

Second update, January 2008

Chapter 21: Nutrition and cancer: Martin Wiseman

Update of pages 313 to 326

Chapter 21 in the 3rd Edition of Essentials of Human Nutrition referred to the 1997 Report of the World Cancer Research Fund (WCRF): Food, Nutrition and the Prevention of Cancer. A Global Perspective. In November 2007 the Second Report (this time including physical activity along with food and nutrition) appeared amidst a blaze of worldwide publicity. The published text, more than 500 pages in length, has been described as the most authoritative and influential Report in its field. The goal of the Report was to use the most meticulous methods to identify lifestyle related causes of cancer in order to generate a comprehensive series of recommendations on food, nutrition and physical activity, designed to reduce the risk of cancer. The recommendations were designed to be suitable for all societies. The process was designed to ensure objectivity and transparency, separating the gathering of evidence from its assessment and judgement. An expert task force developed a method for the systematic review of the vast experimental and epidemiological literature. Then a group of research teams from around the world undertook systematic literature reviews for each of the cancer sites. Finally, a separate independent Expert Panel assessed and judged the evidence and agreed recommendations.

Evidence for associations between lifestyle related variables and cancer sites are graded according to clearly specified criteria as “convincing”, “probable” or “limited” or else showing that any substantial effect on the risk of cancer is unlikely. Evidence graded as “convincing” or “probable” suggests that associations imply causal relationships with one or more cancer sites and should therefore be translated into recommendations.

Not surprisingly there are few important differences between the “convincing” and “probable” judgements for either increased or decreased risk described in the Report (see page 370 of the Second WCRF Report and reproduced here as Figure 1) and those summarised in Table 21.3 by Wiseman in the Third Edition of the Essentials of Human Nutrition. Body fatness is again endorsed as a particularly important determinant of

several cancers: oesophagus, pancreas, colorectum, breast (post menopausal), endometrium and kidney as is alcohol as a cause of mouth, pharynx, larynx, oesophagus, and breast cancers. On a more positive note, exercise is acknowledged as a key protective factor against colorectal cancer. However one judgement which attracted considerable attention and some controversy in the international media was the conclusion that red meat and processed meat are “convincing causes” of colorectal cancer. Previous Reports (and the Wiseman Chapter) had been more guarded with regard to the interpretation of the evidence. The upgraded conclusion is based upon the more recent cohort studies and metaanalyses which showed a 15% increased risk per 50 g/day consumption of red meat and 21% increased risk per 50/day consumption of processed meat. There are several potential underlying mechanisms for a positive association of red meat consumption with colorectal cancer, including the generation of potentially carcinogenic N-nitroso compounds. Some meats are also cooked at high temperatures, resulting in the production of heterocyclic amines and polycyclic aromatic hydrocarbons. Red meat contains haem iron which can lead to the production of free radicals. In addition, nitrates which contribute further to N-nitroso compound production are added as preservatives to processed meats. Many processed meats also contain high levels of salt and nitrites. Hydrocyclic amines, polycyclic aromatic hydrocarbons and free radicals are all potential carcinogens.

A particularly interesting feature of the Report was the systematic literature review relating to the determinants of body fatness. Given the importance of body fatness as a cause of cancers at several sites, a decision was made to use the same methodology to explore causes of body fatness as had been used to examine the causes of cancer. Any cause of obesity might be assumed to be an indirect cause of cancer. Figure 2 (on page 323 of the 2nd WCRF Report) shows the matrix listing the food, nutrition and physical activity related variables associated with weight gain, overweight and obesity. Three of the 10 recommendations (summarised in Figure 3 and found in detail on the website (www.dietandcancerreport.org/) relate to body fatness.

Several aspects of the recommendations warrant special mention. Of particular importance is the fact that recommendations to reduce the risk of cancer are now totally comparable with those aimed at reducing the risk of the other important chronic diseases, cardiovascular disease and type 2 diabetes. In the past dietary recommendations aimed at reducing cancer risk were largely directed towards increased consumption of fruit and

vegetables (5+ a day campaigns). While this remains a component of recommendation 4 (Eat mostly foods of plant origin) it has been placed in the context of the observation that most diets that are protective against cancer are mainly made up from foods of plant origin. The recommendation regarding body fatness are firmer than has been the case with many other sets of guidelines. One public health goal is that median adult BMI should be between 21 & 23 depending upon the normal range for different populations. Personal recommendations include the advice that body weight in childhood and adolescence growth should project towards the lower end of the normal range by age 21. Advice regarding physical activity and food and drinks that promote weight gain are also unequivocal. While physical activity levels for individuals are recommended to be at least 30 minutes every day at a level equivalent to brisk walking (i.e. much the same as many other guidelines), it is suggested that as fitness improves individuals should aim for 60 minutes or more of moderate, or for 30 minutes or more of vigorous, physical activity every day (Recommendation 2). Public health goals regarding food and drinks that promote weight gain suggest that the average energy density of diets be lowered towards 125 kcal/g and that individuals should consume fast foods sparingly, if at all, avoid sugary drinks and consume all energy-dense foods sparingly (Recommendation 3). Population average consumption of red meat to be no more than 300 g/week and individuals who eat red meat are advised to consume less than 500g a week, very little, **if any** to be processed (Recommendation 5). Cancer survivors and those who care for them may be disappointed by the final recommendation which suggests that there is no clear evidence that any particular dietary manipulation is likely to reduce the risk of recurrence of a particular cancer. However cancer survivors are encouraged where possible to follow the general recommendations for diet, healthy weight and physical activity and to receive nutritional care from an appropriately trained professional.

There has been much debate as to the proportion of all cancers which might be preventable. It is now generally accepted that about a third of cancers may be preventable over time by appropriate food and nutrition, regular physical activity and avoidance of obesity. On a global scale this represents over 3 to 4 million cases of cancer that can be prevented in these ways every year. In many of its forms cancer is a disease which can cause great suffering and claims many lives. The hope of the authors is that the Report will contribute not only to the worldwide reduction of rates not just of cancer, but of other

chronic diseases so that more people enjoy good health until they eventually die in old age.

Further reading

World Cancer Research Fund International web site: www.wcrf.org

World Cancer Research Fund/American Institute for Cancer Research (2007) Food, nutrition, physical activity and the prevention of cancer. A global perspective. Washington DC: AICR, 2007, www.dietandcancerreport.org/

Figures

All figures reprinted here with permission from World Cancer Research Fund International, www.wcrf.org

Figure 1

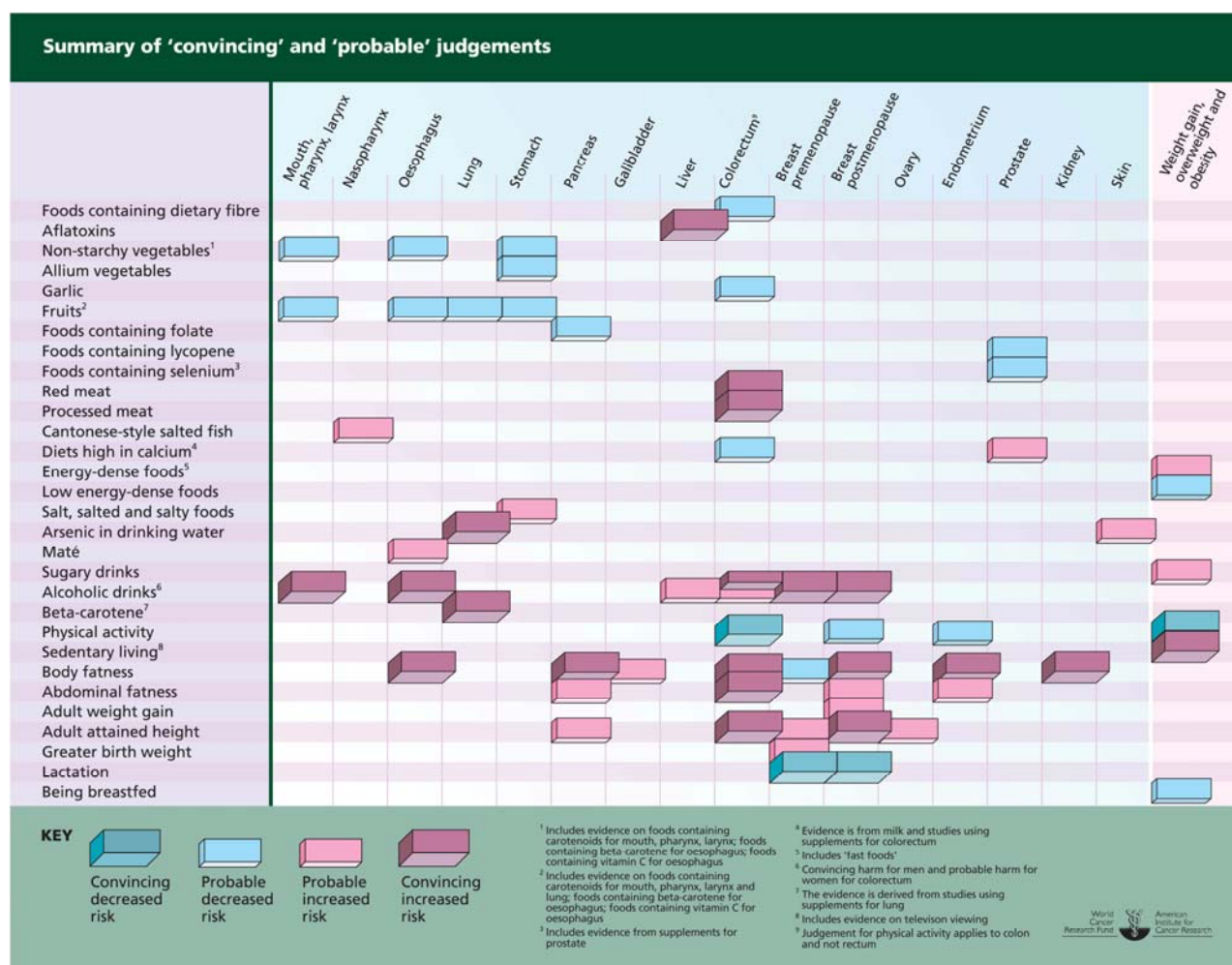


Figure 2

FOOD, NUTRITION, PHYSICAL ACTIVITY, AND WEIGHT GAIN, OVERWEIGHT, AND OBESITY

In the judgement of the Panel, the factors listed below modify the risk of weight gain, overweight, and obesity. Judgements are graded according to the strength of the evidence.

Factors that decrease risk promote appropriate energy intake, and those that increase risk promote excess energy intake, relative to the level of energy expenditure.

	DECREASES RISK	INCREASES RISK
Convincing	Physical activity	Sedentary living¹
Probable	Low energy-dense foods² Being breastfed⁴	Energy-dense foods^{2,3} Sugary drinks⁵ 'Fast foods'⁶ Television viewing⁷
Limited — suggestive		
Limited — no conclusion	Refined cereals (grains) and their products; starchy roots, tubers, and plantains; fruits; meat; fish; milk and dairy products; fruit juices; coffee; alcoholic drinks; sweeteners	
Substantial effect on risk unlikely	None identified	

Figure 3: Recommendations aimed at reducing the global risk of cancer

1. Body fatness: Be as lean as possible within the normal range of body weight
2. Physical activity: Be physically active as part of everyday life
3. Foods & drinks that promote weight gain: Limit consumption of energy-dense foods, avoid sugary drinks
4. Plant foods: Eat mostly foods of plant origin.
5. Animal foods: Limit intake of red meat meals and avoid processed meats
6. Alcoholic drinks: Limit alcoholic drinks
7. Preservation, processing, preparation: Limit consumption of salt, avoid mouldy cereals (grains) or pulses (legumes)
8. Dietary supplements: Aim to meet nutritional needs through diet alone
9. Breastfeeding: Mothers to breastfeed; children to be breastfed
10. Cancer survivors: Following the recommendations for cancer prevention

Each recommendation includes Public Health Goal(s) and Personal Recommendation(s): See website: www.dietandcancerreport.org/