
Fact Sheet

Prostate Cancer

In 2007, an estimated 220,000 men in the United States will be diagnosed with prostate cancer and about 28,000 men will die from the disease. Since 1994, the death rate for prostate cancer has decreased by 4 percent each year, and, in 2004, there were an estimated 2 million prostate cancer survivors in this country. A recent report on cancer mortality shows that, in 2004, the overall death rate from prostate cancer among American men was 25 per 100,000. This is in contrast to the mid-1970s, when the annual death rate from prostate cancer in the U.S. was approximately 31 per 100,000 men.

Yesterday

- Early treatment options for prostate cancer included surgery, radiation therapy, and hormonal therapy (i.e., reducing male hormone levels either by removing the testicles or by administering estrogens, including diethylstilbestrol [DES]). Because the growth of prostate cancer cells initially requires male hormones, such as testosterone, prostate tumors often can be treated by methods that lower blood levels of these hormones.
- In 1974, the National Institutes of Health (NIH) established the National Prostatic Cancer Project, an initiative that enabled collaborations among cancer researchers, epidemiologists, and pathologists to plan, coordinate, direct, and monitor the research being pursued in prostate cancer.
- In the late 1980s, the widespread adoption of the prostate-specific antigen (PSA) test represented a major improvement in the management of prostate cancer. This test measures the amount of PSA protein in the blood, which is often elevated in patients with prostate cancer.
- In 1986, the U.S. Food and Drug Administration approved the use of the PSA test to monitor patients with prostate cancer and, in 1994, additionally approved its use as a screening test for this disease.

Today

- Due to the widespread implementation of PSA testing in the United States, approximately 90 percent of all prostate cancers are currently diagnosed at an early stage, and, consequently, men are surviving longer after diagnosis. However, the results of two ongoing clinical trials – the NIH-sponsored Prostate, Lung, Colorectal, and Ovarian screening trial and the European Study of Screening for Prostate Cancer – will be needed to determine whether PSA screening actually saves lives.
- Advances in the treatment of prostate cancer include new surgical approaches and improvements in radiotherapy. For example, surgeons developed a technique that allows the removal of the prostate while minimizing nerve damage, thereby decreasing adverse side effects. In addition, clinical researchers improved a radiotherapy technique known as brachytherapy, which involves the implantation of a small amount of radioactive material (seeds) into the prostate. This radiation method is an effective treatment for early-stage prostate cancer.
- African American men have mortality rates that are more than twice the rates observed in other racial and ethnic groups in the United States. An ongoing NIH-supported study is investigating a variety of risk factors that may contribute to the higher incidence and mortality rates observed in African American men.

- Advances in hormonal therapy for prostate cancer have included the development of gonadotropin-releasing hormone (GNRH) agonists, which inhibit the pituitary gland's ability to stimulate the testes to make testosterone. Results of a clinical trial showed that the GNRH agonist leuprolide was equivalent to DES in reducing blood levels of testosterone but caused less cardiovascular toxicity. Other GNRH agonists used today include goserelin, triptorelin, and histrelin.
- Advances were also made in chemotherapy for prostate cancer. In 2004, results from two large NIH-sponsored clinical trials showed that use of the drug docetaxel could prolong the survival of men who had advanced prostate cancer that no longer responded to hormonal therapy.
- The Prostate Cancer Prevention Trial, which enrolled nearly 19,000 healthy men, found that finasteride, a drug approved for the treatment of benign prostatic hyperplasia, which is a noncancerous enlargement of the prostate, reduced the risk of developing prostate cancer by 25%. This was the first study to demonstrate that a drug could be used to prevent prostate cancer. Another trial, the Selenium and Vitamin E Cancer Prevention Trial, is studying more than 35,000 men to determine whether daily supplements of selenium and vitamin E can reduce the incidence of prostate cancer in healthy men. Other prostate cancer prevention trials are currently evaluating the protective potential of multivitamins, vitamins C and D, soy, green tea, and lycopene, which is a natural compound found in tomatoes.
- NIH's commitment to basic research has led to recent discoveries that are shedding light on the molecular origins of prostate cancer. A study reported in 2005 showed that specific genes were fused in 60 to 80% of the prostate tumors analyzed. This study represents the first observation of non-random gene rearrangements in prostate cancer. This genetic alteration may eventually be used as a biomarker to aid in the diagnosis and, possibly, treatment of this disease. Other studies have shown that genetic variations in a specific region of chromosome 8 can increase a man's risk of developing prostate cancer. These genetic variations account for approximately 25% of the prostate cancers that occur in white men. They are the first validated genetic variants that increase the risk of developing prostate cancer.
- NIH also supports research that examines how proteins circulating in a patient's blood can be used to improve the diagnosis of prostate and other cancers. In 2005, NIH-supported scientists identified a group of autoantibodies – specific proteins produced by a patient's immune system in response to tumors – that was able to detect the presence of prostate cancer cells in blood specimens with greater than 90% accuracy. These and other blood proteins may eventually be used to reduce the number of false-positive results obtained with PSA testing alone and, in turn, reduce the large number of unnecessary prostate biopsies that are performed each year due to false-positive PSA test results.

Tomorrow

- NIH is committed to supporting research into the biological and molecular mechanisms of prostate cancer. Programs such as the Early Detection Research Network and the Clinical Proteomic Technologies Initiative are supporting research to identify biomarkers – substances in blood and tissues – to aid not only in diagnosis but also in prognosis. Furthermore, an NIH initiative is supporting a partnership of scientists who are studying the use of nanoparticles to improve our ability to image (visualize) prostate tumors. These new technologies could lead to more precise targeting of therapies.
- To support investigations into the molecular mechanisms of prostate cancer, a collection of high-quality blood and tissue specimens from prostate cancer patients was established, called a biorepository, which can be used to evaluate genes and proteins as potential clinical biomarkers or targets for drug development.
- Advances are also being made in the development of new surgical techniques, such as robotic-assisted laparoscopic surgery, which may help decrease the time needed to recover from surgery and shorten the length of hospitalization.
- Ongoing NIH-supported clinical trials are evaluating new treatments for prostate cancer. These include studies of molecularly-targeted agents, novel drug combinations, and vaccines designed to help a patient's own immune system fight this disease.

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