East Lancashire Prostate Cancer Support Group Newsletter

Volume5 **Issue3** **Date March 2016**

What's Inside

Next Meeting Thursday 7th April

The BARRY KILBY PROSTATE CANCER APPEAL charity in conjunction with THE EAST LANCASHIRE PROSTATE CANCER SUPPORT GROUP Pesents

" A N EXTRA TIME EVENT "

Saturday 2nd April 2016

09:00 - 12:00

James Hargreaves Stand at Turf Moor

By Popular Demand the Referee has ordered an extra time event to Provide PSA test's to all those who missed out at the Februart event

We are having another PSA blood testing event on Saturday the 2nd April. We are defining this one as an 'Extra Time' event, it will again be held in the James Hargreaves stand at Turf Moor 9am - 12 noon. The main format will be the same, Subsidised again by the BARRY KILBY PROSTATE CANCER APPEAL charity in conjunction with THE EAST LANCASHIRE PROSTATE CANCER SUPPORT GROUP. This event will provide a second opportunity for all the men who we were unable to test at the February event.

Prostate Cancer (PSA) blood testing event at Burnley Football Club, Turf Moor. (Saturday 13th February)

Last year's event (2015) was the first event ever held in the Lancashire area and was an amazing success, 274 men turned up to have the simple test within the 3 hour event.

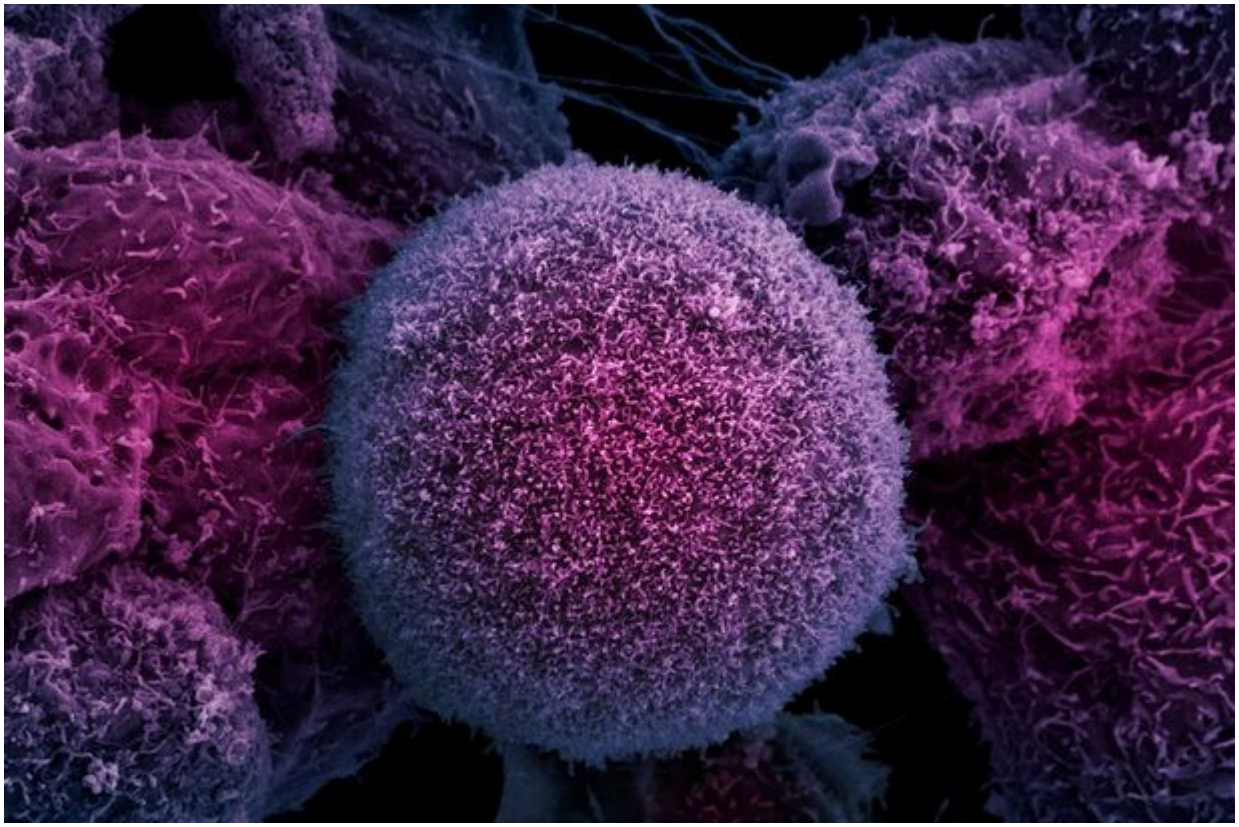
This year the number of men who turned up was 'overwhelming', 460 men were tested within two and half hours and an estimated 200+ men having turned up were unable to have the test due to shortage of time and the fact that medical materials were running low. - 39 men have been advised to visit their GP.

It is intended to offer men who were unable to be given the test a further opportunity, we are therefore hoping to hold another event within the next two months, again in conjunction with Barry Kilby and Burnley FC.

In the meantime we thank you greatly for your kind support in helping to save men's lives and hope that you will support us again in the future.

Prostate cancer treatment which avoids harming sexual performance could soon be available on NHS

In an NHS trial of High Intensity Focused Ultrasound, only 15% had erectile problems compared with 30-60% following surgery



Prostate cancer: High Intensity Focused Ultrasound kills the tumour with heat

A revolutionary prostate cancer treatment which avoids harming men ’s sexual performance could soon be available on the NHS.

High Intensity Focused Ultrasound kills the tumour with heat without damaging healthy tissue around it. In an NHS trial led by University College Hospital, London, 625 men were treated. After five years 93% were cancer-free. Only 15% had erectile problems compared with 30 to 60% following surgery.

The results were revealed to the European Association of Urology in Munich.

Treatment: The results were revealed to the European Association of Urology in Munich .

Tim Dudderidge, one of a small group performing the trial on NHS patients, said: “Results are impressive.

Prostate cancer severity could be predicted by simple blood test before surgery is needed

“I really hope this work will lead to NICE amending the clinical guideline to incorporate focal therapies like HIFU into standard practice.

"We will continue to collect data in trials and on the registries.

Danger: Prostate cancer is the most common male form of the killer disease

“Recruitment to controlled trials is challenging and we are trying to do that right now with this study.

Life after prostate cancer is not for the wasting - it changed me forever

“I think you can see it both ways one [surgery] is more established as giving long term control of disease, the other is less invasive. I do both and I can see merits of both ways and so can my patients.

“However, most patients seem to have a strong view of what is best for them and it’s pretty evenly split.”

HIFU is mainly offered privately in the UK but experts hope the study will pave the way for NHS ops.

DAILY Mirror

From Left to Right Hazel Goulding (Treasurer) Leon D Wright (IT Admin) Stuart Marshall (Secretary) Steve Laird (Vice Chairman) Dave Riley (Chairman)

Contact Information

Tel: 07548 033930
E Mail leondwright4@gmail.com

We are a group of local people who know about prostate cancer. We are a friendly organisation dedicated to offering support to men who have had or who are experiencing the effects of this potentially life threatening disease.

The East Lanc's Prostate Cancer Support Group offers a place for free exchange of information and help for local men and their supporters (family and friends) who may be affected by this increasingly common form of male cancer.

At each meeting we strive to be a happy, supportive and upbeat group of people; encouraging open discussion on what can be a very difficult and perhaps for some an embarrassing subject. We have lively, informative, interactive, sharing and above all supportive meetings.

Prostate Cancer

What is prostate cancer?

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer cells, and can spread to other areas of the body. To learn more about how cancers start and spread, see *What Is Cancer?*

Prostate cancer begins when cells in the prostate gland start to grow uncontrollably. The prostate is a gland found only in males. It makes some of the fluid that is part of semen. The prostate is below the bladder and in front of the rectum. The size of the prostate changes with age. In younger men, it is about the size of a walnut, but it can be much larger in older men.

Just behind the prostate are glands called *seminal vesicles* that make most of the fluid for semen. The *urethra,* which is the tube that carries urine and semen out of the body through the penis, goes through the center of the prostate.

Types of prostate cancer

Almost all prostate cancers are **adenocarcinomas**. These cancers develop from the gland cells (the cells that make the prostate fluid that is added to the semen).

Other types of prostate cancer include:

- Sarcomas
- Small cell carcinomas
- Neuroendocrine tumors (other than small cell carcinomas)
- Transitional cell carcinomas

These other types of prostate cancer are rare. If you have prostate cancer it is almost certain to be an adenocarcinoma.

Some prostate cancers can grow and spread quickly, but most grow slowly. In fact, autopsy studies show that many older men (and even some younger men) who died of other causes also had prostate cancer that never affected them during their lives. In many cases neither they nor their doctors even knew they had it.

Possible pre-cancerous conditions of the prostate

Some research suggests that prostate cancer starts out as a pre-cancerous condition, although this is not yet known for sure. These conditions are sometimes found when a man has a prostate biopsy (removal of small pieces of the prostate to look for cancer).

Prostatic intraepithelial neoplasia (PIN)

In PIN, there are changes in how the prostate gland cells look under a microscope, but the abnormal cells don't look like they are growing into other parts of the prostate (like cancer cells would). Based on how abnormal the patterns of cells look, they are classified as:

- **Low-grade PIN:** the patterns of prostate cells appear almost normal
- **High-grade PIN:** the patterns of cells look more abnormal

PIN begins to appear in the prostates of some men as early as in their 20s.

Many men begin to develop low-grade PIN when they are younger but don't necessarily develop prostate cancer. The possible link between low-grade PIN and prostate cancer is still unclear.

If high-grade PIN is found in your prostate biopsy sample, there is about a 20% chance that you also have cancer in another area of your prostate.

Proliferative inflammatory atrophy (PIA)

In PIA, the prostate cells look smaller than normal, and there are signs of inflammation in the area. PIA is not cancer, but researchers believe that PIA may sometimes lead to highgrade PIN, or perhaps to prostate cancer directly.

Key statistics for prostate cancer

How common is prostate cancer?

Other than skin cancer, prostate cancer is the most common cancer in American men. The American Cancer Society's estimates for prostate cancer in the United States for 2016 are:

- About 180,890 new cases of prostate cancer

- About 26,120 deaths from prostate cancer

Risk of prostate cancer

About 1 man in 7 will be diagnosed with prostate cancer during his lifetime.

Prostate cancer develops mainly in older men. About 6 cases in 10 are diagnosed in men aged 65 or older, and it is rare before age 40. The average age at the time of diagnosis is about 66.

Deaths from prostate cancer

Prostate cancer is the second leading cause of cancer death in American men, behind only lung cancer. About 1 man in 39 will die of prostate cancer.

Prostate cancer can be a serious disease, but most men diagnosed with prostate cancer do not die from it. In fact, more than 2.9 million men in the United States who have been diagnosed with prostate cancer at some point are still alive today.

For statistics related to survival, see Survival rates for prostate cancer.

Visit the American Cancer Society's Cancer Statistics Center for more key statistics.

Prostate cancer risk factors

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. Some risk factors, like smoking, can be changed. Others, like a person's age or family history, can't be changed.

But having a risk factor, or even several, does not mean that you will get the disease. Many people with one or more risk factors never get cancer, while others who get cancer may have had few or no known risk factors.

Researchers have found several factors that might affect a man's risk of getting prostate cancer.

Age

Prostate cancer is rare in men younger than 40, but the chance of having prostate cancer rises rapidly after age 50. About 6 in 10 cases of prostate cancer are found in men older than 65.

Race/ethnicity

Prostate cancer occurs more often in African-American men and in Caribbean men of African ancestry than in men of other races. African-American men are also more than twice as likely to die of prostate cancer as white men. Prostate cancer occurs less often in Asian-American and Hispanic/Latino men than in non-Hispanic whites. The reasons for these racial and ethnic differences are not clear.

Geography

Prostate cancer is most common in North America, northwestern Europe, Australia, and on Caribbean islands. It is less common in Asia, Africa, Central America, and South America.

The reasons for this are not clear. More intensive screening in some developed countries probably accounts for at least part of this difference, but other factors such as lifestyle differences (diet, etc.) are likely to be important as well. For example, Asian Americans have a lower risk of prostate cancer than white Americans, but their risk is higher than that of men of similar backgrounds living in Asia.

Family history

Prostate cancer seems to run in some families, which suggests that in some cases there may be an inherited or genetic factor. (Still, most prostate cancers occur in men without a family history of it.)

Having a father or brother with prostate cancer more than doubles a man's risk of developing this disease. (The risk is higher for men who have a brother with the disease than for those who have a father with it.) The risk is much higher for men with several affected relatives, particularly if their relatives were young when the cancer was found.

Gene changes

Several inherited gene changes seem to raise prostate cancer risk, but they probably account for only a small percentage of cases overall. For example:

- Inherited mutations of the *BRCA1* or *BRCA2* genes raise the risk of breast and ovarian cancers in some families. Mutations in these genes (especially in *BRCA2*) may also increase prostate cancer risk in some men.
- Men with Lynch syndrome (also known as *hereditary non-polyposis colorectal cancer*, or HNPCC), a condition caused by inherited gene changes, have an increased risk for a number of cancers, including prostate cancer.

Other inherited gene changes can also raise a man's risk of prostate cancer. For more on some of these gene changes, see What causes prostate cancer?.

Factors with less clear effect on prostate cancer risk

Diet

The exact role of diet in prostate cancer is not clear, but several factors have been studied. Men who eat a lot of red meat or high-fat dairy products appear to have a slightly higher chance of getting prostate cancer. These men also tend to eat fewer fruits and vegetables. Doctors aren't sure which of these factors is responsible for raising the risk.

Some studies have suggested that men who consume a lot of calcium (through food or supplements) may have a higher risk of developing prostate cancer. Dairy foods (which are often high in calcium) might also increase risk. But most studies have not found such a link with the levels of calcium found in the average diet, and it's important to note that calcium is known to have other important health benefits.

Obesity

Being obese (very overweight) does not seem to increase the overall risk of getting prostate cancer.

Some studies have found that obese men have a lower risk of getting a low-grade (less dangerous) form of the disease, but a higher risk of getting more aggressive prostate cancer. The reasons for this are not clear.

Some studies have also found that obese men may be at greater risk for having more advanced prostate cancer and of dying from prostate cancer, but not all studies have found this.

Smoking

Most studies have not found a link between smoking and *getting* prostate cancer. Some research has linked smoking to a possible small increased the risk of dying from prostate cancer, but this finding needs to be confirmed by other studies.

Chemical exposures

There is some evidence that firefighters can be exposed to chemicals that may increase their risk of prostate cancer.

A few studies have suggested a possible link between exposure to Agent Orange, a chemical used widely during the Vietnam War, and the risk of prostate cancer, although not all studies have found such a link. The Institute of Medicine considers there to be "limited/suggestive evidence" of a link between Agent Orange exposure and prostate cancer. To learn more, see *Agent Orange and Cancer*.

Inflammation of the prostate

Some studies have suggested that *prostatitis* (inflammation of the prostate gland) may be linked to an increased risk of prostate cancer, but other studies have not found such a link. Inflammation is often seen in samples of prostate tissue that also contain cancer. The link between the two is not yet clear, and is an active area of research.

Sexually transmitted infections

Researchers have looked to see if sexually transmitted infections (like gonorrhea or chlamydia) might increase the risk of prostate cancer, because they can lead to inflammation of the prostate. So far, studies have not agreed, and no firm conclusions have been reached.

Vasectomy

Some studies have suggested that men who have had a vasectomy (minor surgery to make men infertile) have a slightly increased risk for prostate cancer, but other studies have not found this. Research on this possible link is still under way.

What causes prostate cancer?

Researchers do not know exactly what causes prostate cancer. But they have found some risk factors and are trying to learn just how these factors cause prostate cells to become cancer.

On a basic level, prostate cancer is caused by changes in the DNA of a normal prostate cell. DNA is the chemical in our cells that makes up our genes. Our genes control how

our cells function. We usually look like our parents because they are the source of our DNA. But DNA affects more than just how we look.

Some genes control when our cells grow, divide into new cells, and die:

- Certain genes that help cells grow, divide, and stay alive are called *oncogene*s.
- Genes that normally keep cell growth under control, repair mistakes in DNA, or cause cells to die at the right time are called *tumor suppressor genes*.

Cancer can be caused in part by DNA changes (mutations) that turn on oncogenes or turn off tumor suppressor genes.

DNA changes can either be inherited from a parent or can be acquired during a person's lifetime.

Inherited gene mutations

Some gene mutations can be passed from generation to generation and are found in all cells in the body. These mutations are *inherited*. Inherited gene changes cause about 5% to 10% of prostate cancers. Cancer caused by inherited genes is called *hereditary cancer*. Several inherited mutated genes have been linked to hereditary prostate cancer, including:

***RNASEL* (formerly *HPC1*):** The normal function of this tumor suppressor gene is to help cells die when something goes wrong inside them. Inherited mutations in this gene might let abnormal cells live longer than they should, which can lead to an increased risk of prostate cancer.

***BRCA1* and *BRCA2*:** These tumor suppressor genes normally help repair mistakes in a cell's DNA (or cause the cell to die if the mistake can't be fixed). Inherited mutations in these genes more commonly cause breast and ovarian cancer in women. But changes in these genes (especially *BRCA2*) also account for a small number of prostate cancers.

DNA mismatch repair genes (such as *MSH2* and *MLH1*): These genes normally help fix mistakes (mismatches) in DNA that are made when a cell is preparing to divide into 2 new cells. (Cells must make a new copy of their DNA each time they divide.) Men with inherited mutations in these genes have a condition known as *Lynch syndrome* (also known as *hereditary non-polyposis colorectal cancer*, or HNPCC), and are at increased risk of colorectal, prostate, and some other cancers.

***HOXB13*:** This gene is important in the development of the prostate gland. Mutations in this gene have been linked to early-onset prostate cancer (prostate cancer diagnosed at a young age) that runs in some families. Fortunately, this mutation is rare.

Other inherited gene mutations may account for some hereditary prostate cancers, and research is being done to find these genes.

Acquired gene mutations

Some gene mutations happen during a person's lifetime and are not passed on to children. These changes are found only in cells that come from the original mutated cell. These are called *acquired* mutations. Most gene mutations related to prostate cancer seem to

develop during a man's life rather than having been inherited.

Every time a cell prepares to divide into 2 new cells, it must copy its DNA. This process is not perfect, and sometimes errors occur, leaving defective DNA in the new cell. It's not clear how often these DNA changes might be random events, and how often they are influenced by other factors (such as diet, hormone levels, etc.). In general, the more quickly prostate cells grow and divide, the more chances there are for mutations to occur. Therefore, anything that speeds up this process may make prostate cancer more likely.

For example, androgens (male hormones), such as testosterone, promote prostate cell growth. Having higher levels of androgens might contribute to prostate cancer risk in some men.

Some research has found that men with high levels of another hormone, insulin-like growth factor-1 (IGF-1), are more likely to get prostate cancer. However, other studies have not found such a link. Further research is needed to make sense of these findings.

As mentioned in Prostate cancer risk factors, some studies have found that inflammation in the prostate may contribute to prostate cancer. One theory is that inflammation might lead to cell DNA damage, which may contribute to a normal cell becoming a cancer cell. More research is needed in this area.

Exposure to radiation or cancer-causing chemicals can cause DNA mutations in many organs, but these factors have not been proven to be important causes of mutations in prostate cells.

Can prostate cancer be prevented?

There is no sure way to prevent prostate cancer. Many risk factors such as age, race, and family history can't be controlled. But there are some things you can do that might lower your risk of prostate cancer.

Body weight, physical activity, and diet

The effects of body weight, physical activity, and diet on prostate cancer risk are not clear, but there are things you can do that might lower your risk, such as:

- Eating at least 2½ cups of a wide variety of vegetables and fruits each day.
- Being physically active.
- Staying at a healthy weight.

For more information, see the *American Cancer Society Guidelines on Nutrition and Physical Activity for Cancer Prevention*.

Vitamin, mineral, and other supplements

Some earlier studies suggested that taking certain vitamin or mineral supplements, such as vitamin E or selenium, might lower prostate cancer risk. But in a large study, neither vitamin E nor selenium was found to lower prostate cancer risk.

Several studies are now looking at the possible effects of soy proteins (called *isoflavones*) on prostate cancer risk. The results of these studies are not yet available.

Any supplement has the potential for both risks and benefits. Before starting vitamins or other supplements, talk with your doctor.

Medicines

Some drugs might help reduce the risk of prostate cancer.

5-alpha reductase inhibitors

The drugs finasteride (Proscar) and dutasteride (Avodart) have been studied to see if they can lower prostate cancer risk, but it's not clear if the benefits outweigh the risks for most men. Still, men who want to know more about these drugs should discuss them with their doctors. These drugs are currently used to treat benign prostatic hyperplasia (BPH), a non-cancerous growth of the prostate.

Aspirin

Some research suggests that men who take a daily aspirin might have a lower risk of getting and dying from prostate cancer. But more research is needed to show if the possible benefits outweigh the risks, such as an increased risk of bleeding.

Other drugs

Other drugs and dietary supplements that might help lower prostate cancer risk are now being tested in clinical trials. But so far, none have been proven to do so.

For more on these topics, see *Prostate Cancer Prevention and Early Detection*.

Can prostate cancer be found early?

Screening is testing to find cancer in people before they have symptoms. For some types of cancer, screening can help find cancers at an early stage, when they are likely to be easier to treat.

Prostate cancer can often be found before symptoms arise by testing the amount of prostate-specific antigen (PSA) in a man's blood. Another way to find prostate cancer is the digital rectal exam (DRE), in which the doctor puts a gloved, lubricated finger into the rectum to feel the prostate gland. These tests are described in more detail in *Prostate Cancer Prevention and Early Detection*.

If the results of either one of these tests are abnormal, further testing is often done to see if a man has cancer. If prostate cancer is found as a result of screening with the PSA test or DRE, it will probably be at an earlier, more treatable stage than if no screening were done.

There is no question that screening can help find many prostate cancers early, but there are still questions about whether the benefits of screening outweigh the risks for most men. There are clearly both pros and cons to the prostate cancer screening tests in use today.

At this time, the American Cancer Society (ACS) recommends that men thinking about getting screened for prostate cancer should make informed decisions based on available information, discussion with their doctor, and their own views on the possible benefits,

risks, and limits of prostate cancer screening.

To learn more about prostate cancer screening and the current ACS screening guidelines, see *Prostate Cancer Prevention and Early Detection*.

Signs and symptoms of prostate cancer

Early prostate cancer usually causes no symptoms. More advanced prostate cancers sometimes cause symptoms, such as:

- Problems urinating, including a slow or weak urinary stream or the need to urinate more often, especially at night
- Blood in the urine or semen
- Trouble getting an erection (erectile dysfunction)
- Pain in the hips, back (spine), chest (ribs), or other areas from cancer that has spread to bones
- Weakness or numbness in the legs or feet, or even loss of bladder or bowel control from cancer pressing on the spinal cord

Most of these problems are more likely to be caused by something other than prostate cancer. For example, trouble urinating is much more often caused by benign prostatic hyperplasia (BPH), a non-cancerous growth of the prostate. Still, it's important to tell your doctor if you have any of these symptoms so that the cause can be found and treated, if needed.

Tests for prostate cancer

Most prostate cancers are first found during screening with a prostate-specific antigen (PSA) blood test or a digital rectal exam (DRE). (See *Prostate Cancer Prevention and Early Detection*.) Early prostate cancers usually don't cause symptoms, but more advanced cancers are sometimes first found because of symptoms they cause.

If cancer is suspected based on results of screening tests or symptoms, tests will be needed to confirm the diagnosis. The actual diagnosis of prostate cancer can only be made with a prostate biopsy.

Medical history and physical exam

If your doctor suspects you might have prostate cancer, he or she will ask you about any symptoms you are having, such as any urinary or sexual problems, and how long you have had them. You might also be asked about possible risk factors, including your family history.

Your doctor will also examine you. This might include a digital rectal exam (DRE), during which the doctor's gloved, lubricated finger is inserted into your rectum to feel for any bumps or hard areas on the prostate that might be cancer. If you do have cancer, the DRE can sometimes help tell if it's only on one side of the prostate, if it's on both sides, or if it's likely to have spread beyond the prostate to nearby tissues.

Your doctor may also examine other areas of your body. He or she might then order some tests.

PSA blood test

The prostate-specific antigen (PSA) blood test is used mainly to screen for prostate cancer in men without symptoms (see *Prostate Cancer Prevention and Early Detection*). It's also one of the first tests done in men who have symptoms that might be caused by prostate cancer.

Most men without prostate cancer have PSA levels under 4 nanograms per milliliter (ng/mL) of blood. The chance of having prostate cancer goes up as the PSA level goes up.

When prostate cancer develops, the PSA level usually goes above 4. Still, a level below 4 does not guarantee that a man doesn't have cancer. About 15% of men with a PSA below 4 will have prostate cancer on a biopsy.

Men with a PSA level between 4 and 10 have about a 1 in 4 chance of having prostate cancer. If the PSA is more than 10, the chance of having prostate cancer is over 50%.

When considering whether to do a prostate biopsy to look for cancer, not all doctors use the same PSA cutoff point. Some may advise it if the PSA is 4 or higher, while others might recommend it starting at a lower level, such as 2.5 or 3. Other factors, such as your age, race, and family history, may affect this decision.

The PSA test can also be useful if you have already been diagnosed with prostate cancer.

- In men just diagnosed with prostate cancer, the PSA test can be used together with physical exam results and tumor grade (determined on the biopsy, described further on) to help decide if other tests (such as CT scans or bone scans) are needed.
- The PSA test is a part of staging (determining the stage of your cancer) and can help tell if your cancer is likely to still be confined to the prostate gland. If your PSA level is very high, your cancer is more likely to have spread beyond the prostate. This may affect your treatment options, since some forms of therapy (such as surgery and radiation) are not likely to be helpful if the cancer has spread to the lymph nodes, bones, or other organs.
- PSA tests are also an important part of monitoring prostate cancer during and after treatment (see Following PSA levels during and after treatment).

Transrectal ultrasound (TRUS)

For this test, a small probe about the width of a finger is lubricated and placed in your rectum. The probe gives off sound waves that enter the prostate and create echoes. The probe picks up the echoes, and a computer turns them into a black and white image of the prostate.

The procedure often takes less than 10 minutes and is done in a doctor's office or

outpatient clinic. You will feel some pressure when the probe is inserted, but it is usually not painful. The area may be numbed before the procedure.

TRUS is often used to look at the prostate when a man has a high PSA level or has an abnormal DRE result. It is also used during a prostate biopsy to guide the needles into the correct area of the prostate.

TRUS is useful in other situations as well. It can be used to measure the size of the prostate gland, which can help determine the PSA density (described in *Prostate Cancer Prevention and Early Detection*) and may also affect which treatment options a man has. TRUS is also used as a guide during some forms of treatment such as brachytherapy (internal radiation therapy) or cryotherapy.

Prostate biopsy

If certain symptoms or the results of tests such as a PSA blood test or DRE suggest that you might have prostate cancer, your doctor will do a prostate biopsy.

A biopsy is a procedure in which small samples of the prostate are removed and then looked at under a microscope. A *core needle biopsy* is the main method used to diagnose prostate cancer. It is usually done by a urologist, a surgeon who treats cancers of the genital and urinary tract, which includes the prostate gland.

Using TRUS to "see" the prostate gland, the doctor quickly inserts a thin, hollow needle through the wall of the rectum and into the prostate. When the needle is pulled out it removes a small cylinder (core) of prostate tissue. This is repeated several times. Most urologists will take about 12 core samples from different parts of the prostate.

Though the procedure sounds painful, each biopsy usually causes only a brief uncomfortable sensation because it is done with a special spring-loaded biopsy instrument. The device inserts and removes the needle in a fraction of a second. Most doctors who do the biopsy will numb the area first by injecting a local anesthetic alongside the prostate. You might want to ask your doctor if he or she plans to do this.

The biopsy itself takes about 10 minutes and is usually done in the doctor's office. You will likely be given antibiotics to take before the biopsy and possibly for a day or 2 after to reduce the risk of infection.

For a few days after the procedure, you may feel some soreness in the area and will probably notice blood in your urine. You may also have some light bleeding from your rectum, especially if you have hemorrhoids. Many men notice blood in their semen or have rust colored semen, which can last for several weeks after the biopsy, depending on how frequently you ejaculate.

Your biopsy samples will be sent to a lab, where they will be looked at a microscope to see if they contain cancer cells. If cancer is seen, it will also be assigned a *grade* (see the next section). Getting the results (in the form of a pathology report) usually takes at least 1 to 3 days, but it can sometimes take longer.

Even when taking many samples, biopsies can still sometimes miss a cancer if none of

the biopsy needles pass through it. This is known as a *false-negative* result. If your doctor still strongly suspects you have prostate cancer (because your PSA level is very high, for example) a repeat biopsy might be needed to help be sure.

Grade (Gleason score) of prostate cancer

Prostate cancers are graded according to the Gleason system. This system assigns a Gleason grade based on how much the cancer looks like normal prostate tissue.

- If the cancer looks a lot like normal prostate tissue, a grade of 1 is assigned.
- If the cancer looks very abnormal, it is given a grade of 5.
- Grades 2 through 4 have features in between these extremes.

Most cancers are grade 3 or higher, and grades 1 and 2 are not often used.

Since prostate cancers often have areas with different grades, a grade is assigned to the 2 areas that make up most of the cancer. These 2 grades are added to yield the *Gleason score* (also called the *Gleason sum*).

There are some exceptions to this rule. If the highest grade takes up most (95% or more) of the biopsy sample, the grade for that area is counted twice as the Gleason score. Also, if 3 grades are present in a biopsy core, the highest grade is always included in the Gleason score, even if most of the core is taken up by areas of cancer with lower grades.

The Gleason score can be between 2 and 10, but most are at least a 6. The higher the Gleason score, the more likely it is that the cancer will grow and spread quickly.

Aside from the Gleason score, t

- Cancers with a **Gleason score of 6 or less** may be called **well-differentiated** or **lowgrade**.
- Cancers with a **Gleason score of 7** may be called **moderately-differentiated** or **intermediate-grade**.
- Cancers with **Gleason scores of 8 to 10** may be called **poorly-differentiated** or **high-grade**.

Other information in a pathology report

Along with the grade of the cancer (if it is present), the pathology report often contains other information about the cancer, such as:

- The number of biopsy core samples that contain cancer (for example, “7 out of 12”)
- The percentage of cancer in each of the cores
- Whether the cancer is on one side (left or right) of the prostate or both sides (bilateral)

Suspicious results

Sometimes when the prostate cells are seen, they don’t look like cancer, but they’re not quite normal, either. These results are often reported as *suspicious*.

Prostatic intraepithelial neoplasia (PIN): In PIN, there are changes in how the prostate cells look, but the abnormal cells don’t look like they’ve grown into other parts of the prostate (like cancer cells would). PIN is often divided into 2 groups:

- **Low-grade PIN:** the patterns of prostate cells appear almost normal

• **High-grade PIN:** the patterns of cells look more abnormal

Many men begin to develop **low-grade PIN** at an early age but don't necessarily develop prostate cancer. The importance of low-grade PIN in relation to prostate cancer is still unclear. If low-grade PIN is reported on a prostate biopsy, the follow-up for patients is usually the same as if nothing abnormal was seen.

If **high-grade PIN** is found on a biopsy, there is about a 20% chance that cancer may already be present somewhere else in the prostate gland. This is why doctors often watch men with high-grade PIN carefully and may advise a repeat prostate biopsy, especially if the original biopsy did not take samples from all parts of the prostate.

Atypical small acinar proliferation (ASAP): This is sometimes just called *atypia*. In ASAP, the cells look like they might be cancerous when viewed under the microscope, but there are too few of them to be sure. If ASAP is found, there's a high chance that cancer is also present in the prostate, which is why many doctors recommend getting a repeat biopsy within a few months.

Proliferative inflammatory atrophy (PIA): In PIA, the prostate cells look smaller than normal, and there are signs of inflammation in the area. PIA is not cancer, but researchers believe that PIA may sometimes lead to high-grade PIN or to prostate cancer directly.

For more information about how prostate biopsy results are reported, see the Prostate Pathology section of our website.

Imaging tests to look for prostate cancer spread

Imaging tests use x-rays, magnetic fields, sound waves, or radioactive substances to create pictures of the inside of your body.

If you are found to have prostate cancer, your doctor will use your digital rectal exam (DRE) results, prostate-specific antigen (PSA) level, and Gleason score from the biopsy results to figure out how likely it is that the cancer has spread outside your prostate. This information is used to decide if any imaging tests need to be done to look for possible cancer spread. Men with a normal DRE result, a low PSA, and a low Gleason score may not need any other tests because the chance that the cancer has spread is so low.

The imaging tests used most often to look for prostate cancer spread include:

Bone scan

If prostate cancer spreads to distant sites, it often goes to the bones first. A bone scan can help show whether cancer has reached the bones.

For this test, you are injected with a small amount of low-level radioactive material, which settles in damaged areas of bone throughout the body. A special camera detects the radioactivity and creates a picture of your skeleton.

A bone scan may suggest cancer in the bone, but to make an accurate diagnosis, other tests such as plain x-rays, CT or MRI scans, or even a bone biopsy might be needed.

Computed tomography (CT) scan

A CT scan uses x-rays to make detailed, cross-sectional images of your body. This test isn't often needed for newly diagnosed prostate cancer if the cancer is likely to be confined to the prostate based on other findings (DRE result, PSA level, and Gleason score). Still, it can sometimes help tell if prostate cancer has spread into nearby lymph nodes. If your prostate cancer has come back after treatment, the CT scan can often tell if it is growing into other organs or structures in your pelvis.

CT scans are not as useful as magnetic resonance imaging (MRI) for looking at the prostate gland itself.

Magnetic resonance imaging (MRI)

Like CT scans, MRI scans show detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays. A contrast material called *gadolinium* may be injected into a vein before the scan to better see details.

MRI scans can give a very clear picture of the prostate and show if the cancer has spread outside the prostate into the seminal vesicles or other nearby structures. This can be very important in determining your treatment options. But like CT scans, MRI scans aren't usually needed for newly diagnosed prostate cancers that are likely to be confined to the prostate based on other factors.

To improve the accuracy of the MRI, you might have a probe, called an *endorectal coil*, placed inside your rectum for the scan. This can be uncomfortable. If needed, medicine to make you feel sleepy (sedation) can be given before the scan.

Lymph node biopsy

In a lymph node biopsy, also known as *lymph node dissection* or *lymphadenectomy*, one or more lymph nodes are removed to see if they have cancer cells. This isn't done very often for prostate cancer, but can be used to find out if the cancer has spread from the prostate to nearby lymph nodes.

Biopsy during surgery to treat prostate cancer

The surgeon may remove lymph nodes in the pelvis during the same operation as the removal of the prostate, which is known as a *radical prostatectomy* (see Surgery for prostate cancer).

If there is more than a very small chance that the cancer might have spread (based on factors such as a high PSA level or a high Gleason score), the surgeon may remove some lymph nodes before removing the prostate gland.

Sometimes the nodes will be looked at right away, while you are still under anesthesia, to help the surgeon decide whether to continue with the radical prostatectomy. This is called a *frozen section* exam because the tissue sample is frozen before thin slices are taken to check under a microscope. If the nodes contain cancer cells, the operation might be stopped (leaving the prostate in place). This could happen if the surgeon feels that removing the prostate would be unlikely to cure the cancer, but would still probably

result in serious complications or side effects.

More often (especially if the chance of cancer spread is low), a frozen section exam is not done. Instead the lymph nodes and the prostate are removed and are then sent to the lab to be looked at. The lab results are usually available several days after surgery.

Lymph node biopsy as a separate procedure

A lymph node biopsy is rarely done as a separate procedure. It's sometimes used when a radical prostatectomy isn't planned (such as for some men who choose treatment with radiation therapy), but when it's still important to know if the lymph nodes contain cancer.

Laparoscopic biopsy: A laparoscope is a long, slender tube with a small video camera on the end that is inserted into the abdomen through a small cut. It lets the surgeon see inside the abdomen and pelvis without needing to make a large incision. Other small incisions are made to insert long instruments to remove the lymph nodes around the prostate gland, which are then sent to the lab.

Because there are no large incisions, most people recover fully in only 1 or 2 days, and the operation leaves very small scars.

Fine needle aspiration (FNA): If your lymph nodes appear enlarged on an imaging test (such as a CT or MRI scan) a doctor may take a sample of cells from an enlarged node by using a technique called *fine needle aspiration* (FNA).

To do this, the doctor uses a CT scan image to guide a long, hollow needle through the skin in the lower abdomen and into the enlarged node. The skin is numbed with local anesthesia before inserting the needle. A syringe attached to the needle lets the doctor take a small tissue sample from the node, which is then sent to the lab to look for cancer cells.

You will be able to return home a few hours after the procedure.

Prostate cancer stages

The stage (extent) of a prostate cancer is one of the most important factors in choosing treatment options and predicting a man's outlook for survival (prognosis). The stage is based on:

- The prostate biopsy results (including the Gleason score)
- The blood PSA level at the time of diagnosis
- The results of any other exams or tests that were done to find out how far the cancer has spread

These tests are described in Tests for prostate cancer.

The AJCC TNM staging system

A staging system is a standard way for the cancer care team to describe how far a cancer has spread. The most widely used staging system for prostate cancer is the American Joint Committee on Cancer (AJCC) TNM system.

The TNM system for prostate cancer is based on 5 key pieces of information:

- The extent of the main (primary) **tumor** (**T** category)
- Whether the cancer has spread to nearby lymph **nodes** (**N** category)
- Whether the cancer has spread (**metastasized**) to other parts of the body (**M** category)
- The **PSA level** at the time of diagnosis
- The **Gleason score**, based on the prostate biopsy (or surgery)

There are 2 types of staging for prostate cancer:

- The **clinical stage** is your doctor's best estimate of the extent of your disease, based on the results of the physical exam (including DRE), lab tests, prostate biopsy, and any imaging tests you have had.
- If you have surgery, your doctors can also determine the **pathologic stage**, which is based on results above, plus the results of the surgery. This means that if you have surgery, the stage of your cancer might actually change afterward (if cancer was found in a place it wasn't suspected, for example). Pathologic staging is likely to be more accurate than clinical staging, as it gives your doctor a firsthand impression of the extent of your disease.

Both types of staging use the same categories (but the T1 category is only used for clinical staging).

T categories (clinical)

There are 4 categories for describing the local extent of a prostate tumor, ranging from T1 to T4. Most of these have subcategories as well.

T1: Your doctor can't feel the tumor or see it with imaging such as transrectal ultrasound.

- **T1a:** Cancer is found incidentally (by accident) during a transurethral resection of the prostate (TURP) that was done for benign prostatic hyperplasia (BPH), a noncancerous growth of the prostate. Cancer is in no more than 5% of the tissue removed.
- **T1b:** Cancer is found during a TURP but is in more than 5% of the tissue removed.
- **T1c:** Cancer is found by needle biopsy that was done because of an increased PSA.

T2: Your doctor can feel the cancer with a digital rectal exam (DRE) or see it with imaging such as transrectal ultrasound, but it still appears to be confined to the prostate.

- **T2a:** The cancer is in one half or less of only one side (left or right) of your prostate.
- **T2b:** The cancer is in more than half of only one side (left or right) of your prostate.
- **T2c:** The cancer is in both sides of your prostate.

T3: The cancer has grown outside your prostate and may have grown into the seminal vesicles.

- **T3a:** The cancer extends outside the prostate but not to the seminal vesicles.
- **T3b:** The cancer has spread to the seminal vesicles.

T4: The cancer has grown into tissues next to your prostate (other than the seminal

vesicles), such as the urethral sphincter (a muscle that helps control urination), the rectum, the bladder, and/or the wall of the pelvis.

N categories

N categories describe whether the cancer has spread to nearby (regional) lymph nodes.

NX: Nearby lymph nodes were not assessed.

N0: The cancer has not spread to any nearby lymph nodes.

N1: The cancer has spread to one or more nearby lymph nodes.

M categories

M categories describe whether the cancer has spread to distant parts of the body. The most common sites of prostate cancer spread are to the bones and to distant lymph nodes, although it can also spread to other organs, such as the lungs and liver.

M0: The cancer has not spread beyond nearby lymph nodes.

M1: The cancer has spread beyond nearby lymph nodes.

- **M1a:** The cancer has spread to distant (outside of the pelvis) lymph nodes.
- **M1b:** The cancer has spread to the bones.
- **M1c:** The cancer has spread to other organs such as lungs, liver, or brain (with or without spread to the bones).

Stage grouping

Once the T, N, and M categories have been determined, this information is combined (along with the Gleason score and PSA level if they are available) to get the overall stage of the cancer. The stage is expressed in Roman numerals from I (the least advanced) to IV (the most advanced). The stage helps determine treatment options and a man's outlook for survival (prognosis).

Stage Stage grouping Stage description

I T1, N0, M0 Gleason score 6 or less PSA less than 10

The doctor can't feel the tumor or see it with an imaging test such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA) [T1]. The cancer is still within the prostate and has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 6 or less and the PSA level is

less than 10.

OR

T2a, N0, M0

Gleason

score 6 or

less

PSA less

than 10

The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in one half or less of only one side (left or right) of the prostate [T2a]. The cancer is still within the prostate and has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 6 or less and the PSA level is less than 10.

IIA T1, N0, M0

Gleason

The doctor can't feel the tumor or see it with imaging such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA

score of 7

PSA less

than 20

level) [T1]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor has a Gleason score of 7. The PSA level is less than 20.

OR

T1, N0, M0

Gleason

score of 6 or

less

PSA at least

10 but less

than 20

The doctor can't feel the tumor or see it with imaging such as transrectal ultrasound (it was either found during a transurethral resection or was diagnosed by needle biopsy done for a high PSA) [T1]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor has a Gleason score of 6 or less. The PSA level is at least 10 but less than 20.

OR

T2a or T2b,

N0, M0

Gleason

score of 7 or

less

PSA less

The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in only one side of the prostate [T2a or T2b]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. It has a Gleason score of 7 or less. The PSA level is less than 20.

than 20

IIB T2c, N0, M0

Any Gleason

score

Any PSA

The tumor can be felt by digital rectal exam or seen with imaging such as transrectal ultrasound and is in both sides of the prostate [T2c]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.

OR

T1 or T2,

N0, M0

Any Gleason

score

PSA of 20 or

more

The cancer has not yet spread outside the prostate. It may (or may not) be felt by digital rectal exam or seen with imaging such as transrectal ultrasound [T1 or T2]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score. The PSA level is at least 20.

OR

T1 or T2,

N0, M0

Gleason

score of 8 or

The cancer has not yet spread outside the prostate. It may (or may not) be felt by digital rectal exam or seen with imaging such as transrectal ultrasound [T1 or T2]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The Gleason score is 8 or higher. The PSA can be any value.

higher

Any PSA

III: T3, N0, M0

Any Gleason

score

Any PSA

The cancer has grown outside the prostate and may have spread to the seminal vesicles [T3], but it has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.

IV T4, N0, M0

Any Gleason

score

Any PSA

The cancer has grown into tissues next to the prostate (other than the seminal vesicles), such as the urethral sphincter (muscle that helps control urination), rectum, bladder, and/or the wall of the pelvis [T4]. The cancer has not spread to nearby lymph nodes [N0] or elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.

OR

Any T, N1,

M0

Any Gleason

score

Any PSA

The tumor may or may not be growing into tissues near the prostate [any T]. The cancer has spread to nearby lymph nodes [N1] but has not spread elsewhere in the body [M0]. The tumor can have any Gleason score and the PSA can be any value.

OR

Any T, any

N, M1

Any Gleason

score

Any PSA

The cancer may or may not be growing into tissues near the prostate [any T] and may or may not have spread to nearby lymph nodes [any N]. It has spread to other, more distant sites in the body [M1]. The tumor can have any Gleason score and the PSA can be any value.

The D'Amico risk categories

The D'Amico system is not used to stage all prostate cancers like the AJCC system. It is sometimes used to estimate the risk that a prostate cancer has spread outside the prostate. This system uses the PSA level, the Gleason score, and the T stage of the cancer to divide men into 3 risk groups: low, intermediate, and high.

Prostate cancer staging can be complex. If you have any questions about your stage, please ask your someone on your health care team to explain it to you in a way you understand.

Survival rates for prostate cancer

Survival rates tell you what percentage of people with the same type and stage of cancer are still alive a certain amount of time (usually 5 years) after they were diagnosed. They can't tell you how long you will live, but they may help give you a better understanding about how likely it is that your treatment will be successful. Some men will want to know the survival rates for their cancer, and some men won't. If you don't want to know, you don't have to.

What is a 5-year survival rate?

Statistics on the outlook for a certain type and stage of cancer are often given as 5-year survival rates, but many people live longer – often much longer – than 5 years. The 5-year survival rate is the percentage of people who live at least 5 years after being diagnosed with cancer. For example, a 5-year survival rate of 90% means that an estimated 90 out of 100 people who have that cancer are still alive 5 years after being diagnosed. Keep in mind, however, that many of these people live much longer than 5 years after diagnosis.

Relative survival rates are a more accurate way to estimate the effect of cancer on survival. These rates compare men with prostate cancer to men in the overall population. For example, if the 5-year relative survival rate for a specific stage of prostate cancer is 90%, it means that men who have that cancer are, on average, about 90% as likely as men who don't have that cancer to live for at least 5 years after being diagnosed.

But remember, all survival rates are estimates – your outlook can vary based on a number of factors specific to you.

Cancer survival rates don't tell the whole story

Survival rates are often based on previous outcomes of large numbers of men who had the disease, but they can't predict what will happen in any particular man's case. There are a number of limitations to remember:

- The numbers below are among the most current available. But to get 5-year survival rates, doctors have to look at men who were treated at least 5 years ago. As treatments are improving over time, men who are now being diagnosed with prostate cancer may have a better outlook than these statistics show.
- These statistics are based on the stage of the cancer when it was first diagnosed. They don't apply to cancers that later come back or spread, for example.
- The outlook for men with prostate cancer varies by the stage (extent) of the cancer – in general, the survival rates are higher for men with earlier stage cancers. But many other factors can affect a man's outlook, such as age and overall health, and how well the cancer responds to treatment. The outlook for each man is specific to his circumstances.

Your doctor can tell you how these numbers may apply to you, as he or she is familiar with your particular situation.

Survival rates for prostate cancer

According to the most recent data, when including *all* stages of prostate cancer:

- The 5-year relative survival rate is almost 100%
- The 10-year relative survival rate is 98%
- The 15-year relative survival rate is 95%

Keep in mind that just as 5-year survival rates are based on men diagnosed and first treated more than 5 years ago, 10-year survival rates are based on men diagnosed more than 10 years ago (and 15-year survival rates are based on men diagnosed at least 15 years ago).

Survival rates by stage

The National Cancer Institute (NCI) maintains a large national database on survival statistics for different types of cancer, known as the *SEER database*. The SEER database does not group cancers by AJCC stage, but instead groups cancers into local, regional, and distant stages.

- **Local stage** means that there is no sign that the cancer has spread outside of the prostate. This corresponds to AJCC stages I and II. About 4 out of 5 prostate cancers are found in this early stage. The relative 5-year survival rate for local stage prostate cancer is nearly 100%.
- **Regional stage** means the cancer has spread from the prostate to nearby areas. This includes stage III cancers and the stage IV cancers that haven't spread to distant parts of the body, such as T4 tumors and cancers that have spread to nearby lymph nodes (N1). The relative 5-year survival rate for regional stage prostate cancer is nearly

100%.

- **Distant stage** includes the rest of the stage IV cancers – cancers that have spread to distant lymph nodes, bones, or other organs (M1). The relative 5-year survival rate for distant stage prostate cancer is about 28%.

Remember, these survival rates are only estimates – they can't predict what will happen to any individual man. We understand that these statistics can be confusing and may lead you to have more questions. Talk with your doctor to better understand your situation.

Prostate cancer treatment

Once your prostate cancer has been diagnosed and staged, you have a lot to think about before you and your doctor choose a treatment plan. It's important that you think carefully about each of your choices. You will want to weigh the benefits of each treatment option against the possible risks and side effects.

Which treatments are used for prostate cancer?

Depending on the situation, the treatment options for men with prostate cancer might include:

- Watchful waiting or active surveillance
- Surgery
- Radiation therapy
- Cryotherapy (cryosurgery)
- Hormone therapy
- Chemotherapy
- Vaccine treatment
- Bone-directed treatment

These treatments are generally used one at a time, although in some cases they may be combined.

To learn about the most common approaches to treating prostate cancer, see these topics:

- Things to think about when considering treatment options
- Typical treatment options based on the stage of the cancer
- Following PSA levels during and after treatment
- Dealing with prostate cancer that remains or recurs after treatment

Which doctors treat prostate cancer?

The main types of doctors who treat prostate cancer include:

- **Urologists:** surgeons who treat diseases of the urinary system and male reproductive system (including the prostate)
- **Radiation oncologists:** doctors who treat cancer with radiation therapy
- **Medical oncologists:** doctors who treat cancer with medicines such as chemotherapy or hormone therapy

Many other specialists might be part of your treatment team as well, including physician assistants (PAs), nurse practitioners (NPs), nurses, nutrition specialists, social workers, and other health professionals. See *Health Professionals Associated With Cancer Care* for more on this.

Making treatment decisions

It's important to discuss all of your treatment options, including their goals and possible side effects, with your doctors to help make the decision that best fits your needs. Some important things to consider include:

- The stage and grade of your cancer
- Your age and expected life span
- Any other serious health conditions you have
- Your feelings (and your doctor's opinion) about the need to treat the cancer right away
- The likelihood that treatment will cure your cancer (or help in some other way)
- Your feelings about the possible side effects from each treatment

You may feel that you must make a decision quickly, but it's important to give yourself time to absorb the information you have just learned. It's also very important to ask questions if there is anything you're not sure about. For a list of some questions to ask, see What should you ask your doctor about prostate cancer?.

Getting a second opinion

You may also want to get a second opinion. This can give you more information and help you feel more certain about the treatment plan you choose. Many men find it helpful to get a second opinion about the best treatment options based on their situation, especially if they have several choices.

Prostate cancer is a complex disease, and doctors can differ in their opinions regarding the best treatment options. Speaking with doctors who specialize in different kinds of treatment may help you sort through your options. If you aren't sure where to go for a second opinion, ask your doctor for help.

Thinking about taking part in a clinical trial

Clinical trials are carefully controlled research studies that are done to get a closer look at promising new treatments or procedures. Clinical trials are one way to get state-of-the art cancer treatment. Sometimes they may be the only way to get access to newer treatments. They are also the best way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

If you would like to learn more about clinical trials that might be right for you, start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service at 1-800-303-5691 for a list of studies that meet your medical needs, or see Clinical Trials to learn more.

Considering complementary and alternative methods

You may hear about alternative or complementary treatment methods that your doctor hasn't mentioned. These methods can include vitamins, herbs, special diets, or other methods such as acupuncture or massage, to name a few.

Complementary methods refer to treatments that are used *along with* your regular medical care. *Alternative treatments* are used *instead of* a doctor's medical treatment. Although some of these methods might be helpful in relieving symptoms or helping you feel better, many have not been proven to work. Some might even be dangerous.

Be sure to talk to your cancer care team about any method you are thinking about using. They can help you learn what is known (or not known) about the method, which can help you make an informed decision. See Complementary and Alternative Medicine to learn more.

Choosing to stop treatment or choosing no treatment at all

For some men, when treatments have been tried and are no longer controlling the cancer, it is often helpful to weigh the benefits and risks of continuing to try new treatments. Whether or not you continue treatment, there are still things you can do to help maintain or improve your quality of life. Learn more in *If Cancer Treatments Stop Working*.

Some men, especially if the cancer is advanced, might not want to be treated at all. There are many reasons you might decide not to get cancer treatment, but it's important to talk this through with your doctors before you make this decision. Remember that even if you choose not to treat the cancer, you can still get supportive care to help with pain or other symptoms.

Help getting through treatment

Your cancer care team will be your first source of information and support, but there are other resources for help when you need it. Hospital- or clinic-based support services are an important part of your care. These might include nursing or social work services, financial aid, nutritional advice, rehab services, or spiritual help.

The American Cancer Society also has programs and services – including rides to treatment, lodging, support groups, and more – to help you get through treatment. Call our National Cancer Information Center at 1-800-227-2345 and speak with one of our trained specialists on call 24 hours a day, every day.

The treatment information here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

Watchful waiting or active surveillance for prostate cancer

Because prostate cancer often grows very slowly, some men (especially those who are older or have other serious health problems) might never need treatment for their prostate cancer. Instead, their doctors may recommend approaches known as *watchful waiting* or *active surveillance*. (Other terms sometimes used include *observation* or *expectant management*.)

Some doctors use the terms active surveillance and watchful waiting to mean the same thing. For other doctors these terms mean something slightly different:

- **Active surveillance** is often used to mean monitoring the cancer closely. Usually this approach includes a doctor visit with a prostate-specific antigen (PSA) blood test and digital rectal exam (DRE) about every 6 months. Prostate biopsies may be done every year as well. If your test results change, your doctor would then talk to you about treatment options.
- **Watchful waiting (observation)** is sometimes used to describe a less intensive type of follow-up that may mean fewer tests and relying more on changes in a man's symptoms to decide if treatment is needed.

Not all doctors agree with these definitions or use them exactly this way. In fact, some doctors prefer to no longer use the term watchful waiting. They feel it implies that nothing is being done, when in fact a man is still being closely monitored.

No matter which term your doctor uses, it's very important for you to understand exactly what he or she means when they refer to it.

When might these approaches be an option?

One of these approaches might be recommended if your cancer:

- Isn't causing any symptoms
- Is expected to grow slowly (based on Gleason score)
- Is small
- Is just in the prostate

These approaches are not likely to be a good option if you have a fast-growing cancer (for example, a high Gleason score) or if the cancer is likely to have spread outside the prostate (based on PSA levels). Men who are young and healthy are less likely to be offered active surveillance, out of concern that the cancer might become a problem over the next 20 or 30 years.

Watchful waiting and active surveillance are reasonable options for some men with slowgrowing cancers because it is not known whether treating the cancer with surgery or radiation will actually help them live longer. These treatments have definite risks and side effects that may outweigh the possible benefits for some men. Some men are not comfortable with this approach, and are willing to accept the possible side effects of active treatments to try to remove or destroy the cancer.

In active surveillance, only men whose cancer is growing (and therefore have a more

serious form of cancer) are treated. This lets men with less serious cancer avoid the side effects of a treatment that might not have helped them live longer. A possible downside of this approach is that it might give the cancer a chance to grow and spread. This might limit your treatment options, and could possibly affect the chances of the cancer being treated successfully.

Not all experts agree how often testing should be done during active surveillance. There is also debate about when is the best time to start treatment if things change.

Comparing watchful waiting or active surveillance with active treatment

A few large studies have compared **watchful waiting** (where men were treated only if they developed symptoms from their cancer) and surgery for early stage prostate cancer, but the evidence from these studies has been mixed. Some have found that men who have surgery might live longer, while others have not found a difference in survival.

So far, no large studies have compared **active surveillance** to treatments such as surgery or radiation therapy. Some early studies of men who are good candidates for active surveillance have shown that only about a third of the men need to go on to treatment with radiation or surgery.

Surgery for prostate cancer

Surgery is a common choice to try to cure prostate cancer if it is not thought to have spread outside the prostate gland.

The main type of surgery for prostate cancer is a *radical prostatectomy*. In this operation, the surgeon removes the entire prostate gland plus some of the tissue around it, including the seminal vesicles. A radical prostatectomy can be done in different ways.

Open approaches to radical prostatectomy

In the more traditional approach to doing a prostatectomy, the surgeon operates through a single long skin incision to remove the prostate and nearby tissues. This type of surgery, sometimes referred to as an *open* approach, is now done less often than in the past.

There are 2 main ways to do this operation.

Radical retropubic prostatectomy

For this operation, the surgeon makes an incision (cut) in your lower abdomen, from the belly button down to the pubic bone. You will either be under general anesthesia (asleep) or be given spinal or epidural anesthesia (numbing the lower half of the body) along with sedation during the surgery.

If there is a reasonable chance the cancer might have spread to nearby lymph nodes (based on your PSA level, prostate biopsy results, and other factors), the surgeon may also remove some of these lymph nodes at this time (known as a *lymph node biopsy*). The nodes are usually sent to the lab to see if they have cancer cells (which can take a few

days to get results), but in some cases the nodes may be looked at during the surgery. If this is done and cancer cells are found in any of the nodes, the surgeon might not continue with the surgery. This is because it's unlikely that the cancer can be cured with surgery, and removing the prostate could lead to serious side effects.

After the surgery, while you are still under anesthesia, a catheter (thin, flexible tube) will be put in your penis to help drain your bladder. The catheter will usually stay in place for 1 to 2 weeks while you heal. You will be able to urinate on your own after the catheter is removed.

You will probably stay in the hospital for a few days after the surgery, and your activities will be limited for several weeks. The possible side effects of prostatectomy are described below.

Radical perineal prostatectomy

In this operation, the surgeon makes the incision in the skin between the anus and scrotum (the perineum), as shown in the picture above. This approach is used less often because it's more likely to lead to erection problems and because the nearby lymph nodes can't be removed. But it is often a shorter operation and might be an option if you aren't concerned about erections and you don't need lymph nodes removed. It also might be used if you have other medical conditions that make retropubic surgery difficult for you. It can be just as curative as the retropubic approach if done correctly. The perineal operation usually takes less time than the retropubic operation, and may result in less pain and an easier recovery afterward.

After the surgery, while you are still under anesthesia, a catheter will be put in your penis to help drain your bladder. The catheter usually stays in place for 1 to 2 weeks while you are healing. You will be able to urinate on your own after the catheter is removed.

You will probably stay in the hospital for a few days after the surgery, and your activities will be limited for several weeks. The possible side effects of prostatectomy are described below.

Laparoscopic approaches to radical prostatectomy

Laparoscopic approaches use several smaller incisions and special long surgical tools to remove the prostate. The surgeon either holds the tools directly, or uses a control panel to precisely move robotic arms that hold the tools. This approach to prostatectomy has become more common in recent years.

If you are thinking about treatment with laparoscopic surgery, it's important to understand what is known and what is not yet known about this approach. The most important factors are likely to be the skill and experience of your surgeon. If you decide that laparoscopic surgery is the right treatment for you, be sure to find a surgeon with a lot of experience.

Laparoscopic radical prostatectomy

For a laparoscopic radical prostatectomy (LRP), the surgeon inserts special long instruments through several small incisions to remove the prostate. One of the instruments has a small video camera on the end, which lets the surgeon see inside the abdomen.

Laparoscopic prostatectomy has some advantages over open radical prostatectomy, including less blood loss and pain, shorter hospital stays (usually no more than a day), and faster recovery times (although the catheter will need to remain in the bladder for about the same amount of time).

In experienced hands, LRP appears to be as good as open radical prostatectomy, although we do not yet have long-term results from procedures done in the United States.

The rates of major side effects from LRP, such as erection problems and trouble holding urine (incontinence) seem to be about the same as for open prostatectomy. (These side effects are described below.) Recovery of bladder control may be delayed slightly with this approach.

Robotic-assisted laparoscopic radical prostatectomy

In this approach, also known as *robotic prostatectomy*, the laparoscopic surgery is done using a robotic interface (called the *da Vinci system*). The surgeon sits at a control panel in the operating room and moves robotic arms to operate through several small incisions in the patient's abdomen.

Robotic prostatectomy has advantages over the open approach in terms of less pain, blood loss, and recovery time. But in terms of the side effects men are most concerned about, such as urinary or erection problems (described below), there doesn't seem to be a difference between robotic prostatectomy and other approaches.

For the surgeon, the robotic system may provide more maneuverability and more precision when moving the instruments than standard LRP. Still, the most important factor in the success of either type of laparoscopic surgery is the surgeon's experience and skill.

Risks and side effects of any type of radical prostatectomy

There are possible risks and side effects with any type of surgery for prostate cancer.

Risks of prostate surgery

The risks with any type of radical prostatectomy are much like those with any major surgery. Problems during or shortly after the operation can include:

- Reactions to anesthesia
- Bleeding from the surgery
- Blood clots in the legs or lungs
- Damage to nearby organs
- Infections at the surgery site.

Rarely, part of the intestine might be injured during surgery, which could lead to

infections in the abdomen and might require more surgery to correct. Injuries to the intestines are more common with laparoscopic and robotic surgeries than with the open approach.

If lymph nodes are removed, a collection of lymph fluid (called a *lymphocele*) can form and may need to be drained.

In extremely rare cases, people die because of complications of this operation. Your risk depends, in part, on your overall health, your age, and the skill of your surgical team.

Side effects of prostate surgery

The major possible side effects of radical prostatectomy are **urinary incontinence** (being unable to control urine) and **erectile dysfunction** (impotence; problems getting or keeping erections). These side effects can also occur with other forms of prostate cancer treatment.

Urinary incontinence: You may not be able to control your urine or have leakage or dribbling. There are different levels of incontinence. Being incontinent can affect you not only physically but emotionally and socially as well. There are 3 major types of incontinence:

- Men with **stress incontinence** might leak urine when they cough, laugh, sneeze, or exercise. Stress incontinence is the most common type after prostate surgery. It is usually caused by problems with the valve that keeps urine in the bladder (the bladder sphincter). Prostate cancer treatments can damage the muscles that form this valve or the nerves that keep the muscles working.
- Men with **overflow incontinence** have trouble emptying their bladder. They take a long time to urinate and have a dribbling stream with little force. Overflow incontinence is usually caused by blockage or narrowing of the bladder outlet by scar tissue.
- Men with **urge incontinence** have a sudden need to urinate. This problem occurs when the bladder becomes too sensitive to stretching as it fills with urine.

Rarely after surgery, men lose all ability to control their urine. This is called **continuous incontinence**.

After surgery for prostate cancer, normal bladder control usually returns within several weeks or months. This recovery usually occurs gradually, in stages.

Doctors can’t predict for sure how any man will be affected after surgery. In general, older men tend to have more incontinence problems than younger men. Large cancer centers, where prostate surgery is done often and surgeons have a lot of experience, generally report fewer problems with incontinence.

Incontinence can be treated. Even if your incontinence can’t be corrected completely, it can still be helped. To learn about managing and living with incontinence, see *Managing Incontinence for Men With Cancer*.

Erectile dysfunction (impotence): This means you can't get an erection sufficient for sexual penetration.

Erections are controlled by 2 tiny bundles of nerves that run on either side of the prostate. If you can have erections before surgery, the surgeon will try not to injure these nerves during the prostatectomy. This is known as a *nerve-sparing* approach. But if the cancer is growing into or very close to the nerves, the surgeon will need to remove them.

If both nerves are removed, you won't be able to have spontaneous erections, but you might still be able to have erections using some of the aids described below. If the nerves on only one side are removed, you might still have erections, but the chance is lower than if neither were removed. If neither nerve bundle is removed you might have normal erections at some point after surgery.

Your ability to have an erection after surgery depends on your age, your ability to get an erection before the operation, and whether the nerves were cut. All men can expect some decrease in the ability to have an erection, but the younger you are, the more likely it is that you will keep this ability.

Surgeons who do many radical prostatectomies tend to report lower impotence rates than doctors who do the surgery less often. A wide range of impotency rates have been reported in the medical literature, but each man's situation is different, so the best way to get an idea of your chances for recovering erections is to ask your doctor about his or her success rates and what the outcome is likely to be in your case.

If your ability to have erections does return after surgery, it often occurs slowly. In fact, it can take from a few months up to 2 years. During the first few months, you will probably not be able to have a spontaneous erection, so you may need to use medicines or other treatments.

Most doctors feel that regaining potency is helped along by trying to get an erection as soon as possible once the body has had a chance to heal (usually several weeks after the operation). Some doctors call this *penile rehabilitation*. Medicines (see below) may be helpful at this time. Be sure to talk to your doctor about your situation.

There are several options for treating erectile dysfunction:

- **Phosphodiesterase-5 (PDE5) inhibitors** such as sildenafil (Viagra), vardenafil (Levitra), and tadalafil (Cialis) are pills that can help with erections. These drugs won't work if both nerves that control erections have been damaged or removed. Common side effects of these drugs are headache, flushing (skin becomes red and feels warm), upset stomach, light sensitivity, and runny or stuffy nose. Rarely, these drugs can cause vision problems, possibly even blindness. Some other drugs such as nitrates, which are drugs used to treat heart disease, can cause problems if you are taking a PDE5 inhibitor, so be sure your doctor knows what medicines you take.
- **Alprostadil** is a man-made version of prostaglandin E1, a substance naturally made in the body that can produce erections. It can be injected almost painlessly into the

base of the penis 5 to 10 minutes before intercourse or placed into the tip of the penis as a suppository. You can even increase the dosage to prolong the erection. You might have side effects, such as pain, dizziness, and prolonged erection, but they are not usually serious.

- **Vacuum devices** are another option to create an erection. These mechanical pumps are placed over the penis. The air is sucked out of the pump, which draws blood into the penis to produce an erection. The erection is maintained after the pump is removed by a strong rubber band placed at the base of the penis. The band is removed after sex.
- **Penile implants** might restore your ability to have erections if other methods don't help. An operation is needed to put them inside the penis. There are several types of penile implants, including those using silicone rods or inflatable devices.

For more on coping with erection problems and other sexuality issues, see *Sexuality for the Man With Cancer*.

Changes in orgasm: After surgery, the sensation of orgasm should still be pleasurable, but there is no ejaculation of semen – the orgasm is "dry." This is because the glands that made most of the fluid for semen (the seminal vesicles and prostate) were removed during the prostatectomy, and the pathways used by sperm (the vas deferens) were cut. In some men, orgasm becomes less intense or goes away completely. Less often, men report pain with orgasm.

Loss of fertility: Radical prostatectomy cuts the vas deferens, which are the pathways between the testicles (where sperm are made) and the urethra (through which sperm leave the body). Your testicles will still make sperm, but they can't leave the body as a part of the ejaculate. This means that a man can no longer father a child the natural way. Often, this is not an issue, as men with prostate cancer tend to be older. But if it is a concern for you, you might want to ask your doctor about "banking" your sperm before the operation. To learn more, see *Fertility and Men With Cancer*.

Lymphedema: This is a rare but possible complication of removing many of the lymph nodes around the prostate. Lymph nodes normally provide a way for fluid to return to the heart from all areas of the body. When nodes are removed, fluid can collect in the legs or genital region over time, causing swelling and pain. Lymphedema can usually be treated with physical therapy, although it may not go away completely. To learn more, see *Understanding Lymphedema: For Cancers Other Than Breast Cancer*.

Change in penis length: A possible effect of surgery is a small decrease in penis length. This is probably due to a shortening of the urethra when a portion of it is removed along with the prostate.

Inguinal hernia: A prostatectomy increases a man's chances of developing an inguinal (groin) hernia in the future.

Transurethral resection of the prostate (TURP)

This operation is more often used to treat men with non-cancerous enlargement of the prostate called benign prostatic hyperplasia (BPH). But it is also sometimes used in men with advanced prostate cancer to help relieve symptoms, such as urination problems. (It is not used to try to cure the cancer.)

During this operation, the surgeon removes the inner part of the prostate gland that surrounds the urethra (the tube through which urine exits the bladder). The skin is not cut with this surgery. An instrument called a *resectoscope* is passed through the tip of the penis into the urethra to the level of the prostate. Once it is in place, either electricity is passed through a wire to heat it or a laser is used to cut or vaporize the tissue. Spinal anesthesia (which numbs the lower half of your body) or general anesthesia (where you are asleep) is used.

The operation usually takes about an hour. After surgery, a catheter (thin, flexible tube) is inserted through the penis and into the bladder. It remains in place for about a day to help urine drain while the prostate heals. You can usually leave the hospital after 1 to 2 days and return to normal activities in 1 to 2 weeks.

You will probably have some blood in your urine after surgery. Other possible side effects from TURP include infection and any risks that come with the type of anesthesia used.

Radiation therapy for prostate cancer

Radiation therapy uses high-energy rays or particles to kill cancer cells.

When is radiation therapy used?

Radiation may be used:

- As the first treatment for cancer that is still just in the prostate gland and is low grade. Cure rates for men with these types of cancers are about the same as those for men treated with radical prostatectomy.
- As part of the first treatment (along with hormone therapy) for cancers that have grown outside the prostate gland and into nearby tissues.
- If the cancer is not removed completely or comes back (recurs) in the area of the prostate after surgery.
- If the cancer is advanced, to help keep the cancer under control for as long as possible and to help prevent or relieve symptoms.

Types of radiation therapy

The 2 main types of radiation therapy used for prostate cancer are:

- External beam radiation
- Brachytherapy (internal radiation)

(Another type of radiation therapy, in which a medicine containing radiation is injected

into the body, is described in Preventing and treating prostate cancer spread to the bone.)

External beam radiation therapy (EBRT)

In EBRT, beams of radiation are focused on the prostate gland from a machine outside the body. This type of radiation can be used to try to cure earlier stage cancers, or to help relieve symptoms such as bone pain if the cancer has spread to a specific area of bone.

Before treatments start, your radiation team will take careful measurements to find the correct angles for aiming the radiation beams and the proper dose of radiation. This planning session, called *simulation*, usually includes getting imaging tests such as CT or MRI scans. You might be fitted with a plastic mold resembling a body cast to keep you in the same position each day during treatment so that the radiation can be aimed more accurately.

You will usually be treated 5 days a week in an outpatient center for at least several weeks, depending on why the radiation is being given. Each treatment is much like getting an x-ray. The radiation is stronger than that used for an x-ray, but the procedure is painless. Each treatment lasts only a few minutes, although the setup time — getting you into place for treatment — takes longer.

Newer EBRT techniques focus the radiation more precisely on the tumor. This let doctors give higher doses of radiation to the tumor while reducing the radiation exposure to nearby healthy tissues.

Three-dimensional conformal radiation therapy (3D-CRT)

3D-CRT uses special computers to precisely map the location of your prostate. Radiation beams are then shaped and aimed at the prostate from several directions, which makes it less likely to damage normal tissues.

Intensity modulated radiation therapy (IMRT)

IMRT, an advanced form of 3D therapy, is the most common type of EBRT for prostate cancer. It uses a computer-driven machine that moves around the patient as it delivers radiation. Along with shaping the beams and aiming them at the prostate from several angles, the intensity (strength) of the beams can be adjusted to limit the doses reaching nearby normal tissues. This lets doctors deliver an even higher dose to the cancer.

Some newer radiation machines have imaging scanners built into them. This advance, known as **image guided radiation therapy (IGRT)**, lets the doctor take pictures of the prostate and make minor adjustments in aiming just before giving the radiation. This may help deliver the radiation even more precisely, which might result in fewer side effects, although more research is needed to prove this.

Another approach is to place tiny implants into the prostate that send out radio waves to tell the radiation therapy machines where to aim. This lets the machine adjust for movement (like during breathing) and may allow less radiation to go to normal tissues. In theory, this could lower side effects. So far, though, no study has shown side effects to be

lower with this approach than with other forms of IMRT. The machines that use this are known as Calypso®.

A variation of IMRT is called **volumetric modulated arc therapy (VMAT)**. It uses a machine that delivers radiation quickly as it rotates once around the body. This allows each treatment to be given over just a few minutes. Although this can be more convenient for the patient, it hasn't yet been shown to be more effective than regular IMRT.

Stereotactic body radiation therapy (SBRT)

This technique uses advanced image guided techniques to deliver large doses of radiation to a certain precise area, such as the prostate. Because there are large doses of radiation in each dose, the entire course of treatment is given over just a few days.

SBRT is often known by the names of the machines that deliver the radiation, such as Gamma Knife®, X-Knife®, CyberKnife®, and Clinac®.

The main advantage of SBRT over IMRT is that the treatment takes less time (days instead of weeks). The side effects, though, are not better. In fact, some research has shown that some side effects might actually be worse with SBRT than with IMRT.

Proton beam radiation therapy

Proton beam therapy focuses beams of protons instead of x-rays on the cancer. Unlike xrays, which release energy both before and after they hit their target, protons cause little damage to tissues they pass through and release their energy only after traveling a certain distance. This means that proton beam radiation can, in theory, deliver more radiation to the prostate while doing less damage to nearby normal tissues. Proton beam radiation can be aimed with techniques similar to 3D-CRT and IMRT.

Although in theory proton beam therapy might be more effective than using x-rays, so far studies have not shown if this is true. Right now, proton beam therapy is not widely available. The machines needed to make protons are very expensive, and they aren't available in many centers in the United States. Proton beam radiation might not be covered by all insurance companies at this time.

Possible side effects of EBRT

Some of the side effects from EBRT are the same as those from surgery, while others are different.

Bowel problems: Radiation can irritate the rectum and cause a condition called *radiation proctitis*. This can lead to diarrhea, sometimes with blood in the stool, and rectal leakage. Most of these problems go away over time, but in rare cases normal bowel function does not return.

Urinary problems: Radiation can irritate the bladder and lead to a condition called *radiation cystitis*. You might need to urinate more often, have a burning sensation while you urinate, and/or find blood in your urine. Urinary problems usually improve over time, but in some men they never go away.

Some men develop urinary incontinence after treatment, which means they can't control their urine or have leakage or dribbling. As described in the surgery section, there are different levels and types of incontinence. Overall, this side effect occurs less often than after surgery. The risk is low at first, but it goes up each year for several years after treatment.

Rarely, the tube that carries urine from the bladder out of the body (the urethra) may become very narrow or even close off, which is known as a *urethral stricture*. This might require further treatment to open it up again.

Erection problems, including impotence: After a few years, the impotence rate after radiation is about the same as that after surgery. Problems with erections usually do not occur right after radiation therapy but slowly develop over a year or more. This is different from surgery, where impotence occurs immediately and may improve over time. As with surgery, the older you are, the more likely it is you will have problems with erections. Erection problems can often be helped by treatments such as those listed in the surgery section, including medicines.

For more about coping with erection problems and other sexuality issues, see *Sexuality for the Man With Cancer*.

Feeling tired: Radiation therapy can cause fatigue that might not go away until a few weeks or months after treatment stops.

Lymphedema: The lymph nodes normally provide a way for fluid to return to the heart from all areas of the body. If the lymph nodes around the prostate are damaged by radiation, fluid may collect in the legs or genital region over time, causing swelling and pain. Lymphedema can usually be treated with physical therapy, although it may not go away completely. To learn more, see *Understanding Lymphedema: For Cancers Other Than Breast Cancer*.

Brachytherapy (internal radiation therapy)

Brachytherapy (also called **seed implantation** or **interstitial radiation therapy**) uses small radioactive pellets, or "seeds," each about the size of a grain of rice. These pellets are placed directly into your prostate.

- Brachytherapy alone is generally used only in men with early-stage prostate cancer that is relatively slow growing (low-grade).
- Brachytherapy combined with external radiation is sometimes an option for men who have a higher risk of the cancer growing outside the prostate.

The use of brachytherapy is also limited by some other factors. For men who have had a transurethral resection of the prostate (TURP) or for those who already have urinary problems, the risk of urinary side effects may be higher. Brachytherapy might not work as well in men with large prostate glands because it might not be possible to place the seeds into all of the correct locations. One way to get around this may be to get a few

months of hormone therapy beforehand to shrink the prostate.

Imaging tests such as transrectal ultrasound, CT scans, or MRI are used to help guide the placement of the radioactive pellets. Special computer programs calculate the exact dose of radiation needed.

There are 2 types of prostate brachytherapy. Both are done in an operating room. You will get either spinal anesthesia (where the lower half of your body is numbed) or general anesthesia (where you are asleep), and you might need to stay in the hospital overnight.

Permanent (low dose rate, or LDR) brachytherapy

In this approach, pellets (seeds) of radioactive material (such as iodine-125 or palladium-103) are placed inside thin needles, which are inserted through the skin in the area between the scrotum and anus and into the prostate. The pellets are left in place as the needles are removed and give off low doses of radiation for weeks or months. Radiation from the seeds travels a very short distance, so the seeds can give off a large amount of radiation in a very small area. This limits the amount of damage to nearby healthy tissues. Usually, around 100 seeds are placed, but this depends on the size of the prostate. Because the seeds are so small, they cause little discomfort, and they are simply left in place after their radioactive material is used up.

You may also get external beam radiation along with brachytherapy, especially if there is a higher risk that your cancer has spread outside the prostate (for example, if you have a higher Gleason score).

Temporary (high dose rate, or HDR) brachytherapy

This technique is done less often. It uses higher doses of radiation that are left in place for a short time. Hollow needles are placed through the skin between the scrotum and anus and into the prostate. Soft nylon tubes (catheters) are placed in these needles. The needles are then removed but the catheters stay in place. Radioactive iridium-192 or cesium-137 is then placed in the catheters, usually for 5 to 15 minutes. Generally, about 3 brief treatments are given over 2 days, and the radioactive substance is removed each time. After the last treatment the catheters are removed. For about a week after treatment, you may have some pain or swelling in the area between your scrotum and rectum, and your urine may be reddish-brown.

These treatments are usually combined with external beam radiation given at a lower dose than if used by itself. The advantage of this approach is that most of the radiation is concentrated in the prostate itself, sparing nearby normal tissues.

Possible risks and side effects of brachytherapy

Radiation precautions: If you get permanent (LDR) brachytherapy, the seeds will give off small amounts of radiation for several weeks or months. Even though the radiation doesn’t travel far, your doctor may advise you to stay away from pregnant women and small children during this time. If you plan on traveling, you might want to get a doctor’s

note regarding your treatment, as low levels of radiation can sometimes be picked up by detection systems at airports

There is also a small risk that some of the seeds might move (migrate). You may be asked to strain your urine for the first week or so to catch any seeds that might come out. You may be asked to take other precautions as well, such as wearing a condom during sex. Be sure to follow any instructions your doctor gives you. There have also been reports of the seeds moving through the bloodstream to other parts of the body, such as the lungs. As far as doctors can tell, this is uncommon and doesn't seem to cause any ill effects. Radiation precautions aren't needed after HDR brachytherapy, because the radiation doesn't stay in the body after treatment.

Bowel problems: Brachytherapy can sometimes irritate the rectum and cause a condition called radiation proctitis. Bowel problems such as rectal pain, burning, and/or diarrhea (sometimes with bleeding) can occur, but serious long-term problems are uncommon.

Urinary problems: Severe urinary incontinence (trouble controlling urine) is not a common side effect. But some men have problems with frequent urination or other symptoms due to irritation of the urethra, the tube that drains urine from the bladder. This tends to be worse in the weeks after treatment and to gradually get better. Rarely, the urethra may actually close off (known as a urethral stricture) and need to be opened with a catheter or surgery.

Erection problems: Some studies have found rates of erection problems to be lower after brachytherapy, but other studies have found that the rates were no lower than with external beam radiation or surgery. The younger you are and the better your sexual function before treatment, the more likely you will be to regain function after treatment. Erection problems can often be helped by treatments such as those listed in the surgery section, including medicines. For more about coping with erection problems and other sexuality issues, see *Sexuality for the Man With Cancer*.

To learn more about radiation therapy, see the Radiation Therapy section of our website.

Cryotherapy for prostate cancer

Cryotherapy (also called **cryosurgery** or **cryoablation**) is the use of very cold temperatures to freeze and kill prostate cancer cells. Despite it sometimes being called cryosurgery, it is not actually a type of surgery.

When is cryotherapy used?

Cryotherapy is sometimes used to treat early-stage prostate cancer. Most doctors do not use cryotherapy as the first treatment for prostate cancer, but it is sometimes an option if the cancer has come back after radiation therapy. As with brachytherapy, this may not be a good option for men with large prostate glands.

How is cryotherapy done?

This type of procedure requires spinal or epidural anesthesia (the lower half of your body

is numbed) or general anesthesia (you are asleep).

The doctor uses transrectal ultrasound (TRUS) to guide several hollow probes (needles) through the skin between the anus and scrotum and into the prostate. Very cold gases are then passed through the needles to freeze and destroy the prostate. To be sure the prostate is destroyed without too much damage to nearby tissues, the doctor carefully watches the ultrasound during the procedure. Warm saltwater is circulated through a catheter in the urethra during the procedure to keep it from freezing. The catheter is left in place for several weeks afterward to allow the bladder to empty while you recover.

After the procedure, you might need to stay in the hospital overnight, but many patients leave the same day.

Cryotherapy is less invasive than surgery, so there is usually less blood loss, a shorter hospital stay, shorter recovery period, and less pain. But compared with surgery or radiation therapy, doctors know much less about the long-term effectiveness of cryotherapy. Cryotherapy doesn't appear to be as good as radiation for more advanced prostate tumors.

Possible side effects of cryotherapy

Side effects from cryotherapy tend to be worse if it is done in men who have already had radiation therapy, as opposed to men who have it as the first form of treatment.

Most men have blood in their urine for a day or two after the procedure, as well as soreness in the area where the needles were placed. Swelling of the penis or scrotum is also common.

Freezing might also affect the bladder and rectum, which can lead to pain, burning sensations, and the need to empty the bladder and bowels often. Most men recover normal bowel and bladder function over time.

Freezing often damages the nerves near the prostate that control erections. Erectile dysfunction is more common after cryotherapy than after radical prostatectomy. For information on coping with erection problems and other sexuality issues, see *Sexuality for the Man With Cancer*.

Urinary incontinence (having problems controlling urine) is rare in men who have cryotherapy as their first treatment for prostate cancer, but it is more common in men who have already had radiation therapy.

After cryotherapy, less than 1% of men develop a fistula (an abnormal connection) between the rectum and bladder. This rare but serious problem can allow urine to leak into the rectum and often requires surgery to repair.

Hormone therapy for prostate cancer

Hormone therapy is also called **androgen deprivation therapy** (ADT) or **androgen suppression therapy**. The goal is to reduce levels of male hormones, called androgens, in the body, or to stop them from affecting prostate cancer cells.

Androgens stimulate prostate cancer cells to grow. The main androgens in the body are testosterone and dihydrotestosterone (DHT). Most of the androgens are made by the testicles, but the adrenal glands (glands that sit above your kidneys) also make a small amount. Lowering androgen levels or stopping them from getting into prostate cancer cells often makes prostate cancers shrink or grow more slowly for a time. But hormone therapy alone does not cure prostate cancer.

When is hormone therapy used?

Hormone therapy may be used:

- If the cancer has spread too far to be cured by surgery or radiation, or if you can't have these treatments for some other reason
- If the cancer remains or comes back after treatment with surgery or radiation therapy
- Along with radiation therapy as initial treatment if you are at higher risk of the cancer coming back after treatment (based on a high Gleason score, high PSA level, and/or growth of the cancer outside the prostate)
- Before radiation to try to shrink the cancer to make treatment more effective

Types of hormone therapy

Several types of hormone therapy can be used to treat prostate cancer.

Treatments to lower androgen levels

Orchiectomy (surgical castration)

Even though this is a type of surgery, its main effect is as a form of hormone therapy. In this operation, the surgeon removes the testicles, where most of the androgens (testosterone and DHT) are made. This causes most prostate cancers to stop growing or shrink for a time.

This is done as an outpatient procedure. It is probably the least expensive and simplest form of hormone therapy. But unlike some of the other treatments, it is permanent, and many men have trouble accepting the removal of their testicles.

Some men having this surgery are concerned about how it will look afterward. If wanted, artificial testicles that look much like normal ones can be inserted into the scrotum.

LHRH agonists

Luteinizing hormone-releasing hormone (LHRH) agonists (also called *LHRH analogs* or *GnRH agonists*) are drugs that lower the amount of testosterone made by the testicles. Treatment with these drugs is sometimes called *chemical castration* or *medical castration* because they lower androgen levels just as well as orchiectomy.

Even though LHRH agonists cost more than orchiectomy and require more frequent doctor visits, most men choose this method. These drugs allow the testicles to remain in place, but the testicles will shrink over time, and they may even become too small to feel.

LHRH agonists are injected or placed as small implants under the skin. Depending on the drug used, they are given anywhere from once a month up to once a year. The LHRH

agonists available in the United States include:

- **Leuprolide (Lupron, Eligard)**
- **Goserelin (Zoladex)**
- **Triptorelin (Trelstar)**
- **Histrelin (Vantas)**

When LHRH agonists are first given, testosterone levels go up briefly before falling to very low levels. This effect is called *flare* and results from the complex way in which these drugs work. Men whose cancer has spread to the bones may have bone pain. If the cancer has spread to the spine, even a short-term increase in tumor growth as a result of the flare could press on the spinal cord and cause pain or paralysis. Flare can be avoided by giving drugs called *anti-androgens* (discussed below) for a few weeks when starting treatment with LHRH agonists.

LHRH antagonist

Degarelix (Firmagon) is an LHRH antagonist. It works like the LHRH agonists, but it lowers testosterone levels more quickly and doesn't cause tumor flare like the LHRH agonists do. Treatment with this drug can also be considered a form of *medical castration*.

This drug is used to treat advanced prostate cancer. It is given as a monthly injection under the skin. The most common side effects are problems at the injection site (pain, redness, and swelling) and increased levels of liver enzymes on lab tests. Other side effects are discussed in detail below.

CYP17 inhibitor

LHRH agonists and antagonists can stop the testicles from making androgens, but other cells in the body, including prostate cancer cells themselves, can still make small amounts, which can fuel cancer growth. **Abiraterone (Zytiga)** blocks an enzyme called CYP17, which helps stop these cells from making androgens.

Abiraterone can be used in men with advanced castrate-resistant prostate cancer (cancer that is still growing despite low testosterone levels from an LHRH agonist, LHRH antagonist, or orchiectomy).

This drug is taken as pills every day. It doesn't stop the testicles from making testosterone, so men who haven't had an orchiectomy need to continue treatment with an LHRH agonist or antagonist. Because abiraterone also lowers the level of some other hormones in the body, prednisone (a cortisone-like drug) needs to be taken during treatment as well to avoid certain side effects.

Drugs that stop androgens from working

Anti-androgens

Androgens have to bind to a protein in the prostate cell called an *androgen receptor* to work. Anti-androgens are drugs that bind to these receptors so the androgens can't.

Drugs of this type include:

- **Flutamide (Eulexin)**
- **Bicalutamide (Casodex)**
- **Nilutamide (Nilandron)**

They are taken daily as pills.

Anti-androgens are not often used by themselves in the United States. An anti-androgen may be added to treatment if orchiectomy or an LHRH agonist or antagonist is no longer working by itself. An anti-androgen is also sometimes given for a few weeks when an LHRH agonist is first started to prevent a tumor flare.

An anti-androgen can also be combined with orchiectomy or an LHRH agonist as firstline hormone therapy. This is called *combined androgen blockade* (CAB). There is still some debate as to whether CAB is more effective in this setting than using orchiectomy or an LHRH agonist alone. If there is a benefit, it appears to be small.

In some men, if an anti-androgen is no longer working, simply stopping the antiandrogen can cause the cancer to stop growing for a short time. Doctors call this the *antiandrogen withdrawal* effect, although they are not sure why it happens.

Enzalutamide (Xtandi) is a newer type of anti-androgen. Normally when androgens bind to their receptor, the receptor sends a signal to the cell's control center, telling it to grow and divide. Enzalutamide blocks this signal. It is taken as pills each day.

Enzalutamide can often be helpful in men with castrate-resistant prostate cancer. In most studies of this drug, men were also treated with an LHRH agonist, so it isn't clear how helpful this drug would be in men with non-castrate levels of testosterone.

Other androgen-suppressing drugs

Estrogens (female hormones) were once the main alternative to orchiectomy for men with advanced prostate cancer. Because of their possible side effects (including blood clots and breast enlargement), estrogens have been replaced by other types of hormone therapy. Still, estrogens may be tried if these other hormone treatments are no longer working.

Ketoconazole (Nizoral), first used for treating fungal infections, blocks production of certain hormones, including androgens, similarly to abiraterone. It is most often used to treat men just diagnosed with advanced prostate cancer who have a lot of cancer in the body, as it offers a quick way to lower testosterone levels. It can also be tried if other forms of hormone therapy are no longer working.

Ketoconazole also can block the production of cortisol, an important steroid hormone in the body, so men treated with this drug often need to take a corticosteroid (such as prednisone or hydrocortisone).

Possible side effects of hormone therapy

Orchiectomy and LHRH agonists and antagonists can all cause similar side effects

from lower levels of hormones such as testosterone. These side effects can include:

- Reduced or absent sexual desire
- Erectile dysfunction (impotence)
- Shrinkage of testicles and penis
- Hot flashes, which may get better or go away with time
- Breast tenderness and growth of breast tissue
- Osteoporosis (bone thinning), which can lead to broken bones
- Anemia (low red blood cell counts)
- Decreased mental sharpness
- Loss of muscle mass
- Weight gain
- Fatigue
- Increased cholesterol levels
- Depression

Some research has suggested that the risk of high blood pressure, diabetes, strokes, heart attacks, and even death from heart disease is higher in men treated with hormone therapy, although not all studies have found this.

Anti-androgens have similar side effects. The major difference from LHRH agonists and antagonists and orchiectomy is that anti-androgens may have fewer sexual side effects. When these drugs are used alone, sexual desire and erections can often be maintained. When these drugs are given to men already being treated with LHRH agonists, diarrhea is the major side effect. Nausea, liver problems, and tiredness can also occur.

Abiraterone can cause joint or muscle pain, high blood pressure, fluid buildup in the body, hot flashes, upset stomach, and diarrhea.

Enzalutamide can cause diarrhea, fatigue, and worsening of hot flashes. This drug can also cause some nervous system side effects, including dizziness and, rarely, seizures. Men taking this drug are more likely to fall, which may lead to injuries.

Many side effects of hormone therapy can be prevented or treated. For example:

- Hot flashes can often be helped by treatment with certain antidepressants or other drugs.
- Brief radiation treatment to the breasts can help prevent their enlargement, but this is not effective once breast enlargement has occurred.
- Several drugs can help prevent and treat osteoporosis.
- Depression can be treated with antidepressants and/or counseling.
- Exercise can help reduce many side effects, including fatigue, weight gain, and the loss of bone and muscle mass.

There is growing concern that hormone therapy for prostate cancer may lead to problems thinking, concentrating, and/or with memory, but this has not been studied thoroughly.

Still, hormone therapy does seem to lead to memory problems in some men. These problems are rarely severe, and most often affect only some types of memory. More studies are being done to look at this issue.

Current issues in hormone therapy

There are many issues around hormone therapy that not all doctors agree on, such as the best time to start and stop it and the best way to give it. Studies are now looking at these issues. A few of them are discussed here.

Treating early-stage cancer: Some doctors have used hormone therapy instead of watchful waiting or active surveillance in men with early stage prostate cancer who do not want surgery or radiation. Studies have not found that these men live any longer than those who don't get any treatment until the cancer progresses or symptoms develop. Because of this, hormone treatment is not usually advised for early-stage prostate cancer.

Early versus delayed treatment: For men who need (or will eventually need) hormone therapy, such as men whose PSA levels are rising after surgery or radiation or men with advanced prostate cancer who don't yet have symptoms, it's not always clear when it is best to start hormone treatment. Some doctors think that hormone therapy works better if it's started as soon as possible, even if a man feels well and is not having any symptoms. Some studies have shown that hormone treatment may slow the disease down and perhaps even help men live longer.

But not all doctors agree with this approach. Some are waiting for more evidence of benefit. They feel that because of the side effects of hormone therapy and the chance that the cancer could become resistant to therapy sooner, treatment shouldn't be started until a man has symptoms from the cancer. This issue is being studied.

Intermittent versus continuous hormone therapy: Most prostate cancers treated with hormone therapy become resistant to this treatment over a period of months or years. Some doctors believe that constant androgen suppression might not be needed, so they advise intermittent (on-again, off-again) treatment. The hope is that giving men a break from androgen suppression will also give them a break from side effects like decreased energy, sexual problems, and hot flashes.

In one form of intermittent hormone therapy, treatment is stopped once the PSA drops to a very low level. If the PSA level begins to rise, the drugs are started again. Another form of intermittent therapy uses hormone therapy for fixed periods of time – for example, 6 months on followed by 6 months off.

At this time, it isn't clear how this approach compares to continuous hormone therapy Some studies have found that continuous therapy might help men live longer, but other studies have not found such a difference.

Combined androgen blockade (CAB): Some doctors treat patients with both androgen deprivation (orchiectomy or an LHRH agonist or antagonist) plus an anti-androgen. Some studies have suggested this may be more helpful than androgen deprivation alone, but

others have not. Most doctors are not convinced there's enough evidence that this combined therapy is better than starting with one drug alone when treating metastatic prostate cancer.

Triple androgen blockade (TAB): Some doctors have suggested taking combined therapy one step further, by adding a drug called a 5-alpha reductase inhibitor – either finasteride (Proscar) or dutasteride (Avodart) – to the combined androgen blockade. There is very little evidence to support the use of this triple androgen blockade at this time.

Castrate-resistant versus hormone-refractory prostate cancer: Both these terms are sometimes used to describe prostate cancers that are no longer responding to hormones, although there is a difference between the two.

- **Castrate-resistant** means the cancer is still growing even when the testosterone levels are as low as what would be expected if the testicles were removed (called castrate levels). Levels this low could be from an orchiectomy, an LHRH agonist, or an LHRH antagonist. Some men might be uncomfortable with this term, but it's specifically meant to refer to these cancers, some of which might still be helped by other forms of hormone therapy, such as the drugs abiraterone and enzalutamide. Cancers that still respond to some type of hormone therapy are not completely hormone-refractory.
- **Hormone-refractory** refers to prostate cancer that is no longer helped by any type of hormone therapy, including the newer medicines.

Chemotherapy for prostate cancer

Chemotherapy (chemo) uses anti-cancer drugs injected into a vein or given by mouth. These drugs enter the bloodstream and go throughout the body, making this treatment potentially useful for cancers that have spread (metastasized) to distant organs.

When is chemotherapy used?

Chemo is sometimes used if prostate cancer has spread outside the prostate gland and hormone therapy isn't working. Recent research has also shown that chemo might be helpful if given along with hormone therapy.

Chemo is not a standard treatment for early prostate cancer, but some studies are looking to see if it could be helpful if given for a short time after surgery.

Chemo drugs used to treat prostate cancer

For prostate cancer, chemo drugs are typically used one at a time. Some of the chemo drugs used to treat prostate cancer include:

- Docetaxel (Taxotere)
- Cabazitaxel (Jevtana)
- Mitoxantrone (Novantrone)

• Estramustine (Emcyt)

In most cases, the first chemo drug given is docetaxel, combined with the steroid drug prednisone. If this drug does not work (or stops working), cabazitaxel is often the next chemo drug tried (although there may be other treatment options as well).

Both of these drugs have been shown to help men live longer, on average, than older chemo drugs. They may slow the cancer's growth and also reduce symptoms, resulting in a better quality of life. Still, chemo is very unlikely to cure prostate cancer.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to allow the body time to recover. Each cycle typically lasts for a few weeks.

Possible side effects of chemotherapy

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body, such as those in the bone marrow (where new blood cells are made), the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells can also be affected by chemo, which can lead to side effects.

The side effects of chemo depend on the type and dose of drugs given and how long they are taken. Some common side effects can include:

• Hair loss

• Mouth sores

• Loss of appetite

• Nausea and vomiting

• Diarrhea

• Increased chance of infections (from having too few white blood cells)

• Easy bruising or bleeding (from having too few blood platelets)

• Fatigue (from having too few red blood cells)

These side effects usually go away once treatment is finished. There is help for many of these side effects. For example, drugs can be given to help prevent or reduce nausea and vomiting.

Along with the risks above, some side effects are seen more often with certain chemo drugs. For example:

• Docetaxel and cabazitaxel sometimes cause severe allergic reactions. Medicines are given before each treatment to help prevent this. These drugs can also damage nerves (known as *peripheral neuropathy*), which can cause numbness, tingling, or burning sensations in the hands or feet.

• Mitoxantrone can, very rarely, cause leukemia several years later.

• Estramustine carries an increased risk of blood clots.

If you notice any side effects while getting chemo report them to your medical team so that they can be treated promptly. In some cases, the doses of the chemo drugs may need to be reduced or treatment may need to be delayed or stopped to prevent the effects from

getting worse.

To learn more about chemo, see the Chemotherapy section on our website.

Vaccine treatment for prostate cancer

Sipuleucel-T (Provenge) is a cancer vaccine. Unlike traditional vaccines, which boost the body's immune system to help prevent infections, this vaccine boosts the immune system to help it attack prostate cancer cells.

The vaccine is used to treat advanced prostate cancer that is no longer responding to initial hormone therapy but that is causing few or no symptoms.

This vaccine is made specifically for each man. To make it, white blood cells (cells of the immune system) are removed from your blood over a few hours while you are hooked up to a special machine. The cells are then sent to a lab, where they are exposed to a protein from prostate cancer cells called prostatic acid phosphatase (PAP). The cells are then sent back to the doctor's office or hospital, where they are given back to you by infusion into a vein (IV). This process is repeated 2 more times, 2 weeks apart, so that you get 3 doses of cells. The cells help your other immune system cells attack the prostate cancer.

The vaccine hasn't been shown to stop prostate cancer from growing, but it seems to help men live an average of several months longer. As with hormone therapy and chemotherapy, this type of treatment has not been shown to cure prostate cancer.

Studies are now being done to see if this vaccine can help men with less advanced prostate cancer.

Possible side effects of vaccine treatment

Side effects from the vaccine tend to be milder than those from hormone therapy or chemotherapy. Common side effects can include fever, chills, fatigue, back and joint pain, nausea, and headache. These most often start during the cell infusions and last no more than a couple of days. A few men may have more severe symptoms, including problems breathing and high blood pressure, which usually get better after treatment.

Preventing and treating prostate cancer spread to bones

If prostate cancer spreads to other parts of the body, it nearly always goes to the bones first. Bone metastasis can be painful and can cause other problems, such as fractures (breaks) or high blood calcium levels, which can be dangerous or even life threatening.

If the cancer has grown outside the prostate, preventing or slowing the spread of the cancer to the bones is a major goal of treatment. If the cancer has already reached the bones, controlling or relieving pain and other complications is also a very important part of treatment.

Treatments such as hormone therapy, chemotherapy, and vaccines may help with this, but other treatments more specifically target bone metastasis and the problems it may cause.

Bisphosphonates

Bisphosphonates are drugs that work by slowing down bone cells called osteoclasts. These cells normally break down the hard mineral structure of bones to help keep them healthy. Osteoclasts often become overactive when prostate cancer spreads to the bones, which can cause problems. Bisphosphonates can be used:

- To help relieve pain and high calcium levels caused by cancer that has spread to the bones
- To help slow the growth of cancer that has spread to the bones and help delay or prevent fractures
- To help strengthen bones in men who are getting hormone therapy

Zoledronic acid (Zometa) is the most commonly used bisphosphonate for prostate cancer. This drug is given as an intravenous (IV) injection, usually once every 3 or 4 weeks. Men given this drug are advised to take a supplement containing calcium and vitamin D to prevent problems with low calcium levels.

Some doctors use other bisphosphonates to treat prostate cancer that has spread to bone. Bisphosphonates can have side effects, including flu-like symptoms and bone or joint pain. They can also cause kidney problems, so patients with poor kidney function might not be able to be treated with these medicines.

A rare but very serious side effect of these drugs is osteonecrosis of the jaw (ONJ). With this condition, part of the jaw bone loses its blood supply and dies. This can lead to tooth loss and infections of the jaw bone that are hard to treat. Some people develop ONJ when dental work is done during treatment. Many cancer doctors advise men to have a dental checkup and have any tooth or jaw problems treated before they start taking a bisphosphonate. Maintaining good oral hygiene by flossing and brushing, making sure that dentures fit properly, and having regular dental checkups may also help prevent ONJ.

Denosumab

Denosumab (Xgeva, Prolia) is another drug that can help when prostate cancer spreads to bone. Like the bisphosphonates, denosumab also blocks bone cells called *osteoclasts*, but it does so in a different way. This drug can be used:

- To help prevent or delay problems like fractures in men whose cancer has already spread to the bones. It may be helpful even if zoledronic acid is no longer working.
- To help slow the spread of the cancer to the bones in men with no obvious cancer spread but with rising PSA levels despite hormone therapy

This drug is injected under the skin every 4 weeks. Men given this drug are often advised to take a supplement containing calcium and vitamin D to prevent problems with low calcium levels.

Common side effects include nausea, diarrhea, and feeling weak or tired. Like the bisphosphonates, denosumab can also cause ONJ, so doctors recommend taking the same

precautions (such as having teeth and jaw problems treated before starting the drug).

Corticosteroids

Some studies suggest that corticosteroid drugs (such as prednisone and dexamethasone) can help relieve bone pain in some men. They also can help lower PSA levels.

External radiation therapy

Radiation therapy can help reduce bone pain, especially if the pain is limited to one or only a few areas of bone. Radiation can be aimed at tumors on the spine, which can help relieve pressure on the spinal cord in some cases. Radiation therapy may also help relieve other symptoms by shrinking tumors in other parts of the body.

Radiopharmaceuticals

Radiopharmaceuticals are drugs that contain radioactive elements. They are injected into a vein and settle in areas of damaged bones (like those containing cancer spread). Once there, they give off radiation that kills cancer cells. These drugs can be used to treat prostate cancer that has spread to many bones. Unlike external beam radiation, these drugs can reach all the affected bones at the same time.

The radiopharmaceuticals that can be used to treat prostate cancer spread to bone include:

- Strontium-89 (Metastron)
- Samarium-153 (Quadramet)
- Radium-223 (Xofigo)

All of these drugs can help relieve pain caused by bone metastases. Radium-223 has also been shown to help men who have prostate cancer spread only to their bones (as opposed to spread to other organs such as the lungs) to live longer. For these men, radium-223 may be an early part of treatment.

The major side effect of these drugs is a decrease in blood cell counts, which could increase risks for infections or bleeding, especially if your counts are already low. Other side effects have also been seen, so ask your doctor what you can expect.

Pain medicines

When properly prescribed, pain medicines (ranging from over-the-counter ibuprofen or acetaminophen to stronger prescription medicines like morphine) are very effective. You may worry about addiction with pain medicines, but this is almost never a problem if these drugs are used as directed to treat cancer pain. Symptoms such as drowsiness and constipation are common but can usually be treated by changing the dose or by adding other medicines.

Pain medicines work best when they’re taken on a regular schedule. They don’t work as well if they’re only used when the pain becomes severe. Several long-acting forms of opioids (prescription medicines such as morphine) are in pill form and only need be taken once or twice a day. There is even a long-acting patch that only needs to be applied every few days.

If you have bone pain from prostate cancer, it's very important that it is treated effectively. This can help you feel better and let you focus on the things that are most important to you. Don't hesitate to discuss pain, other symptoms, or any quality of life concerns with your cancer care team. Pain and most other symptoms of prostate cancer can often be treated effectively. If the treatments listed above don't help with symptoms, there are several other options.

For more on managing pain, see the Cancer-Related Pain section of our website or our *Guide to Controlling Cancer Pain*.

Considering prostate cancer treatment options

For most men diagnosed with prostate cancer, the cancer is found while it is still at an early stage. These men often have several treatment options to consider.

Not every man with prostate cancer needs to be treated right away. If you have earlystage prostate cancer, there are many factors such as your age and general health, and the likelihood that the cancer will cause problems for you to consider before deciding what to do. You should also think about the possible side effects of treatment and how likely they are to bother you. Some men, for example, may want to avoid possible side effects such as incontinence or erection problems for as long as possible. Other men are less concerned about side effects and more concerned about removing or destroying the cancer.

If you are older or have other serious health problems and your cancer is slow growing (low-grade), you might find it helpful to think of prostate cancer as a chronic disease that will probably not lead to your death but may cause symptoms you want to avoid. You may be more inclined to consider watchful waiting or active surveillance, and less inclined to consider treatments that are likely to cause major side effects, such as radiation and surgery. Of course, age itself is not necessarily the best basis on which to make your choice. Many men are in good mental and physical shape at age 70, while some younger men may not be as healthy.

If you are younger and otherwise healthy, you might be more willing to accept possible side effects of treatment if they offer you the best chance for cure. Most doctors believe that surgery, external radiation, and brachytherapy all have about the same cure rates for the earliest stage prostate cancers. However, there are pros and cons to each type of treatment that should be considered, and the benefits should be weighed against possible risks and side effects.

Choosing among treatment options is complicated even further by the development of newer types of surgery (such as robotic-assisted prostatectomy) and radiation therapy (such as proton beam radiation) in recent years. Many of these seem very promising, but there is very little long-term data on them, which means comparing their effectiveness

and possible side effects is difficult, if not impossible.

Getting help with treatment decisions

Making such a complex decision is often hard to do by yourself. You might find it helps to talk with your family and friends before making a decision. You might also find it helpful to speak with other men who have faced or are currently facing the same issues. The American Cancer Society and other organizations offer support programs where you can meet and discuss these and other cancer-related issues. For more about our programs, call us toll-free at 1-800-227-2345 or see the Find Support Programs and Services section of our website. It's important to know that each man's experience with prostate cancer is different. Just because someone you know had a good (or bad) experience with a certain type of treatment doesn't mean the same will be true for you.

You might also want to consider getting more than one medical opinion, perhaps even from different types of doctors. For early-stage cancers, it is natural for surgical specialists, such as urologists, to favor surgery and for radiation oncologists to lean more toward radiation therapy. Doctors specializing in newer types of treatment may be more likely to recommend their therapies. Talking to each of them might give you a better perspective on your options. Your primary care doctor may also be helpful in sorting out which treatment might be right for you.

Some things to consider when choosing among treatments

Before deciding on treatment, here are some questions you may want to ask yourself:

- Are you the type of person who needs to do something about your cancer, even if it might result in serious side effects? Or would you be comfortable with watchful waiting/active surveillance, even if it means you might have more anxiety (and need more frequent follow-up) in the future?
- Do you need to know right away whether your doctor thinks he or she was able to get all of the cancer out (a reason some men choose surgery)? Or are you comfortable with not knowing the results of treatment for a while (as is the case in radiation therapy) if it means not having to have surgery?
- Do you prefer to go with the newest technology (such as robotic surgery or proton beam radiation therapy), which might have some theoretical advantages? Or do you prefer to go with treatment methods that are better proven and with which doctors might have more experience?
- Which potential treatment side effects (incontinence, impotence, bowel problems) might be most distressing to you? (Some treatments are more likely to cause certain side effects than others.)
- How important for you are issues like the amount of time spent in treatment or recovery?
- If your initial treatment is not successful, what would your options be at that point?

Many men find it very stressful to have to choose between treatment options, and are very fearful they will choose the “wrong” one. In many cases, there is no single best option, so it’s important to take your time and decide which option is right for you.

Initial treatment of prostate cancer, by stage

The stage of your cancer is one of the most important factors in choosing the best way to treat it. Prostate cancer is staged based on the extent of the cancer (using T, N, and M categories) and the PSA level and Gleason score at the time of diagnosis.

But other factors, such as your age, overall health, life expectancy, and personal preferences should also be taken into account when looking at treatment options. In fact, many doctors determine a man’s possible treatment options based not just on the stage, but on the risk of cancer coming back (recurrence) after the initial treatment and on the man’s life expectancy.

You might want to ask your doctor what factors he or she is considering when discussing your treatment options. Some doctors might recommend options that are different from those listed here.

Stage I

These prostate cancers are small (T1 or T2a) and have not grown outside the prostate. They have low Gleason scores (6 or less) and low PSA levels (less than 10). They usually grow very slowly and may never cause any symptoms or other health problems.

For men without any prostate cancer symptoms who are elderly and/or have other serious health problems that may limit their lifespan, watchful waiting or active surveillance is often recommended. For men who wish to start treatment, radiation therapy (external beam or brachytherapy) or radical prostatectomy may be options.

Men who are younger and healthy may consider active surveillance (knowing that they may need to be treated later on), radical prostatectomy, or radiation therapy (external beam or brachytherapy).

Stage II

Stage II cancers have not yet grown outside of the prostate, but are larger, have higher Gleason scores, and/or have higher PSA levels than stage I cancers. Stage II cancers that are not treated with surgery or radiation are more likely than stage I cancers to eventually spread beyond the prostate and cause symptoms.

As with stage I cancers, active surveillance is often a good option for men whose cancer is not causing any symptoms and who are elderly and/or have other serious health problems. Radical prostatectomy and radiation therapy (external beam or brachytherapy) may also be appropriate options.

Treatment options for men who are younger and otherwise healthy might include:

- Radical prostatectomy (often with removal of the pelvic lymph nodes). This may be followed by external beam radiation if your cancer is found to have spread beyond the

prostate at the time of surgery, or if the PSA level is still detectable a few months after surgery.

- External beam radiation only*
- Brachytherapy only*
- Brachytherapy and external beam radiation combined*
- Taking part in a clinical trial of newer treatments

*All of the radiation options may be combined with several months of hormone therapy if there is a greater chance of cancer recurrence based on PSA level and/or Gleason score.

Stage III

Stage III cancers have grown outside the prostate but have not reached the bladder or rectum (T3). They have not spread to lymph nodes or distant organs. These cancers are more likely to come back after treatment than earlier stage tumors.

Treatment options at this stage may include:

- External beam radiation plus hormone therapy
- External beam radiation plus brachytherapy, possibly with a short course of hormone therapy
- Radical prostatectomy in selected cases (often with removal of the pelvic lymph nodes). This may be followed by radiation therapy.

Men who are older or who have other medical problems may choose less aggressive treatment such as hormone therapy (by itself) or even active surveillance.

Taking part in a clinical trial of newer treatments is also an option for many men with stage III prostate cancer.

Stage IV

Stage IV cancers have already spread to nearby areas such as the bladder or rectum (T4), to nearby lymph nodes, or to distant organs such as the bones. A small portion of T4 cancers may be curable using some of the same treatments for stage III cancers. Most stage IV cancers can’t be cured, but are treatable. The goals of treatment are to keep the cancer under control for as long as possible and to improve a man’s quality of life.

Initial treatment options may include:

- Hormone therapy, possibly along with chemotherapy
- External beam radiation (sometimes combined with brachytherapy), plus hormone therapy
- Radical prostatectomy in selected patients whose cancer has not spread to the lymph nodes or other parts of the body. This might be followed by external radiation therapy.
- Surgery (TURP) to relieve symptoms such as bleeding or urinary obstruction
- Treatments aimed at bone metastases, such as denosumab (Xgeva), a bisphosphonate like zoledronic acid (Zometa), external radiation aimed at bones, or a

radiopharmaceutical such as strontium-89, samarium-153 or radium-223

- Active surveillance (for those who are older or have other serious health issues and do not have major symptoms from the cancer)
- Taking part in a clinical trial of newer treatments

Treatment of stage IV prostate cancer may also include treatments to help prevent or relieve symptoms such as pain.

The options above are for the *initial treatment* of prostate cancer at different stages. But if these treatments aren't working (the cancer continues to grow and spread) or if the cancer comes back, other treatments might be used (see Treating prostate cancer that doesn't go away or comes back after treatment).

The treatment information here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

Following PSA levels during and after prostate cancer treatment

A man's prostate-specific antigen (PSA) blood level is often a good indicator of how effective treatment is or has been. Generally speaking, your PSA level should get very low after treatment. But PSA results aren't always cut and dry, and sometimes doctors aren't sure what they mean.

Before starting treatment, you might want to ask your doctor what he or she expects your PSA level to be during and after treatment, and what levels might cause concern. It's important to know that the PSA level is only one part of the overall picture. Other factors can also play a role in determining if cancer is still there, if it is growing, or if it has come back.

It's also important to know that PSA levels can sometimes fluctuate a bit on their own, even during or after treatment, so they may not always reflect what is actually happening with your cancer. Understandably, many men being treated for prostate cancer are very concerned about even very small changes in their PSA levels. The PSA level is an important tool to monitor the cancer, but not every rise in PSA means that the cancer is growing and requires treatment right away. To help limit unnecessary anxiety, be sure you understand what change in PSA level your doctor might be concerned about.

During watchful waiting or active surveillance

If you choose watchful waiting or active surveillance, your PSA level will be monitored closely (most likely along with other tests) to help decide whether the cancer is growing and if treatment should be considered. (See Watchful waiting or active surveillance for more details.)

Your doctor will watch the PSA level itself and how quickly it is rising. Not all doctors agree on exactly what PSA levels might require further action (such as a prostate biopsy or treatment). Again, talk to your doctor so you understand what change in your PSA might be considered cause for concern.

After surgery

Your PSA should fall to a very low or even undetectable level within a couple of months after radical prostatectomy. Because some PSA can remain in the blood for several weeks after surgery, even if all of the prostate cells were removed, doctors often advise waiting at least 6 to 8 weeks after surgery before checking the PSA level.

Some men might worry if their PSA is still detectable even at a very low level after surgery, but this does not always mean cancer is still in the body. Modern PSA blood tests can detect even tiny amounts of PSA, but these amounts might not always be significant, especially if they are not rising over time. It could just mean that you have some cells in the body making PSA, but these aren't necessarily cancer cells.

Still, having any detectable PSA after surgery can be stressful for men and their families. If your PSA is still detectable after surgery, even at a very low level, talk to your doctor about what it might mean, and what he or she thinks the best course of action is. Some doctors advise following such low PSA levels over time to get a better idea of what's going on, possibly with repeat tests every few months. Other doctors might be more inclined to recommend further treatment.

After radiation therapy

The different types of radiation therapy don't kill all of the cells in the prostate gland, so they're not expected to cause the PSA to drop to an undetectable level. The remaining normal prostate cells will still make some PSA.

The pattern of the drop in PSA after radiation therapy is also different from after surgery. PSA levels after radiation tend to drop gradually, and might not reach their lowest level until 2 years or more after treatment.

Doctors tend to follow the PSA levels every few months to look for trends. A one-time, small rise in PSA might be a cause for closer monitoring, but it might not mean that the cancer is still there (or has returned), as PSA levels can fluctuate slightly from time to time. However, a PSA that is rising on consecutive tests after treatment might indicate that cancer is still there. Some medical groups have proposed that if the PSA rises more than 2 ng/mL above the lowest level it reached, further treatment should be considered, but some doctors might advise tests to look for cancer in the body even if the PSA has not yet risen this much.

There is also a phenomenon called a *PSA bounce* that sometimes happens after brachytherapy. The PSA rises slightly for a short time within the first couple of years after treatment, but then goes back down. Doctors aren't sure why this happens, but it

doesn’t seem to affect a man’s prognosis.

During treatment for advanced prostate cancer

When treatments such as hormone therapy, chemotherapy, or vaccine therapy are used for more advanced prostate cancer, the PSA level can help show how well the treatment is working or when it might be time to try a different treatment.

Treatments should lower the PSA level (at least at first), although in some cases they may just help keep it from rising further, or even just slow the rise. Of course, other factors, such as whether you’re having symptoms from your cancer and whether it is growing based on imaging tests, are also important when deciding if it might be time to change treatments.

If the cancer has spread outside the prostate, the actual PSA level is often not as important as whether it changes, and how quickly it changes. The PSA level itself does not predict whether or not a man will have symptoms or how long he will live. Many men have very high PSA levels and feel just fine. Other men can have low PSA levels and still have symptoms.

Treating prostate cancer that doesn’t go away or comes back after treatment

If your prostate-specific antigen (PSA) blood level shows that your prostate cancer has not been cured or has come back (recurred) after the initial treatment, further treatment can often still be helpful. Follow-up therapy will depend on where the cancer is thought to be and what treatment(s) you have already had. Imaging tests such as CT, MRI, or bone scans may be done to get a better idea about where the cancer is.

Cancer that is still thought to be in or around the prostate

If the cancer is still thought to be just in the area of the prostate, a second attempt to cure the cancer might be possible.

After surgery: If you’ve had a radical prostatectomy, radiation therapy might be an option, sometimes along with hormone therapy.

After radiation therapy: If your first treatment was radiation, treatment options might include cryotherapy or radical prostatectomy, but when these treatments are done after radiation, they carry a higher risk for side effects such as incontinence. Having radiation therapy again is usually not an option because of the increased potential for serious side effects, although in some cases brachytherapy may be an option as a second treatment after external radiation.

Sometimes it might not be clear exactly where the remaining cancer is in the body. If the only sign of cancer recurrence is a rising PSA level (as opposed to the cancer being seen on imaging tests), another option for some men might be careful observation instead of active treatment. Prostate cancer often grows slowly, so even if it does come back, it

might not cause problems for many years, at which time further treatment could then be considered.

In a Johns Hopkins University study of men whose PSA level began to rise after surgery for prostate cancer, there was an average of about 10 years before there were signs the cancer had spread to distant parts of the body. Of course, these signs appeared earlier in some men and later in others.

Factors such as how quickly the PSA is going up and the original Gleason score of the cancer can help predict how soon the cancer might show up in distant parts of the body and cause problems. If the PSA is going up very quickly, some doctors might recommend that you start treatment even before the cancer can be seen on tests or causes symptoms.

Observation might be a more appealing option to certain groups of men, such as those who are older and in whom the PSA level is rising slowly. Still, not all men might be comfortable with this approach.

Cancer that clearly has spread

If the cancer has spread outside the prostate, it will most likely go to nearby lymph nodes first, and then to bones. Much less often the cancer will spread to the liver or other organs.

When prostate cancer has spread to other parts of the body (including the bones), hormone therapy is probably the most effective treatment. But it isn't likely to cure the cancer, and at some point it might stop working. Usually the first treatment is a luteinizing hormone-releasing hormone **(**LHRH) agonist or antagonist (or orchiectomy). If this stops working, an anti-androgen drug may be added. Another option might be to get chemotherapy along with the hormone therapy. Other treatments aimed at bone metastases might be used as well.

Castrate-resistant and hormone-refractory prostate cancer

Hormone therapy is often very effective at shrinking or slowing the growth of prostate cancer that has spread, but it usually becomes less effective over time. Doctors use different terms to describe cancers that are no longer responding to hormones.

- **Castrate-resistant prostate cancer (CRPC)** is cancer that is still growing despite the fact that hormone therapy (an orchiectomy or an LHRH agonist or antagonist) is keeping the testosterone level in the body as low as what would be expected if the testicles were removed (called *castrate level*s). The cancer might still respond to other forms of hormone therapy, though.
- **Hormone-refractory prostate cancer (HRPC)** is cancer that is no longer helped by any form of hormone therapy.

Men whose prostate cancer is still growing despite initial hormone therapy now have many more treatment options than they had even a few years ago.

If an anti-androgen drug was not part of the initial hormone therapy, it is often added at

this time. If a man is already getting an anti-androgen but the cancer is still growing, stopping the anti-androgen (while continuing other hormone treatments) seems to help sometimes.

Other forms of hormone therapy may also be helpful for a while, especially if the cancer is causing few or no symptoms. These include abiraterone (Zytiga), enzalutamide (Xtandi), ketoconazole, estrogens (female hormones), and corticosteroids.

The prostate cancer vaccine sipuleucel-T (Provenge) is another option for men whose cancer is causing few or no symptoms. This might not lower PSA levels, but it can often help men live longer.

For cancers that are no longer responding to initial hormone therapy and are causing symptoms, several options might be available. Chemotherapy with the drug docetaxel (Taxotere) is often the first choice because it has been shown to help men live longer, as well as to reduce pain. If docetaxel doesn't work or stops working, other chemo drugs, such as cabazitaxel (Jevtana), may help. Another option may be a different type of hormone therapy, such as abiraterone or enzalutamide (if they haven't been tried yet).

Bisphosphonates or denosumab can often help if the cancer has spread to the bones. These drugs can reduce pain and even slow cancer growth in many men. Other medicines and methods can also help keep pain and other symptoms under control. External radiation therapy can help treat bone pain if it's only in a few spots. Radiopharmaceutical drugs can often reduce pain if it's more widespread, and may also slow the growth of the cancer.

If you are having pain from prostate cancer, make sure your doctor and entire health care team know about it. There are many very effective drugs that can relieve pain. For more information, see *Advanced Cancer*.

Several promising new medicines are now being tested against prostate cancer, including vaccines, monoclonal antibodies, and other new types of drugs. Because the ability to treat hormone-refractory prostate cancer is still not good enough, men are encouraged to explore new options by taking part in clinical trials.

The treatment information here is not official policy of the American Cancer Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor. Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

What should you ask your health care team about prostate cancer?

It's important to have honest, open discussions with your cancer care team. Feel free to ask any question, no matter how small it might seem. Here are some questions you might want to ask:

When you're told you have prostate cancer

- What are the chances that the cancer has spread beyond my prostate? If so, is it still curable?
- Do I need any other tests before we decide on treatment?
- Should I see any other types of doctors before deciding on treatment?
- What is the clinical stage and Gleason score (grade) of my cancer? What do those mean to me?
- If I'm concerned about the costs and insurance coverage for my diagnosis and treatment, who can help me?

When deciding on a treatment plan

- How likely is my cancer to cause problems if I'm not treated right away?
- Should I consider active surveillance as an option? Why or why not?
- Do you recommend a radical prostatectomy or radiation therapy? Why or why not?
- Should I consider laparoscopic or robot-assisted prostatectomy?
- What types of radiation therapy might work best for me?
- What other treatment(s) might be right for me? Why?
- What risks or side effects should I expect from my treatment options?
- What are the chances that I will have problems with incontinence or impotence?
- What are the chances that I will have other urinary or rectal problems?
- How quickly do I need to decide on treatment?
- What should I do to be ready for treatment?
- How long will treatment last? What will it be like? Where will it be done?
- How might treatment affect my daily activities?
- What are the chances my cancer will come back with the treatment plans we have discussed? What would be our next step if this happened?

During treatment

Once treatment begins, you'll need to know what to expect and what to look for. Not all of these questions may apply to you, but getting answers to the ones that do may be helpful.

- How will we know if the treatment is working?
- Is there anything I can do to help manage side effects?
- What symptoms or side effects should I tell you about right away?
- How can I reach you on nights, holidays, or weekends?
- Do I need to change what I eat during treatment?
- Are there any limits on what I can do?
- Can you suggest a mental health professional I can see if I start to feel overwhelmed, depressed, or distressed?

After treatment

- Are there any limits on what I can do?
- What symptoms should I watch for?
- Should I exercise or follow a special diet?
- What type of follow-up will I need after treatment?
- How often will I need to have follow-up exams and imaging tests?
- Will I need any blood tests?
- How will we know if the cancer has come back? What should I watch for?
- What will my options be if the cancer comes back?

Along with these sample questions, be sure to write down some of your own. For instance, you might want to ask about recovery time so that you can plan your work or activity schedule. If you still might want to have children, ask if there is a possibility you could become impotent or sterile. You also might want to ask if you qualify for any clinical trials.

Keep in mind that doctors aren't the only ones who can give you information. Other health care professionals, such as nurses and social workers, can answer some of your questions. To find out more about speaking with your health care team, see *Talking With Your Doctor*.

Living as a prostate cancer survivor

For most men with prostate cancer, treatment can remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer growing or coming back. This is very common if you've had cancer.

For other men, the cancer may come back in other parts of the body or may never go away completely. These men may get hormone treatment or other therapies to help keep the cancer in check for as long as possible. Learning to live with cancer that does not go away can be difficult and very stressful.

Life after prostate cancer means returning to some familiar things and also making some new choices.

Ask your doctor for a survivorship care plan

Talk with your doctor about developing a survivorship care plan for you. This plan might include:

- A suggested schedule for follow-up exams and tests
- A schedule for other tests you might need in the future, such as early detection (screening) tests for other types of cancer, or tests to look for long-term health effects from your cancer or its treatment
- A list of possible late- or long-term side effects from your treatment, including what

to watch for and when you should contact your doctor

- Diet and physical activity suggestions

Typical follow-up schedules after prostate cancer

Even if you have completed treatment, your doctors will still want to watch you closely. It's very important to go to all of your follow-up appointments. During these visits, your doctors will ask questions about any problems you may have and may do exams and lab tests or imaging tests to look for signs of cancer or treatment side effects.

Some treatment side effects might last a long time or might not even show up until years after you have finished treatment. Your doctor visits are a good time to ask questions and talk about any changes, problems, or other concerns you have.

Doctor visits and tests

Your doctor visits will usually include PSA blood tests, possibly with digital rectal exams (DREs) if your prostate hasn't been removed. These will probably begin within a few months of finishing treatment. How often you need follow-up visits and tests might depend to some extent on the stage of your cancer and the chance of it coming back.

Most doctors recommend PSA tests about every 6 months or so for the first 5 years after treatment, and at least yearly after that. Bone scans or other imaging tests might also be done, depending on your medical situation.

Prostate cancer can recur even many years after treatment, which is why it's important to keep regular doctor visits and report any new symptoms (such as bone pain or problems with urination).

Keeping health insurance and copies of your medical records

Even after treatment, it's very important to keep health insurance. Tests and doctor visits cost a lot, and although no one wants to think of their cancer coming back, this could happen.

At some point after your cancer treatment, you might find yourself seeing a new doctor who doesn't know about your medical history. It's important to keep copies of your medical records to give your new doctor the details of your diagnosis and treatment.

Learn more in Keeping Copies of Important Medical Records.

Can I lower my risk of prostate cancer progressing or coming back?

If you have (or have had) prostate cancer, you probably want to know if there are things you can do that might lower your risk of the cancer growing or coming back, such as exercising, eating a certain type of diet, or taking nutritional supplements. While there are some things you can do that might be helpful, more research is needed to know for sure.

Getting regular physical activity

Some research has suggested that men who exercise regularly after treatment might be less likely to die from their prostate cancer than those who don't. It's not clear exactly how much activity might be needed, but more seems to be better. More vigorous activity may also be more helpful than less vigorous activity. Further studies are needed to follow up on these findings.

Getting to and staying at a healthy weight

Several studies have found that men who are overweight or obese when diagnosed with prostate cancer tend to have a worse outlook. But it's not yet clear if losing weight can lower this risk. More research is needed to help clarify this.

Quitting smoking

Some research has suggested that men who smoke are more likely to have their prostate cancer recur and are more likely to die from their cancer than men who don't smoke. More research is needed to see if quitting smoking can help lower these risks, although quitting is already known to have a number of other health benefits.

Nutrition and dietary supplements

Some studies have suggested that eating a healthy diet that is rich in vegetables and lower in animal fats might be helpful, but more research is needed to be sure. However, we do know that a healthy diet can have positive effects on your overall health, with benefits that extend beyond your risk of prostate or other cancers.

So far, no dietary supplements have been shown to clearly help lower the risk of prostate cancer progressing or coming back. In fact, some research has suggested that some supplements, such as selenium, might even be harmful. This doesn't mean that no supplements will help, but it's important to know that none have been proven to do so. Dietary supplements are not regulated like medicines in the United States – they do not have to be proven effective (or even safe) before being sold, although there are limits on what they're allowed to claim they can do. If you are thinking about taking any type of nutritional supplement, talk to your health care team. They can help you decide which ones you can use safely while avoiding those that could be harmful.

If the cancer comes back

If your prostate cancer comes back at some point, your treatment options will depend on where it's thought to be and what types of treatment you've already had. For more information, see Treating prostate cancer that remains or comes back after treatment. For more general information on dealing with a recurrence, you may also want to see *When Your Cancer Comes Back: Cancer Recurrence*.

Could I get a second cancer after prostate cancer treatment?

Men who've had prostate cancer can still get other cancers. In fact, prostate cancer survivors are at higher risk for getting some other types of cancer. Learn more in Second cancers after prostate cancer.

Moving on after prostate cancer

Emotional support

Feelings of depression, anxiety, or worry are normal when prostate cancer is a part of your life. Some men are affected more than others. But everyone can benefit from help and support from other people, whether friends and family, religious groups, support groups, professional counselors, or others. Learn more in *Emotions After Cancer Treatment*.

Sexuality and feeling good about your body

Prostate cancer treatment can often affect sexual function. Learning to be comfortable with your body during and after prostate cancer treatment is a personal journey, one that is different for everyone. Information and support can help you cope with these changes over time. Learn more in *Sexuality for the Man With Cancer*.

Second cancers after prostate cancer

Cancer survivors can be affected by a number of health problems, but often a major concern is facing cancer again. If a cancer comes back after treatment it is called a recurrence. But some cancer survivors may develop a new, unrelated cancer later. This is called a second cancer.

Unfortunately, being treated for prostate cancer doesn't mean you can't get another cancer. Men who have had prostate cancer can still get the same types of cancers that other men get. In fact, they might be at higher risk for certain types of cancer.

Men who have had prostate cancer can get any type of second cancer, but they have an increased risk of certain cancers, including:

- Small intestine cancer
- Soft tissue cancer
- Bladder cancer
- Thyroid cancer
- Thymus cancer
- Melanoma of the skin

Men who are treated with radiation therapy also have a higher risk of:

- Rectal cancer
- Acute myeloid leukemia (AML)

This risk is probably related to the dose of radiation. Newer methods of giving radiation therapy may have different effects on the risks of a second cancer. Because these methods are newer, the long-term effects have not been studied as well.

Follow-up after prostate cancer treatment

After completing treatment for prostate cancer, you should still see your doctors regularly. Let them know about any new symptoms or problems, because they could be

caused by the cancer coming back or by a new disease or second cancer.

Prostate cancer survivors should also follow the American Cancer Society guidelines for the early detection of cancer, such as those for colorectal and lung cancer. Most experts don't recommend any other testing to look for second cancers unless you have symptoms.

Can I lower my risk of getting a second cancer?

There are steps you can take to lower your risk and stay as healthy as possible. For example, prostate cancer survivors should do their best to stay away from tobacco products. Smoking can increase the risk of bladder cancer after prostate radiation, as well as increase the risk of many other cancers.

To help maintain good health, prostate cancer survivors should also:

- Get to and stay at a healthy weight
- Stay physically active
- Eat a healthy diet, with an emphasis on plant foods
- Limit alcohol to no more than 2 drinks per day

These steps may also lower the risk of some other health problems.

See *Second Cancers in Adults* for more information about causes of second cancers.

What's new in prostate cancer research?

Research into the causes, prevention, detection, and treatment of prostate is ongoing in many medical centers throughout the world.

Genetics

New research on gene changes linked to prostate cancer is helping scientists better understand how prostate cancer develops. This could make it possible to design medicines to target those changes. Tests to find abnormal prostate cancer genes could also help identify men at high risk who might benefit from screening or from chemoprevention trials, which use drugs to try to keep them from getting cancer.

Most of the gene mutations that have been studied as factors that might increase prostate cancer risk are from chromosomes that are inherited from both parents. Some research has found that a certain variant of mitochondrial DNA, which is inherited only from a person's mother, might also raise a man's risk of developing prostate cancer.

Prevention

Researchers continue to look for foods (or substances in them) that can help lower prostate cancer risk. Scientists have found some substances in tomatoes (lycopenes) and soybeans (isoflavones) that might help prevent prostate cancer. Studies are now looking at the possible effects of these compounds more closely.

Scientists are also trying to develop related compounds that are even more potent and might be used as dietary supplements. So far, most research suggests that a balanced diet including these foods as well as other fruits and vegetables is probably of greater benefit

than taking these substances as dietary supplements.

One vitamin that may be important in prevention is vitamin D. Some studies have found that men with high levels of vitamin D seem to have a lower risk of developing the more lethal forms of prostate cancer. Overall though, studies have not found that vitamin D protects against prostate cancer.

Many people assume that vitamins and other natural substances are safe to take, but recent research has shown that high doses of some may be harmful, including those in supplements marketed specifically for prostate cancer. For example, one study found that men who take more than 7 multivitamin tablets per week may have an increased risk of developing advanced prostate cancer. Another study showed a higher risk of prostate cancer in men who had high blood levels of omega-3 fatty acids. Fish oil capsules, which some people take to help with their heart, contain large amounts of omega-3 fatty acids.

Some research has suggested that men who take a daily aspirin for a long time might have a lower risk of getting and dying from prostate cancer. Still, more research is needed to confirm this, and to confirm that any benefit outweighs potential risks, such as bleeding.

Scientists have also tested certain hormonal medicines called *5-alpha reductase inhibitors* as a way of reducing prostate cancer risk. The results of these studies are discussed in *Prostate Cancer Prevention and Early Detection*.

Early detection

Doctors agree that the prostate-specific antigen (PSA) blood test is not a perfect test for finding prostate cancer early. It misses some cancers, and in other cases the PSA level is high even when prostate cancer can't be found. Researchers are working on strategies to address this problem.

One approach is to try to improve on the test that measures the total PSA level, as described in *Prostate Cancer Prevention and Early Detection*.

Another approach is to develop new tests based on other forms of PSA, or other tumor markers. Several newer tests seem to be more accurate than the PSA test, including:

- The **phi**, which combines the results of total PSA, free PSA, and proPSA to help determine how likely it is that a man has prostate cancer that might need treatment
- The **4Kscore test**, which combines the results of total PSA, free PSA, intact PSA, and human kallikrein 2 (hK2), along with some other factors, to help determine how likely a man is to have prostate cancer that might need treatment
- Tests such as Progensa that look at the level of **prostate cancer antigen 3 (PCA3)** in the urine after a digital rectal exam (DRE). (The DRE pushes some of the prostate cells into the urine.) The higher the level, the more likely that prostate cancer is present.
- Tests that look for an abnormal gene change called ***TMPRSS2:ERG*** in prostate cells

in urine collected after a DRE. This gene change is found in some prostate cancers, but it is rarely found in the cells of men without prostate cancer.

- **ConfirmMDx**, which is a test that looks at certain genes in the cells from a prostate biopsy sample

These tests aren't likely to replace the PSA test any time soon, but they might be helpful in certain situations. For example, some of these tests might be useful in men with a slightly elevated PSA, to help determine whether they should have a prostate biopsy. Some of these tests might be more helpful in determining if men who have already had a prostate biopsy that didn't find cancer should have another biopsy. Doctors and researchers are trying to determine the best way to use each of these tests.

Diagnosis

Doctors doing prostate biopsies often rely on transrectal ultrasound (TRUS), which creates black and white images of the prostate using sound waves, to know where to take samples from. But standard ultrasound may not detect some areas containing cancer.

A newer approach is to measure blood flow within the gland using a technique called *color Doppler ultrasound*. (Tumors often have more blood vessels around them than normal tissue.) It may make prostate biopsies more accurate by helping to ensure the right part of the gland is sampled.

An even newer technique may enhance color Doppler further. In this approach, the patient is first injected with a contrast agent containing microbubbles, which helps improve the ultrasound images. Promising results have been reported, but more studies will be needed before its use becomes common.

Doctors are also studying whether MRI can be combined with TRUS to help guide prostate biopsies in men who previously had negative TRUS-guided biopsies but when the doctor still suspects cancer.

Staging

Determining the stage (extent) of prostate cancer plays a key role in determining a man's treatment options. But imaging tests for prostate cancer such as CT and MRI scans can't detect all areas of cancer, especially small areas of cancer in lymph nodes.

A newer method known as **multiparametric MRI** can be used to help determine the extent of the cancer and how aggressive it might be, which might affect a man's treatment options. This test involves getting a standard MRI, and then getting at least one other type of MRI (such as diffusion weighted imaging [DWI], dynamic contrast enhanced [DCE] MRI, or MR spectroscopy). The results of the different scans are then taken into account.

Another newer method, called **enhanced MRI**, may help find lymph nodes that contain cancer cells. Patients first have a standard MRI. They are then injected with tiny magnetic particles and have another scan the next day. Differences between the 2 scans point to

possible cancer cells in the lymph nodes. Early results of this technique are promising, but it needs more research before it becomes widely used.

A newer type of positron-emission tomography (PET) scan that uses radioactive carbon acetate instead of labeled glucose (sugar) may also be helpful in detecting prostate cancer in different parts of the body, as well as helping to determine if treatment is working. This technique is now being studied.

Treatment

Newer treatments are being developed, and improvements are being made among many standard prostate cancer treatment methods.

Surgery

Doctors are constantly improving the surgical techniques used to treat prostate cancer. The goal is to remove all of the cancer while lowering the risk of complications and side effects from the surgery.

Radiation therapy

As described in Radiation therapy for prostate cancer, advances in technology are making it possible to aim radiation more precisely than in the past. Current methods such as conformal radiation therapy (CRT), intensity modulated radiation therapy (IMRT), and proton beam radiation help doctors avoid giving radiation to normal tissues as much as possible. These methods are expected to increase the effectiveness of radiation therapy while reducing the side effects.

Technology is making other forms of radiation therapy more effective as well. New computer programs allow doctors to better plan the radiation doses and approaches for both external radiation therapy and brachytherapy. Planning for brachytherapy can now even be done during the procedure (intraoperatively).

Newer treatments for early stage cancers

Researchers are looking at newer forms of treatment for early-stage prostate cancer. These new treatments could be used either as the first type of treatment or after radiation therapy in cases where it was not successful.

One treatment, known as **high-intensity focused ultrasound (HIFU)**, destroys cancer cells by heating them with highly focused ultrasonic beams. This treatment has been used in some countries for a while, but it has just recently become available in the United States. Its safety and effectiveness are now being determined.

Nutrition and lifestyle changes

Many studies have looked at the possible benefits of specific nutrients (often as supplements) in helping to treat prostate cancer, although most of this research is still ongoing. Some compounds being studied include extracts from pomegranate, green tea, broccoli, turmeric, flaxseed, and soy.

Some early research has found that in men with a rising PSA level after surgery or

radiation therapy, drinking pomegranate juice or taking a pomegranate extract may slow the time it takes for the PSA level to double. Larger studies are now looking for possible effects of pomegranate juices and extracts on prostate cancer growth.

Some encouraging early results have also been reported with flaxseed supplements. One small study in men with early prostate cancer found that daily flaxseed seemed to slow the rate at which prostate cancer cells multiplied. More research is needed to confirm this finding.

A recent study showed that taking soy supplements after surgery (radical prostatectomy) for prostate cancer did not lower the risk of the cancer coming back.

One study has found that men who choose not to have treatment for their localized prostate cancer may be able to slow its growth with intensive lifestyle changes. The men in the study ate a vegan diet (no meat, fish, eggs, or dairy products) and exercised frequently. They also took part in support groups and yoga. After one year the men saw, on average, a slight drop in their PSA level. It isn't known if this effect will last since the report only followed the men for 1 year. The regimen may also be hard for some men to follow.

Hormone therapy

Several newer forms of hormone therapy have been developed in recent years. Some of these may be helpful even if standard forms of hormone therapy are no longer working. Some examples include abiraterone (Zytiga) and enzalutamide (Xtandi), which are described in the section Hormone therapy for prostate cancer. Others are now being studied as well.

5-alpha reductase inhibitors, such as finasteride (Proscar) and dutasteride (Avodart), are drugs that block the conversion of testosterone to the more active dihydrotestosterone (DHT). These drugs are being studied to treat prostate cancer, either to supplement active surveillance or if the PSA level rises after prostatectomy.

Chemotherapy

Studies in recent years have shown that many chemotherapy drugs can affect prostate cancer. Some, such as docetaxel (Taxotere) and cabazitaxel (Jevtana) have been shown to help men live longer.

Results from recent large studies have found that in men with metastatic prostate cancer, giving chemotherapy (docetaxel) earlier in the course of the disease might help them live longer. These results are encouraging, but these studies were done before newer forms of hormone therapy (abiraterone and enzalutamide) became available, so it's not clear if the results would be the same today.

Other new chemo drugs and combinations of drugs are being studied as well.

Immunotherapy

The goal of immunotherapy is to boost the body's immune system to help fight off or

destroy cancer cells.

Vaccines

Unlike vaccines against infections like measles or mumps, prostate cancer vaccines are designed to help treat, not prevent, prostate cancer. One possible advantage of these types of treatments is that they seem to have very limited side effects. An example of this type of vaccine is sipuleucel-T (Provenge), which has received FDA approval (described in Vaccine treatment for prostate cancer).

Several other types of vaccines to treat prostate cancer are being tested in clinical trials. One example is PROSTVAC, which uses a virus that has been genetically modified to contain prostate-specific antigen (PSA). The patient's immune system should respond to the virus and begin to recognize and destroy cancer cells containing PSA. Early results with this vaccine have been promising, and a larger study is now under way.

Immune checkpoint inhibitors

An important part of the immune system is its ability to keep itself from attacking other normal cells in the body. To do this, it uses "checkpoints" – molecules on immune cells that need to be turned on (or off) to start an immune response. Cancer cells sometimes use these checkpoints to avoid being attacked by the immune system. But newer drugs that target these checkpoints hold a lot of promise as cancer treatments.

For example, newer drugs such as pembrolizumab (Keytruda) and nivolumab (Opdivo) target the immune checkpoint protein PD-1. In some other cancers, these types of drugs have been shown to shrink a larger portion of tumors. Studies are now being done to see how well they might work against prostate cancer.

Another example is the drug ipilimumab (Yervoy), which targets a checkpoint protein called *CTLA-4* on certain immune cells. This drug is already used to treat some other cancers, and is now being tested in men with advanced prostate cancer.

One promising approach for the future might be to combine a checkpoint inhibitor with a prostate cancer vaccine. This might strengthen the immune response and help the vaccine work better.

Targeted therapy drugs

Newer drugs are being developed that target specific parts of cancer cells or their surrounding environments. Each type of targeted therapy works differently, but all alter the way a cancer cell grows, divides, repairs itself, or interacts with other cells.

For example, drugs called *angiogenesis inhibitors* target the growth of new blood vessels (angiogenesis) that tumors need to grow. Several angiogenesis inhibitors are being tested in clinical trials.

Treating cancer that has spread to the bones

Doctors are studying the use of radiofrequency ablation (RFA) to help control pain in men whose prostate cancer has spread to one or more areas in the bones. During RFA, the doctor uses a CT scan or ultrasound to guide a small metal probe into the area of the

tumor. A high-frequency current is passed through the probe to heat and destroy the tumor. RFA has been used for many years to treat tumors in other organs such as the liver, but its use in treating bone pain is still fairly new. Still, early results are promising.

Additional resources for prostate cancer

More information from your American Cancer Society

We have a lot more information that you might find helpful. Explore www.cancer.org or call our National Cancer Information Center toll-free number, 1-800-227-2345. We're here to help you any time, day or night.

Other national organizations and websites*

Along with the American Cancer Society, other sources of information and support include:

Urology Care Foundation

Toll-free number: 1-800-828-7866

Website: www.urologyhealth.org

Offers free brochures on prostate cancer and screening as well as online information on diseases of the prostate, bladder, and other urology health issues in the "Urology A – Z" section of their website.

National Association for Continence

Toll-free number: 1-800-252-3337 (1-800-BLADDER)

Website: www.nafc.org

Offers information and support to all people who are living with incontinence and has information for men who have had prostate surgery. Also available in Spanish.

Prostate Cancer Foundation (formerly CaPCURE)

Toll-free number: 1-800-757-2873 (1-800-757-CURE) or 1-310-570-4700

Website: www.pcf.org

Has information on prostate cancer and treatment options as well as patient guides and survivor stories.

US Too International, Inc.

Toll-free number: 1-800-808-7866 (1-800-80-US-TOO)

Website: www.ustoo.org

Offers information about all stages of prostate cancer, different treatment options, new research findings and current clinical trials, and some referrals to local support groups

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for information and support. Call us at **1-800-227-2345** or visit www.cancer.org.

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