

Cancer survivors

Cancer survivors are people who are living with a diagnosis of cancer, including those who have recovered.

Awareness of cancer survival has increased greatly since the 1990s. So has the number of people living with a diagnosis of cancer. The total number of recorded cancer survivors in the world in 2002 was estimated to be just under 25 million, and by 2050 may approach 70 million.

The term 'cancer survivor' covers a very wide variety of circumstances. Thus, the needs of people currently undergoing therapy are likely to be different from those of people whose metabolic functions have been altered as a result of therapy and from those of people who are evidently fully recovered and whose functions are intact.

Nevertheless, the *Panel accepts* the validity of the concept of cancer survivor, *welcomes* the rising consciousness that cancer is a disease best spoken of and dealt with openly, and *agrees* that the best way to improve quality of life and increase the chances of prolonged life and recovery from cancer is when cancer survivors take responsibility for themselves, supported by associates, friends, and family, while always also consulting their professional advisors and making best use of available medical care systems and qualified social support.

Correspondingly, *we the Panel collectively have accepted a special responsibility* to give our best advice, having examined the evidence derived from systematic reviews of the scientific literature done according to our agreed methodology, and also from our knowledge of the whole range of evidence and consideration of the precautionary principle and best clinical and public health practice.

Research on food, nutrition, physical activity, and cancer survival is at an early stage. Overall, *the Panel agrees* that it is not possible to make judgements that apply specifically to cancer survivors, based on the evidence reviewed for this Report. The available evidence on cancer survivors has a number of limitations: it is of variable quality; it is difficult to interpret; and it has not yet produced any impressive results. Definite general judgements are made more problematic because of differences in the health of cancer survivors at various stages;

between cancers of various sites; and between the effects of the many types of conventional and other therapies used.

The Panel notes as follows:

Regular physical activity and other measures that control body weight may help prevent recurrence, at least of breast cancer. In any case, when able to do so, cancer survivors are likely to gain general health benefit, and a sense of control over their circumstances, from regular physical activity.

The evidence does not support the use of high-dose supplements of microconstituents as a means of improving outcome in people with a diagnosis of cancer. Cancer survivors should consult their physician and/or a qualified nutrition professional, who can evaluate the safety and efficacy of specific dietary supplements, and counsel an appropriate action based on current research relevant to their particular clinical situation.

In summary, evidence that some aspects of food, nutrition, or physical activity specifically modify the condition of cancer survivors is emerging, but is not yet sufficiently developed to enable the Panel to make judgements that apply specifically to cancer survivors, as distinct from people without cancer.

The concept of ‘cancer survivor’ first gained currency in the USA in the 1990s, particularly among advocacy groups formed to give information, advice, and support to people with cancer. The term here refers to people living with a diagnosis of cancer, including those believed to have recovered.

Consciousness of cancer survival has increased greatly since the 1990s, especially in high-income countries. This is only partly because of the increase in numbers. Another reason is that cancer is increasingly a disease spoken of openly, and seen less as the visitation of a death sentence.

Cancer survivors, and their families and friends, are increasingly determined to take responsibility for living with cancer. They do this individually and collectively, usually in collaboration with their medical and surgical advisors, and often with practitioners offering complementary and alternative therapies, regimens, and advice.

Cancer survivors as an overall group, together with those who are closest to them, are especially concerned to learn about and act on helpful recommendations. These should be least likely to do harm, and most likely to help limit the progress of the cancer. They should also help prevent a recurrence of that or another cancer, and help prevent other diseases, as well as improve the quality of survivors’ lives. This places a special responsibility on professionals in this field, to consider carefully what can be recommended.

The Panel’s recommendations for cancer survivors are in Part 3, Chapter 12.

9.1 Definitions

The term ‘cancer survivors’ denotes all people who are living with a diagnosis of cancer, and those who have recovered from the disease. In this definition, then, cancer survival begins at the point of diagnosis.

Cancer survivors include the following population groups; these are often not discrete, because people may fall into several of the groups below.

After diagnosis, before treatment

- People with cancer who have chosen to have treatment
- People with cancer who choose to have no treatment.

During treatment

- People being treated with modern conventional therapies
 - Radiation

- Chemotherapy
- Surgery
- Combinations of radiation, chemotherapy, and surgery.
- People treated with therapies that are alternative or complementary to conventional ones (box 9.1), usually as well as, but sometimes instead of, conventional therapies
 - Naturopathy
 - Radical diets (very low fat, raw food, other)
 - Energy restriction
 - Orthomolecular nutrition (including all forms of supplementation)
 - Gerson therapy, Hoxsey therapy, antineoplastons, Coley’s toxins, other
 - Traditional therapies (Ayurvedic, Chinese herbal, other)
 - Combinations of these, with or without conventional therapy
 - Other.

After treatment

- People whose treatment has been said to be successful, and who have undamaged metabolic functions
- People whose treatment has been said to be successful, and who have damaged metabolic functions
 - People who have had parts of their digestive tract surgically removed (mouth, oesophagus, stomach, small intestine, colon)
 - As above, also with colostomy, ileostomy
 - Other.

People with secondary cancer or cancer of a different site

- Where treatment has been unsuccessful, and who have undamaged metabolic functions
- Where treatment has been unsuccessful, and who have damaged metabolic functions
 - Those who have had parts of their digestive tract surgically removed (mouth, oesophagus, stomach, small intestine, colon)
 - As above, also with colostomy, ileostomy
 - Other
- People with metastasised or disseminated cancer, with or without cachexia
- People with terminal cancer.

After recovery

- People who are alive 5–10 years after successful treatment
- People who are alive 10+ years after successful treatment (including those who had cancer as a child).

The definition of ‘cancer survivor’ here does not include people living with a diagnosis of a benign tumour, or tumours defined as premalignant, such as premalignant cervical lesions or polyps in the colon.

‘Cancer survivors’ as defined here also does not include those living with people who are living with a diagnosis of cancer. Sometimes this wider definition is used, and from the public, community, and family health points of view, issues that concern cancer survivors are also of vital importance to their partners, family members, and close friends.¹ Such loved ones are most likely to want to know what to do, and will seek professional guidance, both for the person with diagnosed cancer, and also for themselves and family members.

This becomes most important practically when decisions need to be made about family shopping and meal preparation, and eating out. Should the family member with cancer be treated differently? Or should the whole family follow the same recommendations and advice? These are not questions of direct professional concern to cancer researchers, but do concern physicians, and other health professionals, whose responsibility includes passing on authoritative recommendations, or else giving the best available advice and guidance.

9.2 Occurrence

The number of cancer survivors has greatly increased in recent decades, especially in high-income countries. This is partly because the general prevalence of cancer continues to rise, within a world population that is also rising. In addition, screening programmes for common cancers are identifying many more cases, usually at relatively early stages. As already stated, the rapid rise in the recorded incidence of prostate cancer in recent years is largely because of increased use of methods of detection (see chapter 7.14.1). Also, for some cancers, medical and surgical treatments and follow-up care are increasing the time that people live with cancer; these interventions are also improving rates of recovery. In the USA, estimates of the number of cancer survivors have increased from around 3 million (1.5 per cent of the population) in 1970 to over 10 million (close to 4 per cent of the population) in 2002. The absolute number of cancer survivors aged 65 years and older is predicted to double in the USA by the year 2050.¹

Calculations of the type made in the USA have not been made in Europe as a whole. European Union countries together now have a larger population than the USA, but given the overall differences between the two (somewhat lower rates of screening, detection, and years of survival after diagnosis in Europe), a rough guess of 5 million European survivors (or 1 per cent of the population) seems reasonable.² In 2002, the total number of recorded cancer survivors in the world was estimated to be just under 25 million.³

If prevalence of, and survival with, cancer worldwide con-

tinues to increase, and follows predictions made in the USA, and given a further increasing global population, the number of recorded cancer survivors worldwide in 2025 will approach 50 million, and in 2050 will approach 70 million. Such projections may be conservative, and also do not take into account people with cancer that is not diagnosed or recorded.

Among cancer survivors in the USA in 2002, the most common cancer diagnosed was breast cancer among women (22 per cent), prostate cancer among men (18 per cent), and colorectal cancer among men and women combined (10 per cent).¹ These figures are not proportional to incidence rates because the average time of survival after diagnosis of different cancers varies. In Europe, breast cancer was the most prevalent cancer in women (34 per cent), followed by colorectal cancer (10 per cent). In men, colorectal cancer (15 per cent), prostate cancer (12 per cent), and lung cancer (10 per cent) were most prevalent.²

9.3 Interpretation of the evidence

9.3.1 General

For general considerations that may affect interpretation of the evidence, see chapters 3.3 and 3.5, and boxes 3.1, 3.2, 3.6 and 3.7.

9.3.2 Specific

Nature of the field. The main problem faced by reviews of cancer survivors, as indicated in 9.1, is the scale and heterogeneity of the field. The interventions reviewed were studied in people with a number of different cancers, at different stages, and for different outcomes.

Classification. There are many groups of cancer survivors. Some have been diagnosed but have not yet received treatment. Others are undergoing treatments that have damaging effects and which, for some, have damaged the physical function of the body. Others have been overtly free from cancer for several or many years. As yet, there are no generally agreed classifications of cancer survivors, or the different stages of cancer survival, which makes comparisons of studies problematic.

Study design. Studies should take into account and report the stage of treatment participants are at, and give details of this treatment. Studies need to have sufficient statistical power to address the research question being examined.

Confounding. Clinical and pathological characteristics of the cancer, such as tissue of origin, stage at diagnosis, and specific molecular characteristics, are the strongest predictors of outcome, and are powerful confounding factors, especially in observational studies. Cancer treatments and their consequences may change the effects of interventions in ways that are not well understood. Different cancers may be modified in different ways by food, nutrition, and physical activity.

This complexity is increased by the effects of treatment and the disease itself, both of which can affect food consumption, digestion, absorption, and metabolism, and

Box 9.1 Conventional and unconventional therapies

Conventional medicine is also known as modern or Western medicine. It is allopathic, meaning that it relies on diagnosis of disease, by examinations and tests, and treatment. With cancer, treatment includes surgery, chemotherapy, and radiotherapy. Conventional medicine is based on investigation of the biology (including anatomy, physiology, and biochemistry) of body organs, tissues, and cells. It includes an understanding of the pathological processes that lead to disease, and testing of interventions for efficacy and safety. Conventional practitioners undergo externally validated and structured education and training programmes, and continuing professional development, and they are subject to statutory regulation.

Complementary and alternative medicine includes many diverse medical and healthcare systems, practices, and products — some traditional, some modern. Training and regulation of providers exist, but often vary between therapies and nations. Some orthodox scientific evidence is available regarding some of these therapies, although the efficacy of many remains unclear and often controversial.

These therapies include mind–body interventions, such as meditation; biologically based treatments, such as radical nutritional regimens, micronutrient supplements, and herbal products; manipulative and body-based techniques, such as massage and osteopathy; ‘energy therapies’, such as the use of magnets or

therapeutic touch; and alternative medical systems, such as traditional Chinese and Ayurvedic medicine.

‘Integrative medicine’ is a recent approach that uses some complementary and alternative therapies within conventional medicine. Physical activity programmes and dietary interventions are commonly used in integrative medicine, together with counselling.

Cancer survivors should consult their physician or qualified health professional before initiating any therapies that are alternative or complementary to conventional therapies. Cancer survivors should keep all of the health professionals involved in providing any treatment fully informed of their choices in these areas.

also a person’s physical condition or behaviour. This is particularly important for studies that relate body fatness to cancer risk, as cancer often causes weight loss. In some cases, surgery may have been performed to remove parts of the gastrointestinal tract affected by cancer. Cancer often results in loss of appetite, and cancer treatments may cause nausea or a decreased ability to absorb nutrients from food.⁴ An important strength of randomised trials, provided they are sufficiently large, is that confounding variables, both known and unknown, will on average be distributed equally between the treatment and control groups, and will therefore not bias the study results (also see chapter 3.1.6).

9.4 Evidence and judgements

A systematic literature review (SLR) was undertaken to assess the role of food, nutrition, and physical activity in the case of cancer survivors. This review addressed the efficacy of nutritional and physical activity interventions in cancer survivors in relation to mortality, disease-free survival, cancer recurrence, secondary cancers, quality of life, and adverse effects of treatment regimens.⁵

This SLR was designed differently from those on the causes of cancer in people assumed to be free from the disease, and used as the bases for judgements in previous chapters. This decision was taken because the focus of the research questions was not on causation, but on the efficacy of particular interventions. In addition, people with cancer are in a clinical situation and will often be receiving, or will have received, medical, surgical, or other treatments that may affect their nutritional status; this limits the value of some kinds of observational evidence.

For these and other reasons, it was decided in the case of cancer survivors to give pre-eminence to randomised controlled trials (RCTs), which are least likely to be confounded, and are best suited to investigate the relatively short-term efficacy of specific interventions. The review undertaken was

of 53 nutritional intervention trials and 23 physical activity trials. It assessed the quality of all the studies reviewed, including the size of the study populations; the length of the interventions and of the follow-up programmes; the methods used to ensure randomisation; and the methods of statistical analysis.

There were usually insufficient numbers of any type of study to allow useful combining of data for meta-analysis. Overall, data were also insufficient to allow for separate analyses of survivors before, during, and after treatment. The Panel’s standard criteria used to grade the strength of evidence, and the matrices used to record the Panel’s judgements, used in previous chapters, were not used in the case of cancer survivors.

A narrative review of observational studies was also conducted. As stated above, these are less suited in the study of efficacy of treatments, and so in studies of cancer survivors their results should be treated with caution. Also see 9.3.

The full SLR is contained on the CD included with this Report.

9.4.1 Randomised controlled trials

9.4.1.1 ‘Healthy’ diets

Food-based RCTs were defined as those using interventions that offered advice about ‘healthy eating’ (variously defined) or specific diets such as high-fibre diets and/or weight-loss programmes. Twelve trials met the criteria for inclusion in the review of food-based interventions. Study designs tended to be of poor quality, and insufficient information was available about the methods used for randomisation and blinding. Duration of interventions varied between seven weeks and three years.

Small trials conducted in Russia, the Netherlands, and Poland reported on the effects of ‘healthy diet’ interventions for breast cancer survivors, either during or after treatment, and cancer recurrence. A reduced fat and energy diet decreased the recurrence of breast cancer in the Russian study.⁶ A study conducted both in the Netherlands and in

Box 9.2 Use of supplements by cancer survivors

In the USA and in other high-income countries, the use of supplements in physiological (low dose) and also pharmacological (high dose) amounts is common among the general population and also among cancer survivors.

At least 50 per cent of the US population take vitamin and mineral supplements.⁵² Supplement use among US cancer survivors has been shown in two studies published in 2004 to be similar to the average, but high-dose supplements may be more commonly used by cancer survivors.^{53 54} Survivors are also reported to be high users of complementary and alternative medicines and other treatments.⁵⁵ Several hundred web sites promote high-dose supplements with unsupported claims that they are active cancer cures or can prevent recurrence.

Poland examined the effect of dietary advice and psychological support to achieve weight loss, but no significant effect on breast cancer recurrence was reported, perhaps because of the small size and limited power of the study.⁷

Six trials reported on the effect of 'healthy diets' on 'quality of life'. Of these, one study of people surviving breast, ovary, prostate, or testicular cancers showed a positive effect, in a programme that combined general dietary information with physical training and coping skills.⁸ A study of people surviving head and neck or gastrointestinal cancers showed a beneficial effect with a programme of dietary counselling compared to usual care.⁹ The other studies reported no effect.¹⁰⁻¹³

Only one trial investigated food-based interventions and side-effects of treatment. This study found that individual nutritional advice, adapted to the patient's own needs and tastes, reduced adverse effects from radiotherapy in people with head and neck cancers.¹⁴

Three small trials examined food-based interventions and all-cause mortality. The studies were conducted in survivors of non-melanoma skin cancer,¹⁵ colorectal or lung cancer,¹⁶ and breast, ovary, prostate, or testicular cancer.⁸ None of the trials reported a significant association between the intervention and all-cause mortality.

No conclusions can be derived from these results.

The Panel is aware of two large, multicentre, randomised trials of breast cancer survivors, the WINS study, published in 2006, and the WHEL study, published in 2007. The WINS trial tested a dietary intervention to reduce fat intake in over 2000 women with early stage breast cancer. After 5 years of follow-up, the women in the intervention group had a 24 per cent reduced risk of recurrence compared with the control group (relative risk 0.76, 95% CI 0.60–0.98).¹⁷ However, these findings cannot be easily translated into recommendations for breast cancer survivors, for several reasons. First, women in the intervention group had more extensive surgical procedures. Also, they lost weight during the trial and it is possible that weight loss was responsible for their improved outcome. Finally, dietary fat reduction was most beneficial in women with oestrogen- or progesterone-receptor negative tumours, a finding that may be due to chance.¹⁸

The WHEL study tested the effect of a dietary intervention high

in vegetables, fruits, and dietary fibre, and low in fat, in over 3000 women with early stage breast cancer. After 7.3 years of follow-up, there was no difference in breast cancer recurrence, new breast cancer, or all-cause mortality between the intervention and control groups.¹⁹ Unlike the WINS study, in the WHEL study women in both the intervention group and the control group experienced small increases in weight, and this may partially account for the different results in these two trials.

9.4.1.2 Supplements

Data from 39 RCTs were assessed. The review included trials on supplements of retinol,²⁰⁻²⁶ beta-carotene,²⁷⁻³⁰ vitamin B6,^{31 32} vitamin C,^{31 32} multivitamins,^{27 33 34} vitamin E,³⁵⁻³⁷ selenium,³⁵⁻³⁸ and isoflavones.^{39 40} Additionally, single trials of each of evening primrose oil,⁴¹ glutamine,⁴² and N-acetylcysteine²⁶ and nine trials of commercial supplements were reviewed.⁴³⁻⁵¹ Also see box 9.2.

Trial quality and number of participants tended to be higher in supplement trials than in the dietary-intervention trials. Compliance was monitored in the majority of trials, and placebos were usually given to the control group. However, the controls in all seven retinol trials and in five of the nine commercial supplement interventions were given 'usual treatment' or an 'unrestricted' diet.

There was considerable variation in the methods and length and type of intervention used, and the overall quality of many studies was poor. Furthermore, the disparate vitamins and other bioactive substances used in these studies make comparison difficult. Results were null or non-significant in almost all cases.

Trials where data were sufficient and the exposures were homogeneous enough to allow meta-analysis included those examining retinol and all-cause or cancer mortality. Comparing the intervention to usual treatment, the summary estimate from four trials that examined all-cause mortality was 0.97 (95% CI 0.83–1.13)²³⁻²⁶; from three trials that examined cancer mortality, the summary estimate was 0.92 (95% CI 0.65–1.31).^{23 24 26}

One small trial of bladder cancer survivors showed a significant reduction in cancer recurrence. This trial compared supplementation with a multivitamin plus a high-dose combination of vitamins A, B6, C, and E and zinc against a multivitamin alone.³³

A larger trial designed to test the effect of 200 micrograms per day of selenium supplementation on recurrent non-melanoma skin cancer showed no effect on skin cancer, but a protective effect on prostate cancer.^{36 37}

Fifteen trials investigated types of supplementation and side-effects of cancer treatment. One small study reported higher treatment toxicity in survivors of haematological cancers with vitamin A supplementation (as retinol or beta-carotene).²³ No significant results were reported in the other studies.^{27 29 31 32 34 35 38-40 48 56-58}

The evidence from this review of trials does not show that micronutrient supplements have any benefits in cancer survivors. High-dose supplements may be harmful. Some micronutrients and other bioactive compounds are known to be toxic at high doses.

9.4.1.3 Physical activity

Twenty-three physical activity RCTs met the criteria for inclusion in the review. Interventions ranged from simple advice to increase physical activity, to enrolment in supervised exercise programmes. These were mostly small trials and of short duration. In half of the studies, compliance levels were unclear, and the majority failed to record physical activity levels in the control group, which severely limits their value.

Only three of the physical activity intervention trials reported on mortality or cancer recurrence.^{8 59 60} None of these studies reported significant effects.

Twenty trials investigated quality of life outcomes with physical activity interventions. Nine of these trials were in survivors of haematological cancer,⁶¹ lung cancer,⁶² prostate cancer,⁶³ and in a combination of cancers.^{8 12 64-68} Eleven trials were in breast cancer survivors.⁶²⁻⁷³ Two of the interventions in these trials included nutrition components.^{12 64}

The physical activity interventions, assessment instruments, and outcomes studied were varied. The interventions included many types of supervised or home-based exercise programmes. Several studies assessed well-being and quality of life using a version of the Functional Assessment of Cancer Therapy scale,⁶⁹ although other questionnaires and scales were also used. Quality of life outcomes included a range of measures of physical, functional, and emotional well-being, as well as measures of physical fitness.

Of the 20 physical activity trials that investigated quality of life, 18 reported a benefit from the intervention on at least one of the outcome measures reported in the study. None of the trials reported harmful effects of the physical activity interventions on any of the outcomes studied.

Taken together, these trials provide some evidence for the benefit of physical activity on post-treatment quality of life in cancer survivors.

9.4.2 Observational data

Three reviews that examined data from 26 observational cohort or case-control studies met the criteria for inclusion in the review of observational data.⁷⁰⁻⁷²

All of these compared breast cancer outcomes in cancer survivors to 'body fatness', as measured by body mass index (BMI) (see chapter 6.1). The results of these studies were generally consistent. An overall increased risk of mortality with increasing BMI was reported, although there was some heterogeneity in study results.

Of 21 studies that followed cases for at least 5 years, 12 showed statistically significant associations between higher BMI and worse outcome, while others showed insignificant results or were null. One study found that mortality risk decreased as BMI increased. Physical activity was associated with an enhanced quality of life in cancer survivors.

While this information suggests that higher body fatness before diagnosis leads to a worse outcome, and also that physical activity may be beneficial in breast cancer survivors, it is nevertheless insufficient to justify any firm judgement on body fatness specifically in relation to cancer survivors.

The Panel is aware of two large observational studies that investigated physical activity in breast cancer survivors. A study of nearly 3000 breast cancer survivors in the Nurses' Health Study reported reduced risk of breast cancer mortality in women who were physically active, compared with sedentary women.⁷³ In a second study of over 1200 women, physical activity measured before diagnosis of breast cancer was associated with reduced all-cause mortality; this association was statistically significant in women who were overweight or obese at diagnosis.⁷⁴

9.5 Comparison with the previous report

The previous report did not include any review, assessment, or recommendations directed at cancer survivors. The panel responsible for that report stated that its recommendations were especially important for population groups and people most susceptible to cancer.

9.6 Conclusions

The Panel concludes:

Research into the effects of food, nutrition, and physical activity in cancer survivors is in its early stages. For this reason, and also because of the scale and heterogeneity of the field, the evidence reviewed here is inconclusive.

Regular physical activity and other measures that control weight may help prevent recurrence of breast cancer and improve quality of life. When able to do so, cancer survivors may gain general health benefit and a sense of control over their circumstances from regular physical activity.

The evidence does not support the use of high-dose supplements of microconstituents as a means of improving outcomes in people with a diagnosis of cancer.

Cancer survivors should consult their physician and/or a qualified nutrition professional who can evaluate the safety and efficacy of specific dietary supplements, and offer advice based on current research relevant to their particular clinical situation.

As with all the chapters in Part 2 of this Report, the Panel's recommendations for cancer survivors are in Part 3, Chapter 12.