FACT SHEET

# Prostate Cancer

NATIONAL INSTITUTES OF HEALTH

## Yesterday

- In 1975, the annual prostate cancer incidence rate among U.S. males was 94 new cases diagnosed per 100,000 men; the mortality rate was 31 deaths per 100,000 men. The incidence rates among white men and African American men were 92 and 141 new cases, respectively, per 100,000 men; the mortality rates for white men and African American men were 29 and 56 deaths, respectively, per 100,000 men.
- Treatment options for localized prostate cancer included surgery (open prostatectomy) and radiation therapy. Men with more advanced disease were treated with hormonal therapy, in which the level of male hormones was reduced either by removal of the testicles or by administration of estrogens, such as diethylstilbestrol (DES). Hormonal therapy can slow the growth of prostate tumors because prostate cancer cells frequently require male hormones, such as testosterone, to grow.
- In 1986, the U.S. Food and Drug Administration (FDA) approved the use of the serum PSA test to monitor patients with prostate cancer; in 1994, the PSA test was additionally approved as a prostate cancer screening test. PSA, or prostate-specific antigen, is a protein that is often found in increased amounts in the blood of patients with prostate cancer. The introduction of widespread PSA screening led to a dramatic increase in the incidence rate of prostate cancer, which peaked at 237 new cases diagnosed per 100,000 American men in 1992.

## Today

- In 2007, the latest year for which we have updated statistics, the U.S. incidence rate for prostate cancer was approximately 166 new cases diagnosed per 100,000 men; the mortality rate was approximately 24 deaths per 100,000 men. The prostate cancer death rate in this country has been declining since 1991–1994, when it peaked at an annual rate of 39 deaths per 100,000 men. Although the prostate cancer death rate has declined for both white men and African American men, the disparity in deaths from this disease persists.
- To address the disparities in prostate cancer incidence and mortality between white men and African American men, NIH-supported researchers are investigating a variety of genetic and other factors that may contribute to the higher incidence and death rates observed among African American men.
- Due to the widespread implementation of PSA screening in the United States, more than 90 % of all prostate cancers are diagnosed at an early stage. Whether this earlier detection actually reduces the number of prostate cancer deaths is controversial and is being studied in two ongoing randomized clinical trials – the NIH-sponsored Prostate, Lung, Colorectal, and Ovarian screening trial (http://www.cancer.gov/cancertopics/factsheet/detection/plco-prostate) and the European Study of Screening for Prostate Cancer. Initial results from these trials, published in 2009, showed that PSA screening produced, at best, only a small reduction in the number of prostate cancer deaths. This benefit, however, came at a cost: many more cancers were diagnosed and treated in the screened group than in the control (unscreened) group. These findings suggest that PSA screening can lead to the diagnosis and treatment of some prostate cancers that will not cause symptoms or threaten a man's life, phenomena known as overdiagnosis and overtreatment (i.e., unnecessary treatment). The major side effects of prostate cancer treatment include urinary incontinence and sexual impotence.
- 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. In addition, laparoscopic and robot-assisted surgical methods are also widely used, although evidence of their superiority to open prostatectomy is lacking. Furthermore, clinical researchers have refined a radiotherapy technique known as brachytherapy, which involves the implantation of small sources of radioactivity (radioactive seeds) into the prostate. This radiation method is an effective treatment for early-stage prostate cancer.

- 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. Additional prostate cancer treatments that interfere with the production or activity of male hormones and are used today include the drugs degarelix, flutamide, bicalutamide, nilutamide, and ketoconazole.
- Advances have also been made in chemotherapy for prostate cancer. In 2004, results from two large NIH-sponsored clinical trials showed that use of the drug docetaxel can prolong the survival of men who have advanced prostate cancer that no longer responds to hormonal therapy. Another drug, cabazitaxel, approved in 2010, improves the survival of men whose prostate cancer no longer responds to docetaxel.
- In 2010, sipuleucel T, a cancer treatment vaccine that improves the survival of men with advanced prostate cancer, was approved by the FDA. This vaccine is created using a patient's own immune cells. The cells are removed from the patient's body, activated, and then infused into the patient's bloodstream to boost the immune response to his cancer.
- In 2003, the NIH-sponsored Prostate Cancer Prevention Trial (http://www.cancer.gov/cancertopics/factsheet/prevention/pcpt) demonstrated that hormonal therapy with finasteride, a drug approved for the treatment of benign prostatic hyperplasia (a noncancerous enlargement of the prostate) reduced the risk of developing prostate cancer by 25%. This was the first study to show that a drug could be used to prevent this disease. In 2010, a similar drug, dutasteride, was also found to reduce the risk of prostate cancer in men at higher than average risk for the disease.
- In 2005, NIH-funded researchers discovered that about half of prostate cancers have a genetic alteration that results from the fusion of two specific genes. Further study of this alteration is helping scientists better understand the biology of prostate cancer and may ultimately lead to improved diagnosis and treatment of the 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 and may eventually lead to a better understanding of the genetic basis of this cancer.
- For the past 2 years, the National Cancer Institute, which is part of NIH, has offered a multidisciplinary clinic for men with newly diagnosed prostate cancer and men at high risk of the disease. The clinic's staff, which includes a urologist, a radiation oncologist, and a medical oncologist, provides patients with all of the information necessary to make fully informed treatment decisions. High-resolution magnetic resonance imaging (MRI) is also available. MRI scans, which provide much better anatomical detail than was previously possible, are helpful in evaluating the local extent of cancer, performing targeted biopsies, and monitoring changes within the prostate over time.

## Tomorrow

- Several clinical trials, including one sponsored in part by NIH, are comparing "active surveillance" (a form of disease management in which treatment is deferred until certain clinical or PSA changes are evident) with immediate treatment for men with early-stage, low-grade prostate cancer. Deferring treatment may allow men diagnosed with disease that will never cause symptoms or threaten their lives to avoid radical treatment while still ensuring that men with aggressive disease are treated in time.
- Other NIH-supported clinical trials are evaluating new treatments for prostate cancer, such as molecularly targeted agents and additional vaccines.
- NIH is also supporting research to identify biomarkers — substances in blood, urine, and other tissues—that will aid not only in prostate cancer diagnosis but also in determining prognosis and in identifying appropriate treatments.

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