

## **Fruit and vegetable consumption: impact on health**

### **General benefits**

There is clear and growing evidence for the protective effects of fruit and vegetables against chronic diseases such as CHD and cancer. Eating at least five portions of fruit and vegetables a day could reduce overall deaths from chronic diseases (such as heart disease, stroke and cancer) by up to 20% (Khaw et al).

Increased consumption of fruit and vegetables can also have a positive impact on other dietary goals, such as recommendations to increase fibre intake and reduce fat intake (Stubbs et al and Cox et al). In addition, fruit and vegetables tend to be low in calories and fat, and therefore, diets which contain plenty of fruit and vegetables can help to reduce the risk of weight gain and obesity (and associated conditions such as diabetes). Swopping fruit and vegetables for other snack foods may reduce intake of foods high in fat and high in sugar. The place of fruit and vegetables within the whole diet is shown in the plate diagram *The Balance of Good Health*.

### **Current consumption**

The World Health Organisation (1991) and Committee on Medical Aspects of Food and Nutrition Policy (1994 and 1998) recommend that people should eat at least 400g (around 5 portions) of fruit and vegetables every day. A recent survey by the Food Standards Agency found that 43% of adults are aware of this advice. In the UK, average consumption is 3-4 portions per day (NFS 1998), though there are marked differences between social groups - unskilled groups tend to eat around 50% less than professional groups (NFS 1998 and NDNS 2000).

### **The Evidence for Cancer**

It has been estimated that diet might contribute to the development of one third of all cancers. COMA's Working Group on Diet and Cancer concluded that, overall, the evidence is moderately consistent that higher vegetable consumption would reduce the risk of colorectal cancer, and that higher fruit and vegetable consumption would reduce the risk of gastric cancer. There is weakly consistent evidence, based on fewer data, that higher fruit and vegetable consumption would reduce the risk of breast cancer. These cancers combined represent about 18% of the cancer burden in men and about 30% of the cancer burden in women in the UK. Even a small reduction in relative risk would have important public health benefits in terms of the absolute numbers affected. The World Cancer Research Fund estimated that increasing fruit and vegetable consumption could prevent 20% or more of all cases of cancer. As a result, increasing fruit and vegetable consumption may be the second most important strategy for cancer prevention after reducing smoking (and could save the NHS £72m per annum (extrapolation from Day, 2000)).

## **The evidence for cardiovascular disease**

The results of a 1997 systematic review were consistent with a strong protective effect of fruit and vegetables for stroke and a weaker protective effect on coronary heart disease (Ness and Powles). The review found that 9 of 10 ecological studies, 2 of 3 case-control studies and 6 of 16 cohort studies showed fruit and vegetables (or surrogate nutrients) to have a significant protective effect on coronary heart disease. For stroke, 3 of 5 ecological studies, none (of one) case-control study and 6 of 8 cohort studies found a significant protective association with consumption of fruit and vegetables or surrogate nutrients. Studies published since this review have also been supportive of a protective effect. For example, a recent study among US health professionals (Joshipura et al) found that each 1 portion per day increase in fruit and vegetable intake was associated with a 4% lower risk of CHD and a 6% lower risk of stroke, after controlling for other risk factors. Increased intake of fruit and vegetables could save the NHS up to £200 m per annum (extrapolation from Day).

## **Vegetarians**

Studies of vegetarians - who tend to have higher intakes of plant foods than non-vegetarians - support the hypothesis that a diet higher in fruit and vegetables might lower the risk of coronary heart disease and some cancers (Rimm et al). A pooled analysis of the data from five large prospective studies found that vegetarians had a 24% lower mortality from ischaemic heart disease than non-vegetarians. Such studies cannot provide conclusive evidence on the benefits of higher consumption, because vegetarians may differ from non vegetarians in other ways – for example they may be more active or less likely to smoke.

## **Protective substances in fruit and vegetables**

There are many biologically plausible reasons why increased consumption of vegetables and fruits might slow or prevent the onset of chronic diseases. A wide variety of substances present in plant foods may play a role including carotenoids, vitamin C, vitamin E, flavonoids and dietary fibre ( Jenkins et al and Lampe).

At almost every stage of the cancer process, identified *phytochemicals* (including glucosinolates, phenols, coumarines, flavinoids and phytoestrogens) are known to be able to alter the likelihood of carcinogenesis – occasionally in a way that enhances risk but usually in a favourable direction. Most of the data for the observations on the anticarcinogenic potential of all of these compounds have come from animal and laboratory studies.

For cardiovascular disease, the main components in fruit and vegetables likely to decrease the risk of disease are the antioxidants, which are capable of reducing the oxidation of LDL cholesterol and folate which lowers plasma homocysteine levels and hence reduces the strong risk factor for arteriosclerosis of the coronary, cerebral, and peripheral arteries.

### **Dietary supplements of substances contained in fruit and vegetables**

Although fruit and vegetables appear to have wide-ranging beneficial effects, this may not be true for supplements of single nutrients or substances derived from them. For example, a Finish study found that supplementation of beta carotene increased the risk of lung cancer among smokers. As a result, COMA (1998) highlighted the need to exercise caution in the use of high doses of purified supplements of other vitamins and minerals as they cannot be assumed to be without risk.

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