

Early Prostate Cancer

Key Points

- The prostate is a gland in the male reproductive system that makes and stores a component of semen (see Question 1).
- The most common risk factor for prostate cancer is age (see Question 3).
- Most of the time prostate cancer does not initially cause symptoms. By the time symptoms do occur, the disease may have spread beyond the prostate (see Question 4).
- The symptoms of prostate cancer can also be caused by noncancerous conditions (see Questions 4 and 5).
- Two tests can be used to detect prostate cancer in the absence of symptoms: A digital rectal exam (DRE) and a blood test to detect a substance made by the prostate called prostate-specific antigen (PSA) (see Questions 6 and 7).
- A diagnosis of prostate cancer can be confirmed only by biopsy (see Question 9).
- Prostate cancer is described by both grade and stage (see Question 9).
- Three treatment options are generally accepted for men with localized prostate cancer: Radical prostatectomy, radiation therapy, and active surveillance (also called watchful waiting) (see Questions 10, 11, and 12).

1. What is the prostate?

The prostate is a gland in the male reproductive system. The prostate makes and stores a component of semen and is located in the pelvis, under the bladder and in front of the rectum. The prostate surrounds part of the urethra, the tube that empties urine from the bladder. A healthy prostate is about the size of a walnut. Because of the prostate's location, the flow of urine can be slowed or stopped if the prostate grows too large.

2. What is prostate cancer?

Prostate cancer forms in the tissues of the prostate. Except for skin cancer, cancer of the prostate is the most common cancer in American men. It was estimated that more than 186,000 men in the United States would be diagnosed with prostate cancer in 2008 (1). In most men with prostate cancer, the disease grows very slowly. The majority of men with low-grade, early prostate cancer (which means that cancer cells have been found only in the prostate gland) live a long time after their diagnosis. Even without treatment, many of these men will not die of prostate cancer, but rather will live with it until they eventually die of some other, unrelated cause. Nevertheless, it was estimated that nearly 29,000 men would die from prostate cancer in 2008 (1).

3. Who is at risk for prostate cancer?

An important risk factor is age; more than 70 percent of men diagnosed with this disease are over the age of 65. African American men have a substantially higher risk of prostate cancer than white men, including Hispanic men. In addition, dramatic differences in the incidence of prostate cancer are seen in different populations around the world.



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Genetic factors appear to play a role in prostate cancer development, particularly among families in which the diagnosis is made in men under age 60. The risk of prostate cancer rises with the number of close relatives who have the disease.

Some evidence suggests that dietary factors may increase or decrease the risk of prostate cancer.

4. What are the symptoms of prostate cancer?

Most of the time, prostate cancer does not initially cause symptoms. By the time symptoms do occur, the disease may have spread beyond the prostate. Symptoms of prostate cancer may include the following:

- Urinary problems:
 - Not being able to urinate.
 - Having a hard time starting or stopping the flow of urine.
 - Needing to urinate often, especially at night.
 - Weak flow of urine.
 - Urine flow that starts and stops.
 - Pain or burning during urination.
- Difficulty having an erection.
- Blood in the urine or semen.
- Frequent pain in the lower back, hips, or upper thighs.

Although these symptoms can be symptoms of cancer, they are much more likely to be caused by noncancerous conditions. It is important to check with a doctor.

5. What other prostate conditions can cause symptoms like these?

As men get older, their prostate may grow bigger and block the flow of urine or interfere with sexual function. This common condition, called benign prostatic hyperplasia (BPH), is not cancer, but it can cause many of the same symptoms as prostate cancer. Although BPH may not be a threat to life, it may require treatment with medicine or surgery to relieve symptoms. An infection or inflammation of the prostate, called prostatitis, may also cause many of the same symptoms as prostate cancer. Again, it is important to check with a doctor.

6. Can prostate cancer be found before a man has symptoms?

Yes. Prostate cancer screening is looking for the disease before a person has any symptoms. Two screening tests commonly used to detect prostate cancer in the absence of symptoms are the digital rectal exam (DRE), in which a doctor feels the prostate through the rectum to find hard or lumpy areas, and a blood test that detects a substance made by the prostate called prostate-specific antigen (PSA). Together, these tests can detect many "silent" prostate cancers that have not caused symptoms. Due to the widespread use 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.

7. How reliable are the screening tests for prostate cancer?

Neither of the screening tests for prostate cancer is perfect. Most men with an elevated PSA level do not have prostate cancer (false positives), and some men with prostate cancer have a low PSA level (false negatives). The DRE is also associated with false positives and false negatives. Using the DRE and PSA together will miss fewer cancers (greater sensitivity) but also increases the number of false positives and subsequent biopsies in men without cancer (lower specificity).

The National Cancer Institute's (NCI) Early Detection Research Network (EDRN) has a Prostate Collaborative Group that is exploring a variety of strategies to find better ways to detect prostate cancer early. In addition, NCI's prostate cancer Specialized Program of Research Excellence (SPORE) is funding projects to identify new diagnostic and prognostic biological markers, or biomarkers, of prostate cancer besides PSA.

8. Does prostate cancer screening save lives?

The benefits of screening and local therapy (surgery or radiation therapy) for early prostate cancer remain unclear, and it is not known for certain whether prostate cancer screening saves lives. Because of this

uncertainty, NCI, which is part of the National Institutes of Health, is supporting research to learn more about screening for prostate cancer. Currently, researchers are conducting a large randomized clinical trial, called the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial, to determine whether screening with PSA tests and DREs reduces the death rate from this disease. The researchers are also assessing the risks of screening. Specifically, men who have an elevated PSA level or a suspicious DRE are more likely to have a biopsy, which is an invasive procedure, and, if the biopsy is positive, the risks of surgery, radiation therapy, and even active surveillance (also called watchful waiting) must be taken into account.

Initial results from the PLCO trial showed that annual PSA testing for 6 years and DRE testing for 4 years (performed in the same years as the first four PSA tests) did not reduce the number of prostate cancer deaths through a median follow-up period of 11.5 years (range 7.2 to 14.8 years) (2). At 7 years of follow-up, a point in time when follow-up of the participants was essentially complete, 23 percent more cancers had been diagnosed in the screening group than in the control group, in which men were randomly assigned to “usual care.” These results suggest that many men were diagnosed with, and treated for, cancers that would not have been detected in their lifetime without screening and were consequently exposed to the potential harms of unnecessary treatments, such as surgery and radiation therapy. Nonetheless, it remains possible that a small benefit from the earlier detection of these “excess” cancers could emerge with longer follow-up. Therefore, follow-up of the PLCO participants will continue until all participants have been followed for at least 13 years.

In contrast, initial results from another large randomized, controlled trial of prostate cancer screening, called the European Randomized Study of Screening for Prostate Cancer (ERSPC), found a 20 percent reduction in prostate cancer deaths associated with PSA testing every 4 years (3). At the time the results were reported, the participants had been followed for a median of 9 years. The average number of PSA tests per participant in ERSPC was 2.1. Most participating centers in this trial used a lower PSA cutoff value as an indicator of abnormality than was used in the PLCO trial (3.0 nanograms per milliliter versus 4.0 nanograms per milliliter). As in the PLCO trial, many more cancers were diagnosed in the screening group than in the control group. The ERSPC researchers estimated that 1,410 men would have to be screened and 48 additional cancers would have to be detected to prevent one death from prostate cancer.

9. How is prostate cancer diagnosed?

A diagnosis of prostate cancer can be confirmed only by biopsy. During a biopsy, a urologist (a doctor who specializes in diseases of urinary and sex organs in men, and urinary organs in women) removes tissue samples, usually with a needle. This is generally done in the doctor’s office with local anesthesia. Then, a pathologist (a doctor who identifies diseases by studying tissues under a microscope) checks for cancer cells.

Men may have blood tests to see if the cancer has spread. Some men also may need the following imaging tests:

- **Bone scan:** A doctor injects a small amount of a radioactive substance into a blood vessel, and it travels through the bloodstream and collects in the bones. A machine called a scanner detects and measures the radiation. The scanner makes pictures of the bones on a computer screen or on film. The pictures may show cancer that has spread to the bones.
- **Computerized tomography (CT) scan:** An x-ray machine linked to a computer takes a series of detailed pictures of areas inside the body. Doctors often use CT scans to see the pelvis or abdomen.
- **Magnetic resonance imaging (MRI):** A strong magnet linked to a computer is used to make detailed pictures of areas inside the body.

Prostate cancer is described by both grade and stage.

- **Grade** describes how closely the tumor resembles normal glandular tissue of the prostate. Based on the microscopic appearance of the tumor tissue, pathologists may describe it as low-, medium-, or high-grade cancer. One way of grading prostate cancer, called the Gleason system, uses scores of 2 to 10. Another system uses G1 through G4. In both systems, the higher the score, the higher the grade of the tumor. High-grade tumors generally grow more quickly and are more likely to spread than low-grade tumors.

- **Stage** refers to the extent of the cancer. Early prostate cancer, stages I and II, is localized. It has not spread outside the prostate gland. Stage III prostate cancer, often called locally advanced disease, extends outside the gland and may be in the seminal vesicles. Stage IV means the cancer has spread beyond the seminal vesicles to lymph nodes and/or to other tissues or organs.

10. How is localized prostate cancer treated?

Three treatment options are generally accepted for men with localized prostate cancer: Radical prostatectomy, radiation therapy (with or without hormonal therapy), and active surveillance (also called watchful waiting).

- **Radical prostatectomy** is a surgical procedure to remove the entire prostate gland and nearby tissues. Sometimes lymph nodes in the pelvic area (the lower part of the abdomen, located between the hip bones) are also removed. Radical prostatectomy may be performed using a technique called nerve-sparing surgery that may prevent damage to the nerves needed for an erection. However, nerve-sparing surgery is not always possible.
- **Radiation therapy** involves the delivery of radiation to the prostate. Radiation therapy is usually administered in an outpatient setting using an external beam of radiation. Radiation can also be delivered in a technique known as brachytherapy, which involves implanting radioactive seeds directly into, or very close to, the tumor using a needle. Patients with high-risk prostate cancer are candidates for adding hormonal therapy to standard radiation therapy.
- **Active Surveillance (watchful waiting)** may be an option recommended for patients with early-stage prostate cancer, particularly those who have low-grade tumors with only a small amount of cancer seen in the biopsy specimen. These patients have regular examinations, PSA tests, and, sometimes, scheduled biopsies. If there is evidence of cancer growth, active treatment may be recommended. Older patients and those with serious medical problems may also be good candidates for active surveillance.

11. How does a patient decide what the best treatment option is for localized prostate cancer?

Choosing a treatment option involves the patient, his family, and one or more doctors. They will need to consider the grade and stage of the cancer, the man's age and health, and his values and feelings about the potential benefits and harms of each treatment option. Since both surgery and radiation therapy are options for localized disease, consultation with both a urologist and a radiation oncologist is recommended. Often it is useful to seek additional opinions—from the same type of doctor, an internist, a family practice physician, or a medical oncologist. Because there are several reasonable options for most patients, patients may hear different opinions and recommendations and the decision can be difficult. However, patients should try to get as much information as possible and allow themselves enough time to make a decision. There is rarely a need to make a decision without taking time to discuss and understand the pros and cons of the various approaches.

12. Where can a person find more information about prostate cancer and its treatment?

NCI has several other resources that readers may find helpful, including the following:

- The Prostate Cancer Home Page provides links to NCI resources about prevention, screening, treatment, clinical trials, and supportive care for this type of cancer. This page can be found on NCI's Web site at <http://www.cancer.gov/cancertopics/types/prostate> on the Internet.
- *Prostate Cancer Treatment (PDQ®)* includes information about prostate cancer treatment, including surgery, chemotherapy, radiation therapy, and hormone therapy. This summary of information from PDQ, the NCI's comprehensive cancer information database, is available at <http://www.cancer.gov/cancertopics/pdq/treatment/prostate/patient> on the Internet.
- *Treatment Choices for Men With Early-Stage Prostate Cancer* describes the treatment choices available to men diagnosed with early-stage prostate cancer and examines the pros and cons of each treatment. This NCI booklet is available at <http://www.cancer.gov/cancertopics/prostate-cancer-treatment-choices> on the Internet.

Selected References

1. American Cancer Society (2008). *Cancer Facts and Figures 2008*. Atlanta, GA: American Cancer Society. Retrieved March 18, 2009, from <http://www.cancer.org/downloads/STT/2008CAFFfinalsecured.pdf>.
2. Andriole G, Crawford E, Grubb R, et al. Seven year mortality results and related findings from the prostate component of the PLCO randomized cancer screening trial. *New England Journal of Medicine*. Published online ahead of print March 18, 2009.
3. Schröder FH, Hugosson J, Roobol MJ, et al. Screening and prostate-cancer mortality in a randomized European study. *New England Journal of Medicine* 2009; 360(13):1320–1328.

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Related NCI materials and Web pages:

- National Cancer Institute Fact Sheet 5.29, *Prostate-Specific Antigen (PSA) Test* (<http://www.cancer.gov/cancertopics/factsheet/Detection/PSA>)
- *Understanding Prostate Changes: A Health Guide for Men* (<http://www.cancer.gov/cancertopics/understanding-prostate-changes>)
- *What You Need To Know About™ Prostate Cancer* (<http://www.cancer.gov/cancertopics/wyntk/prostate>)

How can we help?

We offer comprehensive research-based information for patients and their families, health professionals, cancer researchers, advocates, and the public.

- **Call** NCI's Cancer Information Service at 1–800–4–CANCER (1–800–422–6237)
- **Visit** us at <http://www.cancer.gov> or <http://www.cancer.gov/espanol>
- **Chat** using LiveHelp, NCI's instant messaging service, at <http://www.cancer.gov/livehelp>
- **E-mail** us at cancergovstaff@mail.nih.gov
- **Order** publications at <http://www.cancer.gov/publications> or by calling 1–800–4–CANCER
- **Get help** with quitting smoking at 1–877–44U–QUIT (1–877–448–7848)

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