

# Anti-Angiogenesis

NURSE KIT



# *Evolving Approaches to Cancer Therapy: An Overview*

Advances in cancer treatment, diagnosis and screening have dramatically improved patient care and helped to extend survival. There are now an estimated 10 million Americans living with a history of cancer.

## **Available Cancer Treatments**

Cancer patients today have more treatment options than ever before. Individual treatment regimens are determined for each patient based on the type, location and stage of the cancer.

Today's treatment options include:

- **Surgery**—For many types of cancer, this can offer the best chance for survival; surgery is typically used to remove a tumor, decrease its size or limit discomfort.
- **Radiation**—Uses high-energy rays to kill or shrink rapidly reproducing cancer cells; usually recommended when a tumor has not spread to other parts of the body.
- **Chemotherapy**—Systemic therapy in which anti-cancer drugs are circulated throughout the body and can reach cells that may have metastasized.
- **Immunotherapy**—Aims to stimulate a patient's immune system to work harder naturally or through the use of man-made immune system proteins; used primarily in earlier staged cancers. Over the past few decades, the U.S. Food and Drug Administration (FDA) has approved several immunotherapies for use in specific types of cancers. Research today is focused on the development of cancer vaccines to prevent recurrence.
- **Targeted therapies**—Designed to prevent the growth of tumor cells by interfering with specific proteins or “molecular targets” that are critical to cancer's development and progression. FDA-approved targeted therapies include monoclonal antibodies and some small molecule drugs.

## DIFFERENTIATING CHEMOTHERAPY FROM TARGETED THERAPIES

### Chemotherapy

- Used since the 1950s as a standard method to treat some types of cancer
- Anti-cancer drugs that are circulated throughout the body
- More than 100 different chemotherapy agents exist and are often combined to simultaneously address different aspects of cell growth and division
- Also attacks rapidly dividing healthy cells—such as hair, finger nail, digestive tract and bone marrow cells
- Side effects include nausea following treatment and loss of hair and/or nails

### Targeted Therapies

- New cancer treatments designed to follow a targeted pathway
- Block mechanisms specific to tumor growth and development
- Spare most healthy cells to reach specific molecular targets
- May have fewer, less severe or a different set of side effects than conventional treatments—avoiding some toxicities associated with chemotherapy
- Side effects may include allergic reactions, fever, chills and blood pressure changes

## Combining Treatments

Almost all cancers are treated using more than one approach. Each therapy has its own benefits and side effects, and the use of therapies in combination is helping to advance treatment and improve patient outcomes.

Treatments may be administered before primary treatment such as surgery (neoadjuvant), following primary treatment (adjuvant), or on their own to:

- Reduce the size of the tumor or facilitate subsequent treatment
- Eliminate cancer cells that may remain following surgery or radiation therapy
- Prevent spread of cancer to other parts of the body
- Relieve symptoms of cancer (palliative therapy)

## AN ABBREVIATED HISTORY OF CANCER THERAPY

<b>1600 B.C.</b>	First description of cancer.
<b>1728-1793</b>	John Hunter, a Scottish surgeon, suggests that some tumors may be removed by surgery if they have not invaded nearby tissue.
<b>1838</b>	Johannes Muller, a German pathologist, determines that tumors are made up of cells.
<b>1846</b>	Advent of anesthesia allows broader use of surgery in the treatment of cancer.
<b>1899</b>	First use of radiation to treat cancer.
<b>1940s</b>	Nitrogen mustard, a chemical that causes DNA damage, is shown to have therapeutic activity against lymphoma—setting the stage for development of a broad array of similar chemotherapeutic agents.
<b>1956</b>	First cure of any metastatic cancer using the chemotherapeutic agent methotrexate.
<b>1960</b>	Researchers at Stanford begin using combinations of chemotherapy, radiation and surgery, which would come to define the standard of care for many types of cancer.
<b>1971</b>	U.S. President Richard Nixon declares war on cancer and signs the National Cancer Act, establishing a national cancer research program.
<b>1989</b>	Gene encoding vascular endothelial growth factor (VEGF), a key regulator of new blood vessel formation (angiogenesis), is cloned. This lays the foundation for developing cancer therapies that are designed to inhibit angiogenesis, a process thought to be essential to the growth and survival of tumors.
<b>1990s–present</b>	The age of targeted cancer therapies, which are paving the way for more precise, individualized cancer treatments in a variety of tumor types.
<b>Sources</b>	Abbreviated and adapted from the American Cancer Society's, "The History of Cancer" Stanford University School of Medicine, "Milestones in Cancer Research"



# Anti-Angiogenesis: A New Frontier in Cancer

Targeted therapies are designed to prevent the growth and spread of tumor cells by interfering with specific proteins or “molecular targets” that are critical to the development or progression of cancer. Most targeted cancer therapies affect diverse biochemical pathways that control the development, progression, survival and metastasis of cancer.

Targeted therapies can affect cancer cells in a number of ways, including:

- Inducing cells to “commit suicide” (apoptosis)
- Blocking pathways that support cell survival
- Inhibiting human growth factors that help cancer cells multiply and divide
- Preventing formation of new blood vessels necessary to support tumor growth (angiogenesis)

## Angiogenesis (an-jee-o-JEN-uh-sis)

Latin, from Greek *angei-*, *angeio-*, vessel or blood vessel, and *Genesis-*, origin or birth

1. the process by which the body grows new blood vessels

Angiogenesis is a natural process that normally occurs during wound healing and provides the oxygen and nutrients necessary to support the repair and growth of new cells. Angiogenesis is thought to play an important role in the growth and progression of many solid tumors. Tumor angiogenesis enables cancer cells to recruit their own network of blood vessels, which provides the oxygen and nutrients necessary for growth. Eventually, new capillaries invade and surround the tumor, creating an environment that supports the proliferation, or spread, of cancer cells.

## Anti-Angiogenesis

Through targeted therapies, researchers are looking into ways to interrupt and overcome the natural process of angiogenesis, resulting in a process known as anti-angiogenesis. Anti-angiogenic agents are currently being studied in clinical trials for their effect on multiple types of cancer, including brain, breast, lung, ovarian, pancreatic and prostate. Anti-angiogenic treatments have already been approved for certain types of colorectal, kidney and stomach cancers.

## TYPES OF TARGETED THERAPIES

- **Monoclonal Antibodies**  
Recognize and attach to specific proteins or receptors on the outside of the cell or on its surface — interrupting signals that drive tumor growth
- **Enzyme Inhibitors**  
Inhibit the action of a group of enzymes called kinases, which make biologic processes happen faster and relay signals to the nucleus of a cell
- **Proteasome Inhibitors**  
Stop the break down of proteins inside cancer cells that are necessary for growth and survival
- **Angiogenesis Inhibitors**  
Prevent the formation of new blood vessels to support tumor growth and metastasis

## Anti-Angiogenesis: A Fragile Balance

The initiation of angiogenesis creates new blood vessels that are thought to facilitate the rapid growth and metastasis of tumor cells. This process is dependent on the balance of proangiogenic factors—those that stimulate blood vessel growth—and anti-angiogenic factors, which inhibit such growth. For angiogenesis to occur, proangiogenic factors must outweigh anti-angiogenic factors.

Anti-angiogenesis attempts to restore this balance by inhibiting the growth of new blood vessels and eliminating newly formed vessels.

## VEGF in Tumor Growth

One type of proangiogenic factor is VEGF, or vascular endothelial growth factor. In the context of cancer, this protein is released by tumor cells and is an important therapeutic target to prevent or slow tumor progression. When secreted, VEGF triggers angiogenesis and binds to specific receptors on nearby vessel endothelial cells. It is thought that tumors need this independent blood supply to grow beyond two millimeters.

Newly developed blood vessels—the lifeline of the tumor—are dependent on the presence of VEGF for their survival and growth. Without these blood vessels, the tumor no longer has a sustained mechanism to get the nutrients and oxygen needed to survive and grow. VEGF may also increase vascular density, diameter and permeability. These are changes that may help support the tumor.



**PHASE 1:** As a tumor begins to develop, it needs a constant blood supply to help it grow bigger than the size of a pea. To help it grow, the tumor releases substances called growth factors.

**PHASE 2:** These substances cause new blood vessels to “sprout” toward the tumor, providing nutrients and a steady blood supply. VEGF, or vascular endothelial growth factor, is one of the most common and powerful growth factors a tumor can release.

**PHASE 3:** The growth factors, such as VEGF, attach to blood vessels at a certain place called a receptor. The blood vessels understand these signals and begin to grow toward the tumor.

**PHASE 4:** The blood vessels grow into and around the tumor, supporting its growth, development and spread.

**PHASE 5:** Developments in science have led to the discovery of anti-angiogenic agents. Anti-angiogenic agents are designed to prevent the growth of new blood vessels, “starving” the tumor of nutrients.

## ONGOING INVESTIGATION OF INNOVATIVE THERAPIES

In clinical trials in the United States, Europe, Australia and other countries, more than 40 anti-angiogenic agents are being studied to treat a variety of cancers. Some are being studied in combination with conventional therapies, such as chemotherapy, while others are being administered alone or in concert with other targeted therapies. Researchers hope to find multiple new applications for these anti-angiogenic agents in other cancer types, including:

- brain
- breast
- lung
- ovarian
- pancreatic
- prostate

## BIOLOGICS: HOW ARE THEY MADE?

Unlike traditional drug products, which are made from synthetic chemicals, the development of biologic treatments involves using proteins. Living cells, either bacteria or more complex mammalian cells, are genetically altered so that they serve as mini factories, producing the desired protein. Avastin, for example, is manufactured from Chinese hamster ovary cells. E. coli is another organism commonly used to produce biologics.

Because there are several complex and time-consuming steps involved, the process of manufacturing biologic medicines can take several months to complete. Scientists start with a small supply of medicine-producing cells called “starter” cells. These cells are cultivated and grown to larger quantities, also called “scaling-up.” The multiplying cells are monitored continuously in holding tanks where they secrete the desired protein. These proteins are later extracted and purified. Once the bulk proteins are deemed pure and active, they are dispensed into small, sterile vials and freeze-dried. The final product undergoes several more months of exhaustive testing before it is considered acceptable for release as a biologic treatment.

Because living materials are so delicate and sensitive to heat, light and storage methods, biologics must undergo a series of stringent tests throughout their development to ensure their purity and consistency with the original target antibody.

# Talking with Patients

# Talking to Patients about Anti-Angiogenic Agents

The process of angiogenesis and the science behind anti-angiogenic agents is complex and can often be difficult for patients to understand. Patients and their families may lack the medical knowledge to fully understand how targeted therapies differ from traditional cancer treatments. They may also be under emotional and cognitive strain as they manage their cancer diagnosis.

Oncology nurses play a pivotal role in a patient and family's experience with cancer, and they can help set patients' minds at ease throughout their course of treatment. Patients sometimes feel most comfortable confiding in their nurse about concerns and may view them as a resource for unanswered questions. Consequently, nurses need to be equipped with the latest treatment information to ensure patients are well-informed.

The following frequently asked questions and communication tips may be useful as you talk with your patients about anti-angiogenic agents and other cancer treatments.

## FREQUENTLY ASKED QUESTIONS FROM PATIENTS AND CAREGIVERS

### **Q: How are anti-angiogenic agents different from radiation and/or chemotherapy?**

A: Radiation and chemotherapy attack rapidly dividing cells, such as tumor cells, the healthy cells involved in hair growth and cells that line the digestive tract. This is why they fight cancer but also explains some side effects like hair loss and nausea. In contrast, anti-angiogenic agents block mechanisms specific to cancer cell formation, including the growth of new blood vessels.

### **Q: How do anti-angiogenic agents work?**

A: Tumors need an independent blood supply to grow beyond the size of a pea, so they will try to make the body sprout new blood vessels. The process of growing new blood vessels is called angiogenesis. Anti-angiogenic agents are thought to work by stopping the growth of these new blood vessels. This process "starves" the tumor of blood and nutrients essential for growth. Without new blood vessels, tumors cannot survive or spread.

### **Q: How and when are anti-angiogenic agents used?**

A: Several anti-angiogenic therapies are approved for use alone or in combination with chemotherapy, depending on the type and stage of a patient's cancer.

Anti-angiogenic agents are a relatively new class of cancer medicines and are still being studied, but researchers believe that they:

- May have fewer, less severe or a different set of side effects given their targeted nature
- Can be used in combination with other therapies
- Attack specific proteins associated with cancer cell growth and may spare healthy cells

**Q: Do anti-angiogenic agents have any side effects?**

A: All cancer treatments have side effects, which vary from person to person and drug to drug. Side effects that may be seen with anti-angiogenic inhibitors include allergic reactions, fatigue, fever, chills, headaches, diarrhea, rash and changes in blood pressure. Bleeding and infection have also been reported as side effects. In rare cases, serious side effects including gastrointestinal perforation, an increased risk of bleeding and cardiovascular problems have been reported.

Because they work differently than chemotherapy drugs, anti-angiogenic agents are less likely to cause typical side effects like nausea and hair loss.

This is not a complete list of side effects. A patient should talk with his/her health care team for more information about anti-angiogenic agents.

**Q: When should a patient consider an anti-angiogenic agent?**

A: Anti-angiogenic treatments are approved for use in a number of cancer types, including certain types of colorectal, kidney and stomach cancers. Clinical trials are currently underway to study anti-angiogenic agents in other types of cancer. As always, it is important for a patient to talk with his/her health care team about specific treatment options.

Clinical trials offer the newest in treatment options being studied, as well as closely supervised medical care. Patients should consult with their health care team to discuss whether this option is appropriate for them. Clinical trial resources are available from the Cancer Research and Prevention Foundation at [www.preventcancer.org](http://www.preventcancer.org) or the Coalition of Cancer Cooperative Groups at [www.CancerTrialsHelp.org](http://www.CancerTrialsHelp.org).

## **Helpful Tips in Communicating with Patients**

- ✓ Keep it simple—limit technical medical terminology
- ✓ Use conversational language and descriptive examples
- ✓ Put a patient's cancer diagnosis and treatment into context
- ✓ Actively involve patients in discussions about their cancer treatment

# Clinical Trials

# Talking to Patients about Clinical Trials

Clinical trials hold great promise in the treatment of cancer, yet many patients have limited knowledge about participation and what it means for them. Clinical trials not only offer participants the best possible standard of care and access to cutting-edge treatments, but they have also dramatically advanced cancer care and clinical outcomes.

Nurses on the front lines of cancer care are uniquely positioned to help educate patients about clinical trials.

Research shows that patients are more likely to consider entering a clinical trial when their health care provider:

- Provides a clear explanation of the benefits and risks of trial participation
- Acknowledges and is responsive to their concerns
- Suggests helpful resources

## Helping Patients Understand Clinical Trials

Before a new cancer treatment method is approved and made available to the public, it must first go through the clinical trial process. In this setting, health care professionals are able to comprehensively determine the safety and relative effectiveness of a new treatment approach compared to the accepted standard of care. Today's cancer treatments are the result of earlier clinical trials. Clinical trials are also used to evaluate surgical procedures, prevention and screenings.

## Clinical Trial Phases

New cancer treatments typically go through three distinct phases of research. If a new drug is found to be effective and/or safe in Phase III, it is submitted for FDA approval. In certain cases, a drug may also be submitted for FDA approval earlier than Phase III if studies show clear patient benefit. If approved, the drug may continue to be studied in a larger patient population (Phase IV).

### PHASE I: IS IT SAFE?

- Involves a small group of people, sometimes as few as 20
- Conducted to find a safe dosage and learn how a drug affects the body

### PHASE II: DOES IT WORK?

- Enrolls a larger group of patients; number of participants vary from trial to trial
- Looks at whether a drug is active against a certain kind of cancer and how it affects the body

### PHASE III: HOW DOES IT COMPARE?

- Enrolls more than 100 people, sometimes thousands
- Compares new treatment with current standards

## Phase III Comparisons

Participants are selected if they meet specific criteria (e.g., cancer type and stage, age, gender, weight) and are then randomly assigned to receive the drug under investigation (the intervention group) or the accepted standard treatment (the control group). Some trials will include a placebo along with the standard treatment arm. In addition, Phase III trials may have more than just two arms and compare multiple treatments. The groups are comparable for nearly all criteria in order to reduce bias and to ensure study outcomes are due to the treatment regimen, not chance or other factors. Dosing and duration of treatments are closely controlled and monitored.

## WHAT PATIENTS WANT TO KNOW

### Reasons to participate in a clinical trial

There are many reasons to take part in a clinical trial, namely: access to either the best standard of care or a promising new treatment, close monitoring by the treatment team, and the opportunity to help advance cancer knowledge and treatments for future patients.

### Enrolling in a trial

Patients must first meet the eligibility criteria for the study. Researchers usually select participants based on their specific cancer type and stage (e.g., metastatic colorectal cancer). Age, previous cancer treatments and/or gender may also be important. The research team can help potential participants learn as much as possible about the study; its purpose and the potential benefits and risks; how long it is expected to last; and to determine if enrolling might be an option for them. A patient's personal and medical information will be kept confidential.

### Committing to a clinical trial

Clinical trial participants are given individual attention and followed very closely by the treatment team. This may mean more frequent appointments with the researchers as well as the patient's primary doctor. These appointments, along with additional medical tests and screenings, give participants the advantage of close monitoring of progress and overall health, throughout the trial and beyond. Participation in a clinical trial is voluntary, so a patient can change his or her mind at any point for any reason.

### How a trial is conducted

Depending on the trial, patients may receive care at a large cancer center, a university or local hospital, medical center or a physician's office.

Wherever the clinical trial is conducted, strict federal guidelines regulate clinical trials by requiring independent committees, called Institutional Review Boards (IRBs), to oversee the trial. Each study has an action plan, also called a "protocol," that includes information such as the purpose of the study; number of patients to be enrolled; what medical tests to expect and for how often (duration and frequency); and other details. IRBs approve the protocol and ensure that participants are not exposed to any unnecessary risks. Participants also are provided with "informed consent," which is how researchers provide explanations and updates about the trial, allowing participants to make informed decisions about entering a study. To give their informed consent, patients sign a document that details the study and their rights.

# Cancer Resources

# Cancer Resources

## American Cancer Society (ACS)

ACS is a nationwide, community-based voluntary health organization devoted to fighting all types of cancer.

[www.cancer.org](http://www.cancer.org)

(800) ACS-2345

## CancerCare

CancerCare, a national non-profit organization, provides free professional support services to anyone affected by cancer.

[www.cancercare.org](http://www.cancercare.org)

(800) 813-HOPE or (212) 712-8400

## Cancer Research and Prevention Foundation (CRPF)

CRPF is dedicated to the prevention and early detection of cancer through scientific research and education.

[www.preventcancer.org](http://www.preventcancer.org)

(800) 227-2732 or (703) 836-4412

## Coalition of Cancer Cooperative Groups (CCCG)

CCCG offers a variety of programs and information for clinicians and patients, including TrialCheck®, an online tool designed to help patients and professionals locate cancer clinical trials.

[www.CancerTrialsHelp.org](http://www.CancerTrialsHelp.org) (patients)

[www.TrialCheck.org](http://www.TrialCheck.org) (professionals)

(877) 520-4457

## National Cancer Institute (NCI)

NCI is a component of the National Institutes of Health and the federal government's principal agency for cancer research and training.

[www.cancer.gov](http://www.cancer.gov)

(800) 4-CANCER

## National Coalition for Cancer Survivorship (NCCS)

NCCS is a survivor-led advocacy organization that speaks out on issues related to quality cancer care.

[www.canceradvocacy.org](http://www.canceradvocacy.org)

(877) 622-7937 or (301) 650-9127

## National Institutes of Health (NIH)

NIH is the primary federal agency for conducting and supporting medical research. The agency also provides updated information about federally and privately supported clinical research through its Web site.

[www.clinicaltrials.gov](http://www.clinicaltrials.gov)

(800) 4-CANCER

### People Living With Cancer (PLWC)

PLWC is the patient information Web site of the American Society of Clinical Oncology (ASCO). It features oncologist-approved resources and educational information to help patients through cancer diagnosis and treatment.

**[www.plwc.org](http://www.plwc.org)**

(888) 651-3038

### The Wellness Community (TWC)

TWC provides psychological and emotional support and education to patients, family members and health care providers in all cancer communities.

**[www.wellness-community.org](http://www.wellness-community.org)**

(888) 793-WELL or (202) 659-9709

### U.S. Food and Drug Administration (FDA) Cancer Liaison Program

The Cancer Liaison Program works with FDA's oncology medical division to bring the patient advocate's perspective into the review of new drugs to treat cancer.

**[www.fda.gov/oashi/cancer/cancer.html](http://www.fda.gov/oashi/cancer/cancer.html)**

(888) INFO-FDA or (301) 827-4460

## Resources for Most Commonly Diagnosed Cancers

### Breast Cancer

#### Y-ME National Breast Cancer Organization (Y-ME)

Y-ME works to ensure, through information, empowerment and peer support, that no one faces breast cancer alone.

**[www.y-me.org](http://www.y-me.org)**

(800) 221-2141 (English) or (800) 986-9505 (Spanish)

#### Young Survival Coalition (YSC)

YSC is the only international, non-profit network of breast cancer survivors and supporters dedicated to the concerns and issues unique to young women with breast cancer.

**[www.youngsurvival.org](http://www.youngsurvival.org)**

(212) 206-6610

## Colorectal Cancer

### Colon Cancer Alliance (CCA)

CCA is an organization of colorectal cancer survivors, their families, caregivers, people genetically predisposed to the disease and members of the medical community who are dedicated to patient support, advocacy and education.

**[www.ccalliance.org](http://www.ccalliance.org)**

(877) 422-2030

### Colorectal Cancer Coalition (C3)

C3 works to increase colon cancer awareness and research through patient advocacy.

**[www.c-three.org](http://www.c-three.org)**

(202) 244-2906

## Kidney Cancer

### Action to Cure Kidney Cancer (ACKC)

ACKC is a grassroots organization established by kidney cancer patients and their families to raise awareness of the disease and to ensure that it receives the public and private funding required to find a cure.

**[www.ackc.org](http://www.ackc.org)**

(212) 615-6404

### Kidney Cancer Association (KCA)

KCA helps fund, promote and collaborate on research projects with the National Cancer Institute (NCI), the American Urological Association (AUA) and other institutions, while serving as an advocate on behalf of patients.

**[www.curekidneycancer.org](http://www.curekidneycancer.org) or [www.kidneycancer.org](http://www.kidneycancer.org)**

(800) 850-9132

## Lung Cancer

### Lung Cancer Alliance (LCA)

LCA works to educate public policy leaders of the need for greater resources for lung cancer research while changing the face of lung cancer and reducing its stigma.

**[www.lungcanceralliance.org](http://www.lungcanceralliance.org)**

(800) 298-2436 or (202) 463-2080

### **LungCancerOnline.org (LCOF)**

LCOF seeks to improve the quality of care and quality of life for people with lung cancer by funding lung cancer research and providing information to patients and families.

**[www.lungcanceronline.org](http://www.lungcanceronline.org)**

## **Lymphoma**

### **Leukemia & Lymphoma Society (LLS)**

LLS is the world's largest voluntary health organization dedicated to funding blood cancer research, education and patient services.

**[www.leukemia-lymphoma.org](http://www.leukemia-lymphoma.org)**

(800) 955-4572

### **Lymphoma Research Foundation (LRF)**

LRF is the nation's largest lymphoma-focused voluntary health organization devoted exclusively to funding lymphoma research and providing patients and health care professionals with critical information on the disease.

**[www.lymphoma.org](http://www.lymphoma.org)**

(800) 500-9976 or (310) 204-7040

## **Prostate Cancer**

### **National Prostate Cancer Coalition (NPCC)**

NPCC is dedicated to reducing the burden of prostate cancer on men and their families through awareness, outreach and advocacy.

**[www.fightprostatecancer.org](http://www.fightprostatecancer.org)**

(888) 245-9455 or (202) 463-9455

### **Prostate Cancer Foundation (PCF)**

PCF is the world's largest philanthropic source of support for prostate cancer research, with the goal of finding better treatments and a cure for recurrent prostate cancer.

**[www.prostatecancerfoundation.org](http://www.prostatecancerfoundation.org)**

(800) 757-2873 or (310) 570-4700

# Glossary of Terms

# Glossary of Terms

The following are commonly used terms in cancer diagnosis and treatment. Even though many of these terms are understandable for nurses, the definitions below may help a patient better understand his or her diagnosis.

**Adjuvative Therapy:**

Treatment used with the primary treatment to assist the action of the primary treatment.

**Adjuvant Therapy:**

Treatment given after the primary treatment to increase the chances of a cure. Adjuvant therapy may include chemotherapy, radiation therapy, hormone therapy or biological therapy.

**Angiogenesis:**

Blood vessel formation. Tumor angiogenesis is the growth of blood vessels from surrounding tissue to a solid tumor. This is caused by the release of chemicals by the tumor.

**Anti-Angiogenesis:**

Prevention of the growth of new blood vessels.

**Anti-Angiogenic Factor:**

A substance that inhibits blood vessel growth.

**Anti-Angiogenic Agent:**

A substance that prevents the formation of new blood vessels. In cancer therapy, an anti-angiogenic agent prevents the growth of blood vessels, starving tumors and inhibiting their ability to grow. Also known as angiogenesis inhibitor.

**Avascular Tumor:**

An abnormal mass of tissue that does not have a blood supply.

**Benign:**

Not cancerous. Benign tumors may grow larger but do not spread to other parts of the body.

**Cancer:**

A term for diseases in which abnormal cells divide without control. Cancer cells can invade nearby tissues and spread through the bloodstream and lymphatic system to other parts of the body. There are several main types of cancer. Carcinoma is cancer that begins in the skin or in tissues that line or cover internal organs. Sarcoma is cancer that begins in the bone, cartilage, fat, muscle, blood vessels, or other connective or supportive tissue. Leukemia is cancer that starts in blood-forming tissue such as the bone marrow, and causes large numbers of abnormal blood cells to be produced and enter the bloodstream. Lymphoma and multiple myeloma are cancers that begin in the cells of the immune system.

**Cell:**

The individual unit that makes up the tissues of the body. All living things are made up of one or more cells.

**Chemotherapy:**

Treatment that damages cancerous cells, causing them to stop dividing. Chemotherapy also affects normally dividing cells in the body, such as those in the skin, digestive tract and blood.

**Colon:**

The longest part of the large intestine, which is a tube-like organ connected to the small intestine at one end and the anus at the other. The colon removes water and some nutrients and electrolytes from partially digested food. The remaining material, solid waste called stool, moves through the colon to the rectum and leaves the body through the anus.

**Colonoscopy:**

An examination of the inside of the colon using a thin, lighted tube, called a colonoscope, inserted into the rectum. Samples of tissues may be collected for examination under a microscope.

**Combination Therapy:**

Treatment using more than one anti-cancer drug.

**Complete Response:**

The disappearance of all signs of cancer in response to treatment. This does not always mean the cancer has been cured. Also called complete remission.

**Cryosurgery:**

Treatment performed with an instrument that freezes and destroys abnormal tissues. This procedure is a form of cryotherapy.

**Debulking Surgery:**

An operation to remove as much cancer as possible so that it is more responsive to chemotherapy.

**Double-Blind:**

A clinical trial in which neither the medical staff nor the person knows which of several possible therapies the person is receiving.

**Early-Stage Disease:**

Early cancer that has not spread to neighboring tissue.

**External Beam Radiation:**

Radiation therapy that uses a machine to aim high-energy rays at the cancer. Also called external radiation.

**First-Line Therapy:**

The first therapy given for a condition or a disease.

**Growth Factors:**

Substances made by the body that regulate cell division and cell survival. Some growth factors are produced in the laboratory and used in biologic therapy.

**Hormone Therapy:**

Treatment that adds, blocks or removes hormones. For certain conditions (such as diabetes or menopause), hormones are given to adjust low hormone levels. To slow or stop the growth of certain cancers (such as prostate and breast cancer), synthetic hormones or other drugs may be given to block the body's natural hormones. Sometimes surgery is needed to remove the gland that makes a certain hormone. Also called hormonal therapy, hormone treatment or endocrine therapy.

**Induction Therapy:**

Treatment designed to be used as a first step toward shrinking the cancer and in evaluating response to drugs and other agents. Induction therapy is followed by additional therapy to eliminate any remaining cancer.

**Informed Consent:**

A process in which a person learns key facts about a clinical trial, including potential risks and benefits, before deciding whether or not to participate in a study. Informed consent continues throughout the trial.

**Intestinal Polyps:**

A growth that projects from the lining of the colon or rectum (usually on a stalk).

**Ionizing Radiation:**

A type of radiation made (or given off) by x-ray procedures, radioactive substances, rays that enter the Earth's atmosphere from space and other sources. At high doses ionizing radiation increases chemical activity inside cells and can lead to health risks, including cancer.

**Ions:**

Ions are electrically charged atoms that can cause cell death or a genetic change that inhibits cell growth or proliferation. Ions are produced in cancer cells by radiation therapy.

**Lymph Node:**

A rounded mass of lymphatic tissue that is surrounded by a capsule of connective tissue. Lymph nodes filter lymphatic fluid, and they store lymphocytes (white blood cells).

**Malignant:**

Cancerous. Malignant tumors can invade and destroy nearby tissue and spread to other parts of the body.

**Median Survival:**

In a clinical trial, the time from either diagnosis or treatment at which half of the patients with a given disease are found to be, or expected to be, still alive. Median survival time is one way to measure the effectiveness of a treatment.

**Metastatic:**

Having to do with metastasis, which is the spread of cancer from one part of the body to another.

**Monoclonal Antibodies:**

Laboratory-produced substances that can locate and bind to substances in the blood or cells, including cancer cells, throughout the body. Many monoclonal antibodies are used in cancer detection or therapy; each one recognizes a different protein on certain cancer cells. Monoclonal antibodies can be used alone, or they can be used to deliver drugs, toxins or radioactive material directly to a tumor.

**Neoadjuvant Therapy:**

Treatment given before the primary treatment. Examples of neoadjuvant therapy include chemotherapy, radiation therapy and hormone therapy.

**Palliative Therapy:**

Treatment given to relieve the symptoms and reduce the suffering caused by cancer and other life-threatening diseases. Palliative cancer therapies are given together with other cancer treatments, from the time of diagnosis, through treatment, survivorship, recurrent or advanced disease and at the end of life.

**Partial Response:**

A decrease in the size of a tumor or the amount of cancer in the body in response to treatment. Also called partial remission.

**Proangiogenic Factor:**

A substance that stimulates blood vessel growth.

**Progression-Free Survival:**

Progression-free survival, or PFS, is a measure used to assess the effectiveness of treatment and refers to a patient staying alive without their disease getting worse.

**Prophylactic Radiation Therapy:**

Radiation given to areas of the body that do not have evidence of cancer in order to prevent cancer cells from growing.

**Radiation Therapy:**

The use of high-energy radiation from x-rays, gamma rays, neutrons and other sources to kill cancer cells and shrink tumors. Radiation may come from a machine outside the body (external-beam radiation therapy), or it may come from radioactive material placed in the body near cancer cells (internal radiation therapy, implant radiation or brachytherapy). Systemic radiation therapy uses a radioactive substance, such as a radiolabeled monoclonal antibody, that circulates throughout the body. Also called radiotherapy.

**Rectum:**

The last several inches of the large intestine. The rectum ends at the anus.

**Recurrence:**

Cancer that has returned after a period of time during which the cancer could not be detected. The cancer may come back to the same place as the original (primary) tumor or to another place in the body. Also called recurrent cancer.

**Refractory:**

Cancer that does not respond to treatment.

**Relapse:**

The return of signs and symptoms of cancer after a period of improvement.

**Second-Line Treatment:**

Treatment that is given when initial treatment (first-line therapy) does not work or stops working.

**Small Molecule (Drugs):**

Drug substances that have a low molecular weight. Small molecules penetrate cell membranes and the blood/brain barrier more easily than larger molecular weight compounds such as proteins, peptides and carbohydrates. They can usually be administered orally.

**Standard Therapy:**

In medicine, treatment that experts agree is appropriate, accepted and widely used based on the results of past research and FDA approval. Also called standard of care or best practice.

**Survival Rate:**

The percentage of people in a study or treatment group who are alive for a given period of time after diagnosis. This is commonly expressed as 5-year survival rate, but can be measured in any time increment.

**Systemic Therapy:**

Treatment using substances that travel through the bloodstream, reaching and affecting cells all over the body.

**Targeted Therapy:**

A type of treatment that uses drugs or other substances to identify and attack specific cancer cells. A monoclonal antibody is a type of targeted treatment.

**Third-Line Treatment:**

Treatment that is given when both initial treatment (first-line therapy) and subsequent treatment (second-line therapy) does not work or stops working.

**Tumor:**

An abnormal mass of tissue that results when cells divide more than they should or do not die when they should. Tumors may be benign (not cancerous) or malignant (cancerous). Also called neoplasm.

**Vascular Endothelial Growth Factor (VEGF):**

A substance made by cells that stimulates new blood vessel formation.

**5-FU:**

A drug that is used in the treatment of cancer. It belongs to the family of chemotherapy drugs called antimetabolites. Also called fluorouracil.

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