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Healthy diet & CVD: recommendation for practitioners

Diet and cardiovascular disease

In most cases, cardiovascular diseases don't occur by accident. Lifestyle has an important part to play, not only in its occurrence but also in prevention. We all know the risk factors that we have to avoid – smoking, having a sedentary lifestyle, being overweight, stress, and so on... But we should also list all the things we can do to stack the odds in our favour, particularly in terms of healthy eating.

This is shown in the first article based on the work of Hever, reminding us that a healthy diet should be based on vegetable products, supplemented by a moderate amount of animal products to provide diversity.

The Spanish team that carried out the SUN study of over 19,000 subjects demonstrated that those scoring highly on the consumption of vegetables, fruit, fish and fibre reduced their risk of cardiovascular disease by up to 69%.

To close the demonstration, the work recently published by Aune shows that an intake of 800 g of fruit and vegetables per day has cardiovascular benefits. The circle is complete.

Data such as this cannot remain unheeded. It is time to give consumers – whether healthy or otherwise – the keys to changing their eating habits.

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Key position of plants and fruit and vegetables in prevention and treatment of chronic and cardiovascular diseases

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A recent U.S. study¹ published in the *Journal of Geriatric Cardiology* describes the diet to adopt for better health and offers physicians and healthcare professionals nutritional advice to help patients follow a healthy diet.

Cardiovascular disease (CVD) is the leading cause of death worldwide

According to an analysis over a 20-year period (1990-2010) published in 2013, the major cause of early death in the USA is diet. Conclusion: "The most important nutritional risk factors are diets low in fruit and vegetables, nuts and seeds, and high in sodium, processed meats, low in vegetables, and trans fats."

In consultation, every physician should ask himself or herself what has promoted the occurrence of a disease and whether it could have been prevented. The time dedicated to nutrition is estimated at five minutes. Medications are easier to prescribe than dietary changes!

Health benefits of a plant-rich diet

The accumulation of scientific evidence confirms the health benefits of a diet rich in plants and whole foods (fruit and vegetables, legumes, whole grains, nuts, seeds, herbs and spices).

Recommended food groups and servings

Food groups	Recommended servings per day
Vegetables, including starchy vegetables	Ad libitum, with a variety of colours represented
All fruit	2 to 4 portions
Whole grains and bread	6 to 11 portions
Legumes (beans, lentils, peas, soy-based foods)	2 to 3 portions
Leafy green vegetables (cabbage, lettuce)	At least 2 to 3 portions
Nuts (almonds, pecans, walnuts, etc.)	30 to 60 g
Seeds (chia, flax, etc.)	1 to 3 tablespoons
Fortified plant milks (almond, soy)	Optional (2 to 3 cups)
Herbs and spices	Optional, <i>ad libitum</i>

Half of the plate made up of fruit and vegetables

According to the American Heart Association and the American Institute for Cancer Research, half of the plate should be made up of fruit and vegetables, to ensure the necessary amounts of fibre, potassium, magnesium, folic acid, iron, vitamins A and C, insufficient in current diets.

This diet is associated with a reduction in overall and cardiovascular mortality, medication needs, maintaining a healthy weight, a reduction in at-risk conditions such as obesity and obesity-related inflammatory markers, hyperglycaemia, HTN and dyslipidaemia, and can even reverse CVD and diabetes.

This beneficial effect is due to 2 factors:

- An increase in health-promoting compounds largely found in fruit and vegetables
- A reduction in exposure to health-damaging compounds from

products of animal origin and processed meats (saturated fats, polycyclic aromatic hydrocarbons [PAHs], heterocyclic amines, and advanced glycation end products, salt, sugars, additives, etc.), which contribute to inflammation, oxidation and carcinogenesis and promote the onset of various diseases.

The health-promoting compounds of plants, including fruit and vegetables, are essentially represented by fibre (which protects the gastrointestinal, cardiovascular, and immune systems) and numerous micronutrients (glucosinolates, carotenoids, flavonoids, etc.), which work synergistically to reduce inflammation and oxidation.

Key role of nutrition in the prevention and treatment of CVD

Numerous studies have proven that nutritional intervention is effective for preventing and treating CVD, especially in the elderly. In elderly individuals with dental issues, a plant-rich diet can be facilitated in the form of green smoothies (vegetables, fruit, nuts and seeds), soups and purées. Food preparation can be simplified by using fruit and vegetables that are frozen, canned or dehydrated and user-friendly kitchen tools (microwave, mixer, electric fruit press, automatic opener, etc.).

The focus should be the overall quality of nutrition (well illustrated by the Mediterranean model). Best sources of carbohydrates: fruit and vegetables, whole grains and legumes. Sweet potato and cassava are rich in vegetable protein, with a low caloric density. Many essential amino acids can be provided by legumes, nuts, whole grains and leafy green vegetables. For lipids, α -linolenic acid (ALA)—precursor of polyunsaturated fatty acids (EPA, DHA)—can be provided by flax or chia seeds, leafy green vegetables, soy-based foods, nuts and their respective oils. Monounsaturated fats? From olives and their oil, avocados, etc. Finally, plant phytosterols reduce intestinal absorption of cholesterol.

A diet rich in fruit and vegetables exposes the body to a wide variety of protective antioxidants (polyphenols, flavonoids, stilbenes, curcuminoids), which affect CVD and other diseases (cancers, neurodegenerative diseases). It also provides many vitamins and minerals.

Life-long beneficial nutrition

A diet rich in plants, especially in fruit and vegetable, offers lifelong benefits, including in the elderly. It reduces the risks of CVD through the interaction of multiple micronutrients. Physicians play an essential role in consultation, to give their patients nutritional advice based on these recommendations.



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Healthy-eating attitudes and incidence of cardiovascular disease in middle-aged adults

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Cardiovascular disease (CVD) is responsible of the largest proportion of worldwide deaths from non-communicable diseases under the age of 70 years. The American Heart Association and the American College of Cardiology have emphasized the importance of dietary patterns rather than individual dietary components, and encourage heart-healthy lifestyle behaviours. Dietary assessment is necessary for providing dietary advice, but it is complex in clinical care, thus there is an emerging interest for the use of brief dietary questionnaires capturing key attitudes and practices. The rationale is that attitudes toward nutrition and healthy eating are strong determinants of food choices and dietary quality.

Cardiovascular disease: a public health issue

The Seguimiento University of Navarra (SUN) is a prospective, dynamic, Spanish cohort study of university graduates started in 1999. (<https://www.unav.edu/departamento/preventiva/sun>).

The baseline questionnaire included a validated semi-quantitative food frequency questionnaire and collected information on a wide array of characteristics, including socio-demographic variables, health-related habits and clinical variables.

In this study, we prospectively assessed the association between certain attitudes toward healthy eating (yes/no) and incident CVD in 19,138 participants. We developed a Healthy-eating attitudes score assigning 1 point if the attitude was presumed to be healthy and 0 if it was presumed to be unhealthy. Thus, participants received 1 point for each "Yes" answer if they tried to eat more fruit, more vegetables, more fish, less meat, less sweets and pastries, more fiber and less fat, and if they tried to avoid the consumption of butter, removed fat from meat, and did not add sugar to drinks and 0 otherwise. Thereafter, we grouped participants into four categories according to their baseline score: 0 to 5 points, 6 to 7 points, 8 points, and 9 to 10 points.

CVD events were confirmed by a panel of expert physicians and National Death Index.

Participants in the highest category of the 10-item healthy eating attitudes

score had higher adherence to the Mediterranean diet, and in general, exhibited more favourable food patterns and macronutrient profile.

We observed 139 incident cases of CVD (59 non-fatal myocardial infarctions, 31 non-fatal strokes and 49 cardiovascular deaths) during a mean-follow up of 9.2 years. We found that a higher score was independently associated with a lower risk of CVD [3-5 points, adjusted Hazard Ratio (HR): 0.38 (95% confidence interval: 0.18-0.81); 6-8 points: 0.57 (95% CI:0.29-1.12); 9-10 points: 0.31 (95% CI: 0.15-0.67), compared to 0-2 points].

Fruit, vegetables and whole grains and prevention of CVD

In our study, a better general attitude towards healthy-eating was associated with lower incidence of CVD.

As shown in Table 1 participants who tried to consume more fruit, vegetables and fiber had, respectively, a 41%, 38% and 31% lower risk of CVD comparing to those who did not. Higher fruit and vegetable consumption are known to improve carbohydrate quality and fiber intake, and to provide beneficial elements (potassium, folate, antioxidants, flavonoids), associated with a reduced risk of stroke. Furthermore, fiber intake and whole grain consumption are inversely associated with CVD, which is probably mediated by improvements in BMI, blood glucose control, inflammatory biomarkers, lipid profiles and antioxidant effects.

We did not find any association between other attitudes (not adding sugar to beverages, avoiding butter, removing fat from meat or eating less fat, meat, sweets or pastries) and CVD risk.

Eating attitudes questionnaire: a useful tool to investigate diet-health relation

A brief questionnaire about attitudes toward healthy-eating (particularly fruit, vegetables and fiber) may be an easy and useful tool for the primary prevention of CVD in the setting of primary health care and it could also be helpful to identify those patients with a probable higher risk of developing CVD in the future.

Table 1:

Multivariable-adjusted hazard ratios (and 95% confidence intervals) for incident cardiovascular disease on each healthy-eating attitude question (yes vs. no).

Healthy-eating attitude question	HR (95% CI)
Do you try to eat more fruit?	0.59 (0.40-0.87)
Do you try to eat more vegetables?	0.62 (0.41-0.94)
Do you try to eat more fish?	0.82 (0.57-1.19)
Do you avoid the consumption of butter?	1.37 (0.85-2.20)
Do you try to eat less meat?	1.07 (0.74-1.53)
Do you try to remove fat from meat?	0.97 (0.67-1.42)
Do you try to eat less sweets and pastries?	0.99 (0.68-1.45)
Do you try to increase your fiber intake?	0.69 (0.48-0.98)
Do you try to reduce your fat intake?	1.06 (0.67-1.67)
Do you add sugar to some beverages?	0.97 (0.65-1.46)

The answer 'no' is given as the reference (zero values)

Based upon : Santiago S, Zazpe I, Gea A, de la Rosa PA, Ruiz-Canela M, Martínez-González MA. Healthy-eating attitudes and the incidence of cardiovascular disease: the SUN cohort. *Int J Food Sci Nutr.* 2017 Aug;68(5):595-604. DOI: 10.1080/09637486.2016.1265100. Epub 2016 Dec 28.

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Fruit & vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality

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Although a high intake of fruit and vegetables has been recommended for the prevention of cardiovascular disease and some cancers, questions remain about the optimal intake of fruit and vegetables and whether specific types of fruit and vegetables are particularly beneficial. This is also reflected in differences in the level of fruit and vegetables that is recommended between different countries and organizations. For example the World Cancer Research Fund, the WHO and in England, an intake of 400 g/d is recommended, while 500 g/d is recommended in Sweden, 600 g/d in Denmark, 650-750 g/d in Norway and 640-800 g/d in the USA.

High intake of fruit & vegetables reduce the risk of cardiovascular disease

The current systematic review and meta-analysis therefore aimed to clarify the strength and the shape of the dose-response relationship between fruit and vegetable intake and specific types of fruit and vegetables and the risk of cardiovascular disease, cancer and all-cause mortality. PubMed and Embase databases were searched up to 29th of September 2016 and 95 prospective studies (142 publications) were included in the analyses.

For fruit and vegetables combined, the summary RR per 200 g/day was:

- 0.92 for coronary heart disease (0,90 for 200g/d of fruit and 0,84 for 200g/d of vegetables),
- 0.84 for stroke (0,82 for 200g/d of fruit and 0,87 for 200g/d of vegetables),
- 0.92 for cardiovascular disease (0,87 for 200g/d of fruit and 0,90 for 200g/d of vegetables),
- 0.97 for total cancer (0,96 for 200g/d of fruit or 200g/d of vegetables), and
- 0.90 for all-cause mortality (0,85 for 200g/d of fruit and 0,87 for 200g/d of vegetables).

Reductions in risk were observed up to 800 g/day of fruit and vegetables combined for all outcomes except cancer, where there was no further benefit with an intake above 600 g/day. For coronary heart disease risk and stroke mortality, the inverse associations were approximately linear up to 800 g/d, while for all-cause mortality, the strongest reduction was observed up to 400 g/d, but with slight further reductions in risk up to 800 g/d.

Intake of specific types of fruit & vegetables and the risk of cardiovascular disease, total cancer and all-cause mortality

Of specific types of fruit and vegetables, we found inverse associations between the intake of apples and pears, citrus fruit, green leafy vegetables, cruciferous vegetables, and salads and cardiovascular disease and all-cause mortality, and between the intake of green-yellow vegetables and cruciferous vegetables and total cancer risk. Furthermore, beta-carotene-rich fruit and vegetables and vitamin C-rich fruit and vegetables showed inverse associations with coronary heart disease in the high vs low analysis, and in addition tomatoes were inversely associated with coronary heart disease in the dose-response analysis.

More than 5,5 million premature deaths worldwide may be attributable to a low fruit and vegetable intake

It was estimated that approximately 5.6 and 7.8 million premature deaths worldwide in 2013 may be attributable to a fruit and vegetable intake below 500 and 800 g/day, respectively, if the observed associations are causal. Further studies are needed on less common causes of death and on the intake of other specific types of fruit and vegetables that have been less investigated to date. However, the current results support recommendations to increase fruit and vegetable intake in the general population and suggest that the optimal intake may be 800 g/d based on the current data.



Based on: Aune D. et al. Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality - a systematic review and dose-response meta-analysis of prospective studies. *International Journal of Epidemiology*, 2017 ; 1029–1056.

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