide (PP) time-course profiles differed significantly from any type of bread compared with glucose e.g. GLP-1 increase was lower and PP higher after consumption of bread. This may contribute to the satiety and satiation mediated by bread consumption compared with simple sugars.

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Angel Gil is Full Professor of Biochemistry and Molecular Biology at the University of Granada, Spain and Head of the Research Excellence Group CTS-461 on Nutritional Biochemistry. He is the President of the Iberomerican Nutrition Foundation (FINUT), an institution supported by the International Union of Nutritional Sciences (IUNS), and President of the Spanish Society of Nutrition.

Prof. Gil has authored more than 340 articles published in peer-review journals and more than 100 book chapters. He is the Editor-in Chief of the Tratado de Nutrición, a textbook written in Spanish with 4 volumes and an Web site. He has promoted 44 PhD Thesis and 14 Master Degree Thesis

He managed the R&D team of Puleva SA and Abbott Lab from 1983 to 1994 and 1995 to 1996, respectively, being involved in the development of infant formulas and special diets for nutritional purposes, and a line of enteral nutritional products. From 2000 to 2004 he was the Director of the Foundation University of Granada-Enterprise.

The field of research of Prof. Gil has been related to the biological effects of dietary nucleotides, as well as lipid metabolism in early infancy. In the last ten years he also has been investigating the effects of olive oil in atherosclerosis and currently is leading various projects in nutrigenomics, particularly in the evaluation of gene expression of adipose and muscle tissue in childhood obesity and its association with prepubertal hormonal and metabolic changes related to early onset of metabolic syndrome.

He is the President of the Iberoamerican Council for Nutrition Journals, Associate-Editor of Annals of Nutrition and Metabolism and member of the Advisory Board of a number of selected journals. He is the President of the Spanish Nutrition Society and President of the Iberomerican Nutrition Foundation, Honorary Member of the Royal Academy of Veterinary Sciences and Member of the Spanish Academy of Nutrition and President of the Spanish Scientific Committee of Bread. He is the President and Chairman of the International Congress of Nutrition 2013 of the International Union of Nutrition Sciences (IUNS) that will be held in Granada, Spain 15-20 September.

ICN’2013
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Bread and Health

Chaired by *Prof. Dr. Ángel Gil, Granada University, Spain*

Conferences:

Benefits of Whole Grain Cereals And Bread
Mr. Ibrahim Eldmafa, Vienna University, Austria

Glycaemic Index of Different Types of Bread,
Prof. Dr. Ángel Gil, Granada University, Spain

Relationship Between Bread Consumption, Body Weight and Abdominal Fat Distribution. *Luís Serra, Las Palmas University, Spain*

at Granada Congress Center
Sunday, 15th September 2013
16.00 – 18.00h ANDALUCIA Room

Benefits of whole grain cereals and bread

Ibrahim Elmadfa

Cereals in general and bread have been a staple food for centuries. Their rich content in nutrients and their good storability make them a valuable source of energy. Recently, however, they have become less popular in the wealthy industrialised countries and been considered as contributors to weight gain by some consumers. However, the health-promoting effects of whole grain cereals are scientifically well established.

With their high content of complex carbohydrates, whole grain cereals comply with the requirements of nutritionists and present a counterbalance to foods high in protein and fat. They are rich in micronutrients (potassium, magnesium, zinc, manganese, fluoride, vitamins E and of the B group) concentrated in the germ and bran.

Whole grains are also among the best sources of dietary fibre whose intake is too low in most industrialised societies. In addition to high amounts they also contain a wide variety of dietary fibre like ·ᶠ·-glucans or arabinoxylans. Moreover, among different kinds of fibre, cereal fibre has been the strongest contributor to the reduction of non-communicable diseases. This is even more remarkable as in studies with isolated fibre positive effects on blood lipids or glycaemia were mostly observed with soluble fibre types and much less with the insoluble types predominantly contained in cereals. The exact underlying mechanisms remain unclear. Propositions encompass effects on gut hormones, the intestinal immune system, and the gut microflora with the production of short chain fatty acids during fermentation in the gut and during sourdough fermentation.

Secondary plant compounds in whole grain cereals like polyphenols with antioxidant properties, phytoestrogens of the lignan group and phytosterols have also shown health-promoting effects.

The potential of a diet rich in whole grain bread (1200-1500 kcal, 46 % of these from bread, 60 % of energy from carbohydrates, 20 % each from protein and fat) for weight reduction was already shown in the 1970s in an intervention in healthy subjects resulting in a mean body weight reduction by 6 kg over four weeks accompanied by significant decrease of total cholesterol and triglyceride and no major changes in blood glucose levels.

Whole grain cereals and bread show a number of beneficial effects making them an integral part of a healthy balanced diet.

Ibrahim Elmadfa

President of the International Union of Nutritional Science (IUNS)
President of Austrian Nutrition Society<<<<<<

Professional appointments:
1990-2011: Professor for Human Nutrition and director of the Institute of Nutritional Sciences, University of Vienna, Austria
1980-1990: Professor for Human Nutrition at the University of Giessen, Germany
Expertise: Scientific advice to the
+ European Commission as member (vice-chair) of the Scientific Committee on Food (Working groups Dietetic Foods, Novel Foods, Upper Safe Level of nutrients), and member of Steering Committee on Nutrition, Diet and Healthy Lifestyle of EU commission (DG Sanco);
+ Austrian MOH as member of the Codex Alimentarius Austriacus Committee
+ WHO as member of Nutrition Guidance Expert Advisory Group (NUGAG) and the International Advisory Council of the Global Non-communicable Disease Network (NCDnet).

Editor-in-Chief, Annals of Nutrition and Metabolism and Forum Nutrition (2000-2011); Author and co-author of 400 papers , 24 books. Coordinator and author of the Austrian Nutrition Report 1998, 2003, 2008, 2012 and the European Nutrition and Health Report 2004 and 2009.

Bread and overweight: epidemiological evidences.

Lluis Serra-Majem

The traditional belief held by the general public is that bread fattens. This encourages many people to restrict, or even eliminate, bread from the diet. The objective of a recent from our group was to assess, based on the best available scientific evidence, whether or not eating patterns that included bread (refined or whole-grain) consumption was associated with excess of overall obesity or abdominal adiposity in general, and in subjects undergoing obesity management. We reviewed the articles published over the past 30 years which related the consumption of dietary patterns that included refined and whole-grain bread to ponderal status and abdominal fat distribution. We selected 38 epidemiological studies that fulfilled the inclusion criteria. There were 22 cross-sectional, 11 prospective cohort and 5 intervention studies. The results obtained indicate that dietary patterns that included whole-meal bread did not influence weight gain and may also be beneficial to ponderal status. With respect to dietary patterns that included refined bread, the majority of cross-sectional studies indicated no effects but most well designed cohort studies demonstrated a possible relationship with the distribution of abdominal fat. The results from experimental designs were not conclusive.

Moreover, we analysed 2213 participants at high risk for CVD from the PREvencion con DIeta MEDiterranea (PREDIMED) trial to assess the association between changes in the consumption of bread and weight and waist circumference gain over time. Dietary habits were assessed with validated FFQ at baseline and repeatedly every year during 4 years of follow-up. Using multivariate models to adjust for covariates, long-term weight and waist circumference changes according to quartiles of change in energy-adjusted white and whole-grain bread consumption were calculated. The present results showed
that over 4 years, participants in the highest quartile of change in white bread intake gained 0•76 kg more than those in the lowest quartile (P for trend <0•003) and 1•28 cm more than those in the lowest quartile (P for trend <0•001). No significant dose–response relationships were observed for change in whole-bread consumption and anthropometric measures. Gaining weight (+2 kg) and gaining waist circumference
(+2 cm) during follow-up was not associated with increase in bread consumption, but participants in the highest quartile of changes in white bread intake had a reduction of 33%in the odds of losing weight (+2 kg) and a reduction of 36% in the odds of losing waist circumference (+2 cm).

The results of the latest study suggested that reducing white bread, but not whole-grain bread consumption, within a Mediterranean-style food pattern setting is associated with lower gains in weight and abdominal fat. However, the role of bread in the weight gain in Mediterranean countries is uncertain.

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Lluís Serra Majem is a medical doctor with a Ph.D. specialising in Preventive Medicine and Public Health.
In the early stages of his professional career as a medical epidemiologist, he oversaw various activities within the Catalan Ministry of Health, which he left to undertake Master and Doctoral degrees in Nutrition at the University of Sherbrooke (Canada). Upon his return, in 1988, he became Associate Professor of Preventive Medicine and Public Health at the University of Barcelona, where he founded and is the Director of the Community Nutrition Research Centre of the University of Barcelona Science Park. In 1995 he became Full Professor of Preventive Medicine and Public Health at the University of Las Palmas de Gran Canaria, where he also holds the UNESCO Chair for Research, Planning and Development of Local Health Systems as well as serves as Director of the Biomedical and Health Research Institute (from 2013) and served as the Director of the Department of Clinical Sciences (from 1995 to 2010). He has directed the National Nutrition Surveys of the Catalan population (1992-93), the Nutrition Survey of the Canary Islands (1997-98), the ENKID Study on the Evaluation of Feeding Habits and Nutritional Status in Spanish Children and Youth (1998-2000), the Food and Nutrition Survey of Catalonia (2002-03), the Andorra Nutrition Survey (2004) and the Project “Total Diet Study” of the Community of Valencia (2003-04). In 1989 he founded the Spanish Society of Community Nutrition, of which he served as President from 2000 to 2006, and also created in 1994 the Spanish Journal of Community Nutrition. He is President and founder of the NGO Nutrition without Borders (2005), and also serves as President of the Mediterranean Diet Foundation (from 1996 to 2012), currently President of its Scientific Committee, as well as the Nutrition Research Foundation (since 1997). Recently he has been honoured with the presidency of the Spanish Academy of Nutrition and Food Sciences (since 2009), and he has been appointed Director of the CIISCAM (Centro Interuniversitario Internazionale di Studi sulle Culture Alimentari Mediterranee) at Sapienza University in Rome. He has received numerous awards and recognitions and serves as visiting professor in several European and Latin-American Universities. During the recent years he served on the Steering Committee, among others, of the following European Union Projects: PLANT food supplements: Levels of Intake, Benefit and Risk Assessment; Credits4Health; EURRECA: EURopean RECommendations Aligned; BENERIS: Benefit-Risk assessment for food: an iterative value-of-information approach; PIPS: Personalised Information Platform for Life and Health Services and ENHR II: European Nutrition Health Report II. He is also involved in the Spanish Ministry of Health’s Thematic Centre of Obesity and Nutrition Research (CIBER OBN) and participates in the Predimed Study and Network. He has published 61 books and 310 peer reviewed scientific papers with an impact factor over 700 and an H-index of 34. He has a leading role both nationally and internationally in the field of public health nutrition as well as the Mediterranean Diet. He is the President of the III World Congress of Public Health Nutrition in Las Palmas and Banjul, November 2014. Recently he took a leadership role in promoting the recognition by the UNESCO of the Mediterranean Diet as Intangible Cultural Heritage of the Humanity.