



Review

## Nutrition and lifestyle factors on the risk of developing breast cancer

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### Summary

Aspects of nutrition and lifestyle may be largely responsible for the development of common cancers in Western countries, as indicated by the large differences in breast cancer rates between countries, the striking changes in these rates among migrating populations, and the rapid changes over time within countries. The better informed and increasingly health-conscious population of the present day are intensively seeking to identify and eliminate these putative carcinogenic risk factors and to exploit the preventive effects that have been attributed to certain dietary components. Nutrition and 'lifestyle' may exert its carcinogenic effects indirectly by cell stimulations (alcohol, hormone therapy in postmenopause), inhibition of DNA-repair mechanisms (lack of vitamins), affecting estrogen metabolism (phytoestrogens), or as promoters to enhance growth of tumours (body mass index). Some 'substances' may act as a carcinogenic itself, for example, aromatic hydrocarbons in tobacco or increased polycyclic aromatic hydrocarbons in well done meat. Individual differences in the effects of nutritional factors on mammary epithelia could be caused by genetic polymorphisms. In this critical review, we focus on current data regarding the effect of nutrition and lifestyle, on the risk of developing breast cancer. A health lifestyle, consisting of 'healthy diet', physical activity, renunciation of stimulants, is recommended from childhood throughout life.

### Introduction

Established risk factors that increase the likelihood of developing breast cancer include age, family disposition, early menarche, late menopause, age at first childbirth, no breast feeding, benign mammary lesions, and hormone replacement therapy [1–5]. Moreover, changing nutrition and lifestyle of modern industrial societies are considered to be important risk factors in breast cancer development [6–9]. Diet-related factors are thought to account for about 30% of cancers in developed countries [10]. Accordingly, in the US the annual increase in breast cancer incidence rose from 1% for white women in the years 1940–1980 to 4% in the years 1980–1987, of course partly attributed to increased mammography screening, stabilized by 0.1% in the years 1987–1999 [11], however is expected to increase again by 6% in 2002 from the previous year [12]. In unscreened Australian women the annual increase in breast cancer amounted to 1.5% between 1988 and 1996 [13]. Breast cancer incidence

increased in Japan [14] by 35.5% between 1960 and 1980 and in Singapore [15] by 3.6% per year between 1968 and 1992. Similar developments were also seen in Europe [16, 17]. Asian women, who commonly have low breast cancer rates in their native countries, typically experience rapid increasing breast cancer incidence after immigrating to the United States [6, 18]. Also for Turks living in Germany the breast cancer incidence increased and mortality rates were doubled [19]. These data and twin-studies [4] support the conclusion that in sporadic breast cancer development, nutritional and lifestyle factors dominate over the genetic predisposition of individuals.

### *Body mass index (BMI)*

World-wide obesity becomes a social problem (Figure 1) [20–23]. Excess body mass has been implicated in approximately 5% of all cancers in the European Community – 3% in men and 6% in women – which corresponds to a total of 27,000 male and

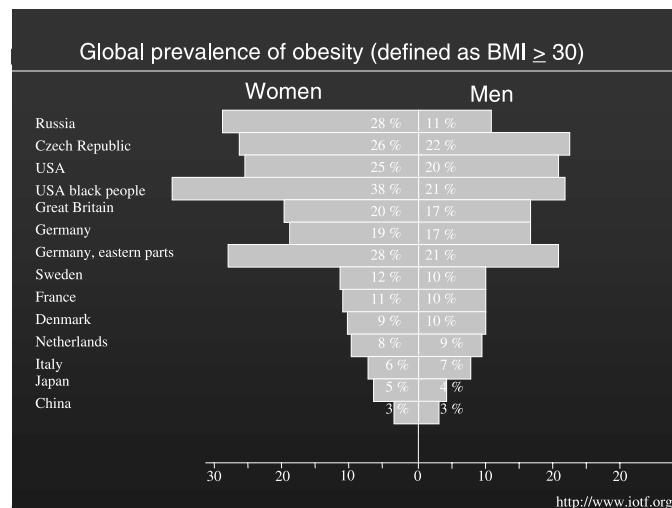


Figure 1. Proportion of males and females with BMI > 30 in the total adult population of selected countries (%) [23].

Table 1. Influence of body weight (BMI) on the risk of developing breast cancer in relation to menopausal status [24]

BMI (kg/m <sup>2</sup> )	Childhood/adolescent	Premenopause odds ratio (95% CI)	Postmenopause odds ratio (95% CI)
<21.7	No data available	1	1
21.7–23.7		0.93 (0.7–1.2)	1.0 (0.8–1.3)
23.8–25.7		0.85 (0.6–1.1)	1.07 (0.8–1.4)
25.8–28.8		0.89 (0.6–1.2)	1.21 (1.0–1.5)
≥28.9		0.67 (0.5–0.9)	1.39 (1.1–1.8)
		4.29 <sup>a</sup>	10.81 <sup>b</sup>

<sup>a</sup>  $p < 0.05$ .

<sup>b</sup>  $p < 0.01$  in trend.

45,000 female cancer cases, including 12,800 breast cancers, per year [21]. Obesity in women is suggested to an increased risk of developing breast cancer, although this does not apply equally to adolescent, premenopausal and menopausal phases [24].

Over the past 100 years, the mean age at menarche has declined from 16 to 13 years in all industrial nations [25, 26]. This phenomenon has been predominantly attributed to the abundant nutritional supply during childhood in addition to a higher energy adjusted fat intake and a deficit in physical activity [25, 27]. Juvenile obesity results in hyperinsulinism and a premature rise in estrogen levels, causing early stimulation of the mammary epithelium. However, recent studies suggest that less obese and taller girls in childhood may have an increased risk of developing breast cancer [28, 29]. One possible explanation is persisting high plasma concentrations of insulin-like growth factors in tall women. The increased adipose tissue-

derived estrogen levels in overweight children could induce early breast differentiation and eliminate some targets for malignant transformation. In conclusion, data on dietary and lifestyle factors in childhood and adolescence, a time of importance for breast cancer aetiology, are limited.

In premenopausal women obesity has little effect on the serum concentration of estradiol and therefore induces little change in the risk for developing breast cancer [30]. Probably the ovarian estrogen synthesis is reduced due to a negative feed back. However, in postmenopausal women estradiol levels are not regulated by negative feedback, and obesity instigates an increase in the serum concentration of bioavailable estradiol (with increasing BMI) which causes an increase in the risk for both endometrial and breast cancer (Table 1) [24, 31, 32]. Proportional with the adipose tissue androstendione from adrenal cortex is aromatized to estron and further biological active

estradiol. Moreover, as body weight and fat mass increase, circulating leptin increases. Leptin appears to be able to control the proliferation of both normal and malignant breast epithelial cells [33]. Also, sex hormone-binding globulin decreases with increasing BMI [34]. In addition to the characterization of obesity as a risk factor, other contributory effects should be considered. Some women not only consume the 'wrong' diet [35], but also drink less milk [36], are less physically active, are from a lower socio-economic class, and have other detrimental habits such as smoking and watching television excessively [37–40].

If there is a correlation between diet or body weight and risk of developing breast cancer, then theoretically there should be a decrease in breast cancer incidence at times of war and famine. In fact, it has been shown in Norwegian women [41, 42] and in girls from the Australian province Queensland [43] that a dietary deficit during the vulnerable phase of thelarche in adolescence did indeed lower the incidence of breast cancer. However, a study on 62,573 adolescent women in Holland during the years of economic crisis (1932–1940), war (1940–1944) or famine (1944–1945 winter) did not reveal a correlation between diet in adolescence and breast cancer incidence [44].

### Meat

More than 20 studies have investigated the relation between meat and dairy food consumption and breast cancer risk with conflicting results. In a meta-analysis [45] with 351,041 women, 7379 of whom were diagnosed with invasive breast cancer during up to 15 years of follow-up, no significant association were found between intakes of total meat, red meat, white meat, total dairy fluids, or total dairy solids and breast cancer risk. However, meat, including liver, is not only composed of fat and protein, it contains essential nutrients which appear exclusively in meat (vitamin A, vitamin B12) and micronutrients for which meat is the major source because of either high concentrations or better bioavailability (folate, selenium, zinc) [46].

Regional differences have been observed not only in the components of food but also in its preparation. In the Western hemisphere, food is mainly fried or grilled, whereas boiled or steamed food dominates in Asian and African countries. During the frying process, the concentration of polycyclic aromatic hydrocarbons increases markedly. Therefore, a 200 g steak contains 10 µg of benzopyrene, whereas

only 0.006 µg of this compound is found in 200 g of boiled meat [47]. In the retrospective Iowa Women's Health Study, the risk of developing breast cancer was significantly greater in women preferring their meat prepared 'well done' compared with those favouring a 'medium' or 'raw' meat preparation [48]. Recent data indicate that the heterocyclic amines from 'well done' steaks increase the breast cancer risk only in the presence of a genetic polymorphism with 'high activity' *N*-acetyltransferases [49, 50] or homozygous deletion of the glutathione *S*-transferases (MI or T1)-genes [51].

### Fat

It has been hypothesized that dietary fat (effects mediated by estrogens) is the key breast cancer risk factor since national consumption correlates with the international differences observed. However, other aspects of Western lifestyles could potentially confound these correlations [7]. In a retrospective interview of 2599 patients with breast cancer and 2588 control subjects, an increased consumption of calories, saturated fatty acids, sugar and alcohol significantly correlated with an increased risk of developing breast cancer [52]. The proportion of fat in the diet or in the body mass correlates with estradiol levels in the serum, and this effect is even greater in postmenopausal women [32, 53, 54]. By contrast, unsaturated and polyunsaturated fatty acids (high levels of which are found in cold processed virgin olive oil and seed oil) have been found to decrease the risk of breast cancer by up to 30% [24]. Because of this, olive oil, the main fatty component of the Mediterranean diet, has been attributed to numerous biological functions, such as improved control of hypertriglyceridemia, favourable effects in inflammatory and autoimmune diseases, modification of inflammatory cytokine production and comprises an elevated level of antioxidants [55, 56]. These effects clearly have health benefits and may reduce the risk of developing breast cancer and other carcinomas. Women with an increased intake of olive oil may also have a more health-conscious lifestyle.

Fish oil also contains large amounts of polyunsaturated fatty acids – this might explain why the low incidence of breast cancer in Japan increased from 1960 to 1980 by 35.5%, paralleled by a decrease in the traditionally high fish-oil consumption in favour of a more Western nutritional pattern [14, 57]. Two large studies were conducted in the US: the Nurses Health Study (NHS) [58, 59] observing 88,795 women

from 1980 to 1994, and a similar study [60] regularly interviewing 40,022 women about their dietary habits; during the observation time, 2956 and 996 breast cancers occurred, respectively. In both studies, no significant correlation was found between breast cancer and total fat consumption, the relationship of saturated versus unsaturated fatty acids, or the origin of the dietary fat. These findings were confirmed by a meta-analysis of eight prospective studies [61]. In the pooled database, 7329 invasive breast cancer cases occurred among 351,821 women; no associations were observed for animal versus vegetable fat intakes, or menopausal status. Although a vegetable diet does appear to reduce the risk of colorectal carcinomas, it does not reduce the mortality of breast cancer, a result also observed in a study of Seven-day Adventists with a diet low in meat and fat [62]. Summarized, available data do not support an important role of dietary fat in the risk of developing breast cancer.

### *Phytoestrogens*

Mainly due to the low breast cancer incidence in Japan and in other countries with a soy-rich diet, the role of soy products was explored. Supporting the belief that soy products provide a true protective measure against breast cancer, phytoestrogens and their metabolites showed multiple desirable effects on cancer cells *in vitro* [63–66]. Isoflavonoid phytoestrogens (e.g., genistein, daidzein, equol, desmethylan-golensin) dominate in soy products, whereas lignanes (macromolecular hydrophobic compounds such as enterodiol, enterolactone, and matairesinol) can be found in linseed, wholemeal products, and several fruits and vegetables.

Both estrogen metabolism and breast cancer risk have been associated with dietary intake and breast cancer patients may have different dietary patterns than healthy controls. Jakovljevic et al. [67] reported an association for the consumption of a specific fatty acid (i.e., linoleic acid) and estrogen receptor status, suggesting dietary influence of nutritional factors on hormone receptor status in premenopausal breast cancer patients. Vegetables of the Brassica genus, such as broccoli, contain a phytochemical (indole-3-carbinol), which may shift estrogen metabolism and increase the 2/16-hydroxyestrone ratio, a ratio found to be predictive of breast cancer risk [68, 69]. Interestingly, a higher concentration of 2-hydroxyestrone was found in Japanese women and in women with an increased consumption of broccoli and other vege-

tables, whereas breast cancer patients had a higher concentration of 16- $\alpha$ -hydroxyestrone [70].

In a case-control study including 144 paired subjects, a significant reduction in breast cancer risk was documented in women with an increased urinary excretion of the isoflavone metabolite equol and of the lignane metabolite enterolactone [64]. In a prospective, multicentre study of 34,759 Japanese women, 427 breast cancers occurred during the observation period [71]. Depending on the consumption of soy products, the relative breast cancer risk varied between 0.99 and 1.07, although these differences were not significant. Even after taking into consideration age, BMI, reproductive behaviour, and alcohol consumption, no correlation between a soy-based diet and breast cancer was identified, whereas breast cancer incidence was found to be inversely related to the consumption of dried fish. In non-Asian US women, phytoestrogens appear to have little effect on breast cancer risk at the levels commonly consumed; an average intake is equivalent to less than one serving of tofu per week [72]. A meta-analysis [73] (including 26 published studies) on the relationship between breast cancer and fruit and vegetable consumption confirmed an inverse association between vegetable intake and, to a lesser extent fruit intake, and breast cancer risk other. By contrast, a pooled analysis of only cohort studies [61] concludes that the few existing data do not prove a significant reduction of breast cancer risk by fruits or vegetables.

Based on rat models, it was postulated that genistein promotes early differentiation of the developing mammary gland, thus rendering it less sensitive to later proliferative stimuli [65]. This indicates that high soy intake during adolescence may reduce the risk of breast cancer in later life [74]. Other researchers have warned against an enrichment of baby food with soy compounds [75]. In an animal model, new-born mice were administered with genistein or diethylstilbestrol between day 1 and 5. Within 18 months, 35% of the genistein-treated animals developed uterine adenocarcinomas. This was similar to the rate of 31% in the diethylstilbestrol group, whereas no endometrium carcinoma developed in the control group [75]. Moreover, male offspring of women who ate a vegetarian diet were found to have a 5-fold increase in rate of occurrence of hypospadias [76]. Even if the effects of soy on the development of breast cancer as well as positive effects in bone health, lipid metabolism, and cognitive functions are still contradictory [77], an enrichment of diet with soy, cereals, vegetables and fruits was

recommended [78]. Furthermore, it is suggested that the consumption of even 10 g (typical of Asian intake) of isoflavone-rich soy protein per day may be associated with health benefits. This modest amount of soy protein would represent only approximately 15% of total US protein intake [77]. To date, no data support supplementary administration of isoflavones as tablets or other formulations.

#### *Vitamins and selenium*

Public interest in vitamin supplements is enormous, with 30% of the population of the United States currently using such supplements [79]. Political pressures have led to a highly unregulated industry with limited control by the Food and Drug Administration over marketing and quality [80]. Based on their anti-oxidative effects, derivatives of the vitamins A ( $\alpha$ -carotene,  $\beta$ -carotene, retinol), B and E (tocopherol), and selenium are thought to play an important role as free-radical scavengers. These substances protect lipids from peroxidation by free radicals, participate in DNA repair, stimulate the immune system, and exert anti-carcinogenic effects. B vitamins play a role in DNA synthesis, repair and methylation, and have also been shown to exert anti-carcinogenic activities.

In a prospective study in Missouri (US), blood samples from 7224 healthy women were analysed [81]. Within 9.5 years after the initial blood sampling, 105 breast cancers occurred. Compared with matched healthy controls, no differences were found in serum concentrations of  $\alpha$ -carotene and  $\beta$ -carotene,  $\alpha$ -tocopherol, retinol and selenium, whereas serum concentrations of other vitamin A derivatives were lower than in the controls. However, by a similar study-design and 295 cases Sato et al. [82] found significantly lower median concentrations of  $\beta$ -carotene, lycopene, luteine and total carotene in cases compared with controls. In the prospective Women's Health Study (>40,000 participants), the administration of 50 mg  $\beta$ -carotene every other day did not significantly reduce the incidence of neoplastic and cardiovascular disease or overall mortality [83]. The only observed effect was the appearance of a yellow tint of the skin. In a population-based cohort study in Northern Sweden, no significant associations were found between breast cancer risk and plasma levels of six carotenoids,  $\alpha$ -tocopherol or retinol [84]. Results from stratified analysis by cohort membership and menopausal status suggest that lycopene and other plasma carotenoids may reduce the risk of developing breast

cancer, and menopausal status may have an impact on the mechanisms involved. Veronesi et al. [85] were unable to detect an effect of fenretinide in preventing a second breast malignancy in women with breast cancer. At present, no reliable data exist proving a preventive effect of dietary carotenoids [86, 87].

A prospective case-control study ( $n = 27,075$ ; Maryland, US) with 195 breast cancers did not demonstrate breast cancer protection by B vitamins with the exception of vitamin B-12, which was lower in breast cancer patients [88]. A protective effect of folic acid was observed in women who consumed alcohol regularly or smoked heavily [89, 90].

Selenium as a free-radical scavenger is an essential component of the anti-oxidative action of glutathione peroxidase. In addition, selenium directly inhibits proliferation of epithelial cells by matrix degradation resulting in an inhibition of angiogenesis, which is obligatory for the growth of solid cancers [91]. Similar to the above-mentioned Missouri study [81], a Finnish investigation on 39,268 men and women did not find differences in selenium serum concentrations between women later developing breast cancer and those in the control group [92]. In men, a protective activity of selenium in preventing stomach and lung cancers was postulated.

The relationship between 17 micronutrients and breast cancer risk was analysed in a case-control study conducted between 1993 and 1999 [93]. In a model including a continuous term for the seven micronutrients significantly related to breast cancer, the only persisting significant inverse relationships were for vitamin C (objective response, OR = 0.23) and lycopene (OR = 0.64).

Until today, prospective studies failed to prove a preventive effect of vitamins and trace elements on breast cancer development. If these effects do exist, they are probably only marginal. Guidelines from some professional societies or governmental panels recommend attempting to obtain vitamins and minerals from food sources rather than from supplements, because foods contain additional important components, such as fibre and essential fatty acids [94, 95]. Lastly, a vitamin supplement cannot begin to compensate for the massive risks associated with smoking, obesity, alcohol or inactivity [80].

#### *Alcohol and tobacco*

Ethanol itself is not a carcinogen, but it is metabolized to potential carcinogenic compounds, for example,

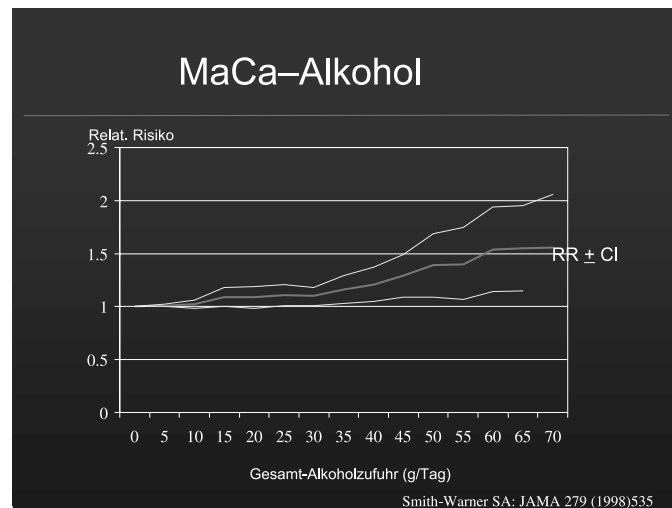


Figure 2. Correlation between daily alcohol consumption and breast cancer risk [98].

acetaldehyde. Alcohol induces oxidative stress in the liver so that other carcinogenic substances can be synthesized through enzyme induction, but cannot be metabolized. Alcohol increases the permeability of cell membranes thus facilitating the traffic of carcinogens into the cells. It also induces the proliferation of mammary epithelia in animal models and is resulting in higher serum concentrations of estradiol in premenopausal women [96]. An established link to breast cancer would be of great interest since this noxious agent could be avoided easily.

In the largest case-control study to date, including 2569 breast cancer patients and 2588 controls, a moderate effect of alcohol was determined [97]. The multivariate OR was 1.21 for drinkers of <5.87 g/day and 1.23, 1.19, 1.21, for drinkers of 5.88–13.40, 13.41–24.55, 24.56–27.60 g/day, respectively. The multivariate OR increased to 1.41 for those consuming more than 27.6 g/day. The trend in cancer risk was significant ( $\chi^2 = 12.28$ ,  $p < 0.0005$ ), however, in premenopausal patients (odds ratio 1.80) but not in postmenopausal women. Dose and duration of alcohol consumption was significantly related to an increased risk of developing breast cancer. In a meta-analysis of six studies with 322,647 women (including 4335 breast cancer patients), a linear correlation was found between breast cancer risk and regular alcohol consumption (Figure 2) [98]. According to this study, a 'tolerable daily alcohol uptake' equivalent to 20–30 g of pure ethanol – as reported by some authors – does not exist. Recent large studies in the US [99–101] and Sweden [102] as well meta-analyses

[103] found only a small percentage of breast cancers to be alcohol-induced or, alternatively, a significant increase in breast cancer risk correlates only with a higher alcohol uptake (>50 g/day) [104]. Similarly, the presumed connection between breast cancer development and juvenile alcohol abuse is not supported by a case-control study [99]. Individual differences in the effects of ethanol on mammary epithelia could be caused by genetic polymorphisms. Lack of the genes for the glutathione S-transferases M1 and T1 and alcohol dehydrogenase II that are important for ethanol metabolism were significantly more common among breast cancer patients compared with healthy controls [51, 105, 106].

Most epidemiological studies of cigarette smoking and incidence of breast cancer have failed to demonstrate a strong association between these factors. In Sweden, between 1960 and 1994, the rise in lung cancer was paralleled by an increase in breast cancer incidence, especially among premenopausal women [107]. The carcinogenic effect of smoking is explained by aromatic hydrocarbons contained in tobacco, with genetic polymorphisms in *N*-acetyltransferase-2 potentially playing an important role [50, 108]. Some studies [99, 109] reported an increased risk of breast cancer and, in other studies [110, 111] smoking was reported to be a protective factor. The risk reduction was explained by the anti-estrogenic effect of smoking, although smoking being associated with an increased occurrence of hormone receptor-negative tumours made this a less favourable prognosis [112]. According to a prospective study in the US with

146,488 female non-smokers followed-up for 12 years [113], passive smoking exposure did not significantly increase the risk for developing breast cancer. However, a Canadian case-control study of 2317 breast cancer patients did find a significantly increased risk for premenopausal women that either smoked actively or passively [114]. Recently, Terry et al. [115] reported a positive association between cigarette smoking of very long duration and high intensity and breast cancer risk. Relative to never-smokers, women who had smoked 40 years or more and 20 cigarettes/day or more were at the highest risk (RR = 1.83, 95% CI 1.29–2.61).

#### *Socio-economic status*

In 1950, daughters from low-income families in Queensland (Australia) were smaller and lighter than daughters from more prosperous families. Thirty-five years later, it was found that fewer breast cancers developed in females from families of lower socio-economic status (17/100,000) than in those from wealthier families (20/100,000) [43]. In a 24-year prospective study of 1462 Swedish women, higher socio-economic status was associated with decreased cardiovascular disease mortality and excess breast cancer mortality [116]. Low intake of carotenoids, owing to poor diet and/or lack of vitamin supplementation, may be associated with an increased risk of breast cancer and may have public health relevance for people with markedly low incomes [117]. Cancer incidence including breast cancer is higher among women from urban areas than in those from rural regions [118–120] which is probably strongly influenced by differences in education, health realization, ethnic background, age at first birth, and other co-variables [121–123].

#### *Physical activity*

The preventive effect of physical exercise is explained by non-specific immune stimulation and decreased estrogen levels during recovery [124]. A retrospective investigation of 1945 physically active and 1995 physically inactive female college students revealed that, after 16 years, athletes had a 40% decrease in breast cancer risk, which increased to 80% by the age of 45, and this effect is still detectable in the postmenopause [125]. In the Nurses' Health Study, a risk reduction due to physical exercise was found in women between 30 and 35 years of age, but this effect became significant only if more than 6 h per week of at least moderate

exercise were performed [126]. An observed inverse association with a dose-response relationship between physical activity and breast cancer was also identified in the majority of the 41 studies including 108,031 breast cancer cases [127]. The Iowa Women's Health Study, including 37,105 postmenopausal women, did not show a reduction of breast cancer risk by physical activity [128]. Accordingly, lean physically active women had a lower breast cancer risk (OR = 0.57) compared with overweight but nonetheless exercising women (OR = 0.92) – this suggests that additional risk factors may be involved [129]. Finally, a study including 9536 same-sex twin women aged 42–70 years who answered a questionnaire about their work and leisure-time physical exercise revealed no significant associations between physical activity (leisure-time activity, work activity) and breast cancer overall [130].

#### *Stress*

A prospective examination of 26,936 postmenopausal women in the Nurses' Health Study [131] and the results of case-control studies [132, 133] revealed no evidence of an independent association between a life-event stress (divorce, loss of job, disease, death, etc.) and breast carcinoma.

#### *Night-shift work*

Recently published studies provide evidence that exposure to light at night may be associated with the risk of developing breast cancer [134, 135]. This risk was associated with number of hours per week of night-shift work and increasing years working on night-shift. Exposure to light at night may increase the risk of breast cancer by suppressing the normal nocturnal production of melatonin in the pineal gland, which, in turn, could increase the release of estrogen by the ovaries.

### **Conclusions**

The data available in 2003 strongly support the hypothesis that breast carcinoma development can be caused and facilitated by dietary factors and lifestyle. It is widely accepted that breast cancer development is a multifactorial process with very limited impact of isolated single factors. Even well-designed epidemiological studies contain several biases that influence their outcome. For example, women with a 'normal'

Table 2. Breast cancer prevention (adapted to NCI recommendations [136])

Start taking preventive measures early in childhood
Eat several servings of vegetables and fruit per day
Consume a diet rich in fibre (e.g., cereals and soy products)
Maintain an ideal body weight (BMI = 20–25)
Avoid animal fat – replace with unsaturated vegetable fat or fish oil
Limit consumption of red meat to 140 g/day
Avoid artificial supplements, preparations of vitamins and trace elements
Exercise regularly
Abstain from alcohol and smoking

body weight, who consume a 'healthy' diet, are moderately physically active, and abstain from unhealthy behaviours like alcohol or tobacco, will pay more attention to their health and environment than their obese counterparts. It is therefore crucial to encourage a healthier lifestyle from childhood throughout life, and this should include a diversified and 'healthy' diet, avoidance of adult weight gain, physical activity, renunciation of alcohol and tobacco, and a 'clean' environment (Table 2). However, it must be pointed out that this review did not really support most of in Table 2 shown items for the prevention of breast cancer.

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