Fruits and vegetables: a natural larder for a healthy heart

In recent years, research on food, nutrition and health has changed our views on eating habits and our approach to dietary recommendations both for healthy subjects and for people who need to follow a specific diet by reason of some disorder. It is against this background that foods and nutritional elements with a specific biological effect have become highly important to any assessment of general health and of a given subject's likelihood of becoming ill. Fruit and vegetables are an outstanding example. Based on the wide-ranging evidence now available, nutrition experts unanimously recommend a daily intake of fruit and vegetables. If we look at fruit and vegetables individually and review the specific advice on how they should be eaten daily, we shall at the same time learn about the guiding principles of what a suitable diet is from the standpoint of heart health.

What vegetables provide

'Vegetable' is a culinary, non-scientific term that covers any plant whose fruits, roots, leaves, bulbs, flower buds or stems are edible. The word 'vegetable' refers to a very wide food group that is difficult to classify in botanical terms owing to its huge variety of forms. Just a few examples include leaf vegetables, like lettuce and spinach; fruit, like tomatoes and peppers; roots, like carrots and beetroot; bulbs, like onion and garlic; flower buds, like artichoke and cauliflower; stems, like asparagus and celery; and seeds, like peas.

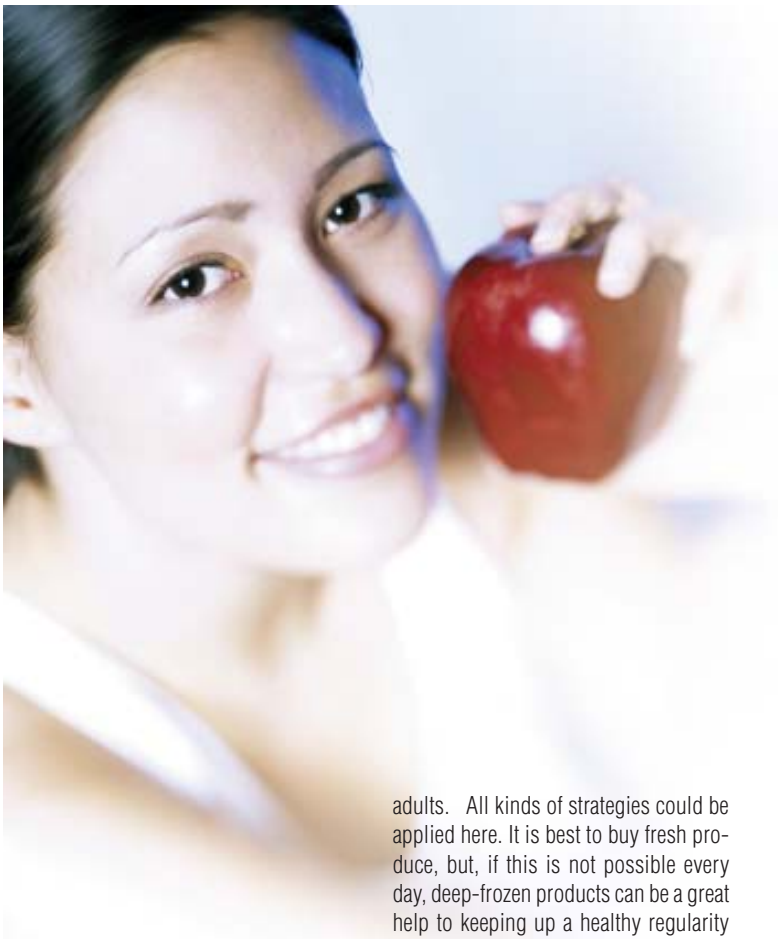
Vegetables are typically seasonal, though nowadays many varieties are available fresh all year round. In addition, tinned, preserved and frozen products account for a huge market share. All foods under the generic term 'vegetables', despite their wide variability, have a number of nutritional features in common. They are all low-calorie - 10-50 kilocalories per 100 g - because water, which is calorie-free, makes up 75 to 90% of their total weight. Fat, on the other hand, is virtually absent from almost all vegetables. Vegetables derive almost all their calorie content from carbohydrates.

Their carbohydrate content ranges from 2 to 12%, with starch predominant over sugar, cellulose and other kinds of fibre. Vegetables are low in protein - which accounts for 1 to 4% of their weight, or slightly more in some mushrooms. This low protein content means that the biological value or essential amino-acid content of vegetable protein is also low. Fat content is negligible: this, and high water content, explains why vegetables are low-calorie. Vegetables contain various different kinds of fibre. Cellulose and hemi-cellulose fibre is insoluble or partly water-soluble, and aids intestinal function; pectin, on the other hand, is water-soluble, and helps prevent heart disease by playing a role in the absorption of cholesterol during digestion. Some vegetables also contain a considerable amount of lignin, a wood-textured fibre that forms part of the supporting structure of plants.

One of the major nutritional virtues of vegetables is their contribution of vitamins and minerals. Vegetables are real storehouses of vitamin A precursors, beta-carotenes, water-soluble vitamins like vitamin C, folic acid, nicotinic acid and vitamins B1 and B2.

A key mineral is potassium, present in an amount as high as 300 mg per 100g in vegetables like cauliflower and beetroot. Other important minerals are iron - notably present in lettuce, peas, chard, spinach and parsley - and calcium. However, the availability or biological use of these minerals in terms of real absorption by the body is far less than through eating meat, for iron, or dairy products, for calcium.

Many of the vitamins provided by vegetables are powerful antioxidants. Moreover, vegetables are rich in non-nutrient antioxidants. The large polyphenol and carotenoid groups are notable examples, but not the only ones. In recent years, the scientific community has recognised the role of natural antioxidants in preventing aging processes and protecting against cancer



and heart attacks at both the biochemical and epidemiological levels. This makes it all the more advisable to eat vegetables every day. But, on average, the Spanish population - particularly younger people - do not eat enough vegetables. Various epidemiological studies on nutritional habits in Spain over the past few years have shown that, though fruit and vegetable consumption is acceptable overall, on an analysis by age groups it emerges that younger people do not eat enough of these foods. The recommended intake is 3 to 5 portions of fruit and vegetables in our daily diet. This recommendation should maintain consumption in groups who are already eating suitable amounts, and encourage an increase among children and young adults. All kinds of strategies could be applied here. It is best to buy fresh produce, but, if this is not possible every day, deep-frozen products can be a great help to keeping up a healthy regularity in our day-to-day diet.

What fruit provides

Fruits are close relatives of vegetables in nutritional terms. Apart from a few special features, they share most of their properties and therefore the same consumption advice applies. The wide diversity of species and organoleptic characteristics (smell, colour, flavour) and the enormous culinary possibilities of fruit makes it a deeply Mediterranean food.

Fruit provide our diet with water, fibre, sugars, vitamins and minerals, and, like vegetables, also contain 'functional' elements. The nutritional similarity among fruit and vegetables makes for a food group with an enormous health

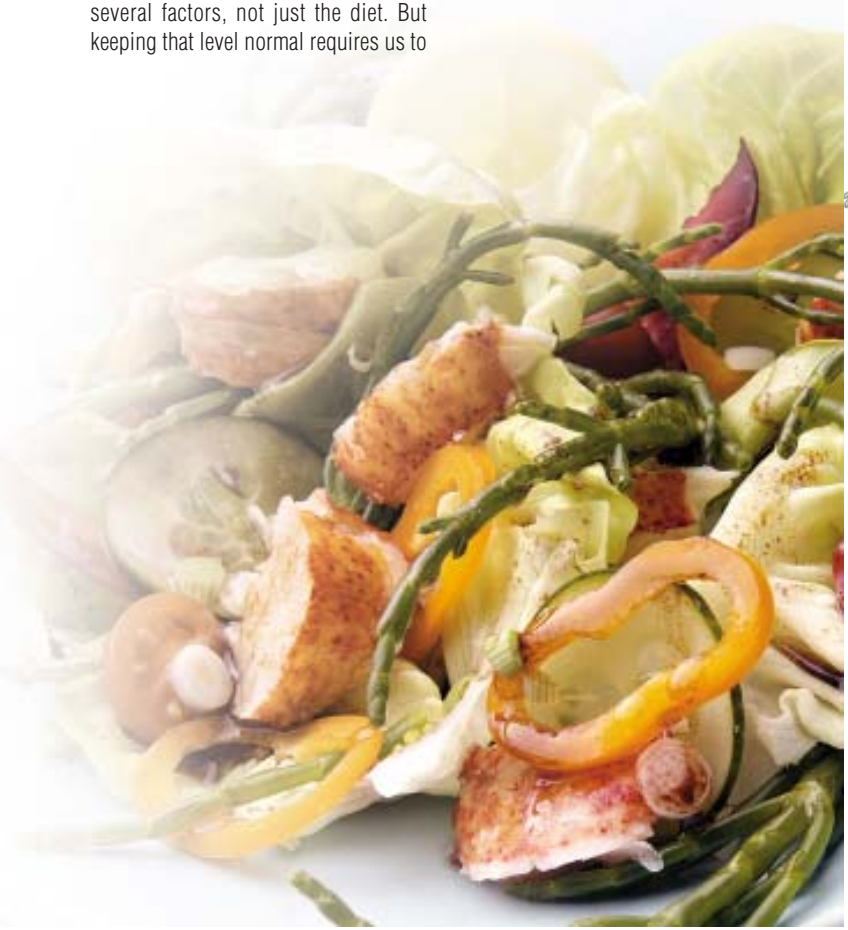
potential for the daily diet. Similar recommendations apply to the entire food group, because as a whole it is a source of essential nutrients for the body and its physiology, supports a healthy diet and makes our daily meals more varied and pleasant.

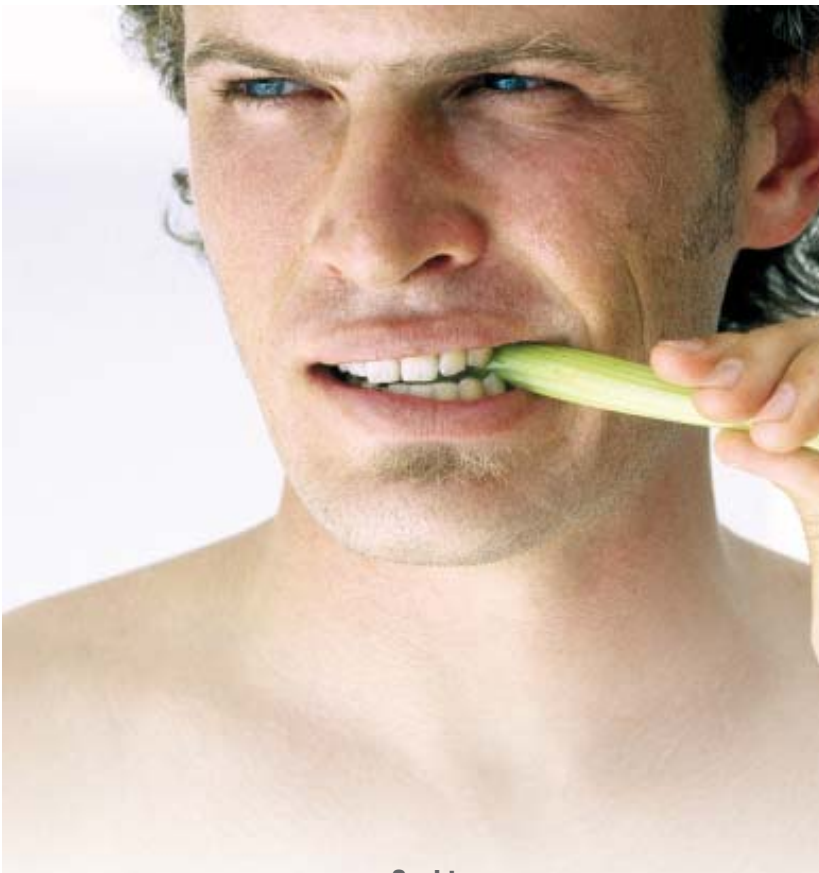
How do fruit and vegetables help prevent heart disease?

A healthy diet that helps fight heart disease should achieve a number of goals:

Goal one: keep blood cholesterol at normal levels

The level of cholesterol in the blood - or cholesterolaemia - depends on several factors, not just the diet. But keeping that level normal requires us to follow a healthy, balanced, Mediterranean-style diet. There is a wealth of scientific evidence that shows that fruit and vegetables, besides the pleasure of a rich and varied gastronomy, provide the fibre, antioxidants, vitamins and minerals to make our diet a healthy one. All this should be supplemented by a moderate intake of meat, wine and frequent fish meals. If this nutritional profile is complemented by physical exercise - which need not be a sport - it is much easier to keep to a healthy weight and thus prevent the secondary hypercholesterolaemia (high cholesterol) associated with the metabolic stress of overweight and obesity.





Fruit and vegetables should be consumed every day to achieve a nutritional model that meets the requirements of heart health. Plant-based foods are cholesterol-free and virtually fat-free and provide a rich variety of nutrients, thus supporting a balanced diet. Nutrients that fruit and vegetables cannot provide but are nonetheless essential for the body must be obtained from other foods - meat, fish, eggs, etc. - which do contain fat. If the diet is vegetable-rich, however, that proportion of fat will be used by the body for physiological purposes rather than stored as the harmful material underlying diseases like arteriosclerosis - whereas this could be the outcome of limited, monotonous diets that are poor in fruit and vegetables.

Goal two: raise 'good cholesterol'

A key waypoint for preventing heart disease is to ensure that 'good cholesterol' - or HDL, high-density lipoprotein - is at a high level. HDL protects against arteriosclerosis. It is known that the intake of certain foods can help raise HDL. Olive oil, seed oils and nuts have this property when eaten as a regular part of the diet. A direct effect cannot be attributed to fruit and vegetables, but in the Mediterranean diet, and in Spain especially, fruit and vegetables are often dressed with olive oil and so serve as vehicles for these healthy fats and boost their beneficial health effects and their ability to raise 'good cholesterol'. This helps prevent heart disease, because, if the concentration of HDL in the blood is

high, the likelihood of heart disease is lower.

Goal three: boost the body's antioxidant capacity

It is now known that the process of plaque formation on the inner walls of arteries (arteriosclerosis) is due to many factors; one decisive factor, however, is the degree of oxidation of cholesterol molecules. The more oxidised blood cholesterol is, the higher the risk to artery walls. Oxidation is a natural process of human metabolism against which the body has some defences which it is essential to support with antioxidants in the diet. Fruit, vegetables, legumes, nuts, olive oil - particularly virgin olive oil - and wine are a great source of antioxidants. Hence the classic Mediterranean diet founded on a broad vegetarian base acts as a powerful protection against heart disease and an excellent way of looking after general health.

The wealth of antioxidants offered by fruit and vegetables boost our body's physiological defences against oxidation. In many diseases - including arteriosclerosis - organic alterations are caused by oxidising agents. So an intake of foods that are rich in antioxidants reduces the risk of many of the diseases that are presently the leading causes of death in developed countries.

Goal four: reduce cholesterol absorption from food

Reducing the absorption into the body of the cholesterol in food is one way

of preventing blood cholesterol from rising. The presence of fibre and substances with a similar structure to cholesterol - namely phytosterols - reduces cholesterol absorption from the digestive tract into the bloodstream. This is a further good reason to eat plant-based food regularly: fruit and vegetables are the chief natural source of fibre and phytosterols. Frequent consumption of fruit and vegetables is a major protection that regulates blood cholesterol concentration, which is one of the factors involved in the onset of arteriosclerosis, one of the complications of which can be a heart attack. So fruit and vegetables reduce the risk of heart attack.

Goal five: reduce intake of saturated fats

A decisive factor in controlling cholesterolaemia is to eat only moderate amounts of cholesterol-rich foods and saturated fats. Cholesterol and saturated fats are not the direct cause of heart disease, but they are important dietary factors that must be borne in mind. You should therefore cut down on - though not cut out entirely - your intake of meat, particularly red meat, sausage products, eggs, whole dairy products, and so on.

All these foods do have their own nutritional benefits, but their fat content means you should eat only moderate amounts of them. However, dairy products have to be consumed almost every day, because they are a key source of calcium, a vital mineral we need throughout our lives: it may be a good idea to use skimmed and semi-skimmed products. These diet recommendations work best in the context of a balanced and varied overall nutritional plan. Everything we have discussed about fruit and vegetables in goals one to four applies also to goal five. Because fruit and vegetables are virtually fat-free, they are essential to healthy eating habits in which every nutrient is provided for. The best assurance of nutritional balance is variety - which is hard to achieve if our day-to-day diet does not include several portions of fruit and vegetables.

Goal six: avoid excess weight and obesity

Obesity is a further risk factor. Obesity and arterioscleroris are mutually reinforcing processes. This explains the wider prevalence of heart disease among overweight people. They are disorders that share many risk factors, such as high blood lipids - specifically cholesterol - high blood pressure, altered insulin regulation and frequent presence of type 2 diabetes or adult diabetes. All these risk factors are closely tied to excess body fat or obesity, particularly in people with so-called 'central' or 'abdominal' obesity, which is far more common in men than in women. We must also realise that the oxidising processes mentioned earlier are more frequent in obese people than in people of normal weight. This is an especially significant fact, because in the emergence and development of arteriosclerosis, oxidising processes play a very harmful role, and in an obese person the several risk factors mutually reinforce one another. This increases the

likelihood of arteriosclerosis and fosters an earlier onset, faster progression and worse severity.

Preventive and therapeutic strategies on overweightness and obesity include dietary measures. The aim is to achieve a healthy diet which provides suitable calories for the subject's specific energy use.

Fruit and vegetables, as described earlier, are a wide food group whose common denominators are high nutritional value and low calorie content. It could be said that nature has given us this wide variety so that we can shape our eating patterns in a way that is compatible with health. For obesity, specifically, maintaining a balanced calorie intake is a key goal to prevent fat

from building up. To keep a steady weight level or to lose weight, our diet must nonetheless be nutritionally complete. There should be no deficit of proteins, vitamins, minerals and so forth, as can often happen if you follow a diet prescribed on the basis of unscientific considerations. The role of fruit and vegetables is therefore essential, owing to their fibre, nutrients, antioxidants and low calorie content.

Conclusions

Fruit and vegetables are essential to a healthy, balanced diet.

Fruit and vegetables are a rich source of micro-nutrients (vitamins and minerals) and fibre.

In addition to their nutritional properties, fruit and vegetables have functional properties, because they contain antioxidants.

On the other hand, diet is not a mere biological fact. Sensory pleasure, tradition, geography and culinary culture all play key roles in a healthy diet. The best example of this is the huge variety of fruit and vegetables in the Mediterranean diet.

The large family of fruit and vegetables, therefore, is a nutritional and culinary luxury. Eating fruit and vegetables every day helps us towards good health and improves our quality of life.

Dr. Jaume Serra

Jaume
Serra Farró

- Degree (licenciatura) in Medicine, Universitat de Barcelona
- Master's degree in human nutrition, Universitat de Barcelona
- Expert assigned to the nutrition programme of the health department of the Generalitat of Catalonia
- Co-author of nutritional surveys of the Catalan population in 1992-3 and 2002-03.
- Taught various postgraduate courses on human nutrition.
- Coordinator of summer courses at the Universidad Internacional Menéndez Pelayo, health and nutrition module.
- Coordinator of summer courses at the Universitat de Barcelona, «los Juliols de la UB», human nutrition module.
- Regular contributor on health and nutrition for various media.
- Author of individual chapters for several books on nutrition.
- Author of numerous articles in the printed press on health and nutrition.
- Co-author of various papers on nutrition at different stages of human life, published by the department of health of the Generalitat of Catalonia.
- Co-author (with Dr Gonçal Lloveras i Vallés) of the book Comer, salud y placer.
- Member of the interdepartmental committee for the prevention of eating disorders of the Generalitat of Catalonia.
- Coordinator of the guide for the prevention of eating disorders in primary healthcare, published by the health department of the Generalitat of Catalonia.
- Member of the nutritional education task force, in partnership with the schools programme of the education department of the Generalitat of Catalonia.

AWARDS

- Jaume Aiguader i Miró award for health education, from the Acadèmia de Ciències Mèdiques de Catalunya i Balears (academy of medical science of Catalonia and the Balearics). Barcelona 2000.
- 10th Instituto Danone prize for science journalism, 2003.