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# The Scientific Newsletter

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"FROM THE 2007 WCRF REPORT"

## Editorial

In 1997, the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR) published the groundbreaking Expert Report, *Food, Nutrition and the Prevention of Cancer*: a Global Perspective. The Report was a catalyst for change, creating great opportunities for advancing knowledge in the area of diet and cancer prevention, and stimulating a surge of research in the field.

Since then, technology has revolutionised the way that information is collected and analysed. As a result, in 2001 WCRF/AICR set out to systematically review and assess the body of evidence on food, nutrition, physical activity, and cancer, and to produce a second Expert Report. *Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective*, published in November 2007, **is the largest project of its kind**, and the conclusions and recommendations for preventing cancer are as definitive as the available evidence allows. (http://www.dietandcancerreport.org)

The good news is that although cancer is one of the world's biggest killers, the disease isn't simply due to fate or bad luck: **up to a third of cancers may be preventable by making lifestyle change**s. By following WCRF/AICR's 10 recommendations and by avoiding exposure to tobacco smoke**, people can now take action**, knowing that the changes they make really can help protect against cancer. In this issue we take a closer look at the recommendations on plant foods and obesity, as well as the methodology behind the Second Expert Report.

**Martin Wiseman**

Second Expert Report Project Director
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## World Cancer Research Fund International 2007 report



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# Recommendations for cancer prevention

1) Be as lean as possible within the normal range of body weight.
2) Be physically active as part of everyday life.
3) Limit consumption of energy-dense foods. Avoid sugary drinks.
4) Eat mostly foods on plant origin.
5) Limit intake of red meat and avoid processed meat.
6) Limit alcoholic drinks.
7) Limit consumption of salt. Avoid mouldy cereals (grains) or pulses (legumes).
8) Aim to meet nutritional needs through diet alone.

## Special recommendations

1) Mothers to breastfeed; children to be breastfed.
2) Follow the recommendations for cancer prevention.

*Please see the Second Expert Report* **(http://www.dietandcancerreport.org)**
*for the full explanation of the recommendations, including footnotes.*

# The methodology behind the Second Expert Report

— **Emma Copeland** —
WCRF Secretariat

The first step of WCRF/AICR's colossal Second Expert Report project was to establish a process for deciding which studies were relevant and how best to analyse these as a basis for drawing conclusions. There was no established methodology for assessing data in the context of causation of disease, including the influence of diet on cancer. Therefore the methodology for the report was drawn up by a task force of 20 experts from several disciplines, including nutrition, epidemiology, cancer, laboratory research, systematic reviewing, and public health. The specification for reviewing the scientific literature was then published in a manual for all of the systematic literature reviews (SLRs) to follow.

Nine independent teams of scientists from institutions in the USA, UK and continental Europe were charged with collecting the evidence by carrying out SLRs on 17 different types of cancer, as well as on cancer survivors, on the determinants of obesity, and on authoritative reports on other chronic diseases such as heart disease. The initial sweep found half a million studies, of which 7,000 were deemed relevant.

Many different types of studies are used to investigate the prevention of cancer; all have strengths and weaknesses, but none is perfect. Even the randomised controlled trial, which works so well with medicines, has limitations when it comes to the study of chronic diseases like cancer and complex lifetime exposures like food and nutrition. WCRF/AICR's comprehensive Second Expert Report has therefore used a portfolio approach to synthesise the evidence, consulting all types of research and taking account of the advantages and disadvantages of each.

WCRF/AICR commissioned and funded the Second Expert Report, but the content was driven by an independent panel of 21 world-renowned scientists. The Expert Panel worked for five years to assess and compare the studies reviewed by the SLR centres, and its conclusions and recommendations are based firmly on scientific evidence. It also had formal observers from six international organisations: the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) of the United Nations (UN), the UN Children's Fund (UNICEF), the International Union of Nutritional Sciences (IUNS), the UICC (Union Internationale Contre le Cancer), and the International Food Policy Research Institute (IFPRI).

The Second Expert Report, Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective, has provided the most up-to-date recommendations for individuals and populations. In coming to judgement, each factor that might affect cancer risk was graded according to the strength, quality, and quantity of the scientific evidence. The Panel rated the likelihood that a particular factor causes cancer or protects against it, as 'convincing' or 'probable'. Or, if there was not adequate evidence, the Panel gave ratings of either 'limited – suggestive', or 'limited – no conclusion'. Occasionally it was possible to conclude that a substantial effect on risk was unlikely. Only judgements of 'convincing' and 'probable' formed the basis for WCRF/AICR's 10 recommendations.

The Report is based on the best evidence available now – it includes relevant studies published up to the end of 2006. But WCRF/AICR are committed to looking to the future, to continue to interpret scientific evidence in the field of food, nutrition, physical activity, and cancer prevention. By establishing a continuous review programme to update the report on an ongoing basis, WCRF/AICR will be able to ensure that its conclusions and recommendations remain current and robust. A select Expert Panel will regularly review and analyse new studies and the results will be published online and in special publications.

(http://www.dietandcancerreport.org/cu)

While the Second Expert Report presents personal recommendations as well as goals for whole populations, setting these targets is just one step. Equally important, is understanding how to achieve them successfully. For this reason WCRF/AICR has commissioned a subsequent report, Policy for Cancer Prevention: Food, Nutrition, and Physical Activity – A Global Perspective, to be published in November 2008. Targeting policymakers, this will address why people adopt particular eating and physical activity behaviours over a lifetime. And it will look at the impact of interventions or policies on those behaviours.

(http://wwwdietandcancerreport.org/pr)

# Eat mosty foods of a plant origin

— Greg Martin —
WCRF - Head of science and research

The power of the WCRF/AICR Second Expert Report comes not only from its rigorous methodology and comprehensive evidence base, but also from the integrated approach taken in coming to judgement and making personal recommendations and public health goals.

The recommendation to eat mostly foods of plant origin is one example of this approach. Judgement of the evidence for plant-based foods shows that eating more of particular types protects against cancers of various sites.

Foods containing dietary fibre are all plant foods and these probably protect against colorectal cancer. Non-starchy vegetables and also fruits probably protect against cancers of the mouth, pharynx and larynx, the oesophagus, and the stomach. Fruits also probably protect against lung cancer. Allium vegetables in general probably protect against stomach cancer, although garlic specifically was judged to probably protect against colorectal cancer.

Foods containing folate, most but not all of plant origin, probably protect against cancer of the pancreas. Foods of plant origin containing carotenoids probably protect against cancers of the mouth, pharynx and larynx, and lung cancer. Foods containing two specific carotenoids probably have protective effects against cancers of two sites: those containing beta-carotene and the oesophagus; and those containing lycopene and the prostate. Foods containing vitamin C probably protect against oesophageal cancer, and those containing selenium, some but not all of which are of plant origin, against prostate cancer.

Vegetables and fruits contain a wide range of vitamins, minerals, and biologically active compounds such as phytochemicals that may protect against cancer. Vitamins C and E can donate electrons to free radicals and block their damaging activity. And compounds such as isothiocyantes and polyphenols can activate the signalling pathways that influence the antioxidant response element, and upregulation of the expression of detoxifying enzymes. Fibre in plant-based foods is thought to have many benefits, including helping to speed up the passage of food through the gut. But it is clear that evidence of benefit from foods containing particular nutrients, cannot reliably predict the effects of supplements of those nutrients.

While there is evidence that fruits and vegetables probably protect against cancer, the evidence does not appear as strong as it did 10 years ago when the first WCRF/AIRC Expert Report rated the protective effect of these foods as convincing. But because of the integrated approach taken in making the recommendations, the evidence overall for increasing the amounts of plant-based foods in diets is just as compelling.

'Plant-based diets' give emphasis to those plant foods that are high in nutrients, high in dietary fibre (and so in non-starch polysaccharides) and low in energy density. Low energy-dense foods probably protect against weight gain, overweight, and obesity. They are high in water and fibre, and provide more bulk in diets. So compared to energy-dense foods, people can eat larger quantities while consuming fewer calories. And by filling up on low energy-dense foods there's a better chance that a person's diet will have less high energy-dense foods.

The importance of the link between obesity and cancer is discussed in detail in the next section. It is clear that achieving and maintaining a normal level of body fatness (usually measured as body mass index) throughout life lowers the risk of a number of cancers.

The WCRF/AICR public health goal for the population average consumption of non-starchy vegetables and of fruits is at least 600g daily. This is best made up from a range of various amounts of non-starchy vegetables and fruits of different colours, including tomato-based products and allium vegetables. Relatively unprocessed cereals (grains) and/or pulses (legumes), and other foods that are a natural source of dietary fibre, should contribute to a population average of at least 25g non-starch polysaccharides daily.

The personal recommendations – those for individuals to follow to protect themselves against various cancers – are: eat at least five portions/servings (at least 400g) of a variety of non-starchy vegetables and of fruits every day; eat relatively unprocessed cereals (grains) and/or pulses (legumes) with every meal; limit refined starchy foods; and people who consume starchy roots or tubers as staples should also ensure intake of sufficient non-starchy vegetables, fruits, and pulses.

# Maintenance of a heathy weight to protect against cancer and other chronic diseases

— Kirsty Matthews —
WCRF - Secretariat

Obesity is commonly linked to a number of chronic diseases such as coronary heart disease and stroke, but many people are unaware of its link to cancer. The WCRF/AICR Second Expert Report judged that maintaining a healthy body weight throughout life may be one of the most important ways to protect against cancer.

Weight gain, overweight, and obesity are now more common than in the 1980s and 1990s. Rates of overweight and obesity doubled in many high-income countries between 1990 and 2005. Chronic diseases including obesity are now more prevalent than nutritional deficiencies and infectious diseases in most countries in Asia and Latin America, and some in Africa. And overweight in childhood and early life makes overweight and obesity in adulthood more likely.

The evidence linking overweight, obesity, and cancer is now judged to be even stronger than in the mid-1990s, when the evidence for the first Expert Report was assessed.

The evidence is convincing that greater body fatness is a cause of cancers of the oesophagus, pancreas, colorectum, breast (postmenopause), endometrium, and kidney; and that greater abdominal fatness is a cause of cancer of the colorectum. Greater body fatness is probably a cause of gallbladder cancer, and greater abdominal fatness is probably a cause of cancers of the pancreas, breast (postmenopause), and endometrium.

One key mechanism for the link between obesity and cancer is the influence of body fatness on levels of a number of hormones and growth factors. Insulin-like growth factor 1, insulin, and leptin are all elevated in obese people, and can promote the growth of cancer cells. Plus obesity increases insulin resistance, leading to overproduction of insulin. Sex steroid hormones are also likely to play a role: adipose tissue is the main site of oestrogen synthesis in men and in postmenopausal women.

Obesity is also characterised by a low-grade chronic inflammatory state, which can promote cancer development. Fat cells produce pro-inflammatory factors, and obese people have elevated concentrations of tumour necrosis factor-alpha, interleukin-6, and C-reactive protein, as well as of leptin, which also functions as a inflammatory cytokine.

While the evidence is convincing that greater body fatness is a cause of postmenopausal breast cancer, it probably protects against premenopausal breast cancer. The role of oestrogen in the cancer process may be the reason for this striking difference. Before the menopause obese women tend to have anovulatory menstrual cycles and, as a result, reduced levels of oestrogen; after the menopause they have higher levels. Nevertheless, for practical reasons, and because premenopausal breast cancer is much less common than postmenopausal, and because of other health benefits, there is no specific recommendation on weight for premonopausal women.

The Second Expert Report also judged the evidence on causes of weight gain, overweight, and obesity. The evidence is convincing that physical activity protects against (and sedentary living promotes) weight gain, overweight, and obesity, so it would be expected to reduce risk of cancers linked to these factors. Sedentary living comprises both high levels of physical inactivity and low levels of physical activity. Sugary drinks, fast foods, and other energy-dense foods – those that provide more than about 225-275 kcal/100g of food – and television viewing probably increase weight gain, overweight, and obesity. Conversely low energy-dense foods probably promote a healthy weight, so would be expected to reduce the risk of obesity-related cancers.

Being breastfed probably protects against excess weight gain in children. Exclusively breastfed children show different growth patterns to those of formula-fed infants, and they consume less total energy and protein.

The recommendation for body fatness is to be as lean as possible within the normal range of body weight. This refers to appropriate ranges issued by national governments and the World Health Organization. The recommendation is related to a number of the others, such as those for physical activity and for foods and drinks that promote weight gain.

The WCRF/AICR public health goals are for median adult body mass index (BMI) to be between 21 and 23, depending on the normal range for populations. Also that by 2017, the proportion of the population that is overweight or obese should be no more than current levels, or preferably lower.

The personal recommendations are to ensure that body weight through childhood and adolescence projects towards the lower end of the normal BMI range at age 21. Also that people should maintain body weight within the normal range from age 21; and to avoid weight gain and increases in waist circumference throughout adulthood.