



The Cretan Mediterranean Diet” The optimal diet for cardiodiabesity?

Professor Catherine Itsiopoulos
Head of School of Allied Health
Professor of Dietetics and Human Nutrition
La Trobe University

17th Australian Almond Conference



HOSTED BY:
The Almond Board of Australia



SUPPORTED BY:
Horticulture Innovation Australia Ltd

Pullman Hotel Melbourne, Albert Park, Victoria
November 8th - 10th, 2016



Professor Catherine Itsiopoulos



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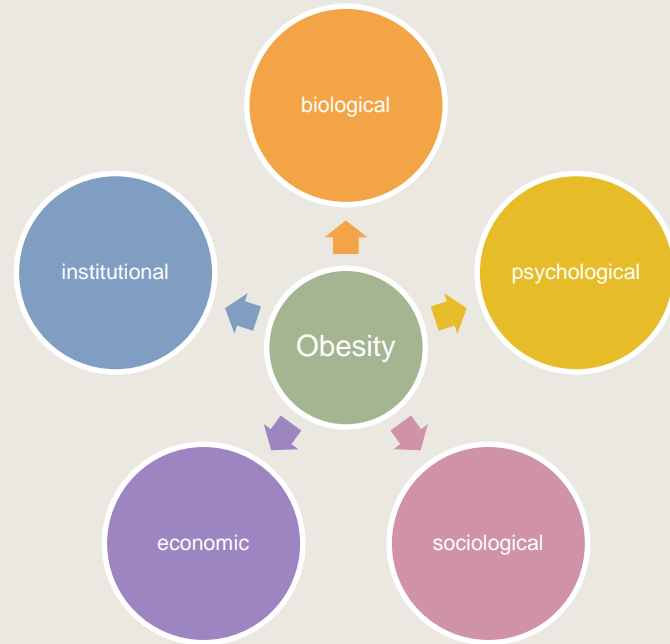


Head of School of Allied Health Professor of Dietetics and Human Nutrition, **La Trobe University**

Catherine is a recognised leader in Dietetics and has international standing as a leader in Mediterranean diet research. She is an Accredited Practising Dietitian, the deputy chair of the Australian Dietetics Council, and is the founding head of the department of Dietetics and Human Nutrition at La Trobe University. Her current role is Head of School of Allied Health at La Trobe University. Catherine's specific research area of interest is Mediterranean diet studies focussing both on migration impact on diet and lifestyle and chronic disease risk and dietary clinical intervention trials using the traditional Cretan Mediterranean diet (and elements of) as intervention models in the prevention and management of metabolic syndrome, Non-Alcoholic Fatty Liver Disease, type 2 diabetes, cardiovascular disease, and more recently mental health. Catherine has authored over 50 peer-reviewed publications with 720 citations, has co-edited a Nutrition textbook, and has published 2 Mediterranean Diet Cookbooks (The Mediterranean Diet 2013, The Mediterranean Diet Cookbook 2015).

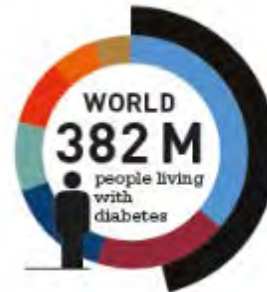
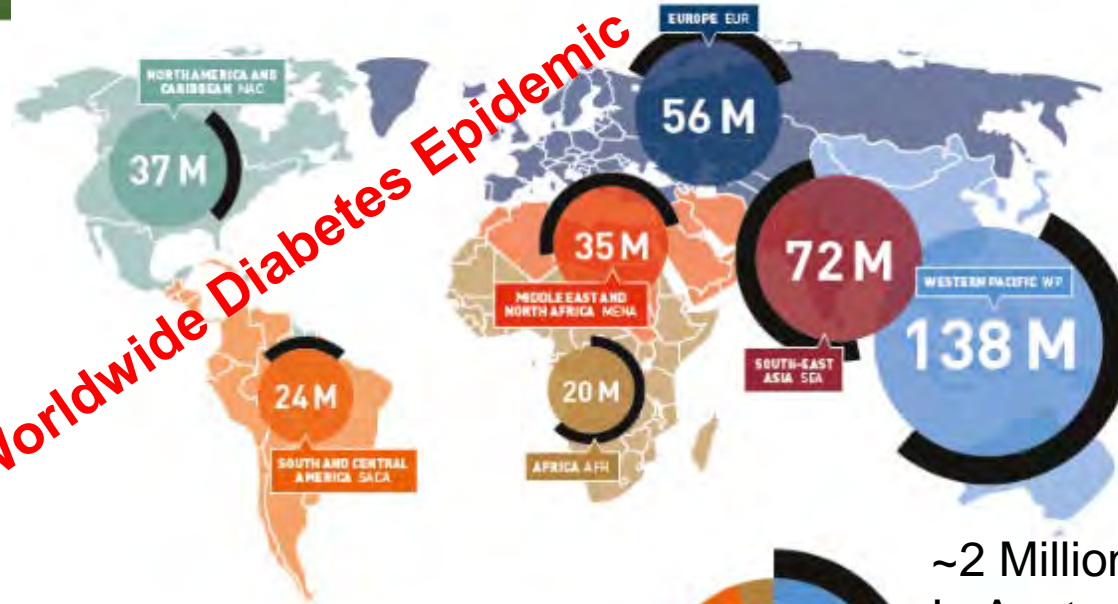
Globally Obesity has reached crisis proportions!

- More than 2.1 billion – 30% of global population – are overweight or obese!
- By 2030 it is estimated that 50% of our population will be overweight or obese.
- Global economic impact of obesity is \$2 trillion (2.8% GDP) via related diseases diabetes and CHD.





Worldwide Diabetes Epidemic



~2 Million
In Australia

46%
undiagnosed

63% of Adult Australians and
25% of children are
Overweight/Obese

We live in an Obesogenic Environment!



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- **Urbanisation**

- sedentary occupations
- computerisation and mechanisation
- improved transportation

- **Nutrition transitions**

- exponential growth in fast food industry (highly processed, high fat, sugar, salt)
- livestock revolution (intensively reared animals with a high n6/n3 fatty acid profile – 20:1 vs 2:1 – not enough omega 3!)
- highly processed grains (poor in fibre, micronutrients, and phytochemicals)

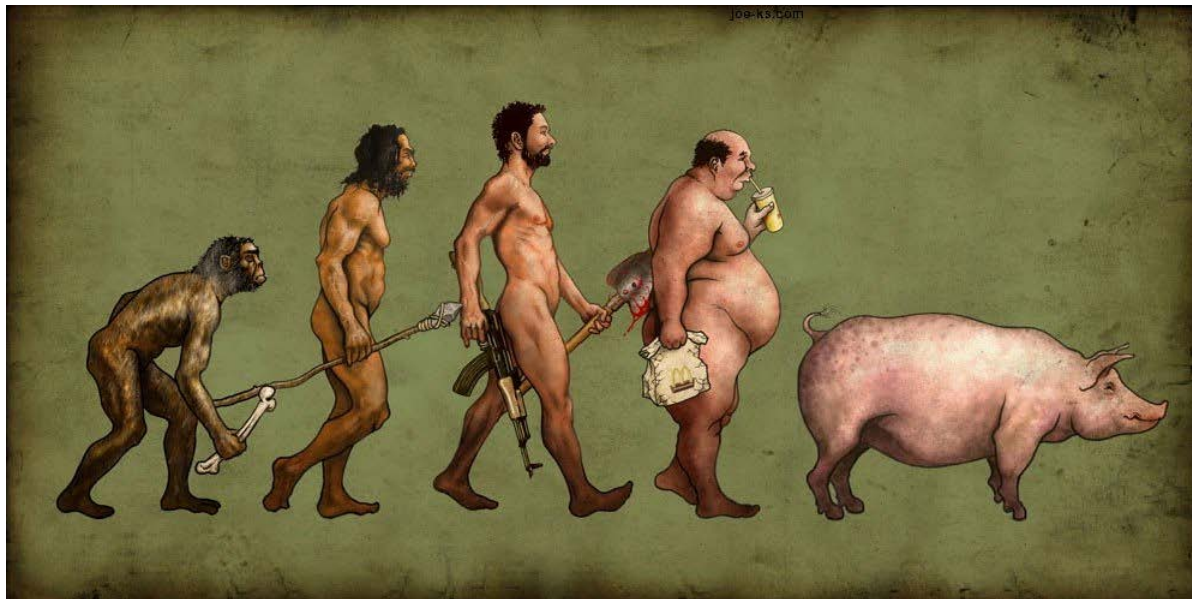


Mr 'Free 2B Me' wants the right to smoke, drink and lie on the couch all day but he also demands that taxpayers pay his medical bills.

EVOLUTION???



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Somewhere, something has gone terribly wrong!

<http://lifedestiny.net/wp-content/uploads/2010/01/EvolutionOfMan.jpg>

Undesirable Food Trends in Australia 2015: What are Australian Eating? (NHS, 2011-2012)



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- Recent Australian Health Survey of 12,000 people shows that we are eating 30% less fruits and vegetables than 15 years ago.
- 25% of Adults eat NO vegetables on an average day and only 7% eating recommended 5 serves per day!
- We eat 3kg of food and beverages each day and 35% of energy comes from high fat, high sugar foods such as cakes, biscuits, alcohol, soft drink and chips.



Could a Mediterranean-style Diet be the answer?

Historical Overview: Traditional Mediterranean diet studies



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7 countries
study
(1950s)



Paradox
Intervention
(late 1990s)



LA TROBE
UNIVERSITY

AUSMED
Heart Trial
(2014-)



University of
South Australia



Lyon Heart
study
(1990s)



PREDIMED
(2013)



SMILE,
MEDINA,
MEDIBRAIN,
AUSMED
ASTHMA



LA TROBE
UNIVERSITY



Ancient Mediterranean Diet: triad of “wheat, olive oil, and wine”



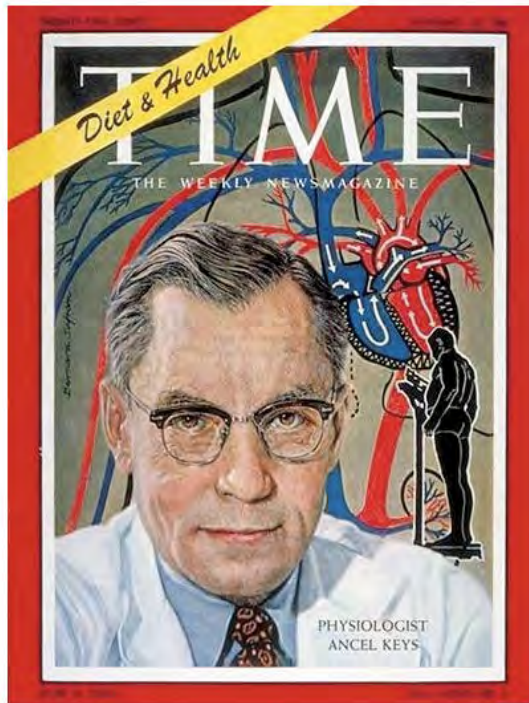
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Considered as a ‘gift of the gods’ the olive tree was an important symbol for the ancient Greeks. It was connected to their diet and their religion and considered a symbol of peace, wisdom and victory.

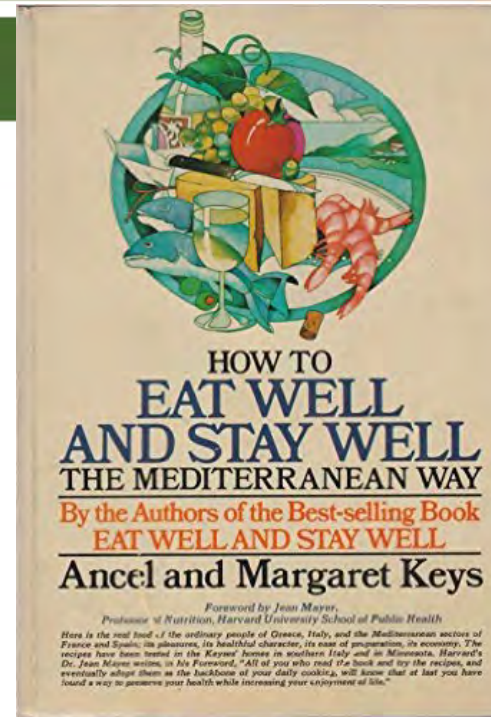


Archaeological finds such as stone mortars and presses used for olive oil extraction date back to 5000 BC!

<http://www.explorecrete.com/nature/olive-oil-history.html>



Ancel Keys 1904-2004



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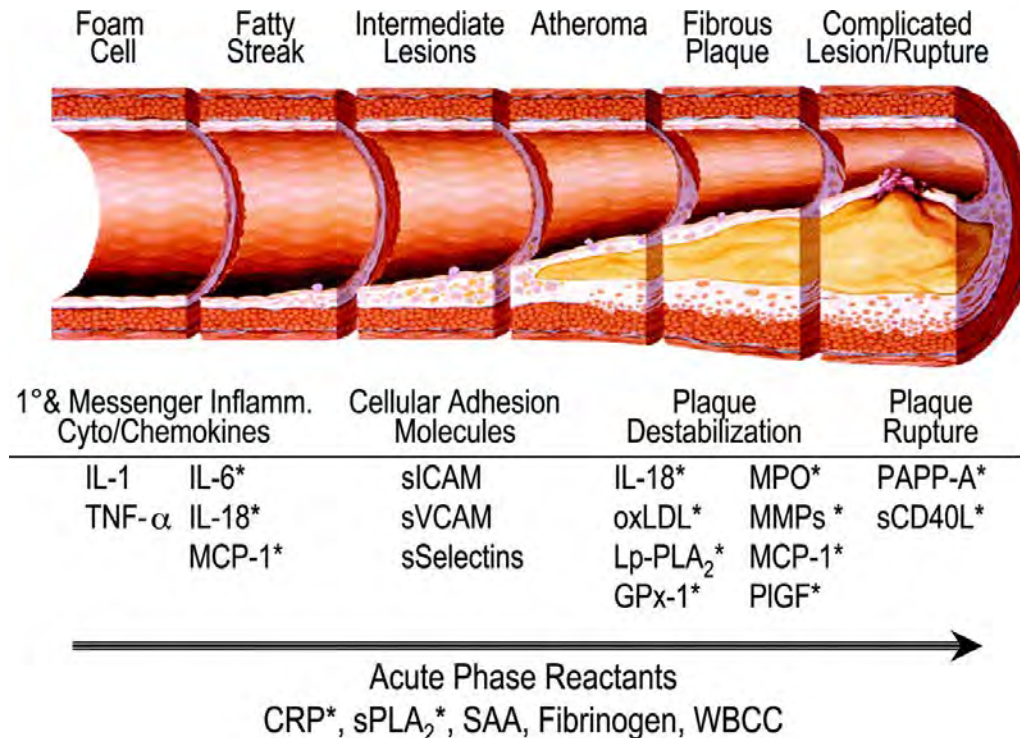
The 7 Countries Study
“The Archetypal Cretan Mediterranean Diet”
The Diet-Heart Hypothesis

Heart Disease is Complex!



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OXIDATION/ INFLAMMATION





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Thursday, March 19, 2015

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PREDIMED Study Group



The multidisciplinary team of the PREDIMED study assembles outstanding research groups involved in nutrition and cardiovascular risk in Spain. Partners are 16 groups distributed in 7 autonomous communities in Spain, which are formed by university researchers, hospital clinicians, primary care physicians, nutritionists and epidemiologists working in various public institutions. The team takes advantage of modern communication technologies and performs as a research network. thus

<http://predimed.onmedic.net/Default.aspx?alias=predimed.onmedic.net/eng>



**Effect independent
of weight loss**

Incidence of cardiac events (%)

PREDIMED Final Outcomes



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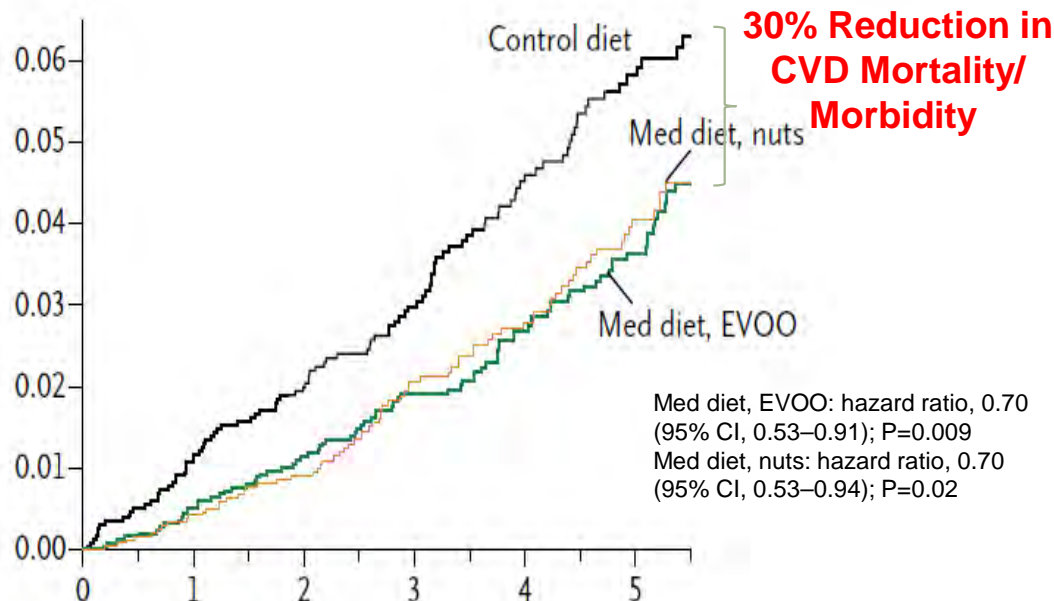


Figure 1. Incidence of Primary End-Point (a combination of acute myocardial infarction, stroke and all-cause death) following use of the Mediterranean Diet for the primary prevention of cardiovascular disease.

EVOO = Extra Virgin Olive Oil

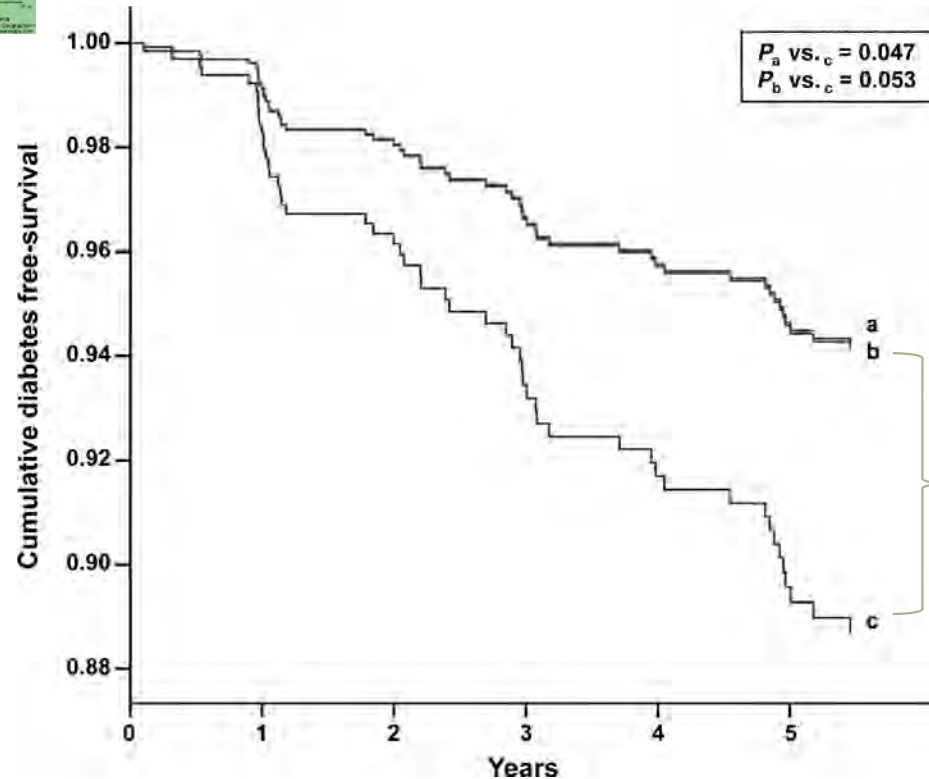
(Estruch et al, 2013)



PREDIMED Cumulative diabetes free-survival: Med diets (a,b) vs control (c)



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55% Risk
Reduction
Diabetes
Incidence

Salas-Salvadó J et al. Diab Care 2011;34:14-19



RESEARCH ARTICLE

Open Access

Polyphenol intake and mortality risk: a re-analysis of the PREDIMED trial

Anna Tresserra-Rimbau^{1,2}, Eric B Rimm³, Alexander Medina-Remón^{2,17}, Miguel A Martínez-González^{2,4}, M Carmen López-Sabater^{1,2}, María I Covas^{2,5}, Dolores Corella^{2,6}, Jordi Salas-Salvadó^{2,7}, Enrique Gómez-Gracia^{2,8}, José Lapetra^{2,9}, Fernando Arós^{2,10}, Miquel Fiol^{2,11}, Emili Ros^{2,12}, Lluís Serra-Majem^{2,13}, Xavier Pintó^{2,14}, Miguel A Muñoz^{2,15}, Alfredo Gea^{2,4}, Valentina Ruiz-Gutiérrez^{2,16}, Ramón Estruch^{2,17}, Rosa M Lamuela-Raventós^{1,2*} and on behalf of the PREDIMED Study Investigators

Abstract

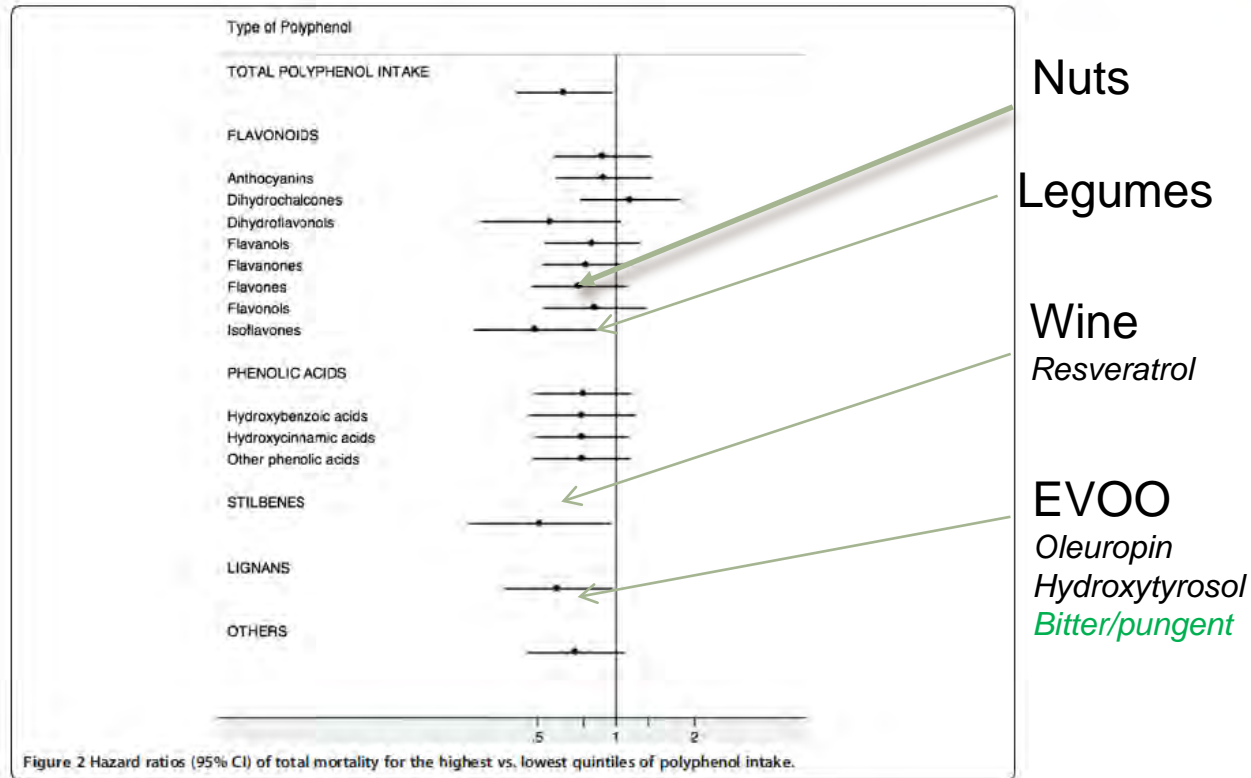
Background: Polyphenols may lower the risk of cardiovascular disease (CVD) and other chronic diseases due to their antioxidant and anti-inflammatory properties, as well as their beneficial effects on blood pressure, lipids and insulin resistance. However, no previous epidemiological studies have evaluated the relationship between the intake of total polyphenols intake and polyphenol subclasses with overall mortality. Our aim was to evaluate whether polyphenol intake is associated with all-cause mortality in subjects at high cardiovascular risk.

37% reduction in mortality in Q5 vs Q1 of polyphenol intake

PREDIMED: Mortality and Polyphenol Intake (by type)



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Sánchez-Villegas *et al. BMC Medicine* 2013, **11**:208
<http://www.biomedcentral.com/1741-7015/11/208>



RESEARCH ARTICLE

Open Access

Mediterranean dietary pattern and depression: the PREDIMED randomized trial

Almudena Sánchez-Villegas^{1,2*}, Miguel Angel Martínez-González^{1,3}, Ramón Estruch^{1,4}, Jordi Salas-Salvadó^{1,5}, Dolores Corella^{1,6}, Maria Isabel Covas^{1,7}, Fernando Arós^{1,8}, Dora Romaguera^{1,9,10}, Enriquè Gómez-Gracia^{1,11}, José Lapetra^{1,12}, Xavier Pintó^{1,13}, Jose Alfredo Martínez^{1,14}, Rosa María Lamuela-Raventós^{1,15}, Emilio Ros^{1,16,17}, Alfredo Gea^{1,3}, Julia Wärnberg^{1,11} and Lluís Serra-Majem^{1,2}

Results suggest that a Mediterranean diet supplemented with 30g nuts/day (almonds, walnuts, hazelnuts) reduces the risk of depression in people with Diabetes.



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Free Radical Research, May 2014; 48(5): 599–606
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DOI: 10.3109/10715762.2014.896458

informa
healthcare

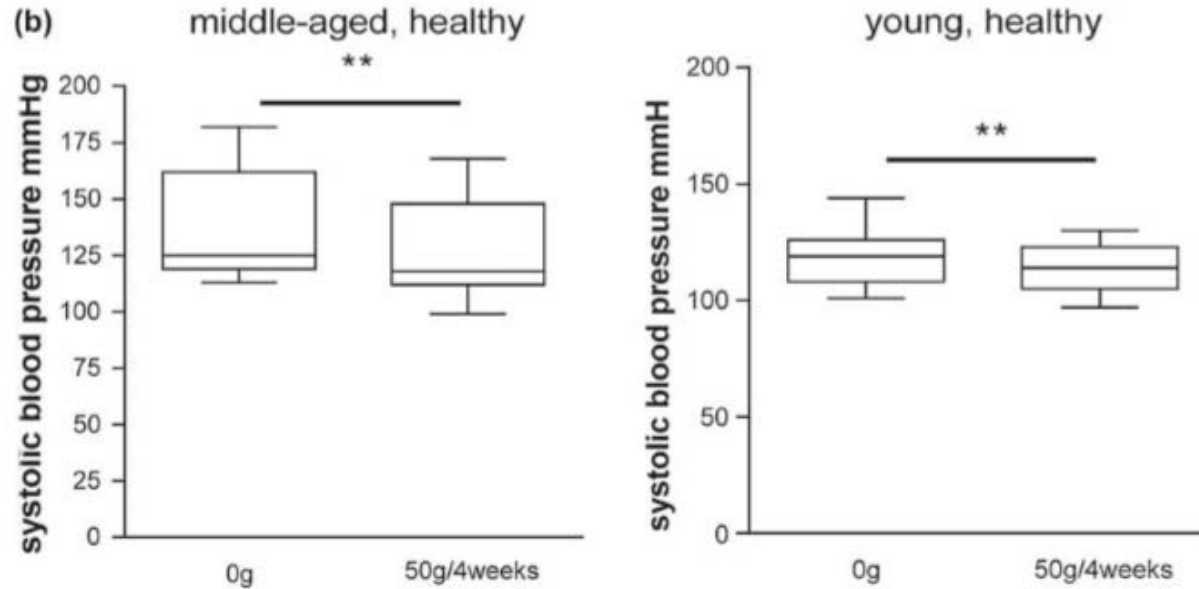
ORIGINAL ARTICLE

An almond-enriched diet increases plasma α -tocopherol and improves vascular function but does not affect oxidative stress markers or lipid levels

K. Choudhury, J. Clark & H. R. Griffiths

Aston Research Centre for Healthy Ageing Life, and Health Sciences, Aston University, Birmingham, UK

Healthy middle aged men (n=20), healthy young men (n=20) and young men with CVD risk factors (n=20) consumed 50g almonds for 4 weeks, compared to controls (n=15) who consumed habitual diet.



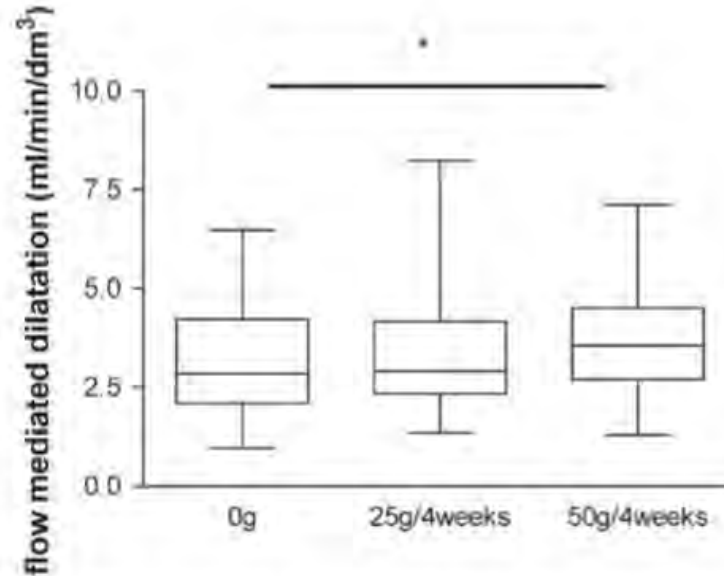


Figure 2. Flow-mediated dilatation was measured in each subject at baseline, following 4 weeks 25 g almonds/day (d) and following 4 weeks of almond intervention (50 g/d). Data are expressed as box and whisker plots with the box showing median and 75% confidence intervals and data range shown as whiskers where * represents $p < 0.05$ and represents $p < 0.01$.

Dietary Patterns and Protection for Type 2 Diabetes (Fardet and Boire, Nutrition Reviews 2014)



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A synthesis of all (304) pooled meta-analyses and
systematic reviewed published 1950-2013

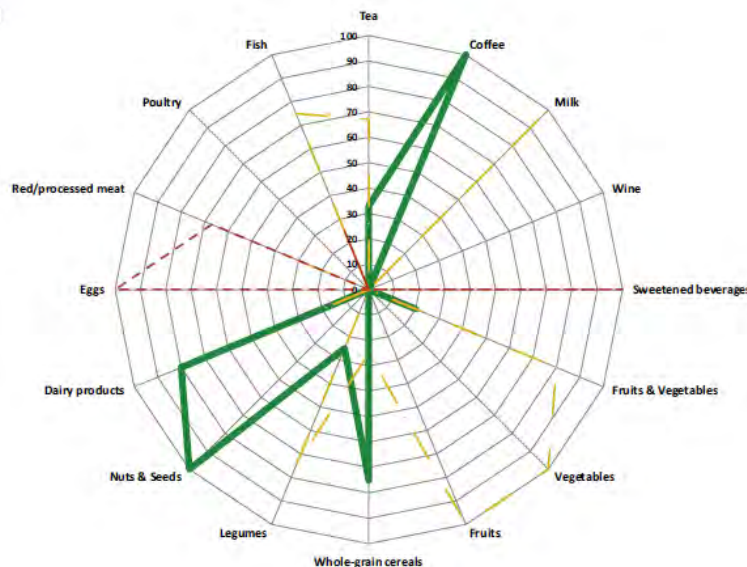


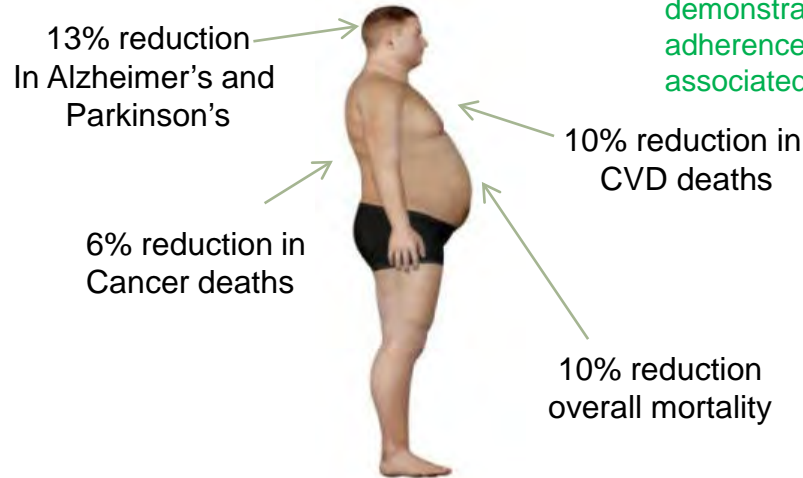
Figure: Radar plot of food groups and beverages and link with type 2 diabetes risk.
protective ----- neutral ----- deleterious

Mediterranean Diet Protective for Deaths from multiple conditions.



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Systematic review and meta-analysis of international studies between 1966-2010 involving over 4 Million people, demonstrated that a 2-point increase in adherence to a Mediterranean diet was associated with:



(Sofi et al, Adherence to Mediterranean diet and health status: meta-analysis. BMJ 2008;337:1344, Updated Sofi et al, AJCN 2010, Updated Sofi F et al Public Health Nutrition, 2014)



REVIEW

Adherence to a Mediterranean-style diet can slow the rate of cognitive decline and decrease the risk of dementia: a systematic review

Rachelle Sara OPIE, Robin A. RALSTON and Karen Z. WALKER

Department of Nutrition and Dietetics, Monash University, Clayton, Victoria, Australia

Abstract

Aim: The aim of the present study was to explore the association between a Mediterranean-style diet and cognitive performance, dementia, Alzheimer's disease and associated mortality in ageing populations.

Methods: A systematic search of Ovid Medline, Embase and Cinahl plus databases for papers published from September 1970.

Results: Ten prospective cohort studies and one cross-sectional study were included in this review. Higher adherence to a Mediterranean-style diet was associated with significantly decreased risks for all-cause dementia, Alzheimer's disease, Alzheimer's disease mortality and infarcts detected by magnetic resonance imaging. Adherence to a Mediterranean-style diet was not, however, consistently associated with tests of cognitive performance and was not associated with the presence of white matter hyper-intensities in the brain. In four of six studies, subjects in the highest tertile for Mediterranean diet adherence had a 28–48% lower risk for development of dementia or Alzheimer's disease than subjects in the lowest tertile. For subjects with Alzheimer's disease, those in the highest tertile of adherence to a Mediterranean-style diet had a 73% lower mortality risk than those in the lowest tertile (fully adjusted hazard ratio 0.27, 95% CIs: 0.10–0.69, *P* for trend = 0.003).

Conclusions: There is strong evidence for the protective role of a Mediterranean-style diet against cognitive decline and development of Alzheimer's disease. Strategies should now be sought to promote this eating pattern in older Australians. Support for dietitians in implementing this change has potential to reduce the high health-care costs associated with cognitive decline on ageing.

Western diet is associated with a smaller hippocampus: a longitudinal investigation

Felice N. Jacka^{1,2,3,4,*}, Nicolas Cherbuin⁵, Kaarin J. Anstey⁵, Perminder Sachdev⁶ and Peter Butterworth⁵

BMC Medicine, 2015

N = 255, 46% Female, mean age 63 yrs, ACT

Healthy Diet

- Fresh vegetables
- Salads
- Fresh Fruit
- Grilled Fish



Unhealthy Diet

- Roast meat
- Sausages
- Hamburgers
- Steak
- Chips
- Crisps and
- Soft drinks

Greater retention of
brain volume over 4 yrs
with healthy diet!

Is a Mediterranean Diet Feasible in a non-Mediterranean Multi-Ethnic Society like Australia?



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First RCT using a reconstructed Cretan Mediterranean diet in a clinical trial in Diabetes in Australia.

Nutrition, Metabolism & Cardiovascular Diseases (2010) xx, 1–8



available at www.sciencedirect.com



Nutrition,
Metabolism &
Cardiovascular Diseases

journal homepage: www.elsevier.com/locate/nmcd

Can the Mediterranean diet lower HbA1c in type 2 diabetes? Results from a randomized cross-over study[☆]

C. Itsiopoulos^{a,*}, L. Brazionis^{b,e}, M. Kaimakamis^c, M. Cameron^c,
J.D. Best^{a,d}, K. O'Dea^e, K. Rowley^f

- 12 week RCT of Greek-style Med diet “**ad libitum**” vs Usual Diet in T2DM
- Clinically significant change in HbA1c (of the order found in many OH drug trials,
- Change of - 0.3 HbA1c% = 10% reduction in CHD Mortality in T2 diabetes

➤ **Health benefits independent of weight loss!**



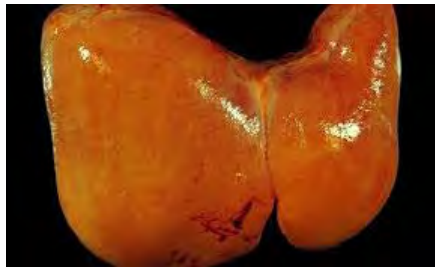
Cooked meals and staples (olive oil, dried fruit, nuts, sourdough bread) provided for duration of study.



The Mediterranean diet improves hepatic steatosis and insulin sensitivity in individuals with non-alcoholic fatty liver disease

Marno C. Ryan^{1,2,*}, Catherine Itsiopoulos^{2,6}, Tania Thodis^{2,6}, Glenn Ward², Nicholas Trost³, Sophie Hofferberth², Kerin O'Dea^{2,7}, Paul V. Desmond¹, Nathan A. Johnson^{4,5}, Andrew M. Wilson²

- After 6 weeks on a Mediterranean Diet there was an almost 40% drop in liver fat compared with only 7% drop on the low fat diet.
- Insulin resistance improved on the Mediterranean Diet but no change on the low fat diet.



Ryan, Itsiopoulos, Thodis et al, 2014 Journal of Hepatology.

AUSMED Heart Trial: Secondary Prevention of AMI with the Mediterranean Diet (2014 -)



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Aims

Examine the potential of a Mediterranean diet vs low fat diet in, reducing risk of secondary events at 12 months in patients surviving a cardiac event mediating cardiometabolic markers at 6 months

Design

Multi-centre, parallel, RCT of 6 month intervention of Modern Med diet versus low fat diet. First secondary prevention trial using Med diet in non-Mediterranean multi ethnic population. Modelled on Lyon Heart study and using PREDIMED tools.

Intervention:

Tailored menus, cookbook and hamper of key staple foods (Med diet) vs control std diet for CVD risk reduction (NHF guidelines). Intensive dietetic counselling in both arms.

Recruitment to date: 49 - Med diet intervention arm (n=27) vs. low fat diet control arm (n=22)

Most common cultural backgrounds: Australian, European, and South Asian.

Feasibility: Med diet adherence score using 14-item PREDIMED tool shows intervention arm (n=16): baseline score 5.4 vs 6 month score 10.9

CIs: Itsiopoulos, Wilson, van Gaal, Tierney, Thomas, Kingsley, Brazionis, Vally, Salim, Segal.

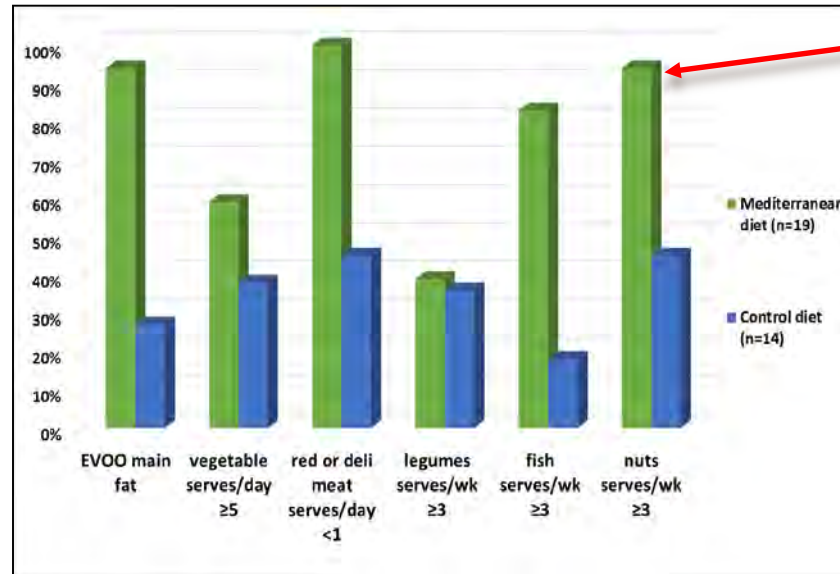
PhD students: Teagan Kucianski, Hannah Mayr

Our Mediterranean trials experience: Challenges and Solutions!



| Challenges | Solutions |
|---|--|
| Cultural diversity/ interest in Med diet | Adjust current foods embedding key Med diet ingredients |
| Fear of eating too much fat – 4 tbs EVOO/ day | Focus on heart health benefits of EVOO, polyphenols, taste |
| Dislike of some food staples (yoghurt) | Try plain Greek-style with fresh fruit, walnuts, honey |
| Concern over eating “carbs” e.g. bread/ pasta | Approach is moderate carbs, focus on sourdough/grain, and high plant:animal food ratio |
| Poor cooking skills/ no time to cook | Focus on ‘no cooking req’ options, cook in bulk and freeze |
| Ingredient challenges (garlic, EVOO, leafy greens, legumes) | Add spinach and lentils to lasagne. Bake veggies with garlic and EVOO. Simple lunches – leafy salad, tinned salmon/tuna, 4 bean mix, EVOO. |

AUSMED Heart Trial: Adherence to Mediterranean Diet at 3 months



Almonds
Walnuts
(Hazelnuts)



Why is the Mediterranean Diet beneficial in cardiometabolic disease?

Anti-inflammatory/ Palatable/ Sustainable/ Ecological



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4:1 Plant to Animal Food Ratio



- Vit C
- Vit E
- Carotenoids
- Phytoestrogens
- Phenolics
- Allylthiosulfinates
- Flavonoids
- Selenium
- N3 fatty acids:
❖ALA and EPA DHA



Ref: Simopoulos and Sidosis. What is so special about the Greek diet? *World Rev Nutr Diet* 2000

A predominantly plant-based diet with fish and seafood!



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Balanced Plate – Mediterranean Style



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4:1 ratio of
Plant: Animal Foods

The Mediterranean Diet is High in Omega-3 fats from a range of sources.



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Wild edible
leafy greens



Nuts



Pumpkin seeds
'πασατεμπο'



Greek village eggs
"free range"



Snails (Crete)



Free range goat
- milk and cheese



Offal – κοκορετσι!

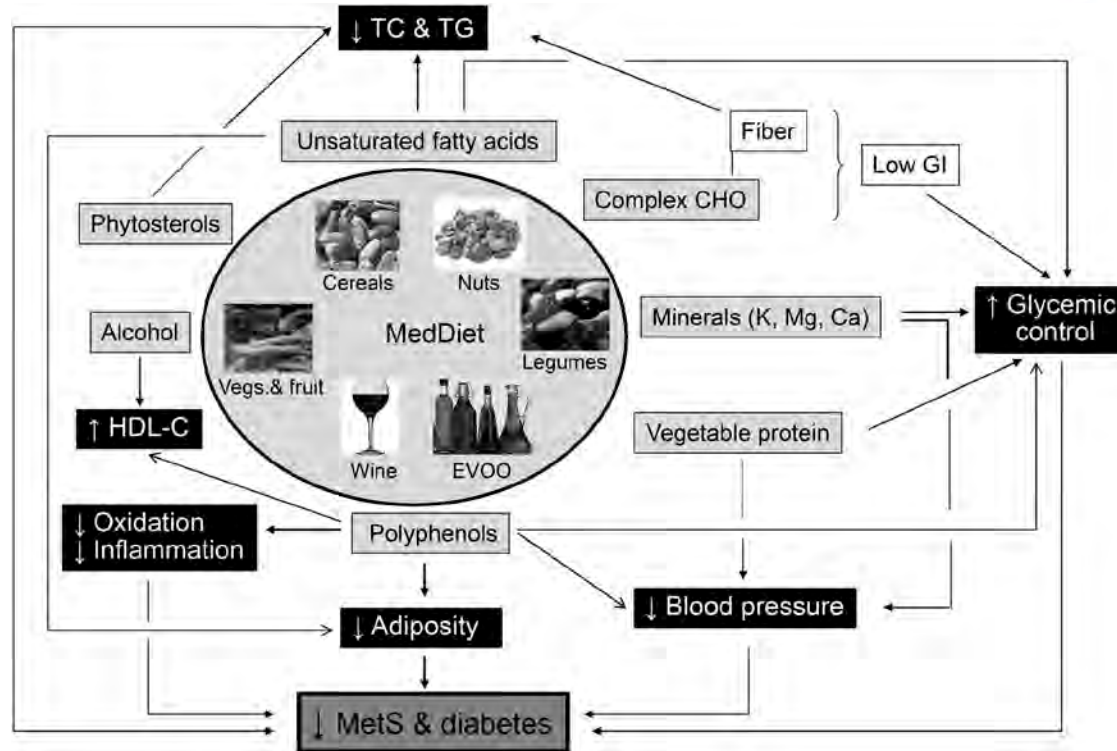


Protective Metabolic Pathways




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JN THE JOURNAL OF NUTRITION



Jordi Salas-Salvadó et al. J. Nutr. 2016;146:920S-927S



Translating the Mediterranean Diet Principles: The Toolkit

Assessing Adherence: PREDIMED 14-Item Diet Quality Guide



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14-item food diet quality guide: PREDIMED Study (Martinez-Gonzalez et al, 2013).

Foods Positively Associated with Mediterranean Diet

- Olive oil as main fat
- ≥ 4 tbsp olive oil/day
- ≥ 2 serves vegetables (2x200g cooked, 100g raw)/day
- ≥ 3 serves of fruit/day
- ≥ 7 glasses wine/week (If a consumer of alcohol)
- ≥ 3 serves (3x150g) legumes /week
- ≥ 3 serves fish (100-150g) or shellfish (200g)/week
- ≥ 3 serves (3x30g) nuts/week
- Chicken, turkey, wild meats as main meats
- ≥ 2 /week dishes cooked in tomato, onion, garlic, olive oil (sofrito or salsa)

Foods Negatively Associated with the Mediterranean Diet

- < 1 serve red meat/meat products (100-150g)/day
- < 1 serve butter, margarine or cream/day
- < 1 sweet/carbonated beverage/day
- < 3 /week commercial sweets, cakes, biscuits.

Translating the traditional Mediterranean Diet: 10 Commandments



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1



Extra Virgin Olive oil as the main added fat!

2



Vegetables /salads with every main meal



Use herbs and spices to flavour foods

3



Legumes twice per week

4



Fish/seafood twice a week

5



Meat/Chicken less often, small portions

Sweets on special occasions

6



Wholegrain sourdough breads

7



Fresh fruit everyday

8



Fermented dairy every day "yoghurt"

9



Nuts everyday

10

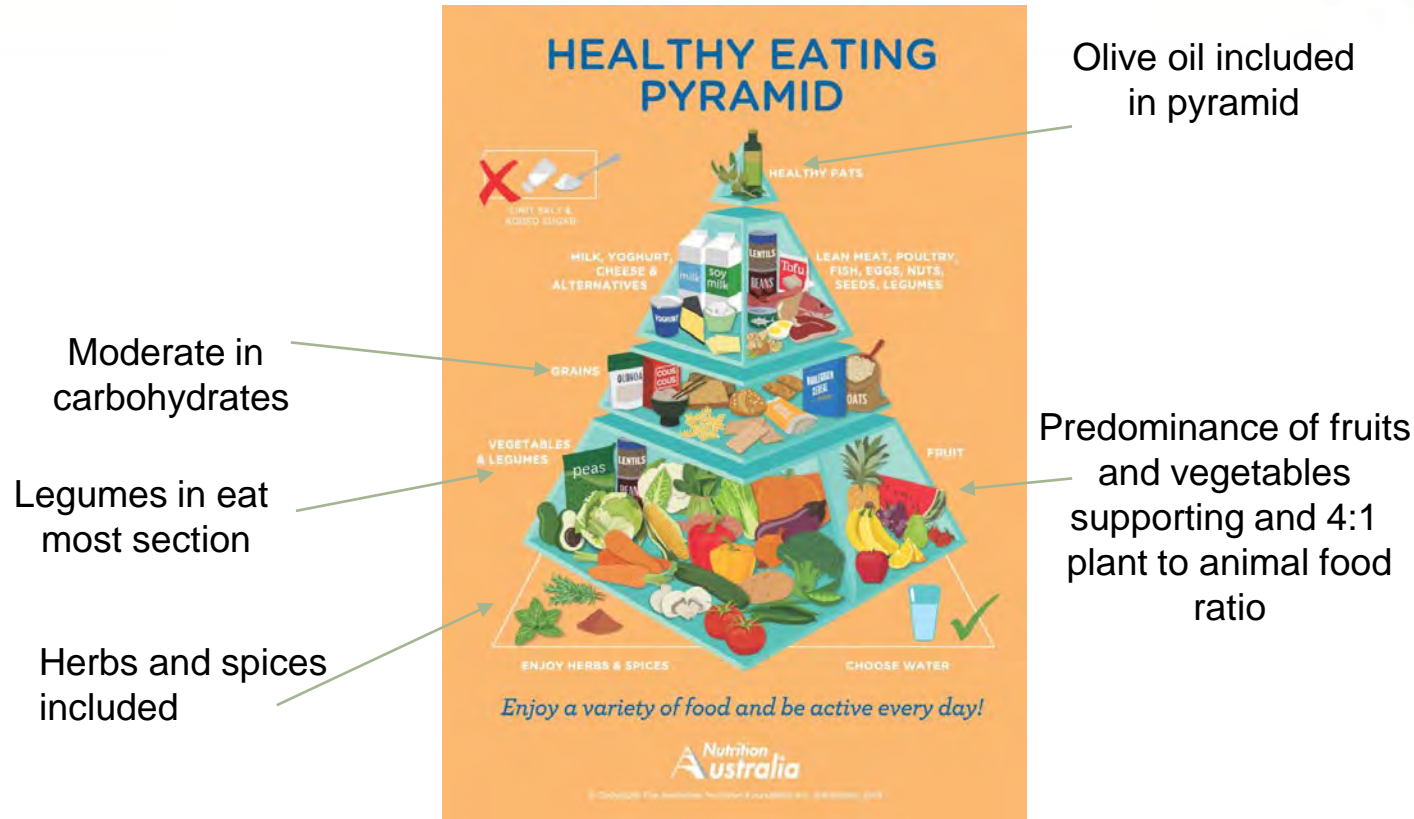


Wine in moderation, always with meals.

New Nutrition Australia pyramid has a strong Mediterranean Diet focus!



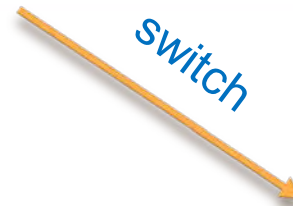
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Typical Australian-born Anglo-Celtic
Plate 2:1 Plant to Animal Food ratio



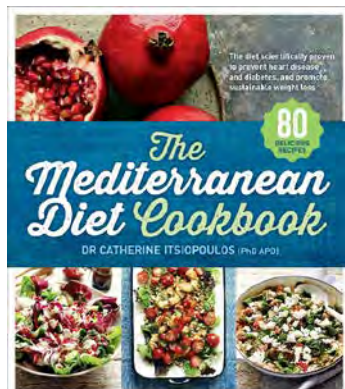
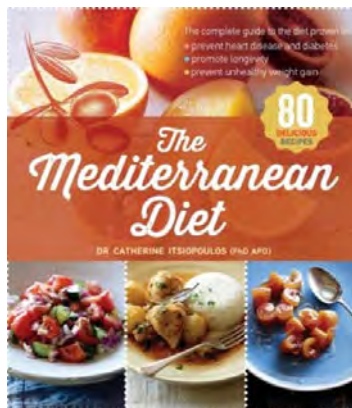
Traditional Mediterranean plate
4:1 Plant to Animal Food ratio



Putting the Mediterranean Diet into Practice!




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Healthy Menu for Chronic Disease Prevention: Diabetes, Heart Disease, Stroke, Dementia

| HIGH OMEGA 3 FATS, LOW IN SATURATED FATS, ANTIOXIDANT RICH | BREAKFAST | LUNCH | DINNER | SNACK |
|--|---|--|--|--|
| SUNDAY | Dakos (Bruchetta) Coffee (Greek/Espresso) Mandarin | Mussels stewed in white wine. Slice grain bread Greek Salad | Eggplant moussaka with lamb mince. Raddichio fennel and walnut salad. | Low Fat Greek yoghurt with berries. Sesame snack bar |
| MONDAY | Slice grain bread with poached egg and sliced avocado sprinkled with lemon juice and cracked pepper. | Rocket, pear and walnut salad with small tin tuna. Mandarin Plain mineral water | Baked chicken breast, skinless. Boiled broccoli salad. Small baked potato. Beetroot and garlic salad. | Low fat Greek yoghurt with walnuts and honey. Slice watermelon. Greek biscuit (koulourakia) |
| TUESDAY | Porridge (cooked rolled oats with skim milk) topped with fresh blueberries. Coffee (Greek/Espresso) | Stuffed vine leaves (4-6) Greek coleslaw salad. Eggplant dip | Baked snapper. Salad of boiled greens and beetroot with garlic side salad. Glass white wine | Risogalo dessert Whole orange Almonds (8-10) |
| WEDNESDAY | Dakos (Bruchetta) Herbal tea Whole orange | Beetroot and runner bean salad with walnuts and feta. Slice grain bread. | Vegetable bake. Greek salad. Mineral water | Dried figs (2-3) Walnuts (30g) Low fat Greek yoghurt with berries |
| THURSDAY | Porridge (cooked rolled oats with skim milk) topped with fresh blueberries. Herbal tea | Cannellini bean soup. Greek salad Slice grain bread. | Rabbit stew with red wine (can use chicken if prefer) Mixed potato salad Glass red wine | Low fat Greek yoghurt with honey and walnuts. Slice revani cake (or other) 1 Apricot |
| FRIDAY | Slice grain bread with poached egg and sliced avocado. Sprinkled with lemon juice and pepper. | Roasted vegetable open sandwich. Plain mineral water | Baked risotto with lamb. Lettuce, cucumber, spring onion salad. Plain mineral water | Slice walnut cake. Low fat Greek yoghurt with berries. Slice rock melon. |
| SATURDAY | Poached eggs in stewed tomatoes. Slice grain bread. Whole orange | Baked sardines on toasted grain bread. Greek coleslaw salad. Plain mineral water. | Stuffed tomatoes with rice. Black eye bean salad. Tzatziki dip Glass white wine. | Baklava (sm. serve) Greek yoghurt with honey. Slice watermelon |
| 8000kj | 78 g Protein (16% Energy) | 180 g Carbs (38% Energy) | 92 g Fat (42% Energy) | 11 g Alf (2.1% Energy) |



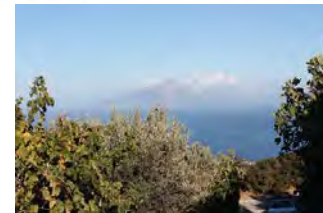
The solution is not just about changing our diets!

Try to emulate the Long Living “Blue Zones” Populations?



17th Australian
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- Populations around the world living beyond 100 yrs:
 - Okinawa (Japan)
 - Sardinia (Italy)
 - Nicoya (Costa Rica)
 - Lima Loma (California)
 - **Ikaria (Greece)**
- *Key lifestyle features of Ikarians (Itsiopoulos et al, 2016):*
 - Very low levels of stress, happiness, and positivity
 - no smoking (in women)
 - active social life and being productive
 - Family coherence, eating together
 - physically active, walking everywhere, keeping home garden
 - **a high plant-food diet focussed on fresh local foods and free range produce.**



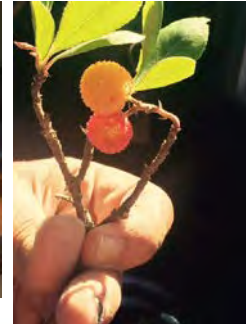
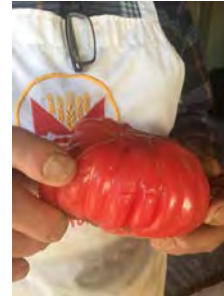


“Make Food Thy Medicine”

Hippocrates
Circ 400 BC



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Thank you to the Researchers and industries providing foods for our studies.

- Professor Kerin O'Dea
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- Dr Marno Ryan
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- A/Prof Bill van Gaal
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- Dr Colleen Thomas
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- Hannah Mayr
- Oana Tatucu

