

# Testis cancer: What to do about it?

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Testis cancer is relatively rare compared to other cancers; there are about four to five cases per 100,000 adult North American males. It accounts for about 1% of all cancers in males. It affects mostly the younger age group, ages 15 to 35. In fact, it's the most common cancer in young men between the ages of 25 to 35. It is more common in the white races compared to races of Asian and African origin. In the last 50 years, testis cancer has become more common worldwide.

## What is a testicle (or testis, plural testes)? And what is testicular cancer?

The two testicles (or testes) in a man are part of the reproductive system. They are two egg-shaped organs below the penis, inside a pouch called the scrotum, each being suspended there by a rope-like structure called the spermatic cord. The testes make testosterone (male hormones) and sperms. Sperm are formed in “gem cells” inside the testis. The testes develop deep inside the abdomen at an early stage and move down into the scrotum before birth.

Cancers are abnormal growths in the body which are not under normal control. Testis cancers (or testicular cancers) are malignant growths starting in the cells of the testis (called “germ cells”).

## What causes testis cancer?

Although we don't fully understand it, some events occurring while you're in the womb appear to be responsible. An “undescended testis” (abnormal development in the fetus where the testis does not move down into the scrotum before birth), also known as “cryptorchidism,” is a major contributing factor.

Abnormal development of the testis itself may increase the risk of testis cancer as well. Certain abnormalities in your chromosomes (your genetic makeup) have been identified more frequently in testis cancer, although the reasons are not fully understood. See Table 1 for a breakdown of the risks.

### Table 1. Who is at higher risk of testes cancer?

- If you have small, under-developed testes
- If you have a hard time fathering children
- If you have some abnormalities in your genetic makeup
- If your mother was exposed to unusually high levels of female hormones while you were in the womb
- If you have a family history of testis cancer (brother, father, perhaps uncle)
- If you have a history of previous testis cancer on one side
- *You are not at risk if you've had an injury to the scrotum or testis*

## Are there different types of testis cancer?

There are several varieties of testis cancers which originate from the cells of the testis. Germ cell tumours are the most common type. There are five main types of germ cell tumours: (1) seminoma, (2) embryonal cell carcinoma, (3) teratoma, (4) yolk sac tumours, and (5) choriocarcinoma.

Often, within a germ cell tumour, there is a mixture or combination of these five cell types. Your doctor will decide on treatment based on the type of germ cell tumours and the extent of the cancer. A “seminoma” is a slow-growing tumour that is just in the testes, but it can spread. A “non-seminoma” grows faster and is made up of more than one type of cell or germ cell tumour (as described above).

Some much less common varieties of testis tumours are non-germ cell tumours and include Leydig cell tumours and Sertoli cell tumours.

Certain cancers start from another organ and spread to the testis. These are called “secondary cancers” or “metastatic cancers.” Cancer of blood cells (called “leukemia”) and cancer of the lymph system (called “lymphoma”) are the more common cancers which can involve the testis.

## How does testis cancer usually grow and spread? What other areas of the body does it affect?

In this chapter, we’ll only cover the most common type – germ cell tumours.

A germ cell tumour starts inside the testis and grows outwards. It then reaches and “invades” the layers covering the testis – the “capsule” or “tunica.” It may also invade neighbouring structures connected to the testis, called the “epididymis.” Eventually, the cancer reaches the layers of the loose skin sac, the scrotum.

Besides growing inside the testis, the cancer cells can escape from the testis and spread to other parts of the body by two routes: (1) through the lymph channels or “lymphatics”, which is a lace-like network of many small tubes inter-connecting with “stations” called lymph nodes; and (2) through blood vessels running through the testis. As the tumour cells reach the small tubes with fluid flowing through them (lymph fluid inside lymph channels and blood inside veins), they may be carried away by the fluid into places outside of the testis and may eventually “land” or take root somewhere else and start growing there. This process is called “metastasis.” Germ cells can travel by two ways:

1. Germ cell cancers which travel through the lymph channels deposit in lymph nodes. The first lymph nodes they “land” in are the ones higher up deep inside the abdomen, near the kidneys, close to the biggest artery in the body (the aorta) and the biggest vein (vena cava). If the lymph glands there become affected by cancer cells, they will start growing and those lymph glands enlarge. Then the cancer cells travel further along the lymph channels and land in lymph glands lower down in the pelvis and also up behind the heart, up to glands near the collar bone, armpit areas and up the neck region.
2. Germ cell cancers which travel through the blood vessels are often first carried to the lungs and are deposited there, where they start growing as “lung nodules.” Later, they may land in other organs, such as the liver and brain.

## What changes in the body might the person notice or feel if he has testis cancer?

The physical “signs” (what you see) and “symptoms” (what you notice or feel) depend on how far along the cancer has grown or spread before the cancer is discovered, and what part of the body has become affected.

Early on, when the tumour is still inside the testis, you may not have any symptoms or signs. Later on, you may have some aching dull pain or feeling of heaviness in the scrotal sac. You may notice a hard lump in the testis inside the scrotal sac as the tumour grows. Less common is sudden severe pain, due to twisting of the testis around the spermatic cord. The tumour may cause some irritation, resulting in tissue fluid build-up around the testis, inside the scrotal sac. Rarely, there may be bleeding inside the scrotal sac, with buildup of blood in the scrotal sac. The different types of fluid build-up would show up as a large swelling between the legs.

## What’s the first sign of trouble?

The first sign of trouble may be the result of cancer cells which have already spread elsewhere.

- Spread to the abdominal lymph glands is relatively common and may show up as a large lump felt inside the abdomen.
- You may feel pressure or pain as the mass presses on other organs inside the abdomen.
- You may have swollen lymph glands in the neck, near the collar bone or in the armpit areas.
- You may cough, have bloody sputum and shortness of breath if the cancer has spread to your lungs.
- You may have headaches, seizures or other brain disturbances if the cancer has spread to your brain.
- Your breasts may be enlarged, you may have pain or swelling or there may be some milky discharge from the nipples (this is rare).
- You may experience weight loss, tiredness, loss of energy and a generalized feeling of being unwell, if your cancer is more advanced.

## What other conditions can mimic testis cancer? How do we distinguish between testis cancer and these different conditions?

Your doctor will ask you questions about your medical history and will examine you and order some tests. All the information and clues are used together to decide on the nature of the problem (possible diagnosis of testis cancer). Your family doctor will likely refer you at this point to a surgical specialist (a urologist).

## Not too fast – some conditions may be mistaken for testis cancer

There are several conditions which cause swelling or pain in the scrotum area which may be mistaken as testis cancer.

- Fluid buildup in the scrotum area causes the sac to become larger, but it may simply be some harmless tissue fluid (called a “hydrocele”).
- If the scrotum area had been hit or injured accidentally, there may be bleeding inside or around the testis, also showing up as a large scrotum (usually with pain and bruising of the scrotal skin).
- A hernia shows up as a bulge in the groin (sometimes with some bowel loops in the bulge), but can be felt in the scrotum separate from the testis itself.
- An infection in the epididymis (attached to the testis) or testis itself often presents, over a period of a few days, as a painful lump (unlike a testis cancer which is usually not painful), usually on the top or bottom of the testis.
- Sudden twisting and winding of the cord from which the testis is suspended will first choke off the blood flow coming out from the testis and eventually shut off blood going into it. This causes the whole testis to become a very tense and firm lump and which causes sudden severe pain.
- Sometimes, a collection of semen fluid in a sac near the testis builds up in a ball-like structure (may feel like a separate testis). This usually does not cause any problems and is harmless.

After getting your history and examining you, your doctor may confirm the diagnosis or order more tests.

## What tests will your doctor do?

Your doctor may arrange an ultrasound of the scrotum to confirm the diagnosis. Blood tests, including “tumour makers” known as “alpha-fetal protein” (AFP) and “beta HCG” (bHCG), will be taken.

A chest X-ray and CAT scan or CT scan of the abdomen and lungs will be arranged. Your urologist will arrange for surgery to remove the testis, a procedure called “radical orchiectomy.”

## What happens with the testis removal (orchiectomy) procedure?

The surgery is short (less than one hour) and performed under an anesthetic. A short incision is made in the lower groin area. You can go home either the same day or the next morning. The testis containing the cancer will be studied by the pathologist to determine the type of cancer and to decide on the next steps.

## What are blood tumour markers? And how are they used?

Some, but not all, germ cell cancers produce some substances (AFP and bHCG) at higher levels than normal and can be detected by blood tests, when the cancer is in the testis and /or elsewhere in the body where the cancer has spread to. They are known as “tumour markers.” Some germ cell tumours, (almost all seminomas and some non-seminomas) do not produce these tumour markers. So, if the blood tests do not find these markers, it doesn’t necessarily mean there is no cancer. However, if the blood tests detect these markers, it confirms the diagnosis.

The markers should be measured again after removing the testis. With the germ cell cancers which produce the markers, they will still be detectable if there is still cancer left in the body (they will produce the markers whether the cancer is in the testis itself or in locations it has spread to, i.e. “metastatic sites”). In such cases, the markers can be monitored with repeated measurements to see if the cancer is responding to treatment.

If the markers start rising again after having come down to a normal level, that usually mean the cancer is becoming active again or has returned (“relapsed”) and further treatment is needed.

## What are the different “stages” of testis cancer?

The “stage” of the cancer means how far along the cancer has grown or spread. The information comes from examining you, from the outcomes of your surgery and from the CT scans and X-rays. See Table 2.

**Table 2. Stages of cancer and what they mean**

<b>Stage 1</b>	This means the cancer is limited to the testis.
<b>Stage 2</b>	This means the cancer has spread to the lymph glands in the abdomen.
<b>Stage 3</b>	This means the cancer has spread to lymph glands further away from the abdomen or it has spread to other organs such as the lungs.

## What are the next steps after you’ve removed the testis with cancer?

Your pathologist will examine the specimen and decide which type of cancer it is. There are five main cell types: (1) seminoma, (2) embryonal cell carcinoma, (3) teratoma, (4) yolk sac tumours and (5) choriocarcinoma. Often there are mixtures of different cell types within one cancer. Your doctor will decide on further steps based partly on whether the diagnosis is a “seminoma” or a “non-seminoma.”

More blood tests will be done after surgery to compare your blood levels before surgery.

A CT scan of the chest and abdomen will be done (you may already have had the test before the testicle removal surgery). This information is also important in deciding whether you need more treatment at this point and whether you need to see a different specialist (a “radiation oncologist” if you may need radiation treatment or “radiotherapy” or a “medical oncologist” if you may need chemotherapy).

## What are the treatment choices after you've removed the testis?

Depending on the type of germ cell cancer, results of the blood marker tests and CT scans, we'll know the "stage" of the cancer and can decide whether further treatment is needed at this point. The choices include chemotherapy, radiotherapy, surgery or no further treatment.

If the CT scans and blood tests are normal, you may not need more treatment, but you'll need regular and frequent blood tests, X-rays and scans for several years. Later on, if these tests become abnormal and indicate that the cancer has returned, you will need treatment (likely with chemotherapy).

If you have a seminoma, even with normal CT scans, you may need radiation treatment (radiotherapy) to the abdomen area. If you have a non-seminoma, you may need surgery for the lymph glands in the abdomen area, a procedure known as "retroperitoneal lymph node dissection."

### Why do I need treatment if the results are normal?

You'll need treatment because some glands may still contain early microscopic, really small, cancer.

If the scans show that the cancer is advanced (if it has spread to the lungs and / or there is extensive cancer in the abdomen), you will need drug treatment (chemotherapy) given through your veins ("intravenous"). Depending on how well you respond to this treatment (how well the tumours shrink, and whether the blood tumour markers return to a normal level), your tumour mass may still need to be removed.

## What is chemotherapy?

Chemotherapy is drug treatment to kill cancer cells. For testis cancer, treatment is usually given via the veins with a combination of two or three different drugs. The drugs are given once every few weeks with a rest period in between. Three or four "cycles" may be given. For testis cancer, chemotherapy is used mainly for more advanced cases, both non-seminoma and seminoma.

Although chemotherapy is intended to kill cancer cells, some normal cells and organs will also be affected as "innocent bystanders." The damage to normal cells presents as "side-effects" of the chemotherapy. Some side-effects are seen and felt soon after starting the chemotherapy treatment. Rarely, some side-effects only become a problem years after the treatment.

### What are the side effects?

- Nausea and vomiting – will usually resolve after the chemotherapy has been completed.
- Hair loss - growth will return after a couple of months after the chemotherapy has been completed.
- Temporary stoppage of sperm production (by the other "healthy" testicle – assuming the one with the cancer has already been removed).

- Low blood counts (“anemia”) include lowered number of red blood cells, white blood cells and platelets. Red blood cells contain “hemoglobin”, which carries oxygen to the different organs. A low red blood cell count or low hemoglobin may cause tiredness, shortness of breath, general illness. White blood cells help fight infections. A very low white blood cell count makes the person much more likely to get infections. Throat, lung and urine infections are the most common. Platelets help the blood to clot and stop bleeding if there is a cut or injury. A very low platelet count makes the person to bleed and bruise much more easily. There can be internal bleeding or bleeding seen in the urine, stool, sputum, skin etc. These problems usually resolve after the chemotherapy has been completed. Occasionally, your doctors may have to temporarily stop treatment until the blood counts improve before resuming.
- Some side effects occur only with particular drugs. For example, lung, breathing and skin problems may occur with a drug called Bleomycin; kidney, hearing, nerve function and circulation problems may occur with Cisplatin; nerve function problems can be caused by Etoposide. Some of these problems are mild and temporary. Others may be more serious and longer lasting.

## What is radiotherapy? What are the side effects?

Radiotherapy or radiation therapy is a treatment delivered from a machine with a beam aimed at the tumour. For testis cancer, radiotherapy is used occasionally to treat less advanced cases of seminoma, aimed at the lymph glands, after the testis containing the cancer has already been removed. Even though the lymph glands in the area appear normal on the CT scan, some cancer cells may already have landed there and your cancer doctor may decide to treat the area with radiotherapy. Your doctor will likely treat smaller seminoma tumour masses in the mid- and lower abdomen with radiotherapy. (Larger seminoma tumour masses are better treated with chemotherapy.)

The radiation causes damage to the cells in the path of the beam. Both cancer cells as well as normal cells are affected and so you have side effects.

### What are the side effects?

- With the radiation beams aimed only at the mid and lower abdomen, there may be skin changes similar to a sun-burn.
- Diarrhea, general tiredness and stomach upset may occur but are relatively uncommon.
- Low blood counts very rarely occurs and hair loss should not be a problem this type of radiotherapy.
- The remaining healthy testicle is shielded or protected from the radiation beam with a lead apron during treatment, so that normal functions of the testis, (i.e. making sperms and male hormones) can continue.

## What is “retroperitoneal lymph node dissection” surgery? What are the side effects?

Since the lymph glands in the mid-abdomen (the “retroperitoneal area”) are a common site for testis cancer cells to spread to, and your doctor needs to pay special attention to this area. If the lymph glands are somewhat enlarged (presenting as a “mass”), you may need surgery to remove them (a procedure called “retroperitoneal lymph node dissection” or RPLND). If the lymph glands are significantly enlarged and if the cancer has also spread to other sites, chemotherapy would be used first. RPLND may still be performed after chemotherapy is completed if there is a tumour mass remaining. This mass may not necessarily contain live cancer cells anymore. It may contain only scar tissue (“fibrosis”), cancer tissue which has died (“necrosis”), or cancer tissue which has changed into a benign non-cancer type of tissue known as “teratoma.” Either way, the tissue still needs to be removed.

In some “non-seminoma cases,” after the removal of testis containing the tumour, some cancer cells may already have landed in the mid-abdomen lymph glands, even though the CT scan may still be normal. Your cancer specialist may decide to remove those lymph glands by RPLND. This procedure will accurately determine if the lymph glands already have cancer cells in them; if so, they would be completely removed. The procedure will also help decide if you need further treatment (chemotherapy).

The RPLND surgery is a major operation on the abdominal area performed under anesthesia, lasting several hours and requiring a hospital stay of several days. The lymph gland tissues (often enlarged and grown into one solid mass) near the kidneys, main artery of the body (the “aorta”) and the main vein (“the vena cava”) are removed.

### What are the side effects?

- The side effects include problems that may occur during anesthesia, especially with the lungs.
- Infection in the wound is sometimes a problem.
- The main arteries and veins may be injured, resulting in major bleeding.
- Several abdominal organs may be accidentally damaged, including the intestines, the kidneys and their drainage tubes (the “ureters”), the spleen and pancreas.
- Some delicate nerves which control the discharge of semen fluid during sexual activities run very close to the lymph glands being removed. Most of the time, your surgeon will try to save those nerves to avoid problems with semen discharge during sex. Occasionally, there will be problems with semen discharge during intercourse afterward this surgery, but erections will **not** be affected.

## What is “sperm banking”?

Your sperm production is commonly affected by testis cancer treatment. Your body will temporarily stop making sperm while you are on chemotherapy. The remaining testis usually recovers after a year or two after chemotherapy and you'll resume making sperm and male hormones.

Your specialist may suggest that you store some of your semen containing sperm by a special freezing procedure at a special facility (“sperm-banking”) before your chemotherapy. These sperm can be preserved; when the semen samples are thawed, they can be artificially inseminated in the female partner to produce pregnancy. A sperm count from a semen sample needs to be taken to decide if your semen is suitable for sperm banking. Sometimes your specialist may not recommend it if the other testicle is not making normal sperms anyway (the semen sample will show this) or if specialist feels that treatment with chemotherapy is very urgently needed and should not be delayed.

## How effective is treatment? What are the chances of survival?

Treatment for testis cancer is very effective. Almost all patients, except the relatively few cases with very advanced and aggressive cancers, survive. If the cancer is discovered and treated in Stage 1 (no spread), then over 99% of the patients will be cured. In patients with limited spread beyond the testis (“Stage 2”), 90-95% can be cured with a combination of surgery chemotherapy and sometimes radiotherapy. Even in very advanced (“Stage 3”) and aggressive cases, most (over 80%) patients will still survive, although they will require a combination of different treatments. The cancer rarely returns. If it does, you will need further treatment, usually with different chemotherapy drugs and possibly additional surgery.

Most patients can be cured of their testis cancer and can lead essentially normal, healthy productive lives, including fathering children (provided the other testis remains healthy).

## What are the effects of treatment on sexual function and “manhood”?

Most patients can father children, provided the other testis has not been affected by disease. Sperm-banking can be, but is infrequently, used to help with fathering children later on. Sexual intercourse should not be affected by the treatment.

Your self-image (your “manhood”) may be affected from losing one testis. With your surgeon, discuss the option of inserting a testicular “prosthesis” or “implant” in the empty scrotum sac. Your surgeon may recommend the procedure, sometimes at the same time as the initial testis cancer removal, sometimes at a later time when the cancer treatment has been successfully completed. However, you may not feel it is necessary or your surgeon may not recommend the implant procedure because of a medical reason.

## After treatment, are you monitored?

After treatment with surgery (testis removal, abdominal lymph node removal), chemotherapy and radiation, your doctor will continue to monitor your body with regular physical exams, blood tests (blood tumour markers), chest X-ray and CT scans. At first, the checkups are fairly frequent (every two to three months). As time passes and if there is no signs of the cancer returning, the checkups, blood tests and scans will be spaced apart. The follow-up will be done by your urologist and other cancer specialists for a time. Eventually, your family doctor will take over.