

# Hormone Therapy for Prostate Cancer – A Patient Guide

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Prostate cancer is the second most common cancer in men after skin cancer. Hormone therapy either reduces the production of testosterone, or prevents testosterone from getting to prostate cells. Testosterone feeds prostate cancer cells; starving them often prevents and controls growth. In selected patients it also improves the effectiveness of radiation therapy. The purpose of this booklet is to explain hormone therapy for men who may be considering or have started hormone therapy and their partners. This booklet will cover the following topics about hormone therapy:

- How it works
- What the different types are
- Who hormone therapy is recommended for
- What the side effects are
- How side effects can best be managed

**Please Note:** all words in **bold** are defined in glossary at end of document, pg. 14.

## What is testosterone?

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All men produce a hormone called testosterone (like women produce estrogen). Testosterone is one of a number of different hormones called androgens that have sexual and other effects on the body.

During puberty, a boy's production of testosterone increases as part of his natural growth and development. This increase in testosterone during adolescence is responsible for male sexual maturity and fertility. Increasing levels of testosterone lead to:

- increased muscle mass
- increased body and facial hair
- deepening of the voice
- lengthening of the penis
- enlargement of the testicles
- increased libido (desire for sexual activity)
- the ability to achieve and maintain an erection

During adolescence, testosterone also aids in the normal development of the prostate gland. The prostate gland begins to produce fluids, which are added to semen during ejaculation. Later in life, testosterone plays a very active role if a man develops prostate cancer because testosterone helps prostate cancer cells grow.

## How is testosterone made?

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Two different pathways produce testosterone in the male body (see *Figure 1*).

- Most testosterone is made by the testicles.
- A much smaller amount is produced by the two **adrenal glands**, located just above the kidneys.
- The first step in testosterone production occurs in the brain when a gland called the **hypothalamus** sends a message to another gland in the brain called the **pituitary gland**.
- The pituitary gland then sends out a message that tells the testicles to make testosterone.

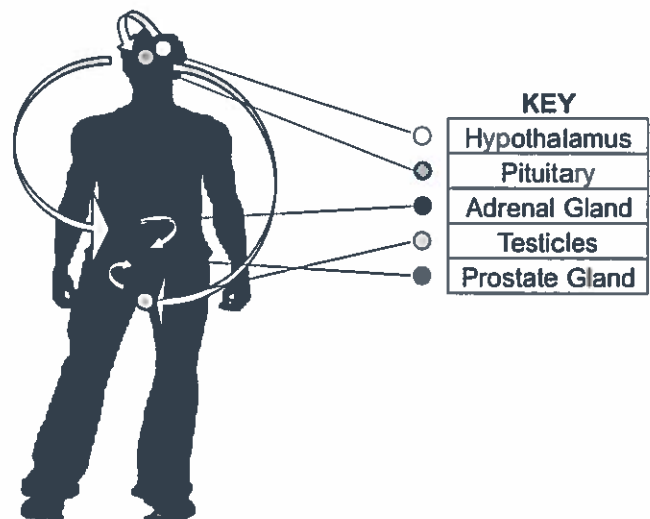


Figure 1

## **How does testosterone help prostate cancer grow?**

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Testosterone travels through the blood and eventually reaches prostate cancer cells. The testosterone moves inside cancer cells, where it helps the cancer grow. One can think about testosterone as a hormone that “feeds” the cancer. The more testosterone the cancer cells have, the more the cancer can grow, thrive, and then spread to other parts of the body.

## **What is hormone therapy?**

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Since testosterone is the driving force behind prostate cancer growth, one method to treat the cancer is to eliminate as much testosterone as possible. This is referred to as **androgen deprivation therapy (ADT)**.

- One family of hormone therapy drugs, known as **LHRH** or **GnRH agonists**, are medications commonly used to reduce the amount of testosterone in a man’s body.
- A second family of hormone therapy drugs, the **anti-androgens**, blocks the use of testosterone by the cancer cells.

When testosterone is reduced, prostate cancer cell growth may be slowed and the cancer usually begins to shrink. As the amount of cancer in the body decreases, **Prostate Specific Antigen (PSA)**, measured by a blood test, will also likely fall. Hormone therapy will not cure the cancer, but it may control prostate cancer for an extended period of time.

For men receiving treatment with radiation, the addition of hormone therapy has been shown to increase the likelihood that the disease will not recur, including improving the likelihood of survival in some situations.

## **Who should be treated with hormone therapy?**

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Hormone therapy may be recommended in the following circumstances:

- In conjunction with radiation, mostly for men with certain risk factors (e.g. **Gleason scores**). This is often given before (neoadjuvant), during (concurrent), and after (adjuvant) radiation.
- After radiation or surgery when PSA rises (particularly if not believed to be a localized recurrence).
- As therapy for men unsuitable for radiation or surgery.
- As therapy for **metastatic** prostate cancer (prostate cancer which has spread outside the prostate to other sites in the body).

Men diagnosed with non-metastatic or **localized prostate cancer** are divided into three categories depending on the characteristics of their cancers. These groups attempt to predict the likelihood of the cancer returning after treatment with surgery or radiation. These are general categories and more specific assessment of risk can be obtained by using other risk assessment tables or nomograms (e.g. UCSF CAPRA, Kattan, etc.). The three groups are low, intermediate and high risk.

Men diagnosed with **low risk** prostate cancer are often treated with surgery (**radical prostatectomy**), or either **external beam radiation** or **brachytherapy** (which may involve placing radioactive seeds inside the prostate). Hormone therapy is generally not recommended for use with either of these treatment options. An exception to this rule is the low risk patient whose prostate is too large to treat with an implant due to its size (e.g. > 50cc). For low risk men selecting to monitor their cancer on an active surveillance program, hormone therapy is not used.

Men with **intermediate** or **high risk** prostate cancer may also select surgery or radiation. Hormone therapy is not used with surgery but may be used after the surgery if the PSA continues to rise, but radiation is generally the preferred option, as it is the only curative option in this setting. Men selecting radiation are usually treated with either external beam radiation or a combination of external beam and brachytherapy. These men often receive hormone therapy based on research showing some men live longer when radiation is supplemented with hormone therapy. Treatment usually begins 2 months prior to the start of radiation, continues throughout radiation, and lasts anywhere from 4 months to 3 years based on the extent of cancer. Your doctor will discuss with you whether or not the hormone therapy should continue after radiation treatments are completed.

Some men are not suited for either surgery or radiation for multiple reasons: for example:

- advanced age
- other medical problems
- patients' choice because of potential side effects.

Hormone therapy may be an option in this situation.

When PSA rises after treatment with surgery and/or radiation, this is called **serologic progression**, which means a rising PSA with no cancer metastasis visible on **bone scan** or **CT scan** (however, depending on disease characteristics, the likelihood of seeing evidence of cancer on a bone scan or CT scan may be so small that the physician feels these scans are not needed). Hormone therapy may be used in this setting, depending on the characteristics of a man's disease, such as the Gleason score and rate of rise of PSA. If cancer is present after treatment with surgery and/or radiation, based on a rising PSA, your physician may recommend hormone therapy alone or in conjunction with additional local therapy (e.g. radiation after surgery or cryosurgery).

Finally, hormone therapy is frequently prescribed for men with **metastatic disease**. When prostate cancer spreads beyond its local environment, the first distant sites are usually lymph nodes and then bones. Less frequently, prostate cancer metastasizes to other organs, such as the liver or lungs; it is rare for prostate cancer to spread to the brain. Hormone therapy is systemic therapy: that is, it kills prostate cancer cells throughout the patient's entire system, regardless of their location. It can treat bone, lymph nodes, organs, and the prostate gland.

## What are the types of hormone therapy?

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There are three main types of hormone therapy:

1. **Orchiectomy** - Surgical removal of the testicles
2. **LHRH agonists or antagonists** - Medication to stop the testicles from making testosterone
3. **Anti-androgens** - Medication that prevents cancer cells from using testosterone

**Orchiectomy** removes the testicles but leaves the scrotal sac. Testicles produce the majority of male testosterone, prostate cancer's fuel. Removing the testicles is permanent and irreversible; often, testicular prostheses (artificial testes) can be placed in the scrotal sac for cosmetic purposes to help maintain a more normal appearance.

Permanently removing the testicles makes intermittent hormone therapy difficult; intermittent hormone therapy may be advantageous and will be discussed in greater detail later in the booklet. Another problem with orchiectomy is the psychological effect. Many men may feel distress and a loss of their manhood if they undergo this surgical procedure.

**LHRH agonists** stop the testicles from making testosterone. They do this by encouraging a continuous message from the brain to produce testosterone that over-stimulates the testes; they respond to being "overworked" by switching off. The initial overstimulation is also the reason why some men may experience a spike or "flare" in their testosterone level before it declines, and why **anti-androgens** like bicalutamide or flutamide (see below) are prescribed for a short period when a man starts LHRH therapy.

**LHRH antagonists** also stop the testicles from making testosterone but they do not induce the initial overstimulation spike or "flare" in their testosterone level; thus, **anti-androgen** like bicalutamide or flutamide (see below) may not be necessary.

When the LHRH medication is stopped, the testicles usually resume production; how long this takes varies from man to man but it can range from several months in younger men to a several years or not at all in older men.

All the drugs listed in Table 1 stop testicular testosterone production. They are all considered equal. The choice of which drug to use is usually based on cost and/or convenience.

**Table 1: LHRH Drugs - Medications that stop the testicles from making testosterone.**

Generic Name	Trade Name	How is the drug given?	How much drug is given & how often?
Leuprolide Acetate	Lupron®	Injected into the muscle of the buttock	7.5 mg monthly 22.5 mg every 3 months 30 mg every 4 months
Goserelin Acetate	Zoladex®	Injected beneath the skin of the abdomen	3.6 mg monthly 10.8 mg every 3 months
Leuprolide Acetate	Eligard®	Injected beneath the skin of the abdomen	7.5 mg monthly 22.5 mg every 3 months 30 mg every 4 months 45 mg every 6 months
Leuprolide Acetate	Viadur®	Surgically implanted into the upper inner arm	65 mg annually
Triptorelin Pamoate	Trelstar®	Injected into the muscle of the buttock	3.75 mg every 4 weeks 11.25 mg every 12 weeks 22.5 mg every 24 weeks
Degarelix Acetate	Firmagon®	Injected beneath the skin of the abdomen. This drug is an LHRH antagonist, does not cause a spike, and does not require an initial course of anti-androgens.	240 mg initially followed by 80 mg every 4 weeks

**Anti-androgen drugs** do not stop the testicles or the adrenal glands from making testosterone; instead they block the cancer cells' ability to use testosterone. An anti-androgen from Table 2 is often used in combination with one of the medications listed in Table 1. This combination therapy is called **combined androgen blockade (CAB)**. The combination is believed to be more effective than use of a LHRH agonist or antagonist alone. Although any of the anti-androgens can be used, bicalutamide is the most frequently used anti-androgen.

**Table 2: Anti-androgens**—Medications that decrease the cancer cell's ability to use testosterone.

Generic Name	Trade Name	How is the drug given?	How much drug is given & how often?
Flutamide	Eulexin®	Oral pills	250 mg three times daily
Bicalutamide	Casodex®	Oral pills	50–150 mg daily depending on situation
Nilutamide	Nilandron®	Oral pills	150 mg daily

Finally, there is another form of hormone blockade that adds a class of drugs known as 5-alpha reductase inhibitors, such as finasteride and dutasteride), to CAB. These drugs reduce the production of dihydrotestosterone (DHT) a breakdown product of testosterone. Addition of these drugs has not been shown to be more effective than standard CAB; therefore, this form of androgen blockade (called Triple Androgen Blockade) is generally not prescribed at UCSF.

## Starting hormone therapy

If you decide to move forward with hormone therapy, there are other common questions.

### *Am I better off with medical or surgical hormone therapy?*

Both options achieve the goal of stopping testosterone production from the testicles. Beginning treatment with the medication will help you avoid a surgical procedure, allow you to keep your testicles, and will provide the option of treating your cancer with **intermittent** hormone therapy, if appropriate.

### *Should I use the testosterone lowering medication (LHRH analog or antagonist) alone or combine it with one of the testosterone blocking medications (anti-androgens) listed in Table 2?*

Many doctors recommend that patients begin hormone therapy using a combination of LHRH and anti-androgen drugs to protect against a testosterone flare and then to discontinue the anti-androgen drug after 2–4 weeks. Of note however, since all of the studies combining short-term hormonal therapy with radiation continued the anti-androgen for the entire course of treatment, this is the preferred approach. Some men may remain on this therapy, or add back the anti-androgen if the PSA does not drop appropriately. The final decision may depend on other factors, such as side effects, cost, or other medical problems. Your health care provider will discuss the best approach for your situation.

### *Is it possible to use a testosterone blocking drug (anti-androgen) on its own (Table 2) WITHOUT an LHRH agonist or antagonist?*

Most of the side effects experienced by men on hormone therapy are caused by low testosterone. Some of these side effects may be minimized with the use of peripheral androgen blockade (PAB). In



PAB, the use of testosterone by the cancer cells is blocked without reducing testosterone levels. Three different PAB options are listed in Table 4; all of these options are considered experimental. PAB should not be used on an intermittent basis (see below) and is considered less effective than an LHRH agonist, but may be considered for some patients. Your health care provider will discuss whether or not PAB is an appropriate option for you.

**Table 3:** Types of peripheral androgen blockade (PAB).

Generic Name	Trade Name	How much drug is given & how often?
High dose bicalutamide	High dose Casodex®	150 mg orally daily
Finasteride and flutamide	Proscar® and Eulexin®	5 mg orally daily 250 mg orally three times daily
Dutasteride and bicalutamide	Avodart® and Casodex®	0.5 mg orally daily 50 mg orally daily

### Intermittent hormone therapy

Intermittent hormone therapy is still considered experimental, but it is widely used in men undergoing hormone treatment for prostate cancer.

The main reasons for intermittent rather than continuous treatment include:

- Improved quality of life for the patient—more time off hormone therapy to limit the side effects.
- The possibility of extending the time the hormone therapy drugs are effective—in most men the drugs eventually lose their effectiveness.

At UCSF, intermittent hormone therapy usually means the hormone therapy is taken for 9–12 months and then stopped. During this 9–12 month time period, the PSA will likely decline. After the medication is stopped, the PSA will eventually begin to climb again. When the PSA reaches a pre-determined number (see Table 4), the medication will be restarted for another 9–12 months. How quickly the PSA climbs depends on how quickly the testosterone level recovers and the disease characteristics of the individual man. It may also depend on the amount of time on hormone therapy. The time off hormone therapy can range from a few months to several years. On average, it tends to be similar to the amount of time spent on hormone therapy.

This on and off cycling of the medication continues for as long as the cancer appears to be under control. Intermittent hormone therapy may not be appropriate in all situations. Your health care provider will discuss with you whether or not intermittent hormone therapy is recommended for you.



Table 4: UCSF guidelines for when to restart hormonal therapy on intermittent androgen deprivation.

If your PSA when starting hormone therapy is:	You will restart hormone therapy when your PSA is approximately:	Example:
Less than or equal to 10	50% of your starting PSA	If your starting PSA is 6, then treatment would be restarted when the PSA climbs back up to approximately 3.
Greater than 10	Between 5 and 10	If your starting PSA is 16, then treatment would be restarted when the PSA is between approximately 5 and 10.

## Side Effects of Hormonal Therapy and How to Deal With Them

The side effects of hormone therapy are related to decreased levels of testosterone. The three most commonly reported side effects are fatigue, hot flashes, and sexual changes, including decreased libido (sex drive) and decreased erectile function.

Many of the side effects discussed are experienced over time. Men treated for 8 months or fewer are less likely to experience many of the issues listed below, although some, like hot flashes and sexual side effects, usually manifest within the first four to six weeks. Most of these side effects are temporary and reversible; they will usually diminish or disappear when the therapy is stopped and testosterone levels recover.

It is important to remember that not all men will experience all side effects. There is also large variability in their severity.

- **Hot flashes**—are common and vary greatly in frequency, intensity and duration among different men. They are often the first to present and some men find them less bothersome over time.

*Recommendations:* Hot flashes can be treated with different medications like venlafaxine or megestrol (Effexor® or Megace® respectively), but most men tolerate them well enough to find treatment unnecessary. Hot environments and spicy foods tend to stimulate hot flashes. There is also some evidence that suggests that acupuncture and decreasing alcohol and caffeine intake may help.

- **Decreased libido**—The majority of men on hormone therapy experience some decrease in sexual desire and erectile dysfunction. For men who are recovering their sexual function after surgery or radiation, this can be particularly frustrating.

*Recommendations:* Working cooperatively with your partner to accommodate the changes resulting from hormone therapy can help you remain sexually active. Couples counseling

can be helpful if this causes distress in your relationship. Touching and massage, a romantic environment, and adult entertainment can also be useful. Pick up a copy of *Your Health Matters: Managing Impotence—A Patient Guide* for a complete and thorough discussion. [www.urology.ucsf.edu/patientGuides/pdf/Manage\\_Impotence.pdf](http://www.urology.ucsf.edu/patientGuides/pdf/Manage_Impotence.pdf)

- **Depression, mood changes, anxiety and irritability**—Low testosterone impacts brain chemistry and may result in mood changes. For men who have never experienced depression, this can be traumatic.

*Recommendations:* Depending on the severity, there are many anti-depressant and anti-anxiety medications. They work differently for each person, so it may take more than one try to find the drug that works best for you. For some men, exercise can help; it is known to stimulate the brain chemistry to produce some of the enzymes that may be lacking. Seek out counseling and support groups, both of which can be very helpful, and ask those around you to be tolerant.

- **Fatigue**—Fatigue can be caused directly by low testosterone levels or may be a result of anemia (a reduction in red blood cells), which occurs because of low testosterone levels. Loss of muscle mass and mood changes can also contribute to fatigue.

*Recommendations:* Participate in regular physical activity and exercise. This is not only useful in dealing with these side effects, but is also important in minimizing weight gain (see below) and reducing the risk of cardiovascular disease. Just walking for half an hour three times per week can provide some positive benefit. Pick up a copy of *Your Health Matters: Cancer and Exercise*, and if you are a UCSF patient, make an appointment with the exercise counselor (see *UCSF Resources*).

- **Reduced muscle mass, and/or weight gain**—Loss of testosterone results in a slower metabolism, as well as less testosterone to maintain muscle. Weight gain is often in the belly.

*Recommendations:* Participate in regular physical activity and exercise (with a component of weight training), as above. If you are a UCSF patient, make an appointment with the exercise counselor and nutritionist (see *UCSF Resources*).

- **Breast enlargement (gynecomastia)**—This can also be associated with nipple tenderness &/ or sensitivity and is caused by a hormone imbalance that results in a more dominant role for estrogen in a man's body. It occurs more commonly with anti-androgen drugs than with the LHRH medications.

*Recommendations:* A single dose of radiation to the breasts at the start of treatment can be preventative. A medication called tamoxifen that blocks estrogen activity can also be helpful in preventing this symptom.

- **Increased appetite**—Many men find increased appetite occurs with declining testosterone levels. This increases the tendency to gain weight.

*Recommendations:* Exercise improves metabolism. A heart and prostate healthy diet is also helpful. For more detail see the sister publication *Your Health Matters: Prostate Cancer and Nutrition* [www.urology.ucsf.edu/patientGuides/pdf/uroOnc/Nutrition\\_Prostate.pdf](http://www.urology.ucsf.edu/patientGuides/pdf/uroOnc/Nutrition_Prostate.pdf).

- **Brain function**—Data about the effect of hormone therapy on brain function have been mixed, but many men report changes in concentration, clarity of thought and memory; these side effects are comparable to ‘chemo brain.’

*Recommendations:* Keep your brain active during treatment. This may include working, playing an instrument, or using word, card or other games. Making lists, writing reminders and alarm reminders can all help.

- **Hair loss & gain**—Loss of testosterone results in loss of body hair over time. Men on short-term hormone therapy may see little difference, but long-term treatment may lead to loss of hair on your arms, legs, underarms and genital area; facial hair may grow more slowly, too. Conversely, hair on your head may become thicker.

*Recommendations:* Know that growth restarts as you rebuild testosterone.

- **Genital shrinkage**—some men may experience shrinkage of their penis or testicles because of reduced testosterone.

*Recommendations:* If this distresses you and/or your partner, discuss it with your physician and consider counseling. Pick up a copy of *Your Health Matters: Managing Impotence—A Patient Guide* [www.urology.ucsf.edu/patientGuides/pdf/Manage\\_Impotence.pdf](http://www.urology.ucsf.edu/patientGuides/pdf/Manage_Impotence.pdf) for a complete and thorough discussion.

- **Bone loss/osteoporosis**—Osteoporosis is thinning of the bones. Men who are on hormone therapy for more than 12 months, are older or are smokers are at a higher risk for developing this condition. Osteoporosis is diagnosed by a bone density imaging (DEXA) test. If you expect to be on hormone therapy for longer than 12 months, consult with your physician about having a bone density test to establish your baseline bone mineral density prior to starting on long-term hormone therapy. A follow-up test should be done every two years if previously normal and yearly if abnormal.

*Recommendations:* A class of medications called bisphosphonates can effectively treat osteoporosis, if a significant reduction in bone density is found. An oral medication, such as Fosamax®, can be taken once a week, while medications such as zoledronic acid (Zometa®) infusion are given every 3–4 weeks or at longer intervals. A recently approved medicine, denosumab (Xgeva®), is injected subcutaneously, and is less traumatic on the kidneys than zoledronic acid but is associated with other side effects. If you are prescribed either zoledronic acid or denosumab, you will also be placed on calcium and vitamin D supplements. Periodic monitoring of calcium, phosphate, and for Zometa®, kidney function with a creatinine blood test, will be undertaken. Regular dental evaluations, both prior to and while on bone-targeted therapy, are also important.

Your vitamin D level may be monitored. Your doctor may recommend supplements according to your levels. Regular weight-bearing exercise is recommended. In particular, weight resistance exercise is recommended at least three times weekly. If you have not lifted weights before, supervision is strongly advised initially. Pick up a copy of *Your Health Matters: Cancer and Exercise*, and if you are a UCSF patient make an appointment with the exercise counselor (see *UCSF Resources*).

- **Anemia**—while generally quite mild, long term hormone therapy may result in a reduction of your red blood cells. This can contribute to fatigue but is unlikely to occur within the first 12 months.

*Recommendations:* Evaluate iron levels with a blood test to make sure that iron deficiency is not a contributing cause.

- **Abnormal liver function**—In less than 5% of patients, oral anti-androgens can irritate the liver, resulting in abnormal blood tests that measure liver function. This typically happens early in the use of anti-androgens but can happen after years of use with no side effects. Blood tests evaluating liver function should be done after the first month of therapy and every 3 months thereafter. Typically, these blood test abnormalities are detected long before there are any symptoms, and discontinuation of the medicine almost always results in normalization of the liver tests. Switching to another anti-androgen is often successful.

*Recommendations:* Ask your doctor to check your liver function tests every 3 months. If your tests are abnormal, you will be asked to reduce your alcohol and acetaminophen (Tylenol) intake and review your medications with your doctor.

- **Cardiovascular disease**— Although some recent analyses have concluded that hormone therapy may slightly increase the risk of heart attack and stroke, this remains controversial. The risk appears to be highest for those who already have other risk factors, such as high blood pressure, high cholesterol or diabetes mellitus.

*Recommendations:* Make sure you know your cholesterol and blood pressure and that you inform your primary care physician that you are on hormone therapy. There are many drugs that can help control your cholesterol. Lifestyle changes in nutrition and exercise are important, as well; a heart healthy diet and aerobic exercise will reduce your risk. Make an appointment with a nutrition counselor—at UCSF this is provided free (see *UCSF Resources*) and pick up a copy of *Your Health Matters: Prostate Cancer and Nutrition*. A prostate healthy diet is a heart healthy diet. [www.urology.ucsf.edu/patientGuides/pdf/uroOnc/Nutrition\\_Prostate.pdf](http://www.urology.ucsf.edu/patientGuides/pdf/uroOnc/Nutrition_Prostate.pdf)

If you know you are at high risk for cardiovascular disease before starting hormone therapy, be sure to discuss this with your physician. Your physician and the UCSF Cancer Resource Center can make helpful suggestions.

- **Diabetes mellitus**—Lack of testosterone is known to increase blood sugar levels. If you are diabetic, this may require some adjustment to how you manage your disease; if you are not diabetic, your blood sugar may increase.

*Recommendations:* If you are diabetic, be sure to consult with your primary care physician or specialist to determine if you need to adjust your disease management. If you are not diabetic, your blood sugar levels will be monitored periodically. For everyone, exercise and a healthy diet with whole grains and fiber helps control your blood sugar levels.

- **Erectile dysfunction**—Hormone therapy reduces libido and induces erectile dysfunction.

*Recommendations:* Drugs such as Viagra, Cialis and Levitra do not usually work well for men on hormone therapy. Other solutions, such as penile injections, pump, and prostheses may be appropriate; consult with your physician. Pick up a copy of *Your Health Matters: Managing*

*Impotence—A Patient Guide* ([www.urology.ucsf.edu/patientGuides/pdf/Manage\\_Impotence.pdf](http://www.urology.ucsf.edu/patientGuides/pdf/Manage_Impotence.pdf)) for a complete and thorough discussion.

Your local prostate cancer support group can be an excellent source for information and psychological support in addressing the side effects of hormone therapy. UsTOO ([www.ustoo.org](http://www.ustoo.org)), American Cancer Society Man-to-Man ([www.cancer.org](http://www.cancer.org)), and the California Prostate Cancer Coalition ([www.prostatecalif.org](http://www.prostatecalif.org)) will guide you to your local support group.

## **Other Considerations**

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Hormone therapy has a finite period of effectiveness for most men. Eventually, the hormone therapy may stop working—for some men that can take 10–20 years or even longer; for others it can happen within months. Much current prostate cancer research is focused on discovering why this happens and on new treatments for advanced prostate cancer. There are several exciting new developments, with many more in the pipeline of clinical trials.

### *Indications that resistance to hormone therapy may be developing:*

- Continuous hormone therapy—A rising PSA while you are on hormone therapy (when a blood test confirms that your testosterone level is low) is the main indicator of declining effectiveness.
- Intermittent hormone therapy—Potential indicators that the treatment is becoming less effective are that the lowest point the PSA reaches on hormone therapy is higher than it was initially, or that the duration of time off hormone therapy becomes shorter.

### *Should the hormone therapy be stopped at this point?*

Not necessarily. The conversion of the cancer to a form that is less sensitive to hormone therapy is usually a gradual process, and some of the cancer will continue to respond to standard treatment. In general LHRH antagonists/agonists are not stopped.

There are a large number of therapies for patients with prostate cancer that is growing despite low testosterone levels. UCSF is a leading center for these and other therapies. Your doctor can discuss these with you.

## **UCSF Resources**

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At UCSF there are excellent resources available.

Familiarize yourself with the UCSF Ida Friend Cancer Resource Center (CRC) (415-885-3693), located on the lobby level at UCSF Mount Zion Cancer Center at 1600 Divisadero. The CRC has many programs and lectures, as well as a place to sit if waiting for treatment. It boasts an excellent library, as well as a selection of pamphlets in the UCSF Health Matters series. You can sign up for their monthly e-mail newsletter to keep you informed.

Two programs are worth singling out. As a UCSF patient, you can receive a free one-on-one nutrition counseling session; speak to your doctor or nurse practitioner to make an appointment with our dietician. There are also informative monthly lectures on Nutrition and Prostate Cancer open to all patients and their families; the CRC will provide you with the dates. You can also see an exercise counselor, who can assess your exercise capacity, help formulate a practical program, direct you to classes and follow-up with your progress; call 415-514-6430 to make your appointment.

The UCSF Symptom Management Service is available to help you manage many of the side effects you may encounter. They have programs to assist with pain management, stress management and more. Speak to your doctor or nurse practitioner for a referral.

## **Glossary of Terms**

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**Adrenal glands:** A pair of glands located near the kidneys that are responsible for producing multiple steroids and hormones, including testosterone.

**Androgens:** Hormones associated with male physical and sexual characteristics. The principal androgen is testosterone; the principal female hormone is estrogen.

**Anti-androgens:** A class of drugs that blocks the uptake of testosterone by the cancer cell.

**Bone scan:** A bone scan is a radiology test used to look for cancer in the bones.

**Brachytherapy:** A treatment where radioactive material is inserted into and/or near the prostate.

**CT scan:** A computed tomography scan, also known as CAT scan, is a test used to look for cancer in the lymph nodes and organs.

**Erection:** The state of the penis when it becomes engorged with blood resulting in a firm, erect position.

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

**Gleason grade or score:** This is a grading system to determine the aggressiveness of a prostate cancer. Biopsy samples are examined under a microscope by a pathologist. The most common and second most common type of cells seen are graded on a rank of 1–5 based on how different the cells appear from normal cells. The two numbers are then added together to make a number between 2 and 10. Low scores of 1 through 4 are rarely seen.

**GnRH antagonists and agonists (also called LHRH antagonists and agonists):** Gonadotropin releasing hormone antagonists or agonists shut down the production of testosterone by the testes.

**Hypothalamus:** A regulatory center located in the brain. One of its functions is to secrete hormones as part of a cascade of events that ultimately results in the production of testosterone.

**LHRH (Luteinizing Hormone Releasing Hormone):** a hormone released by the brain that stimulates release of testosterone from the testicles.

**Libido:** The desire for sexual activity.

**Locally advanced prostate cancer:** The cancer is outside, or suspected to be outside, the prostate gland but still in the neighborhood of the prostate; seminal vesicles and/or local lymph nodes may be involved.

**Lymph nodes or glands:** Small, bean-shaped collections of tissue located along the channels of the lymphatic system that may trap infectious organisms or cancer cells. Those closest to the prostate capsule are located in the groin.

**Metastatic disease:** Cancer cells located outside the prostate (e.g. the lymph nodes or bones).

**MRI:** Magnetic resonance imaging, a form of radiology imaging that is often used to evaluate the prostate.

**Orchiectomy:** The surgical removal of the testicles.

**Pituitary gland:** A gland that exerts a controlling or regulatory influence on other glands, such as the adrenal gland.

**Prostate:** A gland that surrounds the male urethra and produces fluid that combines with semen to form the ejaculate.

**PSA:** Prostate specific antigen is a protein produced by prostate cells whether they are healthy or cancerous; it is measured with a simple blood test. For men diagnosed with prostate cancer, PSA can be used as a cancer marker to determine the success of treatment. Higher PSA levels may suggest the presence of more prostate cells.

**Radical prostatectomy:** Surgical removal of the prostate gland.

**Serologic Progression:** The state of having a rising PSA after prostatectomy and/or radiation but no disease visible on scans.

**Testicles:** Two glands that reside in the scrotum and produce testosterone and sperm.

**Testosterone:** A male hormone produced by the testicles that is responsible for inducing and maintaining male secondary sex characteristics. The adrenal glands also produce a small amount of testosterone.

*Prepared by UCSF health care professionals and advocates*



