

Introduction

Chemotherapy is a common treatment for a variety of cancers. It has proven to be safe and effective. Patients should learn about the possible side effects of chemotherapy.

An understanding of this treatment helps patients better recognize and tolerate side effects, if they occur.

The body is made up of very small cells. Normal cells in the body grow and die in a controlled way. Cancer occurs when cells keep dividing and growing without the normal control.

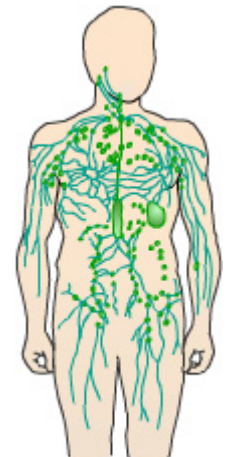
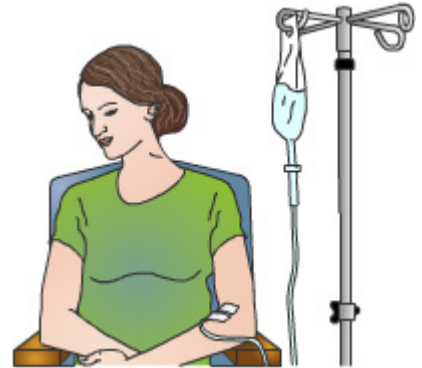
Cancer cells may also spread to different parts of the body through blood vessels and lymph channels.

Cancer treatments are used to control and destroy these abnormally growing cells.

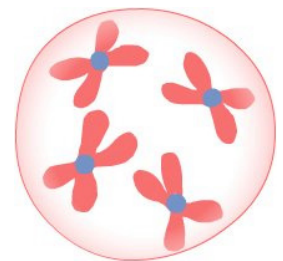
Cancers in the body are given names depending on where the cancer originates. Cancer that begins in the lungs will always be called lung cancer even if it has spread to another place in the body such as the liver, bones, or brain.

The cause of a cancer in a patient cannot usually be specifically determined. Each cell contains hereditary or genetic materials called chromosomes. This genetic material controls the growth of the cell.

Cancer always arises because of changes that occur in this genetic material. When the genetic material in a cell becomes abnormal, it loses its ability to control the growth of the cell. These sudden changes in genetic material can occur for a variety of reasons.



Lymph Channels



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They may be inherited from parents, which is the case for some patients with breast cancer.

If you have relatives with breast cancer or ovarian cancers make sure to discuss with your healthcare provider the possibility of genetic testing.

Changes in genetic materials may also occur because of exposure to specific infections, drugs, tobacco, or other factors.

How Does Chemotherapy Work?

Chemotherapy uses medications which target and destroy cells that are rapidly dividing. The chemo meds circulate through the entire body to stop the growth of cancer cells.

Cancer cells are more sensitive to chemotherapy than healthy cells because they divide more frequently.

Healthy cells can also be affected by chemotherapy, especially the rapidly dividing cells of the skin, hair, lining of the stomach, intestines, the bladder, and the bone marrow.

The side effects of chemotherapy are usually caused by its effects on healthy cells.

The following lists the general side effects of chemotherapy. Not all chemotherapy drugs cause all the side effects discussed in this lesson. In addition, some chemotherapy drugs can cause side effects that are NOT discussed in this lesson.

Blood-Related Side Effects

One of the most important side effects of chemotherapy is its effect on the blood cells.

Blood has 3 important components: red blood cells or RBCs, white blood cells or WBCs, and platelets. Normally, blood cells are among the most rapidly dividing cells in the body and, therefore, the most sensitive to chemotherapy. RBCs carry oxygen from the lungs to the rest of the body. WBCs fight infections. Platelets are important because they help the blood clot and prevent uncontrolled bleeding.

Chemotherapeutic agents may decrease the levels of these blood components. This decrease is usually temporary.

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Depending on the medication, a physician may be able to predict when the decrease of blood components will occur. The time when blood components are at the lowest level is known as “nadir,” and usually occurs one to two weeks after the chemotherapy has begun.

When the RBCs decrease significantly, a condition known as “anemia” (low red blood cell count) occurs. This can make patients feel very tired and sometimes short of breath. A blood transfusion may be necessary at this stage.



When the WBCs decrease significantly, a condition known as “neutropenia” (low white blood count) occurs. This condition may make it difficult for patients to fight infections.

When the platelets decrease significantly, a condition known as “thrombocytopenia” (low platelet count) occurs. Patients who have this condition may bleed longer than usual from minor cuts. They may also have internal bleeding inside their brain, intestines, or urinary bladder.

Internal bleeding can make anemia (or low red blood cell count) worse. Internal bleeding can also cause strokes and even death if it happens in the brain.

These side effects can be treated with blood transfusions and new medications that speed up the replacement of lost blood cells.

Even though physicians check blood counts regularly, patients must watch for symptoms of these side effects. To help in the treatment and prevention of potentially life-threatening complications, if any of the following symptoms occur, patients should contact their physician. Increased tiredness, fatigue, shortness of breath, or chest pain may indicate anemia.

The following are signs of infection that may occur because of neutropenia (low count of white blood cells):

- fever
- chills
- cough

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- sore throat
- skin or mouth sores
- burning during urination
- severe diarrhea (more than 3 liquid stools)

The following are signs of thrombocytopenia, or low platelet count:

- easy bruising
- bleeding from the skin that does not stop after applying pressure for 10 minutes
- blood in the urine or stools
- headache

Patients can help prevent some of these side effects.

To decrease the chances of infections, good oral and body hygiene are essential. Patients should also stay away from people with colds or other infections.

Patients should also avoid activities that may increase the chance of bleeding, such as the use of razors, nail clippers, or flossing teeth. Brushing teeth regularly is okay with a soft bristle toothbrush. Patients with dentures should make sure their dentures fit properly.

Patients should avoid straining while going to the restroom. This can cause hemorrhoids and bleeding. A stool softener may be required.

Patients should check their temperature once a day. This may help in early detection of infections. If the temperature is above 100.5°F, they should call the Oncology department and talk to the chemo nurse or their physician.

Hair Loss

Hair loss is another side effect of chemotherapy. This is also known as “alopecia.”

Cells in the hair follicles are responsible for hair growth and maintenance. Because these cells divide rapidly, they are affected by chemotherapy meds.

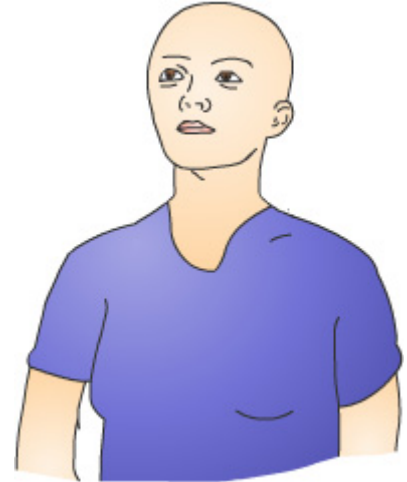


Hair loss may affect the scalp, face, and the rest of the body. The rate and amount of hair loss can vary depending on the chemo med you receive. Some chemo meds can cause a severe hair loss that starts 2 weeks after chemo is given.

Hair loss is usually temporary. When the hair grows back, it may have a different color, texture, or style.

Even though hair loss cannot be prevented, patients may prepare for it. Some patients choose a wig or a hairpiece. Other patients decide to keep their head bare, or cover it with a scarf, wrap or hat.

The exposed scalp may be more sensitive than usual to sunlight. Patients should keep it covered when outdoors. You can also lose body heat through your scalp, wearing a hat or scarf will help keep you warm.



Nausea and Vomiting

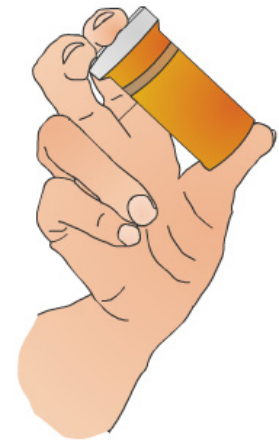
Some chemo meds can cause nausea and/or vomiting. We currently have very effective anti-nausea medications which are given as a pre-med prior to starting the chemotherapy infusion.

Patients should make sure to tell their physician or nurse if they experience nausea and/or vomiting.

You will receive a prescription for anti-nausea medications, and your nurse will give you a calendar explaining when and how to take these meds after chemo.

Drinking clear liquids before chemotherapy helps some patients decrease nausea.

Appetite may also decrease during chemotherapy. Unfortunately, food may also not taste as good for chemotherapy patients. However, patients should maintain a regular calorie intake by eating smaller portions of food more frequently.



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Sore Throat and Mouth

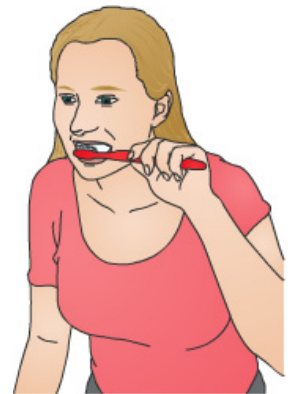
Some chemotherapy meds can harm fast growing cells. The cells lining the inside of the mouth and throat divide rapidly. They are also continuously exposed to infections from the food we eat.

Mouth and throat problems may include:

- Dry mouth
- Changes in taste and smell
- Infections of your gums, teeth, or tongue
- Mouth sores
- Increased sensitivity to hot or cold foods
- Trouble eating and swallowing when your mouth and/or throat is very sore.

Chemotherapy can cause inflammation and infections inside the mouth. This condition, known as “stomatitis,” makes swallowing difficult and painful.

Maintaining good oral hygiene and frequently checking the inside of the mouth for problems, such as bleeding areas, ulcers, or white patches, can help decrease the chance of infections. This also helps detect infections early before they become a problem.



Avoiding very acidic and carbonated drinks, as well as hot, spicy food, and performing good oral hygiene after every meal and at bedtime are helpful.

Mouth care suggestions:

Avoid mouthwashes that have alcohol in them. Rinse your mouth 3 to 4 times a day with a solution of $\frac{1}{4}$ teaspoon baking soda and $\frac{1}{8}$ teaspoon salt in 1 cup of warm water. Follow this with a plain water rinse. If you wear dentures make sure they fit well and limit the amount of time you wear them.

Keeping the inside of the mouth moist by sipping water throughout the day, sucking on ice chips or, sugar free hard candy should also be helpful. You can ask for saliva substitutes if your mouth is always dry.



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What to eat when your mouth is sore:

- Eat foods that are moist, soft and easy to chew or swallow (mashed potatoes, scrambled eggs and cooked cereals)
- Use a blender to puree cooked foods, or eat baby food
- Soften food with gravy, sauces, broth, yogurt, or other liquids
- Eat foods that are cool or at room temperature
- Suck on ice chips or popsicles

Avoid things that can hurt, scrape, or burn your mouth:

- Sharp or crunchy foods, such as crackers and chips
- Spicy, or acidic foods
- Citrus fruits or juices such as orange, lemon, and grapefruit
- Alcohol
- Tobacco products

Diarrhea

Because the cells lining the intestines and colon divide constantly, they can be affected by chemotherapy.

This can cause diarrhea. Diarrhea is frequent bowel movements that may be soft, loose, or watery. Diarrhea can also be caused by infections or drugs used to treat constipation. Increasing fluid intake usually keeps the patient hydrated.

If you have diarrhea drink 8 to 12 cups of clear liquid each day. Clear liquids include water, clear broth, ginger ale, and sports drinks such as Gatorade®. Drink slowly and drink fluids at room temperature. Let carbonated drinks lose their fizz before you drink them.

Foods that are difficult to digest should be avoided during episodes of diarrhea. These foods include milk products, vegetables of the cabbage and broccoli family, as well as spicy food.

Eat low fiber foods: bananas, white rice, and white toast, plain or vanilla yogurt.



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Avoid greasy and fried foods such as hamburgers and French fries. Foods and drinks with caffeine which include coffee, black tea, cola, and chocolate. Avoid high fiber foods such as raw fruits and vegetables, nuts, whole wheat breads and cereals.

If there are more than 3 bowel movements a day, the patient should take a medicine to help stop the diarrhea. The patient can take Imodium A-D® (Loperamide) and should call the chemo nurse or physician if the diarrhea continues or gets worse.

If the patient feels weak, dizzy, and/or light headed notify the Oncology department immediately.

If the diarrhea becomes bloody the patient should call the chemo nurse or doctor. This can be a symptom of internal bleeding or infection and may require immediate medical attention.

Constipation

Constipation is when bowel movements become less frequent and stools are hard, dry, and difficult to pass.

Constipation is sometimes caused by chemotherapy, and/or pain medication.

Constipation can also occur when people are not active, are eating foods that are low in fiber and not drinking enough fluids.

Maintaining a high fiber diet and drinking lots of fluids can help decrease this side effect.

Drink at least 8 cups of water or fluids each day. Drinking warm or hot fluids as well as fruit juices, such as prune, grape, or apricot nectar may also be helpful.

Be active every day and let your nurse or doctor know if you have not had a bowel movement (BM) in 3 days. Patients taking pain meds may need to take additional medications such as a stool softener or laxative to help prevent constipation.



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If constipation becomes a significant problem, a physician may recommend or prescribe stool softeners. This helps decrease the chances of hemorrhoid formation and bleeding.

Effect on the Skin and Nails

Because the cells lining the skin divide fairly rapidly, they are susceptible to chemotherapy. This can cause skin itching, dryness, redness, peeling, darker veins and increased reaction to the sun.

Your nails may become dark, turn yellow, or become brittle and cracked. Sometimes your nails will loosen and fall off, but new nails will grow back in.

Ways to manage skin changes:

- Moisturizing lotions should be used.
- Patients should avoid exposure to the sun and tanning booths. Avoid direct sunlight which means not being in the sun from 10 a.m. until 4 p.m., the time when the sun is the strongest. Sunscreen (spf 15 or higher) should be used whenever patients leave the house because they can still sunburn on cloudy days.
- Wear gloves when washing dishes, working in the garden, or cleaning the house.
- Let your physician or nurse know if your cuticles are red and painful.

Fertility and Sexuality

Some types of chemotherapy can cause sexual changes. These changes are different for women and men.

In women chemotherapy can affect the ovaries which can cause changes in hormone levels. These changes can lead to:

- Hot flashes
- Vaginal dryness
- Irregular or no menstrual periods
- Feeling irritable
- Being too tired to have sex or not being interested in having sex



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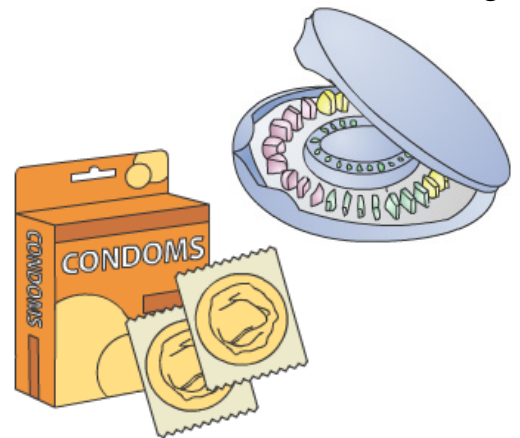
In men, chemotherapy can cause changes in hormone levels, decreased blood supply to the penis, and damage to the nerves that control the penis. These changes can lead to:

- Not being able to reach a climax
- Not being able to get or keep an erection
- Being too tired to have sex or not being interested in having sex

Men wishing to father children may consider sperm banking prior to the start of chemotherapy. Chemotherapy may affect sperm count and viability.

Because chemotherapy may be very toxic to unborn children, women of a childbearing age should take birth control measures during chemotherapy. Discuss your different options with your healthcare provider.

Some women may have changes in their menstrual cycle because of chemotherapy, which could result in the total absence of periods. They should still take precautions against becoming pregnant. Men should use a condom when having sex.



Chemotherapy could also cause dryness of the vagina and increased pain with sexual intercourse. Lubricating, water-soluble jelly such as, K-Y Jelly™, can help decrease such symptoms.

Other Possible Side Effects

Besides the most common side effects of chemotherapy, other side effects can happen, depending on the type of cancer, the type of chemotherapy treatment, and the patient's medical condition.

For example, some chemotherapy drugs may adversely affect the heart, lungs, or nerves. In such cases your physician will monitor these vital organs.

Summary

Chemotherapy is the careful use of medications to treat cancer.

Side effects are common and can be uncomfortable. Knowing about these side effects can make chemotherapy a more tolerable, life-saving journey.

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General chemotherapy guidelines are listed below:

- Lab work is usually required prior to starting chemotherapy and at various times during your chemotherapy cycle. Have your lab work done early in the morning the day before chemo.
- Some chemo meds require pre medication at home, your physician or nurse will review this information with you before you start chemo.
- Notify your physician or nurse for the following:
 - Fever (temperature over 100.4 degrees F or chills)
 - ER visits or hospitalization since your last chemo cycle
 - Nausea, vomiting or diarrhea after your previous chemo cycle
 - Any numbness or tingling in your hands or feet
 - Balance changes
 - Diarrhea or severe constipation
 - Mouth sores or if your mouth is sore and painful when you eat
 - Unusual bleeding or bruising
 - Skin changes (rash) or nail changes
 - Severe fatigue

If you have questions, or you don't feel well call the Oncology department and talk to the chemo nurse.

If you develop a fever or have chills after hours please go to the emergency room for an evaluation.



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