

## WEB EXCLUSIVES

# Survivorship: Long-Term and Late Effects

*The impact of cancer-killing therapies puts survivors at risk for future health problems*

After completing therapy, you may continue to experience side effects or develop new problems associated with your treatment.

Unwanted effects of cancer therapy are common, and the onset of complications can vary widely. Advances in diagnosis and treatment have led to a rapidly growing population of survivors. This, in turn, has led to new recognition of long-lasting treatment risks, the need for new models of survivorship care, and the need for more research on cancer survivorship. These issues are beginning to be addressed at the growing number of survivorship centers and clinics in the United States and around the world.

## Long-Term Survivorship

Some problems, such as fatigue or cognitive dysfunction, can begin during therapy and may continue indefinitely, though the duration and severity differs greatly between individuals. Conditions that start during therapy and persist for months or years, sometimes referred to as long-term effects, differ from those that start well after therapy has been completed, which are considered late effects.

Researchers know that some late effects of treatment, such as second cancers, tend to occur within a specific period of time. For example, leukemia and other blood cancers caused by some chemotherapy drugs tend to develop within several years after treatment. In contrast, the risk of solid cancers, which can be caused by radiation, continues to increase even beyond 10 years after therapy.

[View Illustration: Lymphedema: Disrupting the Flow](#)

Three large studies involving more than a million patients total indicate that adult cancer survivors have almost twice the risk of having a second cancer as healthy controls. But experts say the total risk for the population is misleading because the actual risk of a second cancer differs among survivors and is influenced by numerous factors, including the type of primary cancer, type of treatment received (see [“Cancer Therapies”](#)), age at diagnosis, genetics (see [“Genetic Risk”](#)), and environmental influences, such as smoking.

Most of the risk for treatment-related second cancers will depend on if you received radiation therapy or certain chemotherapy agents. Thus far, a few types of drugs have been implicated in causing second cancers: topoisomerase II inhibitors, such as Vepesid (etoposide); anthracyclines, such as Adriamycin (doxorubicin); and alkylating agents, including Cytoxan (cyclophosphamide). Each of these treatments damage DNA in the tumor cells and can cause mutations in rapidly dividing healthy cells in the body, leaving you at risk for new malignancies.

Another possible effect of therapy, called lymphedema, is characterized by chronic swelling that impacts about one in five patients who undergo cancer treatment that requires the removal of or injury to lymph nodes. The condition is caused by the backup of lymphatic fluid that results from damage to lymph nodes, and as this fluid builds up, the affected area can increase in size. While there is no cure for lymphedema, it can be treated and managed once it is recognized.

While both adult and pediatric cancer survivors experience post-therapy effects, more is known about survivors of pediatric cancer because researchers began gathering long-term survival data in pediatric cancers earlier. Data from the Childhood Cancer Survivor Study, which started in 1993, show that of more than 10,000 survivors, two-thirds had at least one chronic health condition and a third had multiple problems.

Because risk varies depending on the therapy used, physicians have put together a comprehensive list of treatments and the long-term complications associated with them, including heart damage, bone loss, and infertility. The information can be found at [www.survivorshipguidelines.org](http://www.survivorshipguidelines.org). To help survivors understand the implications of the data, specific recommendations are included about who should undergo what type of screening and at what frequency, based on treatment history. The guidelines are for childhood cancer survivors, but are applicable to adult cancer survivors as well.

The issue of research in adults is complicated by the fact that as people age, they develop other medical problems, or comorbidities. It is, therefore, difficult to determine if such problems are because of treatment, aging, or an interaction between the two. Researchers are just beginning to systematically look at the physical and psychological issues of being a survivor of adult cancer.

## Prevention and Management

In addition to looking for ways to treat lasting effects, researchers hope newer therapies will cause fewer problems. Molecularly targeted therapies, such as Gleevec (imatinib) and Herceptin (trastuzumab), are designed to treat the disease

without damaging healthy tissues—that should mean fewer long-term and late side effects (although Herceptin is known to cause heart damage in a small percentage of patients).

Clinical researchers are also looking for ways to modify existing therapies to limit the problems they cause. Such changes include using narrower fields of radiation and lower doses of chemotherapy. The American Society of Clinical Oncology has even established a Survivorship Task Force that will develop a template for physicians that details possible long-term and late effects of different treatments and provides guidance on monitoring for cancer recurrence.

Specialists can be found at survivorship clinics (see [Toolbox](#)), which are often located at major cancer centers and at some large hospitals. As survivorship issues gain more attention, more clinics are expected to open around the country.