

## Short communication

# Is the term 'Mediterranean diet' a misnomer?

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### Abstract

**Objective:** A greater adherence to what has been labelled the Mediterranean diet is associated with a significant improvement in health status. However, it is unclear what this diet really contains. The objective of the present study is to discuss the contents of the scientific Mediterranean diet.

**Conclusions:** We argue that the evidence of the health-enhancing properties of the Mediterranean diet is not necessarily based on Mediterranean foods, and that we indeed do not have to eat Mediterranean foods to enjoy the health-promoting properties of the diet it represents. To maintain dietary variety, cultural diversity and heritage, as well as for environmental reasons, it seems more appropriate to promote regionally appropriate diets throughout the world – rather than a global Mediterranean diet.

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The most popular health-promoting whole diet approach is arguably the Mediterranean diet, and in September 2009 *Public Health Nutrition* published a special issue with articles about this diet<sup>(1)</sup>. According to the scientific literature, a Mediterranean diet is arguably a healthy diet. Recently, a meta-analysis on the relationship between adherence to a Mediterranean diet, mortality and incidence of chronic diseases in a primary prevention setting was published in *British Medical Journal*, concluding that eating in accordance with the Mediterranean diet is associated with a significant improvement in health status<sup>(2)</sup>. Such epidemiological research has been extremely instrumental in arguing in favour of the Mediterranean diet<sup>(3)</sup>.

The purpose of the present study is to discuss the fact that the evidence of the health-enhancing properties of what has been labelled the Mediterranean diet is not necessarily based on Mediterranean foods, and that indeed we do not have to eat Mediterranean foods to enjoy the health promoting properties of the diet. In fact, for health, cultural and environmental reasons, it may be better to endorse regionally appropriate health-enhancing diets.

### The Mediterranean and the diet

The first systematic evidence of the health-enhancing properties of the Mediterranean diet came from observations made in the Seven Countries Study in the late 1950s and early 1960s, showing that Cretan men had exceptionally low rates of heart disease<sup>(4)</sup>. A number of epidemiological studies have since assessed the health effects of the Mediterranean diet.

To estimate adherence to the Mediterranean diet, such studies usually use a version of the Mediterranean Diet Score

first presented by Trichopolou *et al.*<sup>(5)</sup> in 1995. The score usually ranges from 0 to 7–9 points<sup>(3)</sup>, reflecting intake of a number of food categories. Common categories included are (i) the ratio of MUFA to SFA, (ii) legumes, (iii) fruits and nuts, (iv) vegetables, (v) fish, (vi) grains, (vii) meat and meat products, (viii) milk and milk products and (ix) alcohol. Sex-specific medians are used to divide the study sample, and the participants are given one point each for having intakes above the median of MUFA:SFA ratio, legumes, fruits and nuts, vegetables, fish and grains, and for having intakes below the median for meat and meat products and milk and milk products. For alcohol, one point is given for having a moderate intake (differently defined in different studies). Eating more MUFA:SFA, fruit, vegetables, fish and grains, and less meat, milk and products thereof than the median person in a study population as well as drinking alcohol – but not too much – gives a higher Mediterranean Diet Score.

All studies included in the aforementioned meta-analysis used such a score. However, of the twelve studies meeting the criteria, only four studies were conducted in Mediterranean countries, two were cross-European (including both Mediterranean and non-Mediterranean countries), six were from the United States, one was from Australia and one was from Sweden<sup>(2)</sup>. The majority of studies included in the meta-analysis on the Mediterranean diet included non-Mediterranean populations.

Thus, the scoring system is based on general food groups, and not on specific Mediterranean foods, and the study populations are often non-Mediterranean. The Mediterranean diets investigated in several epidemiological studies are, therefore, not necessarily particularly Mediterranean.

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### How Mediterranean is the Mediterranean diet?

Olive oil may be the most typical ingredient of the Mediterranean diet. Olive oil is a good source of MUFA, and eating olive oil is therefore helpful in obtaining a first Mediterranean Diet Score point. However, there are many other good sources of MUFA, e.g. rapeseed oil, which also has a more favourable (i.e. lower)  $n-6:n-3$  ratio than olive oil<sup>(6)</sup>. The top ten producers of rapeseed today are China, Canada, India, Germany, France, the United Kingdom, Poland and Australia<sup>(7)</sup>. The famous Lyon Diet Heart Study, which was presented as proof for the merits of the Mediterranean diet, used rapeseed-oil-based margarine as a crucial part of the heart healthy dietary intervention<sup>(8)</sup>. In addition, one of the cross-European studies in the meta-analysis did not use the MUFA:SFA ratio, but rather a ratio of unsaturated fatty acids:SFA – ‘to allow the (Mediterranean diet) score to be applied to non-Mediterranean countries’<sup>(9)</sup>. Thus, the scientific Mediterranean diet scale is based on a MUFA:SFA ratio, but the message to the public is clearly olive oil. The European Union-sponsored promotion of olive oil in Europe has been questioned<sup>(10)</sup>.

To obtain the Mediterranean diet point for vegetables, one does not necessarily need to eat wild  $n-3$  rich greens (e.g. purslane<sup>(11)</sup> or stamnagathi<sup>(12)</sup>) from Crete. Vegetable intake in the studies included in the meta-analysis of the Mediterranean diet most likely did not include much of the wild green leafy vegetables that are often presented as a key ingredient of the Mediterranean diet. For example, vegetable intakes of the Swedish participants included in the meta-analysis<sup>(13)</sup> were more likely to come from tomatoes, cucumber, carrots and different types of cabbage (*Brassica oleracea*), which are the most eaten vegetables in Sweden<sup>(14)</sup>.

The Mediterranean Diet Score does not differentiate between various fruits based on their origin or present geographical distribution. Most areas in the world have local fruits with great health potential. For example, Bere showed that wild Nordic berries, fruits readily (although seasonably) available across the Nordic countries, contain  $n-3$  fatty acids in amounts similar to the mentioned  $n-3$ -rich wild greens<sup>(15)</sup>, fifteen times more than the three most eaten fruits in Norway (apples, oranges and bananas – all mostly imported).

When one thinks of Mediterranean nuts, almonds are the typical example. In their ‘poly meal’ paper, Franco *et al.*<sup>(16)</sup> in fact included only almonds as nuts to be part of a heart-healthy meal pattern to rival the poly pill. However, other nuts like walnuts and hazelnuts, that also are readily available in more temperate climate zones, have nutrient contents similar to almonds, and walnuts also possess a lower  $n-6:n-3$  ratio.

Fish is a clear example of a food of often non-Mediterranean origins that is promoted as part of the Mediterranean diet. In a study on how to implement a Cretan diet, it was recommended to eat foods rich in  $n-3$  fatty acids, explicitly including salmon and herring<sup>(17)</sup> – fish found in the North Sea and Northern Atlantic, not

the Mediterranean. A total of 271 000 metric tonnes of Norwegian fish was exported to countries bordering the Mediterranean in 2008<sup>(18)</sup>.

Grain and whole grain products are readily available in many regions of the world, low intakes of meat and of milk products are not limited to a few Mediterranean countries, and it is unclear whether our moderate alcohol intake should preferably come from wine rather than other alcoholic drinks<sup>(19)</sup> – like beer, or the Scandinavian aquavit (whose name comes from *aqua vitae*, Latin for *water of life*).

### Traditional rather than Mediterranean

It has been argued that a traditional Mediterranean diet, i.e. as eaten in Crete at the arrival of Ancestral Keys, was especially healthful because it was relatively similar to the food available to the hunter-gatherers from whom we are descended<sup>(20)</sup>. This argument has been used to the extreme in what is now referred to as the Palaeolithic diet<sup>(21)</sup>. However, agriculture was introduced in the Mediterranean area much earlier than in most other parts of the world<sup>(22)</sup>, and it may very well be that traditional diets in these other regions are as close to, or even closer to, the hunter-gatherer diets.

Agriculture reached central Europe later than Greece, but as the soil in central Europe is more productive, central Europe caught up and proceeded faster in economic development, including intensive agriculture production – and thereby also in power<sup>(22)</sup>. It is more likely that the Cretans in the early 1960s stayed closer to original human hunter-gatherer diets, whereas most of the rest of Europe and the USA were already exposed to the modern food environment characterised by readily available mass-produced and highly processed foods. Such modern foods tend to provide us with plenty of energy, sugar, saturated fat and salt at very low costs. This rapid change in our food environment, compared with the slow change in our genes during the same time, has been suggested as an ultimate cause for several of the lifestyle diseases we face today<sup>(21)</sup>.

A recent study reported that in 2005, 86.1% of a sample of Cretan farmers were overweight, and compared with the 1960s, the mean body weight of male farmers had increased from 63 to 83 kg<sup>(23)</sup>. Greece currently is among the countries with the highest obesity prevalence, and Spain has the highest childhood overweight and obesity rates in Europe<sup>(24)</sup>. Spanish children have also been reported to eat few fruits and vegetables<sup>(25,26)</sup>; only children in Iceland were found to have lower intakes<sup>(25)</sup>. These latter facts indicate that important parts of the Mediterranean probably no longer adhere to the diet (and lifestyle) that was named after their region.

### Conclusions

There is a gap between the prototype of the term ‘Mediterranean diet’ (i.e. what was eaten on Crete at the arrival

of Ancel Keys) and the modern scientific usage of the term (i.e. the epidemiological scale) – describing proxies of the prototype. The term 'Mediterranean diet' is a misnomer, as the diet it describes scientifically is today not necessarily based on Mediterranean foods, but more on foods that are similar in nutrient content to those in a traditional (Cretan/Greek/Mediterranean) eating pattern. It may very well be the traditional, rather than the Mediterranean, characteristics of the traditional Mediterranean diet that are health-promoting.

However, the research on the Mediterranean diet has built a strong evidence base for a whole diet approach to healthy eating rather than a specific food or nutrient approach. It has further identified a series of characteristics or properties such a whole diet approach should comply with in order to help people promote and maintain health (i.e. the epidemiological scale). However, an interesting point is that the associations between a high score on the scale and health outcomes appear to be stronger in studies conducted in Mediterranean countries<sup>(27)</sup>.

To maintain dietary variety, cultural diversity and heritage, as well as for environmental reasons, it seems more appropriate to promote regionally appropriate diets throughout the world<sup>(6)</sup> – rather than a global Mediterranean diet. Such new regional appropriate diets, e.g. inspired by traditional diets (food being local, usage of nature, natural foods and few highly processed foods), as well as the epidemiological scale (more plant food and less animal food), rather than specific Mediterranean foods, might also be easier for populations to adhere to outside the Mediterranean area<sup>(28)</sup>.

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## References

- Serra-Majem L & Bach-Faig A (editors) (2009) Selected Conference Proceedings of the VIIth Barcelona International Congress on the Mediterranean Diet, Barcelona, Spain, 11–12th March 2008. *Public Health Nutr* **12**(9a), 1591–1684.
- Sofi F, Cesari F, Abbate R *et al.* (2008) Adherence to Mediterranean diet and health status: meta-analysis. *BMJ* **337**, a1344.
- Bach A, Serra-Majem L, Carrasco JL *et al.* (2006) The use of indexes evaluating the adherence to the Mediterranean diet in epidemiological studies: a review. *Public Health Nutr* **9**, 132–146.
- Keys AB (1980) *Seven Countries: A Multivariate Analysis of Death and Coronary Heart Disease*. Cambridge, MA: Harvard University Press.
- Trichopoulou A, Kouris-Blazos A, Wahlqvist ML *et al.* (1995) Diet and overall survival in elderly people. *BMJ* **311**, 1457–1460.
- Bere E & Brug J (2009) Towards health-promoting and environmentally friendly regional diets – a Nordic example. *Public Health Nutr* **12**, 91–96.
- Wikipedia (2008) Rapeseed. [http://en.wikipedia.org/wiki/rapeseed\\_oil](http://en.wikipedia.org/wiki/rapeseed_oil) (accessed October 2009).
- de Lorgeril M, Renaud S, Mamelle N *et al.* (1994) Mediterranean alpha-linolenic acid-rich diet in secondary prevention of coronary heart disease. *Lancet* **343**, 1454–1459.
- Trichopoulou A, Orfanos P, Norat T *et al.* (2005) Modified Mediterranean diet and survival: EPIC-elderly prospective cohort study. *BMJ* **330**, 991.
- Astrup A, Marckmann P & Blundell J (2000) Oiling of health messages in marketing of food. *Lancet* **356**, 1786.
- Simopoulos AP & Salem N Jr (1986) Purslane: a terrestrial source of omega-3 fatty acids. *N Engl J Med* **315**, 833.
- Zeghichi S, Kallithraka S & Simopoulos AP (2003) Nutritional composition of molokhia (*Corchorus olerarius*) and stamnagathi (*Cichorium spinosum*). *World Rev Nutr Diet* **91**, 1–21.
- Lagiou P, Trichopoulos D, Sandin S *et al.* (2006) Mediterranean dietary pattern and mortality among young women: a cohort study in Sweden. *Br J Nutr* **96**, 384–392.
- Becker W & Pearson M (2003) *Riksmaten 1997–1998 – Kostvanor och näringsintag i Sverige – Metod-och resultatanalys*. Uppsala: Livsmedelverket.
- Bere E (2007) Wild berries: a good source of omega-3. *Eur J Clin Nutr* **61**, 431–433.
- Franco OH, Bonneux L, de LC *et al.* (2004) The polymeal: a more natural, safer, and probably tastier (than the Polypill) strategy to reduce cardiovascular disease by more than 75%. *BMJ* **329**, 1447–1450.
- Simopoulos AP (2001) The Mediterranean diets: what is so special about the diet of Greece? The scientific evidence. *J Nutr* **131**, 3065S–3073S.
- Ekspertutvalget for fisk (2009) Ekspertstatistikk. <http://www.seafood.no/binary?id=108068> (accessed October 2009).
- Rimm EB, Klatsky A, Grobbee D *et al.* (1996) Review of moderate alcohol consumption and reduced risk of coronary heart disease: is the effect due to beer, wine, or spirits. *BMJ* **312**, 731–736.
- Mackenbach JP (2007) The Mediterranean diet story illustrates that 'why' questions are as important as 'how' questions in disease explanation. *J Clin Epidemiol* **60**, 105–109.
- Eaton SB, Strassman BI, Nesse RM *et al.* (2002) Evolutionary health promotion. *Prev Med* **34**, 109–118.
- Diamond J (2002) Evolution, consequences and future of plant and animal domestication. *Nature* **418**, 700–707.
- Vardavas CI, Linardakis MK, Hatzis CM *et al.* (2009) Prevalence of obesity and physical inactivity among farmers from Crete (Greece), four decades after the Seven Countries Study. *Nutr Metab Cardiovasc Dis* **19**, 156–162.
- International Obesity Task Force (2009) International obesity task force prevalence data. <http://www.ioft.org/database/index.asp> (accessed October 2009).
- Yngve A, Wolf A, Poortvliet E *et al.* (2005) Fruit and vegetable intake in a sample of 11-year-old children in 9 European countries: the Pro Children Cross-sectional Survey. *Ann Nutr Metab* **49**, 236–245.
- Garaulet M, Perez-Llamas F, Rueda CM *et al.* (1998) Trends in the Mediterranean diet in children from South-East Spain. *Nutr Res* **18**, 979–988.
- Trichopoulou A, Bamia C & Trichopoulos D (2009) Anatomy of health effects of Mediterranean diet: Greek EPIC prospective cohort study. *BMJ* **338**, b2337.
- Astrup A (2008) Weight loss with a low-carbohydrate, Mediterranean, or low-fat diet. *New Engl J Med* **359**, 2169–2170.