

Hormone Therapy and Prostate Cancer A Patient Guide

Urologic Oncology Program

UCSF Helen Diller Family Comprehensive Cancer Center

University of California, San Francisco - Tel: 415.353.7171

This guide is designed to provide general information that may be helpful to you before starting and during hormone therapy. We hope this helps you understand what to expect from, and how to deal with, all aspects of being treated with hormone therapy. Special thanks to all previous contributors to this document. Definitions for words in bold can be found at the end of this document. If you are reading this online, and have the latest free Adobe Reader, the definitions will appear while hovering over the word.

If you have non-urgent questions related to your health and treatment, please contact your provider through the UCSF online patient portal **MyChart**. If you think you may be experiencing a medical emergency, please call 911 or go to your closest emergency room. The **MyChart** portal can be accessed at: <http://www.ucsfhealth.org/ucsfmychart/>.

Your Feedback

We regularly revise the information presented in this guide in order to keep it up to date and ensure it is as useful as possible to the reader. Because changes and new developments can occur frequently, we suggest you talk to your provider for the latest information.

Your feedback about any aspect of this guide would be much appreciated. You can e-mail your comments to urologyresearch@UCSF.edu or send them by regular mail to Your Health Matters Box 1695, UCSF Department of Urology, San Francisco, CA 94143-1695.

If you wish to talk with a patient advocate, please call (415) 885-7210.

This guide, along with other urologic oncology documents, can be viewed online with this link: <https://urology.ucsf.edu/prostate-cancer-education-documents>.

If you are reading a hard copy, please also refer to the above link for the most up-to-date information.

Authors UCSF Patient Advocate E. Dennis Brod and Hala Borno, M.D.

TABLE OF CONTENTS

ABOUT HORMONE THERAPY	Page 3
Hormone therapy and prostate cancer	Page 3
Kinds of hormone therapy	Page 3
When hormone therapy is indicated	Page 3
When/why hormone therapy is recommended	Page 4
TESTOSTERONE	Page 5
What it is	Page 5
How testosterone is made	Page 5
How testosterone helps prostate cancer grow	Page 6
HORMONE THERAPY CHOICES	Page 6
Orchiectomy	Page 6
LHRH agonists	Page 6
LHRH antagonists	Page 6
Anti-androgens	Page 7
Medication Table 1	Page 8
Medication Table 2	Page 8
Medication Table 3	Page 8
Medication Table 4	Page 9
INTERMITTENT HORMONE THERAPY	Page 9
OLIGOMETASTASIS	Page 9
SIDE EFFECTS	Page 10
DIET AND EXERCISE	Page 13
UCSF RESOURCES	Page 14
GLOSSARY OF TERMS	Page 14

About Hormone Therapy

Hormone therapy in **prostate** cancer is considered a systemic treatment. A systemic treatment affects the whole body and can be in the form of tablets, pills, or capsules taken at home or it can be by injection or infusion given in a clinic. Hormone therapy has been proven to be an essential tool for the **clinician** in helping many prostate cancer patients. The following are some topics related to hormone therapy that may help you understand its role in the treatment of prostate cancer.

Hormone therapy and prostate cancer

The hormone relating to both the growth of, and treatment for, prostate cancer is **testosterone**. Testosterone will be discussed in detail further on. The kind of hormone therapy (HT) for prostate cancer seeks to interfere with the production of testosterone or the ability of the cancer cells to use it. HT is often referred to as **androgen** deprivation therapy (ADT). This will be explained further on.

The reason for reducing testosterone levels in prostate cancer treatment is that prostate cancer cells thrive on androgens such as testosterone. Medical evidence further tells us that eliminating, or substantially reducing, its production will significantly aid in controlling (and sometimes arresting) the progression of the disease. A later section in this guide will elaborate about testosterone.

Kinds of hormone therapy

Hormone therapy (HT), sometimes called endocrine therapy, describes a number of treatments. In some conditions or diseases, hormones are prescribed for, and actually given to, patients in order to increase certain hormone levels. This is frequently referred to as hormone replacement therapy (HRT). Hormones can be natural (endogenous) or synthetic, meaning produced commercially (exogenous). Patients who do not have prostate cancer but have symptoms due to low testosterone levels such as fatigue, may be prescribed testosterone as a type of HRT. Patients with prostate cancer under control may, in certain cases, receive this type of hormone therapy as well, however, because of the potential risk of activating the cancer, some clinicians may advise against it. Children or adults suffering with hypogonadism (failure of the testes to function properly) are prescribed testosterone as an HRT.

As mentioned previously, HT in prostate cancer involves reducing the production of one certain hormone (testosterone) rather than increasing it thereby interfering with the cancer cells' ability to use the hormone in order to grow.

The types of hormone therapies that have become standard treatments for prostate cancer are the ones we will be discussing in detail throughout this patient guide.

As with all the treatments appearing in this publication, choices should be carefully made by the patient and clinician together.

When hormone therapy is indicated

HT can be administered before, during or after a localized treatment (such as **radical prostatectomy**, radiation, HIFU, cryotherapy, etc.). If given before the localized treatment, it is called neoadjuvant therapy. If given after localized treatment without any evidence of prostate cancer recurrence, it is called adjuvant therapy. If prescribed after localized treatment at time of prostate cancer recurrence, it is called salvage therapy. Clinicians make treatment recommendations based on the specific facts of each particular patient.

Sometimes, neoadjuvant (before surgery, radiation, etc.) HT is given when the localized treatment is delayed. This can be due to a patient's need for more time to make a decision as to what his primary treatment will be or for other reasons like reducing the size of the prostate gland before primary treatment. Starting neoadjuvant HT will usually slow or stop cancer growth for a period of time.

Many radiation oncologists use HT along with radiation treatment in the belief that HT will weaken cancer cells and make them more susceptible to being killed by the radiation. Clinical research studies have suggested that there is a synergy (meaning they work better together) between radiation and hormone therapy and that trials have shown improved outcomes for patients receiving combined therapy.

After one specific localized treatment (radical prostatectomy), if **PSA** levels become detectable, this is considered to be a recurrence of the disease. With other localized treatments, a rising PSA may indicate a recurrence and the clinician will make a determination as to prescribing HT as a treatment. This is called salvage treatment, which is typically given in combination with radiation therapy for patients who previously underwent surgery.

When and why hormone therapy is recommended

Hormone therapy may be recommended in the following circumstances:

- In combination with radiation, mostly for patients with certain risk factors (e.g. high **Gleason scores**). This is often given before (neoadjuvant), during (concurrent), and after (adjuvant) radiation.
- After radiation or surgery when PSA rises.
- As therapy for patients unsuitable for radiation or surgery.
- As therapy for **metastatic** prostate cancer (prostate cancer which has spread outside the prostate gland to other sites in the body).

Patients diagnosed with non-metastatic or localized prostate cancer are divided into three categories depending on the characteristics of their cancers – low risk, intermediate risk and high risk. These categories aid in estimating the likelihood of the cancer recurring after localized treatments such as surgery, radiation HIFU, cryotherapy, etc.

Patients diagnosed with low risk prostate cancer choosing a localized treatment are generally not given HT. Nor is HT prescribed for low risk patients preferring to monitor their cancer on an Active Surveillance (AS) program.

Patients with intermediate or high risk prostate cancer, depending on specific circumstances, may choose a treatment option without HT, but HT may be used after an initial treatment if there is a recurrence of prostate cancer. HT may be considered as part of the initial treatment approach and given in combination with radiation to the prostate gland and pelvic **lymph nodes**. These are decisions you will make with guidance from your doctor or treatment team.

Some patients may be not suited for the usual localized treatments based on:

- advanced age
- pre-existing health conditions
- consideration of potential side effects

In these, and other cases, HT may be an option.

Hormone therapy has been the standard of care for patients with metastatic disease (disease that has spread outside of the prostate gland) for some time instead of, or in combination with, chemotherapy. These are systemic therapies, meaning that they can kill prostate cancer cells throughout the patient's entire system, regardless of their location. They can treat bone, lymph nodes and organs including the prostate gland itself.

In recent times, the use of chemotherapy has decreased in the initial treatment planning, but HT continues to be the most prescribed systemic therapy.

Of note, prostate cancer that has metastasized (spread) to other areas of the body remains prostate cancer and not bone cancer, kidney cancer, etc. Cancers are named after their place of origin, not where they spread to.

New developments in technology, however, offer a means to treat a metastatic site sometimes in place of, but normally in combination with, HT. This will be discussed in the **oligometastasis** section.

Testosterone

What it is

All patients produce a hormone called testosterone.

Testosterone is one of a number of different hormones called androgens that are linked to sexual health and other effects on the body.

During puberty, the 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.

Testosterone does not cause prostate cancer, but once prostate cancer occurs, it takes on an additional role - it helps prostate cancer cells grow.

How testosterone is made

There are two different pathways which produce testosterone in the male body: from the testicles (almost all of the testosterone) and from 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.

How testosterone helps prostate cancer grow

Testosterone travels through the blood and eventually reaches prostate cancer cells where it helps the cancer grow. One can think about testosterone as a hormone that “feeds” the cancer. Up to a point, the more testosterone the cancer cells have, the more the cancer can grow, thrive, and then spread (metastasize) to other parts of the body. Since the male hormone testosterone is an androgen, the principal therapy that targets testosterone is known as androgen deprivation therapy (ADT). When referring to this type of hormone therapy, use of the term ADT is very common.

Before considering the material on choices of therapies, it is important to appreciate the role of the prostate specific antigen (PSA) which is measured with a blood test. PSA is a protein produced by cells in the prostate gland. A rising PSA level may be caused by an infection or some kind of irritation, but aside from those things, it is typically associated with a diagnosis of prostate cancer. After diagnosis, the level of PSA is used as an indication of success or failure of any given treatment. With ADT, which targets the testosterone feeding the cancer cells, the reduction of testosterone typically results in reduction of PSA. The speed at which PSA levels rise is called the velocity which is important for evaluating how fast the cancer is progressing.

Hormone Therapy Choices

Please see side effects on page 10.

Orchiectomy - surgical removal of the testicles

In the past, before development of advanced ADT drugs, **orchiectomy** was more in use. Today, it is not a common treatment. It removes the testicles (but not 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 challenging; intermittent hormone therapy may be advantageous and will be discussed in greater detail later in this guide. Another problem with orchiectomy is the psychological effect. Many patients may feel distress and a loss of their manhood if they undergo this surgical procedure.

LHRH agonists

LHRH agonists (luteinizing hormone-releasing hormones) stop the testicles from making testosterone. LHRH agonists are frequently called LHRH analogs or **GnRH** (gonadotropin-releasing hormones) agonists which technically have a slightly different mechanism than the LHRH agonists. All of these are drugs that lower the amount of testosterone made by the testicles. Treatment with these drugs is sometimes called medical or chemical castration because they lower androgen levels just as well as orchiectomy.

This may sound confusing and ironic, but these drugs lower testosterone by encouraging a continuous message from the brain to actually produce more testosterone in order to over-stimulates the testes; they respond to being "overworked" by switching off. The initial overstimulation is also the reason why some patients 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 patient starts LHRH therapy.

LHRH antagonists

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-androgens like bicalutamide or flutamide (see below) may not be necessary.

When either of the LHRH medications is stopped, the testicles usually resume production of testosterone. The time this takes varies in each patient, but it can range from several months in younger patients to several years or not at all in older patients. Typically, however the time it takes for testosterone production to resume, relates to the length of time having received ADT.

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

Oral medications

Anti-androgens are oral medications that attempt to prevent cancer cells from using testosterone and/or its component, dihydrotestosterone (DHT). Anti-androgen drugs do not stop the testicles or the adrenal glands from making testosterone, rather, they inhibit the cancer cells' ability to use testosterone. An anti-androgen from Table 2 can be used in combination with one of the medications listed in Table 1. This combination therapy is called combined androgen blockade (CAB). They may sometimes be more effective than use of a LHRH agonist or antagonist alone. The number of anti-androgen drugs has increased recently providing doctors and patients a wider choice each with a slightly different mechanism.

Anti-androgen, hormone blockade drugs, known as 5-alpha reductase inhibitors (5-ARIs), reduce the production of dihydrotestosterone (DHT). These drugs in Table 3, finasteride and dutasteride, are sometimes prescribed in combination with one of the previously-described anti-androgens. This is a peripheral androgen blockade (PAB). Addition of the 5-alpha reductase inhibitors to two of the CAB drugs has not been shown to be more effective than standard CAB, therefore, this form of androgen blockade (triple androgen blockade or TAB) is not in wide use.

All the drugs in Table 4 are classified as androgen signaling inhibitors (ASIs). They are a newer class of drugs that act along the androgen pathway. These drugs are oral therapies and are typically considered for patients with more advanced disease, such as metastatic prostate cancer (situations where the prostate cancer has left the prostate gland). All ASI medications are currently used in combination with ADT. These medications each have their own particular side effects that require regular monitoring with simple blood tests. Additionally, some of these medications may interact with other commonly prescribed medications. Therefore it is important for patients to have their doctor review all of their current medications and make changes if necessary prior to starting these new therapies.

Regarding all drugs mentioned in this guide, it should be noted that there is ongoing research and newer therapies may become available that are not described here.

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 45 mg every 6 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 antiandrogens.	240 mg initially (loading dose) followed by 80 mg every 4 weeks

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

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

Table 4: Androgen Signaling Inhibitors - Medications that act on the androgen pathway.

Generic Name	Trade Name	Treatment dose	How does this drug work?
Abiraterone Acetate and prednisone	Zytiga®	Abiraterone (1000mg daily) prednisone (5mg or 10mg daily)	Blocks androgen production from the adrenal glands
Enzalutamide	Xtandi®	160mg daily	Androgen receptor blocker
Apalutamide	Erleada®	240mg daily	Androgen receptor blocker
Darolutamide	Nubeqa®	600mg twice daily	Androgen receptor blocker

Intermittent Hormone Therapy

Intermittent hormone therapy (IHT) is the standard of care for patients with recurrence that is non-metastatic.

There are two main reasons for intermittent rather than continuous treatment. The first reason relates to improving quality of life. In the interim period, often called a “holiday,” the patient’s testosterone levels are permitted to rise thus limiting the adverse effects of the therapy. The second reason, which has not yet been fully substantiated, is the possibility of extending the time that the hormone therapy drugs are effective. Unfortunately, with most patients with recurrent disease, the drugs eventually lose their effectiveness. When HT is started, most of the cancer cells are hormone sensitive, and depriving them of the hormone testosterone impairs their growth. At some time, the cells find a way to either grow without testosterone or learn to make their own. These cells have become hormone-refractory (not sensitive). This phase is called castrate (or castration) resistant prostate cancer (CRPC) and can occur in a few months (rarely), in a few years or never. While the drugs are still working, they are very effective.

A typical IHT example at UCSF would be therapy for 9–12 months and then a holiday. During the 9–12 month therapy period, PSA will likely decline. After the medication is stopped, during the holiday period, the PSA will eventually begin to climb again. When the PSA reaches a pre-determined number or rises at a pre-determined rate defined by you and your physician, the medication will be restarted for another 9–12 months. How quickly the PSA climbs depends on how quickly the testosterone level recovers. Each patient is different. This on and off cycling of the medication continues for as long as the cancer appears to be under control. IHT may not be appropriate in all situations and must be discussed with your doctor.

Oligometastasis

Oligometastasis is a fancy word to describe the status of a patient whose cancer has spread outside the prostate gland, but in only a few (oligo means few) locations, usually fewer than five. This is variable depending on the size and location of the tumors. Recognition of this status has become important due to the development of new diagnostic methods and techniques for treating tumors focally (at the site where they are found).

Historically, when a patient develops metastatic disease (cancer that has spread), the only treatments considered were systemic, i.e. affecting the entire body, as opposed to focal (to a specific site). Not long ago, systemic treatment consisted principally of chemotherapy or hormone therapy. In recent years, new systemic treatments have become available that may be used in place of, or in addition to, the old systemic drugs. But something else happened in the world of treating prostate cancer – a method of imaging even very small tumors and a way of reducing them or ablating (removing) them altogether. To diagnose these small tumors, there are new imaging methods such as the PSMA/PET scan which is very sensitive. Examples of focal treatments are stereotactic body radiation therapy (SBRT) and magnetic resonance guided focal ultrasound (MRgFUS), processes that target a specific metastatic tumor with great precision.

None of these new developments has diminished the use or benefits of HT, which continues to be an extremely effective treatment.

Side Effects

Please note that this is not an all-inclusive list. Please consult with your provider about side effects.

This section describes the common side effects (sometimes called adverse effects/AE's) of ADT and provides some suggestions for minimizing them.

Most of the side effects experienced by patients receiving hormone therapy are caused by low testosterone. Some of these side effects may be minimized with the use of a peripheral androgen blockade (PAB) which inhibits the cancer cells from using testosterone without reducing testosterone levels. This would be an alternative to ADT. However, this therapy has restrictions and may not be appropriate for everyone, so its use must be discussed with your doctor.

As to regular HT targeting the testosterone itself, 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 these side effects are experienced over time. Patients treated for 8 months or fewer are less likely to experience many of them, 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 patients will experience all side effects. There is also large variability in their severity.

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

Recommendations: Very troublesome hot flashes can be treated with different medications like venlafaxine or megestrol (Effexor® or Megace® respectively). Warm 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 patients receiving hormone therapy experience some decrease in sexual desire and erectile dysfunction.

Recommendations: Working cooperatively with your partner to accommodate the changes resulting from HT can help you remain sexually active. Counseling for both partners is usually available.

- Depression, mood changes, anxiety and irritability. - Low testosterone impacts brain chemistry and may result in mood changes. See Managing Erectile Dysfunction - A Patient Guide found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>.

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 patients, 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 side effects, but is also important in minimizing weight gain (see below) and reducing the risk of cardiovascular disease. Just walking for a half hour three times per week can provide some positive benefit. See this guidebook on lifestyle and behavior change that can help. See health and wellness guides found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>.

- 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 and/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: If bothersome, 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 patients 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 our health and wellness guides found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>.

- Diminished brain function—Data about the effect of hormone therapy on brain function have been mixed, but many patients report changes in concentration, clarity of thought and memory. UCSF Oncologists are developing a series of studies in conjunction with the Memory and Aging Center (MAC) at UCSF to evaluate the extent and timing of side effects, and the risk factors.

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 or gain—Loss of testosterone results in loss of body hair over time. Patients 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 patients may experience shrinkage of their penis or testicles (hypogonadism) because of reduced testosterone.

Recommendations: If this distresses you and/or your partner, discuss it with your physician and consider counseling. See Managing Erectile Dysfunction - A Patient Guide found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>.

- Bone loss/osteoporosis—Osteoporosis is thinning of the bones. Older patients, smokers or patients who receive hormone therapy for more than 12 months, are at a higher risk for developing this condition. Osteoporosis is diagnosed by a bone density imaging (DEXA) test. If you expect to be receiving 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 when there is a significant reduction in bone density. An oral medication, such as Fosamax[®], can be taken once a week, while medications such as zoledronic acid (Zometa[®]) infusions are given every 3–4 weeks or at longer intervals. Denosumab (Xgeva[®] or Prolia[®]), 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: Moving Through Cancer: A Guide to Exercise for Cancer Survivors, which can be found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents> 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. Discontinuation of the medicine almost always results in normalization of the liver tests. Switching to another anti-androgen is often successful as well.

Recommendations: Ask your clinician to have liver function tests every 3 months. If your tests are abnormal, you may be asked to change some practices such as reducing your alcohol or acetaminophen (Tylenol) intake. Be sure your clinician knows all the medications you are taking.

- 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 levels and that you inform your primary care physician that you are receiving 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. Check out this evidence based dietary guidebook Health and Wellness found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>. 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 with hormone therapy. Other solutions, such as penile injections, pump, and prostheses may be appropriate. Consult with your physician. You may want to look at Managing Erectile Dysfunction - A Patient Guide found on this page <https://urology.ucsf.edu/prostate-cancer-education-documents>.

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), American Cancer Society Man-to-Man (www.cancer.org), and the California Prostate Cancer Coalition (www.prostatecalif.org) will guide you to your local support group. Also for UCSF patients, <http://cancer.ucsf.edu/support/crc/>, is available.

Diet And Exercise

As indicated in the previous section addressing side effects, diet and exercise play an important role in dealing with prostate cancer in general and with hormone therapy specifically. In terms of HT, diet and exercise may aid in three ways:

1. Possibly slowing progression of the cancer as indicated in some studies relating particularly to exercise.
2. Helping to reduce the impact of side effects on both your body and mind.
3. Improving the condition of your body to diminish the potential of **comorbidities**.

The following section provides some practical ways to receive guidance in following a healthier lifestyle.

UCSF Resources

At UCSF there are excellent resources available.

The Ida Friend Patient and Family Cancer Support Center (415-885-3693), located on the lobby level at UCSF Mount Zion Cancer Center at 1600 Divisadero and at Mission Bay, 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 email newsletter to keep you informed. See <http://cancer.ucsf.edu/support/crc/> for more information.

Two programs are worth singling out. As a UCSF patient, you can receive a free one-on-one nutrition counseling session; speak to your clinician 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 cancer support center (above) 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 clinician for a referral.

Glossary of Terms

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.

Clinician: A physician (or nurse practitioner) actively seeing, treating and rendering health care to patients, as opposed to being engaged in academic, theoretical or laboratory endeavors.

Comorbidities: Serious medical conditions which exist at the same time, such as prostate cancer and heart disease.

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

Gleason grade or score: This is a grading system to determine the aggressiveness of a prostate cancer. A pathologist examines biopsy samples and assigns a score depending on the severity of the cancer.

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.

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.

Oligometastasis: A type of metastasis in which cancer cells from the original (primary) tumor travel through the body and form a small number of new tumors (metastatic tumors) in one or two other parts of the body.

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 and other peripheral tissue.

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.

Examples of concerning symptoms:

You develop an unexplained rash.

You develop new swelling in an arm or leg.

You have difficulty breathing.

You have repeated fevers, chills, or a temperature greater than 38°C (over 101°F).

You have fallen without explanation.

You have an unexplained severe pain.

You are nauseated and/or vomiting.

Please contact your cancer provider if you have worrisome symptoms

For emergencies that cannot wait, call 911

IMPORTANT NOTE:

Regarding the content of this document, all medical advice, instructions and information (including references to medications, rehabilitation techniques, time frames and products) are based on standards prevailing at the time of publication.

The reader is recommended to discuss questions with their provider.

As a UCSF patient, you are encouraged to contact us if you experience any unusual signs or symptoms. For non-urgent issues, please use MyChart. Your request will be routed to a clinician who will respond to you as soon as possible.

<http://www.ucsfhealth.org/ucsfmychart/>

For emergency issues, please call 911. If you experience any concerning symptoms please try to contact a healthcare provider.