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Memorial Sloan Kettering
Cancer Center

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on cancer, asking Congress to appropriate \$100 million to launch a campaign to find a cure. In December of that year, with broad bipartisan support, President Nixon signed the National Cancer Act. This set the stage for significant advances in understandings about the biology of cancer and helped to move the fruits of research into clinical care.



Memorial Sloan Kettering President Craig B. Thompson

Forty years ago, a cancer diagnosis meant almost certain death for most patients. Since then, tremendous progress has been made, and the anniversary of the signing of the National Cancer Act offers an opportunity to reflect on where we are today and how much further we still have to go.

Perhaps the most transformative thing we've learned since 1971 is that cancer is not a single enemy against which we can win or lose but an array of diseases that must be attacked on many different fronts with a range of tools. This more sophisticated understanding is revolutionizing the practice of cancer care, and burgeoning knowledge about the fundamental genetic complexities underlying the disease is leading to increasingly personalized approaches to detecting, diagnosing, treating, and ultimately preventing the disease. From manipulating our own immune systems to fight cancer, to molecularly targeting treatments, to turning cancer into a chronic disease for many people, the advances we are seeing today are as important and exciting as any in the history of medicine.

First, some of the good news in terms of the statistics: Since 1971, the average five-year survival rate for patients with all types of cancer has increased by 18 percent, and the overall cancer death rate has dropped by 17 percent since the early 1990s. Today, two out of three patients with cancer live at least five years after a diagnosis and there are nearly 12 million cancer survivors in the United States alone.

One of the clearest examples of the personalization of cancer care is the diagnostic testing now routinely used to select treatments in a number of cancers including breast, lung, and colon. Matching patients with targeted drugs based on the molecular profiles of their tumors means improved outcomes and often the ability to spare patients the toxicities of systemic treatments.

In addition, technologies and tests developed and refined since the late 1970s, including mammography and colonoscopy, now allow us to detect cancer in its early stages when it is most treatable. Spiral CT scans for [lung cancer](#), prostate-specific antigen testing for [prostate cancer](#), and other biomarkers are finding places in our armamentarium as well and can lead to even earlier detection in selected groups of high-risk patients.

Over the past forty years we've also learned what we can do in our own lives to prevent the disease. Stopping smoking — or never starting — healthy eating habits, and exercise are some of our best defenses. And vaccines against the human papillomavirus (known to cause some forms of [cervical cancer](#) as well as certain types of head and neck cancers) and hepatitis B (known to lead to liver cancer) are significant developments in the effort to prevent some of the world's deadliest cancers.

Another profound change — particularly of the past decade — is that for many people, cancer has been transformed into a chronic, manageable disease

rather than a death sentence. Today, patients can receive a combination of established drugs used in innovative new ways to stop cancer in its tracks and forestall its recurrence; and if one regimen stops working, very often another drug or treatment approach is available that will offer another long-term remission. There are also exciting new drugs that, while not offering what would traditionally be called a “cure,” can provide patients with survival that extends over many years.

Gleevec® (imatinib) has become perhaps the most well-known example of this type of drug. Approved by the US Food and Drug Administration for the treatment of chronic myeloid leukemia (CML) and a rare form of [stomach cancer](#) called gastrointestinal stromal tumor (GIST), it represents a new class of cancer drugs — and a new way of thinking about the disease. Gleevec targets abnormal proteins that are fundamental to the cancer itself, homing in on specific cancer-causing molecules and eliminating cancer cells while not damaging other, healthy cells. Patients on Gleevec take a pill once or twice a day that arrests their disease and allows them to have a relatively normal life span with few side effects.

Looking ahead, I believe we'll see increasing successes in engaging our bodies' own defense systems to fight cancer. A drug called Yervoy® (ipilimumab), approved by the FDA in 2011 for the treatment of metastatic [melanoma](#), exploits the body's immune system to fight cancer. Another drug, Provenge® (sipuleucel-T), also approved by the FDA this year for prostate cancer, is a therapeutic vaccine. Unlike a preventive vaccine, which bolsters the immune system to protect people from contracting an illness, Provenge marshals the immune system's disease-fighting forces in men who already have prostate cancer. Even more recently, researchers have begun to treat patients with leukemia using their own T cells (a type of white blood cell that fights infections and tumors). Genes are inserted into the T cells and program the cells to attack the cancer. [Read more about this type of therapy using engineered cells.] It's too early to know how often this type of treatment will be successful, but it is a significant turning point in the development of gene therapies against cancer.

Although there are currently a range of cancers for which we can offer patients the chances either of a cure or long-term disease-free survival, there remain many forms of the disease that we still have difficulty diagnosing at a stage at which they can be effectively treated — and for which we do not have many effective therapies.

In the coming decade we have to continue to invest in the rigorous scientific research that has produced the progress we have made so far, including fostering collaborations not only within our own institution but inter-institutionally, so that as much new knowledge as possible will be brought to patients as quickly as possible. We need to invest in training basic scientists and clinicians committed to translating laboratory discoveries into clinical practice. We need to give renewed focus to clinical trials, which have been the cornerstone in proving which therapies are most effective in treating cancer. We need to do even more to prevent cancer and work to improve technologies and tests so that cancers that do arise are diagnosed at the earliest possible stages. And because more people are living longer, healthier lives after having had cancer, we must see to it that they get the support they need.

By investing in innovative new models of research, treatment, prevention, and training, we can continue to reduce and, some day, even eliminate the scourge of cancer both in our own nation and around the globe.

Because it's football season, I'll conclude with a football analogy to describe where I think we are in the struggle against cancer: It's halftime — we've scored points, but the game's not over.

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