

The Mediterranean Diet - The Future

Special Report June 2012

Written by Dr Simon Poole

Introduction

This report has been produced to support the Food and Drinks Innovation Network seminar of June 2012. The conference has uniquely brought together leading innovators from industry, scientists at the forefront of academic study and specially commissioned consumer research to consider the opportunities arising from the emergence of the Mediterranean Diet as the Gold Standard diet associated with health, wellbeing and longevity.

It seems that as an industry we're always on the back-foot being blamed for making people fat and shortening their lives, but here's our chance to get on the front-foot and run with a really good way-of-eating which ticks all the health boxes and is delicious and convenient.

*So why **The Mediterranean Diet** and why now ... because our researchers tell us that The Mediterranean Diet is a perfect point where scientific understanding meets consumer needs. And when it makes headlines like "Mediterranean Diet can add 15 years to life" we know it's something worth looking into.*

*Consumers already know a healthy diet means eating more salad, fruit, veg, beans, fish and white meat. They also think they should eating less red meat, dairy and carbs ... but they don't yet realise that these **life-style trends** are the essence of **The Mediterranean Diet**.*

And they also don't know that really robust euro-science is proving that eating and drinking the Mediterranean way reduces cancer, stroke, diabetes and heart problems.

*Not only that but a **Mediterranean Diet** is easy to follow, tastes wonderful and has a lower impact on the planet so it's bang on trend.*

The Mediterranean Diet – The Gold Standard Diet for the 21st Century

In 2005, the New York Times reported an article in the New England Journal of Medicine (1) asserting that for the first time in two centuries, the current generation of children in America may have shorter life expectancies than their parents, largely due to the effects of long term illness and obesity associated with poor diet and lifestyle. The World Health Organisation and other Government bodies remind us of the likely impact of the rise in global obesity, including the rise in cardiovascular disease, diabetes, hypertension and the incidence of cancers (2). Epidemiologists cite our sedentary lifestyle, poor dietary choices and excess of calories as the major contributing factors to the “epidemic” of ill health and obesity.

All too often the Food Industry is accused of complacency and of placing profits ahead of social responsibility and consumer health. Meanwhile the UK Government has been criticised for policies which are seen by some to favour voluntary engagement with industry rather than legislative changes with powers of enforcement which have been witnessed in other countries such as Denmark and Switzerland.

However the relationship between science, industry and consumers on matters of good health and nutrition is a complex one.

We have unprecedented access to calories and foods created, processed and designed for our modern environment and customer expectation, yet we also can purchase fresh produce from across the global market at all times of year.

Much of the science of optimum nutrition has been confusing, though recent advances in our knowledge, as they become more widely understood, are likely to have a significant impact on the way we perceive our diet and lifestyle. There is little doubt that there will be changes in consumer expectation and consequently food production and marketing.

The last ten years in particular has seen the emergence of scientific evidence which has clarified the role of macro and micronutrients in our diet, and the emphasis has shifted to promoting healthy foods within the context of a “whole diet” and lifestyle.

We have seen for example that the “high carbohydrate, low fat” diets which were popular in the last decade may in fact increase the risk of cardiovascular disease (3). It is now recognised that carbohydrates vary greatly in their glycaemic index, a consequence of which is a highly variable effect on blood sugar and insulin levels, and that fats can be categorised into those which have a potentially harmful effect on blood lipid profiles and vascular integrity, and those which can be highly beneficial to health. In a similar revision of advice, products are no longer promoted as “high in polyunsaturates”, since it has been established that some common omega6 polyunsaturates compete with, and lessen the advantageous effects of omega3 polyunsaturates. It is estimated that our modern

diet has provided us with an unwelcomed excess ratio of 20;1 omega6 to omega3 which is likely to diminish the benefits of the polyunsaturated fats which are of particular value to our bodies in a more natural ratio of equality (4).

Carbohydrates with a high glycaemic index tend to be highly refined, perhaps devoid of complex fibrous hulk which slows the process of enzymic breakdown in the gastrointestinal tract. Harmful fats such as the trans or hydrogenated fats and saturated fats in high fat dairy and meat diets tend to be far in excess of monounsaturated fats found in olive oil, avocados and nuts for example.

Confusion and misunderstanding, combined with limited legislative control, has resulted in a plethora of misleading health claims and consumer disorientation. In such circumstances a “low fat” product can be marketed with similar calories to its normal fat counterpart and with a reduction in the fats which confer health benefits. Healthy eating products can have fewer calories, yet be inappropriately high in salt levels, or can be laden with additives and additional ingredients which are not considered to be healthy. Certain brands of low fat yoghurt contain higher levels of sugar per pot than a can of “fizzy drink” and a portion of a margarine spread promoted as “light” is higher in saturated fat than a packet of crisps. And furthermore there is widespread expectation that products promoted as healthy will be less palatable and a “denial” rather than a pleasure – healthy living seems to be a recipe for confusion and misery!

Even Government sponsored campaigns to improve our eating habits are simplified, apparently by necessity to ensure the message is understood. Eating five portions of fruit and vegetables remains a key priority for public health in an environment where it is all too easy to avoid consuming fresh foods. There are many who contend that if we are to have any significant impact on the burden of diet related illnesses, we need to have a much more ambitious and broader approach.

To add to the perplexity we witness increasing sales of food supplements, capsules, and specific diets, often promoted by celebrities, making claims about weight loss or the hidden wonders of green algae or a berry harvested from the slopes of the Himalayas which possess qualities which might confer advantages on health and performance!

Meanwhile there is increasing evidence from legitimate science of the importance of micronutrients in our diet, such as minerals which can be reduced in a diet based on intensive agricultural techniques. There is also a greater interest in the role played by antioxidants in protecting our bodies from oxidative damage which can be induced by highly reactive so-called free radical molecules which are by-products of metabolism and inevitable environmental stress. Many antioxidants are present in the phytochemicals in coloured fruits and vegetables which have evolved to protect the plant from the oxidative stress and are utilised by humans to similar effect. From potentially cancer suppressing effects of lycopenes in tomatoes (5), to aspirin-like salicylates in herbs such

as rosemary (6), antioxidant alliums in garlic to polyphenolic compounds in extravirgin olive oil (7) – the discovery of quite remarkable characteristics of the chemistry of everyday common ingredients of the Mediterranean Diet are advancing our knowledge of the ways in which our foods may beneficially interface with our metabolic processes.

A fascinating observation is the apparent reduction in concentration of antioxidants when intensive farming techniques reduce the environmental stress in order to increase product yield. It is asserted that, for example, an olive oil produced from olive trees in a natural, harsh, arid and hot climate will possess more polyphenolic antioxidants than its counterpart where farming techniques ensure a generous supply of irrigation to increase production.

So, in summary, we are discovering that an ideal diet is represented by a combination of foods which include low glycaemic index carbohydrates, for example whole grains and complex fibrous legumes, plenty of colourful fruit and vegetable combinations, protein derived from fish and lean meats, with a low intake of processed trans fats and saturated fats. The predominant fats are monounsaturated fats, with olive oil providing an essential ingredient for dressings and for cooking. Naturally derived Omega6 polyunsaturated fats are in balance with omega3s from oily fish or plant sources, and other minerals present in seeds and nuts are consumed on a regular basis, along with micronutrients which may have a valuable role in promoting health such as those found in herbs and spices. Although there is no single constituent responsible for conferring the benefits of such a diet, numerous studies have demonstrated in vitro and in vivo associations between components such as nuts, extravirgin olive oil, fruit and vegetables, oily fish etc and good health which suggests, perhaps predictably, that the dramatic effects overall represent the sum of the dietary “parts”. This modern scientific understanding of excellence in nutrition describes precisely the features of the Mediterranean Diet, and shows absolute consistency with the observations and hypotheses first described by Professor Ancel Keys in his conclusions on the longevity and health experienced in the Mediterranean region in the 1960s. (8)

This naturally cholesterol lowering and highly protective dietary pattern is compatible with maintenance of a healthy weight when complimented with an active physical lifestyle.

Whilst observational epidemiological surveys have reported dramatic results of longevity with low morbidity and mortality in people who adhere to what has become known as the Mediterranean Diet, and further research has shown that this can be transposed to other parts of the world, academics have published thousands of studies which give us an idea of the likely physiological explanation, even including the effects of individual foods. It transpires that the pattern of diet that we now know to be most beneficial for health is entirely synergistic with the traditional Mediterranean Diet.

We should not be surprised that a diet full of fruits, vegetables, whole grains, beans, nuts, seeds, honey and oils harvested from fruits is proving to be the most healthy diet. We have evolved over millennia to live in an environment which would have afforded us these kinds of staple nutrients, along with occasional fish and lean meat which would have required some exertion to hunt.

To communicate this idea to the public and consumers, Oldways have produced a visual guide which is ensuring that more and more people are able to understand these concepts and have the resources to make these highly beneficial changes.

Sara Baer- Sinnott president of Oldways, and contributor to the FDIN conference writes;

“Oldways was organized by Dun Gifford in the late 1980s to promote traditional foods - their agriculture, their sustainability, their preparations and their healthfulness. Even in 1987 it was clear that traditional "oldways food ways" were alive and well in countries like Italy and China, but that "techno foods" and "junk foods" would soon challenge the "old ways." Since the nutrition science literature for the Mediterranean diet was extensive, Oldways' first focus was the Mediterranean diet.

Collaborating with leading nutrition scientists such as Antonia Trichopoulou, Elisabet Helsing, plus Dimitrios Trichopoulos and Walter Willett, among others, Oldways and a scientific committee wrote a long description of the Mediterranean diet. Oldways also organized, with the Harvard School of Public Health, a high-level international conference in January 1993 to present this "Mediterranean Diet." At the last minute we decided to design a graphic to represent it, and adopted the pyramid form. The Mediterranean Diet Pyramid was born.

Since that initial conference we have worked with chefs, nutritionists and dietitians, food retailers, journalists, cookbook authors, scientists and the food industry to communicate the health benefits and great taste of the gold standard Mediterranean Diet. We believe that we can make positive changes by working with and engaging in constructive dialog with food and drink companies. The Mediterranean Foods Alliance is the core Oldways program focusing on the Mediterranean diet. This Oldways program raises consumer awareness of Mediterranean foods and flavors, and helps food companies build their brands around the remarkably healthy Mediterranean Diet.

Oldways supports companies building their brands around the Mediterranean Diet through our website; media program (trade and mass media); retail programs; development and promotion of educational resources; connections with health professionals, chefs, foodservice; and community programs. We welcome the FDIN to join Oldways in our mission to spread the remarkable health benefits and amazing tastes of the Mediterranean diet. “



Mediterranean Diet Pyramid

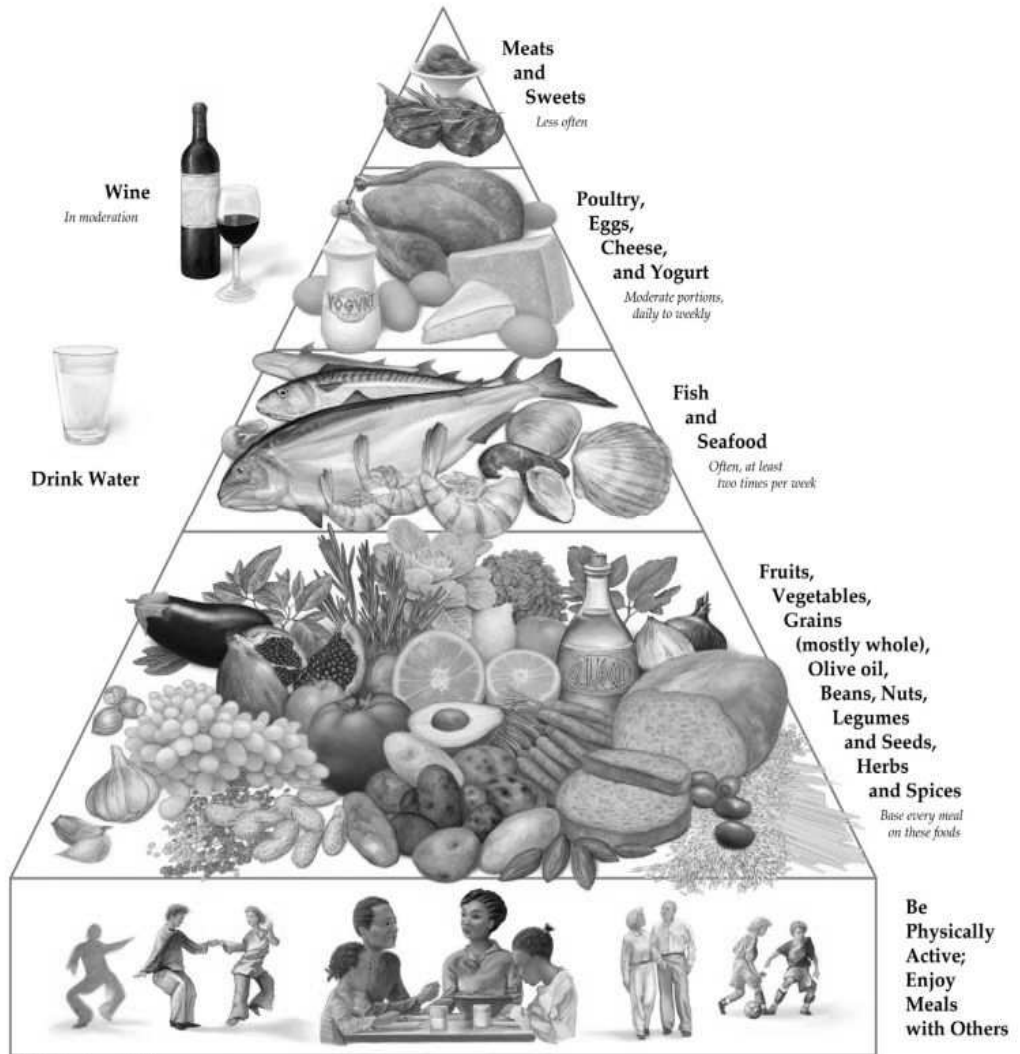


Illustration by George Middleton

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The History and Future of the Mediterranean Diet

The traditions of the Mediterranean Diet stretch back over millennia, and are based on diverse regional variations on a common theme. It is no coincidence that the word “diet” derives from the Greek “diaiti” which may be translated as “way of living”, describing in the context of the Mediterranean Diet a relationship between the population, their environment and food.

The importance of this relationship permeates every aspect of culture past and present, from ancient mythology to modern religious symbolism and the classical writings of Plato and Hippocrates. The importance of food for good health has been a central tenant of these associations. The writings of philosophers of the Ancient World are matched by the modern luminary Professor Ancel Keys, who, following years of study of its effects observed; “The Mediterranean kitchen offers such a wealth of gustatory delights, so many happy surprises at the dinner table, so much pure eating pleasure in dishes for the most part both economical and easy to prepare, that it would warrant enthusiastic praise even if there were no evidence that it is particularly healthful.”

However it has been recognised for a number of years that consumers in the Mediterranean region are adopting less healthy patterns of eating more prevalent in the countries of North Western Europe. There are also increasing concerns about the sustainability of the region’s agronomy in light of increasing demand and industrialisation. For these reasons UNESCO has concluded that the Diet should be granted special status and added to its register as an “Intangible Cultural Heritage” with the following description;

The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food. The Mediterranean diet is characterized by a nutritional model that has remained constant over time and space, consisting mainly of olive oil, cereals, fresh or dried fruit and vegetables, a moderate amount of fish, dairy and meat, and many condiments and spices, all accompanied by wine or infusions, always respecting beliefs of each community

Organisations such as the International Centre for Advanced Agronomic Studies advise governments on the environmental and commercial sustainability of the Mediterranean Diet as the World Health Organisation looks to reverse the trend of worsening dietary patterns which in their most recent report is considered to be the most significant causal factor contributing to global chronic disease.

In a recent review of the role of Governments in promoting healthy eating from the Centre for Food Policy at City University London, Corinna Hawkes suggests that Governments should look for opportunities to be more proactive in their approach (9);

“Governments are already beginning to implement food policies to encourage healthier eating, with action increasing since WHO’s Global Strategy was adopted in 2004. Although the main approach has been to provide information for consumers, countries have made notable steps in reformulation of food products, setting school food standards, nutrition labelling, restricting food marketing to children, fruit and vegetable promotion, and, just recently, food taxes..... policies also need to target the consumer food environment. These should focus on reducing the incentives that companies have to encourage consumers (particularly children) to consume too much and too many of the “eat less” foods through policies to improve the composition of food products, the availability of healthy food out of the home, food prices, and marketing and promotion. Food policies for healthier eating (need to) change from a burdensome extra to an opportunity for governments”

As statistical modelling demonstrates the individual and social imperatives of educating populations to achieve improvements in their diet and lifestyles, and we see data which consistently shows the profound effects comparable to medications such as statins, the National Health Service is increasingly referring to the Mediterranean Diet as a gold standard dietary pattern.

The European Food Safety Authority is recognising the need to create a clearer system for regulating health and nutritional claims to ensure accuracy and legitimacy of labelling and marketing of foods in the future. The organisation has reviewed over 3,000 claims to date, accepting promotion of products with substantiated claims within the terms and scope of its guidance. Generic claims which relate to food characteristics for example those with high fibre, low salt, or a predominance of monounsaturated fats are recognised along with some vitamins and minerals and a few individual food products such as walnuts and the antioxidant effect of extra virgin olive oil where it has a minimum level of polyphenolic content. (10)

There is no doubt that the Mediterranean Diet with its inherent characteristics and individual constituents not only represents tradition and culture associated with well-being and fitness, but will also increasingly feature as the benchmark of excellence in diet and lifestyle. We are already seeing patterns of early adoption which can be measured not only in increasing consumption of fruit and vegetables, “Scratch Cooking” and the “Slow Food Movement” but also in the rapid rise in revenue from sales of specific products such as olive oil in recent years. Many consumers already understand not only the science of the Mediterranean diet, but also express ideas of positive association with the lifestyle and culture of the region of the Mediterranean itself, creating the possibility of significant commercial opportunity.

FDIN Report Conclusion

This report has been compiled to support the material presented at the FDIN Conference on the Mediterranean Diet of June 2012.

The evidence for the benefits of the Mediterranean Diet is compelling, with scientific research continuing to reveal the extent to which individuals and society can maximise the potential of adopting such lifestyle patterns. In the context of the rapid rise in levels of obesity and chronic diseases such as diabetes, there is an unprecedented urgency to address nutritional education and to ensure that food labelling legislation is legitimate and proportional.

As we gain greater understanding of the importance of good nutrition, we are also learning that the features of a healthy diet are more complex than previously assumed, particularly in relation to the subgroups of fats and carbohydrates. We are able to demonstrate significant gains from key components of a balanced diet such as those characterised in the Mediterranean Diet, and there is a clear need for further research to elucidate the precise mechanism for these positive physiological effects, including the impact on cardiovascular risk and the incidence of cancer.

Media reports continue to increase public recognition of the consequences of lifestyle patterns and consumers are becoming more aware of the important choices that they can make. Early adopters of the Mediterranean Diet, including those who value good food and who perceive the importance of nutrition, continue to create real scope for growth in sectors where the increasingly discerning customer is looking for products which can be associated with health and well-being. The acknowledgment of the Mediterranean Diet as the optimum diet in terms of weight management, lipid profile and antioxidant protection is likely to provide significant opportunities for commercial development where the merits of healthy products can be communicated to the public.

The Science of the Mediterranean Diet

Thousands of scientific studies now provide an overwhelming evidence base to support the health benefits of the Mediterranean Diet. It is not possible to usefully list all of the references in this report.

There is also a body of published data that defines the role of individual components of the diet, including olive oil, nuts, vegetable and fruits etc.

We have already referred to the important work of Professor Ancel Keys, who first established the powerful association between the traditional Mediterranean Diet and lowered rates of morbidity and mortality, and more recently significant reviews of the database of journal publications have further described the findings to date. An important analysis of the combined findings of a number of studies in the British Medical Journal recognised the profound impact of the diet on rates of cardiovascular disease and cancer, presenting the sum of evidence in support of the benefits for individuals and society if there was more widespread adherence to the principles of the Mediterranean Diet. (11). A further large review by Kastorini in the Journal of the American College of Cardiology which included a total in excess of half a million subjects, demonstrated the advantages of the Mediterranean Diet in the prevention of metabolic syndrome – the description of obesity, high blood pressure and adverse sugar and fat levels in the blood which can eventually lead to diabetes and cardiovascular disease. (12). A recent study published in the Journal of the American Medical Association described the importance of the Mediterranean Diet, abstinence from smoking, regular exercise and a healthy weight as leading to an overall reduction of risk of sudden cardiac death by as much as 92%. (13)

Not only have studies shown the Mediterranean Diet is associated with lower risks of colorectal, oesophageal, breast and skin cancers such as malignant melanoma (14,15,16,17,18), but also the anti-inflammatory properties of the diet have been shown to reduce the incidence of Rheumatoid Arthritis (19) and also respiratory conditions such as Asthma. Furthermore, research based at the University of Navarra published in 2009 reported a significant reduction in incidence of depression with adherence to the patterns of the traditional diet (20).

The patterns of the Mediterranean Diet are recommended widely to prevent further cardiac events following a heart attack. The NHS Centre for reviews and Dissemination cites evidence that “following myocardial infarction 14 people will need to be given Mediterranean dietary advice to prevent 1 death”. Numerous studies not only exclude confounding factors but also have demonstrated that the adoption of the dietary and lifestyle pattern results in equally powerful beneficial effects to populations residing outside the Mediterranean region.

With the burden of Alzheimers disease and vascular dementia rising at an alarming rate, there is increased interest in the role of lifestyle in promoting a healthy old age. Researchers from the University of Miami, Miller School of Medicine, using MRI scanning and diet questionnaires examined the relationship between the Mediterranean Diet and brain white matter. In this study of 1000 participants with an average age of 72, there was a directly inverse relationship between adherence to the Mediterranean Diet and chronic white matter damage. (21).

In 2011 the role of diet in prevention of neurological diseases was further cited in a paper published in the European Journal of Neurology demonstrating that a Mediterranean-style diet rich in fruit, vegetables and fish was shown to reduce the risk of Parkinson's Disease by up to 46%(22)

Stroke and Cerebrovascular disease shares many of the causal factors of coronary heart disease, and so it should be no surprise to see similar effects on outcomes measured in research papers in relation to the Mediterranean Diet. Samieri et al published research in the Journal of Neurology in 2011 where the rates of stroke in 8000 participants over 65 were demonstrated to be 41% reduced in relation to higher olive oil consumption. The difference between those reporting the highest and lowest use of olive oil was a remarkable 78%. (23). Dr Martinez-Gonzalez from the University of Navarra in the journal Atherosclerosis recently described significantly lowered rates of carotid artery plaque formation in relation to the Mediterranean Diet and concluded that "a modification in the entire diet pattern managed to achieve, in just one year, results that pharmacological drugs did not – even after two years of treatment" (24). Such beneficial effects on blood vessels have repeatedly been demonstrated in successive studies, such as findings published in the American journal of Clinical Nutrition where the Mediterranean Diet led to a significant reduction in endothelial damage and dysfunction and boosted the regenerative capacity of the endothelial lining compared with other diets (25).

Much has been made of the consumption of fried foods leading to increased risk of cardiac disease, and certainly saturated fats and highly processed fats have been showed to be harmful in this context. A study undertaken by the Autonomous University of Madrid recorded the cooking habits of 40,000 subjects and discovered that frying in healthy oils such as olive oil was not associated with such an increased risk of cardiac or other deleterious events (26).

Several studies have considered the cumulative effects of the diet and the influence on longevity. A recent study, published by University of Gothenburg researchers in the Age journal, compared the diet's effects on longevity in thousands of 70-year-olds in the local area over more than 40 years. Gianluca Tognon, one of the authors, said: "This means in practice that older people who eat a Mediterranean diet live an estimated two to three years longer than those who don't."(27).Data covering a longer period of time

and involving a broader description of a healthy lifestyle involving 120,000 individuals for ten years published by Piet Van den Brandt from Maastricht University showed that female non-smokers who eat a Mediterranean diet, exercise and keep a healthy weight could live up to 15 years longer, whilst men who follow a similarly healthy regime could add eight years to their lifespans.(28)

Considering scored adherence to a Mediterranean Diet from a different perspective and published in the journal *Immunity and Aging*, Vasto and colleagues observed a strong correlation between Sicilian centenarians and more closely following the patterns of the traditional diet of the region (29).

Examples of excerpts from medical and scientific journals below include review articles which draw conclusions from numerous published studies. In addition the evidence is cited in documents produced by organisations such as The American Heart Association, the National Standards Framework for Cardiovascular Disease and in numerous National Health Service documents.

The following excerpts from medical and scientific journals further reveal the depth and breadth of the evidence for the “Gold Standard” status of traditional Mediterranean eating patterns. (Reproduced from Oldways)

The **Mediterranean Diet**... has been associated with lower risk for several forms of cancer, obesity, dyslipidemia, hypertension, abnormal glucose metabolism, coronary heart disease, and overall mortality. In a recent study, we demonstrated that higher adherence to the Mediterranean Diet at baseline evaluation was associated with lower risk of developing Alzheimer’s disease during follow-up. Similarly to our previous findings, in this different Alzheimer’s disease population we observe that higher adherence to the Mediterranean Diet is associated with reduced disease odds. Similarly to our previous report, we note a gradual reduction in Alzheimer’s disease risk for higher tertiles of Mediterranean Diet adherence, suggesting a possible dose-response effect. Additionally, in accordance with our previous results, the associations between Mediterranean Diet and Alzheimer’s disease remain unchanged and significant even when simultaneously adjusting for the most commonly considered potential confounders for Alzheimer’s disease, such as age, sex, ethnicity, education, APOE genotype, caloric intake, and BMI. Higher adherence to Mediterranean Diet reduced risk for probable Alzheimer’s disease either with or without coexisting stroke.

Mediterranean Diet, Alzheimer Disease, and Vascular Mediation

Scarmeas, N., Stern, Yaakov., et al. *Archives of Neurology* 63 (2006).

A systematic review was made and a total of 43 articles corresponding to 35 different experimental studies were selected. Results were analyzed for the effects of the

Mediterranean diet on lipoproteins, endothelial resistance, diabetes and antioxidative capacity, cardiovascular diseases, arthritis, cancer, body composition, and psychological function. The Mediterranean diet showed favorable effects on lipoprotein levels, endothelium vasodilatation, insulin resistance, metabolic syndrome, antioxidant capacity, myocardial and cardiovascular mortality, and cancer incidence in obese patients and in those with previous myocardial infarction.

Scientific Evidence of Interventions Using the Mediterranean Diet: A Systematic Review

Serra-Majem, Ll., Roman, B., et al. *Nutrition Reviews* 64(1): 24-47(21) (2006).

The findings support the hypothesis that a **Mediterranean diet** that emphasizes olive oil, fiber, fruits, vegetables, fish, and alcohol and reduces meat and meat products can be an effective measure for reducing the risk of coronary heart disease. The benefits of the Mediterranean diet were significant in all studies. The reduction in the risk of coronary heart disease varied from study to study, but this also reflects the different increments used, explicitly or implicitly, in these studies. To our knowledge there are no studies that have shown a detrimental or non-significant impact of the Mediterranean diet on cardiovascular disease.

Can a Mediterranean diet moderate the development and clinical progression of coronary heart disease? A systematic review

Panagiotakos, D.B., Pitsavos, C., et al. *Med Sci Monit*, 10(8): RA 193-198 (2004).

The main finding of this study is that high adherence to the traditional **Mediterranean dietary pattern**, characterized by high intakes of vegetables, fruits, legumes, fish, cereals, and nuts and low and moderate consumption of meat and wine, respectively, is associated with a lower prevalence of obesity in men and women in this Mediterranean population. This association held even after controlling for age, leisure time physical activity, educational level, smoking, and alcohol consumption.

Adherence to the Traditional Mediterranean Diet Is Inversely Associated with Body Mass Index and Obesity in a Spanish Population

Schroeder, H., Marrugat, J., et al. *The Journal of Nutrition* 134: 3355-3361 (2004).

Recent findings showing that elderly African Americans and Japanese living in the USA have a much higher prevalence of AD (6.24% and 4.1%, respectively) than those still living in their ethnic homelands (< 2%) suggest that the prevalence of Alzheimer's disease is more strongly influenced by diet and nutrition, environment and/or lifestyle than by genetics... In conclusion, the **Mediterranean diet** pattern based on complex

carbohydrates, fibre and non-animal fat appears to protect against age-related cognitive decline and cognitive decline of vascular or degenerative origin.

Mediterranean diet and cognitive decline

Panza, F., Solfrizzi, V., et al. *Public Health Nutrition* 7(7): 959-963 (2004).

The present study provides a pathophysiologic explanation to the growing scientific evidence for the beneficial effect of the **Mediterranean diet** on human health and, especially, atherosclerotic disease. We found that greater adherence to this traditional diet was independently associated with a reduction in the inflammation and coagulation indexes that are believed to have an important role in CVD. The World Health Organization reports that the three major components involved in preventing atherosclerotic disease are smoking, physical inactivity, and an unhealthy diet, as they are factors that can be changed. Our findings emphasize the need for actions from public health care professionals in order to prevent the development and progression of atherosclerotic diseases through the adoption of low animal fat diets, like the Mediterranean diet.

Adherence to the Mediterranean diet attenuates inflammation and coagulation process in healthy adults: the Attica study

Chrysohoou, C., Panagiotakos, D.B., et al. *Journal of the American College of Cardiology* 44:152-158 (2004).

Greater adherence to the **Mediterranean diet** is associated with a significant reduction in total mortality. A one unit increase in a diet score, devised a priori on the basis of eight key features of the traditional common diet in the Mediterranean region, was associated with a 17% reduction in overall mortality.

Adherence to a Mediterranean diet and Survival in a Greek Population

Trichopoulou A. et al *The New England Journal of Medicine*, 348:2599-2608 (2003).

Dietary intervention with the **Mediterranean diet** and statin treatment improve flow-mediated vasodilatation in the brachial artery in patients with ischemic heart disease and hyper-cholesterolemia to a greater degree than statin treatment alone.

Effect of dietary intervention and lipid-lowering treatment on brachial vasoreactivity in patients with ischemic heart disease and hypercholesterolemia

Sondergaard, E., Moller JE., Egstrup K. *American Heart Journal* 145(5):E19 (2003).

The results indicate that patients with Rheumatoid arthritis, by adjusting to a **Mediterranean diet**, did obtain a reduction in inflammatory activity, an increase in physical function, and improved vitality.

An experimental study of a Mediterranean diet intervention for patients with rheumatoid arthritis

Skoldstam, L., Hagfors, L., Johansson G. *Annals of the Rheumatic Diseases* 62(3):208-14 (2003).

Myocardial infarction patients can respond positively to simple dietary advice, and this can be expected to lead to a substantial reduction in the risk of early death. Regardless of any drug treatment prescribed, clinicians should routinely advise patients with myocardial infarction to increase their frequency of consumption of **Mediterranean foods**.

Mediterranean diet and all-causes mortality after myocardial infarction: results from the GISSI-Prevenzione trial

Barzi, F. et al. *European Journal of Clinical Nutrition* 57(4):604-11 (2003).

Efforts to combat nutrient deficiencies have centered on supplemental nutrient administration and addition of selected nutrients to the food chain in the form of food fortification. In addition to supplementation or fortification with specific nutrients, the consumption of certain dietary patterns (such as the **Mediterranean diet**) is associated with a reduced risk of chronic diseases, particularly cardiovascular diseases.”

Fortification, supplementation, and nutrient balance

Caballero, B. *European Journal of Clinical Nutrition* 57 1:S76-8, (2003).

Trichopoulou et al. report the results of a population-based study involved 22,043 apparently healthy adults in Greece, in which adherence to a traditional **Mediterranean diet** was associated with significantly lower total mortality, mortality from coronary heart disease, and mortality from cancer. To measure adherence to this diet, a score was constructed that incorporated relatively high intakes of vegetables, fruits and nuts, legumes, cereals, fish, and monounsaturated fat; relatively low intakes of meat, including poultry, and moderate consumption of alcohol.

The Mediterranean Diet and Mortality – Olive Oil and Beyond

Hu, F.B. *New England Journal of Medicine* 348:26, 2595-2596 (2003).

Until the picture can be clarified, lipid modification with strategies proved to reduce the risk for coronary events, such as statins or dietary changes in the style of the **Mediterranean diet**, should be better implemented in clinical practice.

Antioxidants, statins, and atherosclerosis

Gotto, AM. *Journal of American College of Cardiology* 41:1205-10 (2003).

In the Lyon Heart Study, higher ALA consumption in the context of a **Mediterranean diet** dramatically reduced total and cardiovascular mortality as well as nonfatal MI. These trials strongly support the protective effects of omega-3 fatty acids, including both ALA and fish oil, in secondary prevention of CHD. Mediterranean diet enriched with ALA reduced death by more than 70%.

Optimal Diets for Prevention of Coronary Heart Disease

Hu, F.B., Willet, W.C. *Journal of the American Medical Association*, 288: 2569-2578 (2002).

The **traditional Mediterranean diet** as outlined in this article is an ideal eating pattern for prevention of cardiovascular disease. We believe that current understanding and scientific evidence are adequate to recommend this diet widely as a practical, effective, and enjoyable strategy – the new “**gold standard**” – in heart disease prevention.

Understanding the Mediterranean Diet: Could This Be the New “Gold Standard” for Heart Disease Prevention?

Curtis, B., O’Keefe, J., *Postgraduate Medicine*, 112(2): 35-8. 41-5 (2002).

The **Indo-Mediterranean diet** is a safe and economical way to improve the health of a non-Western population over 2 years. A diet enriched with fruit, vegetables, nuts, whole grains, and mustard or soy bean oil is associated with a pronounced decline in CAD morbidity and mortality, without an increase in non-cardiac deaths, and in the presence of improved metabolic profiles. The long-term benefits may be even more substantial.

Effect of an Indo-Mediterranean diet on progression of coronary artery disease in high risk patients (Indo-Mediterranean Diet Heart Study): a randomized single-blind trial.

Singh, R.B., Dubnov, G., et al. *The Lancet* 360; 1455-1461 (2002).

Our data support the hypothesis that a **Mediterranean diet** (that emphasizes olive oil, fiber, fruits, vegetables, fish and alcohol and reduces meat/meat products) can be an effective measure for reducing the risk of myocardial infarction. However, our results support the exclusion of refined cereals with a high glycaemic load as healthy elements of this pattern.

Mediterranean diet and reduction in the risk of a first acute myocardial infarction: an operational healthy dietary score

Martinez-Gonzalez, M.A., Fernandez-Jarne, E., et al. *European Journal of Nutrition* 41(4): 153-160 (2002).

We studied the acute and longer-term effects of vitamin C compared to a '**Mediterranean-type**' diet on endothelial function in healthy older subjects. A '**Mediterranean-type**' diet rich in vitamin C improves vascular function. Neither acute intra-arterial nor sustained administration of oral vitamin C improves vascular function in healthy older subjects.

Effects of a 'healthy' diet and of acute and long-term vitamin C on vascular function in healthy older subjects

Singh, N., Graves, J., et al. *Cardiovascular Research*. 56(1): 118-25 (2002).

Based on the estimated risk model we found that the **Mediterranean type of diet** reduces significantly the risk of developing acute coronary syndromes even in the presence of unfavorable lifestyle situations, such as sedentary life, smoking habit, as well as hypertension, hyper-cholesterolemia and diabetes mellitus.

The role of traditional Mediterranean type of diet and lifestyle in the development of acute coronary syndromes: preliminary results from CARDIO 2000 study

Panagiotakis, D.B., Pitsavos, Ch., et al. *Central European Journal of Public Health*. 10(1-2): 11-5 (2002).

Long-term success in weight loss with dietary treatment has been elusive. A moderate-fat, Mediterranean-style diet, controlled in energy, offers an alternative to a low-fat diet with superior long-term participation and adherence, with consequent improvements in weight loss."

A randomized controlled trial of a moderate-fat, low-energy diet compared with a low-fat, low-energy diet for weight loss in overweight adults

McManus, K., Antinoro, L., Sacks, F. *International Journal of Obesity & Related Metabolic Disorders* 25(10):1503-11 (2001).

It would be short-sighted not to recognize the enormous public health benefit that the **Mediterranean-style diet** could confer... there is a pressing need to identify unknown risk **Mediterranean diet** itself on CHD. Other characteristics of factors and effective intervention strategies... The findings from the Lyon Diet Heart Study illustrate the importance of a [Mediterranean] dietary pattern that emphasizes fruits, vegetables,

bread and cereals, and fish, within the context of a Step I diet... to dramatically lower CVD risk in the population and can be followed by free living people.

Lyon Diet Heart Study: Benefits of a Mediterranean-Style, National Cholesterol Education Program American Heart Association Step I Dietary Pattern on Cardiovascular Disease

Kris-Etherton, P., et al. *Circulation* 103: 1823-1825 (2001).

A **Mediterranean-style diet** demonstrates impressive effects on cardiovascular disease. Early reports from the Lyon Heart Study caused us to commission this advisory and to examine the current scientific basis for the effect of such dietary modifications in general; this led to recommendations for the AHA, practitioners, and the public. Because of the potentially substantial significance of their findings, we believe an aggressive pursuit of the issues raised in the study and the advisory must be undertaken. It does seem that substantial enhancement to the effectiveness of our current dietary recommendations may be provided by integrating the features of the diet used in the Lyon Diet Heart Study with current AHA guidelines. Studies addressing the issues listed in the scientific advisory will need to be completed before this conclusion can be drawn. Such studies should be aggressively pursued because of their major potential and societal impact.

Can a Mediterranean-Style Diet Reduce Heart Disease? Editorial

Robertson, R.M., Smaha, L. *Circulation* 103: 1821 (2001).

The DART and the **Mediterranean diet** trials did show significant reduction in coronary heart disease in comparison with the placebo.

What Role for Statins: A Review and Economic Model [Treatment and Prevention]

Updated 31-05-2001 NHS Centre for Reviews and Dissemination, University of York, U.K.
(2001)

The most effective means of reducing the risk of sudden cardiac death (apart from the prophylactic implantation of a defibrillator) appears to be dietary prevention in the light of animal experiments, epidemiological studies and four randomized trials... Adoption of a dietary pattern, for instance a **Mediterranean type of diet**, seems to be the best way.

Diet and medication for heart protection in secondary prevention of coronary heart disease. New concepts [Review]

de Lorgeril, M., Salen, P., et al. *Nutrition, Metabolism & Cardiovascular Diseases* 10(4): 216-22 (2000).

There is increasing scientific evidence of positive health effects from diets which are high in fruits, vegetables, legumes, and whole grains, and which include fish, nuts and low-fat dairy products. Such diets need not be restricted in total fat as long as there is not an excess of calories, and emphasize predominantly vegetable oils that are low in saturated fats and free of partially hydrogenated oils. The **traditional Mediterranean Diet**, whose principal source of fat is olive oil, encompasses these dietary characteristics.

2000 Consensus Statement on Dietary Fat, the Mediterranean Diet, and Lifelong Good Health: Summary Statement

The **Mediterranean diet** is a centuries-old tradition that contributes to excellent health, provides a sense of pleasure and well-being, and forms a vital part of the world's collective cultural heritage. For Mediterranean peoples, this way of eating describes a traditional diet that can be readily preserved and revitalized within a modern lifestyle. For Americans, Northern and Eastern Europeans, and other who wish to improve their diets, the Mediterranean way of eating describes a dietary pattern that is attractive for its famous palatability as well as for its health benefits, and one that can be adopted in its entirety or adapted to a **Mediterranean-style diet**.

From the Scientific Exchange of the 2000 International Conference on the Mediterranean Diet

The **Mediterranean diet** and moderate consumption of red wine have complementary, mostly beneficial effects on haemostatic cardiovascular risk factors.

Complementary effects of Mediterranean diet and moderate red wine intake on haemostatic cardiovascular risk factors- Mezzano, D., et al. European Journal of Clinical Nutrition 55(6): 444-451 (2001).

The data confirms the impressive protective effect of the **Mediterranean diet**. The protective effect of the Mediterranean dietary pattern was maintained up to 4 years after the first infarction.

Mediterranean Diet, Traditional Risk Factors, and the Rate of Cardiovascular Complications After Myocardial Infarction. Final Report of the Lyon Diet Heart Study. de Lorgeril, M., Salen, P., Martin, J.L., et al. Circulation, 99: 779-785 (1999).

Adherence to the principles of the traditional **Mediterranean diet**... is likely to be associated with lower overall mortality. Moreover, key features of this diet appear to be transplantable to other dietary cultures and cuisines, and may have a substantial beneficial impact on the general mortality of elderly people who have the Westernized dietary habits. We conclude that a diet that adheres to these principles of the traditional Mediterranean diet is associated with longer survival.

*Are the Advantages of the Mediterranean Diet Transferable to Other Populations?
A Cohort Study in Melbourne, Australia- Kouris-Blazos, A. British Journal of Nutrition 82:
57-61 (1999).*

Adoption of a **Mediterranean diet** results in a significant reduction of total and LDL-cholesterol with also a significant effect on triglycerides and a small positive or no effect on HDL-cholesterol. However, the **Mediterranean diet** has been shown to be cardioprotective (for instance, prevention of sudden death) through biological effects (probably induced by omega-3 fatty acids) independent of its effect on blood lipoproteins. The association of these cardioprotective and beneficial effects on blood lipids, in addition to gastronomic properties, renders this type of diet extremely attractive for public health purposes.

Hyperlipidemias. Concern with the Mediterranean diet

Salen, P., de Lorgeril, M. *Presse Medicale* 28(36): 2018-24 (1999).

There is increasing scientific evidence that there are positive health effects from **[Mediterranean-type] diets** which are high in fruits, vegetables, legumes, and whole grains, and which include fish, nuts, and low-fat dairy products. Such diets need not be restricted in total fat as long as there is not an excess of calories, and the diet is low in saturated fats and partially hydrogenated oils. Diets that emphasize vegetable oils (predominantly monounsaturated), nuts, and fish are preferable to those high in animal products and partially hydrogenated oils. Many individuals will have to limit their intake of fat or carbohydrate to avoid excess calories.

*1998 Consensus Statement on Total Dietary Fat and the Overall Dietary Pattern
American Journal of Medicine, January 30, 2003 Supplement (in press)*

From the Scientific Exchange of the 1998 International Conference on the
Mediterranean Diet

Patients who followed a **Mediterranean-type diet** had reduced... combined all-cause mortality, nonfatal cancer, and myocardial infarction compared with those who followed an approximate American Heart Association Step 1 diet. The Mediterranean-type diet also showed a trend toward a decreased risk for cancer. A Mediterranean-type diet reduced mortality in patients with a first MI.

*Mediterranean dietary pattern in a randomized trial: prolonged survival and possible
reduced cancer rate*

de Lorgeril, M., Salen, P., et al. *Arch Intern Med.*; 158: 1181-1187 (1998).

The **Mediterranean diet** or its elements have repeatedly been shown to provide remarkable protection against chronic diseases.

Albanian Paradox, Another Example of Protective Effect of Mediterranean Lifestyle?

Gjonça, A., Bobak, M. *Lancet* 350: 1815-1817 (1997).

As conceptualized in the '**Mediterranean**' and '**Asian-vegetarian**' types of diet, it is very important that a healthy diet should be thought of as a whole rather than as a recitation of good and bad components. Although these protective dietary modifications should probably all be used in each patient to obtain maximal efficacy, these scientifically quantitated principles should be adapted to the culture, ethnic origin and 'image of the world' of each patient in order to create an environment favourable to the perception of positive associations between various foods and healthy habits.

The 'diet heart' hypothesis in secondary prevention of coronary heart disease

de Longiril, M., Salen, P., et al. *European Heart Journal* 18(1): 13-8 (1997).

The **Mediterranean diet** was found not only to produce favorable effects on blood lipid profiles, but also to protect against oxidative stress and carcinogenesis... the dietary profile has maintained its basic features, and vital statistics still demonstrate a comparative advantage of eating behaviors in Mediterranean countries.

Mediterranean Diet, Italian-style: Prototype of a Healthy Diet

Ferro-Luzzi, A., Branca, F. *American Journal of Clinical Nutrition* 61: 1338S-1345S (1995).

We present a food pyramid that reflects **Mediterranean dietary traditions**, which historically have been associated with good health. This **Mediterranean diet pyramid** is based on food patterns... where adult life expectancy was among the highest in the world and rates of coronary heart disease, certain cancers, and other diet-related chronic diseases were among the lowest. The pyramid describes a dietary pattern that is attractive for its famous palatability as well as for its health benefits.

Mediterranean Diet Pyramid: A Cultural Model for Healthy Eating Willett, W.C. et al.,
American Journal of Clinical Nutrition 61: 1402S-1406S (1995).

A **Mediterranean diet** with more cereal, vegetables, fruit, less saturated fats and more n-3 fatty acids has recently been shown to afford a rapid and exceptional protection from recurrences and death in coronary patients.

Nutrition, atherosclerosis and coronary heart disease

Renaud, S., de Lorgeril, M. *Reproduction, Nutrition, Development* 34(6): 599-607 (1994).

An alpha-linolenic acid-rich **Mediterranean diet** seems to be more efficient than presently used diets in the secondary prevention of coronary events and death.

de Lorgeril, M., Renaud, S., et al. *Lancet* 343(8911): 1454-9 (1994).

13th Congress of Dietetics 2000; "High MUFA diet beats low fat and weight reducing diets in cardioprotection" (*Dr Kris-Etherton, Am J Clin Nut* 1999)

"Following Myocardial Infarction between 9 and 19 people will need to be given **Mediterranean dietary** advice to prevent 1 death - NHS Centre for reviews and dissemination". Source British Dietetics Association

BNF Report 2000 ; "The adoption of a **Mediterranean - style diet** and lifestyle would confer substantial health benefits to populations in Northern Europe. Growing evidence suggests that this diet provides an alternative to the low fat diet for improving lipid profile and promoting weight maintenance"

Olive oil and health

12th International Symposium on Atherosclerosis, 2000 "**Olive oil** improves blood lipid profiles, protects against atherosclerosis, decreases risk of atherothrombosis, improves blood vessel endothelial function and clears post prandial apolipoproteins"

12th Congress of the European Society of Cardiology ..."antioxidant effects of **olive oil** based on a number of bioactive substances...."

"The wide range of antiatherogenic effects associated with **olive oil** consumption could contribute to explain the low rate of cardiovascular mortality found in Southern European countries in comparison with other Western countries, despite a high prevalence of CVD factors"

Review of olive oil and health, M.Covas, Pharmacological Research, 2007 .01.010

"**Olive oil** is the principle source of fat in the Mediterranean Diet which is associated with low mortality for cardiovascular disease...a large body of knowledge exists providing evidence of the benefits of **olive oil** consumption on secondary end points for cardiovascular disease. The benefits of **olive oil** consumption are beyond a mere reduction of the low density lipoprotein cholesterol".

Pharmacol Research 2007 March; 55 175-86

The **Mediterranean Diet**, rich in **olive oil**, improves the major risk factors for cardiovascular disease...some of these effects are attributed to components of virgin **olive oil**.

International conference on the healthy effects of virgin olive oil. European Journal clinical Investigation 2005 July 35 421-4

“**Olives and olive oil** contain antioxidants in abundance..and substantial amounts of other compounds that are deemed to be anticancer agents”

Olives and Olive oil in cancer prevention . Owen et al, European Journal Cancer Prevention, 2004 Aug 13 (4) 319-26

The role of dietary extra virgin **olive oil** in preventing the onset of atherosclerosis and inflammatory bowel disease.

A report to the 12th international symposium on atherosclerosis Stockholm, Sweden. June 25-29. Masella et al, Rome.

“Antioxidant polyphenolic compounds such as quercetin- which is abundant in **olive oil**- help switch off the mechanisms which lead to atherosclerosis by inhibition of endothelial activation, the process by which the lining of the blood vessels contribute to the development of atherosclerosis”.*Report to the 12th Congress of the European society of cardiology ,Amsterdam, 2000 . Carluccio, University Milan.*

“**Olive oil** intake showed a significant reduction of oesophageal cancer risk, even allowing for total vegetable consumption.”

International Journal of Cancer 2000 , 87;2 289-94. Bosetti et al

“**Olive oil** contains a vast range of substances such as monounsaturated free fatty acids (e.g., oleic acid), hydrocarbon squalene, tocopherols, aroma components, and phenolic compounds. Higher consumption of **olive oil** is considered the hallmark of the traditional Mediterranean diet, which has been associated with low incidence and prevalence of cancer, including colorectal cancer. The anticancer properties of **olive oil** have been attributed to its high levels of monounsaturated fatty acids, squalene, tocopherols, and phenolic compounds. Nevertheless, there is a growing interest in studying the role of **olive oil** phenolics in carcinogenesis. This review aims to provide an overview of the relationship between **olive oil** phenolics and colorectal cancer, in particular summarizing the epidemiologic, in vitro, cellular, and animal studies on antioxidant and anticarcinogenic effects of **olive oil** phenolics.”

Components of olive oil and chemoprevention of colorectal cancer .Nutr Review 2005 Nov63 374-86. Hashim et al

“In the Mediterranean basin, **olive oil**, along with fruits, vegetables, and fish, is an important constituent of the diet, and is considered a major factor in preserving a healthy and relatively disease-free population. Epidemiological data show that the

Mediterranean diet has significant protective effects against cancer and coronary heart disease. We present evidence that it is the unique profile of the phenolic fraction, along with high intakes of squalene and the monounsaturated fatty acid, oleic acid, which confer its health-promoting properties. The major phenolic compounds identified and quantified in olive oil belong to three different classes: simple phenols (hydroxytyrosol, tyrosol); secoiridoids (oleuropein, the aglycone of ligstroside, and their respective decarboxylated dialdehyde derivatives); and the lignans [(+)-1-acetoxypinoresinol and pinoresinol]. All three classes have potent antioxidant properties. High consumption of extra-virgin **olive oils**, which are particularly rich in these phenolic antioxidants (as well as squalene and oleic acid), should afford considerable protection against cancer (colon, breast, skin), coronary heart disease, and ageing by inhibiting oxidative stress.”

Olive-oil consumption and health: the possible role of antioxidants

Lancet Oncol 2000 Oct;1:107-12. owen et al. Division of Toxicology and Cancer Risk Factors, German Cancer Research Center, Heidelberg

Appendix

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Venket Rao, PhD J Am Coll Nutr October 2000 vol. 19 no. 5 563-569
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Dietary factors in relation to rheumatoid arthritis: a role for olive oil and cooked vegetables Athena Linos
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