

Radiation Management Of Prostate Cancer An Overview

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THE PROSTATE GLAND

The **prostate gland**, a male sex organ, produces a thick fluid that makes up most of the semen. It is located between the bladder and rectum. A normal sized prostate is about the size of a walnut. The urethra, a tube that drains the urine from the bladder during urination, passes through the prostate.

Interference with urinary flow is usually caused by a nonmalignant enlargement of the prostate called **benign prostatic hyperplasia (BPH)**. Symptoms associated with **BPH** include frequency of urination, inability to completely empty the bladder, a weak urinary stream, and frequent urination during the night. Infrequently, prostate cancer can cause similar symptoms. Diabetes, medical conditions, and some medications can also cause some of these symptoms.

PROSTATE CANCER

The prostate, like all other organs of the body, is made up of many types of cells. Normally, cells divide in an orderly and controlled fashion to produce more cells only when they are needed. This process helps to keep the body healthy. **Cancer** is a group of diseases that have two things in common: cells become abnormal and then begin to divide and grow uncontrollably. When this happens a **malignant** lump or tumor may appear. In the case of prostate cancer, sometimes a nodule or firm area can be felt on **digital rectal exam (DRE)**.

Cancer cells may invade and damage the healthy surrounding tissue. In the case of prostate cancer, the adjacent normal tissues include the surrounding fat and muscle, the nerves that stimulate an erection (located in the neuro-vascular bundle), the seminal vesicles, (sacs that sit on top of the prostate that store the seminal fluid that is ejaculated during sex), the bladder, and the urethra. Cancer cells can also grow into the blood stream or into lymphatic channels and spread to other parts of the body. This process is called **metastasis**. When prostate cancer **metastasizes**, it most commonly spreads to the pelvic lymph nodes and the bones.

PATIENT EVALUATION AND DIAGNOSTIC TESTS

PROSTATE BIOPSY

If your PSA is elevated, or if you have an abnormal DRE, your **urologist** may perform a **transrectal ultrasound (TRUS)** and multiple **biopsies** of the prostate. The **TRUS** uses sound waves to image the prostate. Sometimes abnormal areas within the prostate can be seen with **TRUS** and your urologist will target these at the time of biopsy. Once the procedure is completed, the biopsy tissue is sent to a **pathologist** for analysis. The tissue is then examined under a microscope, and the **pathologist** may make a diagnosis of **prostate cancer**.

PSA TEST

The **prostate specific antigen (PSA)** is a blood test that helps determine how much cancer is present. In general, the higher the **PSA**, the larger or more advanced is the cancer. However, the **PSA** level can also be **elevated** because of other factors, such as **BPH**, and the presence of **inflammation or infection** in the prostate gland. On the other hand, some medications, such as **Finasteride (Proscar)** or **Dutasteride (Avodart)**, can **lower the PSA** by as much as **50 percent** creating a false impression that the **PSA** is okay. For patients on these medications, it is best to double their **PSA** value to get a more accurate indication of what their **PSA** really is.

The **PSA** is valuable in determining your prognosis (likelihood that you will be cured). For example, if the **PSA** is lower than 4, the cure rate is very high. When the **PSA** is 4-10, the prognosis is usually very good. For patients with a **PSA** of 10-20, the prognosis is fair and for a **PSA** of greater than 20 the prognosis is less favorable. The cure rate for patients with a **PSA** greater than 30 is very low, unless a special kind of prostate cancer, called a transition zone cancer, is present.

Your **PSA** also helps your physicians determine the most appropriate treatment for you. In general, the higher the **PSA**, the more aggressive the treatment. If the **PSA** is very low, careful follow-up without any treatment can be considered (watchful waiting). If the **PSA** is very high, hormone therapy alone may be indicated.

TUMOR STAGE

If cancer is found in your prostate, your physicians will need to know **the tumor stage**. **Staging** is a careful attempt to find out how large your cancer is, and whether the cancer has grown outside the prostate gland, or spread to other parts of your body. **Blood work, the DRE**, and various scans such as a **CT scan, MRI scan, and bone scan** can all provide valuable information regarding **tumor stage**. Your physicians will decide which studies are necessary. The **stage** of your cancer will strongly influence which treatment options are most appropriate for you.

TUMOR GRADE

The tumor **grade** provides important information regarding how fast the cancer is likely to be growing, and the likelihood that the cancer has spread to other parts of the body, such as the lymph nodes or bones. The **pathologist** assigns a **grade** to your tumor when he or she looks at the malignant cells under the microscope. The higher the **Gleason grade**, the more aggressive the tumor.

The most commonly used **grading** system is called the **Gleason score**. Each patient's tumor is assigned **two grades** that represent the **major and minor patterns of malignant glands** seen under the microscope. Each of the two grades will range from 1-5. The two **grades** are then added together to give a **Gleason score** (which ranges from 2 to 10). A **Gleason score of 2 to 5** represents a **low-grade** malignancy. These tumors are usually slow growing, have a low likelihood of spreading, and are rarely fatal. Tumors that have a **Gleason score of 8 to 10** are **high grade**, and are more likely to be fast growing or to have metastasized to lymph nodes or bones. Most patients have **intermediate grade** tumors or a **Gleason score of 6 or 7**. These are medium growing tumors and the prognosis is generally good. The **Gleason score** strongly influences which staging tests are ordered and what treatment options should be considered.

MANAGEMENT OF PROSTATE CANCER AN OVERVIEW OF APPROACHES

There are a wide variety of treatments available for the management of prostate cancer. **Radical prostatectomy, external beam radiation, and radioactive prostate seed implant** are potential **cures** for prostate cancer. **Hormone therapy** may force the cancer into a prolonged remission but does not provide a cure unless it is combined with other treatments. The most commonly used treatments include the following:

1. **RADICAL PROSTATECTOMY**—surgical removal of the entire prostate gland.
2. **EXTERNAL BEAM RADIATION**—treatment with high energy X-rays, delivered by powerful linear accelerators. The X-rays pass through the patient and preferentially kill cancer cells.
3. **RADIOACTIVE PROSTATE SEED IMPLANT**—treatment delivered by radioactive pellets that are placed directly into the prostate and surrounding tissues. This type of treatment is also called **brachytherapy**, which comes from the Greek word “**brachy**” which means near or close to; in other words, therapy that is near or close to the tumor. The two types of radioactive seeds most commonly used are: **Palladium-103 (Pd-103)** and **Iodine-125 (I-125)**. **Seed implants** can deliver two to four times more radiation than external beam radiation.
4. **HORMONE THERAPY**—treatment which either stops male hormone production or blocks male hormones from acting on the tumor. Most prostate cancers are stimulated to grow by testosterone and other similar male hormones. When the production of these hormones is suppressed, or these hormones are prevented from getting to the tumor, the cancer will usually stop growing and will shrink. This treatment can work well for many years.
5. **WATCHFUL WAITING**—patients whose cancers are not likely to harm them are candidates for **watchful waiting**. With **watchful waiting**, patients do not undergo treatment, but rather they are carefully monitored with routine PSA tests. For some patients, periodic repeat prostate biopsies are also performed.

COMBINATIONS OF THERAPIES: AN OVERVIEW

There are many situations where **combinations of treatments** are recommended. For example, patients with **very large prostate glands** may require **hormone treatment** before a **seed implant** can be performed. Very large prostates may be difficult or sometimes impossible to implant. Three to four months of hormone therapy will usually shrink the prostate by 40-50 percent, often making these difficult glands amenable to a seed implant.

Patients with a **high PSA, a high Gleason score, or advanced cancer found on staging studies** will often benefit from **hormone therapy** administered prior to, during, or even after **external beam radiation**. In this case, the **hormone treatment shrinks** the cancer, making it easier for the radiation therapy to kill the remaining cancer cells.

About half of the patients being considered for a **seed implant** are advised to receive this therapy in **combination** with **external beam radiation**. In this case, the treatment is not doubled; but rather, **a reduced-dose of external radiation is combined with a reduced-dose seed implant**. The **external radiation** is used to destroy cancer cells that may be in the tissues around the prostate or in the lymph nodes. The goal of the reduced-dose **seed implant** is to destroy the remaining cancer cells that are still present in the prostate after completion of the reduced-dose external beam radiation.

Patients who undergo **radical prostatectomy** may be at risk for a recurrence of their prostate cancer in the surgical area if the pathologist finds that the cancer has extended outside of the prostate gland. For example, if there is involvement of the seminal vesicles, neuro-vascular bundle, or lymph nodes, **external beam radiation** may be advised to clean up any remaining cancer cells.

There are some situations where combinations of three treatments are advised. Some patients receive both **hormone therapy and external radiation** after a **radical prostatectomy**. Some patients undergoing a **seed implant** require **hormone therapy and external beam radiation**.

EXTERNAL BEAM RADIATION THERAPY

Patients who are treated with **external beam radiation therapy** are treated as an outpatient, **five days a week for 8-9 weeks**. Treatments take **10 – 30 minutes per day**. These treatments are **painless**. It is similar to having an X-ray. There is no nausea. Patients are able to carry on their normal activities, work full-time, and drive themselves to and from treatment.

Between the third and fifth weeks, most patients will experience **mild to moderate urinary symptoms**. These include urinary frequency (especially at night), burning on urination, and a weak stream. Very rarely patients will have bleeding. These symptoms can be partially relieved with medications. They are rarely severe.

During this same time frame, most patients experience **mild to moderate anal-rectal symptoms**. These include frequent small stools, rectal urgency, rectal irritation, excessive gas, and bleeding. Patients with hemorrhoids are more likely to be bothered, especially with bleeding and discomfort. There are medications for these symptoms.

Additional complaints include **mild to moderate fatigue, hair loss in the irradiated area (not on the head), and very mild skin reddening**. Patients may need 1-2 hours of extra **sleep or a nap**.

Most, if not all, of these symptoms resolve 3 to 6 weeks after completion of radiation.

Long-term complications include erectile dysfunction (20-40%), chronic rectal bleeding (5-10%), rectal urgency and frequency (5%), hip fracture (1-2%), urinary bleeding (< 1%), and urinary incontinence (< 1%). Rectal bleeding can usually be treated successfully with suppositories. HEMORRHOID SURGERY AND CAUTERY FOR RECTAL BLEEDING MUST BE AVOIDED SINCE MAJOR COMPLICATIONS MAY OCCUR. NEW LASER TREATMENTS MAY BE SAFE BUT SHOULD BE USED WITH CAUTION.

Erectile dysfunction (ED) is the most common complication following all treatments of prostate cancer. **The good news** is that most cases of **ED following external beam radiation can be successfully treated with medication (Viagra, Levitra, or Cialis)**. **If a patient has good erections prior to treatment, the probability that he will maintain an erection satisfactory for sexual intercourse after treatment is about 80%; however, many patients will use one of these medications at least some of the time.** If the erection is already impaired prior to radiation therapy, these drugs are less likely to work. If they are unsuccessful, other treatments such as **penile injections** may prove effective.

RADIOACTIVE SEED IMPLANTS

(MONOTHERAPY)

Radioactive seed implantation involves the precise placement of small, rice-sized radioactive seeds directly into the prostate gland under transrectal ultrasound guidance. Two radiation isotopes are commonly used: 1) **Palladium-103 (Pd-103)**, which has a half-life of 17 days and emits most of the radiation over 2 months; and 2) **Iodine-125 (I-125)** which has a half-life of 60 days and emits most of its radiation over 6 months. During these time periods, the prostate gland receives continuous irradiation. When a seed implant is performed alone, without external beam radiation, it is called **monotherapy**.

PROCEDURE PREPARATION

Approximately two weeks prior to implantation, the patient will have routine blood tests and may also undergo an EKG, chest X-ray and a urinalysis. If there is any history of heart disease or other significant medical problems such as hepatitis, diabetes, or lung disease, you should let your doctors know as soon as possible, as it may be necessary to get clearance from your internist, cardiologist, or other medical specialists. Sometimes this can take several weeks. If you have any history of a heart attack or angina, a thallium stress test may be required.

All anti-inflammatory medications, such as aspirin, Motrin, Advil, ibuprofen, Aleve, or naprosyn must be discontinued at least two weeks prior to the implant. It is OK to take Tylenol for pain. If you are on Coumadin®, this must be discontinued five to seven days prior to the implant, under the direct supervision of the physician who prescribed this medication. In many cases another medication is substituted for Coumadin.

Prior to the implant, the patient will be instructed to take laxatives or enemas (a bowel prep). It is very important for the rectum to be empty at the time of seed placement. Both stool and gas will interfere with ultrasound imaging of the prostate. If your physician has not given you these instructions, please let us know several days before the implant.

IMPLANT PLANNING

Before an implant can be performed, the patient must undergo a **volume study**. This study involves placing a transrectal ultrasound into the rectum and making measurements and taking pictures. Unlike the biopsy, no needles are used. This procedure takes a few minutes. This measurement will provide the necessary information so that the radiation oncologist can order the proper number of seeds for the seed implant.

THE IMPLANT PROCEDURE

The prostate seed implant is performed by a urologist and radiation oncologist, both of who have undergone special training in prostate seed implantation. When you arrive at the hospital, you should have already have completed your **bowel prep**. After completing your **registration** you will go to the pre-op area and will meet with the **anesthesiologist** to discuss the kind of **anesthesia** that is most appropriate for you.

When it is time to start the procedure, you will be taken to an operating room that is specially equipped for urological procedures. **Anesthesia** will then be administered. A **Foley catheter** will be placed into the bladder. The skin of the **perineum**, an area located between the rectum and scrotum, **will be cleaned** with an antibacterial solution. In order to further reduce the risk of infection, the **hair may be shaved** from this area.

The implant procedure is initiated by placing the **ultrasound probe** into the rectum and attaching it to a stabilization unit and the seed implantation system. The next step involves a careful **mapping of the prostate gland**. This allows your physicians to determine how many seeds are required and where the seeds are going to be placed.

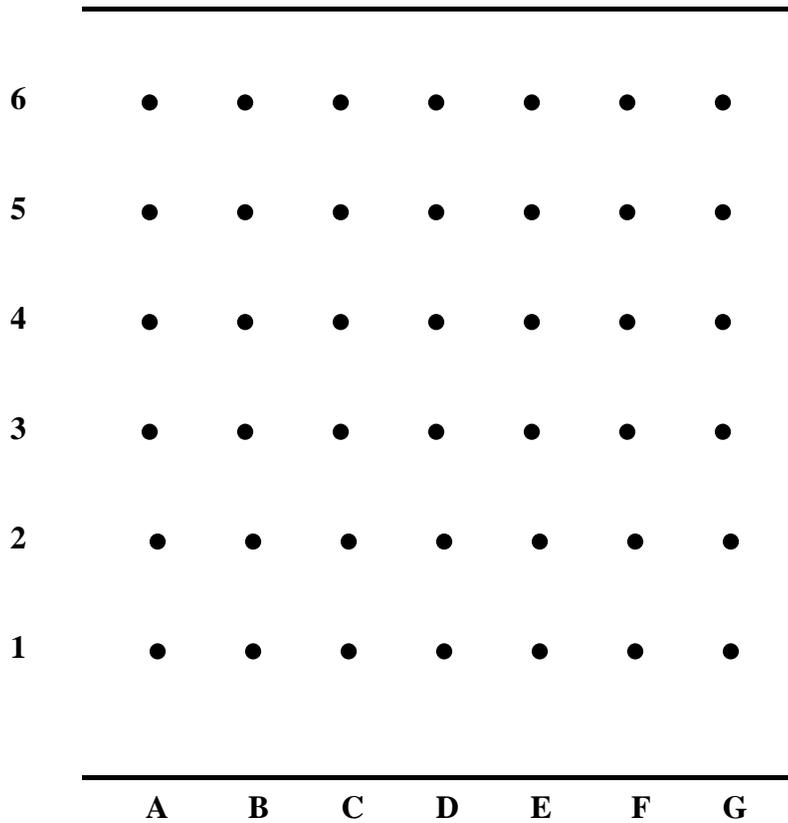
During the course of the implant, approximately **16 to 26 needles** are inserted through the **perineum** into the prostate. The implant needles are easily seen on the **ultrasound screen**. **This allows precise placement into specific locations within the prostate under direct visualization.**

THE IMPLANT PROCEDURE cont.

A **template**, or guidance system, is attached to the **ultrasound probe** outside the patient next to the perineum. The **template** is used to guide the needles into precise locations in the prostate as is called for by the plan. The **template (FIGURE 1)** has a series of holes, **coded A through G horizontally and 1 through 6 vertically**. The dots correspond to holes in the template, which are used to guide the implant needles into precise locations within the prostate.

FIGURE 1

TEMPLATE

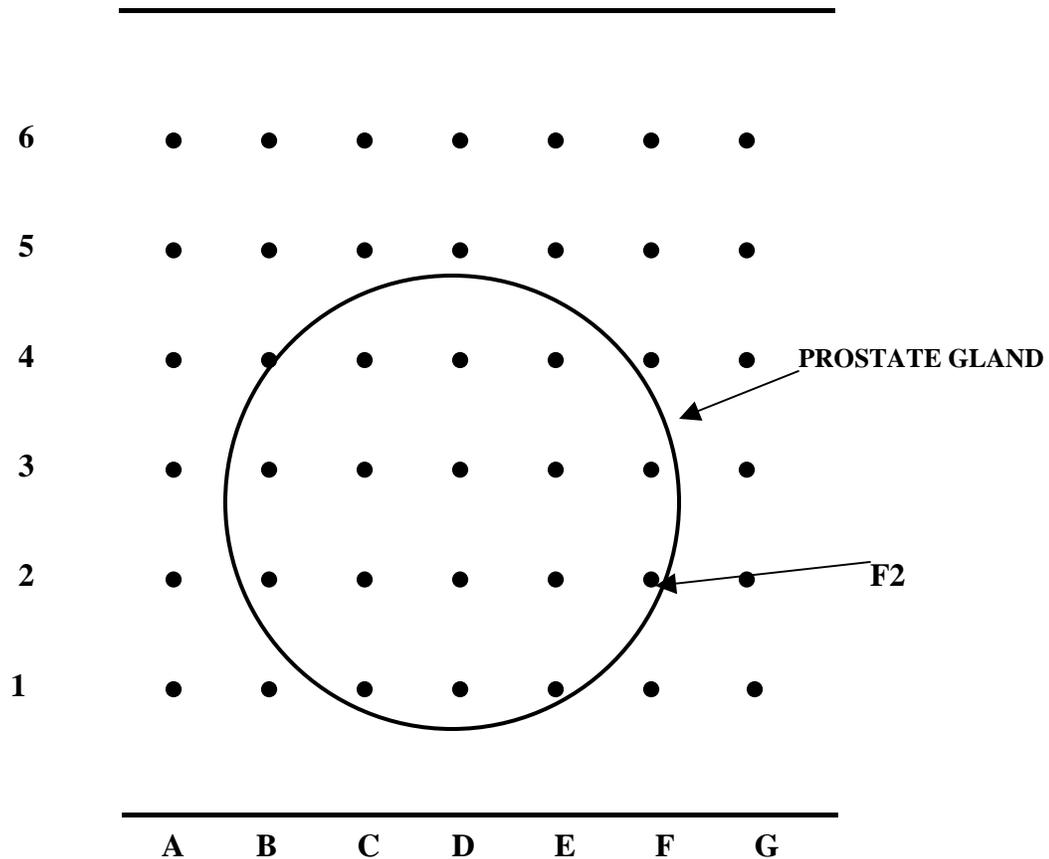


THE IMPLANT PROCEDURE cont.

The **template coordinate grid** seen above is activated so that it appears on the ultrasound screen (**Figure 2**). The **prostate is aligned so that it is superimposed onto the template grid** in such a way that the **D row** is centered in the central portion of the prostate and the **1 row** is aligned along the back edge of the prostate.

FIGURE 2

ULTRASOUND SCREEN



THE IMPLANT PROCEDURE cont.

Example of how the template is used in a prostate implant: If the implant is to start at the location of “F2” on the grid, the needle is placed through the “F2” aperture in the template and, under the guidance of the ultrasound, is directed into the prostate at the “F2” location as seen on the ultrasound screen. If the needle does not hit the “F2” coordinate, it can be easily steered into the proper location. **Depending upon the size of the prostate, 16-26 needles are used to implant 60-140 seeds.**

Once the procedure is completed, the patient is transferred to the **recovery room**. After the anesthesia has worn off, the patient is discharged to home. In most cases, **the Foley catheter is removed** prior to discharge.

FOLLOW-UP PROCEDURE

You will be scheduled to have a **CT scan of the prostate** so that computerized dose calculations can be performed. This will allow your radiation oncologist to evaluate the actual **dose delivered to the prostate gland** as a result of the implant. These calculations are called **post-implant dosimetry**. The post-implant CT scan does **not** involve the injection of any dyes or contrast. You will **not** be required to drink any barium or use any laxatives or enemas. This test only takes about five minutes.

As part of your follow-up care, you will be instructed to see both your **urologist and radiation oncologist**. They will help you to get through the side effects as comfortably as possible. After three months they will perform routine **DRE's**.

The **first PSA test** will be drawn about **three months** after the implant. Bone scans, CT scans, and MRI scans are **not** part of the routine follow-up. They may be ordered if your **PSA** rises.

SIDE EFFECTS OF SEED IMPLANT THERAPY

1) PERINEAL SYMPTOMS

Side effects of seed therapy vary widely from one patient to the next. Most patients experience **tenderness in the perineum** for several days following the implant.

Bruising and discoloration can **extend into the scrotum**. This should not be alarming. The **perineal discomfort** is usually **mild to moderate** and can be managed with **Tylenol, Aleve, or ibuprofen**. These medications are okay to take after your implant.

2) URINARY SYMPTOMS

In the first 24-48 hours, there may be **moderate to severe burning on urination and the urinary stream may be very weak**. About **5 percent of the patients find it impossible to urinate** at night and must return to the **hospital emergency room for placement of a Foley catheter**. **If urinary blockage occurs during the day, please contact your urologist. He or she may be available to place a catheter in their office.**

For several weeks or months after the implant, patients will experience **urinary urgency, frequency, and irritation**. These symptoms can be **mild, moderate or severe** and tend to be **worse at night**. Initially, most men find that they **get up at night to urinate 2-4 times more** than they did before the implant. Men who have **burning on urination usually report that this discomfort is felt on the tip of the penis**. This is not the result of any injury to the penis, but rather these sensations are being referred to the penis from the prostate.

Medications called **alpha-blockers (Flomax, Hytrin, or Cardura)** are particularly helpful in relieving these symptoms. These medications help the prostate to relax, allowing the urine to pass more freely through the swollen and inflamed gland. Anti-inflammatory medications such as **Aleve or ibuprofen** can also be very helpful. Occasionally, there is bladder irritation. In that case, patients may benefit from **Pyridium**, which numbs the bladder.

Urinary urgency can be rather severe for a month or two after the implant, and if the patient is not careful, an accident might occur. In order to avoid urinary leakage it is best to set-up a schedule and void every hour while awake. Severe urgency is often triggered by standing up or touching water. So be prepared to rush to the bathroom in those situations. Be prepared to quickly find a bathroom when you hop out of your car. If you have been sitting in a meeting at work for more than an hour, be prepared to rush to the bathroom when you stand up. Never pass up the opportunity to use the men's room.

SIDE EFFECTS OF SEED IMPLANT THERAPY cont.

2) URINARY SYMPTOMS cont.

HOW LONG DO THE URINARY SYMPTOMS LAST?

The urinary symptoms can last for many months. They tend to last longer with I-125 seeds than with Pd-103 seeds. However, at some point, usually **6-8 weeks after the implant, the symptoms will begin to improve.** By three months, most men who have a Pd-103 prostate seed implant, will say that their **urinary function is 90 percent** back to normal, and that they are getting up at night one extra time or the same number of times as they did before the implant. **Urinary burning** may last only a few days, however, as the radiation dose builds up in the prostate, the burning sometimes returns between the third and sixth week after the procedure. If this is the case, the burning usually resolves by three months. The last symptom to go away is the **weak stream.** The strength of the stream is usually pretty good by three months, but it may take another couple of months for the stream to fully return to normal. **Alpha-blockers are usually discontinued between the third and fourth month.** Occasionally the urinary stream never fully recovers and patients may stay on long-term alpha-blocker medication.

URINATION AT NIGHT

The most common urinary complaint is frequent urination at night, which can significantly interfere with sleep. Patients report that they will get up many times to urinate, but that **the stream is weak** and that they **cannot empty their bladder.** This will cause them to get up again soon thereafter. Sometimes patients are unable to get their stream started for 5-10 minutes. Infrequently patients have severe burning and say that urination feels like they are “**peeing through razor blades.**” **Alpha-blockers** are very helpful for nighttime symptoms, **and unless a patient is instructed otherwise, it is best to take these medications about one hour after dinner. It is also helpful to avoid fluids in the evening to reduce the urination frequency during the night.**

SIDE EFFECTS OF SEED IMPLANT THERAPY cont.

3) RECTAL SYMPTOMS

Some patients occasionally experience rectal urgency, frequency, discomfort, or bleeding. Bleeding is more likely to occur in patients with **hemorrhoids**. Ointments or suppositories can help with these symptoms. These symptoms are usually mild.

4) SEXUAL FUNCTION

It is not necessary to abstain from sexual activity, however a condom should be used for the first several sexual encounters or for the first several months to avoid ejaculating a radioactive seed into another person.

Erectile dysfunction (ED), or difficulty with erection during sex, may occur immediately after the implant. This is likely due to bruising of the nerve to erection. This may recover spontaneously. In the meantime, **ED** can be treated very successfully with **Viagra, Cialis, or Levitra**. Some patients report a **mixture of pleasure and pain** during orgasm. Usually the discomfort resolves by 3-4 months. The **semen** is almost always **discolored** (dark) for several months due to the presence of old blood. The ejaculatory ducts may become blocked, and semen production by the prostate may be impaired, resulting in a marked diminution in the volume of ejaculatory fluid at the time of orgasm.

5) MISCELLANEOUS SYMPTOMS

Patients usually experience some **fatigue**. It usually resolves within 3-4 months. Blood counts are not affected by this treatment. There will be **no** hair loss.

COMPLICATIONS OF SEED IMPLANT THERAPY

Complications refer to long-term or permanent problems. If a complication occurs, that does not mean that there was an error in the treatment. Whenever cancer cells are being “killed,” normal healthy cells can be temporarily or permanently damaged. The same holds true for hormone therapy, external beam radiation, and radical prostatectomy.

1) URINARY INCONTINENCE

After the urinary urgency has resolved, **urinary incontinence**, the involuntary loss of urine, is infrequently seen (< **1% of patients**). However, patients who have had a prior **transurethral resection of the prostate (TURP)**, sometimes called a “roto-rooter job,” **have an increased risk of incontinence of about 5 percent. Patients with large TURP defects are not implant candidates.** If incontinence develops following a seed implant, it is usually mild requiring no more than 1-2 pads per day.

2) URINARY STRICTURE

About **5 percent of patients develop a urinary stricture or bladder neck fibrosis.** This means that **scar tissue** has formed, and has caused **narrowing of the urethra, or scarring of that portion of the bladder, which is near the prostate.** This results in a weak urinary stream, frequent bathroom visits at night or inability to urinate. Initially the treatment of choice is **alpha-blockers.** If the urinary flow is completely blocked, a temporary catheter is placed. **Surgery is not often required, and should be considered a treatment of last resort. When surgery is contemplated it is best to wait one year. The procedures most commonly used are: 1) a “mini-TURP”; 2) a trans-urethral incision of the prostate (TUIP); 3) a bladder neck incision; or 4) a trans-urethral needle ablation (TUNA). Before any surgery is contemplated, your urologist should consult with your radiation oncologist. Experience has shown that in many cases the blockage will resolve by itself without surgery. The primary risk of these surgical procedures is permanent and sometimes severe urinary incontinence.**

COMPLICATIONS OF SEED IMPLANT THERAPY cont.

3) RECTAL INJURY

The most common rectal injury is chronic rectal bleeding. Rectal bleeding may result from pre-existing hemorrhoids, a rectal cancer, or from fragile blood vessels that form on the rectal wall as a result of the radiation. These fragile blood vessels are not dangerous and can usually be treated successfully with suppositories. **If rectal bleeding occurs, please notify your radiation oncologist.** You may need to see a gastroenterologist (a GI doctor).

IT IS OF THE UTMOST IMPORTANCE THAT YOU INFORM YOUR GI DOCTOR THAT YOU HAVE HAD A PROSTATE SEED IMPLANT. IT IS NOT SAFE TO HAVE HEMORRHOID SURGERY OR CAUTERY ON YOUR RECTUM. THERE HAVE BEEN CASES WHERE SUCH PROCEDURES HAVE RESULTED IN SEVERE RECTAL INJURIES REQUIRING A COLOSTOMY. WE ADVISE YOU TO SHOW THIS PAGE TO ANY PHYSICIANS TREATING YOU FOR RECTAL BLEEDING.

There are new laser therapies, which are very superficial and are more likely to be safe, but this should only be used in cases of severe rectal bleeding that cannot be controlled by more conservative means.

Rectal ulcers are very uncommon. The first sign of an ulcer may be moderate to severe rectal pain, which is usually associated with bleeding. However, these symptoms can also occur with hemorrhoids. **RECTAL ULCERS MUST NOT BE CAUTERIZED, LASERED, OR OPERATED ON.**

THE MOST SEVERE RECTAL INJURY IS A FISTULA. Fortunately fistula are very uncommon. A rectal fistula is a hole that develops between the rectum, and the bladder or urethra. The first signs are pain associated with the leakage of urine through the rectum. Usually a colostomy must be done. **FOLLOWING SEED IMPLANTS, RECTAL FISTULAS CAN BE CAUSED BY CAUTERY FOR RECTAL BLEEDING, OR HEMORRHOID SURGERY. THESE MUST BE AVOIDED.**

COMPLICATIONS OF SEED IMPLANT THERAPY cont.

4) ERECTILE DYSFUNCTION

Erectile dysfunction (ED) is the most common complication following all treatments of prostate cancer. **The good news** is that most cases of **ED** following seed implant therapy **can be successfully treated with medication (Viagra, Levitra, or Cialis)**. **If a patient has good erections** prior to treatment, the probability that he will **maintain an erection satisfactory for sexual intercourse after treatment is about 80 percent**; however, **the majority of patients will use one of these medications at least some of the time**. If the erection is already impaired prior to the seed implant, these drugs are less likely to work. If they are unsuccessful, other treatments such as **penile injections** may prove effective.

For several months following the implant, **the ejaculate may be discolored**. Usually the color is very dark as the result of old blood. Eventually, most patients report that the **ejaculate dries out, and that very little semen is ejaculated**. **Fortunately, the quality of the orgasm is usually not affected**.

EXTERNAL BEAM RADIATION THERAPY AND RADIOACTIVE SEED IMPLANTS (COMBINED THERAPY)

INDICATIONS

Some patients may benefit from the **combination of external beam radiation and seed implant therapy**. In this case a **reduced-dose of external radiation (5 weeks) and a reduced-dose implant is used**. The goal of the 5 weeks of external radiation is to kill any cancer cells that are outside the prostate in the surrounding fat and muscle, nerve bundle area (neuro-vascular bundle), seminal vesicles or lymph nodes. Some or all of these areas may need to be targeted with the external radiation depending on the risk factors in your particular case. In general, patients with a **PSA >10, a Gleason Score 7 or higher, a sizeable tumor felt on DRE, extensive cancer seen on the biopsy material (ie the majority of the biopsy cores involved), or cancer seen outside the prostate on an MRI, are more likely to be advised to undergo combination therapy**.

Studies have shown that **5 weeks of external radiation (45 Gy) is usually sufficient to destroy small amounts of cancer**. Surgical studies have shown that about **half of patients do have “small fingers” of malignant cells outside the prostate**, and that the risk factors for extra-prostatic cancer are those described above. Therefore, your treatment will be custom tailored based on which risk factors you have. For example, if you have a PSA of 9 and a Gleason score of 7, the external beam radiation treatment might be limited to the prostatic region. On the other hand, if you have a Gleason score of 8, and a PSA of 15, it is likely that whole pelvic radiation will be recommended.

THE TIMING OF THERAPY

Please keep in mind that the 5 weeks of external radiation is also treating the prostate. Therefore, the seed implant dose must be reduced to take into account the 45 Gy that you have already received to the prostate. In most cases, the external radiation is given first. After a 2-6 week break, the seed implant is performed.

COMBINED THERAPY cont.

SIDE EFFECTS

The 5 weeks of external beam radiation is extremely well tolerated. Just as the urinary and rectal symptoms are getting started, the treatment ends. By the time that the implant is performed, these side effects will have mostly or completely resolved. The side effects of the seed implant are virtually identical to those observed when seeds alone are performed. See a detailed description above under **“SEED IMPLANT THERAPY”**.

COMPLICATIONS

The **long-term complications are similar to those described above under “SEED IMPLANT THERAPY.”** With **combination therapy**, we do observe rectal bleeding more frequently than with **monotherapy**. Erectile dysfunction may occur more often. As described above, these two problems can usually be managed successfully with medications.

FOLLOW-UP PROCEDURE

Refer to this section under **PROSTATE SEED IMPLANT THERAPY**.

RADIATION SAFETY

When patients are receiving **external beam radiation**, as far as the general public goes, there are no safety procedures that need to be followed. Once the treatment is completed and the machine is turned off, there is no radiation in the room and no radiation in your body. Therefore, **you do not need to worry about contact with children, pregnant women or anybody else.**

Both **Palladium-103 and Iodine-125 emit continuous radiation**. Since the radiation is **very low energy**, most of the radiation is confined to the prostate gland and the immediate surrounding area. Parts of the body that are more than a few inches away do not receive enough radiation to be damaged.

Bodily wastes such as urine and stool are not radioactive unless a seed is present. On rare occasions, a seed may be lost during urination. If a seed passes, it will most likely occur in the first week following the implant procedure.

Small amounts of radiation can reach other people. For most people, this is not a cause for concern. For example, if your **significant other** sleeps with you every night, they will get less radiation from you than they would get from a chest x-ray or mammogram. Therefore, there are no restrictions when it comes to adults.

Growing children and a growing fetus within a pregnant woman are sensitive to the effects of radiation. Radiation can cause cancer in growing tissues and can cause birth defects. If such people are exposed to you, we advise that you keep a distance of 6 or more feet, until about 75% of the isotope has decayed. Pd-103 has a half-life of 17 days, and we suggest that you follow these guidelines for 5 weeks. I-125 has a half-life of 60 days, and therefore decays more slowly. Additionally, the radiation energy of I-125 is slightly higher and more penetrating than Pd-103; and therefore, in the case of I-125 we suggest that you follow these guidelines for 4 1/2 months. Stricter guidelines are advised for sleeping with pregnant women, or holding infants or small children in your lap. You should avoid these activities for 2 months with Pd-103 and 7 months for I-125. Brief encounters for hugging or saying hello are allowed.

RADIATION SAFETY cont.

LEAD-LINED UNDERWEAR

If there are infants at home or if you have frequent contact with grandchildren or other small children, you may want to consider **purchasing lead-lined underwear**. These garments weigh about 1 pound. They can be worn when you plan to have extended contact with children or kids in your lap. We have taken measurements, and **no radiation could be detected** outside this garment. They are worn over your regular underwear. Some seed implant patients come into close, frequent contact with pregnant women at work. The lead-lined underwear may serve to allay any fears that your co-workers may have. They cost about \$100.

CONDOMS

A condom is recommended during sexual intercourse for the first several encounters or for 3-4 months in the case of Pd-103 and 12 months in the case of I-125. Occasionally, seeds that are implanted into the seminal vesicles, may enter the patient's semen, and be ejaculated. We have had several patients report that seeds were found in the semen, but the actual frequency of this event is not known.

HORMONE THERAPY

Hormone therapy is intended to keep male hormones (testosterone) from getting to prostate cancer cells, thereby stimulating them to grow and spread. There are several types of hormone therapies, and they will be outlined below. Estrogens are effective hormone treatments, but are no longer used because of unacceptable side effects.

SURGICAL CASTRATION

Surgical castration or removal of the testicles is the cheapest of the hormone treatments. However, it is disfiguring and irreversible. For patients who do not mind having this done, it may be preferable if permanent hormone ablation is recommended.

LUTEINISING HORMONE-RELEASING HORMONE ANALOGUES (LHRH AGONIST)

LHRH agonists are given in the form of a shot. These shots can be administered every 1-4 months depending on how much medication is given. Examples of **LHRH agonists** include **Leuprorelin Acetate (Lupron)**, and **Goserelin Acetate (Zoladex)**. These medications act on the brain (pituitary gland), and block the release of a hormone that normally would go to the testicles and stimulate them to make testosterone. The testosterone level usually drops to the same very low level that it would after castration. This treatment is sometimes called “medical castration.”

HORMONE THERAPY cont.

ANTI-ANDROGENS

Anti-androgens are given in the form of a pill. **Casodex** is taken once a day. **Flutamide** must be taken 3 times each day. They block testosterone from getting to the cancer cells. In the case of castration and LHRH agonist therapy, small amounts of male hormones are still made in other organs such as the adrenal glands. **Anti-androgens** can stop the effects of these male hormones; and therefore, sometimes they are prescribed along with surgical or medical castration. Some patients are treated with **anti-androgens alone** without castration. The advantage of this is that most men can remain sexually active.

SIDE EFFECTS OF HORMONE THERAPY

Surgical and medical castration almost always causes **loss of sex drive and impotence**. Rarely are men sexually active and usually they don't care. Most men have **hot flashes**, which can be drenching and can interfere with sleep. Usually the hot flashes become less bothersome over time, but the sex drive does not come back as long as castration is in effect.

Other possible side effects include **anemia, loss of bone (osteoporosis), changes in hair or skin, fatigue, loss of muscle mass, weakness, increase in body fat (usually around the waist) and breast enlargement (gynecomastia)**. **Gynecomastia can be painful, but it can usually be prevented with tamoxifen or 3 radiation treatments to the breast. These treatments must be given before the breast enlargement occurs.**

The anti-androgens, if given alone, have a very high probability of causing painful, enlarged breasts. It is strongly advised to give tamoxifen or breast radiation in this situation, and the treatment should be given before the anti-androgens are started. These medications can cause diarrhea or cramping. Rarely they can cause liver damage. Liver enzymes (liver function tests), a blood test, should be performed periodically.