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|  | **My Drift**  **Jerry D. Petersen**  **Prostate Cancer**  **30 May 2014** | **177-2014-06** |

**Some United States prostate cancer statistics:**

* **One in six men will be diagnosed with prostate cancer during his lifetime.**
* **6 out of 10 cases of prostate cancer are found in men older than 65.**
* **More than 2.7 million men in America are now living with the disease.**
* **Prostate cancer is the second most common cancer in men. Skin cancer is first.**
* **In 2014, about 240,000 men will receive a diagnosis of prostate cancer.**
* **In 2014, about 33,000 men will die from the disease - about 1 man in 36 will die of prostate cancer.**
* **It is the second leading cause of cancer deaths for men. Lung cancer is first.**
* **The good news is men dying from this disease has decreased significantly in recent years because of early detection and better treatments.**
* **Prostate cancer often progresses slowly and most men who have the disease will die from other causes.**

**\*\*\*\*Remember that every man is different and every prostate cancer case is different\*\*\*\***

**I have a couple of good friends who have found out that they have prostate cancer. I could very well have the disease myself but at my age, I don’t really care to know for sure. Most men in their 70’s and 80’s die of heart attacks and strokes – not prostate cancer - even if they have it. There are some very good websites out on the Internet that you can Google to get all of the basic information and statistics about prostate cancer. Here are some of them:**

[**http://www.cancer.gov/cancertopics/types/prostate**](http://www.cancer.gov/cancertopics/types/prostate)

[**http://en.wikipedia.org/wiki/Prostate\_cancer**](http://en.wikipedia.org/wiki/Prostate_cancer)

[**http://www.webmd.com/prostate-cancer/default.htm?names-dropdown**](http://www.webmd.com/prostate-cancer/default.htm?names-dropdown)**=**

[**http://www.cancer.org/cancer/prostatecancer/detailedguide/**](http://www.cancer.org/cancer/prostatecancer/detailedguide/)

**These sites present most everything there is to know about prostate cancer. I’m not going into a lot of detail in this article but since there are still some people out there (like my mother) who don’t have a computer or a smart phone, I plan to summarize the basic information about prostate cancer. I will go into a little more detail on the treatment options and when possible, I will try to add some insight on what’s new in prostate cancer research and treatment.**

**What is Prostate Cancer?**

**Prostate cancer is a form of cancer that develops in the prostate, a gland in the male reproductive system. Most prostate cancers are slow growing, however, there are cases of aggressive prostate cancers. The cancer cells may spread from the prostate to other parts of the body, particularly the bones and lymph nodes. Prostate cancer may cause pain, difficulty in urinating, problems during sexual intercourse, erectile dysfunction, or death.**

**What are the Symptoms?**

**There are no early warning signs of prostate cancer. But, because of the proximity of the prostate gland in relation to the bladder and urethra, prostate cancer may be accompanied by a variety of urinary symptoms. Depending on the size and location, a tumor may press on and constrict the urethra, inhibiting the flow of urine. Here are some other prostate cancer signs related to urination:**

* **Burning or pain during urination**
* **Difficulty urinating, or trouble starting and stopping while urinating**
* **More frequent urges to urinate at night**
* **Loss of bladder control**
* **Decreased flow or velocity of urine stream**
* **Blood in urine**

**Prostate cancer may spread (metastasize) to nearby tissues or bones. If the cancer spreads to the spine, it may press on the spinal nerves.**

**Other prostate cancer symptoms include:**

* **Blood in semen**
* **Difficulty getting an erection (erectile dysfunction)**
* **Painful ejaculation**
* **Swelling in legs or pelvic area**
* **Numbness or pain in the hips, legs or feet**
* **Bone pain that doesn't go away, or leads to fractures**

**What Are the Risk Factors?**

**GENERAL**

* **Race: African American (Black) men are approximately 60 percent more likely to develop prostate cancer in their lifetime than Caucasian or Hispanic or Asian men. This is probably because blacks have higher levels of testosterone than other races.**
* **Age: The risk of developing prostate cancer increases with age. While only one in 10,000 men under age 40 will be diagnosed with prostate cancer, one in 15 men in their 60s will be diagnosed with the disease.**

**GENETICS**

* **Family history: Men with an immediate blood relative, such as a father or brother, who has or had prostate cancer, are twice as likely to develop the disease. If there is another family member diagnosed with the disease, the chances of getting prostate cancer increases.**

**LIFESTYLE**

* **Diet: A diet high in saturated fat, as well as obesity, increases the risk of prostate cancer.**
* **High testosterone levels: Men who have high testosterone or use testosterone therapy are more likely to develop prostate cancer, as an increase in testosterone stimulates the growth of the prostate gland.**

**What tests can detect prostate cancer?**

**The tests discussed below are used to look for warning signs of prostate cancer. But these early detection tests can’t tell for sure if a man has cancer. If the result of one of these tests is abnormal, you will need a prostate biopsy to determine for sure if you have cancer.**

* **Prostate-specific antigen (PSA) blood test**

**The PSA test measures the blood level of PSA, a protein that is produced by the prostate gland. The higher a man’s PSA level, the more likely it is that he has prostate cancer. However, there are additional reasons for having an elevated PSA level, and some men who have prostate cancer do not have elevated PSA. For this test, a blood sample is sent to a laboratory for analysis. The results are usually reported as nanograms of PSA per milliliter (ng/mL) of blood. A PSA level of 4.0 ng/mL or lower is considered normal. If a man has a PSA level above 4.0 ng/mL, his doctor would probably recommend a prostate biopsy to determine whether prostate cancer is present.**

* **Digital rectal exam (DRE)**

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|  | **For a digital rectal exam (DRE), the doctor inserts a gloved, lubricated finger into the rectum to feel for any bumps or hard areas on the prostate that might be cancer. As shown in the picture to the left, the prostate gland is just in front of the rectum, and most cancers begin in the back part of the gland, which can be felt during a rectal exam.** |

* **Magnetic resonance imaging (MRI)**

**Normally, a MRI is used to identify targets for the prostate biopsy.**

* **Biopsy**

**If cancer is suspected, a biopsy is usually performed. During a biopsy an urologist or radiologist obtains tissue samples from the prostate via the rectum. A biopsy gun inserts and removes special hollow-core needles (usually three to six on each side of the prostate) in less than a second. Prostate biopsies are routinely done on an outpatient basis and rarely require hospitalization. There will be some discomfort, however, during a prostate biopsy.**

**Gleason score - A system of grading prostate cancer tissue based on how it looks under a microscope. Gleason scores range from 2 to 10 and indicate how likely it is that a tumor will spread. A low Gleason score means the cancer tissue is similar to normal prostate tissue and the tumor is less likely to spread; a high Gleason score means the cancer tissue is very different from normal and the tumor is more likely to spread.**

* **Staging**

**An important part of evaluating prostate cancer is determining the stage, or how far the cancer has spread. Knowing the stage helps define prognosis and is useful when selecting therapies. The most common system is the four-stage TNM system (abbreviated from Tumor/Nodes/Metastases). The most important distinction made by any staging system is whether or not the cancer is still confined to the prostate. In the TNM system, clinical T1 and T2 cancers are found only in the prostate, while T3 and T4 cancers have spread elsewhere.**

**Can Prostate Cancer be prevented?**

**Well, besides castration at a young age, which doesn’t sound very fun, the only sure way for a man to prevent getting prostate cancer is to die young from something else.**

**What are the treatment options?**

**The first decision to be made in managing prostate cancer is whether treatment is needed. Prostate cancer, especially low-grade forms found in the elderly, often grows so slowly that no treatment is required. Treatment may also be inappropriate if a person has other serious health problems or is not expected to live long enough for the bad symptoms to appear.**

**Which treatment option is best depends on the stage of the disease. Many men diagnosed with low-risk prostate cancer are eligible for “watchful waiting” or “active surveillance”. These terms imply careful observation of the tumor over time, with the intention of treatment if there are signs of cancer progression. Treatment of aggressive prostate cancers may involve surgery, radiation therapy, high-intensity focused ultrasound (HIFU), chemotherapy, hormonal therapy, or some combination of these.**

**Since it is very important to select the right treatment option, let’s examine each option in a little more detail. There are also some new, experimental, and/or emerging treatment options that we will take a look at.**

**Watchful Waiting: Active Surveillance of Prostate Cancer**

**Thanks to screening and early detection, many prostate cancers are first detected long before they pose a threat. Indeed, many of the cancers detected by PSA tests and biopsies prove to be very early cancers or so slow-growing that they never pose a life-threatening danger.**

**The best approach for a growing number of men is to monitor the cancer for signs that it is getting worse. This strategy allows men with early-stage or very slow growing prostate cancer to avoid treatment and its side effects -- or actively monitor the disease and to “maybe” take action if the cancer grows or spreads. I say “maybe” because a lot of men over seventy years old (me included) might elect to take no action and just let the disease run its course.**

**But for most men, active surveillance means being regularly monitored with PSA tests, digital rectal exams, imaging, and follow-up biopsies to make sure the cancer hasn’t progressed. The use of ultrasound, CT (CAT) scan, bone scan, or MRI might also be used to watch for disease growth and the need for treatment.**

**Medical experts say this approach could be appropriate for 40% of all men diagnosed with prostate cancer in the U.S.**

**Some additional treatment options you might consider during active surveillance:**

* **Scientists have found some substances in tomatoes (lycopenes) and soybeans (isoflavones) that might help prevent prostate cancer.**
* **Research suggests that a balanced diet including fruits and vegetables is of greater benefit than taking dietary supplements.**
* **Recent 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.**
* **Researcher all agree that you should do things that lower testosterone levels such as more exercise and increased sexual activities.**

**Radiation Therapy**

**Radiation therapy has been used to treat prostate cancer for many years. Recent advances allow doctors to target prostate cancer cells more precisely and with a higher dose of radiation, lowering the risk of unwanted side effects while at the same time improving effectiveness.**

**External beam radiation treatment targets prostate cancer with high-energy X-rays delivered from outside the body. It is one of the main treatment options for prostate cancer confined to a small area. External beam radiation treatment typically consists of treatments five days a week over a period of eight weeks. Each treatment takes about 15 to 25 minutes. Because there is no pain, anesthesia is not required. Side effects can include sexual problems, fatigue, loss of appetite, and urinary or rectal urgency and bleeding.**

**Radioactive seed implants deliver radiation via tiny radioactive metal pellets or "seeds" that are implanted into the prostate gland, where they release low-doses of radiation over a period of about one year. Toward the end of the year the pellets lose their radioactivity. The procedure, called brachytherapy, is done under general anesthesia and typically takes an hour or two. Between 40 and 150 seeds are usually implanted, each about the size of a grain of rice. Implants pose less risk of damage to surrounding tissues in the rectum than external beam radiation, but they may have a higher risk of impairing urinary function than external beam radiation. Side effects can also include sexual problems.**

**Proton therapy is a type of external radiation that uses positively-charged particles to treat the cancer. This type of radiation therapy may allow your doctor to reach tissues deeper within the body.**

**Surgery for Prostate Cancer**

**Many different approaches are used, each with its own risks and benefits. As with any surgery, the outcome depends in large measure on the expertise of the surgeon. It’s crucial to find a surgeon with extensive experience in performing the type of surgery you choose.**

**Open radical retro-pubic prostatectomy involves removing the prostate through a cut made in the lower abdomen. This technique allows surgeons to remove not only the prostate but also any nearby lymph nodes that have become cancerous. Nerve-sparing techniques are now widely used to preserve urinary control and sexual function. The operation typically requires two or three days in the hospital. Most men need a urinary catheter in place for one two weeks after the surgery. For cancers confined to the prostate, radical prostatectomy remains the most effective way to remove cancer.**

**Radical perineal prostatectomy involves removing the prostate through a cut made in the perineum, the area between the anus and scrotum. This approach typically causes less bleeding, but surgeons are unable to remove nearby lymph nodes, making it useful only when the cancer is confined to the prostate.**

**Robot-assisted radical prostatectomy is performed through five or six tiny “keyhole” cuts in the lower abdomen. Manipulating robot-like fingers that pass through these cuts, surgeons can remove the diseased prostate with minimal disturbance to healthy surrounding tissue. The technique also allows surgeons to remove cancerous lymph nodes. The principle advantage of this robot-assisted prostatectomy is a shorter hospital stay and faster recovery time from surgery.**

**Laparoscopic prostatectomy involves your surgeon making four or five very small cuts -- about a half inch each -- in the abdomen. The surgeon inserts tiny cameras and surgical tools through the cuts to remove the cancerous tissue.**

**Nerve-sparing surgery is performed by cutting prostate tissue carefully away from the nerve bundles without damaging them. This surgical technique was developed to potentially prevent erection difficulties that may occur after prostate surgery.**

**High-intensity focused ultrasound (HIFU)**

**The HIFU procedure may be an option for men diagnosed with organ-confined prostate cancer. During the procedure, precisely focused ultrasound waves raise the temperature of the targeted prostate tissue to 195 degrees Fahrenheit in 2-3 seconds. This rapid-firing heat destroys the targeted tissue while leaving structures outside the targeted tissue unharmed.**

**The most common side effects are urinary problems and difficulty getting and keeping an erection (erectile dysfunction).**

**Cryosurgery for Prostate Cancer**

**Cryotherapy kills prostate cancer by freezing prostate tissue. But so far, the technique has not been widely adopted because of a high risk of damage to the rectum or urethra from freezing. Loss of sexual function is also much more likely after cryosurgery than after other treatments.**

**In cryotherapy, surgeons pass liquid nitrogen or argon gas through narrow rods inserted into the prostate. Cryosurgery can be performed in two to three hours, and patients are often able to leave the hospital the same day.**

**Hormone Therapy**

**Male sex hormones, mostly testosterone, provide the fuel that drives prostate cancer growth. The goal of hormone therapy is to deprive prostate cancer cells of that fuel. Hormone therapy is used to treat advanced prostate cancer, but it can also be used to shrink larger tumors, making other treatments easier. Hormone therapy does not kill cancer cells but can significantly shrink tumors and slow any further growth. Side effects include loss of sex drive, impotence, nausea, diarrhea, and fatigue.**

**Androgen Deprivation Therapy (ADT). These medications are injected into the buttocks either once a month, once every three to four months, or once a year, depending on the specific drug. If these treatments are used instead of surgery, these drugs must be administered regularly for life. Anti-androgens can be given in pill form but this type of therapy is not given by itself. It is used in combination with surgery or other hormonal therapies.**

**Orchiectomy involves the removal of the testicles, which reduces testosterone production by about 90%. (About 10% of testosterone is produced by the adrenal glands.) This approach is sometimes chosen by older men who do not want the inconvenience or expense of taking medications.**

**Chemotherapy**

**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.**

**Chemotherapy is sometimes used if prostate cancer has spread outside the prostate gland and hormone therapy isn't working. 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.**

**Doctors give chemotherapy 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.**

**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®)**

**◾Doxorubicin (Adriamycin®)**

**◾Etoposide (VP-16)**

**◾Vinblastine (Velban®)**

**◾Paclitaxel (Taxol®)**

**◾Carboplatin (Paraplatin®)**

**◾Vinorelbine (Navelbine®)**

**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), a newer drug called 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 several months longer, on average, than older chemotherapy drugs. They may slow the cancer's growth and also reduce symptoms, resulting in a better quality of life. Still, chemotherapy for prostate cancer is very unlikely to result in a cure.**

**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, the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are also likely to be affected by chemotherapy, which can lead to side effects.**

**The side effects of chemotherapy depend on the type and dose of drugs given and the length of time they are taken. These side effects may include:**

**◾ Hair loss**

**◾ Mouth sores**

**◾ Loss of appetite**

**◾ Nausea and vomiting**

**◾ Diarrhea**

**◾ Lowered resistance to infection (due to low white blood cell counts)**

**◾ Easy bruising or bleeding (due to low blood platelets)**

**◾ Fatigue (due to low red blood cells)**

**Most of these side effects are usually short-term and 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. Other drugs can be given to boost blood cell counts, if needed.**

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

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

**◾ Mitoxantrone can rarely cause leukemia several years later.**

**◾ Estramustine carries an increased risk of blood clots.**

**◾ Doxorubicin can weaken the heart muscle over time, so doctors must limit the amount of this drug that is used.**

**Combination Therapy for Advanced Prostate Cancer**

**To treat aggressive cancers that have spread beyond the prostate gland, doctors may recommend various types of therapies.**

**There’s growing evidence that combination therapy improves survival time for men with aggressive cancers. In 2009, researchers at the Mount Sinai Medical Center in New York reported results from a study of combined radioactive seed implants, external beam radiation, and hormonal therapy. The 181 men in the study, with a median age of 69, all had Gleason scores of 8 or higher, indicating very aggressive tumors. Even in this high-risk group, prostate cancer survival rates after eight years were 87% with combined therapy.**

**Provenge (sipuleucel-T) is a "vaccine" for advanced prostate cancer. It doesn't cure prostate cancer but helps prolong survival. Provenge isn't your everyday vaccine. It's an immune therapy created by taking immune cells from a patient, genetically engineering them to fight prostate cancer, and then putting them back into the patient. It's approved only for treatment of patients with few or no prostate cancer symptoms whose cancer has spread outside the prostate gland and is no longer responding to hormone therapy. The most common side effect is chills, which occurs in more than half of the men that receive Provenge. Some other common side effects include fatigue, fever, back pain, and nausea.**

**Another drug called Xofigo is approved for use in men who have advanced prostate cancer that has spread only to the bones. Candidates should have also received therapy designed to lower testosterone. Xofigo, given by injection once a month, works by binding to minerals within bones to deliver radiation directly to bone tumors. A study of 809 men showed that those taking Xofigo lived an average of 3 months longer than those taking a placebo.**

**Another treatment for cancer that has spread and doesn't respond to hormone therapy is the medicine called Zytiga. The drug is taken with the steroid prednisone and may help prolong survival. Common side effects include high blood pressure, fatigue, joint swelling or pain, diarrhea, and fluid retention.**

**Emerging Prostate Cancer Therapies**

**In labs around the world, researchers are busy identifying new drugs and treatment approaches that might prove beneficial to men with prostate cancer. Most of these investigational agents are being tested in men with advanced prostate cancer: therapy options for men at this stage of disease may not be effective enough to halt progression of the disease, and men are typically affected by side effects from the disease and/or the medications that they’re taking. It’s therefore the perfect stage at which to test out new drugs because any improvement will likely be rapidly noticed and much appreciated.**

**Targeted Chemotherapy**

**Chemotherapy drugs can play an important role in improving the lives of men with advanced prostate cancer, but they often don’t distinguish between tumor cells and healthy cells to a high degree and can kill off some normal cells along the way. So-called targeted therapies, by contrast, are drugs that are specifically designed to interfere with the way cancer cells grow, with the way cancer cells interact with each other, and/or with the way that the immune system interact with the cancer without damaging a man’s normal cells.**

**There are a number of different kinds of targeted therapies being investigated for prostate cancer. As of yet, none have been approved by the FDA for use in prostate cancer, but the excitement generated by some of the early studies have led many researchers to believe that it’s only a matter of time before a targeted therapy is found that can result in better outcomes overall.**

**All cells in the body, including cancer cells, rely on a complex communication system to know when to grow, when to divide, and when to die. This system uses specialized proteins, fats, and other substances to tell the different cells or parts of cells how to act. Over the years, cancer researchers have been studying ways to interfere with the signaling system that regulates the growth of cancer cells.**

**So far, interfering with cellular signaling to halt cancer cell growth hasn’t yet proven to be a very effective strategy in prostate cancer. But in the process of learning which drugs might work and why, researchers found that the strategy of adding a "targeted therapy" to other effective drugs in order to see better results than with either drug alone is an important part of cancer research. The idea is to exploit the synergy between the two drugs, or the ways in which the two drugs might work together to fight off the cancer.**

**Immunotherapy**

**Immunotherapy, also called biologic therapy, is an exciting new field of study that is designed to boost the body’s immune system to fight cancer. It uses materials either made by the body or in a lab to improve, target or restore immune function. There are different types of immunotherapy including vaccines, monoclonal antibodies and non-specific immunotherapies. In prostate cancer, a treatment vaccine helps the body’s immune system fight cancer by training it to recognize and destroy cancer cells.**

**Provenge (Sipuleucel-T) is a vaccine treatment that is used in men with advanced, metastatic hormone resistant prostate cancer with no symptoms. It is the only FDA approved cancer vaccine. Provenge stimulates the immune system to recognize and attack prostate cancer cells. Each dose of Provenge is specially prepared for each patient and requires several visits to the physician. First, white blood cells are removed from the man’s blood. They are then enhanced to fight the prostate cancer and then infused back into the man through a vein. The aim of the treatment is to delay growth of the cancer and extend life. The treatment is used alone or with other treatments such as radiation or hormone therapy. Clinical trials continue to be conducted with Provenge to determine the best way to use the drug.**

**More prostate cancer advances….**

**More prostate cancer advances are found in an article I found online** **titled “What’s new in prostate cancer research and treatment?” I thought it was pretty good so I will end my article with the article below as written. URL is below. There is sure a lot of information out there on Prostate Cancer. The biggest problem for somebody diagnosed with the disease is trying to figure out how bad the cancer is, how fast it is growing or spreading, and the best treatment option. I wish the very best for my friends with Prostate Cancer.**

**http://www.cancer.org/cancer/prostatecancer/detailedguide/prostate-cancer-new-research**

**What’s new in prostate cancer research and treatment?**

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

**Genetics**

New research on genes linked to prostate cancer is helping scientists better understand how prostate cancer develops. This research will help provide answers about the genetic changes that lead to prostate cancer. 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 would benefit from more intensive screening or from chemoprevention trials, which use drugs to try to keep them from getting cancer.

Recently, a mutation in a gene called *HOXB13* has been linked to early onset prostate cancer that runs in families. This mutation is rare, though, found in less than 2% of the men with prostate cancer that were studied.

The *HOXB13* gene and most of the genes that have been studied so far 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 double or even triple a man's risk of developing prostate cancer.

One of the biggest problems now facing men with prostate cancer and their doctors is figuring out which cancers are likely to stay within the gland and which are more likely to grow and spread (and definitely need [treatment](http://www.cancer.org/ssLINK/prostate-cancer-treating-general-info)). New discoveries may help with this in the near future. For example, the product of a gene known as *EZH2* seems to appear more often in advanced prostate cancers than in those at an early stage. Researchers are now trying to decide whether the presence of this gene product, or others, indicates that a cancer is more aggressive. This could eventually help tell which men need treatment and which might be better served by [active surveillance](http://www.cancer.org/ssLINK/prostate-cancer-treating-watchful-waiting).

**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 of greater benefit than taking these substances as dietary supplements.

Some studies have suggested that certain vitamin and mineral supplements (such as vitamin E and selenium) might lower prostate cancer risk. But a large study of this issue, called the Selenium and Vitamin E Cancer Prevention Trial (SELECT), found that neither vitamin E nor selenium supplements lowered prostate cancer risk after daily use for about 5 years. In fact, men taking the vitamin E supplements were later found to have a slightly higher risk of prostate cancer.

Another vitamin that may be important is vitamin D. Recent 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 cause no harm, but recent research has shown that high doses may be harmful, including those 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.

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 were discussed in the section "[Can prostate cancer be prevented?](http://www.cancer.org/ssLINK/prostate-cancer-prevention)"

**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 it is elevated when cancer isn't present. Researchers are working on two strategies to address this problem.

One approach is to try to improve on the test that measures the total PSA level, as described in the section "[Can prostate cancer be found early?](http://www.cancer.org/ssLINK/prostate-cancer-detection)" The percent-free PSA is one way to do this, although it requires two separate tests. Another option might be to measure only the "complexed" PSA (the portion of PSA that is not "free") to begin with, instead of the total and free PSA. This one test could give the same amount of information as the other two done separately. Studies are now under way to see if this test provides the same level of accuracy.

The other approach is to develop new tests based on other tumor markers. Several newer blood tests seem to be more accurate than the PSA test, based on early studies. Early results have been promising, but these and other new tests are not yet available outside of research labs and will need more study before they are widely used to test for prostate cancer.

Other new tests being studied are urine tests. One test, called Progensa®, looks at the level of prostate cancer antigen 3 (PCA3) in the urine. The higher the level, the more likely that prostate cancer is present. In studies, it was used along with the PSA test.

Another test looks for an abnormal gene change called *TMPRSS2:ERG* in prostate cells. The cells to be tested are found in urine collected after a rectal exam. This gene change is found in about half of all localized prostate cancers. It is rarely found in the cells of men without prostate cancer. Studies are under way to develop this into a test for early detection of prostate cancer.

**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. It involves first injecting the patient with a contrast agent containing microbubbles. Promising results have been reported, but more studies will be needed before its use becomes common. This test is currently only available as a part of a [clinical trial](http://www.cancer.org/ssLINK/prostate-cancer-treating-clinical-trials).

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

**Staging**

Staging plays a key role in deciding which treatment options a man may be eligible for. But imaging tests for prostate cancer such as CT and MRI scans can't detect all cancers, especially small areas of cancer in lymph nodes.

A newer method, called *enhanced MRI*, may help find lymph nodes that contain cancer. Patients first have a standard MRI. They are then injected with tiny magnetic particles and have another scan done 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 has been effective. Studies of this technique are now in progress.

**Treatment**

This is a very active area of research. Newer treatments are being developed, and improvements are being made among many standard prostate cancer treatment methods.

**Surgery**

If the nerves that control erections (which run along either side of the prostate) must be removed during the operation, a man will become impotent. Some doctors are now exploring the use of nerve grafts to replace cut nerves and restore potency. These grafts could be nerves removed from other parts of the body or something artificial. This is still considered an experimental technique, and not all doctors agree as to its usefulness. Further study is under way.

**Radiation therapy**

As described in the section "[Radiation therapy for prostate cancer](http://www.cancer.org/ssLINK/prostate-cancer-treating-radiation-therapy)," advances in technology are making it possible to aim radiation more precisely than in the past. Currently used methods such as conformal radiation therapy (CRT), intensity modulated radiation therapy (IMRT), and proton beam radiation allow doctors to treat only the prostate gland and avoid radiation to normal tissues as much as possible. These methods are expected to increase the effectiveness of radiation therapy while reducing the side effects. Studies are being done to find out which radiation techniques are best suited for specific groups of patients with prostate cancer. 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 more in Europe, but it is not available outside of clinical trials in the United States at this time. Studies are now under way to determine its safety and effectiveness.

**Nutrition and lifestyle changes**

One early study has found that in men with a rising PSA level after surgery or radiation therapy, drinking pomegranate juice seemed to slow the time it took the PSA level to double. Larger studies are now trying to confirm these results.

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.

Another study found that men who chose not to have treatment for their localized prostate cancer may be able to slow its growth with intensive lifestyle changes. The men 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 to follow for some men.

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

**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 described in the section "[Hormone therapy for prostate cancer](http://www.cancer.org/ssLINK/prostate-cancer-treating-hormone-therapy)."

Another new drug being studied, known as *orteronel*, works in a similar way to abiraterone. This drug may target CYP17 more precisely, which may do away with the need for taking a steroid drug such as prednisone along with treatment. Orteronel is only available in clinical trials at this time.

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 normally used to shrink the prostate in men with benign prostatic hyperplasia. They are also 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. Other new chemo drugs and combinations of drugs are now being studied.

**Immunotherapy**

**Vaccines**

Several types of vaccines for boosting the body's immune response to prostate cancer cells are being tested in [clinical trials](http://www.cancer.org/ssLINK/prostate-cancer-treating-clinical-trials). Unlike vaccines against infections like measles or mumps, these 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.

Another prostate cancer vaccine (PROSTVAC-VF) 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.

Several other prostate cancer vaccines are also in development.

**Other drugs**

A drug called ipilimumab (Yervoy) targets certain white blood cells that help control the immune system. This drug is used to treat advanced melanoma, and is being tested in men with advanced prostate cancer.

**Targeted therapy drugs**

Targeted therapy is a newer type of cancer treatment that uses drugs or other substances to identify and attack cancer cells while doing little damage to normal cells. These therapies attack the cancer cells' inner workings -- the programming that makes them different from normal, healthy cells. Each type of targeted therapy works differently, but all alter the way a cancer cell grows, divides, repairs itself, or interacts with other cells.

Cabozantinib (Cometriq™, also known as XL184) is a new drug that targets the MET protein, as well as having an effect on angiogenesis by targeting the VEGFR protein. In early studies, this drug was found to make bone tumors get smaller or even go away on imaging scans in many men whose prostate cancer was no longer responding to hormones. Cabozantinib also helped stop tumor growth (outside the bones) and improved pain. The effect lasted an average of about 6 months. It’s not yet clear if the drug can help men live longer.

**Angiogenesis inhibitors**

Growth of prostate cancer tumors depends on growth of new blood vessels (angiogenesis) to nourish the cancer cells. Looking at angiogenesis in prostate cancer specimens may help predict treatment outcomes. Cancers that stimulate many new vessels to grow are harder to treat and have a poorer outlook.

New drugs are being studied that may be useful in stopping prostate cancer growth by keeping new blood vessels from forming. Several anti-angiogenic drugs have been tested in clinical trials. One of these is thalidomide (Thalomid®), which has been approved by the FDA to treat patients with [multiple myeloma](http://www.cancer.org/cancer/multiplemyeloma/). It was combined with chemotherapy in an early phase study of men with advanced prostate cancer. It has also been studied to see if it could help hormone therapy work better. While promising, this drug can cause major side effects, including nerve damage and serious blood clots.

**Treating spread of cancer 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 passed through the probe heats and destroys 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.

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