

# Cancer Treatment

## Treatment Types

Find out what you need to know about the most common types of cancer treatment, such as surgery, chemotherapy, radiation therapy, and many others. Learn how they work and why they are used, and get an idea of what to expect and how they might affect you if you're getting them.

### Common Types of Treatments for Cancer

- Surgery
- Chemotherapy
- Radiation Therapy
- Targeted Therapy
- Immunotherapy

### Other Procedures and Techniques

- Stem Cell Transplant
- Hyperthermia
- Photodynamic Therapy
- Blood Product Donation and Transfusion
- Lasers in Cancer Treatment

### Surgical therapy

Surgery has been used to treat cancer for many, many years.

#### Goals of Surgical therapy

- to cure or control
- Slow cancers are most amenable
- Margin of normal tissue must surround tumor

## Chemotherapy

Chemotherapy (chemo) usually refers to the use of medicines or drugs to treat cancer. The thought of having chemotherapy frightens many people. But knowing what chemotherapy is, how it works, and what to expect can often help calm your fears. It can also give you a better sense of control over your cancer treatment.

#### Goals of Chemotherapy:

- 1) Cure: tumor or cancer disappears and doesn't return.
- 2) Control: stop the cancer from growing and spreading.
- 3) Palliation: when cure and control are not possible the goal is to relieve symptoms caused by cancer.

Must be realistic because they will define the meds to be used & aggressiveness of treatment. The primary focus of chemotherapy is preventing cancer cells from multiplying, invading adjacent tissue or developing metastasis. Objective of chemo: Destroy all malignant cells without excessive destruction of normal cells

#### Types Chemotherapeutic Agents:

- A. **Cell Cycle Specific:** mostly affect the S phase & some the M phase. Administered in minimal concentrations by continuous dosing routes.
- B. **Cell Cycle Non-Specific:** affects dividing and resting cells in all phases of the cell cycle. Administered in single bolus injection.

- C. **Combination:** agents that differ in both cell cycle specificity & their toxicities are combined to maximize tumor cell kill with minimal toxicity. Administered in repeated courses

## **Radiation Therapy**

Radiation therapy uses high-energy particles or waves to destroy or damage cancer cells. It is one of the most common treatments for cancer, either by itself or along with other forms of treatment.

### **Goals of Radiation therapy**

- Emission and distribution of energy through space or material medium
- Energy produced breaks bonds in DNA, leading to death at time of reproduction
- Affects both cancer as well as normal cells
- Normal tissues are usually able to recover

## **Targeted Cancer Therapy**

Targeted therapy is a newer type of cancer treatment that uses drugs or other substances to more precisely identify and attack cancer cells, usually while doing little damage to normal cells. Targeted therapy is a growing part of many cancer treatment regimens

## **Cancer Immunotherapy**

Immunotherapy is treatment that uses your body's own immune system to help fight cancer. Get information about the different types of immunotherapy and the types of cancer they are used to treat.

## **Stem Cell Transplant for Cancer**

Stem cell transplants, including peripheral blood, bone marrow, and cord blood transplants, can be used to treat cancer. Stem cell transplants are most often used for cancers affecting the blood or immune system, such as leukemia, lymphoma, or multiple myeloma. We'll outline why people need transplants, what stem cells do, and what a transplant is like for most people. We'll also cover some of the issues that come with transplants, and what it's like to donate stem cells.

## **Hyperthermia to Treat Cancer**

Hyperthermia usually is taken to mean a body temperature that is higher than normal. High body temperatures are often caused by illnesses, such as fever or heat stroke. But hyperthermia can also refer to heat treatment – the carefully controlled use of heat for medical purposes. Here, we will focus on how heat is used to treat cancer.

When cells in the body are exposed to higher than normal temperatures, changes take place inside the cells. These changes can make the cells more likely to be affected by other treatments such as radiation therapy or chemotherapy. Very high temperatures can kill cancer cells outright (thermal ablation), but they also can injure or kill normal

cells and tissues. This is why hyperthermia must be carefully controlled and should be done by doctors who are experienced in using it.

Current instruments can deliver heat precisely, and hyperthermia is being used (or studied for use) against many types of cancer.

## Local hyperthermia

Local hyperthermia is used to heat a small area like a tumor. Very high temperatures are used to kill the cancer cells and destroy nearby blood vessels. In effect, this cooks the area that is exposed to the heat. and, as with cooking, the higher the temperature and duration of exposure, the greater the effect seen within tissues. Thermal ablation comprises the treatments where very high temperatures cause irreversible damage to cells whereas smaller rises in temperature constitute mild hyperthermia. Radio waves, microwaves, ultrasound waves, and other forms of energy can be used to heat the area. When ultrasound is used, the technique is called high intensity focused ultrasound, or HIFU, sometimes also referred to as just focused ultrasound. The heat may be applied in different ways:

- **External:** High energy waves are aimed at a tumor near the body surface from a machine outside the body.
- **Internal:** A thin needle or probe is put right into the tumor. The tip of the probe releases energy, which heats the tissue around it.

**Radiofrequency ablation:** Radiofrequency ablation (RFA) is probably the most commonly used type of thermal ablation. It uses high-energy radio waves for treatment. A thin, needle-like probe is inserted into the tumor for a short time, usually about 10 to 30 minutes. The probe is guided into place using ultrasound, MRI, or CT scans. The tip of the probe puts out a high-frequency current that creates very high heat and destroys the cells within a certain area. The dead cells are not removed, but become scar tissue and shrink over time.

RFA is most often used to treat tumors that cannot be removed with surgery or for patients who are not able to go through the stresses of surgery. It can usually be done as an outpatient. RFA may be repeated for tumors that come back or start to grow. It can also be added to other treatments like surgery, radiation therapy,

chemotherapy, hepatic arterial infusion therapy, alcohol ablation, or chemoembolization. RFA can be used to treat tumors up to about 2 inches (5 cm) across. It is most commonly used to treat tumors in the liver, kidneys, and lungs, and is being studied for use in other areas of the body. Long-term outcomes after RFA treatment are not yet known, but early results are encouraging.

## Photodynamic Therapy

Photodynamic therapy (PDT) is a treatment that uses special drugs, called photosensitizing agents, along with light to kill cancer cells. The drugs only work after they have been activated or “turned on” by certain kinds of light. PDT may also be called photoradiation therapy, phototherapy, or photochemotherapy.

Depending on the part of the body being treated, the photosensitizing agent is either put into the bloodstream through a vein or put on the skin. Over a certain amount of

time the drug is absorbed by the cancer cells. Then light is applied to the area to be treated. The light causes the drug to react with oxygen, which forms a chemical that kills the cells. PDT might also help by destroying the blood vessels that feed the cancer cells and by alerting the immune system to attack the cancer.

## **Blood Transfusion and Donation**

Transfusions of blood and blood products temporarily replace parts of the blood when a person's body can't make its own or has lost them from bleeding. Here, we describe blood and its components and why they are important. We also explain how blood is donated and transfused and how this relates to people with cancer.

## **Lasers in Cancer Treatment**

The word LASER stands for Light Amplification by Stimulated Emission of Radiation. Laser light is different from regular light. The light from the sun or from a light bulb has many different wavelengths and spreads out in all directions. Laser light, on the other hand, has a single wavelength and can be focused in a very narrow beam. This makes it both powerful and precise.

Lasers can be used instead of blades (scalpels) for very careful surgical work, such as repairing a damaged retina in the eye or cutting body tissue. They can also be used to heat and destroy small areas (such as some tumors), or to activate light-sensitive drugs.

## **Types of lasers**

Lasers are named for the liquid, gas, solid, or electronic substance that's used to create the light. Many types of lasers are used to treat medical problems, and new ones are being tested all the time. The main types of lasers currently being used in cancer treatment include:

- Carbon dioxide (CO<sub>2</sub>)
- Argon
- Neodymium: yttrium aluminium garnet (Nd:YAG)

Doctors and other health professionals who use these lasers need special training in how to operate and safely handle them.