

## Localized Prostate Cancer and its Treatment: A Patient Guide

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<http://urology.ucsf.edu/patient-care/cancer/prostate-cancer>

This document is intended for men newly diagnosed with prostate cancer, where the cancer is believed to be localized to the prostate and regional lymph nodes. In some cases, more advanced disease may be managed with the treatment described here. The goal is to give the reader the information needed to be well informed when having treatment decision discussions with their providers. Words that are bolded can be found in the glossary at the end of this document.

Understanding prostate cancer and choosing among the various treatment options can be a difficult and anxiety-provoking process. We have prepared this publication to help you learn more about prostate cancer so you can feel more confident in the course of treatment you choose. Advances in the early detection of prostate cancer mean that the disease can be treated effectively in most men, who can usually expect an otherwise normal life expectancy. Additionally, many men may need no treatment, an initial strategy called “Active Surveillance.” There is a great reason to feel hope and optimism for your future.

For some people, most of the information presented here may be completely new. Others may already be well informed about prostate cancer and its treatment. Either way, please do not feel that this material has to be fully absorbed and understood in one reading. Reviewing portions of the material and discussing it with your physicians, family, and other men with prostate cancer can make this information more useful. Your physicians in UCSF will be available to answer all your questions as you go through your decision making and treatment. We are all here for you.

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*Areas covered in this guide include:*

- How prostate cancer is detected and diagnosed
- Available treatments, their effectiveness, and their effects on quality of life
- Effective ways of coping with the stress related to a cancer diagnosis

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## Introduction

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### *How Common Is Prostate Cancer?*

**Prostate** cancer is the most common cancer, other than skin cancer, in American men and is the second leading cause of cancer death in men. 1 in 9 American men born today will be diagnosed with prostate cancer during their lifetime. The risk of dying from prostate cancer, however, is much lower at 1 in 41. Your particular risk depends on your individual risk factors. Continue reading this document to find out what that may be. The American Cancer Society (ACS) has estimated that each year more than 190,000 new cases of prostate cancer will be diagnosed in the United States, and over 33,000 men will die from this disease. The death rate for prostate cancer remains twice as high in African American men than in the general population. The incidence of prostate cancer increases with age. Most men are diagnosed in their 60s and 70s (average age 66), although prostate cancer is sometimes detected in men in their 50s or even younger. The good news is that the 5-year survival rate for all **stages** of prostate cancer has increased from 69% to almost 99% over the past 20 years. These rates vary depending on the extent of disease. Reasons for this include increased public awareness, earlier detection through **screening** with prostate specific antigen (PSA) blood tests, and continued improvements in the treatment of this cancer.

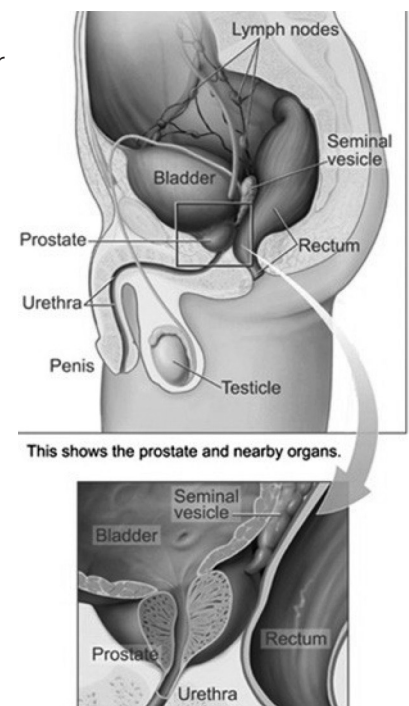
### *Take Time to Make a Treatment Decision*

Most prostate cancers are relatively slow-growing, but some grow more quickly and spread, or metastasize, to other parts of the body. If unchecked, metastatic prostate cancer can be fatal. Because prostate cancer usually grows slowly, *immediate* action to treat is rarely necessary. Many men can safely take months to decide on what to do. The decision process can be complicated. The treatment(s) chosen can significantly affect your life, which makes it especially important to take the time needed to educate yourself and confidently choose the treatment that is appropriate for you.

### *Take an Active Role*

It is essential that you take an active role in becoming informed about your condition, choosing a treatment, dealing with the effects of the treatment, and monitoring the outcome. During the course of this process, you will be meeting and working with a number of physicians and other health care professionals. While you will be relying upon those you choose to work with for their advice and treatment, you should feel that you are in charge of the decision-making process. Your various providers' roles are to gather all the information on your cancer to help you understand the risk that the cancer poses, and to reduce uncertainty in the decision process.

You need to be fully informed about the pros and cons of the various treatments, commonly request second opinions, and then decide what is best for you. Your decision will depend upon your particular situation and your personal priorities. Learning about prostate cancer from a variety of sources, involving your family in the process, and attending a support group can help you to take charge and develop a more confident and positive attitude. Ultimately, you need to choose the treatment(s) that you are most comfortable with.



source National Cancer Institute

## What Is Prostate Cancer?

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The prostate is a walnut-sized gland that is part of the male reproductive system. It is located below the bladder and in front of the **rectum**. It surrounds part of the urethra, the tube that carries urine from the bladder to outside the body. The gland's main function is to produce fluid for semen, which nourishes and transports sperm cells.

When cells grow abnormally and form a mass, it is called a **tumor**. Some tumors are **benign** (not likely to be life-threatening) and others are **malignant** (cancerous and potentially life-threatening). Over the course of a man's lifetime, some prostate cells may become cancerous. Sometimes, the cancer can be very small and confined within the prostate. In other cases, the cancer may extend through the prostate **capsule** (called extra-capsular extension or ECE) or into the seminal vesicles, or may invade into adjacent structures. Additionally, through a process called metastasis, the cancer cells can spread outside the prostate to nearby lymph nodes or to more distant parts of the body through the blood and **lymphatic systems**— most often to the bones. Determining whether the cancer is confined to the prostate or whether it has spread either locally or to more distant sites is very important in selecting the appropriate treatment.

**Localized prostate cancer** refers to cancer that is confined to the prostate. Locally - advanced cancer refers to cancer that may have spread outside of the prostate perhaps even to regional lymph nodes but not more distantly such as to bones. There is hope for cure in both stages, however, **locally advanced** tumors may require several types of treatment to achieve this. *Metastatic prostate cancer* refers to cancer, which has spread distantly, typically to bones, but other sites are possible as well.

## Diagnosing and Assessing Prostate Cancer

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The information needed to understand a man's prostate cancer risk and **prognosis** is in the various tests performed during the diagnosis. A man cannot make an informed treatment choice without understanding his risk factors.

This section describes how prostate cancer is diagnosed and what factors are used to determine how aggressive it is.

### *Screening: Prostate-Specific Antigen and Digital Rectal Examination*

At UCSF we believe a man should know if he has prostate cancer, but that does not mean every man diagnosed should have aggressive treatment. Screening is the only way to detect high-risk, potentially life-threatening prostate cancer early, while it can still be cured.

Most prostate cancers in the United States are identified through a simple blood test for **prostate-specific antigen (PSA)** or a physical examination called Digital Rectal Examination (DRE). Prostate-specific antigen is a protein in the blood produced by prostate cells. It is widely used as a screening test for prostate cancer. The higher the PSA level, the more likely that prostate cancer is present. In a DRE, a doctor inserts a gloved, lubricated finger into a man's rectum to feel for any irregular or abnormally firm area in the prostate. While most prostate cancers are detected by PSA results, some cancers produce little PSA but are detected by DRE.

A prostate biopsy should only be performed after several tests indicate sufficient risk of prostate cancer to justify a biopsy.

An elevated PSA may suggest an increased risk of prostate cancer, but elevations in the PSA can also occur in benign conditions, most commonly, **benign prostatic hyperplasia (BPH)**, in which the prostate enlarges, as in most men over their lifetime. In some circumstances, your physician may order additional tests to help determine whether a PSA elevation is the result of a benign condition. These tests may include a repeat PSA test, a **free PSA** test, and a urine test called **PCA3**. However, there are newer serum and urine tests that better tell which men with an elevated PSA (usually between 2.5 and 10) have higher grade cancers and may benefit from a biopsy. These include SelectMDx, 4score, PHI (prostate health index) tests. In addition, multiparametric magnetic resonance **imaging** (MRI) exam of the prostate is helpful and can allow for a more targeted biopsy. Not all of these are always needed, however, before a biopsy decision can be made. Such tests determine who is most likely to have a higher-grade tumor which may be treated, and avoid biopsy in those who do not have cancer or have very low-grade cancer which does not need to be treated. At UCSF, we have decreased biopsy rates by about 40% using such tests.

If you have had symptoms of urinary infection or prostatitis, your physician may prescribe antibiotics prior to further testing to eliminate the possibility of an infection being responsible for an elevated PSA. The decision to investigate further with a prostate biopsy is based on a combination of factors, including the PSA, DRE, other test results, family history, age, race and other medical conditions you may have as well as the tests noted above. A biopsy should be performed only after discussing the risks and benefits of the procedure with a physician.

## *Diagnosis*

Making a formal diagnosis of prostate cancer requires a needle biopsy. The tissue samples obtained from the prostate are then examined by a **pathologist** in a laboratory to confirm the diagnosis.

**Transrectal ultrasound (TRUS) guided biopsy.** A TRUS uses sound waves produced by a small probe placed in the rectum to create an image of the prostate on a video screen. The transrectal ultrasound image can sometimes provide valuable information about whether the cancer has reached the edge of or broken through the capsule of the prostate gland. The TRUS also provides an estimate of the size of the prostate.

Whether or not the image reveals suspicious areas, the prostate is systematically biopsied for signs of cancer. An instrument called a biopsy needle is used to remove a series of tissue samples. The samples are then sent to a laboratory for examination. A minimum of 12 samples and up to 20 should be removed from different areas of the prostate and especially from any suspicious locations. The 10-15 minute procedure usually causes only mild discomfort and a little bleeding. An antibiotic is usually given before and after the procedure to reduce the risk of infection. However, there is still a small (1%) risk of infection from a prostate needle biopsy.

Sometimes, the first biopsy does not identify any cancer, even when it is strongly suggested by the patient's symptoms or PSA test results. Repeat biopsies may be required in such cases. Prostate MRI is more commonly used in this situation than before a first biopsy, as are the other blood and urine tests described above, and another new test called ConfirmMDx which analyzes genes in the negative (normal appearing) tissue from the first biopsy. Your physician can review all these optional tests with you.

## *Grading the Cancer*

If cancer is found in the prostate biopsy sample, it is graded to estimate how abnormal the cells look. The more abnormal the cells, the more likely the tumor will grow aggressively. The most commonly used prostate cancer grading system is called the **Gleason** system. The pathologist examines the cancer cells under a microscope and evaluates how closely the arrangement of the cancer cells in each biopsy sample matches that of normal prostate cells, using a scale that generally ranges from 3 (most like normal cells) through 5 (least like normal cells).

Prostate cancers that appear to be low-grade are labeled Gleason pattern 3; intermediate grade cells are labeled pattern 4 and the most aggressive cells are pattern 5. Prostate cancers can be heterogeneous (having a mixture of different cells), so two numbers are assigned to each cancer. The first number is the most common cell type and the second is the second most common cell type (e.g., Gleason 3+4 means mostly grade 3 with some pattern 4). Since accurate grading of the cancer is so important and depends in part on the skill and experience of the pathologist, it may be appropriate to get a second opinion on the Gleason score.

## *Importance of the Gleason Score*

The Gleason score is essential for treatment planning and decision-making. The Gleason system has recently been simplified, and the Gleason grade is now summarized on a 1 to 5 scale (least to most aggressive). Gleason 3+3 is Group 1, Gleason 3+4 is Group 2, Gleason 4+3 is Group 3, Gleason 4+4 is Group 4, and Gleason 4+5 or higher is Group 5.

## *Staging the Cancer*

A prostate cancer's stage indicates how far it has spread. The commonly used staging system is the TNM system. This describes the extent of the primary tumor (T), the absence or presence of metastasis to nearby lymph nodes (N), and the absence or presence of distant metastasis (M).

**T Categories** – There are two types of T classifications for prostate cancer. The clinical stage is based on the digital rectal examination (DRE) and imaging findings. The clinical stage is used in making treatment decisions. It is important to note that both the clinical stage and biopsy grade are estimates and may not reflect what is actually found when surgery is performed. (The second T classification type is the pathological stage, which is determined by taking a close look at the prostate after it is surgically removed.)

- **T1** refers to a tumor that is not felt during a digital rectal exam or seen on imaging. T1a and T1b describe cancers found incidentally during a surgical procedure done to relieve symptoms of benign prostatic hyperplasia. T1c cancers are those detected by a biopsy triggered by an elevated PSA. T1c is now the most common stage for newly diagnosed men.
- **T2** refers to a cancer that is felt by the doctor during the digital rectal examination, or is seen with imaging studies, and is believed to be confined within the prostate gland. If the cancer is in one half or less of only one side of the prostate, the stage is T2a. If the cancer is in more than one half of only one side of the prostate, the stage is T2b. If the cancer is felt or seen in both sides of the prostate (not just identified on both sides by biopsy), the stage is T2c.
- **T3** – Refers to a cancer that has extended beyond the capsule of the prostate and/or to the seminal vesicles. This is determined by either imaging studies or less commonly by biopsy. If the cancer can be felt during a digital rectal examination and extends outside the prostate on one side, but not to the seminal vesicles, the stage is T3a. If the cancer has spread to the seminal vesicles, the stage is T3b.

- **T4** – The cancer has spread to other organs next to the prostate. Imaging tests can detect this more advanced tumor stage, which is uncommon in contemporary medical practice.

**N Categories** – N0 means the cancer has not spread to any lymph nodes. N1 or N+ indicates spread to one or more nearby (regional) pelvic lymph nodes. (Nx indicates that regional lymph nodes have not been assessed.)

**M Categories** – M0 means the cancer has not metastasized beyond the regional lymph nodes. M1a means metastases are present in distant lymph nodes. M1b means the cancer has spread to the bones. M1c means the cancer has spread to other distant organs. (Mx indicates that distant metastases have not been assessed.)

It is also important to consider the extent of the cancer in relation to the samples taken during needle biopsy of the prostate. If 1 of 12 needle biopsies shows prostate cancer, it suggests a smaller tumor than if 8 of 12 show cancer. Likewise, the extent of cancer within each needle biopsy sample is also sometimes assessed.

### *Imaging Techniques*

Imaging is often used to determine if the cancer has escaped the prostate - and to where.

The diagnosis risk factors predict who is likely to have cancer outside the prostate. For those at higher risk, several imaging techniques can be used to clarify the diagnosis. If cancer is detected outside the prostate by imaging, that may change the treatment plan.

	<b>IMAGING TEST NAME</b>	<b>DESCRIPTION</b>	<b>SENSITIVITY</b>	<b>AVAILABILITY</b>
1	Trans Rectal Ultrasound (often combined with power Doppler)	Aims the biopsy needles	Varies	Urologist Office
2	Technetium Bone Scan	Looks for cancer in bone	Poor	Imaging Center
3	NaF Bone Scan	Looks for cancer in bone	Medium	Imaging Center
4	CT Scan	Looks for tumor in regional lymph nodes or bone	Medium	Imaging Center
6	Multi-Parametric MRI	Better for prostate imaging than CT.	Good	Imaging Center
7	C11 Choline PET/CT	Finds cancer anywhere in the body	Good	Imaging Center
8	Axumin Scan	Finds cancer anywhere in the body	Very Good	Imaging Center
9	PSMA PET/CT PET/MRI	Finds cancer anywhere in the body	Best	Imaging Center

**Power Doppler Ultrasound** – Standard transrectal ultrasound produces black and white images of the structure of the prostate and adjoining tissues. Power Doppler ultrasound can detect blood flow patterns in tissue. This is important because cancerous areas sometimes show an increase in the density of blood vessels.

The Technetium Bone Scan and CT Scan below are older, less sensitive scans. It is suggested to obtain the newer, more sensitive scans listed below, to evaluate risk.

**Bone Scan** – A bone scan may show whether cancer has spread from the prostate to the bones. During the scan, a very small amount of radioactive material is injected into your blood stream via an IV (Intravenous) line. This is then absorbed by diseased bone cells. The location of diseased bone can then be seen on the total body bone scan image. Although a scan may suggest that metastatic cancer is present, arthritis and other bone diseases can create a similar pattern. Very small metastases may not be detected by this scan.

Usually, a bone scan is not ordered unless there are signs of aggressive disease, such as an elevated PSA level (>15ng/ml), a high Gleason score, a large tumor, or bone pain. In some cases, instead of a standard bone scan you may undergo NaF (sodium fluoride) or Axumin PET/CT scans, which are more sensitive (identify smaller bone metastases) than a standard bone scan. In some cases a bone scan may be followed by other x-rays and/or bone biopsy to confirm metastasis.

**Computed Tomography (CT scan or CAT scan)** – This study uses a rotating X-ray beam to create a series of pictures of the body from many angles. These are put together into a detailed cross-sectional image. This scan can reveal abnormally enlarged pelvic lymph nodes or spread of the cancer to other internal organs. A CT scan usually is not ordered unless there is an elevated PSA or a high Gleason score.

**Magnetic Resonance Imaging (MRI)** – This study is similar to a CT scan, except that magnetic fields are used instead of X-rays to create images. MRI scans are not effective in revealing microscopic cancers, although an MRI using an endorectal coil may provide a better image of the prostate gland than a routine MRI of the pelvis. A multiparametric MRI uses special techniques to better demonstrate the extent of disease within the pelvis. MRI may be used before a biopsy to help target the biopsy needles, or after prostate cancer diagnosis to help determine the stage.

**AXUMIN PET/CT SCAN** -- A newer and more sensitive scan that can detect small amounts of prostate cancer anywhere in the body. It is only FDA approved for detecting recurrent prostate cancer after therapy. Insurance typically will not pay for Axumin Scan for newly diagnosed men. It may be possible to get Axumin by paying the high cost out-of-pocket.

**PSMA PET/CT OR PET/MRI** -- This is the most sensitive prostate cancer scan available as of April, 2020. It can detect very small tumors anywhere in the body. It is not yet FDA approved but is available at UCSF and other locations as part of several clinical trials. It can be used before treatment or in those whose PSA rises after treatment with surgery or radiation. To learn about PSMA clinical trials contact UCSF Email: [psma@ucsf.edu](mailto:psma@ucsf.edu) Ph: (415) 514-PSMA (-7762) <https://radiology.ucsf.edu/psma>

**OLIGOMETASTATIC PROSTATE CANCER** -- Using PSMA newer forms of PET imaging we are identifying a new class of patients, those with only a limited number of metastases (usually classified as 1 – 6 sites). This new state is called “oligometastases”. In the past most of these men would have been given hormone blockade which is not curative. Now there is evidence that men with newly diagnosed oligometastatic disease can have quality of life benefit from treatment to the prostate and the small metastases. Some men go into remission and are able to avoid or delay going on hormone blockade.

## Prostate Cancer Risk Assessment

Prostate cancer represents a wide spectrum of disease. Some prostate cancers progress and need treatment, while others grow slowly if at all and can be managed conservatively with Active Surveillance. It is important to learn the characteristics of the cancer before making treatment decisions. There are many ways to determine prostate cancer risk, most of which incorporate information from several parameters including the PSA, Gleason score (tumor grade), and the tumor extent (number of cores involved and tumor stage on DRE).

### The UCSF-CAPRA score

Variable	Specific patient's level	Points to be assigned
Age at diagnosis	Under 50	0 ○
	50 or older	1 ○
PSA at diagnosis (ng/ml)	less than or equal to 6	0 ○
	between 6.1 and 10	1 ○
	between 10.1 and 20	2 ○
	between 20.1 and 30	3 ○
	more than 30	4 ○
Gleason score of the biopsy (primary/secondary)	no pattern 4 or 5	0 ○
	secondary pattern 4 or 5	1 ○
	primary pattern 4 or 5	3 ○
Clinical stage (T-stage)	T1 or T2	0 ○
	T3a	1 ○
Percent of biopsy cores involved with cancer (positive for cancer)	less than 34 percent	0 ○
	34 percent or more	1 ○

In an effort to address the limitations of these approaches to risk assessment UCSF developed the Cancer of the Prostate Risk Assessment (UCSF-CAPRA) score. CAPRA is a straightforward 0 to 10 score. It is nearly as easy to calculate as the D'Amico classification, yet with accuracy comparable to the best nomograms. A CAPRA score is valid across multiple treatment approaches and it predicts an individual's likelihood of metastasis, cancer-specific mortality, and overall mortality.

The score is calculated using points assigned to: age at diagnosis, PSA at diagnosis, Gleason score of the biopsy, clinical stage and percent of biopsy cores involved with cancer. These variables are outlined in the chart.

<https://urology.ucsf.edu/research/cancer/prostate-cancer-risk-assessment-and-the-ucsf-capra-score>

**How the UCSF-CAPRA score is determined:** As an example, a 51-year-old man (1 point) with a PSA of 6.2 (1 pt.), a Gleason score of 3+4 (1 pt.), and stage T2c (0 pts.) prostate cancer involving 2 of 8 (25%) biopsy cores (0 pts.) would have a CAPRA score of 3. A 48-year-old man (0 pts.) with a PSA of 15.2 (2 pts.), a Gleason score of 4+3 (3 pts.), and stage T1c (0 pts.) prostate cancer involving 5 of 10 (50%) cores (1 pt.) would have a score of 6.

\*If your clinical stage is higher than T3a, you are still assigned 1 point on the CAPRA score under T stage.

**What does this score mean?** A CAPRA score of 0 to 2 indicates relatively low-risk disease. A CAPRA score of 3 to 5 indicates intermediate-risk disease. A CAPRA score of 6 to 10 indicates high-risk disease.

In summary, risk assessment is an important part of making a decision on how to treat prostate cancer. The CAPRA score is one of several risk assessment options. Regardless of the specific approach taken, treatment must be guided by the risk that the cancer will spread.

The CAPRA scoring system is not intended to replace individualized doctor-patient decision making. However, it does provide a straightforward tool for classifying disease risk—one that is useful in patient care and research.

## **Genetic and Genomic tests for localized prostate cancer**

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A man's inherited genes predict his prostate cancer risk. For a long time, we have known that there is a family risk in prostate cancer. If a man's father or brother has prostate cancer, or his mother or sister has breast or ovarian cancer, he is at higher risk of possibly being diagnosed with prostate cancer. That genetic risk can be partially quantified by a 'germ line' genetic test that can be performed before a biopsy. If the test is low risk, perhaps a man with slightly elevated PSA can avoid a biopsy while doing careful screening for prostate cancer. A man's status of BRCA1 and BRCA2 inherited mutations is an example of what can be learned from a germ line genetic test.

A man diagnosed with prostate cancer can have the tissue from his biopsy or prostatectomy tested with a genomic test that looks for 'somatic' DNA mutations in the actual tumor. Some somatic mutations are known to increase a man's risk of progression after treatment. Knowing that risk, a man and his doctors can make more informed treatment choices. For example, if genomic testing of the biopsy indicates low risk of progression, a man might decide to do Active Surveillance to avoid or delay treatment **side effects**.

Results from these tests can supplement what is learned from the CAPRA score, PSA, Gleason grade, clinical stage, imaging tests, etc. They are especially helpful when a man and his doctors are unsure if Active Surveillance is appropriate in what appears to be a low risk diagnosis. Also, in high risk cases, if the cancer risk is high enough to suggest longer term ADT **testosterone** suppression drugs.

Genomic tests measure expression of various genes that relate to how aggressive a cancer is likely to be. They indicate how rapidly cancer cells are growing and how abnormal they are relative to normal cells at the genetic level. They do not provide a yes/no answer about whether a cancer will progress, but they do add valuable information to help guide treatment decisions.

Tests that are currently available include the **Decipher™** test from GenomeDx Biosciences, the Prolaris® assay from Myriad Genetics, and the Oncotype DX® GPS test from Genomic Health. There is some degree of overlap among these tests, and the ideal use for each differs, depending on the clinical situation. Your doctor can discuss with you which test will be most valuable in your case.

### *Treatment Options for Localized Disease*

Deciding how to treat prostate cancer can be a confusing process. Each treatment has its own mix of benefits, risks and impacts on quality of life. The good news is that several treatments are very successful for many prostate cancer patients, either in providing a cure or keeping the cancer under control for many years. However, your physician cannot always tell you specifically which treatment to choose, because for most men, the choice is significantly influenced by personal preferences.

In addition to the tumor risk factors described above, that choice is influenced by factors such as:

- Your age and life expectancy
- Your general health and specific medical conditions
- Cost and practical considerations
- Attitudes about cure and/or living with cancer
- Your needs, concerns, values and social relationships
- Your feelings about specific side effects which can include urinary **incontinence, erectile dysfunction**, bowel problems, and other effects which will be discussed in greater detail below.

You and your physicians may choose a combination of the treatments described below.

## *Active Surveillance*

As previously discussed, many prostate cancers do not pose an immediate risk to health and may not require treatment. Active Surveillance is a way to monitor low-risk prostate cancer— cancer that is not an immediate risk to your health or well-being.

The ideal candidate for Active Surveillance has:

- A PSA at the time of diagnosis of 10 or less that does not change much over time. A better way to interpret PSA is to calculate “PSA density” or PSAD (PSA divided by the prostate volume). A PSA density under 0.15 is favorable (i.e. the cancer is less likely to grow).
- Ultrasound, MRI and physical examination (digital-rectal examination) or other test results that suggest the cancer has not spread outside the prostate gland.
- Low-risk biopsy results, including: a prostate biopsy Gleason score of 6 or less (no pattern 4 or 5), cancer in no more than one third of the total needle samples, PSA density <0.15. It is very important that the biopsy be performed correctly; sampling enough of the prostate to be sure the cancer is not large and/or more aggressive. Therefore, 12 or more needle samples should be taken during the prostate biopsy. If the initial biopsy was not extensive enough, another may be needed before finalizing a decision for Active Surveillance. These confirmatory biopsies are particularly important if the original biopsy was done outside an academic setting. An MRI is recommended before the biopsy to help target the biopsies.

However, there is some flexibility within these guidelines. Carefully selected and highly motivated men with slightly higher-risk disease characteristics (e.g., higher volume Gleason 3+3 or low-volume Gleason 3+4) may also be candidates for Active Surveillance, particularly if imaging and/or genomic testing are reassuring. You and your doctor can discuss whether you will be a good candidate for this option.

If you choose Active Surveillance, you will visit your doctor for regular checkups. During these visits, you will undergo tests to find out if there have been any changes in your cancer. The tests usually include:

- a blood test to measure PSA every 3 – 6 months
- a periodic prostate biopsy (every 1 to 2 years initially; sometimes sooner than 1 year), less frequent in subsequent years to monitor your cancer grade and volume.
- In many cases, MRI, genetic testing of the tumor, and other tests we have been developing at UCSF and elsewhere to better assess risk and the appropriateness of continuing Active Surveillance for treatment.

If the tests suggest the cancer is growing or becoming more aggressive, your doctor may recommend that you have treatment or consider an early re-biopsy. But if the changes are small or nonexistent, your doctor may advise that it is safe to continue Active Surveillance.

Making lifestyle changes such as improving your nutrition, reducing stress and getting more exercise can also be part of Active Surveillance. A study at UCSF showed that men on Active Surveillance who made lifestyle changes had lower PSA levels and lower rates of treatment than men who did not make these changes. You may choose to join diet and lifestyle studies at UCSF or support groups as part of your Active Surveillance. Making healthy lifestyle choices can also lower your risk of cardiovascular disease—the number one cause of death in men with or without prostate cancer. Lifestyle changes are reviewed below.

## *Is Active Surveillance right for you?*

There are some risks associated with Active Surveillance. They include a low risk of infection with every biopsy and a very low risk of cancer progressing in any one interval of surveillance. Sometimes men choose Active Surveillance for a period of time and then decide to undergo treatment.

At UCSF, well over 2000 men have chosen Active Surveillance to initially manage their prostate cancer. This is one of the largest groups of patients on Active Surveillance in the world. About one third of these men may receive treatment by 5 years and 50% by 10 years. So far, treatment results for these men appear to be similar to what would have been expected had they chosen treatment right after their original diagnosis. Based on our experience and those reported from other centers, the risk of significant cancer progression in the short to intermediate term, while not zero, appears to be very low.

The most common reason for seeking treatment is a biopsy that shows the cancer is growing or becoming more aggressive in appearance (such as a Gleason score increase from 6 to 7, or more). Changes in PSA or cancer stage based on imaging results may also lead to treatment.

Over the years, Active Surveillance has emerged from a research concept to the preferred standard of care for most men with low-risk prostate cancer. Your doctor can discuss any questions you have about Active Surveillance. Together, you can decide whether this is a good option for you.

## *Radical Prostatectomy*

A **radical prostatectomy** is surgery to remove the entire prostate gland and seminal vesicles after a diagnosis of prostate cancer is made. Sometimes, nearby (regional) lymph nodes are also removed. Radical prostatectomy is one of many options for the treatment of prostate cancer, and you should carefully discuss all treatment options with your physician.

Radical prostatectomy can be done through an “open” incision made in the abdomen (radical retropubic prostatectomy) or through an incision in the perineum, the area between the **scrotum** and the anus (radical **perineal** prostatectomy). This has become uncommon in most high-volume U.S. centers.

Alternatively, it may be done with several small incisions in a procedure called laparoscopic radical prostatectomy. Laparoscopy is a technique in which surgery is performed by making small incisions and passing specially designed telescopes and instruments into the body. Laparoscopic radical prostatectomy results in less blood loss, less discomfort, and an earlier return to work.

At UCSF we perform laparoscopic radical prostatectomies using a surgical system called the da Vinci® robot. Currently, 3 different systems are available (Si, Xi and SP robotic systems). The systems offer excellent magnification and surgical precision. Outcomes in terms of cancer control, urinary function and sexual function are at least as good as those obtained via open radical retropubic prostatectomy. Other complications appear to be less common with the robot assisted approach.

Other subtle differences between these procedures for prostatectomy can be discussed with your surgeon. At UCSF, the vast majority of procedures are done using a robotic approach for the following reasons: the robotic approach appears to be able to remove the prostate cancer equally as well as the open approach, it is associated with less blood loss, an earlier return to normal activities and fewer complications, and may be associated with an enhanced ability to spare the **neurovascular bundles** that control erectile function.

At the time of radical prostatectomy, the entire prostate gland, surrounding tissue, and seminal vesicles are removed. The seminal vesicles are glandular structures attached to the prostate, which may be invaded by prostate cancer. Once the prostate gland and seminal vesicles are removed, lymph nodes may be sampled (see below), and the bladder is reattached to the urethra. Most men only need to spend one night in the hospital after surgery. A **catheter** is left in the bladder to allow urine to drain while healing takes place (usually for about a week). In some cases, an abdominal drain (tube that drains fluid accumulations) may be left in place for one or two days.

**Why would I choose to have a radical prostatectomy?** Radical prostatectomy is one of several options for men whose prostate cancer still appears to be localized to the prostate. It allows, in most cases, for complete removal of the cancer. Once the prostate is removed, one can tell how advanced the cancer is, what the risk for cancer **recurrence** is, and whether or not additional treatment may be needed. It is relatively easy to follow men who have undergone radical prostatectomy to be sure their cancer is gone. Once the prostate is removed, the PSA should fall to undetectable levels within 6-8 weeks. Radiation can be given after surgery, if necessary, with some risk of additional side effects.

Patients who choose radical prostatectomy should be in good health, have a life expectancy of more than 10 years, and have discussed all available treatment options with their doctors. Some men with prostate cancer extending beyond the prostate gland may benefit from the procedure as well, frequently in combination with radiation or other treatments. Radical prostatectomy may occasionally be an option when prostate cancer recurs after radiation or other treatments. This approach (salvage prostatectomy) carries higher risks of side effects and should be considered carefully.

### *Lymph node dissection*

When prostate cancer spreads (metastasizes), it often first invades the lymph nodes in the area of the prostate. For this reason, the lymph nodes close to the prostate may be removed so they can be checked for cancer. Lymph nodes can be removed as part of either an open or laparoscopic radical prostatectomy, using the same incisions. Lymph node removal is not necessary in all patients and has the risk of lymphedema.

### *Nerve-sparing radical prostatectomy*

The nerves and blood vessels (neurovascular bundles), which allow the penis to become erect, run next to either side of the prostate. Either one or both of these bundles can be spared to help a man achieve erections after surgery. Each bundle contains multiple nerve fibers, and in some cases part of a nerve may be spared (nerve sparing is not necessarily a yes/no question). The best results are achieved if both bundles can be spared. Young men who are sexually active and report having very good erections before surgery are most likely to benefit from preservation of the bundles. In some cases, preservation of the bundles may not be advised due to the location or extent of the cancer. As the nerves run very close to the prostate, preservation of the bundles in some men may risk leaving cancer behind. The risks and benefits of nerve sparing surgery should be discussed with your doctor.

## *Side effects of radical prostatectomy*

Incontinence (leakage of urine, usually with stress, activity) and erectile dysfunction (inability to get or maintain an erection) are the most common side effects of surgery. Incontinence, although relatively common early after surgery, generally resolves in the vast majority of men. Whether or not erectile function returns is dependent on whether the nerves surrounding the prostate can be spared at surgery, patient age and baseline function. Men who are older or have existing problems getting or maintaining an erection are most likely to have erectile dysfunction afterwards. A more detailed description of radical prostatectomy is available at [Radical Prostatectomy - A Patient Guide](https://urology.ucsf.edu/prostate-cancer-education-documents) <https://urology.ucsf.edu/prostate-cancer-education-documents>

For more information on erectile dysfunction and treatment see [Managing Erectile Dysfunction – A Patient Guide](https://urology.ucsf.edu/prostate-cancer-education-documents) <https://urology.ucsf.edu/prostate-cancer-education-documents>

## *Radiation Therapy*

Unlike radical prostatectomy which seeks to cure cancer by removing it, radiation therapy is designed to cure the disease by killing cancer cells in place. Radiation can be given as **external beam radiation therapy (EBRT)** and/or as **brachytherapy** (temporarily or permanently implanting radioactive “seeds”). EBRT radiates the cancer from the outside to inside. Brachytherapy radiates from inside the tumor.

Radiation therapy is all about the radiation dose. Higher dose does a better job killing more cancer cells. But higher dose increases the risk of radiation induced side effects. New radiation hardware, software, and technique have greatly improved the ability of radiation therapy to give a high dose to the cancer, while minimizing the dose to surrounding health tissues. This has resulted in much improved cure rates and reduced side effects from radiation therapy.

*External Beam Radiation Therapy (EBRT).* With EBRT, radiation in the form of photons or protons is focused from a source outside the body onto the prostate, and surrounding lymph node areas if needed. First, internal markers (typically three gold non-radioactive seeds) are placed under transrectal ultrasound guidance into the prostate to help align and target the prostate with the radiation beam. Then, a planning CT scan is performed to locate the prostate gland in relation to the surrounding structures and organs. Using the planning CT scan, a treatment plan is designed to treat the prostate gland (with or without the seminal vesicles or the lymph nodes) while simultaneously protecting the normal surrounding tissues (such as bladder or rectum). Most radiation today is given as a type of EBRT known as intensity modulated radiation therapy (IMRT), in which the shape and intensity of several radiation beamlets can be varied during treatment to minimize damage to surrounding tissues. At UCSF, patients also benefit from image-guided radiation therapy (IGRT), where the prostate is imaged immediately before the start of each treatment session to verify and adjust the position of the gland for added accuracy. Stereotactic body radiation therapy, also known as SBRT (whether done on the linear accelerator or the CyberKnife robot), is a special type of IMRT/IGRT where high doses of radiation are given over a small number of treatments (typically 4 or 5). EBRT can be either delivered in daily small doses per session (5 days a week) over a protracted course of 5 to 9 weeks (conventional radiation) or in high doses per session in 4 to 5 sessions delivered over 2-3 weeks (hypofractionated radiation). SBRT is a special form of hypofractionated radiation. A third kind of radiation schedule is delivered through a daily intermediate dose per session, typically in 4 weeks (moderately hypofractionated radiation), also 5 days a week.

Depending on the prostate cancer risk category and other individual or disease characteristics, your doctor may recommend conventional fractionation or stereotactic treatments. All treatments, however, are delivered in an outpatient setting. Conventional treatments typically last approximately 10 to 15 minutes whereas SBRT treatments take a bit longer (around 30 minutes). Patients receiving radiation to the lymph nodes (such as those with high risk disease) or those receiving radiation after prostatectomy usually receive conventional treatments.

In certain situations such as high-risk prostate cancer, your doctor may recommend a combination of EBRT and brachytherapy (see below) to give a “boost” to the prostate and to improve the likelihood of cancer control. In that scenario, the number of EBRT treatments will be reduced, typically to five weeks. Additionally, EBRT is sometimes combined with 4-24 months or more of hormonal therapy in men with intermediate to very high-risk disease.

There is a great deal of discussion, and often highly misleading marketing, surrounding an alternative to standard radiation therapy called proton beam therapy. No clinical study has ever shown any advantage for proton beam therapy in terms of either cancer control, complications, or quality of life preservation as compared to other radiation treatments.

### *Side effects of external beam radiotherapy*

As with any treatment, there are potential side effects to radiation therapy. These can occur during the treatments and include loose stool or diarrhea, frequent urination or defecation, a burning sensation while urinating, and fatigue. These symptoms usually resolve within a few weeks after treatment is over, and in the interim, some relief is possible with medications or changes in diet. Other side effects may occur in the months or years after your treatment is over such as erectile dysfunction, scar tissue in the urethra, fistulas (holes opening between the rectum and urinary tract, which can lead to chronic infection), blood in the urine or stool, and secondary cancers of the bladder or rectum. These delayed side effects are luckily not common. Because of the effect on sexual function, men who may want to father children after their radiation therapy should consider sperm banking prior to the treatment. As with surgery, radiation to the prostate will maintain your ability to have an orgasm (climax). However, you may or may not be able to ejaculate, and the force and/or volume of ejaculate is often reduced.

### *Brachytherapy (seed implants)*

Brachytherapy uses radiation seeds placed in and/or near the prostate gland to destroy cancer cells. Brachytherapy can be delivered using radioactive seeds placed permanently in or near the prostate, or through seed-filled narrow tubes that are placed temporarily for one or two days.

With a **permanent seed implant** (also known as low dose rate (LDR) brachytherapy), small radioactive pellets (“seeds”), less than the size of a grain of rice each, are implanted into the prostate. These seed implants contain radioactive isotopes such as iodine-125, palladium-103, or cesium-131. The seeds are placed inside thin hollow needles inserted through the skin of the perineum, the area between the scrotum and anus, and the needles are then withdrawn, leaving the seeds in place inside the prostate. The placement of the seeds follows a pre-determined computer map which is generated to specifically fit your prostate volume and shape. This is typically a two-step procedure: first, a transrectal ultrasound is performed to map the prostate, and then seeds are placed under either general or spinal anesthesia on an out-patient basis. In cases of substantial prostate enlargement, testosterone lowering medication is sometimes required to shrink the prostate before the seeds can be placed.

On the other hand, **high-dose rate (HDR) brachytherapy** (using temporary seeds) is administered in one (for boost treatments) or more (for definitive treatments) sessions over one or two days in the hospital. Under anesthesia and ultrasound guidance, multiple hollow needles are placed through the perineum into the prostate. Then, a planning CT scan is done and a complex computer program helps generate a treatment plan. The HDR machine houses a high-energy radioactive seed (iridium-192) which is attached to a wire. After a treatment plan is approved, the hollow needles are attached to the HDR machine and the radioactive seed is pushed automatically and systemically into each of these needles and then withdrawn when the appropriate radiation dose is delivered to the prostate. Treatment is typically delivered over several minutes. The hollow needles are withdrawn from the perineum after treatment is complete.

In many cases, a combination of radiation treatments is recommended, especially in patients with high risk features, with HDR brachytherapy used to treat the prostate and external beam radiotherapy used to treat the prostate and the whole pelvis. Brachytherapy alone is sufficient for men with low or selected intermediate risk disease patients.

**Side effects of brachytherapy** – Many men experience some mild short-term side effects from brachytherapy, such as pain in the perineum, discolored urine (pink/bloody), difficulty starting the flow of urine, incomplete emptying of the bladder, or increased urinary frequency. Erectile dysfunction may develop over time. A small percentage of men will experience other long-term side effects such as urinary urgency, urinary obstruction, or significant rectal or bowel irritation. Men who may want to father children after their radiation therapy should consider sperm banking prior to the treatment.

Both external-beam radiation and brachytherapy increase the risk of other cancers especially bladder and rectal cancer, starting about 5-10 years after treatment. While the risk of second cancers is increased relative to the general population, radiation induced cancers remain a rare, but serious, side effect of radiotherapy when they occur.

**Treatment outcomes** –The effectiveness of both brachytherapy and external beam radiation therapy is indicated by the extent of decline of the PSA. The lowest level of the PSA that is attained is referred to as the nadir. A nadir around 0.5 mg/ml is typically expected for men undergoing EBRT with conventional fractionation, while the nadir in patients undergoing SBRT or brachytherapy is typically <0.5 ng/ml. It may take one to five years after radiation therapy to reach a nadir. About one-third of men who have undergone brachytherapy experience a temporary “spike” or “bounce” in their PSA values 6 to 36 months after the procedure before the PSA resumes its continuing decline. Such a spike can be alarming, but should not be interpreted as treatment failure. A similar spike may occur in a smaller percentage of patients undergoing external beam radiation therapy especially with SBRT.

The rates for successful treatment decrease for men with higher disease risk (increased CAPRA score) and thus higher risk patients generally receive hormone therapy together with radiation (often brachytherapy boost with EBRT).

## *Hormone Therapy with Radiation*

Most prostate cancers are driven by testosterone. Hormone therapy attempts to establish very low levels of testosterone in an attempt to control cancer progression. Although it does not cure the cancer on its own, hormone therapy is often recommended in conjunction with radiation therapy for men with intermediate or high-risk localized disease. However, hormone therapy may have significant side effects. When offered as short-term therapy in conjunction with radiation it is often well tolerated. How long one receives the hormonal therapy still remains controversial and depends on the aggressiveness of the cancer being treated. Please see Your Health Matters: Hormone Therapy for further information [Hormone Therapy for Prostate Cancer – A Patient Guide](https://urology.ucsf.edu/prostate-cancer-education-documents)

An increasing volume of literature suggests that for men with high-risk prostate cancer, the best treatment approach may well be so-called multimodal therapy—i.e., combining surgery, radiation therapy, and/or systemic treatment depending to an extent on the pathology report, PSA outcomes, and/or genomic testing after surgery. This is a paradigm which has become standard of care over the years for other aggressive cancers such as breast cancer, rectal cancer, and others. In academic settings like UCSF either radiation or surgery may also be appropriate for some men with limited metastatic disease at the time of diagnosis.

## *Tissue ablation using other energy sources*

There is a variety of energy sources (heating, freezing, vaporizing, etc.) used to ablate (destroy) prostate cancer. These energy sources can be applied to the whole or just part of the prostate (focal ablation). Whereas whole gland ablation has fallen out of favor, focal ablation has gained popularity. The two most commonly used energy sources are **cryosurgery** and **high intensity focused ultrasound (HIFU)**.

Cryosurgery kills cancer cells in the prostate by freezing them through special needles that are inserted into the prostate gland. The needles are placed under ultrasound guidance to destroy prostate tissue. This method is effective in curing cancer, but cannot treat lymph nodes, and commonly causes erectile dysfunction if the entire prostate is treated. Urinary incontinence may also occur rarely. While improvements with the technology have decreased the complication rate significantly, erectile problems are still very common and for this reason whole gland cryosurgery is not a common choice today.

High intensity focused ultrasound (HIFU) attempts to kill cancer cells with high temperatures created by highly focused sound wave energy. HIFU has been used in Europe, Asia and Canada where results have been very mixed, with some reporting excellent results, and others reporting high rates of retreatment and complications. Like whole gland cryotherapy, whole gland HIFU is not commonly performed. Although cryotherapy and HIFU are the most common techniques used for prostate tissue ablation, there are many others including interstitial laser ablation, electroporation (“Nanoknife”), vascular targeted photodynamic therapy, gold nanoparticle therapy and many others being refined and developed. Whereas whole-gland prostate tissue ablation has fallen out of favor, using the same technology to treat just the cancerous area of the prostate (focal therapy) has rapidly increased in popularity.

An ideal candidate for focal therapies must be carefully selected most often based on carefully performed, image guided biopsy techniques (MRI: ultrasound fusion technology). Patients with intermediate-grade, visible tumors on imaging in a single location, hopefully away from the urethra or bladder neck could be considered for focal therapy. Some feel that cancer close to the urethra can also be treated in this fashion; there may be a higher risk of side effects or incomplete treatment. Some physicians feel that additional candidates for focal therapy include those with one dominant tumor as described above and a micro focus of low-grade disease elsewhere. The latter is not treated but followed as is done for those on Active Surveillance.

Results to date have been favorable, but the experience and time of follow up is still limited. In addition, these patients must be evaluated carefully to avoid under treatment, and still need to undergo post-treatment, periodic imaging, PSA assessment and biopsies.

## *Does it matter where my treatment is performed?*

A large body of evidence has shown that in the case of surgery for prostate cancer, experience matters greatly. Medical centers and surgeons performing a high number of prostatectomies per year demonstrate better outcomes in terms of both cancer control and quality of life results than those performing a lower number. Similar data do not exist regarding radiation outcomes. However, performing brachytherapy well requires a high degree of expertise and experience, particularly in prostate ultrasound. There are many subtleties in terms of planning and administration of external beam radiation therapy, which likely translate to better outcomes by more experienced clinicians. No matter what a given surgeon’s or radiation oncologist’s practice volume is, however, he or she should be able to discuss his or her own outcomes both in terms of cancer control and quality of life.

## When Further Treatment Is Needed

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While the diagnosis and treatment of prostate cancer have improved significantly in recent years, the cancer can still recur. Not surprisingly, clinical studies show that the likelihood is higher, the more advanced the disease was in the first place, and the more time that has passed between diagnosis and treatment. Recurrence may be related to the type of initial treatment, but other factors are also involved, such as the original staging, Gleason score, extent of the cancer, and age of the patient. (See section on risk assessment.)

There are usually a number of treatment options that men can consider to successfully treat or control recurrent cancer. Choosing among them will require a new decision-making process. It is essential that you and your physician continue to monitor your PSA on a quarterly basis for some period of time, no matter how successful your treatment has seemed to be.

### *Why Cancer Recurs*

- Your cancer may have been understaged (meaning that it was more extensive than originally estimated) and/or undergraded (meaning that, once the prostate was removed, the tumor showed higher Gleason scores than in the pre-treatment biopsy). Understaging and undergrading have been discovered in up to one-third of pathology studies of the entire prostate following a prostatectomy. Understaging or undergrading can also occur with treatments other than surgery. The use of more refined and advanced imaging such as mpMRI and Axumin PET scans have improved initial staging
- The cancer may have been undertreated. Sometimes pre-treatment scores indicate that a patient is in a higher risk category, but the patient undergoes only a single treatment method that is unlikely to be effective by itself.
- The cancer may have been incompletely treated or excised with radiation or surgery, respectively.
- The biology of the cancer may make it likely to recur even after the best treatment. On very rare occasions, the cancer may also change into a different form, for example, from adenocarcinoma to small-cell cancer, which is more aggressive.

### *The PSA as an Indicator of Remaining or Recurrent Cancer*

If your prostate has been surgically removed, you may find indications that the cancer was understaged and/or undergraded in the post-operative pathology examination. However, the most common sign that the cancer has not been completely removed or has recurred after surgery or radiation therapy is a persistently rising PSA. As mentioned earlier, some who are treated with radiation therapy will see their PSA rise only to fall (“PSA bounce”). Not all patients with a persistently rising PSA will go on to develop metastatic prostate cancer (or any visible cancer), and not all patients will face the possibility of a life-threatening form of the disease. Indeed, some patients with a late, low rising PSA may not require immediate treatment. The severity of the relapse can be determined by reviewing how soon the PSA started to rise after treatment and how quickly it is rising. This is frequently referred to as the PSA “doubling time” (PSADT), which is expressed generally in months

## *Options for Dealing with Recurrence*

With a persistently increasing PSA, the suspicion for recurrence increases. The most important factor in determining your long-term outcome is determining the location of the recurrence, i.e. where are the prostate cancer cells producing the PSA. Advanced imaging techniques such as MRI and PSMA PET/CT are often helpful in determining where the cancer is located.

If a man has undergone surgery as an initial treatment, revisiting the post-operative pathology report may help to identify what may have contributed to a recurrence. If there was still cancer present (positive margins) or the cancer was more aggressive (higher Gleason scores were detected), and/or genomic profiling of the tumor shows high-risk features, then several options are available:

- External beam radiation to the prostate bed with or without the pelvis may be prescribed.
- External radiation can be accompanied by hormone therapy. The duration of hormone therapy will depend on the PSA level just prior to radiation and to a lesser extent on Gleason score and staging of the cancer.
- Systemic treatment using hormonal therapy and/or other treatments may be given to those at risk for metastatic disease.
- Active Surveillance with its implied monitoring may be appropriate if the remaining cancer appears insignificant. You and your physician can decide when and whether to intervene more aggressively.
- For patients who chose an initial therapy other than surgery, a “salvage” prostatectomy is possible, but it is more likely to result in incontinence and/or **impotence** when performed after previous treatments. Further radiation or cryosurgery are also options, but again entail greater risks than when used as first-line treatment.
- If you seek additional or different treatment, you may be eligible to participate in an appropriate clinical trial. You can research this with the help of your doctor.

## **New Treatment Approaches and Clinical Trials**

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**What Are Clinical Trials?** Clinical trials are medically - supervised, carefully - controlled patient studies that attempt to determine whether a proposed new treatment is both safe and effective. Clinical trials also look at whether a new treatment can lead to better outcomes than existing treatments. These studies may include combinations of researchers such as physicians, geneticists, biologists, chemists, engineers and psychologists.

New treatments are continually being developed for prostate cancer. Many prostate cancer trials are designated for patients with a rising PSA after local treatment or for men with advanced, metastatic cancers. However, there are still many trials for men with less aggressive cancer, such as Active Surveillance trials at UCSF. Sometimes we also offer trials of **neoadjuvant** treatments—i.e. medications given before surgery for higher risk prostate cancer. A number of new agents and treatments show promise—some as simple as lifestyle changes in diet and exercise.

Funding sources for clinical trials include the National Cancer Institute, universities and medical centers, private research foundations, pharmaceutical and biotechnology companies, or some combination of these groups. Trials always occur in phases.

- Phase I studies determine safe and therapeutic dosage levels
- Phase II trials determine whether the new agent is beneficial
- Phase III trials extend the test to a large group that receives the experimental treatment. Results are compared with results from a **control group** receiving standard therapy and/or a **placebo**. After a successful Phase III trial, the new treatment must still be formally approved by the Food and Drug Administration (FDA) for use in appropriate patients.

### *Should You Participate?*

Clinical trials can offer hope and the chance for you and society to benefit from a promising new treatment, but they have their risks. Any patient considering participating in a trial should ask himself and his treating doctor the following:

- Do I fit the criteria for inclusion?
- How might I benefit from participating?
- What are the probable side effects?
- What if I'm placed in the control group that doesn't get the treatment or medication? (In many trials, those receiving the placebo will "cross-over" later on and receive the active treatment.)
- How large is the control group vs. the group receiving active treatment?
- What will happen if I quit or am dropped from the trial?
- What will happen if my condition gets worse while I am in the trial?

### *Accessing Clinical Trials at UCSF*

Clinical trials are conducted at hospitals, clinics and centers around the country, and participants are often actively recruited. UCSF is currently conducting research in four main areas:

1. Identification of genetic and lifestyle factors that predispose men to clinically significant prostate cancer.
2. Discovering alterations in genes and proteins to improve current prostate cancer treatment.
3. Developing new therapies for men with recurrent widespread prostate cancer.
4. Preventing progression of early stage untreated disease.

For more information, see <http://cancer.ucsf.edu/clinical-trials>

## Complementary and Alternative Medicine (CAM)

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### *Definitions*

There is an important distinction between “complementary” and “alternative” therapies.

- Complementary therapies, such as exercise and diet changes, are undertaken in addition to conventional medical treatment. Health providers are often supportive of complementary therapies, depending on your particular situation.
- Alternative therapies are undertaken instead of conventional medical treatment. Some of these may be effective for some people, but most have not been well studied, and none are well regulated. Therefore, misleading websites and false advertising abound. You should be extremely careful in choosing non-**standard treatments** instead of treatments, which have been evaluated in careful clinical trials with published results.

Many therapies can fall into either category. Some interfere with standard medical treatment or cause serious side effects, so be sure to inform your physician if you are considering these therapies. Lifestyle changes are likely to be helpful in both controlling and reducing the risk of getting prostate cancer. UCSF is a leader in coordinating clinical trials of diet, exercise and stress in prostate cancer. In addition, every prostate cancer patient treated at UCSF receives open access to a nutritionist/dietician to help plan a healthy diet and to address diet issues that may arise during treatment.

### **Nutrition and Prostate Cancer**

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Researchers are still learning about potential links between diet and prostate cancer through ongoing studies. It is well established that following a healthy diet reduces the risk for cardiovascular disease—a leading cause of death for men, including those with prostate cancer. Many of the current dietary recommendations for men with prostate cancer follow heart-healthy guidelines.

### *Healthy Eating Guidelines*

Eat a plant-based diet. A diet high in vegetables, fruits, whole grains and beans provides important nutrients including vitamins, minerals, fiber and phytochemicals (lycopene, carotenoids, indoles and flavanols). Plant foods that may be particularly protective against prostate cancer include cooked tomato products like tomato sauce, cruciferous vegetables such as broccoli and cabbage, and pomegranates.

Aim to cover at least two thirds of your plate with plant foods. Limit animal foods, particularly processed red meats, poultry with skin, egg yolks, and dairy. Aim to eat at least 4-5 cups of colorful vegetables and fruits daily. For example, have 2-3 pieces of fruit, 1 cup or more of vegetables with lunch and dinner and 1 cup of vegetables as a snack daily.

Opt for whole grains and limit added sugars. Examples of foods made with refined grains are white bread, white rice and pasta. Some foods high in added sugars include sugary drinks, desserts, candy, and processed foods like muffins and sweetened cereals. These foods are loaded with calories yet offer very little nutritive value, and they promote weight gain. It is best to avoid or eat these foods only occasionally. On the other hand, whole grains such as oats, barley, brown rice, quinoa, bulgur, spelt, wild rice and whole wheat are nutrient-dense and provide your body with a good source of energy.

Choose whole grains instead of refined grains. Choose breads and grain products that list a whole or sprouted grain or whole-grain flour as the first ingredient.

Choose healthy fats in moderate amounts. Some studies have found that omega-3 fatty acids may decrease prostate cancer risk and progression. Omega-3 fatty acids are found in cold water fatty fish such as salmon, sardines, black cod, trout and herring and in plant foods including ground flaxseed, chia seeds, walnuts, and pumpkin seeds. Consuming fat from vegetable sources such as olive oil-based salad dressings and nuts after your diagnosis may also reduce the risk of prostate cancer progression and all-cause mortality.

Replace saturated and trans fats with fats from vegetable sources such as olive oil-based salad dressings and nuts, and aim for two or more servings of fish per week. Minimize processed meats (e.g. bacon, hot dogs, salami), poultry skin, egg yolks, and full-fat dairy products such as whole milk, butter, and cheese.

For more detailed information on nutrition and prostate cancer, including the important subject of supplementation, please see our documents for Health and Wellness on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>

## **Exercise and Prostate Cancer**

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Exercise is a valuable tool in managing cancer treatment. It reduces rates of prostate cancer recurrence and mortality. Exercise is helpful before, during, and after cancer treatment. It can improve how well you tolerate your treatments, decrease side effects, and improve sleep. Following treatment, an exercise program can improve mobility, strength, and cardiovascular fitness. Exercise needs not be intense to promote these benefits.

### *The Bottom Line*

Research and clinical guidelines all come down to this: avoid inactivity!

### *Consult Your Doctor Before You Start*

Before starting a new exercise program, check with your doctor or other health care practitioner. Find out if there are special precautions you need to take, or issues that you or your instructor/trainer need to consider. It is often standard procedure for the program director or trainer to ask for a letter from your doctor giving you medical clearance to begin a program of exercise.

### *Learn What Types of Exercise Will Work Best for You*

There are different types of exercise and each has its own benefits. A balanced program includes regular activities from each level below. The key to most lifestyle changes is to start slowly, develop a routine that fits your lifestyle, and maintain that routine over time.

### *When Should You Start Exercising?*

Begin exercising as soon as possible following surgery or other phases of cancer treatment. Do whatever is possible and work towards meeting the recommended amount. Anything is better than nothing!

## *What Amount of Exercise Is Recommended?*

Guidelines on recommended levels of exercise are as follows:

AEROBIC EXERCISE = 150 minutes per week (progress by increasing time and intensity)

STRENGTH TRAINING = 2 weekly sessions that include exercises for major muscle groups

FLEXIBILITY = Everyday (examples: stretching, yoga)

If you are interested in exercise counseling, see <https://www.ucsfhealth.org/services/cancer-exercise-counseling>

## *Cautions for Exercise*

During exercise, stop immediately if you experience any unusual symptoms such as shortness of breath, chest pain, dizziness, muscle pain, clamminess, headaches, irregular heartbeat, excessive sweating or any joint or limb pain. If these persist, contact your doctor right away.

## *Stress Reduction Exercises*

Many activities can help reduce stress and anxiety. These include various meditation practices (such as mindfulness meditation), modifying your breathing rhythm, visualization, relaxation exercises and massage. Recent Harvard research has shown that daily meditation lowers high blood pressure by increasing the level of nitric oxide in the blood stream, thus dilating the blood vessels. Acupuncture, increasingly accepted by Western medicine, can reduce pain and discomfort. Stylized exercises such as tai chi, qigong and yoga can help people become more at ease with themselves. Classes and groups are available to teach these techniques (<https://osher.ucsf.edu/public-classes/mindfulness-based-stress-reduction-mbsr>). These centers can provide information and direct you to helpful resources. A diagnosis of cancer can lead to an examination of one's life and how it is lived, resulting in positive changes in work, play, relationships, and personal and social practices that accentuate the positive and reduce the more stressful and negative aspects of daily life.

## **Coping with Prostate Cancer – Helpful Hints**

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### *Dealing with Anxiety, Distress, and Uncertainty*

*"I heard the doctor say, 'I'm sorry; the test results show that you have prostate cancer.' I heard nothing else. My mind went blank, and then I kept thinking, 'No, there must be some mistake.'"* Learning that you have prostate cancer can come as a shock. How did you react? You may have felt numb, frightened, or angry. You may not have believed what the doctor was saying. You may have felt all alone, even if your friends and family were in the same room with you. These feelings are all normal.

For many people, the first few days and weeks after diagnosis are very difficult. After you hear the word "cancer," you may have trouble breathing or listening to what is being said. When you are at home, you may have trouble thinking, eating, or sleeping. People diagnosed with cancer and those close to them experience a wide range of feelings and emotions. These feelings can change often and without warning.

## *Getting knowledge and support*

It is normal to be confused at first. However becoming knowledgeable about prostate cancer and the different treatment options available to you may diminish this distress and enable you to make more informed treatment decisions. This process is helped by support from family, friends and health care professionals, and by learning how to take charge of your treatment. The most important step you can take is to seek help as soon as you feel you are having trouble coping. Don't go through it alone; reach out to others, such as your physician or trusted friends, and let them know about your struggles and any mood changes. Taking action early will enable you to understand and deal with the many effects of your illness.

## *Living with uncertainty*

Learning to live with the basic uncertainty about treatment outcomes is a challenge for anyone. There are no absolute guarantees that a "cure" has been achieved, even with confirmed good findings at the time of treatment, and a number of years being disease-free after treatment. The PSA level should be monitored at appropriate intervals for the rest of your life. Some men experience temporary "PSA-anxiety" around the time the test is done. But many men and their families live their lives without obsessive worry that the cancer may return.

## *What can help you*

A variety of sources can provide information and support to help you during diagnosis, treatment and beyond, including:

- Your physicians and other medical team members
- Books and articles
- Support groups, in person and on the internet
- Peer Support, a program offered through UCSF which enables UCSF and non-UCSF patients to speak one on one to other patients who have been through a similar experience. The telephone number for requesting peer support is: 415-885-7210.

The Symptom Management Service at UCSF can provide additional support for men struggling with anxiety, depression or other symptoms related to the diagnosis or its treatments.

## *Networking with other prostate cancer patients*

The UCSF Ida and Joseph Friend Cancer Resource Center offers special events, classes and support groups, and the staff can help link you to counseling and supportive services. For those seeking online resources but lacking access, computer access may be available at your local library. Local cancer centers may also provide Internet access and often have staff to assist you with your search for information. Be careful to validate the information you find on websites not associated with accredited cancer treatment facilities or endorsed by the American Cancer Society or other reputable cancer information facilities. UCSF's Prostate Cancer Support group meets monthly and is open to patients, wives, partners, family members, friends, and caregivers. Meetings are 1st Tuesdays, 1:00-3:00 pm, 1600 Divisadero Street Contact: Patient and Family Cancer Support Center (415) 885-3693

<http://cancer.ucsf.edu/support/crc/support-groups>

## *Getting Second Opinions*

Because understanding the different treatments and then choosing among them isn't easy, getting multiple opinions may be a necessary part of your decision making. In the course of developing a treatment approach for yourself, you may consult with a urologist (surgeon), radiation oncologist, and medical oncologist, along with your primary care physician and other medical specialists. They may bring differing perspectives to the assessment of your cancer and to their treatment recommendations. It is helpful to prepare yourself in advance for a meeting with any doctor. Write out a list of questions you want to ask, bring along a partner or a friend, and record the discussion for future reference. The Ida and Joseph Friend Cancer Resource Center at UCSF has a good list of questions you can review and bring to your office visit.

## *Keeping Good Records*

It is very helpful to keep a complete and well-organized medical record, with copies of your laboratory work, diagnostic studies and treatment recommendations, and the treatment reports with the outcomes.

This will help you get the most out of your second opinions, deal with insurance companies, and play a more active role in your treatment. Test results in particular can provide baseline data about your condition, help you monitor the outcome of your treatment, and alert you to the need for possible changes in your treatment approach.

## *Involving the Family*

Many are affected by a cancer diagnosis – Prostate cancer affects not just the patient, but family and friends as well. Keeping them informed and involving them in decision-making is helpful to everyone involved. Wives, partners and children, who may become fearful about losing a mate or parent, may not be able to express these fears directly. Studies have shown that the wives, partners, and family caregivers of prostate cancer patients are at increased risk for anxiety, depression and other symptoms of distress. Keeping communication channels open and discussing fears and hopes openly can be helpful. In some instances, the wife or partner may become the more active person in getting information about the disease, arranging for and participating in medical visits, and supporting continued action and decision-making. The UCSF Ida and Joseph Friend Cancer Resource Center staff can help link your loved ones to supportive services and information.

It may be appropriate to have frank talks about risk reduction measures with adult sons and brothers, who may be at greater risk for developing prostate cancer. In some families, the increased risk may be related to known, inherited or genetic factors. Suspicions are raised about a genetic predisposition when prostate cancer occurs in multiple family members, when the diagnosis occurs at age 60 or younger, and/or when there is a family history of cancer. Family members who are at increased risk may reduce their risk through regular screening and risk reduction strategies. Patients are encouraged to discuss their medical family histories with their doctors.

Genetic counseling – In some families, genetic testing may identify altered genes that increase the risk for cancer and are passed from parent to child. Patients and family members may find it helpful to consult with trained genetic counselors and physicians. They can provide accurate family history assessment, education and counseling, offer genetic testing for cancer predisposition genes (when appropriate), and discuss screening and risk reduction options for patients and family members. These services are available through the UCSF Prostate Cancer Risk and Prevention Program. 415-885-7779.

## *Sexuality and Intimacy*

Prostate cancer treatment does affect sexuality – Every treatment for prostate cancer can have side effects including impact on sexual drive and functioning, often in a major way. The man may have to cope with the prospect and then the actuality of partial or total impotence. This can create anxiety, a sense of loss, and/or a lowered self-esteem, which in turn can affect and disrupt the sexual relationship with the man's partner. If the relationship is to remain mutually satisfying for both partners, significant changes may have to be made over time in the attitudes, behavior, and interaction of the partners. However, many men do have very satisfying sexual relationships after treatment.

## *Dealing with sexual concerns and changes*

Various concerns may emerge during and after treatment. A man's anxiety about his difficulty in getting an erection and/or a lessening of sexual drive, may lead to his avoiding sexual activity with his partner. But men often overestimate their partners' need for frequent sexual intercourse, as compared with other means of showing love and physical closeness. An adjustment in how partners relate to each other may be needed. Partners need to be open with each other, comfortable and direct in expressing their desires, fears and hopes, and be willing to work out their differences in a mutually respectful way. For more extensive information, see our document "Managing Erectile Dysfunction – A Patient Guide"

<https://urology.ucsf.edu/prostate-cancer-education-documents>

## *Join a Support Group*

A support group can help both the man with prostate cancer and his loved ones, before, during and after treatment. Studies have shown the value of support groups in helping with decision-making, enhancing quality of life and possibly in prolonging life. Being with other men with prostate cancer who have been successfully treated can be tremendously reassuring. Hearing how others approached their decision-making, what their actual experiences were, and how they coped with the consequences of their treatment is also very helpful. This also applies to men whose initial treatment has failed or who are dealing with recurrence of their cancer. Many support groups (including Us Too <https://www.ustoo.org/>) enable partners and loved ones to participate, and/or to have their own meetings. The local office of the American Cancer Society is a good source of information about support groups in your area, as is the UCSF Ida and Joseph Friend Cancer Resource Center. The Helen Diller Family Comprehensive Cancer Center also offers a peer support program where cancer patients can speak with others who have already "been there." This confidential on-the-phone service is free for patients and caregivers. All are welcome, regardless of where the care is received. See <http://cancer.ucsf.edu/support/crc/peer-support> UCSF's Prostate Cancer Support group meets monthly.

## *Keeping a Positive Attitude*

- Learning more about prostate cancer and its treatment is one way to develop a positive attitude. As you get more information about treatment options and what that means for you, feelings of hope and optimism will emerge more frequently.
- Recognize that everyone copes differently and benefits from different types of support. Become aware of what feels most supportive to you.
- Try to incorporate activities and people that bring you a sense of joy, peace and healing. This may mean joining a support group, spending more time with family, seeking individual counseling, varying your daily routine, setting aside special days for yourself, or spending time alone in nature. Schedule pleasant events to boost your mood and cultivate perspective.

**If you are reading this online:** To help UCSF provide you with helpful information, please take a few moments and answer four questions. [Click here to leave your feedback.](#)

## Glossary

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**Adjuvant therapy** - The use of hormone therapy or chemotherapy after surgery or radiation therapy as part of cancer treatment. Compare with neoadjuvant.

**Adrenal glands** - Glands located above each kidney that produce several kinds of hormones, including a small amount of sex hormones.

**Androgen** - A male sex hormone. The main one is testosterone.

**Anti-androgen** - A drug that blocks the action of male sex hormones on prostate and other cells.

**Benign** - Refers to a tumor that is not malignant and does not spread.

**Benign prostatic hyperplasia (BPH)** - A non-cancerous enlargement of the prostate that may cause difficulty in urination.

**Biopsy** - A procedure that removes small samples of tissue from the body for examination.

**Brachytherapy** - A treatment in which radioactive material is inserted into and/or near the prostate.

**Cancer** - A general term for more than 100 diseases characterized by the abnormal and uncontrolled growth of cells, which may eventually spread to other parts of the body.

**Capsule** - A thin layer of tissue that encases the prostate gland.

**Catheter** - A thin, flexible tube inserted through the urethra into the bladder to drain urine.

**Chemotherapy** - The use of one or more strong drugs to treat or control a cancer.

**Clinical trial** - The systematic investigation in human subjects of the safety and effectiveness of a procedure or drug designed to diagnose or treat a specific disease.

**Combination therapy** - The use of two or more modes of treatment (e.g. surgery, radiotherapy, chemotherapy, hormone therapy, immunotherapy) in combination to achieve optimum results against cancer or other disease.

**Control group** - A group of patients in a clinical trial that receives either a standard treatment or no treatment, that is compared with an experimental group that is receiving a proposed new treatment that might be more effective.

**Cryosurgery** - A procedure that uses extremely cold liquid nitrogen to destroy cancer cells.

**Decipher™** test from GenomeDx Biosciences is performed with tissue obtained either from a biopsy or prostatectomy that measures how aggressive a cancer is likely to be.

**Digital rectal exam (DRE)** - A screening procedure for prostate cancer where a doctor inserts a gloved, lubricated finger into the rectum to feel the size and shape of the prostate.

**Double-blind** - Characteristic of a controlled experiment in which neither the patient nor the attending physician knows whether the patient is getting one or another drug or dose.

**Dry orgasm** - Sexual climax without the release of seminal fluid.

**Ejaculation** - The release of fluid containing semen through the penis during orgasm.

**Erectile dysfunction** - Difficulty in achieving an erection.

**Estrogen** - A female sex hormone.

**External beam radiation therapy** - The use of high-energy x-rays or heavy particles (protons) aimed from outside the body to treat a cancer.

**Free PSA** - Most PSA in the blood is bound to serum proteins. A small amount is not protein bound and is called 'free PSA'. In men with prostate cancer the ratio of free (unbound) PSA to total PSA is decreased.

**Gleason system (grade and score)** - This system is used to determine how aggressive a prostate cancer is. Samples of prostate cancer cells are examined under a microscope and graded by number according to how much they differ from normal prostate cells. These grades are then added for an overall score.

**HIFU**-High Intensity Focused Ultrasound approved by the FDA in 2015 for certain prostate cancer treatments.

**Hormone** - A chemical product of one of the endocrine glands of the body, which is secreted into body fluids and has a specific effect on other cells or organs.

**Hormone therapy** - A treatment method for prostate cancer that interferes with the production and/or activity of testosterone and other male hormones that promote prostate cancer growth.

**Imaging tests** - A variety of tests that produce pictures of the inside of the body to help diagnose and stage a cancer.

**Immune system** - A complex network of organs, cells, and specialized substances distributed throughout the body that defend it from foreign organisms that cause infection or disease.

**Immunotherapy** - An experimental method of treating cancer that stimulates the body's immune defense system to identify and attack the cancer cells.

**Impotence** - Inability to have an unassisted erection. Also called erectile dysfunction.

**Incontinence** - Inability to control the flow of urine from the bladder (urinary incontinence), or the passage of feces from the intestines (fecal incontinence.).

**Informed consent** - The process in which a patient learns about and understands the purpose and aspects of a treatment or clinical trial and then agrees to participate.

**Internal radiation therapy** (see brachytherapy) - The placement of radioactive material inside an organ of the body to treat a cancer.

**Kegel exercise** – Exercise that tightens the pelvic floor and helps with urinary continence.

**Localized therapy** - A method of treating cancer only in the area where the cancer is.

**Localized prostate cancer** – Cancer that is confined to the prostate gland.

**Locally advanced prostate cancer** – Cancer that has spread locally outside of the prostate but not to other organs, nearby lymph nodes or the blood stream.

**Luteinizing hormone-releasing hormone (LHRH) agonist** - A class of drugs that are used as part of hormone therapy that shuts down the production of testosterone by the testes.

**Lymph nodes or glands** - Small, bean-shaped collections of tissue located along the channels of the lymphatic system that may trap infectious organisms or cancer cells.

**Lymphatic system** - The tissues and organs, including the bone marrow, spleen, thymus, and lymph nodes, which produce and store cells that fight infection and disease.

**Malignant** - Refers to a tumor that is cancerous and can grow and spread to other parts of the body.

**Margin status** – This refers to how close the cancer comes to the edge of tissues removed during surgery. A negative margin suggests all the cancer was removed, while a positive margin suggests that some cancer cells may remain.

**Metastasis** - The spread of cancer cells from the original tumor site through the blood and lymph vessels to other parts of the body to produce tumors at new sites.

**Neoadjuvant** - Therapy given before and/or during primary therapy.

**Neurovascular bundles** - Nerves and blood vessels running on either side of the prostate that allow the penis to become erect.

**Oncologist** - A doctor who specializes in treating cancer, either through surgery, radiation, or the administration of special drugs.

**OncotypeDX®** – A genetic test offered by Genomic Health Inc. performed with tissue obtained either from a biopsy or prostatectomy that measures how aggressive a cancer is likely to be.

**Orchiectomy** - Surgery to remove the testes, but not the scrotum.

**Palpable tumor** - A tumor in the prostate that can be felt during a digital rectal exam.

**Pathologist** - A doctor who identifies and grades diseases, in part by studying cells and tissues under a microscope.

**Pelvic** - Referring to the areas of the body located below the waist and surrounded by the hip and pubic bones.

**Pelvic lymph node dissection** - The removal of lymph nodes in the pelvic area to examine them for the presence of cancer cells.

**Perineal** - Referring to the area between the anus and scrotum that may be used as the site where a prostatectomy or brachytherapy will be performed.

**Placebo** - An inactive substance, used as a control, which may resemble a medication that is being evaluated for its treatment effectiveness in a clinical trial.

**PCA3** - Prostate cancer antigen 3 (PCA3, also referred to as DD3) is a gene that expresses a non-coding RNA. PCA3 is only expressed in human prostate tissue, and the gene is highly overexpressed in prostate cancer.

**Prognosis** - A judgment made about the course of a disease and/or the probable outcome of its treatment.

**Prolaris®** assay from Myriad Genetics is a genetic test performed with tissue obtained either from a biopsy or prostatectomy that measures how aggressive a cancer is likely to be.

**Prostate** - A gland, part of the male reproductive system and located below the bladder, which produces fluid for the semen that carries sperm cells.

**Prostate-specific antigen (PSA)** - A protein produced by the prostate gland; its level can be determined by a blood test. The PSA test scores can be used to help detect prostate cancer, estimate the extent of the cancer, and monitor the results of the treatment(s) for the cancer.

**Prostatic acid phosphatase (PAP)** - An enzyme produced by the prostate gland. Changes in its level in the blood may help detect changes in the extent and nature of the prostate cancer.

**Radical prostatectomy** - Surgery to remove the entire prostate gland to treat prostate cancer. Also just called prostatectomy.

**Rectum** - The last six inches of the large intestine ending at the anus, which leads to the outside of the body.

**Recurrence** - A return of the cancer following the completion of treatment.

**Remission** - Disappearance of the signs and symptoms of cancer, either temporarily or permanently.

**Risk** - Refers to the likelihood of a person developing a certain disease, or an estimation of the probable success or failure of the treatment for that disease.

**Screening** - The use of different tests and/or examinations to detect the presence of cancer or other diseases at early stages.

**Scrotum** - The external sac or pouch that contains the testes.

**Semen** - The fluid that is released through the penis during orgasm. Semen is made up of sperm from the testicles and fluid from the prostate and seminal vesicles.

**Seminal vesicles** - Pouch-like organs located above the prostate that produce and store seminal fluid.

**Side effect** - A secondary and usually negative effect from a drug or procedure used to treat a disease.

**Stage and staging** - Stage is a term used to describe the size and extent of a cancer and whether it has progressed throughout the body. Staging refers to the tests and examinations done to determine the stage.

**Standard treatment** - A treatment or other intervention currently being used and considered to be of proven effectiveness on the basis of past studies.

**Systemic therapy** - Treatment that attempts to reach and affect cancer cells all over the body.

**Testes** - The two egg-shaped glands that produce sperm and male hormones.

**Testosterone** - The primary male sex hormone (androgen) produced mostly by the testes. It stimulates the growth and activity of the male sex organs, and also plays a role in the development of healthy bones. It also appears to be necessary for the growth of prostate cancer tumor cells.

**Transrectal ultrasound (TRUS)** - An imaging technique that uses sound waves and their echoes from an instrument inserted into the rectum to form a picture of the prostate and help locate sites of abnormal tissue.

**Transurethral resection of the prostate (TURP)** - The use of an instrument inserted through the penis to remove tissue from the prostate, usually to treat the symptoms of BPH.

**Tumor** - An abnormal and excessive growth of cells. This can be benign or malignant.

**Urethra** - The canal that carries urine from the bladder or semen from the sex glands to the outside of the body.

**Urologist** - A doctor who specializes in diseases of the urinary organs in females and the urinary and sex organs in males.

## Notes

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