

## DIET AND EPIDEMIOLOGY OF CANCER

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A number of epidemiological clues have now been identified which indicate a relationship between food intake patterns and the emergence of or protection against certain neoplastic diseases. One line of epidemiologic evidence relates to the change of food intake pattern within a country and the associated changes in standardised mortality rates for various cancers. Another approach has been the change in food intake patterns and cancer patterns on migration. In Australia, there are opportunities for both kinds of investigation.

Significant changes have taken place amongst Australians in the intake of beef, fats from animal and vegetable sources, cereals, roots, tubers and pulses, and also in alcohol consumption since 1930. Apparent food consumption data were available from this time.

The major wave of migration to Australia after the Second World War has now large ceased and provides a unique opportunity to examine changes amongst, especially, southern European migrants.

Already it appears that colonic cancer mortality is rising amongst Greek men according to duration of residence in Australia and work is now in progress to establish what dietary correlates there might be of these changes.

In general, the neoplastic disease patterns which characterize affluent society are different from those in underdeveloped countries,

with a higher prevalence of lung colorectal, breast and uterine cancers in the former and a higher prevalence of hepatic and gastric carcinomas in the latter.

An important 10 year prospective study of 250,000 Japanese by Hirayama and colleagues indicates that, even in lung cancer, for a given cigarette consumption, green leafy and yellow vegetables may be protective. Several studies now indicate that the risk of breast cancer increases with obesity and fat intake. Cervical cancer relates to the per capita daily vitamin A intake. For oesophageal, buccal cavity and pharyngeal cancers, the interaction between alcohol intake and cigarette smoking seems important. Prostatic cancer is less amongst men who have a daily intake of green-yellow vegetables as compared with those who only occasionally or rarely have those vegetables. Colonic cancer seems to have a number of dietary correlates including fat, cholesterol, protein and fibre intake. Likewise, gastric cancer has a number of nutritional correlates in Japan with the highest risk in smokers and the lowest in milkdrinkers, and second lowest in regular consumers of green-yellow vegetables.

Nutrition may affect the incidence of cancer by (1) providing a source of carcinogens or precarcinogens (2) providing the substrate for production of carcinogens in vivo or (3) by having a modifying effect on carcinogens. Examples of nutritional factors which may increase the risk of cancer include alcohol, excess energy intake over needs, fat, meat, mycotoxins, nitrosamines, natural carcinogens (as in bracken fern), benzopyrenes and food additives. Factors which may decrease the risk of cancer include vegetable intake, dietary fibre, certain vitamins and certain trace elements (molybdenum and selenium).

Sir Richard Doll has taken the view that the currently justifiable practical recommendations are (1) a reduction in the amount of alcohol consumed by those who continue to smoke tobacco, (2) a reduction in overall food consumption if needed to avoid obesity, (3) precautions to avoid contamination of food by fungi in hot moist climates and (4) probably an increase in the consumption of whole-meal bread, vegetables and fruit, partly to increase the amount of dietary fibre and vitamins A and C.

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