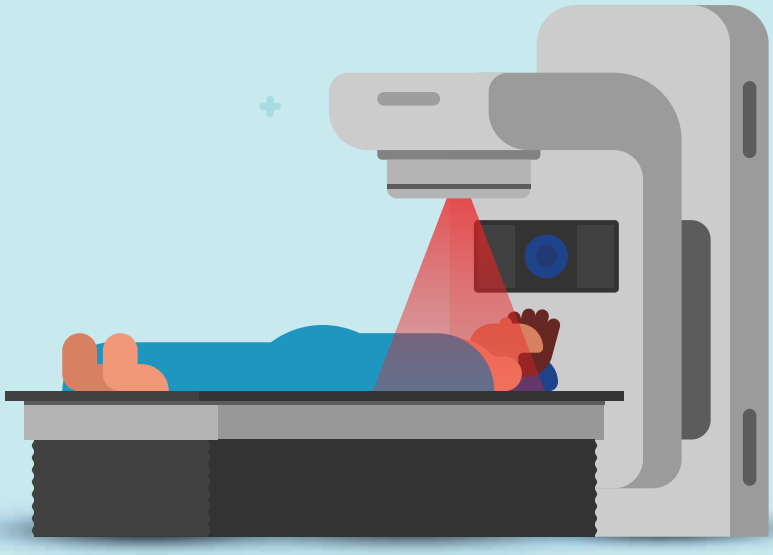
Your Questions | Our Answers

A Handbook on

RADIATION THERAPY



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Sri Ramakrishna Multi-Speciality Hospital

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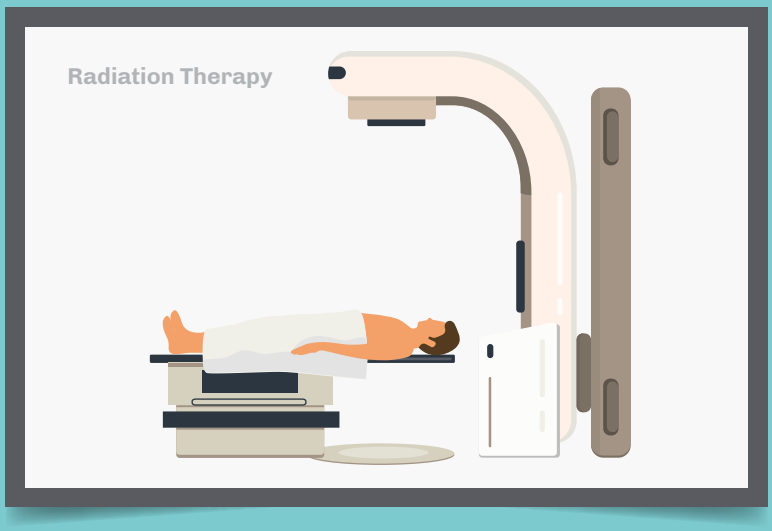


Foreword

This booklet contains general information, mostly about external beam radiotherapy. It is impossible to include everything you may need to know. Depending on which part of your body is going to be treated, you will probably be given additional information by your therapist, nurse or doctor.

We hope you find it useful!

Prelude

This information booklet has been written to help you understand more about radiotherapy. This booklet will also answer some of the common questions patients ask.

Your doctor will explain why and when radiotherapy (out of 3 important modalities – surgery, radiotherapy and chemotherapy) is recommended for you and what your treatment will involve.

Radiation Therapy: The Basics

What is it? - The radiation used for therapy are X-rays, electrons or radiation given off by a radioactive material.

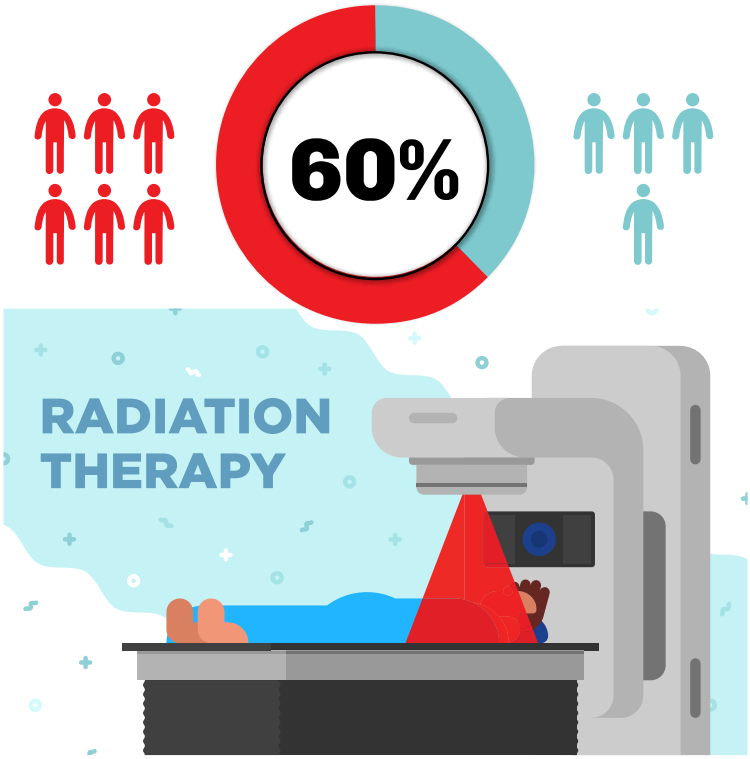
How often will you have external beam radiation therapy?

As a second line, the treatment lasts anywhere from 2 to 7 weeks.

Who gets this therapy?

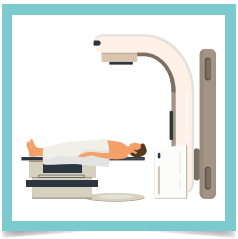
Many people with cancer need treatment with radiation therapy. Sometimes, radiation therapy is the only kind of cancer treatment people have.[1]

About 60% of people with cancer have radiation therapy[1]

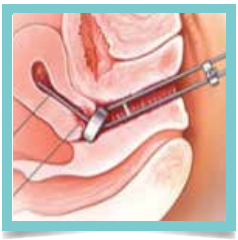


How is it given?

Radiation therapy can be given in 2 ways:[2,3]



External beam radiation: Uses a machine that directs high-energy rays from outside the body into the tumor. Most people get external radiation therapy for a few weeks. It is done during outpatient visits to a hospital or a treatment center.[3]



Internal beam radiation: It is also called brachytherapy. Radioactive source delivers radiation inside or close to the tumor.[3]

The type of radiation you might get depends on the kind of cancer you have and where it is. In some cases, more than one type is used.[3]

How does it work on cancer cells?

Radiation damages the cells that grow and divide rapidly. Only the cells in the area of the body receiving the treatment are affected. Modern treatment methods can avoid treating normal cells as much as possible. The healthy normal cells can repair themselves while the abnormal cancer cells cannot recover.[2]

Radiotherapy may be given before surgery to shrink a tumor or to reduce the risk of a recurrence of the cancer when delivered after surgery. It can also be given before, during or after chemotherapy or hormone treatment to improve overall results.[2]

Radiation therapy is used to:

- Treat cancer: Radiation can be used to cure cancer, to prevent it from returning, or to stop or slow its growth[1]
- Reduce symptoms: When a cure is not possible, radiation may be used to treat pain and other problems caused by the cancer. Or, it can prevent problems that may be caused by a growing tumor such as weakness of limbs or loss of bowel and bladder control.[1]

How long does it take to work?

It takes days or weeks of treatment before cancer cells start to die, as radiation therapy does not kill cancer cells right away. Then, cancer cells keep dying for weeks or months after radiation therapy ends.[1]

What is its effect on normal cells?

Radiation not only kills or slows the growth of cancer cells, it can also affect the nearby healthy cells. The healthy cells almost always recover after treatment is over, but sometimes people may have side-effects that are severe or do not get better. Other side-effects may show up months or years after radiation therapy is over. These are called late side-effects.[1]

Doctors try to protect healthy cells during treatment by:

- **Using as low a dose of radiation as possible to the normal tissues.** The radiation dose is balanced between being high enough to kill cancer cells, yet low enough to limit damage to healthy cells.[1]
- **Spreading out treatment over time.** You may get radiation therapy once a day or in smaller doses twice a day for several weeks. Spreading out the radiation dose allows normal cells to recover while cancer cells die.[1]
- **Aiming radiation at a precise part of your body.** Some types of radiation therapy allow your doctor to aim high doses of radiation at your cancer while reducing radiation to the nearby healthy tissue. These techniques use a computer to deliver precise radiation doses to a cancer tissue and shield the surrounding normal tissue.[1]

Is it painful?

No, radiation therapy does not hurt while it is being given. It is not harmful.[1]

Can it be used along with other types of cancer treatments?

Yes, radiation therapy is often used with other cancer treatments. Here are some examples:

- **Radiation therapy and surgery.** Radiation may be given before, during or after surgery. Doctors may use radiation to shrink the size of the cancer before surgery or they may use radiation after surgery to kill any cancer cells that remain. Sometimes, radiation therapy is given during surgery, so that it goes straight to the cancer without passing through the skin. Radiation therapy given during surgery is called intraoperative radiation.[1]

- **Radiation therapy and chemotherapy.** Radiation may be given before, during or after chemotherapy. Before or during chemotherapy, radiation therapy can shrink the cancer so that the chemotherapy works better. After chemotherapy, radiation therapy can be used to kill any cancer cells that remain.[1]

Radiation Therapy: The Team

Who all constitute the Radiation Therapy Team in SRIOR, Coimbatore?

A team of highly trained medical professionals constitute the Radiation Therapy Team in SRIOR. The team includes the following people:[3]

- **Radiation oncologist:** A radiation oncologist is the only doctor who can prescribe radiotherapy treatment. This person oversees your radiation treatment plan.[2,3]
- **Medical physicist:** Makes sure that the radiation machine is working properly and delivers the exact dose as prescribed by the oncologists[4,5]
- **Dosimetrist:** Helps the radiation oncologist to plan the treatment[5]
- **Radiotherapists:** They are the main people you will come into contact with when you have radiotherapy treatment. They are professionally qualified staff who are involved in all stages of your treatment planning and delivery.[2]
- **Dietitian:** Recommends an eating plan to follow while you are in treatment and recovery[4]
- **Speech therapist:** Helps with communication and swallowing[4]
- **Physiotherapists:** They can teach you exercises to help your body function properly during treatment. These exercises can help manage side-effects, relieve pain and keep you healthy.[5]

Radiation Therapy: Preparations before treatment

What are the procedures that proceed before going for radiation therapy?

You can expect these steps before beginning treatment:

Giving permission for radiation therapy

Your doctor will ask you to sign a consent form. This is a written record to show that you have agreed to the planned radiotherapy.[2,6]

Treatment Planning (includes steps pre-treatment planning, details of mask and cast)

Pre-treatment planning:

Every radiotherapy treatment is carefully planned for each patient individually:[2]

- For most people, the first step in planning is to do a mask or cast
- Next step is to take a CT scan of the treatment area. The scan will give your doctor and radiographers a detailed picture of the area that needs treatment.
- The doctors will use all the information available from previous x-rays or scans, clinical examination, surgery, experience and clinical research to help them determine the treatment area and to define areas that should be avoided
- Planning specialists will then plan the best way to deliver the treatment the doctor has prescribed. The planning stage of your treatment will usually be scheduled a few days after you have seen the clinical oncologist unless more investigations are needed.
- They can also be scheduled when radiotherapy is part of a combined treatment plan (with surgery or chemotherapy) - in these circumstances, you may be given dates for your radiotherapy some time ahead

Treatment planning sessions usually last from 30 minutes to 60 minutes.

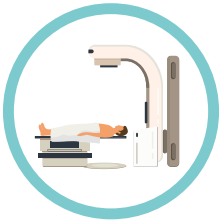
Mask or cast?

If you are having radiation treatment, you will need to wear a special mask to keep your body still. The mask or cast will need to be worn for your planning CT scan and your treatment.[2]

You will be given an appointment to attend the mould room. The technicians or radiographers will explain what they are going to do. You will be positioned on a couch, and then a sheet of thermoplastic material will be warmed in a water bath which makes it flexible. It will be laid across your face and neck or your arm or leg and gently pressed into position. It will feel warm and a little damp. If the mask is for your head, your mouth and nose will be covered, but you will be able to breathe normally through the perforations. A well-fitting mask is difficult to make if you have long hair or a beard or moustache, so you may be asked to tie your hair back and shave any facial hair before your appointment at the mould room.[2]

Radiation Therapy: The Rationale and Types

External beam radiation therapy



External beam radiation therapy comes from a machine that aims radiation at your cancer. It does not touch you, but it can move around you, sending radiation to your body from pre-planned positions.[1]

How often will you have external beam radiation therapy?

Most people have external beam radiation therapy once a day, 5 days a week, Monday through Friday. Treatment lasts anywhere from 2 to 10 weeks, depending on the type of cancer you have and the goal of your treatment. [1]

Radiation therapy may also be given on other schedules. These schedules include:[1]

- **Accelerated fractionation:** This treatment given in larger daily or weekly doses to reduce the number of weeks of treatment
- **Hyperfractionation:** Smaller doses of radiation given more than once a day
- **Hypofractionation:** Larger doses given once a day (or less often) to reduce the number of treatments

Your doctor may prescribe one of these treatment schedules if he or she feels that it will work better for you.

Internal beam radiation therapy

Internal radiation therapy is a form of treatment in which a source of radiation is put inside your body.[1]

One form of internal radiation therapy is called **brachytherapy**. In brachytherapy, a solid radiation source, such as seeds, ribbons or capsules, is placed in your body in or near the cancer.[1]

There are three types of brachytherapy:

- **Low-dose Rate (LDR) implants:** In this type of brachytherapy, the radiation source stays in place for 1–7 days. You are likely to be in the hospital during this time. Once your treatment is finished, your doctor will remove the radiation source and the catheter or applicator.[1]

- **High-dose Rate (HDR) implants:** In this type of brachytherapy, special applicators are used and in the applicators the radiation source is left in place for just 10–20 minutes at a time and then taken out. You may have treatment twice a day for 2–5 days or once a week for 2–5 weeks. The schedule depends on your type of cancer. As with LDR implants, your doctor will remove the catheter or applicator once you have finished treatment.[1]
- **Permanent implants:** After the radiation source is put in place, the catheter is removed. The implants always stay in your body, but the radiation gets weaker each day. As time goes on, almost all radiation will go away. When the radiation is first put in place, you may need to limit your time around other people. Be extra careful not to spend time with children or pregnant women.[1]

Radiation Therapy: Queries during the treatment session

What happens during the treatment session?

- You may be asked to change into a hospital gown or robe[1]
- You will go to the treatment room where you will receive radiation[1]
- Depending on where your cancer is, you will either sit in a chair or lie down on a treatment table. The radiation therapist will use your skin marks and body mould or face mask, if you have one, to help you get into the correct position.[1]
- You may see colored lights pointed at your skin marks. These lights are harmless and help the therapist position you for treatment each day.[1]
- You will need to stay very still so the radiation goes to the exact same place each time. You will get radiation for 1–5 minutes. During this time, you can breathe normally and do not have to hold your breath.[1]

The radiation therapist will leave the room just before your treatment begins. He or she will go to a nearby room to control the radiation machine. The therapist can watch you on a TV screen or through a window and talk with you through a speaker in the treatment room. Be sure to tell the therapist if you feel sick or are uncomfortable. He or she can stop the radiation machine at any time. You won't be able to feel, hear, see or smell the radiation.[1]

Your entire visit may last from 30 minutes to an hour. Most of that time is spent placing you in the correct position. Certain types of radiation may take longer. Your visit may also take longer if your treatment team needs to take and review x-rays.[1]

What should the patient wear during the session?

Wear clothes that are comfortable and made of soft fabric, such as cotton. Choose clothes that are easy to take off, as they may need to pull them away from the treatment area or change into a hospital gown. Do not wear clothes that are tight, such as close-fitting collars or waistbands, near your treatment area. Also, do not wear jewelry, adhesive bandages or powder in the treatment area.[1]

How does the patient relax and cope up during the treatment session?

Waiting for and having radiation therapy can make people feel anxious.[4]

- Bring something to keep you busy in the waiting room, such as a book or magazine, crossword puzzles or knitting[1]
- Ask a friend or family member to keep you company, or try chatting to other people waiting for treatment[4]
- To help you relax during the session, try meditation or breathing exercises, or ask the radiation therapists if you can listen to music[4]

Radiation Therapy: The post treatment

What are the therapy-related symptoms/side-effects one is required to know of and how to manage the same?

Following are the possible side-effects related to the treated local area/s. Consult your doctor if you develop any of these side-effects. Do not treat yourself on your own.

Diarrhea

Radiation therapy to the pelvis, stomach and abdomen can cause diarrhea. People get diarrhea because the healthy cells that line the inside of the intestines are affected due to the radiation needed to treat cancer.[1]

Tips for managing diarrhea[1]

- Drink 8–12 cups of clear liquid per day
- Eat small meals and snacks
- Eat foods that are high in salts, such as sodium and potassium
- Eat low-fiber foods
- Take care of your rectal area

Avoid[1]

- Beer, wine, and other types of alcohol
- Milk and dairy foods, such as ice cream, sour cream and cheese
- Spicy foods, such as hot sauce, salsa, chili and curry dishes
- Foods or drinks with caffeine, such as regular coffee, black tea, soda and chocolate
- Foods or drinks that cause gas, such as cooked dried beans, cabbage, broccoli, soy milk and other soy products
- Foods that are high in fiber, such as raw fruits and vegetables, cooked dried beans and whole wheat breads and cereals
- Fried or greasy foods
- Food from fast-food restaurants

Fatigue

Attending daily radiotherapy sessions can make you feel more tired than usual. You may also be recovering from surgery or chemotherapy and these can also cause fatigue. You should listen to your body and rest if you need to but continue your normal activities where possible. Sometimes dehydration can cause tiredness – you might try to increase your fluid intake to see if your energy level improves. During your course of radiotherapy, you may have regular blood tests to check your general health. If you have anemia, you may be advised to have a blood transfusion.[2]

Tips for managing fatigue[1]

- Try to sleep at least 8 hours each night
- Plan time to rest
- Try not to do too much
- Exercise
- Relax
- Eat and drink well
- Plan a work schedule that is right for you
- Plan a radiation therapy schedule that makes sense for you
- Let others help you
- Learn from others who have cancer
- Keep track of how you feel each day
- Talk with your doctor or nurse

Nausea and Vomiting

Nausea and vomiting can occur after radiation therapy to the stomach, small intestine, colon or parts of the brain. Your risk for nausea and vomiting depends on how much radiation you are getting, how much of your body is in the treatment area, and whether you are also having chemotherapy.[1]

Tips for managing nausea and vomiting[1]

- Try to relax before treatment
- Plan when to eat and drink
- Eat small meals and snacks
- Have foods and drinks that are at room temperature (not too hot and not too cold)
- Talk with your doctor or nurse

Skin changes

Radiation therapy can cause skin changes like redness, itching, dry and peeling skin, moist reaction, swollen skin, etc.[1]

Tips for managing skin changes[1]

- **Take extra good care of your skin during radiation therapy:** Be gentle and do not rub, scrub or scratch in the treatment area. Use creams that your doctor or nurse suggests.
- Do not put anything on your skin that is very hot or cold
- Be gentle when you shower or take a bath
- Use only those lotions and skin products that your doctor or nurse suggests
- Wear clothes and use bed sheets that are made of very soft fabrics
- Do not wear clothes in your treatment area that are tight and do not breathe, such as girdles, body shapers and pantyhose

- Protect your skin from the sun every day
- Do not use tanning beds
- Do not put adhesive bandages or other types of sticky tape on your skin in the treatment area
- Ask your doctor or nurse if you can shave the treatment area. If you can shave, use an electric razor, but do not use a pre-shave liquid.

Changes in the mouth/oral cavity

Radiation therapy to the head or neck can cause mouth problems, such as:[1]

- Mouth sores that are like little cuts or ulcers in your mouth
- Dry mouth (also called xerostomia) and throat
- Loss of taste
- Tooth decay
- Changes in taste such as a metallic taste when you eat meat
- Infections of your gums, teeth or tongue
- Jaw stiffness and bone changes
- Thick, rope-like saliva

Tips for managing changes in the mouth/oral cavity[1]

- **Visit a dentist**
- **Check your mouth every day:** This way, you can see or feel problems as soon as they start
- **Keep your mouth moist**
  - Sip water often during the day
  - Suck on ice chips
  - Chew sugar-free gum
  - Suck on sugar-free hard candy
  - Use a saliva substitute
  - Ask your doctor if medicine that helps increase saliva will help you
- **Clean your mouth, teeth, gums and tongue**
  - Brush your teeth, gums and tongue after every meal and at bedtime
  - Use an extra-soft toothbrush
  - Use fluoride toothpaste
  - Do not use mouthwashes that contain alcohol
  - Keep your dentures clean by soaking or brushing them each day
- **Be careful on what you eat**
  - Choose foods that are easy to chew and swallow
  - Take small bites, chew slowly and sip liquids with your meals
  - Eat soft and moist foods
  - Eat foods that are warm or at room temperature

- **Avoid things that can hurt, scrape or burn your mouth**
- **Avoid foods and drinks that are high in sugar**
- **Exercise your jaw muscles**
- **Keep your oral cavity clean and hygienic**
- **Rinse your mouth after every feed**

Throat changes

Radiation therapy to the neck or chest can cause the lining of your throat to become swollen and sore. This problem is called mucositis. You may feel as if you have a lump in your throat or burning in your chest or throat. You may also have mild discomfort swallowing.[1]

Tips for managing throat changes[1]

- Be careful what you eat when your throat is sore:
  - o Choose foods that are easy to swallow
  - o Cut, blend or shred foods to make them easier to eat
  - o Eat moist soft foods, such as cooked cereals, mashed potatoes and scrambled eggs
  - o Wet and soften food with gravy, sauce, broth, yogurt or other liquids
  - o Do not drink hot liquids
  - o Sip drinks through a straw
  - o Eat foods that are cool or at room temperature
- Eat small meals and snacks
- Choose foods and drinks that are high in calories and protein
- Sit upright and bend your head slightly forward when you are eating or drinking
- Avoid things that can burn or scrape your throat

Changes in the urinary bladder activity

Radiation therapy can cause urinary and bladder problems, such as:

- Burning or pain when you begin to urinate or after you urinate
- Trouble starting to urinate
- Trouble emptying your bladder completely
- Frequent, urgent need to urinate
- Cystitis, a swelling in your urinary tract

- Incontinence, when you cannot control the flow of urine from your bladder, especially when coughing or sneezing
- Waking frequently to urinate
- Blood in your urine
- Bladder spasms, which are like painful muscle cramps

***Tips for managing changes in the urinary bladder activity*[1]**

- Drink lots of fluids
- Avoid coffee, black tea, alcohol, spices and all tobacco products
- Talk with your doctor or nurse if you think you have urinary or bladder problems: You may need to provide a urine sample to check whether you have an infection.

Changes in sexual/reproductive health

Radiation therapy sometimes causes sexual changes, which can include hormone changes and loss of interest in or ability to have sex. It can also affect fertility, both while you are getting treatment and after it ends. Sexual and fertility changes are different for men and women.[1]

***Tips for managing changes in sexual/reproductive health*[1]**

Issues to discuss with your doctor or nurse include:[1]

- **Fertility (for women):** Before radiation therapy starts, let your doctor or nurse know if you think you might want to get pregnant after your treatment ends. He or she can talk with you about ways to preserve your fertility, such as saving your eggs to use in the future.
- **Birth control (for women):** It is very important that you do not get pregnant while having radiation therapy
- **Pregnancy (for women):** Make sure to tell your doctor or nurse if you are already pregnant
- **Stretching your vagina (for women):** Vaginal stenosis is a common problem for women who have radiation therapy to the pelvis. This problem can make it painful to have sex. You can help by stretching your vagina using a dilator, which is a device that gently stretches the tissues of the vagina. Ask your doctor or nurse where to find a dilator and how to use it.
- **Lubrication (for women):** Use a special lotion for your vagina once a day to keep it moist. When you have sex, use a water-or mineral oil-based lubricant.
- **Sex (for men and women):** Ask your doctor or nurse whether it is okay for you to have sex during radiation therapy

Hair loss

Radiotherapy can cause hair loss in the area being treated. Most hair loss is temporary and will start to grow back within 2–3 months of finishing treatment.[2]

Tips for managing hair loss

Before hair loss:[1]

- Decide whether to cut your hair or shave your head
- If you plan to buy a wig, do so while you still have hair
- Be gentle when you wash your hair
- Do not use items that can hurt your scalp, such as:
    - Straightening or curling irons
    - Brush rollers or curlers
    - Electric hair dryers
    - Hair bands and clips
    - Hair sprays
    - Hair dyes
    - Products to perm or relax your hair
- **Do not use products that are harsh on your hair,** such as hair colors, perms, gels, mousse, oil, grease or pomade

After hair loss:[1]

- **Protect your scalp:** Protect it from very cold air and sunburn by covering your head with a hat, turban or scarf when you are outside
- **Stay warm:** Stay warmer and more comfortable by wearing a hat, turban, scarf or wig

Late effects

Radiation therapy can also cause health problems that may not show up for months or years after treatment has ended. Late effects are specific to the part of your body that was treated and the doses of radiation you received. Your doctor should talk with you about late effects when you discuss your follow-up care.[1]

What are the dietary precautions/rules to be followed?

- **Fluids:**[1]

Soups

- Clear, fat-free broth
- Strained vegetable broth

Drinks

- Any fresh juice
- Fruit punch
- Butter milk
- Water
- Health mix drinks
- Vegetable juice

Sweets

- Fruit ices without fruit pieces
- Fruit ices without milk
- Honey
- Jelly

- **Low fiber diet:**[1]

Main Meals

- Soft or non-spicy food
- Idli/Dosa/Chapathi
- Rice/Gravy/Dal
- Curd
- All vegetables (cooked and non-spicy)
- Non-vegetarian food (cooked and non-spicy)

Fruits and Vegetables

- Bananas

Snacks

- Sherbet or sorbet
- Yogurt, plain or vanilla

- **Diet rich in high proteins/calories:**[1]

Soups

- Cream soups
- Soups with lentils, dried peas or beans such as pinto, black, red, or kidney

Drinks

- Instant breakfast shakes
- Milkshakes
- Smoothies
- Whole milk (instead of low-fat or skim)

Desserts and Other Sweets

- Custards, soft or baked
- Frozen yogurt
- Ice cream
- Muffins
- Puddings
- Yogurt

Main Meals and Other Foods

- Legumes, such as lentils, kidney, and black beans
- Butter or oil
- Cheese
- Chicken, fish or beef
- Cottage cheese
- Eggs, such as scrambled or boiled eggs
- Nuts, seeds, wheat germ

Meal Replacements and Other Supplements

- Powdered milk added to foods such as pudding, milkshakes or scrambled eggs
- High-protein supplements

Summary

- Radiation therapy is a cancer treatment that uses radiation to kill cancer cells and shrink tumors
- About 60% of people with cancer undergo radiation therapy
- There are two types of radiation therapy, such as external beam radiation and internal beam radiation
- The type of radiation therapy depends on the kind of cancer you have and its position in the body
- It works by damaging cells that grow and divide rapidly
- At SRIOR, a team of highly trained medical professionals constitute the Radiation Therapy Team
    - o Radiation oncologist
    - o Medical physicist
    - o Dosimetrists
    - o Radiotherapist
    - o Dietitians
    - o Speech therapists and
    - o Physiotherapists
- Before beginning treatment, your doctor will ask you to sign a consent form which is a written record to show that you have agreed to the planned radiotherapy
- There are few therapy-related side-effects like diarrhea; fatigue; nausea and vomiting; changes in skin, mouth/oral cavity, throat, urinary bladder activity and sexual/reproductive health; hair loss, etc.
- Radiation therapy can also cause health problems that may not show up for months or years after treatment has ended. Consult with your doctor regarding the same.
- Follow the tips which have been discussed in this booklet to manage these side-effects

Notes

This information booklet has been written to help you understand more about radiotherapy

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0422 - 4389797

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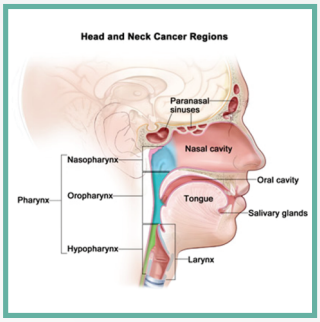
HEAD AND NECK CANCER

What is head and neck cancer?

Head and neck cancer



- Cancer that arises in the head or neck region
- Head and neck cancers usually begin in the squamous cells that line the moist, mucosal surfaces inside the head and neck for example, inside the mouth, the nose and the throat.

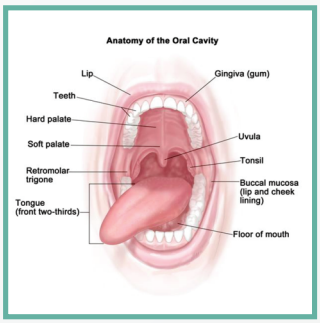
Incidence of head and neck cancer

- The worldwide incidence of head and neck cancer exceeds half a million cases annually, ranking it as the 5th most common cancer worldwide.
- Males are affected significantly more than females (2:1 to 4:1)
- Cancers of the brain, the eye, the esophagus, and the thyroid gland, as well as those of the scalp, skin, muscles, and bones of the head and neck, are not usually classified as head and neck cancers.

Types of head and neck cancer

- Cancers of the head and neck are further categorized by the area of the head or neck in which they begin
    - Oral cavity cancer
    - Pharyngeal cancer
    - Laryngeal cancer
    - Paranasal sinuses and nasal cavity cancer
    - Salivary gland cancer

Oral cavity cancer



Oral cavity cancer, or oral cancer, is cancer that starts in the mouth (oral cavity)

The oral cavity includes the following

- The lips
- The front two-thirds of the tongue
- The gums
- The lining inside the cheeks and lips
- The floor of the mouth under the tongue

- The hard palate (bony top of the mouth)
- The small area of the gum behind the wisdom teeth

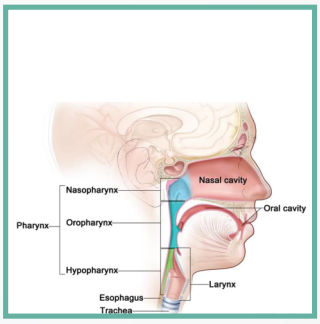
Oral cavity cancer in India

- Oral cavity cancer is a major health concern in India.
- It is the most common cancer among men and the 3rd most common cancer among women.
- Of all these patients, almost 70–80% is diagnosed with an advanced cancer, making it difficult to treat and control the disease.
- According to World Health Organization (WHO) report, the incidence of oral cancer ranges from one to 10 cases per 1, 00,000 people in most countries.

Pharyngeal cancer

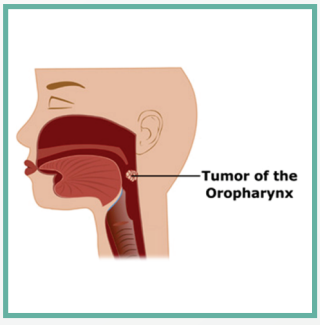
- Pharyngeal cancer is a disease in which cancer cells form in the tissues of the pharynx.
- The pharynx is a hollow tube about 5 inches long that starts behind the nose and leads to the esophagus (food pipe).
- Pharyngeal cancer is categorized by pharyngeal region
    - Nasopharyngeal cancer
    - Oropharyngeal cancer
    - Hypopharyngeal cancer

Pharynx has three parts:



- **Nasopharynx:** The upper part of the pharynx, behind the nose.
- **Oropharynx:** The middle part of the pharynx, including the soft palate (the back of the mouth), the base of the tongue and the tonsils.
- **Hypopharynx:** The lower part of the pharynx.

Nasopharyngeal cancer



- Cancer of the nasopharynx.
- Most nasopharyngeal cancers are squamous cell carcinomas.

Oropharyngeal cancer

- Cancer of the oropharynx
- Like other pharyngeal cancers, most oropharyngeal cancers are squamous cell carcinomas.

- Sites within the oropharynx that may develop cancer are:
    - Base of the tongue
    - Tonsillar region (the most common site for primary cancers of the oropharynx)
    - Soft palate, which includes the uvula
    - Pharyngeal walls

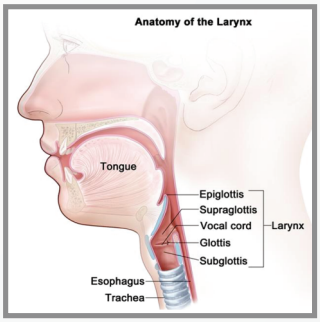
Hypopharyngeal cancers

- Cancer of the hypopharynx
- Hypopharyngeal cancers are the least common type of pharyngeal cancer.
- Again, almost all cancers of this type are squamous cell carcinomas.

Laryngeal cancer

- Laryngeal cancer is a disease in which cancer cells form in the tissues of the larynx.
- Most laryngeal cancers form in squamous cells, the thin, flat cells lining the inside of the larynx.
- The larynx is a part of the throat, between the base of the tongue and the trachea.
- The larynx contains the vocal cords, which vibrate and make sound when air is directed against them. The sound echoes through the pharynx, mouth, and nose to make a person's voice.

There are 3 main parts of the larynx:



- Supraglottis: The upper part of the larynx above the vocal cords, including the epiglottis.
- Glottis: The middle part of the larynx where the vocal cords are located.
- Subglottis: The lower part of the larynx between the vocal cords and the trachea (windpipe).

Paranasal sinuses and nasal cavity cancer

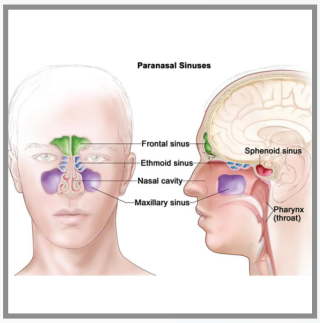
- Paranasal sinus and nasal cavity cancer is a disease in which cancer cells form in the tissues of the paranasal sinuses and nasal cavity.

Paranasal sinuses

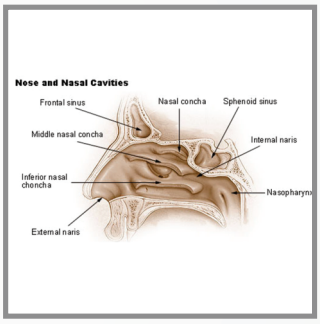
- "Paranasal" means near the nose.
- The paranasal sinuses are hollow, air-filled spaces in the bones around the nose.
- The sinuses are lined with cells that make mucus, which keeps the inside of the nose from drying out during breathing.

There are several paranasal sinuses named after the bones that surround them:

- The frontal sinuses are in the lower forehead above the nose.
- The maxillary sinuses are in the cheekbones on either side of the nose.
- The ethmoid sinuses are beside the upper nose, between the eyes.
- The sphenoid sinuses are behind the nose, in the center of the skull.



Nasal cavity

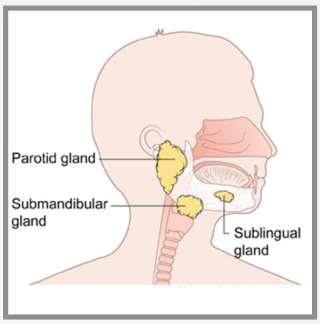


- The nose opens into the nasal cavity, which is divided into two nasal passages.
- Air moves through these passages during breathing.
- The nasal cavity lies above the bone that forms the roof of the mouth and curves down at the back to join the throat.
- The area just inside the nostrils is called the nasal vestibule. A small area of special cells in the roof of each nasal passage sends signals to the brain to give the sense of smell.
- Together the paranasal sinuses and the nasal cavity filter and warm the air, and make it moist before it goes into the lungs.
- The movement of air through the sinuses and other parts of the respiratory system help make sounds for talking.

Salivary gland cancer

- A rare cancer that forms in tissues of a salivary gland. Most salivary gland cancers occur in older people.
- The salivary glands make saliva and release it into the mouth. Saliva has enzymes that help digest food and antibodies that help protect against infections of the mouth and throat.
- More than half of all salivary gland tumors are benign (not cancerous) and do not spread to other tissues

There are 3 pairs of major salivary glands:



- **Parotid glands:** These are the largest salivary glands and are found in front of and just below each ear. Most major salivary gland tumors begin in this gland.
- **Sublingual glands:** These glands are found under the tongue in the floor of the mouth.
- **Submandibular glands:** These glands are found below the jawbone

What causes head and neck cancer?

Risk factors

- Anything that increases your chance of getting a disease is called a risk factor.
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Head and neck cancer risk factors

- The most important risk factors for head and neck cancers are alcohol and tobacco use (including use of smokeless tobacco).
- At least 75% of head and neck cancers are caused by tobacco and alcohol use.
- People who use both tobacco and alcohol are at greater risk of developing these cancers than people who use either tobacco or alcohol alone

Risk factors for oral cavity cancer





- Smoking and chewing tobacco
- Heavy alcohol use
- Chewing betel quid (Paan)
- Being exposed to natural sunlight or artificial sunlight (such as from tanning beds) over long periods of time
- Being infected with human papillomavirus (HPV)
- Being male
- Poor oral hygiene and missing teeth
- Use of mouthwash that has a high alcohol content is a possible, but not proven, risk factor

Risk factors for pharyngeal cancer

- Smoking and chewing tobacco
- Heavy alcohol use
- Chewing betel quid (Paan)
- Being infected with human papillomavirus
- Epstein-Barr virus infection
- Occupational exposure to wood dust
- Consumption of certain preserved or salted foods during childhood
- A diet low in fruits and vegetables

Risk factors for laryngeal cancer

- Alcohol or tobacco use
- Certain industrial exposures, including exposures to asbestos and synthetic fibers
- People working in certain jobs in the construction, metal, textile, ceramic, logging and food industries may have an increased risk of cancer of the larynx

Risk factors for paranasal sinuses and nasal cavity cancer

- Being exposed to certain workplace chemicals (wood or nickel dust or formaldehyde) or dust, such as those found in the following jobs:
    - Furniture-making
    - Sawmill work
    - Woodworking (carpentry)
    - Shoemaking
    - Metal-plating
    - Flour mill or bakery work
- Being infected with human papillomavirus (HPV)
- Being male and older than 40 years
- Smoking

Risk factors for salivary glands cancer

- Older age
- Treatment with radiation therapy to the head and neck
- Being exposed to certain substances at work
- Infection with Epstein-Barr virus

What are the signs of head and neck cancer?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

- **Sign:** Signal that can be seen by someone else
    - For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.
- **Symptom:** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.
    - For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

Head and neck cancer signs and symptoms

- The signs and symptoms of head and neck cancers may include
    - A lump or a sore that does not heal
    - A sore throat that does not go away
    - Difficulty in swallowing
    - A change or hoarseness in the voice
- These symptoms may also be caused by other, less serious conditions.
- It is important to check with a doctor or dentist about any of these symptoms.

Signs of oral cancer

- A sore on the lip or in the mouth that does not heal
- A lump or thickening on the lips or gums or in the mouth
- A white or red patch on the gums, tongue, tonsils, or lining of the mouth

- Bleeding, pain, or numbness in the lip or mouth
- Change in voice
- Loose teeth or dentures that no longer fit well
- Trouble chewing or swallowing or moving the tongue or jaw
- Swelling of jaw
- Sore throat or feeling that something is caught in the throat

Signs of pharyngeal cancer

- Trouble breathing or speaking
- Pain when swallowing
- Pain in the neck or the throat that does not go away
- Frequent headaches, pain, or ringing in the ears
- Trouble hearing

Signs of laryngeal cancer

- A sore throat or cough that does not go away
- Trouble or pain when swallowing
- Ear pain
- A lump in the neck or throat
- A change or hoarseness in the voice

Signs of paranasal sinuses and nasal cavity cancer

- Blocked sinuses that do not clear, or sinus pressure
- Headaches or pain in the sinus areas
- A runny nose
- Nosebleeds
- A lump or sore inside the nose that does not heal
- A lump on the face or roof of the mouth
- Numbness or tingling in the face

- Swelling or other trouble with the eyes, such as double vision or the eyes pointing in different directions
- Pain in the upper teeth, loose teeth, or dentures that no longer fit well
- Pain or pressure in the ear

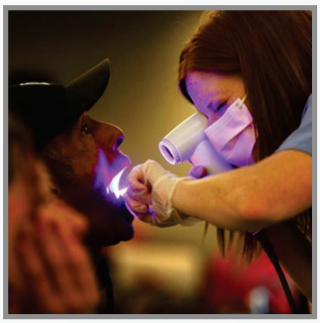
Signs of salivary gland cancer

- A lump (usually painless) in the area of the ear, cheek, jaw, lip, or inside the mouth
- Fluid draining from the ear
- Trouble swallowing or opening the mouth widely
- Numbness or weakness in the face
- Pain in the face that does not go away

Head and neck cancer early detection

- **Screening**
  - Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms
- **Early detection**
  - Using an approach that lets head and neck cancer get diagnosed earlier than otherwise might have occurred.

Early detection of oral cavity and oropharyngeal cancer



- Many pre-cancers and cancers of the oral cavity and oropharynx can be found early, during routine screening exams by a dentist, doctor or by self-exam.
- Regular dental checkups that include an exam of the entire mouth are important in finding oral cancers early.
- The American Cancer Society recommends that doctors examine the mouth and throat as part of a routine cancer-related checkup.
- Along with a clinical exam of the mouth and throat, some dentists and doctors may use special dyes and/or lights to look for abnormal areas, especially if you are at higher risk for these cancers.
- If an abnormal area is spotted, some of these tests may also be used to help determine if they might be cancers (and therefore will need a biopsy) or to choose the best area to sample for a biopsy.

Early detection of laryngeal and hypopharyngeal cancer

- There is no simple screening test for laryngeal and hypopharyngeal cancers.
- These cancers are often hard to find and diagnose without complex tests.
- Because the cancers are not common, and the tests require specialized doctors, there is no recommended routine screening tests for these cancers.
- Still, many laryngeal and some hypopharyngeal cancers can be found early.
- They usually cause symptoms, such as voice changes. Talk to your doctor if you have any of these symptoms.
- Many of the symptoms of laryngeal and hypopharyngeal cancers are more often caused by less serious, benign (non-cancerous) problems, or even other cancers.
- Still, it is important to see a doctor to find out what is causing your symptoms. The sooner the cause is found, the sooner it can be treated, if needed.

Early detection of nasopharyngeal cancer

- Most doctors do not recommend routine screening for nasopharyngeal cancer as it is a rare condition.
- There are no simple, non-invasive exams or blood tests that can reliably find this cancer early.
- But in some parts of the world such as China, where nasopharyngeal cancer is common, some people are being screened routinely for this cancer.
- They are first selected because their blood shows evidence of infection with the Epstein-Barr virus. They are given regular exams of the nasopharynx and neck.

Early detection of nasal cavity and paranasal sinus cancer

- Small cancers of the nasal cavity and paranasal sinuses usually do not cause any specific symptoms that help to find them early.
- Many of the symptoms of nasal cavity and paranasal sinus cancers can also be caused by benign conditions like infections.
- Because of this, many of these cancers are not found until they have grown large enough to block the nasal airway or sinuses, or until they have spread to nearby tissues or even to distant areas of the body.
- Still, some nasal cavity and paranasal sinus cancers can be found early.
- Talk to your doctor if you have symptoms. Most of these symptoms are much more likely to be caused by less serious problems.
- Still, it is important to see a doctor so that the cause can be found and treated, if needed.

Early detection of salivary gland cancer

- Salivary gland cancer is uncommon, so doctors do not recommend testing for it unless someone has symptoms.
- Still, because of its location, in many cases salivary gland cancer can be found early.
- Often patients, their dentists, or their doctors notice a mass or lump within one of the salivary glands (usually on the sides of the face or in the mouth).
- Checking the salivary glands for lumps is often a routine part of general medical and dental checkups.
- Being alert to certain symptoms and not ignoring them might help find salivary gland cancers early, when treatment is likely to be most effective.

Diagnosis and Staging of head and neck cancer

- To find the cause of the signs or symptoms of a problem in the head and neck area, a doctor **evaluates a person's medical history, performs a physical examination and orders diagnostic tests.**
- The exams and tests may vary depending on the symptoms.
- Examination of a sample of tissue under a microscope is always necessary to confirm a diagnosis of cancer.

Diagnosis of oral cancer

- If you have symptoms that suggest oral cancer, your doctor or dentist will check your mouth and throat for red or white patches, lumps, swelling, or other problems.
- A physical exam includes looking carefully at the roof of your mouth, back of your throat, and insides of your cheeks and lips.
- Your doctor or dentist also will gently pull out your tongue so it can be checked on the sides and underneath. The floor of your mouth and lymph nodes in your neck will also be checked.
- If your doctor or dentist does not find the cause of your symptoms, you may be referred to a specialist.
- An ear, nose, and throat specialist can see the back of your nose, tongue, and throat by using a small, long-handled mirror or a lighted tube.
- Sometimes pictures need to be made with a CT scan or MRI to find a hidden tumor.
- The removal of a small piece of tissue to look for cancer cells is called a biopsy. A pathologist then looks at the tissue under a microscope to check for cancer cells. A biopsy is the only sure way to know if the abnormal area is cancer.

Staging of oral cancer

- If oral cancer is diagnosed, your doctor needs to learn the extent (stage) of the disease to help you choose the best treatment.
- When oral cancer spreads, cancer cells may be found in the lymph nodes in the neck or in other tissues of the neck. Cancer cells can also spread to the lungs, liver, bones, and other parts of the body.
- Doctor may order one or more of the following tests to stage the disease:
    - X-rays
    - CT scan
    - MRI
    - Endoscopy
    - PET scan

- **X-rays:** An x-ray of your entire mouth can show whether cancer has spread to the jaw. Images of your chest and lungs can show whether cancer has spread to these areas.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of your body. You may receive an injection of dye. Tumors in your mouth, throat, neck, lungs, or elsewhere in the body can show up on the CT scan.

- **MRI:** A powerful magnet linked to a computer is used to make detailed pictures of your body. An MRI can show whether oral cancer has spread.
- **Endoscopy:** The doctor uses a thin, lighted tube (endoscope) to check your throat, windpipe, and lungs. The doctor inserts the endoscope through your nose or mouth.

- **PET scan:** A procedure in which a small amount of radioactive glucose (sugar) is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is used. Because cancer cells often use more glucose than normal cells, the pictures can be used to find cancer cells in the body.

Stages of oral cancer

- Doctors describe the stage of oral cancer based on the size of the tumor, whether it has invaded nearby tissues, and whether it has spread to the lymph nodes or other tissues:

- **Early cancer:** Stage I or II oral cancer is usually a small tumor, and no cancer cells are found in the lymph nodes.
- **Advanced cancer:** Stage III or IV oral cancer is usually a large tumor (as big as a lime). The cancer may have invaded nearby tissues or spread to lymph nodes or other parts of the body.

Diagnosis of laryngeal cancer

- If you have symptoms that suggest laryngeal cancer, your doctor may do a physical exam.
- Your doctor looks at your throat and feels your neck for lumps, swelling, or other problems.
- You may have one or more of the following tests:
    - Indirect laryngoscopy
    - Direct laryngoscopy
    - Biopsy

Indirect laryngoscopy

- Your doctor uses a small mirror with a long handle to see your throat and larynx.
- Your doctor will check whether your vocal cords move normally when you make certain sounds.

Direct laryngoscopy

- Your doctor uses a lighted tube (laryngoscope) to see your throat and larynx.
- The lighted tube can be flexible or rigid:
    - **Flexible:** Your doctor puts a flexible tube through your nose into your throat.
    - **Rigid:** Your doctor puts a rigid tube through your mouth into your throat. A tool on the rigid tube can be used to collect tissue samples.

Biopsy

- The removal of a small piece of tissue to look for cancer cells is called a biopsy.
- Usually, tissue is removed with a rigid laryngoscope under general anesthesia. A pathologist then looks at the tissue under a microscope to check for cancer cells.
- A biopsy is the only sure way to know if the abnormal area is cancer.

Staging of Laryngeal cancer

- To learn whether laryngeal cancer has invaded nearby tissues or spread, doctor may order one or more tests:
    - Chest x-ray
    - CT scan
    - MRI

Doctors describe the stage of laryngeal cancer based on the size of the tumor, whether the vocal cords move normally, whether the cancer has invaded nearby tissues, and whether the cancer has spread to other parts of the body

Stages of Laryngeal cancer

Early cancer

- Stage 0, I, or II laryngeal cancer is usually a small tumor, and cancer cells are rarely found in lymph nodes.

Advanced cancer

- Stage III or IV laryngeal cancer is a tumor that has invaded nearby tissues or spread to lymph nodes or other parts of the body.
- Or the cancer is only in the larynx, but the tumor prevents the vocal cords from moving normally.

Diagnosis of pharyngeal cancer

Physical exam of the throat

- An exam in which the doctor feels for swollen lymph nodes in the neck and checks for anything else that seems unusual.

Nasoscopy

- A procedure to look inside the nose for abnormal areas. A nasoscope is inserted through the nose. A nasoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove tissue samples, which are checked under a microscope for signs of cancer.

Neurological exam

- A series of questions and tests to check the brain, spinal cord, and nerve function.
- The exam checks a person's mental status, coordination, and ability to walk normally, and how well the muscles, senses, and reflexes work.

CT scan

- A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles. The pictures are made by a computer linked to an x-ray machine. A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly.

MRI (magnetic resonance imaging)

- A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body.

X-rays

- An x-ray of the organs and bones. An x-ray is a type of energy beam that can go through the body and onto film, making pictures of areas inside the body.

PET scan

- A procedure to find malignant tumor cells in the body. A small amount of radionuclide glucose (sugar) is injected into a vein. The PET scanner rotates around the body and makes a picture of where glucose is being used in the body. Malignant tumor cells show up brighter in the picture because they are more active and take up more glucose than normal cells do.

Endoscopy

- A procedure to look at organs and tissues inside the body to check for abnormal areas. An endoscope is inserted through the patient's nose or mouth to look at areas in the throat that cannot be seen during a physical exam of the throat.

Bone scan

- A procedure to check if there are rapidly dividing cells, such as cancer cells, in the bone. A very small amount of radioactive material is injected into a vein and travels through the bloodstream. The radioactive material collects in the bones and is detected by a scanner.

Barium esophagogram

- An x-ray of the esophagus. The patient drinks a liquid that contains barium (a silver-white metallic compound). The liquid coats the esophagus and x-rays are taken.

Esophagoscopy

- A procedure to look inside the esophagus to check for abnormal areas. An esophagoscope is inserted through the mouth or nose and down the throat into the esophagus. Tissue samples may be taken for biopsy.

Bronchoscopy

- A procedure to look inside the trachea and large airways in the lung for abnormal areas. A bronchoscope is inserted through the nose or mouth into the trachea and lungs. Tissue samples may be taken for biopsy.

Biopsy

- The removal of cells or tissues so they can be viewed under a microscope to check for signs of cancer.

Diagnosis of Paranasal sinuses and nasal cavity cancer

The following tests and procedures may be used to diagnose paranasal sinuses and nasal cavity cancer

- Physical exam and history
- X-rays of the head and neck
- MRI
- Nasoscopy
- Laryngoscopy
- Biopsy

Diagnosis of salivary gland cancer

The following tests and procedures may be used to diagnose salivary gland cancer

- Physical exam and history
- MRI
- CT scan
- PET scan
- Ultrasound exam
- Endoscopy
- Biopsy

Head and neck cancer staging

- Head and neck cancer staging involves both the size of the tumor and whether or not it has spread to other parts of the body such as the lymph nodes.
- Staging helps doctor to determine whether or not to try a particular treatment.
- Stages of head and neck cancer start at 0 and go up to 4 (I–IV)
- Generally, a lower number means the cancer has spread less. A higher number means the cancer has spread more.

Treatment options for head and neck cancer

Treatment options

- The treatment plan for an individual patient depends on a number of factors, including
  - The exact location of the tumor
  - The stage of the cancer
  - The person's age and general health.
- Treatment for head and neck cancer can include
  - Surgery
  - Radiation therapy
  - Chemotherapy
  - Targeted therapy
  - Combination of treatments

Treatment of oral cancer

- Treatment for oral cancer can include
  - Surgery
  - Radiation therapy
  - Chemotherapy
  - Targeted therapy

Surgery

- Surgery (removing the cancer in an operation) is a common treatment for all stages of oral cavity cancer.
- Surgery may include the following:
  - **Wide local excision:** Removal of the cancer and some of the healthy tissue around it. If cancer has spread into bone, surgery may include removal of the involved bone tissue.
  - **Neck dissection:** Removal of lymph nodes and other tissues in the neck. This is done when cancer may have spread from the oral cavity.
  - **Plastic surgery:** An operation that restores or improves the appearance of parts of the body. Dental implants, a skin graft, or other plastic surgery may be needed to repair parts of the mouth, throat, or neck after removal of large tumors.

Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left.

Radiation therapy

- Radiation therapy uses high-energy rays to kill cancer cells. It's an option for small tumors or for people who can't have surgery. Or, it may be used before surgery to shrink the tumor. It also may be used after surgery to destroy cancer cells that may remain in the area.

Chemotherapy

- Chemotherapy uses drugs to kill cancer cells. The drugs that treat oral cancer are usually given through a vein. The drugs enter the bloodstream and travel throughout the body.
- Chemotherapy and radiation therapy are often given at the same time.

Targeted Therapy

- Some people with oral cancer receive a type of drug known as targeted therapy. It may be given along with radiation therapy or chemotherapy.
- Cetuximab was the first targeted therapy approved for oral cancer. Cetuximab binds to oral cancer cells and interferes with cancer cell growth and the spread of cancer.

Treatment of hypopharyngeal cancer

- Treatment for hypopharyngeal cancer can include
    - Surgery
    - Radiation therapy
    - Chemotherapy

Surgery is a common treatment for all stages of hypopharyngeal cancer.

The following surgical procedures may be used:

- **Laryngopharyngectomy:** Surgery to remove the larynx (voice box) and part of the pharynx (throat).
- **Partial laryngopharyngectomy:** Surgery to remove part of the larynx and part of the pharynx. A partial laryngopharyngectomy prevents loss of the voice.
- **Neck dissection:** Surgery to remove lymph nodes and other tissues in the neck.

Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left.

- Treatment for oropharyngeal cancer can include
    - Surgery
    - Radiation therapy
    - Chemotherapy

Surgery is a common treatment of all stages of oropharyngeal cancer. A doctor may remove the cancer and some of the healthy tissue around the cancer. Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given **chemotherapy or radiation therapy** after surgery to kill any cancer cells that are left.

Treatment for nasopharyngeal cancer can include

- Radiation therapy
- Chemotherapy
- Surgery

Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing.

- **Chemotherapy**
    - Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.
    - Chemotherapy may be given after radiation therapy to kill any cancer cells that are left.
- **Surgery**
    - Surgery is a procedure to find out whether cancer is present, to remove cancer from the body, or to repair a body part. Surgery is sometimes used for nasopharyngeal cancer that does not respond to radiation therapy. If cancer has spread to the lymph nodes, the doctor may remove lymph nodes and other tissues in the neck.

Treatment of laryngeal cancer

- Treatment for laryngeal cancer can include
    - Radiation therapy
    - Surgery
    - Chemotherapy
- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing.

Surgery is a common treatment for all stages of laryngeal cancer. The following surgical procedures may be used:

- **Cordectomy:** Surgery to remove the vocal cords only.
- **Supraglottic laryngectomy:** Surgery to remove the supraglottis only.
- **Hemilaryngectomy:** Surgery to remove half of the larynx. A hemilaryngectomy saves the voice.
- **Partial laryngectomy:** Surgery to remove part of the larynx. A partial laryngectomy helps keep the patient's ability to talk.
- **Total laryngectomy:** Surgery to remove the whole larynx. During this operation, a hole is made in the front of the neck to allow the patient to breathe. This is called a tracheostomy.
- **Thyroidectomy:** The removal of all or part of the thyroid gland.
- **Laser surgery:** A surgical procedure that uses a laser beam (a narrow beam of intense light) as a knife to make bloodless cuts in tissue or to remove a surface lesion such as a tumor.

Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left.

Treatment of paranasal sinus and nasal cavity cancer

- Treatment for paranasal sinus and nasal cavity cancer can include
    - Surgery
    - Radiation therapy
    - Chemotherapy
- Surgery is a common treatment for all stages of paranasal sinus and nasal cavity cancer.
    - A doctor may remove the cancer and some of the healthy tissue and bone around the cancer. If the cancer has spread, the doctor may remove lymph nodes and other tissues in the neck.
    - Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left. Treatment given after surgery, to lower the risk that the cancer will come back, is called adjuvant therapy.

Treatment of salivary gland cancer

- Treatment for salivary gland cancer can include
    - Surgery
    - Radiation therapy
    - Chemotherapy
- Treatment for head and neck cancer can include surgery, radiation therapy, chemotherapy, targeted therapy, or a combination of treatments.
- The patient and the doctor should consider treatment options carefully. They should discuss each type of treatment and how it might change the way the patient looks, talks, eats, or breathes.

Prevention of head and neck cancer

Prevention of oral cavity and oropharyngeal cancers

- Not all cases of oral cavity and oropharyngeal cancer can be prevented, but the risk of developing these cancers can be greatly reduced by avoiding certain risk factors.
    - Quitting tobacco and alcohol

Limit exposure to ultraviolet (UV) light

- Limit the time you spend outdoors during the middle of the day, when the sun's UV rays are strongest. If you are out in the sun, wear a wide-brimmed hat and use sunscreen and lip balm with a sun protection factor (SPF) of at least 15.

- **Wear properly fitted dentures:** Avoiding sources of oral irritation (such as dentures that do not fit properly) may also lower your risk for oral cancer.

Eat a healthy diet

- A poor diet has been linked to oral cavity and oropharyngeal cancers, although it's not exactly clear what substances in healthy foods might be responsible for reducing the risk of these cancers.
- In general, eating a healthy diet is much better than adding vitamin supplements to an otherwise unhealthy diet.
- The American Cancer Society recommends eating a healthy diet, with an emphasis on plant foods.
- This includes eating at least 2½ cups of vegetables and fruits every day. Choosing whole-grain breads and cereals instead of refined grains, and eating fish, poultry, or beans instead of processed meat and red meat may also help lower your risk of cancer.

Avoid HPV infection

- A poor diet has been linked to oral cavity and oropharyngeal cancers, although it's not exactly clear what substances in healthy foods might be responsible for reducing the risk of these cancers.
- In general, eating a healthy diet is much better than adding vitamin supplements to an otherwise unhealthy diet.
- The American Cancer Society recommends eating a healthy diet, with an emphasis on plant foods.
- This includes eating at least 2½ cups of vegetables and fruits every day. Choosing whole-grain breads and cereals instead of refined grains, and eating fish, poultry, or beans instead of processed meat and red meat may also help lower your risk of cancer.
- The risk of HPV infection of the mouth and throat is increased in those who have oral sex and multiple sex partners.
- These infections are common and rarely cause symptoms. Although HPV infection is linked to oropharyngeal cancer, most people with HPV infections of the mouth and throat do not go on to develop this cancer.

- In recent years, vaccines that reduce the risk of infection with certain types of HPV have become available. These vaccines are only effective if given before someone is infected with HPV, which is why they are generally recommended before a person becomes sexually active.

Prevention of nasopharyngeal cancer

- Most people who develop nasopharyngeal cancer (NPC) have no avoidable risk factors, so their cancers could not have been prevented.
- The possible links with tobacco and heavy alcohol use are not clear, so it's not known if avoiding these can lower a person's risk of NPC. However, both tobacco and alcohol use have clearly been linked to a number of other cancers, as well as other health problems, so avoiding them can have many health benefits.

- Because certain dietary factors have been linked with NPC risk, reducing or eliminating some types of food (for eg. high in salt-cured fish and meat) may lower the number of cases

Prevention of laryngeal and hypopharyngeal cancer

- Not all of these cancers can be prevented, but the risk can be greatly reduced by avoiding risk factors such as smoking and alcohol use, and by using safe work habits if you are around cancer-causing chemicals.
- Poor diet and a lack of some vitamins have been linked to these cancers. Eating a healthy, balanced diet may help lower your risk of these cancers and many others.

Prevention of nasal cavity and paranasal sinus cancers

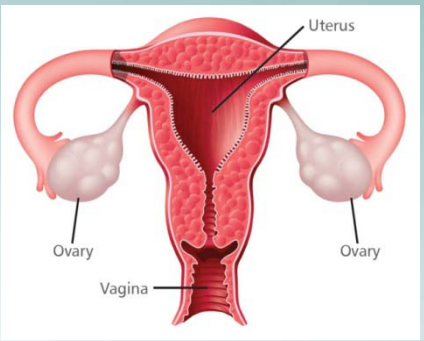
- Not all nasal cavity and paranasal sinus cancers can be prevented, but the risk of developing these cancers can be greatly reduced by avoiding certain risk factors, such as workplace exposures to certain substances.
    - Wood dusts from carpentry (such as furniture and cabinet builders), sawmills, and other wood-related industries
    - Dusts from textiles (textile plants)
    - Leather dusts (shoemaking)
    - Flour (baking and flour milling)
    - Nickel and chromium dust
    - Mustard gas (a poison used in chemical warfare)
    - Radium (a radioactive element)

- If you are working with any of the substances listed above, it is important for you to find out if you are being protected from harmful exposure.
- Cigarette smoking is another avoidable risk factor for cancers of the nasal cavity and sinuses.
- Most people with cancer of the nasal cavity and paranasal sinuses have no known risk factors, so there is currently no way to prevent most of these cancers.

Prevention of salivary gland cancer

- Because we do not know what causes most salivary gland cancers, it is not yet possible to prevent all of them.
- Avoiding certain risk factors (tobacco, excessive alcohol use, unhealthy diets) may slightly lower the likelihood of developing salivary gland cancer.
- People who work with radioactive substances, silica dust, and nickel alloy dust should take precautions to protect themselves against exposure to these materials.
- People who are at risk of head and neck cancers—particularly those who use tobacco—should talk with their doctor about ways that they may be able to reduce their risk.
- They should also discuss with their doctor how often to have checkups.

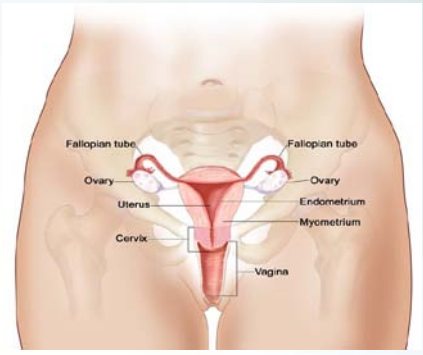
What is ovarian cancer?



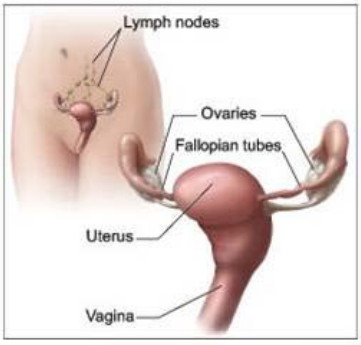
The Ovaries

- The ovaries are part of a woman's reproductive system
- They are in the pelvis

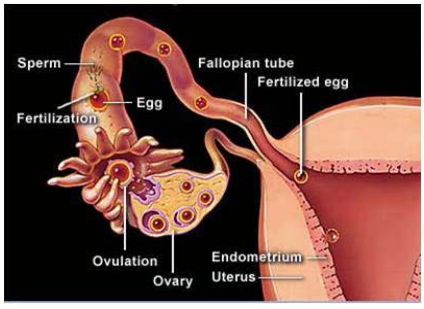
Each ovary is about the size of an almond



- The ovaries make the female hormones — **Estrogen and Progesterone**
- They also release **eggs**



- The eggs travel through the fallopian tubes into the uterus where the fertilized egg implants and **develops into a fetus**



- When a woman goes through her menopause, her ovaries stop releasing eggs and make far lower levels of hormones

Cells of ovaries

The ovaries contain 3 main kinds of cells:

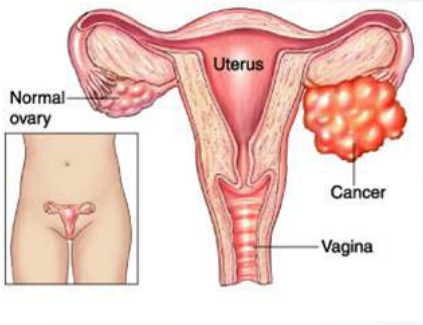
- **Epithelial cells:** Which cover the ovary
- **Germ cells:** Which are found inside the ovary

  These cells develop into the eggs (ova) that are released into the fallopian tubes every month during the reproductive years
- **Germ cells:** Which are found inside the ovary

  These cells develop into the eggs (ova) that are released into the fallopian tubes every month during the reproductive years

Ovarian cancer

- Ovarian cancer happens when normal cells in the ovary change into abnormal cells and grow out of control



Types of ovarian cancer

- **Epithelial tumors:** Start from the cells that cover the outer surface of the ovary. **Most ovarian tumors are epithelial cell tumors**
- **Germ cell tumors:** Start from the cells that produce the eggs
- **Stromal tumors:** Start from structural tissue cells that hold the ovary together and produce the female hormones estrogen and progesterone
- Most of these tumors are benign (non-cancerous) and never spread beyond the ovary
- Benign tumors can be treated by removing either the ovary or the part of the ovary that contains the tumor

- Ovarian tumors that are not benign are malignant (cancerous) or low malignant potential tumors
- These types can spread (metastasize) to other parts of the body and **can be fatal**

What causes ovarian cancer?

Risk factors

- Anything that increases your chance of getting a disease is called a **risk factor**
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer

Ovarian cancer risk factors

Risk factors for ovarian cancer include the following:

- Age over 55
- Family history of cancer
- Personal history of cancer
- Never pregnant
- Menopausal hormone therapy

Age over 55

•The risk of developing ovarian cancer gets higher with age

- Ovarian cancer is rare in women younger than 40
- Most ovarian cancers develop after menopause
- Most women are over the age of 55 when diagnosed with ovarian cancer

Obesity

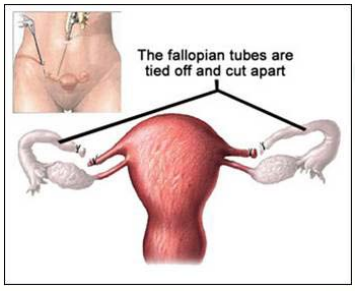
- Obese women (those with a body mass index of at least 30) have a higher risk of developing ovarian cancer

- A study from the American Cancer Society found a higher rate of death from ovarian cancer in obese women
- The risk increased by 50% in the heaviest women

Reproductive history

- A woman who has had children has a lower risk of ovarian cancer than women who have no children
- Using oral contraceptives significantly lowers the risk of ovarian cancer if taken for longer than 5 years

Gynecologic surgery



- Tubal ligation (having your "tubes tied") may reduce the chance of developing ovarian cancer by up to 67%
- A hysterectomy (removing the uterus without removing the ovaries) also seems to reduce the risk of getting ovarian cancer by about one-third

Estrogen therapy and hormone therapy

•Some recent studies suggest women using estrogens after menopause have an increased risk of developing ovarian cancer

•The risk seems to be higher in women taking estrogen alone (without progesterone) for many years (at least 5 or 10)

•The increased risk is less certain for women taking both estrogen and progesterone

Family history of cancer

•Women who have a mother, daughter, or sister with ovarian cancer have an increased risk of the disease

•Also, women with a family history of cancer of the breast, uterus, colon or rectum may also have an increased risk of ovarian cancer

If several women in a family have ovarian or breast cancer, especially at a young age, this is considered a strong family history

Personal history of cancer

•Women who have had cancer of the breast, uterus, colon, or rectum have a higher risk of ovarian cancer

What are the signs of ovarian cancer?

Signs and symptoms

• Signals of injury, illness, disease, or that something is not right in the body

•***Sign:*** Signal that can be seen by someone else

- For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia

Symptom: Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

- For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia

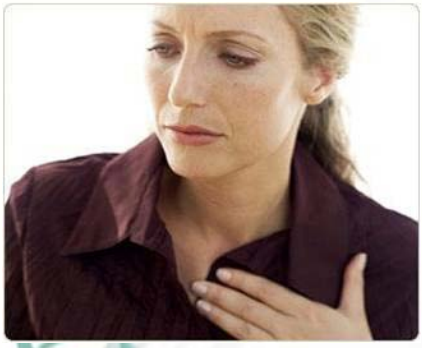
Ovarian cancer symptoms

- When ovarian cancer begins to grow, some women might not notice their symptoms much. But as the cancer grows, the symptoms become worse
- When ovarian cancer begins to grow, some women might not notice their symptoms much. But as the cancer grows, the symptoms become worse

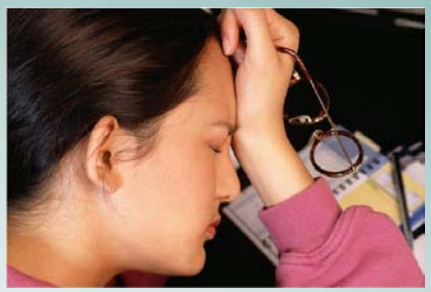
•Pressure or pain in the abdomen, pelvis, back, or legs

•A swollen or bloated abdomen

•Nausea, indigestion, gas, constipation or diarrhea



•**Nausea, indigestion, gas, constipation or diarrhea**



Less common symptoms include:

- •Shortness of breath
- •Feeling the need to urinate often
- •Unusual vaginal bleeding (heavy periods, or bleeding after menopause)

- •These symptoms can also be caused by conditions that are not ovarian cancer
- •A woman with any of these symptoms should tell her doctor **so** that problems can be diagnosed and treated as early as possible

Ovarian cancer early detection/screening

- •***Screening***
  - – Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms
- •***Early detection***
  - – Using an approach that lets ovarian cancer get diagnosed earlier than otherwise might have occurred

Can ovarian cancer be found early?

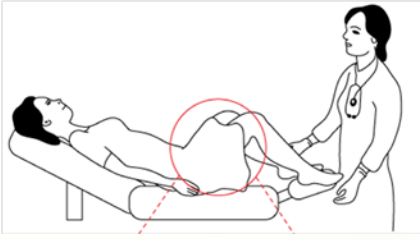
- About 20% of ovarian cancers are found at an early stage
- When ovarian cancer is found early at a localized stage, about 94% of patients live longer than 5 years after diagnosis
- Several studies are in progress to learn the best ways to find ovarian cancer in its earliest stage

Ways to find ovarian cancer early

- Regular women's health exams
- See a doctor if you have symptoms
- Screening tests for ovarian cancer

Regular women's health exams

- During a pelvic exam, the doctor feels the ovaries and uterus for size, shape and consistency



- A pelvic exam can be useful because it can find some reproductive system cancers at an early stage, but most early ovarian tumors are difficult or impossible for even the most skilled examiner to feel

- Pelvic exams may, however, help identify other cancers or gynecologic conditions
- Women should discuss the need for these exams with their doctor
- The Pap test is effective in early detection of cervical cancer, but it isn't a test for ovarian cancer. Rarely ovarian cancers are found through Pap tests, but usually these are at an advanced stage

See a doctor if you have symptoms

- If you have symptoms similar to those of ovarian cancer almost daily for more than a few weeks, and they can't be explained by other more common conditions, report them to your doctor (preferably a gynecologist) right away

Screening tests for ovarian cancer

- Screening tests and exams are used to detect a disease, like cancer, in people who don't have any symptoms
- There has been a lot of research to develop a screening test for ovarian cancer, but there hasn't been much success so far
- The 2 tests used most often to screen for ovarian cancer are *transvaginal ultrasound* (TVUS) and the *CA-125* blood test

Transvaginal ultrasound (TVUS)

- TVUS is a test that uses sound waves to look at the uterus, fallopian tubes and ovaries by putting an ultrasound wand into the vagina
- It can help find a mass (tumor) in the ovary, but it can't actually tell if a mass is cancer or benign
- When it is used for screening, most of the masses found are not cancer

CA-125

- CA-125 is a protein in the blood
- In many women with ovarian cancer, levels of CA-125 are high
- This test can be useful as a tumor marker to help guide treatment in women known to have ovarian cancer, because a high level often goes down if treatment is working
- But CA-125 has not been found to be as useful as a screening test for ovarian cancer
- In studies of women at average risk of ovarian cancer, using TVUS and CA-125 for screening led to more testing and sometimes more surgeries, but did not lower the number of deaths caused by ovarian cancer
- For that reason, no major medical or professional organization recommends the routine use of TVUS or the CA-125 blood test to screen for ovarian cancer

- Better ways to screen for ovarian cancer are being researched

- Hopefully, improvements in screening tests will eventually lead to a lower ovarian cancer death rate

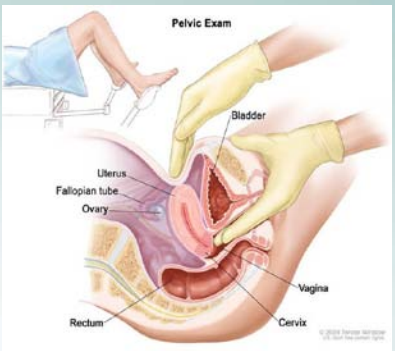
Diagnosis and Staging of ovarian cancer

- The cervix is the loIf patient has any symptom that suggests ovarian cancer, doctor must find out whether it is due to cancer or to some other cause
- Doctor may ask about personal and family medical history of patient
- Doctor may conduct the following tests:
    - Physical exam
    - Pelvic exam
    - Blood tests
    - Ultrasound
    - Biopsy

Physical exam

- Doctor checks general signs of health
- Doctor may press on abdomen to check for tumors or an abnormal buildup of fluid (*ascites*)
- A sample of fluid can be taken to look for ovarian cancer cells

Pelvic exam



- An exam of the vagina, cervix, uterus, fallopian tubes, ovaries and rectum
- The doctor inserts one or two lubricated, gloved fingers of one hand into the vagina and the other hand is placed over the lower abdomen to feel the size, shape and position of the uterus and ovaries
- A speculum is also inserted into the vagina and the doctor looks at the vagina and cervix for signs of disease

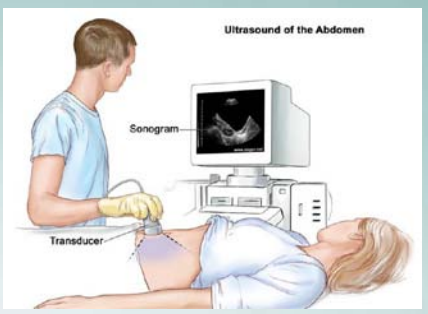
Blood tests

- The lab may check the level of several substances, including *CA-125*
- CA-125 is a substance found on the surface of ovarian cancer cells and on some normal tissues
- A high CA-125 level could be a sign of cancer or other conditions
- The CA-125 test is not used alone to diagnose ovarian cancer

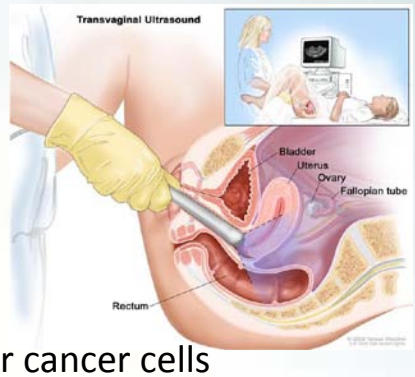
Ultrasound

- The ultrasound device uses sound waves that people cannot hear
- The device aims sound waves at organs inside the pelvis

- The waves bounce off the organs



- A computer creates a picture from the echoes
- The picture may show an ovarian tumor
- For a better view of the ovaries, the device may be inserted into the vagina (*transvaginal ultrasound)*



Biopsy

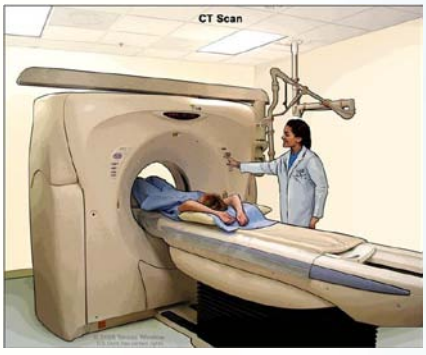
- A biopsy is the removal of tissue or fluid to look for cancer cells
- Based on the results of the blood tests and ultrasound, doctor may suggest surgery (laparotomy) to remove tissue and fluid from the pelvis and abdomen
- Surgery is usually needed to diagnose ovarian cancer
- Although most women have a laparotomy for diagnosis, some women have a procedure known as *laparoscopy*
- The doctor inserts a thin, lighted tube (a laparoscope) through a small incision in the abdomen
- Laparoscopy may be used to remove a small, benign cyst or an early ovarian cancer. It may also be used to learn whether cancer has spread
- A pathologist uses a microscope to look for cancer cells in the tissue or fluid
- If ovarian cancer cells are found, the pathologist describes the grade of the cells. Grades 1, 2, and 3 describe how abnormal the cancer cells look
- Grade 1 cancer cells are not as likely as to grow and spread as Grade 3 cells

Staging

- To plan the best treatment, doctor needs to know the grade of the tumor and the extent (stage) of the disease
- The stage is based on whether the tumor has invaded nearby tissues, whether the cancer has spread, and if so, to what parts of the body
- Usually, surgery is needed before staging can be completed. The surgeon takes many samples of tissue from the pelvis and abdomen to look for cancer
- **Doctor may order following tests to find out whether the cancer has spread:**

CT scan

- Doctors often use CT scans to make pictures of organs and tissues in the pelvis or abdomen
- An x-ray machine linked to a computer takes several pictures

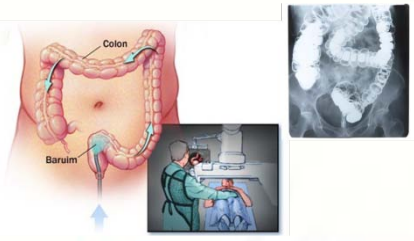


Chest x-ray

- X-rays of the chest can show tumors or fluid

Barium enema x-ray

- A procedure in which a liquid that contains barium sulfate is put through the anus into the rectum and colon



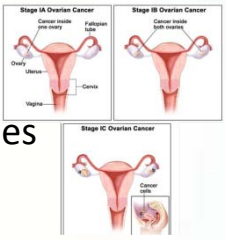
- Barium sulfate is a silver-white metallic compound that helps show pictures of the colon, rectum, and anus on an x-ray

Colonoscopy

- Doctor inserts a long, lighted tube into the rectum and colon
- This exam can help tell if cancer has spread to the colon or rectum

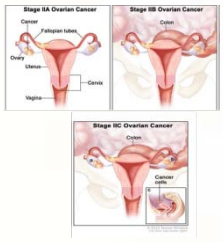
Staging

Stage I



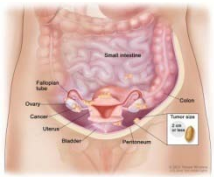
- Cancer cells are found in one or both ovaries
- Cancer cells may be found on the surface of the ovaries or in fluid collected from the abdomen

Stage II



- Cancer cells have spread from one or both ovaries to other tissues in the pelvis
- Cancer cells are found on the fallopian tubes, the uterus, or other tissues in the pelvis
- Cancer cells may be found in fluid collected from the abdomen

Stage III



- Cancer cells have spread to tissues outside the pelvis or to the regional lymph nodes.
- Cancer cells may be found the outside the liver

Stage IV

- Cancer cells have spread to tissues outside the abdomen and pelvis

- Cancer cells may be found inside the liver, in the lungs, or in other organs

Treatment options for ovarian cancer

Certain factors affect the chance of recovery and treatment options

- The stage of the cancer
- The type and size of the tumor
- Whether the entire tumor can be removed by surgery
- The patient's age and general health
- Whether the cancer has just been diagnosed or has recurred (come back)

Treatment options

- Treatment options for women with ovarian cancer are…

  -Surgery

  -Chemotherapy

  -Radiation therapy

Surgery

- Removing the cancer in an operation

- The surgeon makes a long cut in the wall of the abdomen. This type of surgery is called a **laparotomy**

If ovarian cancer is found, the surgeon removes:

- Both ovaries and fallopian tubes (salpingo-oophorectomy)
- The uterus (hysterectomy)
- The omentum (the thin, fatty pad of tissue that covers the intestines)
- Nearby lymph nodes
- Samples of tissue from the pelvis and abdomen

If the cancer has spread, the surgeon removes as much cancer as possible. This is called "debulking" surgery

Chemotherapy

- Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing
- Chemotherapy is given in cycles. Each treatment period is followed by a rest period. The length of the rest period and the number of cycles depend on the anticancer drugs used

Radiation therapy

- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growin
- Radiation therapy is rarely used in the initial treatment of ovarian cancer, but it may be used to relieve pain and other problems caused by the disease

Prevention of ovarian cancer

Can ovarian cancer be prevented?

•There are several ways you can reduce your risk of developing ovarian cancer

•It is important to realize that some of these strategies reduce the risk only slightly, while others decrease it much more

•Some strategies are easily followed, and others require surgery

•**If you are concerned about your risk of ovarian cancer, you may want to discuss this information with your doctor.** They can help you consider these ideas as they apply to your own situation

Oral contraceptives

•Using oral contraceptives (birth control pills) decreases the risk of developing ovarian cancer, especially among women who use them for several years

•Women who used oral contraceptives for 5 or more years have about a 50% lower risk of developing ovarian cancer compared with women who never used oral contraceptives

•Still, birth control pills do have some serious risks and side effects. Women considering taking these drugs for any reason should first discuss the possible risks and benefits with their doctor

Gynecologic surgery

- Both tubal ligation and hysterectomy may reduce the chance of developing ovarian cancer, but experts agree that these operations should only be done for valid medical reasons -- not for their effect on ovarian cancer risk
- If you are going to have a hysterectomy for a valid medical reason and you have a strong family history of ovarian or breast cancer, you may want to consider having both ovaries and fallopian tubes removed (called a *bilateral salpingo-oophorectomy*) as part of that procedure
- Even if you don't have an increased risk of ovarian cancer, some doctors recommend that the ovaries be removed with the uterus if a woman has already gone through menopause or is close to menopause
- If you are older than 40 and you are going to have a hysterectomy, you should discuss having your ovaries removed with your doctor

Prevention strategies for women with a family history of ovarian cancer

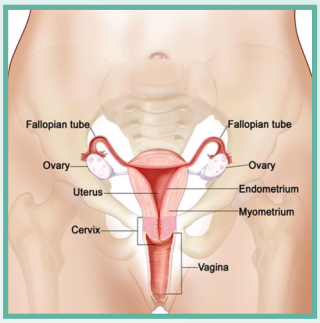
- Genetic counseling can predict whether you are likely to have one of the gene mutations associated with an increased ovarian cancer risk
- If your family history suggests that you might have one of these gene mutations, you might consider genetic testing
- Before having genetic tests, you should discuss their benefits and potential drawbacks with the counselor
- Genetic testing can help determine if you or members of your family carry certain gene mutations that cause a high risk of ovarian cancer. Still, the results are not always clear , and a genetic counselor can help you sort out what the results mean to you

- For some women with a strong family history of ovarian cancer, knowing they do not have a mutation that increases their ovarian cancer risk can be a great relief for them and their children
- Knowing that you do have such a mutation can be stressful, but many women find this information very helpful in making important decisions about certain prevention strategies for them and their children
- Using oral contraceptives is one way that many women can reduce their risk of developing ovarian cancer. Oral contraceptives also seem to reduce the risk for women with *BRCA1* and *BRCA2* mutations
- But birth control pills can increase breast cancer risk in women without these mutations
- Research is continuing to find out more about the risks and benefits of oral contraceptives for women at high ovarian and breast cancer risk
- Research has shown that premenopausal women who have *BRCA* gene mutations and have had their ovaries removed reduce their risk of breast cancer as well as their risk of ovarian cancer
- The risk of ovarian cancer is reduced by 85% to 95%, and the risk of breast cancer cut by 50% to 60%

CERVICAL CANCER

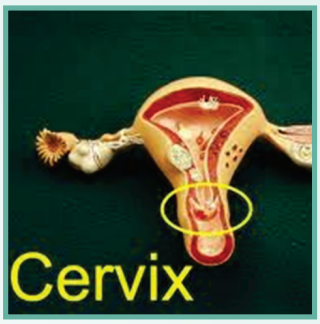
WHAT IS CERVICAL CANCER?

The Cervix

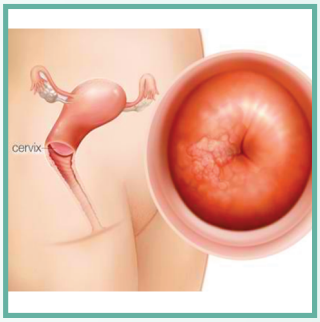


- The cervix is the lower, narrow end of the uterus (womb)
- The cervix leads from the uterus to the vagina (birth canal)

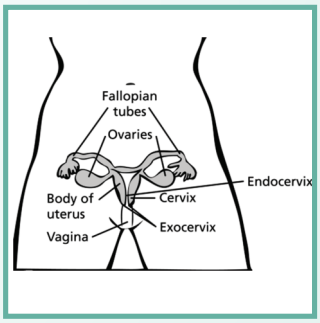
The cervix is a passageway

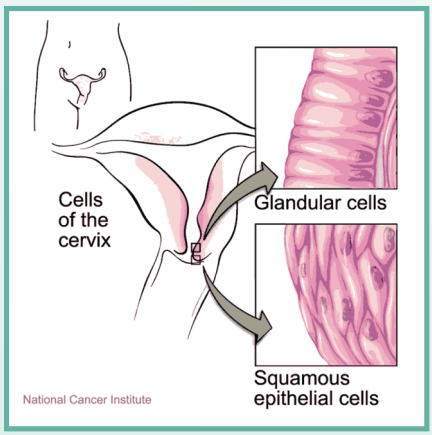


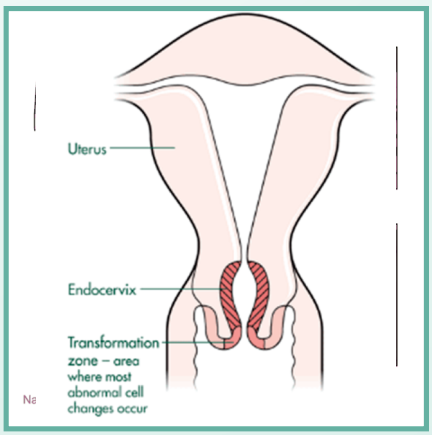
- Cervix is part of a woman's reproductive system
- Cervix connects the uterus to the vagina
- During a menstrual period, blood flows from the uterus through the cervix into the vagina.
- The cervix makes mucus. During sex, mucus helps sperm move from the vagina through the cervix into the uterus.



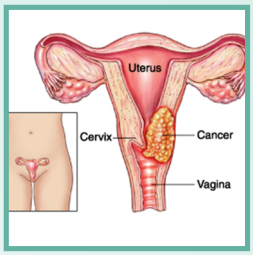
- During pregnancy, the cervix is tightly closed to help keep the baby inside the uterus.
- During childbirth, the cervix opens to allow the baby to pass through the vagina.
- The part of the cervix closest to the body of the uterus is called the endocervix.
- The part next to the vagina is the exocervix (or ectocervix).
- The 2 main types of cells covering the cervix are squamous cells (on the exocervix) and glandular cells (on the endocervix).
- The place where these 2 cell types meet is called the transformation zone. Most cervical cancers start in the transformation zone.



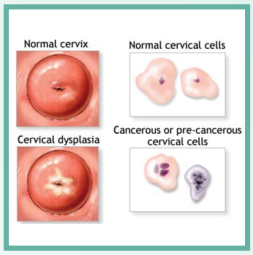




Cervical cancer



- Cervical cancer happens when normal cells in the cervix change into abnormal cells, and grow out of control
- Cervical cancer usually develops slowly over time.
- Before cancer appears in the cervix, the cells of the cervix go through changes known as dysplasia, in which cells that are not normal begin to appear in the cervical tissue.
- Later, cancer cells start to grow and spread more deeply into the cervix and to surrounding areas.



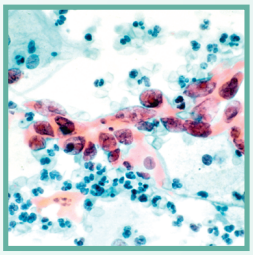
Cervical cancer types

- Cervical cancers are classified by how they look under a microscope.
- There are 2 main types of cervical cancers:

  -Squamous cell carcinoma

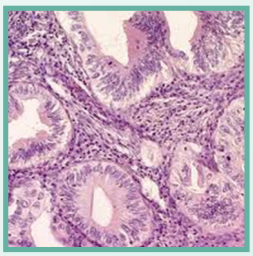
  -Adenocarcinoma

Squamous cell carcinoma



- About 80–90% of cervical cancers are squamous cell carcinomas.
- These cancers are from the squamous cells that cover the surface of the exocervix.
- Squamous cell carcinomas most often begin where the exocervix joins the endocervix.

Adenocarcinoma



- Cervical adenocarcinomas seem to have becoming more common in the past 20 to 30 years.
- Cervical adenocarcinoma develops from the mucus-producing gland cells of the endocervix.

What causes cervical cancer?

Risk factors

- Anything that increases your chance of getting a disease is called a risk factor.
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Cervical cancer risk factors

Risk factors for cervical cancer include the following:

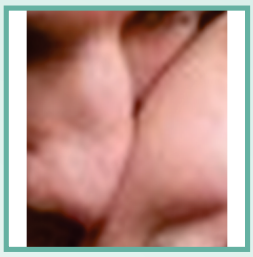
- Human papilloma virus infection
- Smoking
- Immunosuppression
- Chlamydia infection
- Diet
- Oral contraceptives
- Multiple full-term pregnancies
- Young age at the first full-term pregnancy
- Family history of cervical cancer

Human papilloma virus infection

- The most important risk factor for cervical cancer is infection by the human papilloma virus (HPV).
- HPV is a group of more than 100 related viruses, some of which cause a type of growth called a papilloma, which are more commonly known as warts.

- HPV can infect cells on the surface of the skin, genitals, anus, mouth and throat, but not the blood or most internal organs such as the heart or lungs.
- Infection with HPV is common, and in most people the body is able to clear the infection on its own.
- Sometimes, however, the infection does not go away and becomes chronic.
- Chronic infection, especially when it is caused by certain high-risk HPV types, can eventually cause certain cancers, such as cervical cancer.

- Although HPV can be spread during sex including vaginal intercourse, anal intercourse and oral sex, sex doesn't have to occur for the infection to spread. All that is needed to pass HPV from one person to another is skin-to-skin contact with an area of the body infected with HPV.



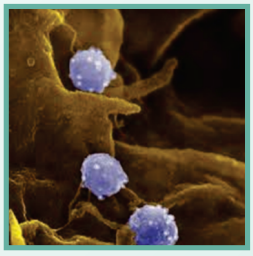
Smoking

- Women who smoke are about twice as likely as non-smokers to get cervical cancer.
- Smoking exposes the body to many cancer-causing chemicals that affect organs other than the lungs
- These harmful substances are absorbed through the lungs and carried in the bloodstream throughout the body.
- Tobacco by-products have been found in the cervical mucus of women who smoke.
- Researchers believe that these substances **damage the DNA of cervix cells and may contribute to the development of cervical cancer.** Smoking also makes the immune system less effective in fighting HPV infections.

Immunosuppression

- Human immunodeficiency virus (HIV), the virus that causes AIDS, damages the body's immune system and places women at higher risk for HPV infections.
- This may explain the increased risk of cervical cancer for women with AIDS.
- Another group of women at risk of cervical cancer are women receiving drugs to suppress their immune response, such as those being treated for an autoimmune disease or those who have had an organ transplant.

Chlamydia infection



- Chlamydia is a relatively common kind of bacteria that can infect the reproductive system.
- It is spread by sexual contact. Chlamydia infection can cause pelvic inflammation, leading to infertility.
- Some studies have seen a higher risk of cervical cancer in women whose blood test results show evidence of past or current chlamydia infection (compared with women who have normal test results).
- Infection with chlamydia often causes no symptoms in women. A woman may not know that she is infected at all unless she is tested for chlamydia when she gets her pelvic exam.

Diet

- Women with diets low in fruits and vegetables may be at increased risk for cervical cancer.
- Also overweight women are more likely to develop adenocarcinoma of the cervix.

Oral contraceptives (birth control pills)

- There is evidence that taking oral contraceptives (OCs) for a long time increases the risk of cancer of the cervix.
- Research suggests that the risk of cervical cancer goes up the longer a woman takes OCs, but the risk goes back down again after the OCs are stopped.

Multiple full-term pregnancies

- Women who have had 3 or more full-term pregnancies have an increased risk of developing cervical cancer. No one really knows why this is true.
- One theory is that these women had to have had unprotected intercourse to get pregnant, so they may have had more exposure to HPV.
- Also, studies have pointed to hormonal changes during pregnancy as possibly making women more susceptible to HPV infection or cancer growth.
- Another thought is that the immune system of pregnant women might be weaker, allowing for HPV infection and cancer growth.

Young age at the first full-term pregnancy

- Women who were younger than 17 years when they had their first full-term pregnancy are almost 2 times more likely to get cervical cancer later in life than women who waited to get pregnant until they were 25 years or older.

Family history of cervical cancer

- Cervical cancer may run in some families.
- If your mother or sister had cervical cancer, your chances of developing the disease are 2 to 3 times higher than if no one in the family had it.
- Some researchers suspect that some instances of this familial tendency are caused by an inherited condition that makes some women less able to fight off HPV infection than others.

What are the signs of cervical cancer?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

- **Sign:** Signal that can be seen by someone else
    - For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.
- **Symptom:** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.
    - For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

Cervical cancer symptoms

- Early cervical cancers usually don't cause symptoms.
- When the cancer grows larger, women may notice
    - Abnormal vaginal bleeding
    - Increased vaginal discharge
    - Pelvic pain
    - Pain during sex

Abnormal vaginal bleeding

- Bleeding after sex (vaginal intercourse)
- Bleeding after menopause
- Bleeding and spotting between periods
- Bleeding after douching, or after a pelvic exam

Increased vaginal discharge

- Having longer or heavier (menstrual) periods than usual

- Pelvic pain
- Pain during sexual intercourse
- Cervical cancer, infections, or other health problems may cause these symptoms.

- A woman with any of these symptoms should tell her doctor so that problems can be diagnosed and treated as early as possible.

Cervical cancer early detection/screening

- **Screening**
    - Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms
- **Early detection**
    - Using an approach that lets cervical cancer get diagnosed earlier than otherwise might have occurred.

Can cervical cancer be found early?

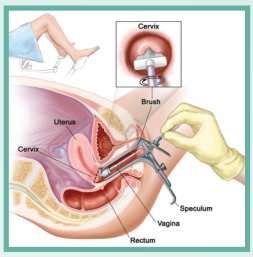
- Cervical cancer can usually be found early by having regular screening with a Pap test (which may be combined with a test for HPV).
- Being alert to any signs and symptoms of cervical cancer can also help avoid unnecessary delays in diagnosis.
- Early detection greatly improves the chances of successful treatment and prevents any early cervical cell change from becoming cancerous.

Cervical cancer screening

- There are several ways to screen for cervical cancer
- The traditional screening test is called a Pap test
- A Pap test (sometimes called a "Pap smear") is a test that doctors use to check the cervix for early signs of cancer.

Pap test

A piece of cotton, a brush, or a small wooden stick is used to gently scrape cells from the cervix and vagina. The cells are viewed under a microscope to find out if they are abnormal.



Who should have a pap smear?

- The first Pap test is recommended at age 21
- Pap testing is suggested every 3 years for most women over age 21.
- More frequent testing may be needed if test results are not normal, or for women with HIV disease or other specific immune system conditions.
- Even if you have had a vaccine for human papillomavirus, you will still need cervical cancer screening.

HPV testing

- A laboratory test used to check DNA (genetic material) for certain types of HPV infection.
- Cells are collected from the cervix and checked to find out if an infection is caused by a type of human papillomavirus that is linked to cervical cancer.
- This test may be done if the results of a Pap smear show certain abnormal cervical cells.

Who should have HPV testing?

- If you are 30 years or older, your doctor may recommend HPV testing in addition to a Pap test.
- If your HPV test and Pap test are negative, repeat testing is not usually needed for five years.
- HPV testing may also be done if the results of your Pap test results are unclear

Be alert!!!

- Being alert to any signs and symptoms of cervical cancer can also help avoid unnecessary delays in diagnosis.

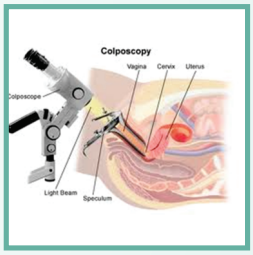
Diagnosis and Staging of cervical cancer

- If the patients have symptoms of cervical cancer,the doctor will try to find out what's causing the problems.
- Patients may have the following tests:
    - Lab tests
    - Cervical exam
    - Tissue sample

Lab tests

- The doctor scrapes a sample of cells from the cervix.
- For a **Pap test,** the lab checks the sample for cervical cancer cells or abnormal cells that could become cancer later if not treated.
- For an **HPV test,** the same sample is tested for HPV infection.
- HPV can cause cell changes and cervical cancer.

Cervical exam



- The doctor uses a colposcope to look at the cervix.
- The colposcope combines a bright light with a magnifying lens to make tissue easier to see.

Tissue sample

- Biopsy: The removal of tissue to look for cancer cells
- The doctor will remove tissue in one of the following ways:
    - Punch biopsy
    - LEEP
    - Endocervical curettage
    - Cone biopsy
- **Punch biopsy:** The doctor uses a sharp tool to pinch off small samples of cervical tissue.
- **LEEP:** The doctor uses an electric wire loop to slice off a thin, round piece of cervical tissue.
- **Endocervical curettage:** The doctor uses a curette (a small, spoon-shaped instrument) to scrape a small sample of tissue from the cervical canal. Some doctors may use a thin, soft brush instead of a curette.

- **Cone biopsy:** The doctor removes a cone-shaped sample of tissue. A cone biopsy lets the pathologist look at the tissue beneath the surface of the cervix to learn whether it has abnormal cells.

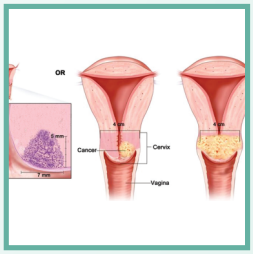
A pathologist checks the tissue under a microscope for cancer cells. **In most cases, a biopsy is the only sure way to tell whether cancer is present.**

Staging

- If the biopsy shows that patient has cancer, doctor will need to learn the extent (stage) of the disease to choose the best treatment option.
- The stage is based on whether the cancer has invaded nearby tissues or spread to other parts of the body.
- Cervical cancer spreads most often to nearby tissues in the pelvis or to lymph nodes. It may also spread to the lungs, liver, or bones.

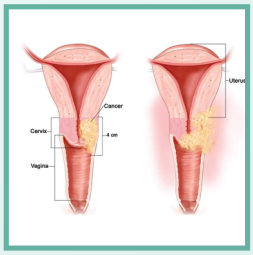
To study the stage of disease, doctor may order one or more tests:

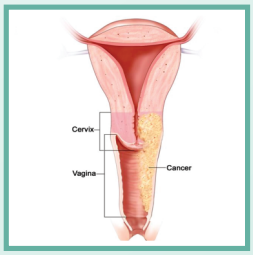
- **Chest x-ray:** An x-ray of the chest can often show whether cancer has spread to the lungs.
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of pelvis, abdomen, or chest. A tumor in the liver, lungs, or elsewhere in the body can show up on the CT scan.
- MRI: A powerful magnet linked to a computer makes detailed pictures of pelvis and abdomen. MRI can show whether cancer has invaded tissues near the cervix or has spread from the cervix to tissues in the pelvis or abdomen.



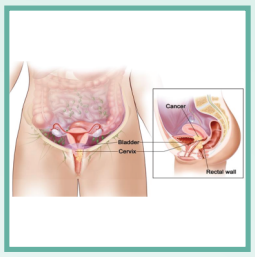
The stage is based on where cancer is found

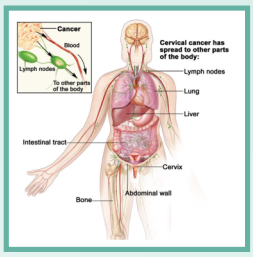
- **Stage I:** Cancer cells are found only in the cervix
- **Stage II:** The tumor has grown through the cervix and invaded the upper part of the vagina. It may have invaded other nearby tissues but not the pelvic wall (the lining of the part of the body between the hips) or the lower part of the vagina.
- **Stage III:** The tumor has invaded the pelvic wall or the lower part of the vagina. If the tumor is large enough to block one or both of the tubes through which urine passes from the kidneys, lab tests may show that the kidneys aren't working well.





- **Stage IV:** The tumor has invaded the bladder or rectum. Or, the cancer has spread to other parts of the body, such as the lungs.





Treatment options for cervical cancer

Certain factors affect the chance of recovery and treatment options

The chance of recovery depends on the following:

- The patient's age and general health
- Whether or not the patient has a certain type of human papillomavirus
- The stage of the cancer
- The type of cervical cancer
- The size of the tumor

Treatment options depend on the following:

- The stage of the cancer
- The size of the tumor
- The patient's desire to have children
- The patient's age
    - Treatment of cervical cancer during pregnancy depends on the stage of the cancer and the stage of the pregnancy.
    - For cervical cancer found early or for cancer found during the last trimester of pregnancy, treatment may be delayed until after the baby is born.

Treatment options

- Treatment options for women with cervical cancer are…
    - Surgery
    - Radiation therapy
    - Chemotherapy
    - A combination of these methods

Surgery

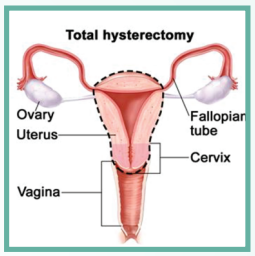
- Surgery: Removing the cancer in an operation
- Surgery is an option for women with Stage I or II cervical cancer.

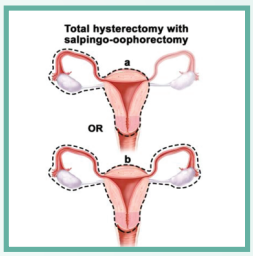
Radical trachelectomy

- Surgery to remove the cervix, nearby tissue and lymph nodes, and the upper part of the vagina.
- It may be used to treat women with early-stage cervical cancer who want to have children.
- After the cervix is removed, the uterus is attached to the remaining part of the vagina.
- A special stitch or band is used to act as the cervix and create an opening to the uterus.
- The stitch or band may be opened or closed as needed. Also called radical cervicectomy.

Complete hysterectomy

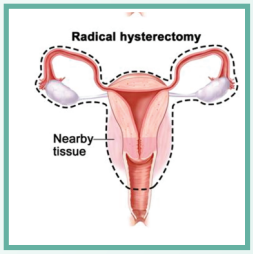
- Surgery to remove the entire uterus, including the cervix.
- Also called total hysterectomy.





Radical hysterectomy

- Removing the cervix, uterus, and upper part of the vagina



Radiation therapy

- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing.

Chemotherapy

- Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.

Prevention of cervical cancer

Can cervical cancer be prevented?

- In many cases, yes.
- The first way is to find and treat pre-cancers before they become true cancers, and the second is to prevent the pre-cancers.

Finding cervical pre-cancers

- A well-proven way to prevent cervix cancer is to have testing (screening) to find pre-cancers before they can turn into invasive cancer.
- The Pap test (or Pap smear) and the human papilloma virus (HPV) test are used for this.
- If a pre-cancer is found it can be treated, stopping cervical cancer before it really starts.

The American Cancer Society recommends the following guidelines for early detection:

- All women should begin cervical cancer testing (screening) at age 21. Women aged 21 to 29, should have a Pap test every 3 years.
- Beginning at age 30, the preferred way to screen is with a Pap test combined with an HPV test every 5 years. This should continue until age 65.
- Another reasonable option for women 30 to 65 is to get tested every 3 years with just the Pap test.

Prevention of pre-cancers

Things to do to prevent pre-cancers

- Avoid being exposed to HPV
- Don't smoke
- Get vaccinated

Avoid being exposed to HPV

- Avoid sex at an early age
- Avoid multiple sexual partners
- Avoid a partner who has had many sex partners
- Avoid sex with uncircumcised males
- Men who use condoms are less likely to be infected with HPV and to pass it on to their female partners

Don't smoke

- Not smoking is another important way to reduce the risk of cervical pre-cancer and cancer.

Get vaccinated

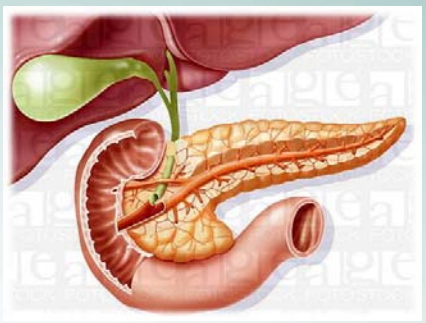
- Vaccines that prevent people from getting infected with HPV are now available.

The American Cancer Society guidelines recommend that the HPV vaccine be routinely given to females aged 11 to 12 and as early as age 9 years at the discretion of doctors. The Society also recommends that catch-up vaccinations should be given to females up to age 18.

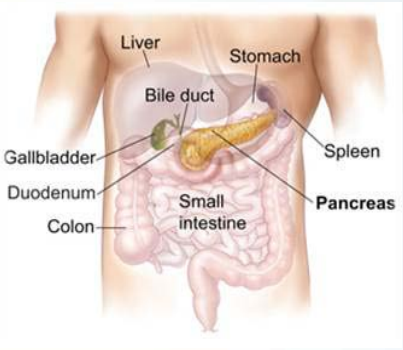
World Health Organization

WHO position paper suggests that girls within the age range of 9 through 13 years should be the primary target population for HPV immunization

What is Pancreatic cancer?

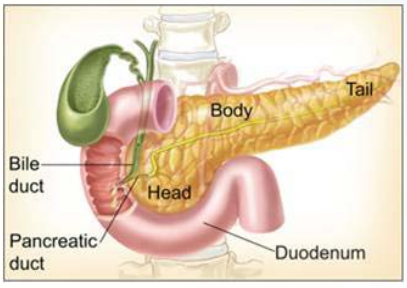


The Pancreas



- The pancreas is an organ found deep in the body, behind the stomach
- It is about 6 inches long and less than 2 inches wide

What does the pancreas do?



- The pancreas has two main jobs in our body:

  -To produce **juices** that help **digest food.**

  -To produce **hormones**, such as insulin and glucagon, that helps **control blood sugar levels**

- The pancreas contains 2 different types of glands: **exocrine and endocrine**
- The digestive juices are produced by exocrine pancreas cells and the hormones are produced by endocrine pancreas cells
- Both the exocrine and endocrine cells of the pancreas **can form tumors**

- Exocrine tumors are by far the most common type of pancreas cancer. When someone says that **they have pancreatic cancer, they usually mean an exocrine pancreatic cancer**

Pancreatic cancer

- Pancreatic cancer happens when normal cells in the pancreas change into abnormal cells and grow out of control

Prevalence

- Worldwide, pancreatic cancer ranks 13th in incidence but 8th as a cause of cancer death
- The incidence in India is less than 2 cases per 1,00,000 persons per year

Types of pancreatic cancer

Exocrine tumors

- Most common type of pancreas cancer
- An adenocarcinoma is a cancer that starts in gland cells. About 95% of cancers of the exocrine pancreas are adenocarcinomas

-These cancers usually begin in the ducts of the pancreas, but they sometimes develop from the cells that make the pancreatic enzymes

Endocrine tumors

- Tumors of the endocrine pancreas are uncommon
- As a group, they are known as *pancreatic neuroendocrine tumors (NETs)*, or sometimes as *islet cell tumors*
- There are several subtypes of islet cell tumors. Each is named according to the type of hormone-making cell it starts in:

-*Insulinomas* come from cells that make insulin
-*Glucagonomas* come from cells that make glucagon
-*Gastrinomas* come from cells that make gastrin
-*Somatostatinomas* come from cells that make somatostatin
-*VIPomas* come from cells that make vasoactive intestinal peptide (VIP)
-*PPomas* come from cells that make pancreatic polypeptide

- It is very important to distinguish between exocrine and endocrine cancers of the pancreas
- They have distinct risk factors and causes, have different signs and symptoms, are diagnosed using different tests, are treated in different ways, and have different prognoses (Outlook)

Pancreatic cancer stages

Staging is a careful attempt to find out the following:

- The size of the tumor in the pancreas
- Whether the tumor has invaded nearby tissues
- Whether the cancer has spread, and if so, to what parts of the body

These are the stages of cancer of the pancreas:

- **Stage I**: The tumor is found only in the pancreas
- **Stage II**: The tumor has invaded nearby tissue but not nearby blood vessels. The cancer may have spread to the lymph nodes
- **Stage III**: The tumor has invaded nearby blood vessels
- **Stage IV**: The cancer has spread to a distant organ, such as the liver or lungs

What causes pancreatic

Risk factors

- Anything that increases your chance of getting a disease is called a **risk factor**
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer

Pancreatic cancer risk factors

Risk factors for pancreatic cancer include the following:

- Smoking
- Diabetes
- Pancreatitis
- Diet, physical inactivity, obesity
- Family history

Age and Gender

- The risk of developing pancreatic cancer is usually low before the age of 40 with most people being diagnosed between their sixties and eighties
- Pancreatic cancer occurs more commonly in men than in women (1.5:1)
- Recent data however suggests that relative risk in women is approaching that seen in men, probably due to the increased use of tobacco by females

Smoking

- Smoking tobacco is the most important risk factor for pancreatic cancer
- People who smoke tobacco are more likely than nonsmokers to develop this disease
- Heavy smokers are most at risk

Diabetes

- Diabetes has also been linked to pancreatic cancer
- Diabetes appears to be both a symptom of pancreatic cancer, and long-standing adult-onset diabetes may also increase the risk of developing pancreatic cancer

Chronic pancreatitis

- Long-term inflammation of the pancreas (pancreatitis) has been linked to cancer of the pancreas
- Hereditary pancreatitis may have a higher lifetime risk for developing pancreatic cancer

Diet

- Diets high in meat, cholesterol, fried foods and nitrosamines may increase the risk of pancreatic cancer
- Recent research has suggested **obesity** and **physical inactivity** as additional risk factors

Environmental factors

- Environmental factors substantially increase the risk of pancreatic cancer
- Occupational exposure to carcinogens (e.g. asbestos, pesticides, dyes and petrochemicals) has been associated with pancreatic cancers
- The incidence risk due to industrial chemical exposure is 3 to 5 fold more

Peptic ulcer surgery

- Patients who have had a portion of their stomach removed for some ailment (i.e. partial gastrectomy) appear to have an increased risk for developing pancreatic cancer

What are the signs of pancreatic cancer?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

•***Sign:*** Signal that can be seen by someone else

- For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia

•***Symptom:*** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

- For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia

Pancreatic cancer symptoms

•Early cancer of the pancreas often doesn't cause symptoms

•When the cancer grows larger, you may notice one or more of these common symptoms:

- **Jaundice**
- **Pain in the upper or middle abdomen and back**
- **Weight loss for no known reason**
- **Loss of appetite**
- **Fatigue (tiredness)**

Pain

•Pain is common

•It usually develops in the upper abdomen as a dull ache that wraps around to the back

•The pain can come and go, and it might get worse after eating

Weight loss

•Some people lose weight because of

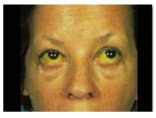
-Lack of appetite

-Feeling full after eating only a small amount of food

-Diarrhea

•The bowel movements might look greasy and float in the toilet bowl because they contain undigested fat

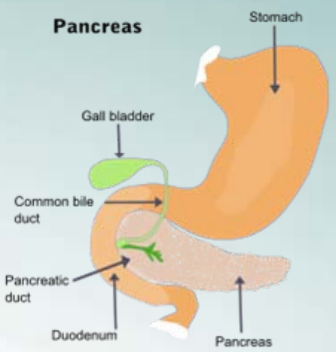
Jaundice



•Jaundice causes yellow colored skin and whites of the eyes

•Bowel movements may not be a normal brown color and instead have a grayish appearance

•Jaundice is caused by a block in the flow of bile from the gallbladder, where it is stored, to the intestinal tract where the bile assists in digestion of food



•The block is caused by the cancer

•Most people with pancreatic cancer have **pain and weight loss, with or without jaundice**

•These symptoms may be caused by pancreatic cancer or by other health problems. People with these symptoms should tell their doctor so that problems can be diagnosed and treated as early as possible

Pancreatic cancer early detection/ screening

•*Screening*

– Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms

•*Early detection*

– Using an approach that lets pancreatic cancer get diagnosed earlier than otherwise might have occurred

Can pancreatic cancer be found early?

- One reason for the often poor outlook for people with pancreatic cancer is that very few of these cancers are found early
- The pancreas is **located deep inside the body**, so early tumors cannot be seen or felt by health care providers during routine physical exams
- Patients usually **have no symptoms until the cancer has spread to other organs**
- **Right now, there are no blood tests to find early cancers of the pancreas**
- Doctors are looking to see if something called *endoscopic ultrasound* can be useful in screening people with a high risk of pancreatic cancer

Blood tests

- A substance called **CA 19-9** is released into the blood by exocrine pancreatic cancer cells and can be detected by blood tests
- But by the time blood levels are high enough to be consistently detected by available methods, the cancer is no longer in its early stages
- This is why the test is not recommended for routine screening of people without symptoms or a known diagnosis of cancer

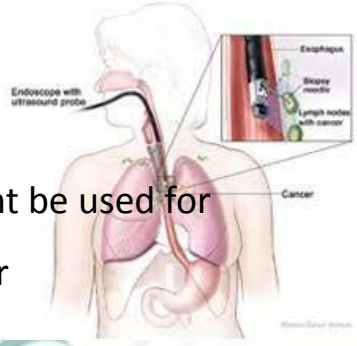
- The CA 19-9 test is sometimes used during treatment to see if the therapy is working or after treatment to see if the cancer has recurred (come back)
- Another substance, **carcinoembryonic antigen (CEA),** can help detect advanced pancreatic cancer in some people. But it isn't sensitive enough to find the cancer early and is not recommended as a screening test

Genetic testing

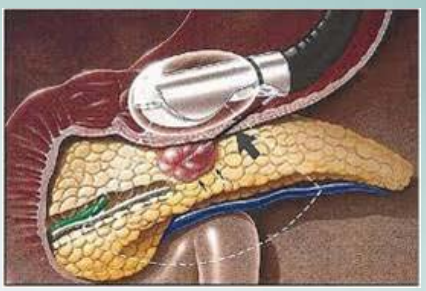
- Inherited DNA changes are thought to cause as many as 10% of pancreatic cancers
- Because these inherited cases are sometimes linked with other cancers, determining whether a patient's relatives have an increased risk is not simple
- Talking to someone with experience in hereditary cancer syndromes such as a genetic counselor, geneticist, or an oncologist is often helpful

Endoscopic ultrasound

- For people in families at high risk of pancreatic cancer, there are newer tests for detecting early pancreatic cancer that may help
- One of these is called *endoscopic ultrasound*
- This test is not used to screen the general public but might be used for someone with a strong family history of pancreatic cancer



- Using endoscopic ultrasound, doctors have been able to find early, treatable pancreatic cancers in some members of high-risk families



Diagnostic tests for pancreatic cancer

Tests to detect, diagnose and stage pancreatic cancer

- Pancreatic cancer is usually diagnosed with tests and procedures that produce pictures of the pancreas and the area around it
- The process used to find out if cancer cells have spread within and around the pancreas is called staging
- Tests and procedures to detect, diagnose, and stage pancreatic cancer are usually done at the same time
- In order to plan treatment, it is important to know the stage of the disease and whether or not the pancreatic cancer can be removed by surgery
- The following tests and procedures may be used:

  - Physical exam and history
  - Chest x-ray
  - CT scan
  - MRI (Magnetic resonance imaging)
  - PET scan
  - Endoscopic ultrasound (EUS)
  - Laparoscopy
  - Endoscopic retrograde cholangiopancreatography (ERCP)
  - Percutaneous transhepatic cholangiography (PTC)
  - Biopsy

Physical exam and history

- An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual
- A history of the patient's health habits and past illnesses and treatments will also be taken

Chest x-ray

- An x-ray of the organs and bones inside the chest

CT scan

- A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles
- The pictures are made by a computer linked to an x-ray machine
- A dye may be injected into a vein or swallowed to help the organs or tissues show up more clearly

MRI

Magnetic resonance imaging

- A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of areas inside the body

PET scan

Positron emission tomography scan

- A procedure to find malignant tumor cells in the body
- A small amount of radionuclide glucose (sugar) is injected into a vein
- The PET scanner rotates around the body and makes a picture of where glucose is being used in the body
- Malignant tumor cells show up brighter in the picture because they are more active and take up more glucose than normal cells do

Endoscopic ultrasound

- A procedure in which an endoscope is inserted into the body, usually through the mouth or rectum
- An endoscope is a thin, tube-like instrument with a light and a lens for viewing
- A probe at the end of the endoscope is used to bounce high-energy sound waves (ultrasound) off internal tissues or organs and make echoes
- The echoes form a picture of body tissues called a sonogram

Laparoscopy

- A surgical procedure to look at the organs inside the abdomen to check for signs of disease

- Small incisions (cuts) are made in the wall of the abdomen and a laparoscope (a thin, lighted tube) is inserted into one of the incisions
- Other instruments may be inserted through the same or other incisions to perform procedures such as removing organs or taking tissue samples for biopsy

Endoscopic retrograde cholangiopancreatography

- ERCP is a procedure used to x-ray the ducts (tubes) that carry bile from the liver to the gallbladder and from the gallbladder to the small intestine
- Sometimes pancreatic cancer causes these ducts to narrow and block or slow the flow of bile, causing jaundice
- An endoscope is passed through the mouth, esophagus and stomach into the first part of the small intestine
- A catheter (a smaller tube) is then inserted through the endoscope into the pancreatic ducts
- A dye is injected through the catheter into the ducts and an x-ray is taken. If the ducts are blocked by a tumor, a fine tube may be inserted into the duct to unblock it. This tube may be left in place to keep the duct open. Tissue samples may also be taken

Percutaneous transhepatic cholangiography

- A procedure used to x-ray the liver and bile ducts
- A thin needle is inserted through the skin below the ribs and into the liver

- Dye is injected into the liver or bile ducts and an x-ray is taken
- If a blockage is found, a thin, flexible tube called a stent is sometimes left in the liver to drain bile into the small intestine or a collection bag outside the body
- This test is done only if ERCP cannot be done

Biopsy

- The removal of cells or tissues so they can be viewed under a microscope by a pathologist to check for signs of cancer
- There are several ways to do a biopsy for pancreatic cancer
- A fine needle may be inserted into the pancreas during an x-ray or ultrasound to remove cells
- If a blockage is found, a thin, flexible tube called a stent is sometimes left in the liver to drain bile into the small intestine or a collection bag outside the body
- Tissue may also be removed during a laparoscopy

Treatment options for pancreatic cancer

Factors affect chance of recovery and treatment options

- **Whether or not the tumor can be removed by surgery**
- **The stage of the cancer**

-The size of the tumor and whether the cancer has spread outside the pancreas to nearby tissues or lymph nodes or to other places in the body

- **The patient's general health**
- **Whether the cancer has just been diagnosed or has recurred (come back)**
- Pancreatic cancer can be controlled only if it is found before it has spread, when it can be removed by surgery
- If the cancer has spread, palliative treatment can improve the patient's quality of life by controlling the symptoms and complications of this disease

Treatment types

The 3 main types of treatment for pancreatic cancer are

-Surgery
-Radiation therapy
-Chemotherapy

- Depending on the stage of the cancer, some of these treatments may be combined

Surgery

- Surgery is the mainstay of treatment for pancreatic cancer
- Depending on the location of the tumor within the pancreas, several operations can be performed
- Most commonly, the tumor is located in the "head" of the pancreas, but can also be found in the body or tail

- There are 2 general types of surgery used for pancreatic cancer:

Potentially curative surgery

-Used when imaging tests suggest that it is possible to remove all the cancer

Palliative surgery

-May be done if imaging tests show that the tumor is too widespread to be completely removed

-This is done to relieve symptoms or to prevent certain complications like a blocked bile duct or intestinal tract

Potentially curative surgery

Whipple procedure

- A surgical procedure in which the head of the pancreas, the gallbladder, part of the stomach, part of the small intestine, and the bile duct are removed
- Enough of the pancreas is left to produce digestive juices and insulin
- **Total pancreatectomy**

-This operation removes the whole pancreas, part of the stomach, part of the small intestine, the common bile duct, the gallbladder, the spleen and nearby lymph nodes

- **Distal pancreatectomy**

-The body and the tail of the pancreas and usually the spleen are removed

Palliative surgery

Surgical biliary bypass

- If cancer is blocking the small intestine and bile is building up in the gallbladder, a biliary bypass may be done
- During this operation, the doctor will cut the gallbladder or bile duct and sew it to the small intestine to create a new pathway around the blocked area

Endoscopic stent placement

- If the tumor is blocking the bile duct, surgery may be done to put in a stent (a thin tube) to drain bile that has built up in the area
- The doctor may place the stent through a catheter that drains to the outside of the body or the stent may go around the blocked area and drain the bile into the small intestine

Gastric bypass

- If the tumor is blocking the flow of food from the stomach, the stomach may be sewn directly to the small intestine so the patient can continue to eat normally

Radiation therapy

- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing

Chemotherapy

- Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing
- Chemotherapy and radiation therapy are frequently used after surgery to reduce the risk of the tumor recurring, or coming back
- Occasionally chemotherapy and radiation are given prior to surgery in an effort to reduce the tumor
- When tumors cannot be removed surgically, chemotherapy can be used to slow the spread

Chemoradiation therapy

- Chemoradiation therapy combines chemotherapy and radiation therapy to increase the effects of both

Targeted therapy

- Targeted therapy uses drugs or other substances to identify and attack specific cancer cells without harming normal cells

- Tyrosine kinase inhibitors (TKIs) are targeted therapy drugs that block signals needed for tumors to grow
- Erlotinib is a type of TKI used to treat pancreatic cancer

Prevention of pancreatic cancer

Can pancreatic cancer be prevented?

- There are no established guidelines for preventing pancreatic cancer
- For now, the best approach is to avoid pancreatic cancer risk factors whenever possible

Smoking – Quit NOW

- Smoking is the **most important avoidable risk factor** for pancreatic cancer. It is responsible for 20–30% of pancreatic cancers

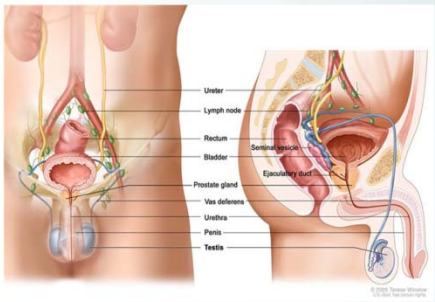
Healthy life style

- Maintaining a healthy weight, eating well and exercising are also important
- Eat a healthy diet, with an emphasis on plant foods
- This includes eating at least 2½ cups of vegetables and fruits every day
- Choosing whole-grain foods and cereals instead of refined grains
- Cut down on red meats, especially those are processed or high in fat

What is testicular cancer?

The testes

- The testicles are 2 egg-shaped glands located inside the scrotum (a sac of loose skin that lies directly below the penis)
- The testicles are held within the scrotum by the spermatic cord, which also contains the vas deferens and vessels and nerves of the testicles
- The testicles are the male sex glands and produce testosterone and sperm
- Germ cells within the testicles produce immature sperm that travel through a network of tubules (tiny tubes) and larger tubes into the epididymis (a long coiled tube next to the testicles)
- The sperm matures and gets stored in the testicles



Testicular cancer

- Testicular cancer is a disease in which malignant (cancer) cells form in the tissues of one or both testicles
- Almost all testicular cancers start in the germ cells

Types

- **Germ cell tumors:** The most common type of testicular tumors. Germ cell tumors start in the cells that make sperm
- **Stromal tumors:** Start in the cells that make hormones and the cells that support the cells that make sperm
- **Secondary testicular tumors:** Start from cancer that has spread to the testicles from other parts of the body

Germ cell tumors

- The 2 main types of germ cell tumors are seminomas and nonseminomas

❑ Seminomas

- Start from germ cells of the testicle that make sperm
- Within this group there are also subtypes
- Seminomas usually happen in men when they are between 25 and 45

Germ cell tumors

❑ Nonseminomas

- Tend to develop earlier in life than seminomas
- They are often found in men between their late teens and early 30s
- There are 4 main subtypes
- Most tumors are mixed, having at least 2 different subtypes
- But all nonseminoma germ cell cancers are treated the same way, so the exact type is not that important

Stromal tumors

- Tumors can also grow in the cells that make hormones and in the supportive tissues (the stroma) of the testicles
- Stromal cell tumors are often benign (not cancer)
- They usually do not spread beyond the testicle and can be cured by taking them out. But a few stromal cell tumors spread to other parts of the body (metastasize)
- Metastatic stromal cell tumors have a poor outlook because they do not respond well to chemotherapy or radiation treatment
- The 2 main types of stromal tumors are **Leydig cell tumors** and **Sertoli cell tumors**

Secondary testicular tumors

- These tumors start in another organ and then spread to the testicle
- Lymphoma is the most common cancer that does this. In boys with acute leukemia, the leukemia cells can sometimes form a tumor in the testicle
- Cancers of the prostate, lung, skin, kidney, and other organs can also spread to the testicles
- The outlook for these cancers is usually poor. That's because very often these cancers have spread widely to other organs, too
- Treatment depends on the exact type of cancer

What causes testicular cancer?

- **Risk factors**
- Anything that increases your chance of getting a disease is called a **risk factor**
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn’t mean that you will not get cancer

Testicular cancer risk factors

- **Risk factors for testicular cancer include the following:**
- Undescended testicle (cryptorchidism)
- Congenital abnormalities
- History of testicular cancer
- Family history of testicular cancer
- Abnormal testicular development

Undescended testicle (cryptorchidism)

- Normally, the testicles descend from inside the abdomen into the scrotum before birth

- The risk of testicular cancer is increased in males with a testicle that does not move down into the scrotum
- This risk does not change even after surgery to move the testicle into the scrotum
- The increased risk applies to both testicles

Congenital abnormalities

- Men born with abnormalities of the testicles, penis, or kidneys
- Men with inguinal hernia (hernia in the groin area, where the thigh meets the abdomen), may be at increased risk

History of testicular cancer

- Men who have had testicular cancer are at increased risk of developing cancer in the other testicle

Family history of testicular cancer

- The risk for testicular cancer is greater in men whose brother or father has had the disease

Abnormal testicular development

- Conditions, such as Klinefelter's syndrome, where the testicles do not develop normally, may increase a person's risk of testicular cancer

What are the signs of testicular cancer?

Signs and symptoms

- **Signals of injury, illness, disease, or that something is not right in the body**

Sign: Signal that can be seen by someone else

For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.

•***Symptom:*** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

- For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

- **Testicular cancer symptoms**

- Possible signs of testicular cancer include ***swelling or discomfort in the scrotum***

- These and other symptoms may be caused by testicular cancer

- **A painless lump or swelling in either testicle**

- **A change in how the testicle feels**

- **A sudden build-up of fluid in the scrotum**

- **A dull ache in the lower abdomen or the groin**

- **Pain or discomfort in a testicle or in the scrotum**

- **Testicular cancer early detection/screening**

Screening

Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms

Early detection

Using an approach that lets ovarian cancer get diagnosed earlier than otherwise might have occurred

Can testicular cancer be found early?

- Most testicular cancers can be found at an early stage

- In some men, early testicular cancers cause symptoms that lead them to seek medical attention

- Most of the time a lump on the testicle is the first sign

- Unfortunately, however, some testicular cancers may not cause symptoms until after they have reached an advanced stage
- Most doctors agree that examining a man's testicles should be part of a general physical exam
- The American Cancer Society (ACS) recommends a testicular exam as part of a routine cancer-related check up
- The ACS advises men to be aware of testicular cancer and to see a doctor right away if they find a lump in a testicle
- If you have certain risk factors that increase your chance of developing testicular cancer (such as an undescended testicle, previous germ cell tumor in one testicle, or a family history), you should seriously consider monthly self-exams and talk about it with your doctor

Testicular self-exam

- The best time for you to examine your testicles is during or after a bath or shower, when the skin of the scrotum is relaxed
- Hold the penis out of the way and examine each testicle separately
- Hold the testicle between your thumbs and fingers with both hands and roll it gently between the fingers
- Look and feel for any hard lumps or nodules (smooth rounded masses) or any change in the size, shape, or consistency of the testes

Diagnosis and Staging of testicular cancer

- ***Tests that examine the testicles and blood are used to detect (find) and diagnose testicular cancer***
- The following tests and procedures may be used:
- Physical exam and history
- Ultrasound exam
- Serum tumor marker test
- Radical inguinal orchiectomy and biopsy

Medical history and physical exam

- An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual
- The testicles will be examined to check for lumps, swelling, or pain
- A history of the patient's health habits and past illnesses and treatments will also be taken

Ultrasound exam

- A procedure in which high-energy sound waves (ultrasound) are bounced off internal tissues or organs and make echoes
- The echoes form a picture of body tissues called a sonogram

Serum tumor marker test

- A procedure in which a sample of blood is examined to measure the amounts of certain substances released into the blood by organs, tissues, or tumor cells in the body
- Certain substances are linked to specific types of cancer when found in increased levels in the blood
- These are called tumor markers

Serum tumor marker test

- The following 3 tumor markers are used to detect testicular cancer:
- Alpha-fetoprotein (AFP)
- Beta-human chorionic gonadotropin (β-hCG)
- Lactate dehydrogenase (LDH)
- Tumor marker levels are measured before radical inguinal orchiectomy and biopsy, to help diagnose testicular cancer

Radical inguinal orchiectomy and biopsy

- A procedure to remove the entire testicle through an incision in the groin
- A tissue sample from the testicle is then viewed under a microscope to check for cancer cells. (The surgeon does not cut through the scrotum into the testicle to remove a sample of tissue for biopsy, because if cancer is present, this procedure could cause it to spread into the scrotum and lymph nodes

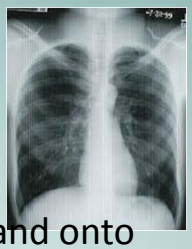
Radical inguinal orchiectomy and biopsy

- It is important to choose a surgeon who has experience with this kind of surgery.)
- If cancer is found, the cell type (seminoma or nonseminoma) is determined in order to help plan treatment

Staging

- After testicular cancer has been diagnosed, tests are done to find out if cancer cells have spread within the testicles or to other parts of the body
- The process used to find out if cancer has spread within the testicles or to other parts of the body is called staging
- The information gathered from the staging process determines the stage of the disease
- It is important to know the stage in order to plan treatment
- The following tests and procedures may be used in the staging process:
- Chest X-ray
- CT scan
- Lymphangiography
- Abdominal lymph node dissection
- Serum tumor marker test

Chest X-ray



- An x-ray of the organs and bones inside the chest
- An x-ray is a type of energy beam that can go through the body and onto film, making a picture of areas inside the body

MRI scan

- A strong magnet linked to a computer is used to make detailed pictures of your lower abdomen
- An MRI can show whether cancer has spread to lymph nodes or other areas
- Sometimes contrast material is used to make abnormal areas show up more clearly on the picture

Lymphangiography

- A procedure used to x-ray the lymph system
- A dye is injected into the lymph vessels in the feet
- The dye travels upward through the lymph nodes and lymph vessels, and x-rays are taken to see if there are any blockages
- This test helps find out whether cancer has spread to the lymph nodes

Abdominal lymph node dissection

- A surgical procedure in which lymph nodes in the abdomen are removed and a sample of tissue is checked under a microscope for signs of cancer
- This procedure is also called lymphadenectomy
- For patients with nonseminoma, removing the lymph nodes may help stop the spread of disease
- Cancer cells in the lymph nodes of seminoma patients can be treated with radiation therapy

Stage 0

- Abnormal cells are found in the tiny tubules where the sperm cells begin to develop
- These abnormal cells may become cancer and spread into nearby normal tissue. All tumor marker levels are normal
- Stage 0 is also called carcinoma in situ

Stage I

- Cancer has formed Stage I is divided into stage IA, stage IB, and stage IS and is determined after a radical inguinal orchiectomy is done

Stage IA

- Cancer is in the testicle and epididymis and may have spread to the inner layer of the membrane surrounding the testicle
- All tumor marker levels are normal

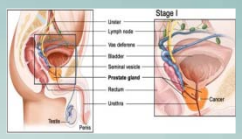
Stage IB

- Cancer is in the testicle and the epididymis has spread to the blood vessels or lymph vessels in the testicle
- Or has spread to the outer layer of the membrane surrounding the testicle
- Or is in the spermatic cord or the scrotum and may be in the blood vessels or lymph vessels of the testicle
- All tumor marker levels are normal

Stage IS

- Cancer is found anywhere within the testicle, spermatic cord, or the scrotum and either
- All tumor marker levels are slightly above normal; or

- One or more tumor marker levels are moderately above normal or high



Stage II

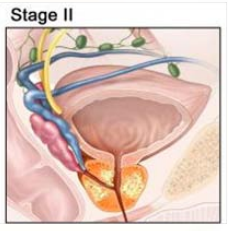
- Stage II is divided into stage IIA, stage IIB, and stage IIC and is determined after a radical inguinal orchiectomy is done

In stage IIA, cancer

- Cancer is anywhere within the testicle, spermatic cord, or scrotum; and
- Has spread to up to 5 lymph nodes in the abdomen, none larger than 2 centimeters
- All tumor marker levels are normal or slightly above normal

In stage IIB, cancer

- Is anywhere within the testicle, spermatic cord, or scrotum; and either:
- Has spread to up to 5 lymph nodes in the abdomen; at least one of the lymph nodes is larger than 2 centimeters, but none are larger than 5 centimeters; or
- Has spread to more than 5 lymph nodes; the lymph nodes are not larger than 5 centimeters
- All tumor marker levels are normal or slightly above normal



Stage III

- Stage III is divided into stage IIIA, stage IIIB, and stage IIIC and is determined after a radical inguinal orchiectomy is done

In stage IIIA, cancer:

- Is anywhere within the testicle, spermatic cord, or scrotum; and

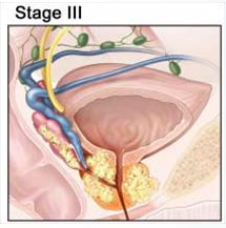
- May have spread to one or more lymph nodes in the abdomen; and
- Has spread to distant lymph nodes or to the lungs
- Tumor marker levels may range from normal to slightly above normal

In stage IIIB, cancer:

- Is anywhere within the testicle, spermatic cord, or scrotum; and
- May have spread to one or more lymph nodes in the abdomen, to distant lymph nodes, or to the lungs
- The level of one or more tumor markers is moderately above normal

In stage IIIC, cancer:

- Is anywhere within the testicle, spermatic cord, or scrotum; and
- May have spread to one or more lymph nodes in the abdomen, to distant lymph nodes, or to the lungs
- The level of one or more tumor markers is high



Treatment options for testicular cancer

- Different types of treatment are available for patients with testicular cancer
- Some treatments are standard (the currently used treatment), and some are being tested in clinical trials
- A treatment clinical trial is a research study meant to help improve current treatments or obtain information on new treatments for patients with cancer
- Patients may want to think about taking part in a clinical trial. Some clinical trials are open only to patients who have not started treatment

Treatment options

- Surgery

- Radiation therapy
- Chemotherapy
- Watchful waiting
- High-dose chemotherapy with stem cell transplant

Surgery

- Surgery to remove the testicle (radical inguinal orchiectomy) and some of the lymph nodes may be done at diagnosis and staging
- Tumors that have spread to other places in the body may be partly or entirely removed by surgery
- Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given chemotherapy or radiation therapy after surgery to kill any cancer cells that are left
- Treatment given after the surgery, to lower the risk that the cancer will come back, is called adjuvant therapy

Radiation therapy

- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing
- External radiation therapy uses a machine outside the body to send radiation toward the cancer
- Internal radiation therapy uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer
- The way the radiation therapy is given depends on the type and stage of the cancer being treated

Chemotherapy

- Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping the cells from dividing

- When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy)
- When chemotherapy is placed directly into the cerebrospinal fluid, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas (regional chemotherapy)
- The way the chemotherapy is given depends on the type and stage of the cancer being treated

Watchful waiting

- Watchful waiting is closely monitoring a patient's condition without giving any treatment until symptoms appear or change
- This is also called observation

High-dose chemotherapy with stem cell transplant

- High-dose chemotherapy with stem cell transplant is a method of giving high doses of chemotherapy and replacing blood -forming cells destroyed by the cancer treatment
- Stem cells (immature blood cells) are removed from the blood or bone marrow of the patient or a donor and are frozen and stored
- After the chemotherapy is completed, the stored stem cells are thawed and given back to the patient through an infusion
- These reinfused stem cells grow into (and restore) the body's blood cells

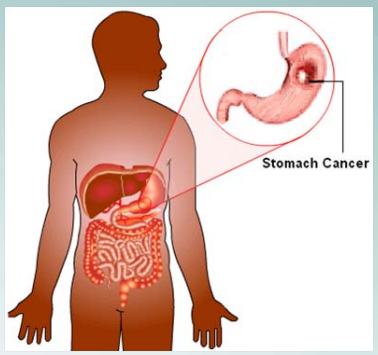
Prevention of testicular cancer

Can testicular cancer be prevented?

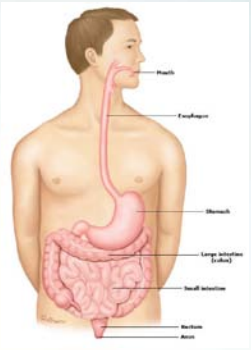
- Many men with testicular cancer have no known risk factors
- And some of the known risk factors, such as undescended testicles, white race, and a family history of the disease, are unavoidable
- For these reasons, it is not possible now to prevent most cases of this disease

- It is wise to correct cryptorchidism in male children, but experts disagree if this changes the child's risk for testicular cancer
- It does seem that correcting cryptorchidism earlier in life is better than waiting until puberty for reasons like fertility and body image
- Furthermore, someone who knows that he has a risk factor such as cryptorchidism may be motivated to be more watchful and to practice testicular self-exam to allow an earlier diagnosis

What is stomach cancer?



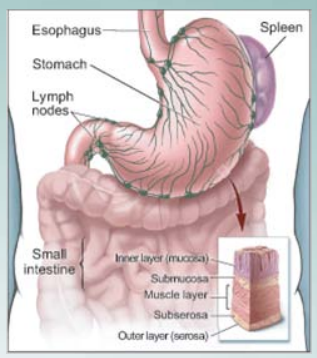
The stomach



- The stomach is a hollow organ in the upper abdomen, under the ribs
- Stomach is a part of the digestive system
- Food moves from the mouth through the esophagus to the stomach
- In the stomach, the food becomes liquid. Muscles in the stomach wall push the liquid into the small intestine
- The wall of the stomach has five layers:

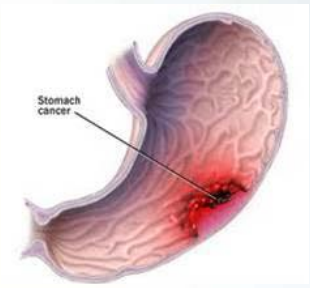
- **Inner layer or lining (mucosa)**
  - Juices made by glands in the inner layer help digest food.
  - Most stomach cancers begin in this layer
- **Submucosa**
  - This is the support tissue for the inner layer
- **Muscle layer**
  - Muscles in this layer contract to mix and mash the food
- **Subserosa**
  - This is the support tissue for the outer layer
- **Outer layer (serosa)**
  - The outer layer covers the stomach. It holds the stomach in place

The stomach and nearby organs



Stomach cancer

- Also called as gastric cancer
- Stomach cancer happens when normal cells in the stomach change into abnormal cells and grow out of control.
- There are different kinds of stomach cancer, depending on the type of cells and part of the stomach involved



Prevalence of stomach cancer

- Stomach cancer is one of the most common cancers worldwide with approximately 9, 89,600 new cases and 7,38,000 deaths per year, accounting for about 8% of new cancers
- 25, 200 men and 27,500 women die of stomach cancer every year in India

Types of stomach cancer

➢ **Adenocarcinoma**

- About 90–95% of cancerous tumors of the stomach are adenocarcinomas
- The term *stomach cancer*, or *gastric cancer*, almost always refers to adenocarcinoma.
- This cancer develops from the cells that form the innermost lining of the stomach (*mucosa*)

Lymphoma

- These are cancers of the immune system tissue that are sometimes found in the wall of the stomach

- They account for about 4% of stomach cancers

➢ **Gastrointestinal stromal tumor**

- These are rare tumors that seem to start in cells in the wall of the stomach called *interstitial cells of Cajal*
- Some are non-cancerous (benign); others are cancerous
- Although these tumors can be found anywhere in the digestive tract, most (about 60–70%) occur in the stomach

Carcinoid tumor

- These are tumors that start in hormone-making cells of the stomach
- Most of these tumors do not spread to other organs.
- About 3% of stomach cancers are carcinoid tumors

Stomach cancer stages

- **Staging is a careful attempt to find out the following:**
- How deeply the tumor invades the wall of the stomach
- Whether the stomach tumor has invaded nearby tissues
- Whether the cancer has spread and, if so, to what parts of the body

These are the stages of stomach cancer:

Stage 0

- The tumor is found only in the inner layer of the stomach.

Stage I is one of the following:

- The tumor has invaded only the submucosa. Cancer cells may be found in up to 6 lymph nodes
- Or, the tumor has invaded the muscle layer or subserosa. Cancer cells have not spread to lymph nodes or other organs

Stage II is one of the following

- The tumor has invaded only the submucosa. Cancer cells have spread to 7 to 15 lymph nodes
- Or, the tumor has invaded the muscle layer or subserosa. Cancer cells have spread to 1 to 6 lymph nodes
- Or, the tumor has penetrated the outer layer of the stomach. Cancer cells have not spread to lymph nodes or other organs

Stage III is one of the following

- The tumor has invaded the muscle layer or subserosa. Cancer cells have spread to 7 to 15 lymph nodes
- Or, the tumor has penetrated the outer layer. Cancer cells have spread to 1 to 15 lymph nodes
- Or, the tumor has invaded nearby organs, such as the liver, colon, or spleen. Cancer cells have not spread to lymph nodes or to distant organs

Stage IV is one of the following:

- Cancer cells have spread to more than 15 lymph nodes.
- Or, the tumor has invaded nearby organs and at least 1 lymph node.
- Or, cancer cells have spread to distant organs

What causes stomach cancer?

- **Risk factors**
- Anything that increases your chance of getting a disease is called a **risk factor**
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer

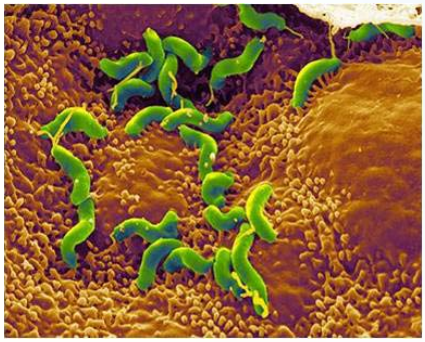
Stomach cancer risk factors

Risk factors for stomach cancer include the following:

- Helicobacter pylori infection
- Long-term inflammation of the stomach
- Smoking
- Family history
- Poor diet, lack of physical activity, or obesity

Helicobacter pylori infection

- H. pylori is a bacterium that commonly infects the inner lining (the mucosa) of the stomach
- Infection with H. pylori can cause stomach inflammation and peptic ulcers
- It also increases the risk of stomach cancer, but only a small number of infected people develop stomach cancer



Long-term inflammation of the stomach

- People who have conditions associated with long-term stomach inflammation (such as the blood disease pernicious anemia) are at increased risk of stomach cancer
- Also, people who have had part of their stomach removed may have long-term stomach inflammation and increased risk of stomach cancer many years after their surgery

Smoking

- Smokers are more likely than nonsmokers to develop stomach cancer

- Heavy smokers are most at risk

Family history

- Close relatives (parents, brothers, sisters, or children) of a person with a history of stomach cancer are somewhat more likely to develop the disease themselves
- If many close relatives have a history of stomach cancer, the risk is even greater

Poor diet

- Studies suggest that people who eat a diet high in foods that are smoked, salted, or pickled have an increased risk for stomach cancer
- On the other hand, people who eat a diet high in fresh fruits and vegetables may have a lower risk of this disease

Lack of physical activity or obesity

- A lack of physical activity may increase the risk of stomach cancer
- Also, people who are obese may have an increased risk of cancer developing in the upper part of the stomach

Age

- There is a sharp increase in stomach cancer after the age of 50
- Most people are diagnosed with stomach cancer when they are between their late 60s and 80s

Blood type

- Blood type groups refer to certain substances that are normally present on the surface of red blood cells and some other types of cells

- These groups are important in matching blood for transfusions
- For unknown reasons, people with **type A blood** have a higher risk of getting stomach cancer

Certain occupations

- Workers in the coal, metal, and rubber industries seem to have a higher risk of getting stomach cancer

What are the signs of stomach cancer?

Signs and symptoms

- **Signals of injury, illness, disease, or that something is not right in the body**
- ***Sign:*** Signal that can be seen by someone else
    - For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia
- ***Symptom:*** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.
    - For example, weakness, aching, and feeling short of breath may be symptoms of pneumoni

Stomach cancer symptoms

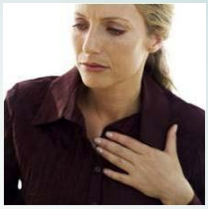
- People who have stomach cancer rarely have symptoms in the early stages of the disease
- This is one of the reasons why stomach cancer is so hard to find early
- **The signs and symptoms of this cancer can include:**

- No desire to eat (poor appetite)

- Unintended weight loss

- Pain in the area of the stomach (abdominal pain)
- Vague discomfort in the abdomen (belly), often above the navel

- A sense of fullness just below the chest bone after eating a small meal



- Heartburn, indigestion, or ulcer-type symptoms

- Nausea

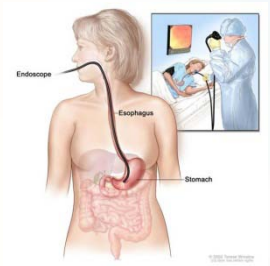
- Vomiting, with or without blood

- Swelling or fluid build-up in the abdomen
- Many of these symptoms can be caused by problems other than cancer
- But if you have any of these problems and they don't go away or get worse, you **should see a doctor**

Stomach cancer early detection/ screening

- ***Screening***
  - Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms
- ***Early detection***
  - Using an approach that lets stomach cancer get diagnosed earlier than otherwise might have occurred

- **Can stomach cancer be found early?**
- Screening is the search for disease, such as cancer, in people without symptoms
- In countries such as Japan, where stomach cancer is very common, mass screening of the population has helped find many cases at an early, curable stage
- This may have reduced the number of people who die of this disease, but the studies were not designed to prove this
- Routine screening for gastric cancer is not recommended outside of a few countries with a high gastric cancer burden that have already implemented screening programs
- **The effectiveness of these programs is unclear**
- Eradication of H. pylori has the potential to reduce the burden of gastric cancer, but the ideal means to implement a screening and prevention program and settings in which it would be appropriate remain unclear
- The decision to recommend a screening program is made on an individual patient basis
- Periodic upper endoscopy can be offered to patients who are considered to be at increased risk



Diagnostic tests for stomach cancer

- Tests that examine the stomach and esophagus are used to detect and diagnose stomach cancer

Physical exam and history
Blood chemistry studies
Complete blood count
Upper endoscopy
Fecal occult blood test
Barium swallow
Biopsy
CT scan

Physical exam and History

- An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual
- A history of the patient's health habits and past illnesses and treatments will also be taken

Blood chemistry studies

- A procedure in which a blood sample is checked to measure the amounts of certain substances released into the blood by organs and tissues in the body

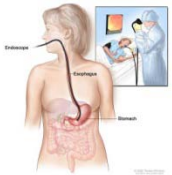
- An unusual (higher or lower than normal) amount of a substance can be a sign of disease in the organ or tissue that produces it

Complete blood count

- A procedure in which a sample of blood is drawn and checked for the following:
- The number of red blood cells, white blood cells and platelets
- The amount of hemoglobin (the protein that carries oxygen) in the red blood cells
- The portion of the sample made up of red blood cells

Upper endoscopy

- A procedure to look inside the esophagus, stomach, and duodenum (first part of the small intestine) to check for abnormal area
- An endoscope (a thin, lighted tube) is passed through the mouth and down the throat into the esophagus



Fecal occult blood test

- A test to check stool (solid waste) for blood that can only be seen with a microscope

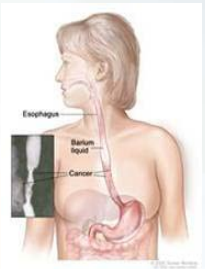
- Small samples of stool are placed on special cards and returned to the doctor or laboratory for testing

- **Barium swallow**

- A series of x-rays of the esophagus and stomach

- The patient drinks a liquid that contains barium (a silver-white metallic compound)

- The liquid coats the esophagus and stomach, and x-rays are taken



- This procedure is also called an upper GI series

- **Biopsy**

- The removal of cells or tissues so they can be viewed under a microscope to check for signs of cancer

- A biopsy of the stomach is usually done during the endoscopy

- **CT scan**

- A procedure that makes a series of detailed pictures of areas inside the body, taken from different angles

- The pictures are made by a computer linked to an x-ray machine

Treatment options for stomach cancer

- **Factors affect chance of recovery and treatment options**

- **The stage of the cancer**

- Whether it is in the stomach only or has spread to lymph nodes or other places in the body

- **The patient's general health**

- When stomach cancer is found very early, there is a better chance of recovery. Stomach cancer is often in an advanced stage when it is diagnosed. At later stages, gastric cancer can be treated but rarely can be cured

Treatment types

- The 3 main types of treatment for stomach cancer are

Stomach cancer is usually treated with 1 or more of the following:

- Surgery
- Radiation therapy
- Chemotherapy

Surgery

- Surgery is the main treatment for stomach cancer
- Surgery is a common treatment of all stages of gastric cancer
- Surgery may be used to remove the cancer and part or all of the stomach and some nearby lymph nodes, depending on the type and stage of stomach cancer

Types of surgery

- **Subtotal gastrectomy**
- Removal of the part of the stomach that contains cancer, nearby lymph nodes, and parts of other tissues and organs near the tumor
- The spleen may be removed. The spleen is an organ in the upper abdomen that filters the blood and removes old blood cells
- **Total gastrectomy**
- Removal of the entire stomach, nearby lymph nodes, and parts of the esophagus, small intestine, and other tissues near the tumor
- The spleen may be removed

- The esophagus is connected to the small intestine so the patient can continue to eat and swallow
- If the tumor is blocking the stomach but the cancer cannot be completely removed by standard surgery, the following procedures may be used:

➢ Endoluminal stent placement

➢ Endoluminal laser therapy

➢ Gastrojejunostomy

Endoluminal stent placement

- A procedure to insert a stent (a thin, expandable tube) in order to keep a passage (such as arteries or the esophagus) open
- For tumors blocking the passage into or out of the stomach, surgery may be done to place a stent from the esophagus to the stomach or from the stomach to the small intestine to allow the patient to eat normally

Endoluminal laser therapy

- A procedure in which an endoscope (a thin, lighted tube) with a laser attached is inserted into the body
- A laser is an intense beam of light that can be used as a knife

Gastrojejunostomy

- Surgery to remove the part of the stomach with cancer that is blocking the opening into the small intestine
- The stomach is connected to the jejunem (a part of the small intestine) to allow food and medicine to pass from the stomach into the small intestine

Chemotherapy

- Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing

Radiation therapy

- Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing

Chemoradiation therapy

- Chemoradiation therapy combines chemotherapy and radiation therapy to increase the effects of both

Targeted therapy

- Targeted therapy uses drugs or other substances to identify and attack specific cancer cells without harming normal cells

Prevention of stomach cancer

Can stomach cancer be prevented?

- Even though we do not know the exact cause of stomach cancer, it is still possible to prevent many stomach cancers

Diet

- Avoid diets that are high in smoked and pickled foods and salted meats and fish

- A diet high in fresh fruits and vegetables can also lower stomach cancer risk

- Citrus fruits (such as oranges, lemons, and grapefruit) may be especially helpful, but grapefruit and grapefruit juice can cause the blood levels of certain drugs you take to go up, so it's important to discuss this with your health care team before adding grapefruit to your diet
- Eat a healthy diet, with an emphasis on plant foods
- This includes eating at least 2½ cups of vegetables and fruits every day

- Choosing whole-grain foods and cereals instead of refined grains
- Cut down on red meats, especially those are processed or high in fat

Physical activity

- Obesity may add to the risk of stomach cancer
- The *American Cancer Society* recommends maintaining a healthy weight throughout life by balancing calorie intake with physical activity
- Aside from possible effects on the risk of stomach cancer, losing weight may also have an effect on the risk of several other cancers and health problems related to obesity

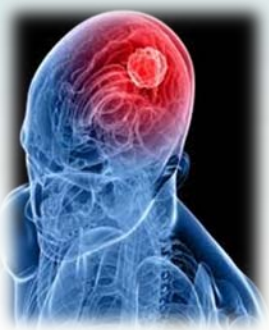
Avoid tobacco

- Tobacco use can increase the risk of cancers of the proximal stomach (the portion of the stomach closest to the esophagus)

H pylori infection

- It is not yet clear whether antibiotic treatment should be given to people whose stomach linings are chronically infected with the bacteria *H pylori* but who do not have any symptoms
- This is a topic of current research
- Some early studies have suggested that giving antibiotics to people with *H pylori* infection may lower the number of pre-cancerous lesions in the stomach and may reduce the risk of developing stomach cancer
- But not all studies have found this
- More research is needed to be sure that this is a way to prevent stomach cancer in people with *H pylori* infection
- **Avoiding risk factors when possible can lower a person's stomach cancer risk, but it cannot guarantee protection from this disease**
- **Early detection may be the best way to improve the chance of successful treatment and reduce the number of deaths caused by the disease**

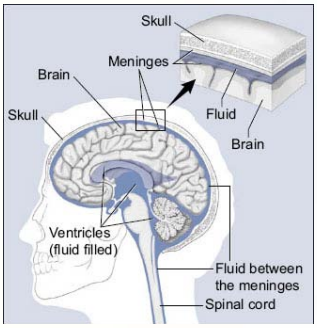
What is brain cancer?



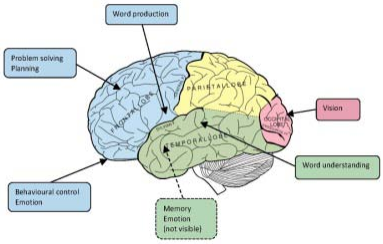
The Brain

The brain is a soft, spongy mass of tissue. It is protected by:

- ✓ The bones of the skull
- ✓ Three thin layers of tissue (meninges)
- ✓ Watery fluid (cerebrospinal fluid) that flows through spaces between the meninges and through spaces (ventricles) within the brain



- ✓ The brain directs the things we choose to do (like walking and talking) and the things our body does without thinking (like breathing).
- ✓ The brain is also in charge of our senses (sight, hearing, touch, taste, and smell), memory, emotions, and personality.

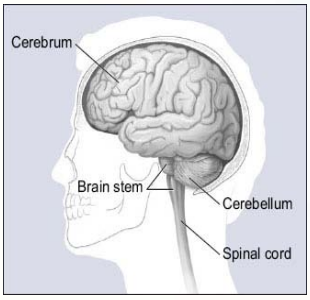


- ✓ A network of nerves carries messages back and forth between the brain and the rest of the body. Some nerves go directly from the brain to the eyes, ears, and other parts of the head.
- ✓ Other nerves run through the spinal cord to connect the brain with the other parts of the body.
- ✓ Within the brain and spinal cord, glial cells surround nerve cells and hold them in place.
- ✓ **Glial cell:** Any of the cells that hold nerve cells in place and help them work the way they should. The types of glial cells include oligodendrocytes, astrocy tes, microglia, and ependymal cells. Also called neuroglia.

Major parts of the brain

The 3 major parts of the brain control different activities:

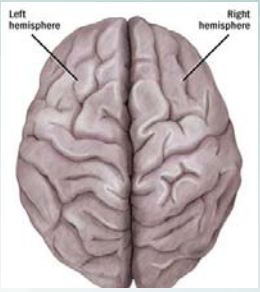
- **Cerebrum**
- **Cerebellum**
- **Brain stem**



Cerebrum

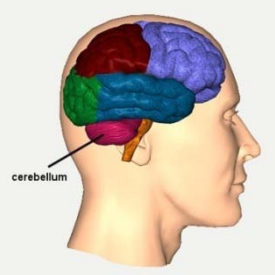
- ✓ The cerebrum uses information from our senses to tell us what is going on around us and tells our body how to respond.
- ✓ It controls reading, thinking, learning, speech and emotions.

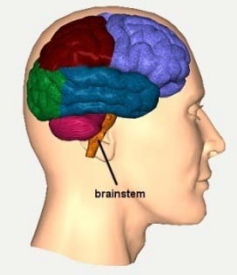
✓ The cerebrum is divided into the left and right cerebral hemispheres. The right hemisphere controls the muscles on the left side of the body. The left hemisphere controls the muscles on the right side of the body.



Cerebellum

✓ The cerebellum controls balance for walking and standing, and other complex actions.





Brain stem

✓ The brain stem connects the brain with the spinal cord. It controls breathing, body temperature, blood pressure and other basic body functions.

What is brain cancer?

✓ Brain cancer happens when normal cells in the brain change into abnormal cells, and grow out of control.

✓ There are different types of brain cancer. Some types grow very slowly. Others grow much faster.

✓ As brain cancer grows, it can spread into normal parts of the brain.

Types of brain cancer

Doctors group brain tumors by grade. The grade of a tumor refers to the way the cells look under a microscope:

✓ Grade I: The tissue is benign. The cells look nearly like normal brain cells, and they grow slowly.

✓ Grade II: The tissue is malignant. The cells look less like normal cells than do the cells in a Grade I tumor.

✓ Grade III: The malignant tissue has cells that look very different from normal cells. The abnormal cells are actively growing (anaplastic).

✓ Grade IV: The malignant tissue has cells that look most abnormal and tend to grow quickly.

Cells from low-grade tumors (grades I and II) look more normal and generally grow more slowly than cells from high-grade tumors (grades III and IV)

Over time, a low-grade tumor may become a high grade tumor. However, the change to a high-grade tumor happens more often among adults than children.

Types of primary brain tumors

✓ There are many types of primary brain tumors.

✓ Primary brain tumors are named according to the type of cells or the part of the brain in which they begin. For example, most primary brain tumors begin in glial cells. This type of tumor is called a glioma.

- ✓ Among adults, the most common types are:
  - Astrocytoma
  - Meningioma
  - Oligodendroglioma

Astrocytoma

- ✓ The tumor arises from star-shaped glial cells called astrocytes.
- ✓ It can be any grade. In adults, an astrocytoma most often arises in the cerebrum.
  - Grade I or II astrocytoma: It may be called a low-grade glioma.
  - Grade III astrocytoma: It's sometimes called a high-grade or an anaplastic astrocytoma.
  - Grade IV astrocytoma: It may be called a glioblastoma or malignant astrocytic glioma.

Meningioma

- ✓ The tumor arises in the meninges.
- ✓ It can be grade I, II, or III. It's usually benign (grade I) and grows slowly.

Oligodendroglioma

✓ The tumor arises from cells that make the fatty substance that covers and protects nerves.

✓ It usually occurs in the cerebrum. It's most common in middle-aged adults. It can be grade II or III.

Among children, the most common types are:

Medulloblastoma:

✓ The tumor usually arises in the cerebellum.

✓ It's sometimes called a primitive neuroectodermal tumor.

✓ It is grade IV.

Grade I or II astrocytoma:

✓ In children, this low grade tumor occurs anywhere in the brain.

✓ The most common astrocytoma among children is juvenile pilocytic astrocytoma.

✓ It's grade I.

Ependymoma:

✓ The tumor arises from cells that line the ventricles or the central canal of the spinal cord.

✓ It's most commonly found in children and young adults.

✓ It can be grade I, II, or III.

Brain stem glioma:

- ✓ The tumor occurs in the lowest part of the brain.
- ✓ It can be a low-grade or high-grade tumor.
- ✓ The most common type is diffuse intrinsic pontine glioma .

What causes brain cancer?

Risk factors

- ✓ Anything that increases your chance of getting a disease is called a risk factor.
- ✓ Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Brain cancer risk factors

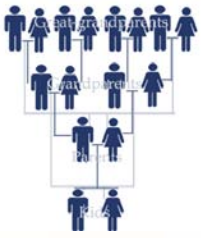
- ✓ No one knows the exact cause of brain cancer. Doctors seldom know why one person develops a brain cancer and another doesn't.
- ✓ Researchers are studying whether people with certain risk factors are more likely than others to develop a brain cancer.
- ✓ However studies have found some risk factors for brain tumors

Ionizing radiation

✓ Ionizing radiation from high dose x-rays (such as radiation therapy from a large machine aimed at the head) and other sources can cause cell damage that leads to a tumor.

✓ People exposed to ionizing radiation may have an increased risk of a brain tumor, such as meningioma or glioma.

Family history



✓ It is rare for brain tumors to run in a family.

✓ Only a very small number of families have several members with brain tumors.

Researchers are studying whether using cell phones, having had a head injury, or having been exposed to certain chemicals at work or to magnetic fields are important risk factors.

Studies have not shown consistent links between these possible risk factors and brain tumors, but additional research is needed.

What are the signs of brain cancer?

What are the signs of Signs and symptoms brain cancer?

Signals of injury, illness, disease, or that something is not right in the body Cerebrum

✓ Sign: Signal that can be seen by someone else

For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.

✓Symptom: Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

Brain cancer symptoms

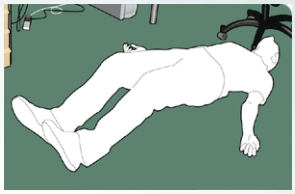
✓ The symptoms of a brain cancer depend on tumor size, type, and location.

✓ Symptoms may be caused when a tumor presses on a nerve or harms a part of the brain.

✓ Also, they may be caused when a tumor blocks the fluid that flows through and around the brain, or when the brain swells because of the buildup of fluid.

Often, one of the first symptoms of brain cancer is a seizure. Seizures are caused by abnormal electrical activity in the brain.

A seizure can cause a person to:



- Pass out
- Stiffen and then have jerking movements of the arms or legs
- Lose muscle control throughout the body

These are the most common symptoms of brain tumors:

- **Headaches (usually worse in the morning)**

- **Nausea and vomiting**

- **Changes in vision, speech and hearing**

- **Memory related disorders**

other symptoms include:

- Changes in mood, personality, or ability to concentrate
- Problems balancing or walking
- Muscle jerking or twitching (seizures or convulsions)
- Numbness or tingling in the arms or legs

✓ Most often, these symptoms are not due to cancer. Other health problems may also cause these symptoms. Only a doctor can tell the exact reason

✓ Anyone with these symptoms should tell the doctor so that problems can be diagnosed and treated as early as possible

Brain cancer early detection/screening

✓ Screening

Tests and exams are used to find a disease, such as cancer, in people who do not have any symptoms

✓ Early detection

Using an approach that lets brain cancer get diagnosed earlier than otherwise might have occurred.

Can brain cancer be found early?

✓ At this time there are no widely recommended tests used to screen for brain tumors.

✓ Most brain tumors are found when a person sees a doctor because of signs or symptoms they are having.

✓ In most cases, the patient's survival is determined by their age, the type of tumor, and its location, not by how early it is detected

✓ But as with any disease, earlier detection and treatment is likely to be helpful.

✓ For people with certain inherited syndromes that put them at higher risk for brain tumors, such as neurofibromatosis or tuberous sclerosis, doctors may recommend frequent physical exams and other tests starting when they are young.

✓ In some cases these tests may find tumors when they are still small.

✓ Not all tumors related to these syndromes may need to be treated right away, but finding them early may help doctors monitor them so that they can be treated quickly if they begin to grow or cause problems.

Diagnosis and Staging of brain cancer

✓ If patient has the symptoms of brain cancer doctor must find out whether they are due to cancer or some other cause.

✓ Doctor may ask about the personal and family medical history of patient.

Physical exam and history

✓ An exam of the body to check general signs of health, including checking for signs of disease, anything else that seems unusual.

✓ A history of the patient's health habits and past illnesses and treatments will also be taken.

Neurological exam

✓ A series of questions and tests to check the brain, spinal cord, and nerve function.

✓ The exam checks a person's mental status, coordination, and ability to walk normally, and how well the muscles, senses, and reflexes work.

Visual field exam

✓ An exam to check a person's field of vision (the total area in which objects can be seen).

✓ This test measures both central vision (how much a person can see when looking straight ahead) and peripheral vision (how much a person can see in all other directions while staring straight ahead).

✓ Any loss of vision may be a sign of a tumor that has damaged or pressed on the parts of the brain that affect eyesight.

Magnetic resonance Imaging

✓ A large machine with a strong magnet linked to a computer is used to make detailed pictures of areas inside the patient's head.

✓ Sometimes a special dye (contrast material) is injected into a blood vessel into the arm or hand to help show differences in the tissues of the brain. The pictures can show abnormal areas, such as a tumor.

Computer tomography scan

✓ An x-ray machine linked to a computer takes a series of detailed pictures of patient's head.

✓ Patient may receive contrast material by injection into a blood vessel in the arm or hand. The contrast material makes abnormal areas easier to see.

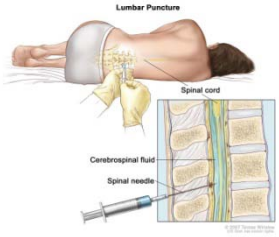
Angiogram

✓ Dye injected into the bloodstream makes blood vessels in the brain show up on an x-ray.

✓ If a tumor is present, the x-ray may show the tumor or blood vessels that are feeding into the tumor.

Spinal tap

✓ Doctor may remove a sample of cerebrospinal fluid (the fluid that fills the spaces in and around the brain and spinal cord).

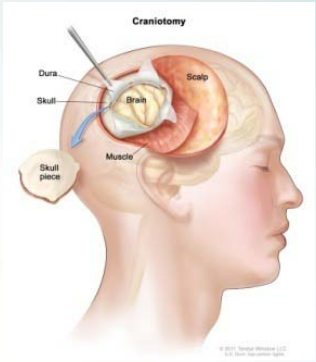


✓ The doctor uses a long, thin needle to remove fluid from the lower part of the spinal column.

✓ A laboratory checks the fluid for cancer cells.

Biopsy

✓ The removal of tissue to look for tumor cells is called a biopsy.



✓ A pathologist looks at the cells under a microscope to check for abnormal cells.

✓ A biopsy can show cancer, tissue changes that may lead to cancer, and other conditions.

✓ A biopsy is the only sure way to diagnose a brain tumor, learn what grade it is, and plan treatment.

Staging

The extent or spread of cancer is usually described as stages.

✓ There is no standard staging system for brain tumors.

✓ Brain tumors that begin in the brain may spread to other parts of the brain and spinal cord, but they rarely spread to other parts of the body.

- The type of cell in which the tumor began.
- Where the tumor formed in the brain.
- The amount of cancer left after surgery.
- The grade of the tumor.

Treatment options for brain cancer

- ✓ People with brain tumors have several treatment options.
- ✓ The options are surgery, radiation therapy and chemotherapy.
- ✓ Many people get a combination of treatments.
- ✓ The choice of treatment depends mainly on the following:
  - The type and grade of brain tumor
  - Its location in the brain
  - Its size
  - Age and general health of patient

Surgery

- ✓ Surgery: Removing the cancer in an operation.
- ✓ Surgery is the usual first treatment for most brain tumors.
- ✓ During surgery, doctors try to remove as much of the cancer as possible.
- ✓ Often, brain cancer cannot be cured with surgery, but surgery might reduce symptoms and help people live longer.
- ✓ On the other hand, surgery can also lead to more symptoms or problems. This is because healthy parts of the brain can be damaged during surgery.

Radiation therapy

✓ Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing.

✓ People might receive radiation therapy after surgery, or when surgery is not possible.

Chemotherapy

✓ Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.

Prevention of brain cancer

✓ In general, there is no known way to prevent brain cancers.

✓ However, early diagnosis and treatment of tumors that tend to metastasize (spread) to the brain may reduce the risk of metastatic brain tumors.

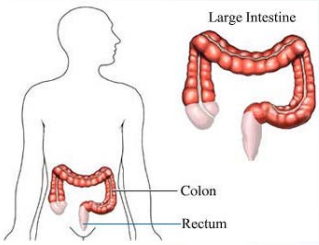
✓ Avoiding or reducing contact with radiation (especially to the head) and avoiding toxic chemicals associated with the oil and rubber industry, embalming chemicals, and other environmental toxins may help prevent brain cancers.

✓ Avoiding HIV infection is also suggested.

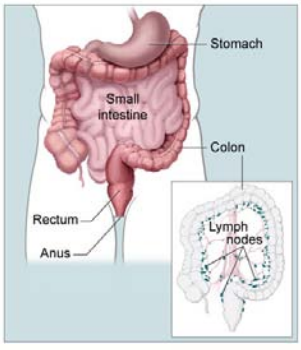
What is colorectal cancer?

Colon and Rectum

- ✓ Colon and Rectum are parts of the digestive system
- ✓ They form a long, muscular tube called the large intestine
- ✓ The Colon is the first 4 to 5 feet of the large intestine, and the Rectum is the last several inches.



- ✓ Partly digested food enters the colon from the small intestine.
- ✓ The colon removes water and nutrients from the food and turns the rest into waste (stool).
- ✓ The waste passes from the colon into the rectum and then out of the body through the anus.



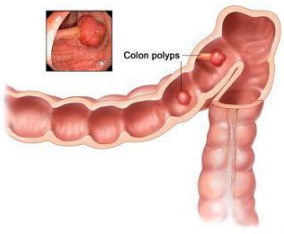
Colorectal cancer

- ✓ Colorectal cancer, commonly known as bowel cancer, is a cancer from uncontrolled cell growth that starts in the colon or rectum.
- ✓ These cancers can also be referred to separately as colon cancer or rectal cancer, depending on where they start.

- ✓ Colon cancer and rectal cancer have many features in common.
- ✓ The word "colorectal" is just a shortened way of saying colon and rectal.

Incidence of colorectal cancer

- ✓ Globally, colorectal cancer is the 3rd most commonly diagnosed cancer in males and the 2nd in females.
- ✓ 1.2 million new cases and 6,08,700 deaths estimated to have occurred in 2008.
- ✓ The lifetime incidence of colorectal cancer in patients at average risk is about 5%, with 90% of cases occurring after age 50.
- ✓ Most colorectal cancers develop slowly over several years.
- ✓ Before a cancer develops, a growth of tissue or tumor usually begins as a non-cancerous polyp on the inner lining of the colon or rectum.
- ✓ Some polyps can change into cancer but not all do.



Types of cancer in the colon and rectum

Several types of cancer can start in the colon or rectum.

Adenocarcinomas

- ✓ More than 95% of colorectal cancers are a type of cancer known as adenocarcinomas.

- ✓ These cancers start in cells that form glands that make mucus to lubricate the inside of the colon and rectum.
- ✓ When doctors talk about colorectal cancer, this is almost always what they are referring to.

Less common types

Other, less common types of tumors may also start in the colon and rectum. These include:

Carcinoid tumors

- ✓ Tumors start from specialized hormone-producing cells in the intestine

Gastrointestinal stromal tumors (GISTs)

- ✓ Tumors start from specialized cells in the wall of the colon called the interstitial cells of Cajal. Some are benign (non-cancerous); others are malignant (cancerous). These tumors can be found anywhere in the digestive tract, but they are unusual in the colon.

Lymphomas

- ✓ These are cancers of immune system cells that typically start in lymph nodes, but they may also start in the colon, rectum, or other organs

Sarcomas

- ✓ These tumors can start in blood vessels as well as in muscle and connective tissue in the wall of the colon and rectum. Sarcomas of the colon or rectum are rare

What causes colorectal cancer?

Risk factors

- ✓ Anything that increases your chance of getting a disease is called a **risk factor.**
- ✓ Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Colorectal cancer risk factors

Risk factors for colorectal cancer include the following:

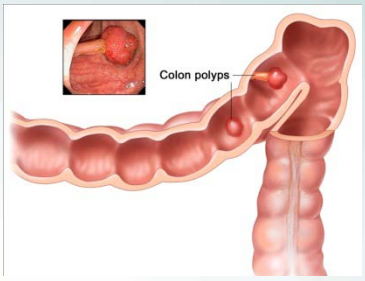
- Age over 50
- Colorectal polyps
- Family history of colorectal cancer
- Genetic alterations
- Personal history of cancer
- Ulcerative colitis or Crohn disease
- Diet
- Smoking

Age over 50

- ✓ Colorectal cancer is more likely to occur as people get older.
- ✓ More than 90% of people with this disease are diagnosed after age 50.

- ✓ The average age at diagnosis is 72.

Colorectal polyps



- ✓ Polyps are growths on the inner wall of the colon or rectum.
- ✓ They are common in people over age 50.
- ✓ Most polyps are benign (not cancer), but some polyps (adenomas) can become cancer.
- ✓ Finding and removing polyps may reduce the risk of colorectal cancer.

Family history of colorectal cancer

- ✓ Close relatives (parents, brothers, sisters, or children) of a person with a history of colorectal cancer are somewhat more likely to develop this disease themselves, especially if the relative had the cancer at a young age.
- ✓ If many close relatives have a history of colorectal cancer, the risk is even greater.

Genetic alterations

Changes in certain genes increase the risk of colorectal cancer.

Hereditary nonpolyposis colon cancer (HNPCC)

- ✓ Most common type of inherited (genetic) colorectal cancer.
- ✓ It accounts for about 2% of all colorectal cancer cases.
- ✓ It is caused by changes in an HNPCC gene.
- ✓ Most people with an altered HNPCC gene develop colon cancer, and the average age at diagnosis of colon cancer is 44.

Familial adenomatous polyposis (FAP)

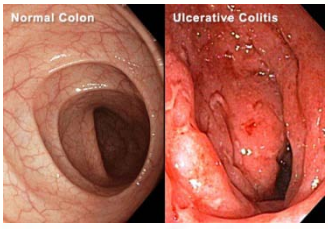
- ✓ Rare, inherited condition in which hundreds of polyps form in the colon and rectum.
- ✓ It is caused by a change in a specific gene called APC.
- ✓ Unless FAP is treated, it usually leads to colorectal cancer by age 40.
- ✓ FAP accounts for less than 1% of all colorectal cancer cases.
- ✓ Family members of people who have HNPCC or FAP can have genetic testing to check for specific genetic changes.
- ✓ For those who have changes in their genes, doctor may suggest ways to try to reduce the risk of colorectal cancer, or to improve the detection of this disease.
- ✓ For adults with FAP, the doctor may recommend an operation to remove all or part of the colon and rectum.

Personal history of cancer

- ✓ A person who has already had colorectal cancer may develop colorectal cancer a second time.
- ✓ Also, women with a history of cancer of the ovary, uterus (endometrium), or breast are at a somewhat higher risk of developing colorectal cancer.

Ulcerative colitis or Crohn disease

- ✓ A person who has had a condition that causes inflammation of the colon (such as ulcerative colitis or Crohn's disease) for many years is at increased risk of developing colorectal cancer.



Diet

- ✓ Studies suggest that diets high in fat (especially animal fat) and low in calcium, folate and fiber may increase the risk of colorectal cancer.

- ✓ Also, some studies suggest that people who eat a diet very low in fruits and vegetables may have a higher risk of colorectal cancer.

Smoking

- ✓ A person who smokes cigarettes may be at increased risk of developing polyps and colorectal cancer.

What are the signs of colorectal cancer?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

✓ Sign: Signal that can be seen by someone else

For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.

✓ Symptom: Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

Colorectal cancer symptoms

✓ Possible signs of colorectal cancer include a change in bowel habits or blood in the stool

Change in bowel habits

- Diarrhea
- Constipation

- Feeling that the bowel does not empty completely
- Stools that are narrower or have a different shape than usual
- **Blood (either bright red or very dark) in the stool**

- **General abdominal discomfort (frequent gas pains, bloating, fullness, or cramps)**

- **Change in appetite**

- **Weight loss for no known reason**

- **Feeling very tired**

- **Vomiting**

✓ Most of these symptoms are more often caused by conditions other thancolorectal cancer, such as infection, hemorrhoids, or inflammator bowel disease.

✓ Still, if you have any of these problems, it's important to see your doctor right away so the cause can be found and treated, if needed.

Colorectal cancer early detection/screening

Screening

Tests and exams are used to find a disease, such as cancer, in people who do not have any symptoms

Early detection

Using an approach that lets colorectal cancer get diagnosed earlier than otherwise might have occurred.

Can colorectal cancer be found early?

- ✓ Regular screening can often find colorectal cancer early, when it is most likely to be curable.
- ✓ In many cases, screening can also prevent colorectal cancer altogether.
- ✓ This is because some polyps, or growths, can be found and removed before they have the chance to turn into cancer.

What is colorectal cancer screening?

- ✓ Colorectal cancer screening is a way in which doctors check the colon and rectum for signs of cancer or growths (polyps) that might become cancer.
- ✓ It is done in people who have no symptoms and no reason to think they have cancer.
- ✓ The goal is to find and remove polyps before they become cancer, or to find cancer early, before it grows, spreads, or causes problems.

Colorectal cancer screening tests

- ✓ Several different tests can be used to screen for colorectal cancers.

  These tests can be divided into 2 broad groups:

  - Tests that can find both colorectal polyps and cancer
  - Tests that mainly find cancer

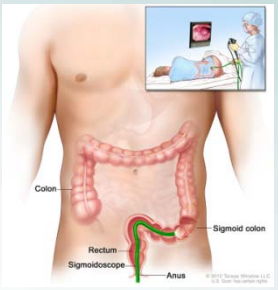
Tests that can find both colorectal polyps and cancer

- ✓ Colorectal cancer screening is a way in which doctors check the colon and rectum for signs of cancer or growths (polyps) that might become cancer.
- ✓ It is done in people who have no symptoms and no reason to think they have cancer.
- ✓ The goal is to find and remove polyps before they become cancer, or to find cancer early, before it grows, spreads, or causes problems.

Tests that can find both colorectal polyps and cancer

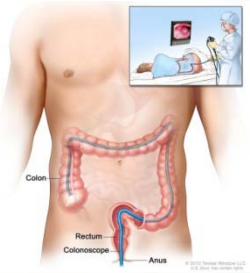
- ✓ Flexible sigmoidoscopy
- ✓ Colonoscopy
- ✓ Double-contrast barium enema
- ✓ CT colonography (virtual colonoscopy)

Flexible sigmoidoscopy



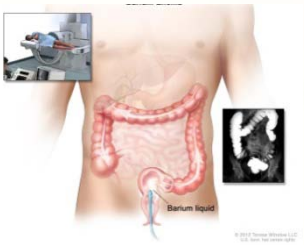
- ✓ A sigmoidoscope is inserted through the rectum into the sigmoid (lower) colon.
- ✓ A sigmoidoscope is a thin, tube-like instrument with a light and a lens for viewing.
- ✓ It may also have a tool to remove polyps or tissue samples, which are checked under a microscope for signs of cancer.

Colonoscopy



- ✓ A colonoscope is inserted through the rectum into the colon.
- ✓ A colonoscope is a thin, tube-like instrument with a light and a lens for viewing.
- ✓ It may also have a tool to remove polyps or tissue samples, which are checked under a microscope for signs of cancer.

Double-contrast barium enema



- ✓ A series of x-rays of the lower gastrointestinal tract.
- ✓ A liquid that contains barium (a silver-white metallic compound) is put into the rectum.
- ✓ The barium coats the lower gastrointestinal tract and x-rays are taken.
- ✓ This procedure is also called a lower GI series.

CT colonography (virtual colonoscopy)

- ✓ A procedure that uses a series of x-rays called computed tomography to make a series of pictures of the colon.
- ✓ A computer puts the pictures together to create detailed images that may show polyps and anything else that seems unusual on the inside surface of the colon.

Tests that mainly find cancer

- ✓ These test the stool (feces) for signs that cancer may be present.
  - Fecal occult blood test
  - Fecal immunochemical test
- ✓ These tests are less invasive and easier to have done, but they are less likely to detect polyps.

Fecal occult blood test

- ✓ A test to check stool (solid waste) for blood that can only be seen with a microscope
- ✓ Small sampales of stool are placed on special cards and returned to the doctor or laboratory for testing

Fecal immunochemical test

- ✓ The fecal immunochemical test (FIT), also called an immunochemical fecal occult blood test (iFOBT), is a newer kind of test that also detects occult (hidden) blood in the stool.

- ✓ This test reacts to part of the human hemoglobin protein, which is found in red blood cells.
- ✓ The FIT is done essentially the same way as the FOBT, but some people may find it easier to use because there are no drug or dietary restrictions (vitamins or foods do not affect the FIT) and sample collection may take less effort.

Who should be screened for colorectal cancer?

- ✓ To find polyps or early colorectal cancer:
- People in their 50s and older should be screened.
- People who are at higher-than-average risk of colorectal cancer should talk with their doctor about whether to have screening tests before age 50, what tests to have, the benefits and risks of each test, and how often to schedule appointments.
- ✓ Most people can stop being screened around the age of 75, or at the latest 85

How often should I be screened?

- ✓ That depends on your risk of colorectal cancer and which test you have.
- ✓ Most people can choose 1 of these schedules:
  - Colonoscopy every 10 years
  - Computed tomography (CTC) every 5 years
  - Sigmoidoscopy every 5 years
  - Barium enema every 5 years
  - Stool testing for blood once a year

- ✓ People who have a high risk of colon cancer often need to be tested more often and should have a colonoscopy

Diagnosis and Staging of colorectal cancer

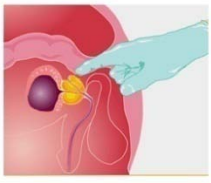
- ✓ If patient has the symptoms of colorectal cancer doctor must find out whether they are due to cancer or some other cause.
- ✓ Doctor may ask about the personal and family medical history of patient.

Physical exam and history

- ✓ An exam of the body to check general signs of health, including checking for signs of disease, such as lumps or anything else that seems unusual.
- ✓ A history of the patient's health habits and past illnesses and treatments will also be taken.

Digital rectal exam

- ✓ An exam of the rectum.
- ✓ The doctor inserts a lubricated, gloved finger into the rectum to feel for lumps or anything else that seems unusual.

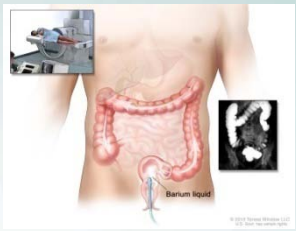


Digital Rectal Exam

Fecal occult blood test

- ✓ A test to check stool (solid waste) for blood that can only be seen with a microscope.
- ✓ Small samples of stool are placed on special cards and returned to the doctor or laboratory for testing.

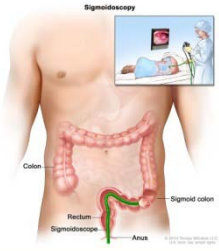
Barium enema



- ✓ A series of x-rays of the lower gastrointestinal tract.
- ✓ A liquid that contains barium (a silver-white metallic compound) is put into the rectum.
- ✓ The barium coats the lower gastrointestinal tract and x-rays are taken.

Sigmoidoscopy

- ✓ A procedure to look inside the rectum and sigmoid (lower) colon for polyps (small pieces of bulging tissue), abnormal areas, or cancer.
- ✓ A sigmoidoscope is inserted through the rectum into the sigmoid colon.
- ✓ A sigmoidoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove polyps or tissue samples, which are checked under a microscope for signs of cancer.

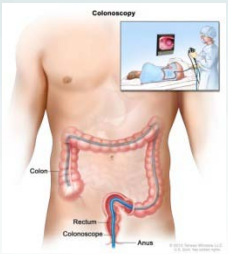


Sigmoidoscopy. A thin, lighted tube is inserted through the anus and rectum and into the lower part of the colon to look for abnormal areas.

Colonoscopy

- ✓ A procedure to look inside the rectum and colon for polyps, abnormal areas, or cancer.
- ✓ A colonoscope is inserted through the rectum into the colon.

- ✓ A colonoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove polyps or tissue samples, which are checked under a microscope for signs of cancer



Colonoscopy. A thin, lighted tube is inserted through the anus and rectum a nd into the colon to look for abnormal areas.

Virtual colonoscopy

- ✓ A procedure that uses a series of x-rays called computed tomography to make a series of pictures of the colon.
- ✓ A computer puts the pictures together to create detailed images that may show polyps and anything else that seems unusual on the inside surface of the colon.

Biopsy

- ✓ The removal of cells or tissues so they can be viewed under a microscope by a pathologist to check for signs of cancer.
- ✓ If tests show an abnormal area (such as a polyp), a biopsy to check for cancer cells may be necessary. Often, the abnormal tissue can be removed during colonoscopy or sigmoidoscopy. A pathologist checks the tissue for cancer cells using a microscope.

Staging

- ✓ If the biopsy shows that cancer is present, doctor needs to know the extent (stage) of the disease to plan the best treatment.

- ✓ The stage is based on whether the tumor has invaded nearby tissues, whether the cancer has spread and, if so, to what parts of the body.

Staging tests

- ✓ **Blood tests:** Doctor checks for Carcinoembryonic antigen (CEA) and other substances in the blood. Some people who have colorectal cancer or other conditions have a high CEA level.

- ✓ **Colonoscopy:** If colonoscopy was not performed for diagnosis, doctor checks for abnormal areas along the entire length of the colon and rectum with a colonoscope.

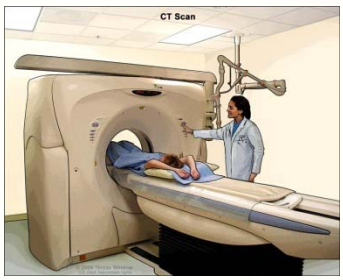
- ✓ **Endorectal ultrasound:** An ultrasound probe is inserted into rectum. The probe sends out sound waves that people cannot hear. The waves bounce off rectum and nearby tissues, and a computer uses the echoes to create a picture. The picture may show how deep a rectal tumor has grown or whether the cancer has spread to lymph nodes or other nearby tissues.

- ✓ **Chest x-ray:** X-rays of chest may show whether cancer has spread to lungs.

- ✓ **CT scan:**

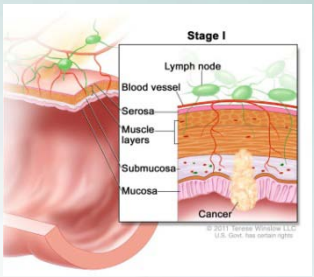
  - An x-ray machine linked to a computer takes a series of detailed pictures of areas inside the body.

  - A CT scan may show whether cancer has spread to the liver, lungs or other organs.



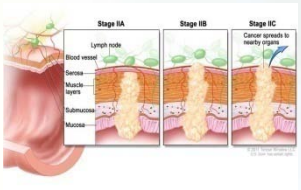
Stage I

- ✓ The tumor grows into the inner wall of the colon or rectum. The tumor does not grown through the wall.



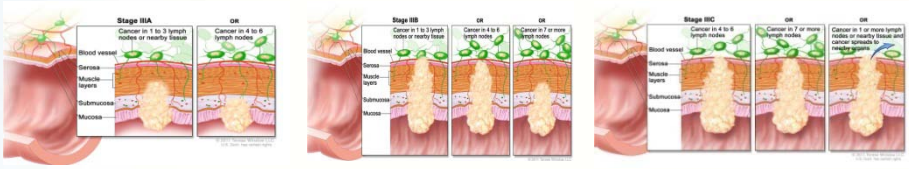
Stage II

- ✓ The tumor gets extended more deeply into or through the wall of the colon or rectum. It can also invade nearby tissue, but cancer does not spread to the lymph nodes



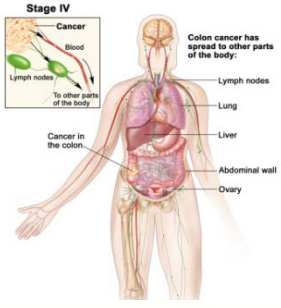
Stage III

- ✓ The cancer spreads to the nearby lymph nodes, but not to other parts of the body.



Stage IV

- ✓ The cancer would have spread to other parts of the body, such as the liver or lungs.



Treatment options for colorectal cancer

Certain factors affect the chance of recovery and treatment options

Treatment options depend on the following:

- The stage of the cancer.
- Whether the cancer has recurred.
- The patient's general health.

The chance of recovery depends on the following:

- ✓ The stage of the cancer
- ✓ Whether the cancer has blocked or created a hole in the colon or rectum.
- ✓ Whether there are any cancer cells left after surgery.
- ✓ The blood levels of carcinoembryonic antigen (CEA; a substance in the blood that may be increased when cancer is present) before treatment begins.
- ✓ Whether the cancer has recurred.
- ✓ The patient's general health.

Treatment options

- ✓ Treatment options for colorectal cancer are:
  - Surgery
  - Radiation therapy
  - Chemotherapy
  - Biological therapy

Surgery

- ✓ Surgery: Removing the cancer in an operation
- ✓ Surgery is the most common treatment for colorectal cancer.

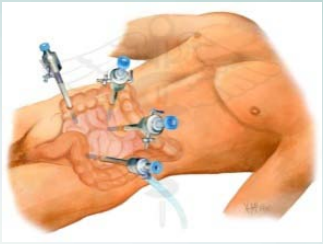
Colonoscopy

- ✓ A small malignant polyp may be removed from the colon or upper rectum with a colonoscope.
- ✓ Some small tumors in the lower rectum can be removed through the anus without a colonoscope.

Laparoscopy

- ✓ Early colon cancer may be removed with the aid of a thin, lighted tube (laparoscope).
- ✓ Three or four tiny cuts are made into the abdomen.

- ✓ The surgeon sees inside the abdomen with the laparoscope.
- ✓ The tumor and part of the healthy colon are removed.



Open surgery

- ✓ The surgeon makes a large cut into the abdomen to remove the tumor and part of the healthy colon or rectum.
- ✓ Some nearby lymph nodes are also removed.
- ✓ The surgeon checks the rest of the intestine and liver to see if the cancer has spread.

Colostomy

- ✓ When a section of the colon or rectum is removed, the surgeon can usually reconnect the healthy parts.
- ✓ However, sometimes reconnection is not possible. In this case, the surgeon creates a new path for waste to leave from body.
- ✓ The surgeon makes an opening (stoma) in the wall of the abdomen, connects the upper end of the intestine to the stoma, and closes the other end. The operation to create the stoma is called a colostomy. A flat bag fits over the stoma to collect waste, and a special adhesive holds it in place.

Radiation therapy

- ✓ Radiation therapy uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing.

Chemotherapy

- ✓ Chemotherapy uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing.

Biological therapy

- ✓ Some people with colorectal cancer that has spread receive a monoclonal antibody, a type of biological therapy.
- ✓ The monoclonal antibodies bind to colorectal cancer cells.
- ✓ They interfere with cancer cell growth and the spread of cancer.

Treatment for colon cancer

- ✓ Most patients with colon cancer are treated with surgery. Some people have both surgery and chemotherapy. Some with advanced disease get biological therapy.
- ✓ A colostomy is seldom needed for people with colon cancer.
- ✓ Although radiation therapy is rarely used to treat colon cancer, sometimes it is used to relieve pain and other symptoms.

Treatment for rectal cancer

- ✓ For all stages of rectal cancer, surgery is the most common treatment. Some patients receive surgery, radiation therapy and chemotherapy. Some with advanced disease get biological therapy.
- ✓ About 1 out of 8 people with rectal cancer needs a permanent colostomy.

- ✓ Radiation therapy may be used before and after surgery. Some people have radiation therapy before surgery to shrink the tumor, and some have it after surgery to kill cancer cells that may remain in the area.

- ✓ People also may have radiation therapy to relieve pain and other problems caused by the cancer.

Prevention of colorectal cancer

Can colorectal cancer be prevented?

- ✓ Even though we don't know the exact cause of most colorectal cancers, it is possible to prevent many of them.

Screening

- ✓ Regular colorectal cancer screening is one of the most powerful weapons for preventing colorectal cancer.

- ✓ Screening is the process of looking for cancer or pre-cancer in people who have no symptoms of the disease.

- ✓ From the time the first abnormal cells start to grow into polyps, it usually takes about 10 to 15 years for them to develop into colorectal cancer.

- ✓ Regular screening can, in many cases, prevent colorectal cancer altogether. This is because most polyps can be found and removed before they have the chance to turn into cancer.

- ✓ Screening can also result in finding colorectal cancer early, when it is highly curable.

- ✓ People who have no identified risk factors (other than age) should begin regular screening at age 50.
- ✓ Those who have a family history or other risk factors for colorectal polyps or cancer, such as inflammatory bowel disease, should talk with their doctor about starting screening at a younger age and/or getting screened more frequently.

Frequency of screening

- ✓ That depends on your risk of colorectal cancer and which test you have.
- ✓ Most people can choose 1 of these schedules:
  - Colonoscopy every 10 years
  - Computed tomography (CTC) every 5 years
  - Sigmoidoscopy every 5 years
  - Barium enema every 5 years
  - Stool testing for blood once a year
- ✓ People who have a high risk of colon cancer often need to be tested more often and should have a colonoscopy

Diet, exercise and body weight

- ✓ You can lower your risk of developing colorectal cancer by managing the risk factors that you can control, like diet and physical activity.

- ✓ Most studies have found that being overweight or obese increases the risk of colorectal cancer in both men and women, but the link seems to be stronger in men. Having more belly fat (that is, a larger waistline) has also been linked to colorectal cancer.

- ✓ Diets that are high in vegetables, fruits, and whole grains (and low in red and processed meats) have been linked with lower colorectal cancer risk.

- ✓ Studies show a lower risk of colorectal cancer and polyps with increasing levels of activity.

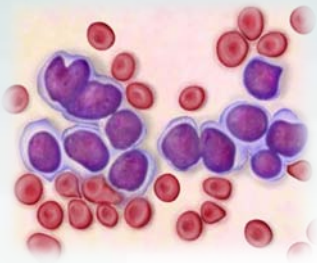
- ✓ Moderate activity on a regular basis lowers the risk, but vigorous activity may have an even greater benefit.

- ✓ Several studies have found a higher risk of colorectal cancer with increased alcohol intake, especially among men.

At this time, the best advice about diet and activity to possibly reduce your risk of colorectal cancer is to:

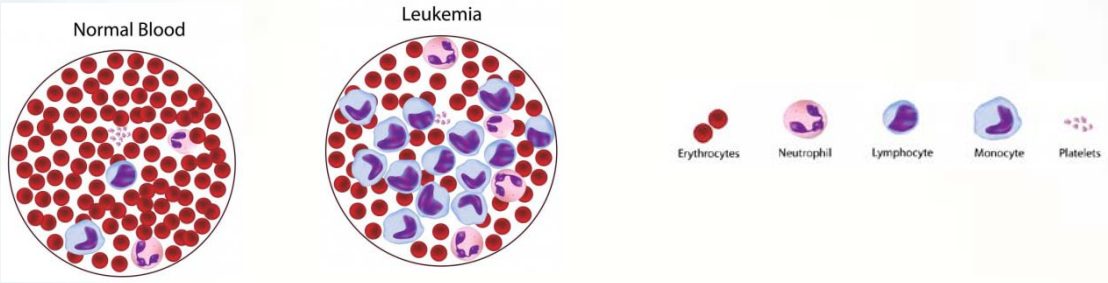
- ✓ Increase the intensity and amount of physical activity.
- ✓ Limit intake of red and processed meats.
- ✓ Get the recommended levels of calcium and vitamin D.
- ✓ Eat more vegetables and fruits.
- ✓ Avoid obesity and weight gain around the midsection.
- ✓ Avoid excess alcohol.

What is Leukemia?



Leukemia

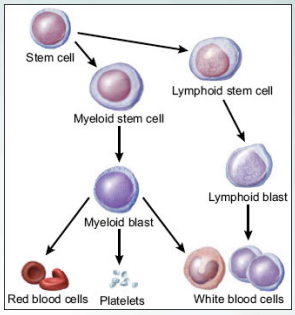
- ✓ Leukemia is a type of blood cancer
- ✓ In a person with leukemia, the bone marrow produces abnormal white blood cells. These abnormal cells are **leukemia cells.**
- ✓ Unlike normal blood cells, leukemia cells don't die when they should. They may crowd out normal white blood cells, red blood cells, and platelets. This makes it hard for normal blood cells to do their work.



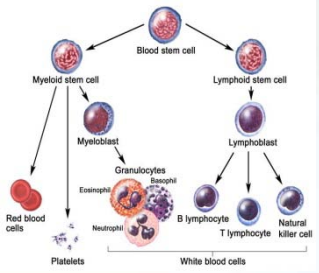
Stem cell

- ✓ Most blood cells develop from cells in the bone marrow (soft material in the center of most bones) called stem cells.
- ✓ Stem cells can mature into different types of white blood cells.
- ✓ First, a stem cell matures into either a myeloid stem cell or a lymphoid stem cell

- ✓ A myeloid stem cell matures into a myeloid blast. The blast can form a red blood cell, platelets, or one of several types of white blood cells.
- ✓ A lymphoid stem cell matures into a lymphoid blast. The blast can form one of several types of white blood cells, such as B cells or T cells.



- ✓ The white blood cells that form from myeloid blasts are different from the white blood cells that form from lymphoid blasts.



Types of Leukemia

- ✓ The types of leukemia can be grouped based on how quickly the disease develops and gets worse.
- ✓ Leukemia is either chronic (which usually gets worse slowly) or acute (which usually gets worse quickly)

Chronic leukemia

- ✓ In the early stages of disease, the leukemia cells can still do some of the work of normal white blood cells.
- ✓ People may not have any symptoms at first. Doctors often find chronic leukemia during a routine checkup - before there are any symptoms.
- ✓ Slowly, chronic leukemia gets worse.
- ✓ As the number of leukemia cells in the blood increases, people get symptoms, such as swollen lymph nodes or infections.

- ✓ When symptoms do appear, they are usually mild at first and get worse gradually.

Acute leukemia

- ✓ The leukemia cells can't do any of the work of normal white blood cells.
- ✓ The number of leukemia cells increases rapidly.
- ✓ Acute leukemia usually worsens quickly.

Types of leukemia based on the type of white blood cell affected

- ✓ Leukemia can start in lymphoid cells or myeloid cells.
- ✓ Leukemia that affects lymphoid cells is called lymphoid, lymphocytic, or lymphoblastic leukemia.
- ✓ Leukemia that affects myeloid cells is called myeloid, myelogenous, or myeloblastic leukemia.

There are four common types of leukemia:

- Chronic lymphocytic leukemia (CLL)
- Chronic myeloid leukemia (CML)
- Acute lymphocytic (lymphoblastic) leukemia (ALL)
- Acute myeloid leukemia (AML)

Chronic lymphocytic leukemia (CLL)

- ✓ Affects lymphoid cells and usually grows slowly
- ✓ Most often, people diagnosed with the disease are over age 55
- ✓ It usually never affects children

Chronic myeloid leukemia (CML)

- ✓ Affects myeloid cells and usually grows slowly at first
- ✓ It mainly affects adults

Acute lymphocytic (lymphoblastic) leukemia (ALL)

- ✓ Affects lymphoid cells and grows quickly
- ✓ The most common type of leukemia in young children
- ✓ It also affects adults

Acute myeloid leukemia (AML)

- ✓ Affects myeloid cells and grows quickly
- ✓ It occurs in both adults and children

Hairy cell leukemia

- ✓ A rare type of leukemia in which abnormal B-lymphocytes (a type of white blood cell) are present in the bone marrow, spleen, and peripheral blood.
- ✓ When viewed under a microscope, these cells appear to be covered with tiny hair-like projections.

What causes Leukemia?

- ✓ No one knows the exact cause of leukemia.
- ✓ Doctors seldom know why one person gets leukemia and another doesn't.
- ✓ However, research shows that certain risk factors increases the chance of a person getting this disease.

Risk factors

- ✓ Anything that increases your chance of getting a disease is called a risk factor.
- ✓ Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Leukemia risk factors

Risk factors for leukemia include the following:

- Radiation
- Smoking
- Benzene
- Chemotherapy
- Certain inherited and blood disorders
- Family history

The risk factors may be different for different types of leukemia

Radiation

- ✓ People exposed to very high levels of radiation are much more likely than others to get acute myeloid leukemia, chronic myeloid leukemia, or acute lymphocytic leukemia.

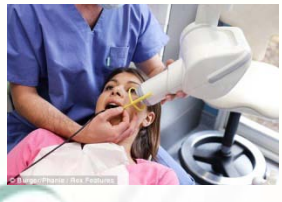
Atomic bomb explosions

- ✓ Very high levels of radiation have been caused by atomic bomb explosions (such as those in Japan during World War II).
- ✓ People, especially children, who survive atomic bomb explosions are at increased risk of leukemia.

Radiation therapy

- ✓ Another source of exposure to high levels of radiation is medical treatment for cancer and other conditions.
- ✓ Radiation therapy can increase the risk of leukemia.

Diagnostic x-rays



- ✓ Dental x-rays and other diagnostic x-rays (such as CT scans) expose people to much lower levels of radiation
- ✓ It's not known yet whether this low level of radiation to children or adults is linked to leukemia.

Smoking

- ✓ Smoking cigarettes increases the risk of acute myeloid leukemia.

Benzene

- ✓ Exposure to benzene in the workplace can cause acute myeloid leukemia.
- ✓ It may also cause chronic myeloid leukemia or acute lymphocytic leukemia.
- ✓ Benzene is used widely in the chemical industry. It's also found in cigarette smoke and gasoline.

Chemotherapy

- ✓ Cancer patients treated with certain types of cancer-fighting drugs sometimes later get acute myeloid leukemia or acute lymphocytic leukemia.
- ✓ For example, being treated with drugs known as alkylating agents or topoisomerase inhibitors is linked with a small chance of later developing acute leukemia.

Certain diseases

Down syndrome and certain other inherited diseases

- ✓ Down syndrome and certain other inherited diseases increase the risk of developing acute leukemia.

Myelodysplastic syndrome and certain other blood disorders

- ✓ People with certain blood disorders are at increased risk of acute myeloid leukemia.

Human T-cell leukemia virus type I (HTLV-I)

- ✓ People with HTLV-I infection are at increased risk of a rare type of leukemia known as adult T-cell leukemia.
- ✓ Although the HTLV-I virus may cause this rare disease, adult T-cell leukemia and other types of leukemia are not contagious

Family history

- ✓ It's rare for more than one person in a family to have leukemia.
- ✓ When it does happen, it's most likely to involve chronic lymphocytic leukemia.
- ✓ However, only a few people with chronic lymphocytic leukemia have a father, mother, brother, sister, or child who also has the disease.

What are the signs of leukemia?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

- Sign: Signal that can be seen by someone else

For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.

- Symptom: Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

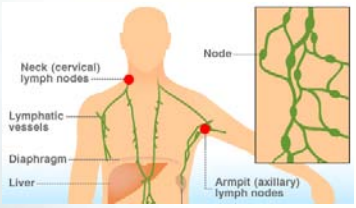
For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

Signs and symptoms of leukemia

- ✓ Like all blood cells, leukemia cells travel through the body.
- ✓ The symptoms of leukemia depend on the number of leukemia cells and where these cells collect in the body.
- ✓ People with **chronic leukemia** may not have symptoms. The doctor may find the disease during a routine blood test.
- ✓ People with **acute leukemia** usually go to their doctor because they feel sick.
- ✓ If the brain is affected, they may have headaches, vomiting, confusion, loss of muscle control, or seizures. Leukemia also can affect other parts of the body such as the digestive tract, kidneys, lungs, heart, or testes.

Common symptoms of chronic or acute leukemia may include:

Swollen lymph nodes that usually doesn't hurt (especially lymph nodes in the neck or armpit)



Fever

Night sweats

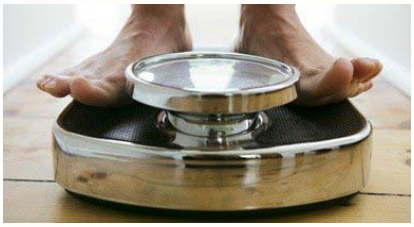
Weakness and tiredness that don't go away

Pain, swelling, or a feeling of fullness in the abdomen

Frequent infections

Bleeding and bruising easily (bleeding gums, purplish patches in the skin, or tiny red spots under the skin)

Weight loss for no known reason



Pain in the bones or joints

- ✓ Most often, these symptoms are not due to cancer. An infection or other health problems may also cause these symptoms. Only a doctor can tell the exact reason.
- ✓ Anyone with these symptoms should tell the doctor so that problems can be diagnosed and treated as early as possible.

Leukemia early detection/screening

Screening

- ✓ Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms

Early detection

- ✓ Using an approach that lets leukemia get diagnosed earlier than otherwise might have occurred.

Can leukemia be found early?

- ✓ At this time there are no widely recommended blood tests or other screening exams for leukemia before it starts to cause symptoms.

  [Screening is testing for cancer in people without any symptoms]

- ✓ The best way to find this cancer early is prompt attention to the signs and symptoms of this disease.

Be alert on warning signs

- ✓ Some people are known to be at increased risk of leukemia because of certain blood disorders (myelodysplastic syndrome) or inherited disorders (Down syndrome), or because they were treated with certain chemotherapy drugs or radiation.

- ✓ Most doctors recommend that these people receive careful, regular medical checkups. They do not usually develop leukemia, but they and their doctors should be familiar with possible symptoms of leukemia.

Diagnosis and Staging of leukemia

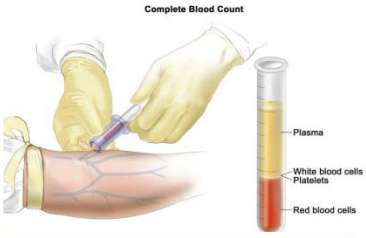
- ✓ Doctors sometimes find leukemia after a routine blood test.
- ✓ If patient has the symptoms that suggests leukemia, doctor must find out whether they are due to leukemia or some other cause.
- ✓ Doctor may ask about the personal and family medical history of patient.

Physical exam

- ✓ Doctor checks for swollen lymph nodes, spleen, or live

Blood tests

- ✓ The lab does a complete blood count to check the number of white blood cells, red blood cells and platelets.
- ✓ Leukemia increases the level of white blood cells. It may also decrease the levels of platelets and hemoglobin, which is found inside red blood cells.



Biopsy

- ✓ A biopsy is the only sure way to know whether leukemia cells are in the bone marrow.

- ✓ Before the sample is taken, local anesthesia is used to numb the area. This helps reduce the pain. Doctor removes some bone marrow from the hipbone or another large bone.
- ✓ A pathologist uses a microscope to check the tissue for leukemia cells.

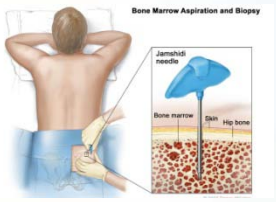
There are two ways to obtain bone marrow. Some people will have both procedures during the same visit:

Bone marrow aspiration

- ✓ The doctor uses a thick, hollow needle to remove samples of bone marrow.

Bone marrow biopsy

- ✓ The doctor uses a very thick, hollow needle to remove a small piece of bone and bone marrow.



Other tests

- ✓ The tests that doctor orders depends on the symptoms and type of leukemia.

Patient may have other tests:

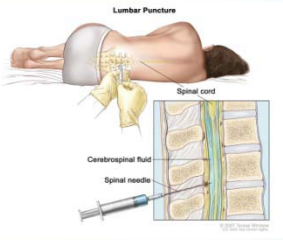
- Cytogenetics
- Spinal tap
- Chest x-ray

Cytogenetics

- ✓ The lab looks at the chromosomes of cells from samples of blood, bone marrow, or lymph nodes.
- ✓ Presence of abnormal chromosomes suggests the type of leukemia
- ✓ For example, people with CML have an abnormal chromosome called the Philadelphia chromosome.

Spinal tap

- ✓ Doctor may remove some of the cerebrospinal fluid (the fluid that fills the spaces in and around the brain and spinal cord).
- ✓ The doctor uses a long, thin needle to remove fluid from the lower spine.
- ✓ The lab checks the fluid for leukemia cells or other signs of problems



Chest x-rays

- ✓ An x-ray can show swollen lymph nodes or other signs of disease in the chest.

Staging

- ✓ For most cancers, staging is the process of finding out how far the cancer has spread.

- ✓ Most types of cancer are given stages of I, II, III, or IV, based on the size of the tumor and how far from the original site in the body the cancer has spread.
- ✓ Stages are useful because they can help guide treatment.
- ✓ Leukemia is not staged like most cancers.

Chronic Myelogenous Leukemia (CML) has 3 phases

The number of blast cells (immature blood cell) in the blood and bone marrow and the severity of symptoms determine the phase of the disease.

- **Chronic phase:** Fewer than 10% of the cells in the blood and bone marrow are blast cells.
- **Accelerated phase:** 10% to 19% of the cells in the blood and bone marrow are blast cells.
- **Blastic phase**: 20% or more of the cells in the blood or bone marrow are blast cells.

Stages of chronic lymphocytic leukemia (CLL)

Stage I

- There are too many lymphocytes in the blood and the lymph nodes are larger than normal.

Stage II

- There are too many lymphocytes in the blood, the liver or spleen is larger than normal, and the lymph nodes may be larger than normal.

Stage III

- There are too many lymphocytes in the blood and there are too few red blood cells. The lymph nodes, liver, or spleen may be larger than normal.

Stage IV

- There are too many lymphocytes in the blood and too few platelets. The lymph nodes, liver, or spleen may be larger than normal and there may be too few red blood cells.

Staging of acute lymphoblastic leukemia (ALL)

✓ There is no staging system for ALL

✓ Risk groups are used to plan treatment for children

Standard (low) risk: Includes children aged 1 to < 10 years who have a white blood cell count of less than 50,000/µL at diagnosis.

High risk: Includes children younger than 1 year or 10 years and older and children who have a white blood cell count of 50,000/µL or more at diagnosis.

Acute myeloid leukemia (AML)

✓ There is no standard staging system for AML.

✓ In AML, the subtype of AML and whether the leukemia has spread outside the blood and bone marrow are used instead of the stage to plan treatment.

Treatment options for leukemia

Treatment options

People with leukemia have many treatment options.

- Watchful waiting
- Chemotherapy
- Targetead therapy
- Biological therapy
- Radiation therapy
- Stem cell transplant
- If the spleen is enlarged, doctor may suggest surgery to remove it.

Sometimes a combination of these treatments is used

Choice of treatment

The choice of treatment depends mainly on the following:

- The type of leukemia (acute or chronic)
- Age
- Whether leukemia cells were found in cerebrospinal fluid
- Certain features of the leukemia cells

- Symptoms
- General health

Watchful waiting

✓ People with chronic lymphocytic leukemia who do not have symptoms may be able to put off having cancer treatment. By delaying treatment, they can avoid the side effects of treatment until they have symptoms.

✓ Not getting cancer treatment right away is called watchful waiting.

Chemotherapy

✓ Many people with leukemia are treated with chemotherapy.

✓ Chemotherapy uses drugs to destroy leukemia cells.

✓ Depending on the type of leukemia, you may receive a single drug or a combination of two or more drugs.

✓ Chemotherapy is usually given in cycles. Each cycle has a treatment period followed by a rest period

Targeted therapy

✓ People with chronic myeloid leukemia and some with acute lymphoblastic leukemia may receive drugs called targeted therapy.

✓ Targeted therapies use drugs that block the growth of leukemia cells. For example, a targeted therapy may block the action of an abnormal protein that stimulates the growth of leukemia cells.

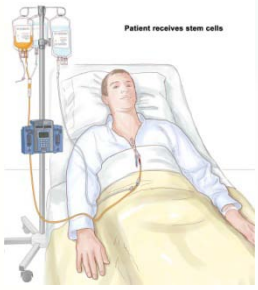
Biological therapy

- ✓ Biological therapy for leukemia is treatment that improves the body's natural defense against the disease.
- ✓ One type of biological therapy is a substance called a **monoclonal antibody.**
- ✓ This substance binds to the leukemia cells. One kind of monoclonal antibody carries a toxin that kills the leukemia cells. Another kind helps the immune system destroy leukemia cells.

Radiotherapy

- ✓ Radiation therapy (also called radiotherapy) uses high-energy rays to kill leukemia cells.

Stem Cell Transplantation



- ✓ A method of replacing immature blood-forming cells in the bone marrow that have been destroyed by cancer.
- ✓ Stem cells are injected into the patient and make healthy blood cells.

A stem cell transplant may be

- ✓ Autologous: Using a patient's own stem cells that were saved before treatment
- ✓ Allogeneic: Using stem cells donated by someone who is not an identical twin
- ✓ Syngeneic : Using stem cells donated by an identical twin

Acute leukemia

- ✓ People with acute leukemia need to be treated right away.
- ✓ The goal of treatment is to destroy signs of leukemia in the body and make symptoms go away. This is called a remission.
- ✓ After people go into remission, more therapy may be given to prevent a relapse. This type of therapy is called consolidation therapy or maintenance therapy.
- ✓ **Many people with acute leukemia can be cured.**

Chronic leukemia

- ✓ Chronic leukemia without symptoms, may not need cancer treatment right away.
- ✓ Doctor will watch the patient health closely so that treatment can start when patient begin to have symptoms (watchful waiting).
- ✓ When treatment for chronic leukemia is needed, it can often control the disease and its symptoms. People may receive maintenance therapy to help keep the cancer in remission, but chronic leukemia can seldom be cured with chemotherapy.
- ✓ However, stem cell transplants offer some people with chronic leukemia the chance for cure.

Prevention of leukemia

Can leukemia be prevented?

- ✓ There is no known way to prevent most cases of leukemia.

- ✓ Many types of cancer can be prevented by lifestyle changes to avoid certain risk factors, but this is not true for most cases of leukemia.
- ✓ The only potentially avoidable risk factor for leukemia is exposure to high doses of radiation, which is seen in only a few cases.

What is lymphoma?

Lymphoma

- ✓ Lymphoma is a cancer of the lymphatic system.
- ✓ The lymphatic system is made up of organs all over the body that produce and store cells that fight infection.
- ✓ These infection-fighting cells are also called “white blood cells.”

Lymphatic system

- ✓ The lymphatic system is a part of the **immune system.**
- ✓ The immune system fights infections and other diseases.

The lymphatic system includes the following:

- Lymph vessels
- Lymph
- Lymph nodes
- Other parts of the lymphatic system: Tonsils, Thymus and spleen

Lymph vessels

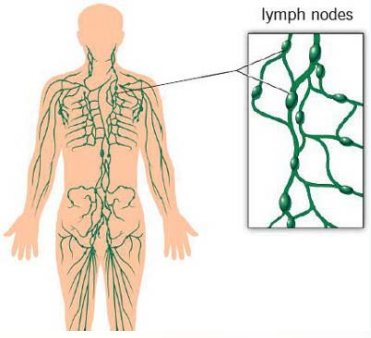
- ✓ The lymphatic system has a network of lymph vessels.

- ✓ Lymph vessels branch into all the tissues of the body.

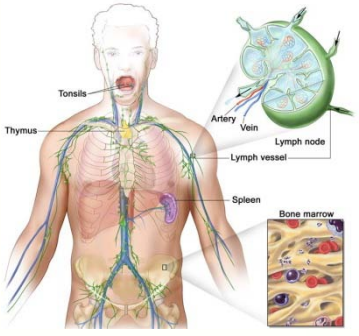
Lymph

- ✓ The lymph vessels carry clear fluid called lymph.
- ✓ Lymph contains white blood cells, especially lymphocytes such as **B cells** and **T cells**.

Lymph nodes



- ✓ Lymph vessels are connected to small, round masses of tissue called lymph nodes.
- ✓ Groups of lymph nodes are found in the neck, underarms, chest, abdomen and groin.
- ✓ Lymph nodes store white blood cells. They trap and remove bacteria or other harmful substances that may be in the lymph.



- ✓ Other parts of the lymphatic system include the tonsils, thymus and spleen.
- ✓ Lymphatic tissue is also found in other parts of the body including the stomach, skin and small intestine.
- ✓ Because lymphatic tissue is in many parts of the body, lymphoma can start almost anywhere.
- ✓ Usually, it's first found in a lymph node.

Lymphoma cells

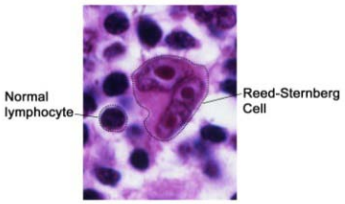
- ✓ Lymphoma begins when a lymphocyte (usually a B cell) becomes abnormal.
- ✓ The abnormal cell divides to make copies of itself.
- ✓ The new cells divide again and again, making more and more abnormal cells.
- ✓ The abnormal cells don't die when they should.
- ✓ They don't protect the body from infections or other diseases.
- ✓ The buildup of extra cells often forms a mass of tissue called a growth or tumor.

Types of Lymphoma

The two main types of lymphoma are

- Hodgkin lymphoma
- Non-Hodgkin lymphoma

- ✓ Hodgkin lymphoma spreads in an orderly manner from one group of lymph nodes to another.
- ✓ Non-Hodgkin lymphoma spreads through the lymphatic system in a non-orderly manner.
- ✓ A person with Hodgkin's lymphoma usually has large, abnormal cells known as Reed-Sternberg cells.
- ✓ They are not found in people with non-Hodgkin lymphoma.



Types of Hodgkin Lymphoma

There are two major types of Hodgkin's lymphoma:

Classical Hodgkin's lymphoma

- ✓ Most people with Hodgkin's lymphoma have the classical type.

Nodular lymphocyte-predominant Hodgkin's lymphoma

- ✓ This is a rare type of Hodgkin's lymphoma.
- ✓ The abnormal cell is called a popcorn cell.
- ✓ It may be treated differently from the classical type.

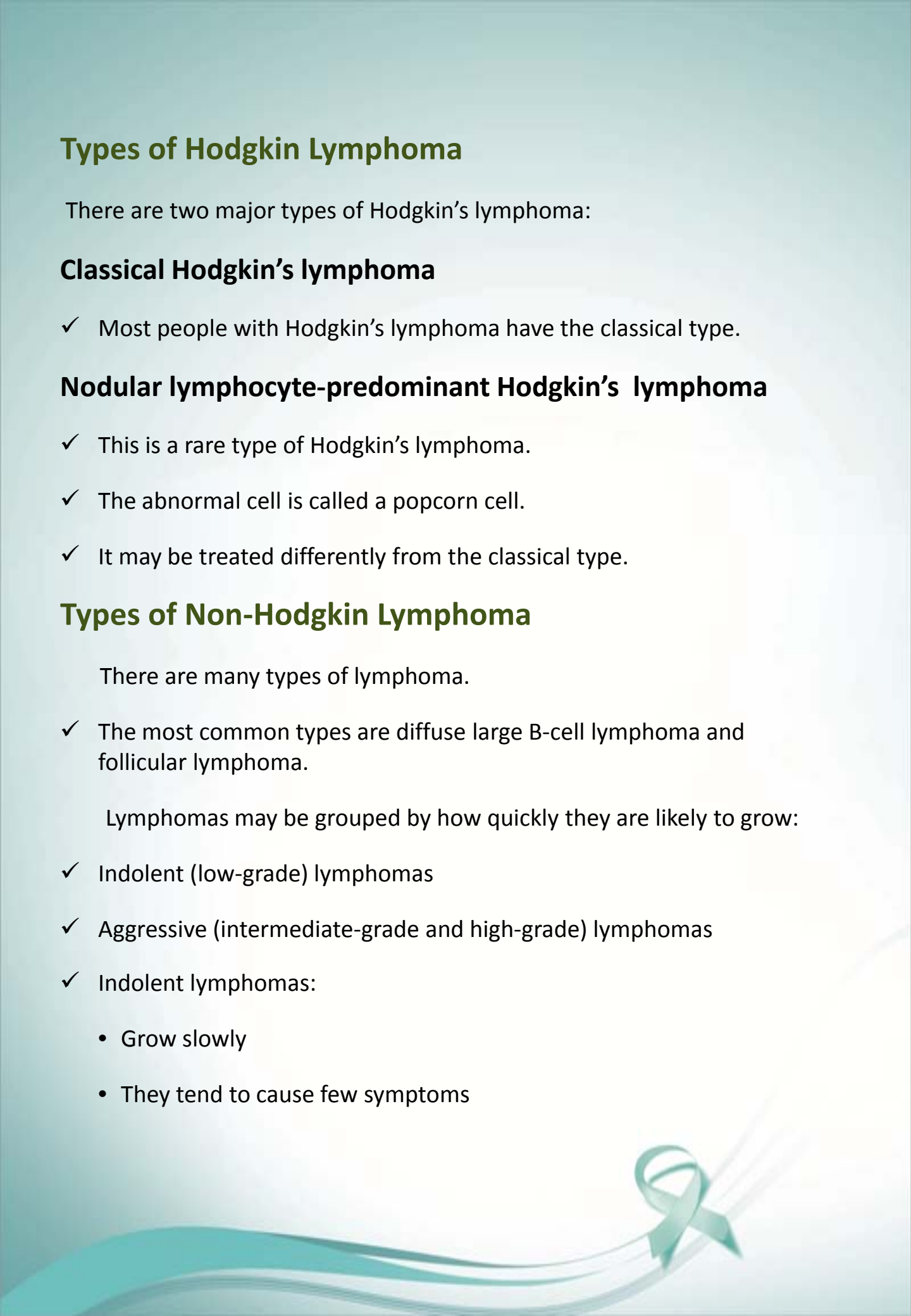
Types of Non-Hodgkin Lymphoma

There are many types of lymphoma.

- ✓ The most common types are diffuse large B-cell lymphoma and follicular lymphoma.

Lymphomas may be grouped by how quickly they are likely to grow:

- ✓ Indolent (low-grade) lymphomas
- ✓ Aggressive (intermediate-grade and high-grade) lymphomas
- ✓ Indolent lymphomas:
  - Grow slowly
  - They tend to cause few symptoms



- ✓ Aggressive lymphomas
  - Grow and spread more quickly
  - Tend to cause severe symptoms
- ✓ Over time, many indolent lymphomas become aggressive lymphomas.

What causes Lymphoma?

- ✓ Doctors seldom know why one person develops lymphoma and another does not. **factors** increase the chance that a person will develop this disease
- ✓ But research shows that certain **risk** .

Risk factors

- ✓ Anything that increases your chance of getting a disease is called a risk factor.
- ✓ Having a risk factor does not mean that you will get cancer; not having risk factors doesn't mean that you will not get cancer.

Lymphoma risk factors

Risk factors for lymphoma include the following:

- ✓ Age
- ✓ Weakened immune system
- ✓ Certain viruses
- ✓ Family history

Age

- ✓ **Hodgkin's lymphoma** is most common among teens and adults aged 15 to 35 years and adults aged 55 years and older.
- ✓ Although non-Hodgkin lymphoma can occur in young people, the chance of developing this disease goes up with age. Most people with **non-Hodgkin lymphoma** are older than 60.

Weakened immune system

- ✓ The risk of developing lymphoma may be increased by having a weakened immune system (such as from an inherited condition or certain drugs used after an organ transplant).

Certain infections

- ✓ Having certain types of infections increases the risk of developing lymphoma.
- ✓ However, lymphoma is not contagious. You cannot catch lymphoma from another person.

The following are the main types of infection that can increase the risk of lymphoma:

Human immunodeficiency virus (HIV)

- ✓ HIV is the virus that causes AIDS.
- ✓ People who have HIV infection are at much greater risk of some types of non-Hodgkin lymphoma.

Epstein-Barr virus (EBV)

- ✓ Infection with EBV has been linked to an increased risk of lymphoma.

Helicobacter pylori

- ✓ H. pylori are bacteria that can cause stomach ulcers.
- ✓ They also increase a person's risk of lymphoma in the stomach lining.

Human T-cell leukemia/lymphoma virus type 1 (HTLV-1)

- ✓ Infection with HTLV-1 increases a person's risk of lymphoma and leukemia

Hepatitis C virus

- ✓ Some studies have found an increased risk of lymphoma in people with hepatitis C virus.
- ✓ More research is needed to understand the role of hepatitis C virus.

Family history

- ✓ Family members, especially brothers and sisters, of a person with Hodgkin's lymphoma or other lymphomas may have an increased chance of developing this disease.

What are the signs of lymphoma?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

Sign: Signal that can be seen by someone else

- For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia.

Symptom: Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

- For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia.

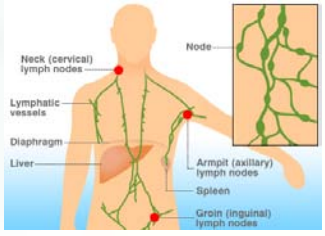
Signs and symptoms of lymphoma

✓ The first sign of lymphoma is often one or more large, **swollen lymph nodes**.

✓ These swollen lymph nodes can be felt under the skin, but are usually not painful.

✓ They are often in the neck, groin, armpit, or stomach.

Swollen, painless lymph nodes in the neck, armpits, or groin



Becoming more sensitive to the effects of alcohol or having painful lymph nodes after drinking alcohol

Weight loss for no known reason

- Fever that does not go away

- Soaking night sweats

- Itchy skin

- Coughing, trouble breathing, or chest pain

- Weakness and tiredness that does not go away

- Pain, swelling, or a feeling of fullness in the abdomen

- ✓ All of these symptoms can also be caused by conditions that are not lymphoma. But if you have these symptoms, you should let your doctor know.

Lymphoma early detection/screening

Screening

- ✓ Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms

Early detection

- ✓ Using an approach that lets lymphoma get diagnosed earlier than otherwise might have occurred.

Can lymphoma be found early?

- ✓ At this time, there are no widely recommended screening tests for this cancer.
- ✓ Still, in some cases lymphoma can be found early.

  [Screening is testing for cancer in people without any symptoms]
- ✓ The best way to find this cancer early is prompt attention to the signs and symptoms of this disease.

Be alert on warning signs

- ✓ Careful, regular medical checkups are important for people with known risk factors for lymphoma (such as HIV infections, organ transplants, autoimmune disease, or prior cancer treatment).
- ✓ These people do not commonly develop lymphoma, but they and their doctors should be aware of possible symptoms and signs of lymphoma.

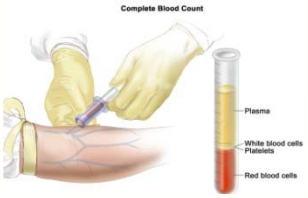
Diagnosis and Staging of Lymphoma

- ✓ If patient has the symptoms that suggests lymphoma, doctor must find out whether those symptoms are due to lymphoma or some other cause.
- ✓ Doctor may ask about the personal and family medical history of patient.

Physical exam

- ✓ Doctor checks for swollen lymph nodes in the neck, underarms and groin.
- ✓ Doctor also checks for a swollen spleen or liver.

Blood tests



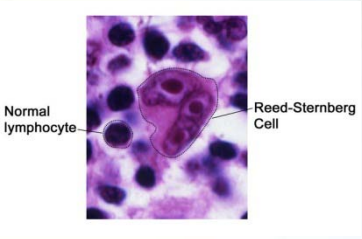
- ✓ The lab does a complete blood count to check the number of white blood cells.
- ✓ The lab also checks for other cells and substances, such as lactate dehydrogenase (LDH). Lymphoma may cause a high level of LDH.

Chest x-rays

- ✓ X-ray pictures may show swollen lymph nodes or other signs of disease in the chest.

Biopsy

- ✓ A biopsy is the only sure way to diagnose lymphoma.
- ✓ Doctor may remove an entire lymph node (excisional biopsy) or only a part of a lymph node (incisional biopsy).
- ✓ A thin needle (fine needle aspiration) usually cannot remove a large enough sample for the pathologist to diagnose lymphoma. Removing an entire lymph node is best.
- ✓ The pathologist uses a microscope to check the tissue for Hodgkin's lymphoma cells.
- ✓ A person with Hodgkin lymphoma usually has large, abnormal cells known as Reed-Sternberg cells. They are not found in people with **non-Hodgkin lymphoma.**



Staging

- ✓ Doctor needs to know the extent (stage) of lymphoma to plan the best treatment.
- ✓ Staging is a careful attempt to find out what parts of the body are affected by the disease.
- ✓ Lymphoma usually starts in a lymph node. It can spread to nearly any other part of the body. For example, it can spread to the liver, lungs, bone and bone marrow.

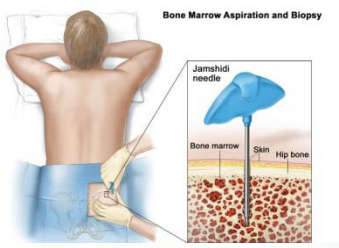
Staging tests

- ✓ Staging may involve one or more of the following tests:

- ✓ Bone marrow biopsy
- ✓ CT scan
- ✓ MRI
- ✓ Ultrasound
- ✓ Spinal tap
- ✓ PET scan

Bone marrow biopsy

- ✓ The doctor uses a thick needle to remove a small sample of bone and bone marrow from the hipbone or another large bone.
- ✓ Local anesthesia can help control pain.
- ✓ A pathologist looks for lymphoma cells in the sample.

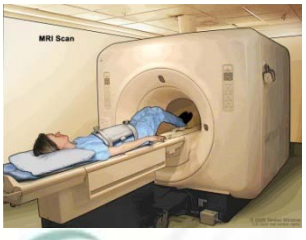


CT scan

- ✓ An x-ray machine linked to a computer takes a series of detailed pictures of the head, neck, chest, abdomen, or pelvis.

MRI

- ✓ Doctor may order MRI pictures of the spinal cord, bone marrow, or brain.
- ✓ MRI uses a powerful magnet linked to a computer.

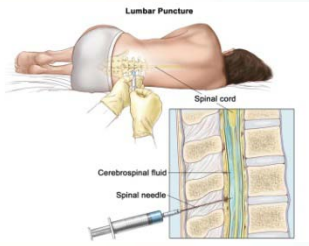


- ✓ It makes detailed pictures of tissue on a computer screen or film.

Ultrasound

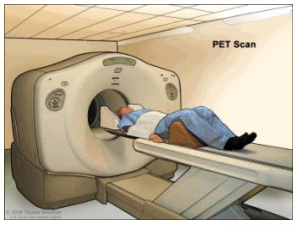
- ✓ An ultrasound device sends out sound waves that we cannot hear.
- ✓ A small hand-held device is held against the body.
- ✓ The waves bounce off nearby tissues, and a computer uses the echoes to create a picture.
- ✓ Tumors may produce echoes that are different from the echoes made by healthy tissues. The picture can show possible tumors.

Spinal tap



- ✓ The doctor uses a long, thin needle to remove fluid from the spinal column.

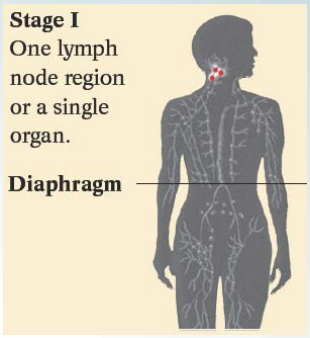
PET scan



- ✓ Patient receives an injection of a small amount of radioactive sugar.
- ✓ A machine makes computerized pictures of the sugar being used by cells in your body.
- ✓ Lymphoma cells use sugar faster than normal cells,and areas with lymphoma look brighter on the pictures.
- ✓ The stage is based on where lymphoma cells are found (in the lymph nodes or in other organs or tissues).
- ✓ The stage also depends on how many areas are affected.

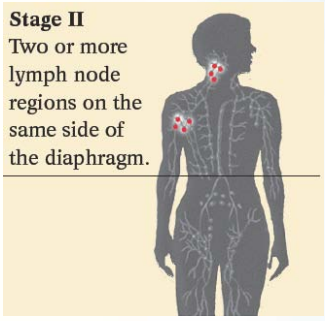
Stage I

- ✓ The lymphoma cells are in one lymph node group (such as in the neck or underarm).
- ✓ Or, if the abnormal cells are not in the lymph nodes, they are in only one part of a tissue or organ (such as the lung, but not the liver or bone marrow).



Stage II

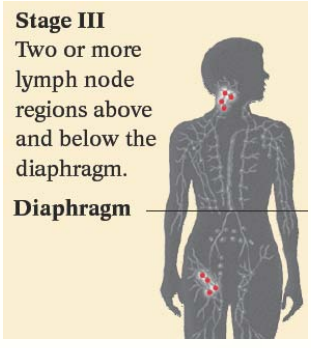
- ✓ The lymphoma cells are in at least two lymph node groups on the same side of (either above or below) the diaphragm.
- ✓ Or, the lymphoma cells are in one part of a tissue or an organ and the lymph nodes near that organ (on the same side of the diaphragm).



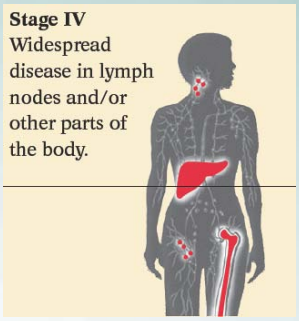
- ✓ There may be lymphoma cells in other lymph node groups on the same side of the diaphragm.

Stage III

- ✓ The lymphoma cells are in lymph nodes above and below the diaphragm.
- ✓ Lymphoma also may be found in one part of a tissue or an organ (such as the liver, lung, or bone) near these lymph node groups. It may also be found in the spleen.



Stage IV



- ✓ Lymphoma cells are found in several parts of one or more organs or tissues.
- ✓ Or, the lymphoma is in an organ (such as the liver, lung, or bone) and in distant lymph nodes.
- ✓ In addition to these stage numbers, doctor may also describe the stage as A or B:

A: You have not had weight loss, drenching night sweats, or fevers.

B: You have had weight loss, drenching night sweats, or fevers.

Diagnosis and Staging of Lymphoma

Certain factors affect the chance of recovery and treatment options

- ✓ The patient's symptoms
- ✓ The stage of the cancer
- ✓ The type of lymphoma
- ✓ Blood test results
- ✓ The patient's age, gender and general health
- ✓ Whether the cancer is recurrent or progressive

Treatment options

- ✓ Treatment options for lymphoma are:
  - Watchful Waiting
  - Chemotherapy
  - Biological Therapy
  - Radiation Therapy
  - Stem Cell Transplantation

Watchful waiting

- ✓ If patient has indolent non-Hodgkin lymphoma without symptoms, he/she may not need treatment for the cancer right away.
- ✓ Doctor watches the patient's health closely so that treatment can start when he/she begin to have symptoms.
- ✓ Not getting cancer treatment right away is called watchful waiting.

Chemotherapy

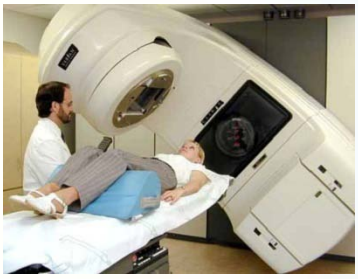
- ✓ Chemotherapy for lymphoma uses drugs to kill lymphoma cells.
- ✓ It is called systemic therapy because the drugs travel through the bloodstream.

- ✓ The drugs can reach lymphoma cells in almost all parts of the body.

Biological therapy

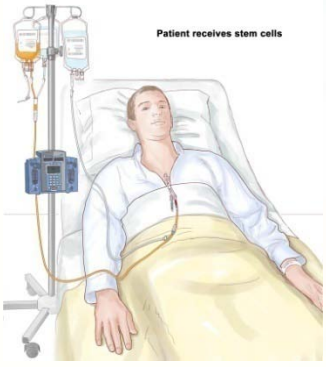
- ✓ People with certain types of non-Hodgkin lymphoma may have biological therapy.
- ✓ This type of treatment helps the immune system fight cancer.
- ✓ Monoclonal antibodies are the type of biological therapy used for lymphoma.
- ✓ They are proteins made in the lab that can bind to cancer cells. They help the immune system kill lymphoma cells.

Radiotherapy



- ✓ Radiation therapy for lymphoma uses high-energy rays to kill lymphoma cells.
- ✓ It can shrink tumors and help control pain.

Stem Cell Transplantation



- ✓ A method of replacing immature blood-forming cells in the bone marrow that have been destroyed by cancer.
- ✓ Stem cells are injected into the patient and make healthy blood cells.

A stem cell transplant may be

- ✓ Autologous: Using a patient's own stem cells that were saved before treatment

- ✓ Allogeneic: Using stem cells donated by someone who is not an identical twin
- ✓ Syngeneic : Using stem cells donated by an identical twin

Non-Hodgkin lymphoma

Indolent lymphoma with symptoms

- Treated with chemotherapy and biological therapy
- Radiation therapy may be used for people with Stage I or Stage II lymphoma.

Aggressive lymphoma

- The treatment is usually chemotherapy and biological therapy.
- Radiation therapy also may be used.

Relapsed non-Hodgkin lymphoma

- People with lymphoma that comes back after treatment may receive high doses of chemotherapy, radiation therapy, or both, followed by stem cell transplantation.

Hodgkin's lymphoma

- ✓ People with Hodgkin's lymphoma may be treated with chemotherapy, radiation therapy, or both

Relapsed Hodgkin's lymphoma

- People with lymphoma that comes back after treatment may receive high doses of chemotherapy, radiation therapy, or both, followed by stem cell transplantation

Prevention of lymphoma

Can lymphoma be prevented?

- ✓ There are few known preventable risk factors for lymphoma, so it is not possible to prevent most cases of the disease at this time.
- ✓ For now, the best way to reduce the risk for lymphoma is to try to prevent known risk factors such as immune deficiency.

Human immunodeficiency virus (HIV)

- ✓ Infection with HIV is a preventable cause of immune deficiency.
- ✓ HIV is spread among adults mostly through unprotected sex and by injection drug users sharing contaminated needles.
- ✓ Blood transfusions are now an extremely rare source of HIV infection.
- ✓ Curbing the spread of HIV would prevent many deaths from lymphoma.
- ✓ Treating HIV with anti-HIV drugs also lowers the chance of developing lymphoma.

Human T-cell leukemia/lymphoma virus (HTLV-1)

- ✓ Preventing the spread of the HTLV-1 could have a great impact on lymphoma in areas of the world where this virus is common.
- ✓ The same strategies used to prevent HIV spread could also help control HTLV-1.

Helicobacter pylori

- ✓ Helicobacter pylori infection has been linked to some lymphomas of the stomach.
- ✓ Treating H. pylori infections with antibiotics and antacids may lower this risk, but the benefit of this strategy has not been proven yet.
- ✓ Most people with H. pylori infection have no symptoms, and some have only mild heartburn. More research is needed to find the best way to detect and treat this infection in people without symptoms

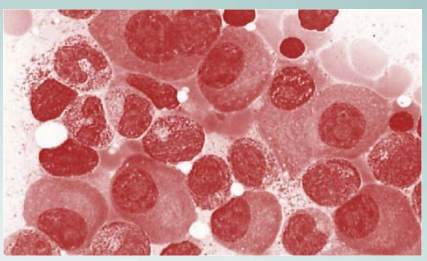
Epstein-Barr virus

- ✓ Another risk factor for lymphoma is infection with the Epstein-Barr virus (the cause of infectious mononucleosis, or mono), but there is no known way of preventing this infection.
- ✓ Some lymphomas are caused by treatment of cancers with radiation and chemotherapy or by the use of immune-suppressing drugs to avoid rejection of transplanted organs.
- ✓ Doctors are trying to find better ways to treat cancer and organ transplant patients without increasing the risk of lymphoma as much.
- ✓ But for now, the benefits of these treatments still usually outweigh the small risk of developing lymphoma many years later.

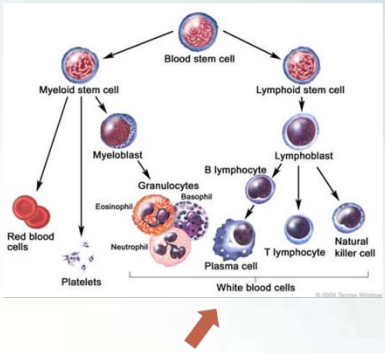
Obesity

- ✓ Some studies have suggested that being overweight or obese may increase the risk of lymphoma.
- ✓ Other studies have suggested that a diet high in fat and meats may raise the risk.
- ✓ Maintaining a healthy weight and eating a healthy diet may help protect against lymphoma, although more research is needed to confirm this.

What is multiple myeloma?



Multiple myeloma

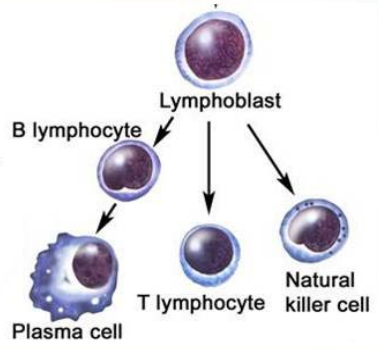


- Multiple myeloma is a cancer that starts in **plasma cells**, a type of white blood cell

Immune system

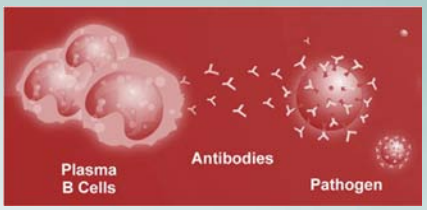
- The immune system is composed of several types of cells that work together to fight infections and other diseases
- Lymphocytes are the main cell type of the immune system
- There are 2 major types of lymphocytes: **T cells and B cells**

Plasma cells



- When B cells respond to an infection, they mature and change into **plasma cells**
- Plasma cells are mainly found in the bone marrow
- Plasma cells make the **antibodies** that help the body attack and kill germs

- Antibodies are part of the **immune system**. They work with other parts of the immune system to help protect the body from germs and other harmful substances



- Each type of plasma cell makes a different antibody

Myeloma Cells

- Myeloma begins when a plasma cell becomes abnormal. The abnormal cell divides to make copies of itself
- The new cells divide again and again, making more and more abnormal cells. These **abnormal plasma cells are called myeloma cells**
- In time, myeloma cells collect in the bone marrow. They may damage the solid part of the bone
- When myeloma cells collect in several bones, the disease is called **"multiple myeloma"**
- This disease may also harm other tissues and organs, such as the kidneys.

M proteins

- Myeloma cells make antibodies called M proteins and other proteins. These proteins can collect in the blood, urine and organs
- The antibody made by the myeloma cells does not help fight infections
- The antibody made by myeloma cells can harm the kidneys. This can lead to kidney damage and even kidney failure

What causes multiple myeloma?

- No one knows the exact causes of multiple myeloma
- Doctors seldom know why one person develops this disease and another doesn't
- Research has shown that certain **risk factors** increase the chance that a person will develop this disease

Risk factors

- Anything that increases your chance of getting a disease is called a risk factor
- Having a risk factor does not mean that you will get cancer; not having risk factors doesn’t mean that you will not get cancer

Multiple myeloma risk factors

Risk factors for multiple myeloma include the following:

- Age over 65
- Gender
- Exposure to radiation
- Personal history of monoclonal gammopathy of undetermined significance (MGUS)
- Family history of multiple myeloma
- Work place exposure
- Obesity

Age over 65

- Growing older increases the chance of developing multiple myeloma
- Most people with myeloma are diagnosed after age 65. This disease is rare in people younger than 35

Gender

- Men are slightly more likely to develop multiple myeloma than women

Radiation

- Exposure to radiation may increase the risk of multiple myeloma
- At most, this accounts for a very small number of cases

Personal history of MGUS

- MGUS is a benign condition in which abnormal plasma cells make M proteins
- Usually, there are no symptoms, and the abnormal level of M protein is found with a blood test
- Sometimes, people with MGUS develop certain cancers, such as multiple myeloma
- Monoclonal gammopathy of undetermined significance : MGUS

Family history

- Studies have found that a person's risk of multiple myeloma may be higher if a close relative had the disease

Workplace exposures

- Some studies have suggested that workers in certain petroleum-related industries may be at a higher risk of multiple myeloma

Obesity

- Some studies have suggested that workers in certain petroleum-related industries may be at a higher risk of multiple myeloma

What are the signs of multiple myeloma?

Signs and symptoms

Signals of injury, illness, disease, or that something is not right in the body

•***Sign:*** Signal that can be seen by someone else

- For example, fever, fast breathing, and abnormal lung sounds heard through a stethoscope may be signs of pneumonia

•***Symptom:*** Signal that is felt or noticed by the person who has it, but may not be easily seen by anyone else.

- For example, weakness, aching, and feeling short of breath may be symptoms of pneumonia

Common symptoms of multiple myeloma

While some people don't have any symptoms at all, the following are the most common symptoms of this disease:

- **Bone pain, usually in the back and ribs**

- **Broken bones, usually in the spine**

- **Feeling weak and very tired**

- **Feeling very thirsty**

- **Frequent infections and fevers**

- **Weight loss**

- **Nausea, vomiting or constipation**

- **Frequent urination**

- All of these symptoms can also be caused by conditions that are not multiple myeloma. But if you have these symptoms, let your doctor know

Multiple myeloma early detection/screening

- ***Screening***
  - Tests and exams used to find a disease, such as cancer, in people who do not have any symptoms
- ***Early detection***
  - Using an approach that lets multiple myeloma get diagnosed earlier than otherwise might have occurred

Can multiple myeloma be found early?

- It is difficult to diagnose multiple myeloma early
- Often, multiple myeloma causes no symptoms until it has reached an advanced stage
- In some cases, it may cause vague symptoms that at first seem to be caused by other diseases

- Rarely, multiple myeloma is found early when a routine blood test shows an abnormally high amount of protein in the blood
- The best way to find this cancer early is prompt attention to the signs and symptoms of this disease

Diagnosis and Staging of multiple myeloma

- Doctors sometimes find multiple myeloma after a routine blood test. More often, doctors suspect multiple myeloma after an x-ray for a broken bone. Usually though, patients go to the doctor because they are having other symptoms
- To find out whether such problems are from multiple myeloma or some other condition, doctor may ask about personal and family medical history of patient

Blood tests

The lab does several blood tests:

- Multiple myeloma causes high levels of proteins in the blood. The lab checks the levels of many different proteins, including **M protein** and other immunoglobulins (antibodies), albumin, and beta-2-microglobulin
- Myeloma may also cause anemia and low levels of white blood cells and platelets. The lab does a **complete blood count** to check the number of white blood cells, red blood cells, and platelets

- The lab also checks for high levels of **calcium**
- To see how well the kidneys are working, the lab tests for **creatinine**
- **Urine tests**
- The lab checks for Bence Jones protein, a type of M protein, in urine
- The lab measures the amount of Bence Jones protein in urine collected over a 24-hour period
- If the lab finds a high level of Bence Jones protein in urine sample, doctors will monitor the kidneys. Bence Jones protein can clog the kidneys and damage them

X-rays

- X-rays to check for broken or thinning bones
- An x-ray of the whole body can be done to see how many bones could be damaged by the myeloma

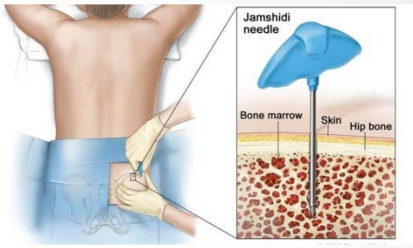
Biopsy

- Doctor removes tissue to look for cancer cells
- A biopsy is the only sure way to know whether myeloma cells are in the bone marrow

- Doctor removes some bone marrow from the hip bone or another large bone
- A pathologist uses a microscope to check the tissue for myeloma cells

There are two ways to obtain bone marrow. Some people will have both procedures during the same visit:

- **Bone marrow aspiration:** The doctor uses a thick, hollow needle to remove samples of bone marrow



- **Bone marrow biopsy**: The doctor uses a very thick, hollow needle to remove a small piece of bone and bone marrow

Staging

- If the biopsy shows that the patient has multiple myeloma, doctor needs to learn the extent (stage) of the disease to plan the best treatment
- Staging may involve having more tests:
  - Blood tests
  - CT scan
  - MRI

Staging tests

- **Blood tests:** For staging, the doctor considers the results of blood tests, including albumin and beta-2-microglobulin
- **CT scan:** An x-ray machine linked to a computer takes a series of detailed pictures of bones
- **MRI:** A powerful magnet linked to a computer is used to make detailed pictures of bones

Stages of multiple myeloma

- Doctors may describe multiple myeloma as smoldering, Stage I, Stage II, or Stage III
- The stage takes into account whether the cancer is causing problems with bones or kidneys
- Smoldering multiple myeloma is early disease without any symptoms
- Early disease with symptoms (such as bone damage) is Stage I. Stage II or III is more advanced, and more myeloma cells are found in the body

Stage I multiple myeloma

In stage I multiple myeloma, the blood levels are as follows:

- beta-2-microglobulin level is lower than 3.5 mg/L; and
- albumin level is 3.5 g/dL or higher

Stage II multiple myeloma

In stage II multiple myeloma, the blood levels are as follows:

- beta-2-microglobulin level is lower than 3.5 mg/L and the albumin level is lower than 3.5 g/dL; or
- beta-2-microglobulin level is between 3.5 mg/L and 5.4 mg/L

Stage III multiple myeloma

- In stage III multiple myeloma, the blood level of beta-2-microglobulin is 5.5 mg/L or higher

Treatment options for multiple myeloma

Treatment options

- People with multiple myeloma have many treatment options
- The options are

  - Watchful waiting

  - Induction therapy

  - Stem cell transplant

- Sometimes a combination of methods is used
- **Radiation therapy** is used sometimes to treat painful bone disease. It may be used alone or along with other therapies

Watchful waiting

- If patient has smoldering myeloma or Stage I myeloma he/she may not need treatment for the cancer right away
- Doctor watches the patient health closely so that treatment can start when he/she begin to have symptoms
- Not getting cancer treatment right away is called watchful waiting

Induction therapy

- Many different types of drugs are used to treat myeloma
- People often receive a combination of drugs, and many different combinations are used to treat myeloma
- Each type of drug kills cancer cells in a different way:

  - Chemotherapy
  - Targeted therapy
  - Steroids

Chemotherapy

- Chemotherapy kills fast-growing myeloma cells, but the drug can also harm normal cells that divide rapidly

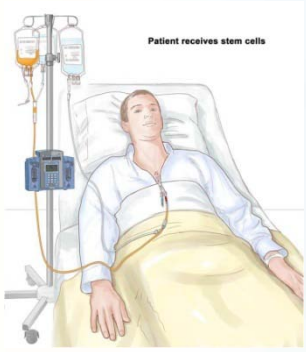
Targeted therapy

- Targeted therapies use drugs that block the growth of myeloma cells
- The targeted therapy blocks the action of an abnormal protein that stimulates the growth of myeloma cells

Steroids

- Some steroids have antitumor effects
- It is thought that steroids can trigger the death of myeloma cells
- A steroid may be used alone or with other drugs to treat myeloma

Stem cell transplantation



- A method of replacing immature blood-forming cells in the bone marrow that have been destroyed by drugs, radiation or cancer
- Stem cells are injected into the patient and make healthy blood cells

A stem cell transplant may be

- Autologous: Using a patient's own stem cells that were saved before treatment
- Allogeneic: Using stem cells donated by someone who is not an identical twin
- Syngeneic : Using stem cells donated by an identical twin

Prevention of multiple myeloma

Can multiple myeloma be prevented?

- For some types of cancer, risk factors that account for the majority of cases are known
- With multiple myeloma, there are no risk factors you can avoid that are known to be responsible for most cases. And for those people with monoclonal gammopathy of undetermined significance or solitary plasmacytomas there is no known way to prevent multiple myeloma from developing