IMMUNOTHERAPY for the treatment of LUNG CANCER
THANKS

The Society for Immunotherapy of Cancer (SITC) is the world’s leading member-driven organization specifically dedicated to improving cancer patient outcomes by advancing the science and application of cancer immunotherapy. Established in 1984, SITC, a 501(c)(3) not-for-profit organization, serves scientists, clinicians, academicians, patients, patient advocates, government representatives and industry leaders from around the world. Through educational programs that foster scientific exchange and collaboration, SITC aims to one day make the word “cure” a reality for cancer patients everywhere.
Understanding the immune system’s role in treating lung cancer

Immunootherapy was approved in 2015 to treat advanced lung cancer. It is very different from other types of cancer treatment because it uses the body’s own immune system to recognize and attack cancer cells that have been hiding and targets them for destruction. Immunotherapy is a systemic treatment, which means the drugs travel through your bloodstream to all parts of your body to kill cancer cells or keep them from dividing. This guide explains lung cancer, the immune system, immunotherapy and ways to help manage your treatment.

Learning you have lung cancer is life-changing. Give yourself time to digest the news, and then focus on learning as much as you can about your exact diagnosis. Knowing key information, including stage and any biomarkers, will better prepare you to make well-informed decisions with your doctor. If you’re unsure of your specific diagnosis, have your doctor or nurse navigator write it down for you, and be sure to ask about any medical terms you don’t understand.

EXPLAINING LUNG CANCER

Your lungs are a pair of large, spongy, expandable organs in your chest cavity that are surrounded by a thin layer of protective tissue (pleura). The right lung is a little larger with three parts (lobes), and the left lung has only two (see Figure 1). When you inhale, your lungs absorb oxygen, which is then delivered to the rest of your body. When you exhale, your lungs rid the body of carbon dioxide. Your diaphragm helps your lungs expand and contract when you breathe.

Lung cancer often begins in the lining of the airways when abnormal cells grow out of control, dividing faster and living longer than normal cells. Over time, these cancerous cells accumulate to form a tissue mass (primary tumor). Left untreated, a primary tumor may grow into the pleura and form secondary tumors nearby. The cancer cells can eventually crowd out the normal cells to make breathing increasingly difficult.

In advanced disease, lung cancer cells may break away to form tumors in the opposite lung and distant sites such as the liver, brain or bones. These are known as metastases. Regardless of location, the metastases are still considered lung cancer and are treated as such.

Your doctor will analyze the cancer cells in a biopsy specimen or fluid taken from the lung or elsewhere to define the type of lung cancer, which will help guide treatment decisions.

Adenocarcinoma is the most common subtype diagnosed, especially in never smokers. It generally begins in the mucus-producing cells in the more distal (those that are farthest away) airways. Because it tends to grow more slowly than other types of lung cancer, adenocarcinoma is slightly more likely to be found before it spreads. Adenocarcinomas tend to develop in the peripheral lung and spread to distant sites more often than other types except for small cell lung cancer.

Squamous cell lung cancer (epidermoid carcinoma) is the second most common and starts in the early versions of squamous cells, the thin, flat cells that line the more central airways in the lungs. It most often develops in smokers and in the central lung. It spreads to distant sites less often than adenocarcinomas.

Large cell lung cancer can develop anywhere in the lungs and tends to grow and spread quickly. When it includes neuroendocrine features, it may behave and be treated like small cell lung cancer.

Adenocarcinoma and squamous cell and large cell lung cancers are sometimes collectively referred to as non-small cell lung cancer (NSCLC), which accounts for the majority of lung cancer diagnoses. Each type has distinct characteristics and responses to treatment, which makes it important for your doctor to determine the specific type.

Small cell lung cancer (SCLC), named for its appearance under a microscope, often starts in the central airways (bronchi) in the center of the chest. An aggressive form of lung cancer, it most often spreads to distant parts of the body before it is found. SCLC cells may secrete proteins that cause symptoms such as neurologic weakness or abnormalities in blood electrolytes.

WHAT IS THE IMMUNE SYSTEM?

To understand how your immune system can be used to fight cancer, it’s helpful to know it’s a complex network of cells, molecules, organs and lymph tissues working together to defend the body against bacteria, cancer cells and other microscopic invaders.

Its first job is to distinguish between what is part of the body (self) and what is not (non-self). Once it determines that a cell is non-self, or foreign, to the body, it begins a series of reactions to identify, target and eliminate the non-self cells (see Figure 2, page 2).

The lymphatic system, which is made up of lymph nodes, the spleen, thymus, adenoids and tonsils, is a driving force in the immune system. Lymph, a clear fluid, collects and filters bacteria, viruses, toxins and chemicals known as antigens as it circulates in the lymphatic system and bloodstream. Lymph nodes are located throughout the body, with large concentrations near the chest, abdomen, groin, pelvis, underarms and neck.

Lymph contains lymphocytes, a type of white blood cell that attacks infectious agents. Lymphocytes begin in the bone marrow and develop from lymphoblasts (immature cells found in bone marrow). The two main types of lymphocytes are B-lymphocytes (B-cells) and T-lymphocytes (T-cells).

B-cells develop in the bone marrow and mature into either plasma cells or memory cells. Plasma cells make antibodies to fight germs and infection. Memory B-cells help the immune system remember which antigens attacked the body so it can recognize them and respond if they return.

T-cells also develop in the bone marrow and mature into four types: helper, killer, regulatory and memory T-cells. Each responds to non-self antigens in different ways.

SITC Guidelines: The Society for Immunotherapy of Cancer (SITC) offers guidelines for medical professionals regarding the recommended use of immunotherapy treatment and immune-related adverse event management. Guidelines for lung cancer and several others are currently available at www.sitcancer.org/guidelines
HOW THE IMMUNE SYSTEM ELIMINATES CANCER
An immune response begins when B-cells and helper T-cells identify a non-self antigen and tell the rest of the immune system. The body then ramps up its production of T-cells to fight and destroy the antigen.

The immune system uses the same process to recognize and eliminate cancer, but the process is more complicated. Cancer cells are created by the body, so the normal ways to find and fight invading cells aren’t always effective. The immune system may have difficulty identifying cancer cells as non-self. It may still see them as part of the body and not coordinate an attack. If the body can’t tell the difference between tumor cells and normal cells, the tumor cells may be able to hide from the immune system.

Additionally, cancer cells can change and use multiple methods to escape or confuse the immune system. One way is to produce proteins on their surface to hide from the immune system, like camouflage. Another is to create their own messengers (cytokines), which means that the cancer cells can communicate and confuse other immune cells. This allows the cancer to take control of certain parts of the process that the body uses to regulate the immune response. This means that even if the immune system recognizes the cancer, it may not be able to successfully start or maintain an attack long enough to kill the cancer cells.

The longer the cancer cells face a weakened immune response, the more they’re able to adapt, and the easier it is for them to manipulate immune cells inside the tumor’s location, sometimes called the tumor microenvironment area. Immunotherapy offers the immune system reinforcements to keep up its fight.

IMMUNOTHERAPY: YOUR POTENTIAL TREATMENT PATH
You may be a candidate for immunotherapy if you meet certain criteria. If you have a pre-existing autoimmune disorder, be sure to discuss it with your doctor (see Molecular Testing, page 7).

It’s important to note that immunotherapy is not effective for every person, even if it is approved for that person’s cancer type. Doctors and scientists are involved in clinical trials to learn why, as well as to improve existing therapies and develop new ones.

Biomarker testing may be a requirement, particularly in clinical trials, because some types of immunotherapy are approved to treat cancers in people who have specific biomarkers. This helps doctors recommend immunotherapy only to patients who are most likely to respond. One test determines how many of your cancer cells express a protein called programmed death-ligand 1 (PD-L1). If there is a large amount of these proteins, immunotherapy alone may be used. If there are fewer, chemotherapy combined with immunotherapy may be used.

Depending on the cancer’s type and stage and unique characteristics, such as previous treatments, age and general health, your doctor may select immunotherapy alone or combined with one of the following therapies.
• Surgery is the removal of the tumor and some surrounding normal tissue.
• Chemotherapy involves drugs to stop the growth of or directly kill cancer cells throughout the whole body. How it is given depends on the type and stage of the cancer.
• Radiation therapy uses high-energy X-rays or other types of radiation to kill cancer cells or stop them from growing.
• Targeted therapy involves drugs or other substances designed to attack cancer cells directly by targeting a specific abnormal gene or protein. Molecular (targeted) therapies are most often used in adenocarcinomas because molecular abnormalities are most common in this type of lung cancer.
• Clinical trials may involve immunotherapy and/or other treatment types.

IMMUNE SYSTEM
Antibody: A protein B-cells make in response to antigens (foreign substances such as bacteria, viruses and toxins).
Antigen: Any substance that triggers an immune response. Bacteria, viruses, toxins, abnormal proteins in cancer cells and chemicals are all antigens.
B-cell: A type of immune cell that makes antibodies and other proteins to mark specific foreign substances for other immune cells to destroy. A B-cell is a type of lymphocyte or white blood cell.
Immune cells: White blood cells in the immune system that help defend against cancer, infectious disease and other threats to the many cells and tissues in the body.
Immune checkpoint inhibitor: A type of immunotherapy that blocks certain proteins or receptors some immune cells make to turn off an immune response. In effect, these inhibitors “release the brakes” on the immune system so T-cells can destroy cancer cells unchecked.

GLOSSARY
Immune-related adverse events (irAEs): The immune system’s overreaction to immunotherapy. In rare cases, irAEs can rapidly become life-threatening without medical attention.
Lymphocyte: A type of immune cell (white blood cell) in lymph tissue and blood. The main types are B-lymphocytes (B-cells) and T-lymphocytes (T-cells), which both help the immune system fight cancer and infections.
PD-1 (programmed cell death-1): A receptor that binds with another protein (PD-L1) to help keep the body’s immune response in check by turning off immune responses.
Receptors (immune receptors): Surface molecules on immune cells that bind to the surfaces of other immune cells. This typically causes the cell to produce signals that help cells communicate and regulate specific functions in the immune system.
T-cells: White blood cells (immune cells) that play a significant role in the immune system’s fight against infection and disease. They are a type of lymphocyte that can directly kill cancer cells.
White blood cells: Made up of normal cells, molecules and blood vessels.

HEALTH CARE TEAM
Case manager: Your personal advocate who collaborates with health care professionals and non-medical personnel to help overcome various financial, logistical and other common barriers to care.
Medical oncologist: Physician who treats cancer using medications.
Multidisciplinary medical team: A medical team made up of many people, each with a specialized role in your treatment plan. They will work closely together to ensure you receive the best care possible.
Patient navigator: A health care team member who may or may not be licensed (also may be called a lay navigator) who will help guide you through diagnosis and treatment.
Pulmonologist: Physician who specializes in the evaluation and treatment of lung problems.
We turned to immunotherapy, a type called an immune checkpoint inhibitor. I got an IV infusion every other week at first, then after a while, just once a month. It was so easy, and the entire process took less than an hour.

Cancer treatments almost always come with side effects. Getting three chemotherapy drugs at once would wipe me out, and I could barely get out of bed afterward. Immunotherapy damaged my thyroid, so I take thyroid medication. I've been on and off steroids to manage lung inflammation. Acid reflux, which makes my esophagus feel raw, is another side effect. Early-stage heart congestion may or may not be treatment-related.

Being realistic, I knew the immunotherapy drug would run its course, too. That's just the nature of the beast with metastatic cancer. I get scans like clockwork, and if we see progression, we know the treatment has likely done all it can for me. After two and a half years on the checkpoint inhibitor, a scan showed an active spot on my left lung. My doctor recommended moving to a targeted therapy treatment of two different medications taken as pills. I'm so thankful I have options because I figure all I need is something new coming down the pike every two or three years.

As a lung cancer support phone volunteer, I make it my mission to give people hope. Sometimes callers say they just want to cry. I tell them, “Of course you do. You have every right to cry.” But then I gently try to move their outlook to a more positive light. The important thing is to have more good days when you're positive than bad days when you cry. Personally, I feel so very fortunate for this gift of additional time, seven years so far. I can spend it being miserable about having cancer, or I can be grateful, positive and hopeful about my life.

We're incredibly lucky to live in an era of rapidly evolving cancer research and expanding treatment options. Researchers and scientists are essentially changing what it means to be diagnosed with lung cancer.
STAGING

Key factors contribute to your treatment plan

Staging is a process that helps your medical team develop a personalized treatment plan based on the extent of disease and how far it has progressed (see Figure 1). To assign a stage, your doctors will evaluate the results of your tissue biopsy, imaging studies, diagnostic tests and physical exams.

The TNM classification system developed by the American Joint Committee on Cancer (AJCC) is used to stage non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) (see Table 1). The T category specifies the primary tumor’s size and location. The N category indicates whether lymph nodes show evidence of cancer cells. The location of these lymph nodes is important because it shows how far the disease has spread. The M category describes distant metastasis, if any. An M subcategory may be added based on the presence of tumor cells that can be detected only by using a microscope or molecular testing.

Lung cancer stages range from 0 through IV (see Table 2). Stage 0 (also known as “in situ”) is a precursor of an invasive cancer. In situ cancers have not spread to other parts of the body. Stages I and II are generally confined to the local area where the cancer is found, and Stage III has spread to regional lymph nodes. Stage IV is locally or regionally advanced disease that has spread to distant sites, such as the brain, liver or bone.

These basic stages group patients who have similar prognoses (outlooks), allowing doctors to more accurately predict survival outcomes depending on the type of treatment they have. The AJCC also recommends tumor genetic testing to help determine which treatments are likely to be most effective.

FIGURE 1
STAGES OF LUNG CANCER

Stage IA1, IA2, IA3

Stage IB

Stage IIA

Stage IIB

Stage IIC

Stage III A

Stage III B

Stage IV, IVA, IVB

Metastasis
All lung cancers are staged according to the AJCC TNM system. Sometimes doctors describe SCLC as limited stage (corresponding to Stages I-III) or extensive stage (corresponding to Stage IV) as an additional tool to determine the treatment that may be most beneficial.

- Limited-stage SCLC is confined to one part of the chest, in just one part of the lung and in nearby lymph nodes. Radiation therapy to that area combined with chemotherapy may be a curative treatment option.

- Extensive-stage SCLC has spread to other parts of the body, such as the bone, brain or other lung. Patients with limited-stage SCLC whose tumors are too large to tolerate radiation therapy may be considered as extensive stage.

During staging, your doctors will rely on a pathology report. It is prepared by a pathologist, a doctor with special training in identifying diseases by studying cells and tissues under a microscope. Your report will describe the results of tissue sample testing and may include results from biomarker testing, tumor molecular analysis or other tests.

With today’s emphasis on personalizing treatment for each person’s cancer, pathology report results are becoming increasingly important in the diagnosis and treatment of lung cancer (see Treatment Options, page 6). Ask your doctor to discuss the report's findings and how they will affect your treatment options. Request a copy to take with you to medical appointments.

### TABLE 1

<table>
<thead>
<tr>
<th>Classification</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>T0</td>
<td>No evidence of primary tumor.</td>
</tr>
<tr>
<td>Tis</td>
<td>Carcinoma in situ. Squamous cell carcinoma in situ (SCIS). Adenocarcinoma in situ (AIS): adenocarcinoma with pure lepidic pattern (on the alveolar lining), ≤ (not more than) 3 cm in greatest dimension.</td>
</tr>
<tr>
<td>T1</td>
<td>Tumor ≤ (not more than) 3 cm in greatest dimension, surrounded by lung or visceral pleura (membrane surrounding the lung), without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e., not in the main bronchus). Minimal invasive adenocarcinoma: adenocarcinoma ≤ (not more than) 3 cm in greatest dimension with a predominantly lepidic pattern (on the alveolar lining) and ≤ (not more than) 5 mm invasion in greatest dimension. Tumor ≤ (not more than) 1 cm in greatest dimension.</td>
</tr>
<tr>
<td>T1a</td>
<td>Tumor &gt; (more than) 1 cm but ≤ (not more than) 2 cm in greatest dimension.</td>
</tr>
<tr>
<td>T1b</td>
<td>Tumor &gt; (more than) 2 cm but ≤ (not more than) 3 cm in greatest dimension.</td>
</tr>
<tr>
<td>T1c</td>
<td>Tumor &gt; (more than) 3 cm but ≤ (not more than) 5 cm or having any of the following features: • Involves the main bronchus regardless of distance to the carina (ridge at the base of the trachea), but without involvement of the carina. • Involves visceral pleura (membrane surrounding the lung). • Associated with atelectasis (collapse of part of the lung) or obstructive pneumonitis (inflammation of lung tissues) that extends to the hilar region, involving part or all of the lung. Tumor &gt; (more than) 3 cm but ≤ (not more than) 4 cm in greatest dimension. Tumor &gt; (more than) 4 cm but ≤ (not more than) 5 cm in greatest dimension.</td>
</tr>
<tr>
<td>T2a</td>
<td>Tumor &gt; (more than) 5 cm but ≤ (not more than) 7 cm in greatest dimension or directly invading any of the following: parietal pleura (outer lung membrane), chest wall (including superior sulcus tumors), phrenic nerve (nerve that helps breathing), parietal pericardium, or separate tumor node(s) in the same lobe as the primary.</td>
</tr>
<tr>
<td>T2b</td>
<td>Tumor &gt; (more than) 7 cm in greatest dimension or 3 cm in greatest dimension, surrounded by lung or visceral pleura (membrane surrounding the lung), without bronchoscopic evidence of invasion more proximal than the lobar bronchus (i.e., not in the main bronchus).</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor &gt; (more than) 7 cm or tumor of any size invading one or more of the following: diaphragm, mediastinum (area between the lungs), heart, great vessels, trachea (windpipe), recurrent laryngeal nerve (nerve that helps speech), esophagus, vertebral body, or carina (at base of the trachea); separate tumor node(s) in an ipsilateral lobe (lobe that is on the same side of the body) different from that of the primary.</td>
</tr>
<tr>
<td>T4</td>
<td>Tumor &gt; (more than) 7 cm or tumor of any size invading one or more of the following: diaphragm, mediastinum (area between the lungs), heart, great vessels, trachea (windpipe), recurrent laryngeal nerve (nerve that helps speech), esophagus, vertebral body, or carina (at base of the trachea); separate tumor node(s) in an ipsilateral lobe (lobe that is on the same side of the body) different from that of the primary.</td>
</tr>
</tbody>
</table>

### TABLE 2

<table>
<thead>
<tr>
<th>Stage</th>
<th>TNM Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX, N0, M0</td>
<td>Occult carcinoma</td>
</tr>
<tr>
<td>Tis, M0</td>
<td>Carcinoma in situ. Squamous cell carcinoma in situ (SCIS). Adenocarcinoma in situ (AIS): adenocarcinoma with pure lepidic pattern (on the alveolar lining), ≤ (not more than) 3 cm in greatest dimension.</td>
</tr>
<tr>
<td>T1a, N0, M0</td>
<td>IA1</td>
</tr>
<tr>
<td>T1b, N0, M0</td>
<td>IA2</td>
</tr>
<tr>
<td>T1c, N0, M0</td>
<td>IA3</td>
</tr>
<tr>
<td>T2a, N0, M0</td>
<td>IB</td>
</tr>
<tr>
<td>T2b, N0, M0</td>
<td>IIA</td>
</tr>
<tr>
<td>T3, N0, M0</td>
<td>IIB</td>
</tr>
<tr>
<td>T4, N0, M0</td>
<td>IIIC</td>
</tr>
<tr>
<td>T4, N1, M0</td>
<td>IV</td>
</tr>
<tr>
<td>T4, N1, M1</td>
<td>IVA</td>
</tr>
<tr>
<td>T4, N1, M1a</td>
<td>IVB</td>
</tr>
</tbody>
</table>

### ADDITIONAL RESOURCES

- Society for Immunotherapy of Cancer: www.sitcancer.org
- American Cancer Society: www.cancer.org
- American Lung Association: www.lung.org
- American Society of Clinical Oncology: www.cancer.net
- GO Foundation for Lung Cancer: go2foundation.org
- LUNGevity Foundation: www.lungevity.org
- National Cancer Institute: www.cancer.gov
**Immunotherapy unlocks the power of the immune system**

The ability to harness the potential of the immune system to fight cancer is giving new hope to people with lung cancer, improving patient outcomes and offering an enhanced quality of life. Sometimes referred to as biologic therapy or biotherapy, immunotherapy trains the immune system to respond to and attack cancer. This type of treatment is very different from conventional options, such as surgery, chemotherapy and radiation therapy, because it has the potential for a more lasting response that can extend beyond the end of treatment.

Treating lung cancer with immunotherapy is considered a significant leap forward, especially because many cases are diagnosed at an advanced stage. The first immunotherapy approval for a type of lung cancer occurred in 2015. Now, immunotherapy options are available for advanced and metastatic non-small cell lung cancer (NSCLC) and extensive-stage small cell lung cancer (SCLC).

Used alone or in combination with other treatments such as chemotherapy, targeted therapy and radiation therapy, immunotherapy may be used as first- or second-line therapy. A first-line therapy is the first treatment given for a disease. When used by itself, first-line therapy is the one accepted as the best treatment. Second-line therapy is given when the first-line therapy doesn’t work or stops working.

**INTRODUCING IMMUNE CHECKPOINT INHIBITORS**

Immune checkpoint inhibitors are the type of immunotherapy currently approved to treat lung cancer. They target the proteins PD-1 (programmed cell death protein 1) and PD-L1 (programmed cell death-ligand 1) found on cells and boost the immune system's cancer-fighting response. Other types of immunotherapy approved for other cancers are being studied as possible lung cancer treatments (see Clinical Trials, page 8).

A primary function of the immune system is to determine which cells or substances are self or non-self (see Overview, page 1). The immune system only makes enough white blood cells to fight non-self cells, also called antigens, present in the body. When the immune system is alerted to the threat of antigens, such as bacteria or viruses, it ramps up production of T-cells that attack and destroy the antigens. After an attack, the immune system must slow down so that the T-cells don’t begin attacking healthy cells. It does this through the use of checkpoints.

Checkpoints keep the immune system “in check.” This process happens between proteins and receptors at the cellular level. To understand how this occurs, it’s important to know that the surface of each cell is not completely round and smooth. Cells are covered with receptors and proteins, which work like puzzle pieces. Proteins have “tabs” that stick out, and receptors have “spaces” that curve inward. When the puzzle pieces fit together (known as binding), chemical signals and information are exchanged in a biochemical reaction; this process allows cells to communicate with each other. When the correct proteins and receptors connect, a series of signals is sent to the immune system to slow down once an immune response is finished.

The immune system also can attack and kill cancer cells. In order for a cancer to grow, it must turn off the immune response. This occurs when cancer cells express immune checkpoint proteins. Three checkpoint receptors that slow down the immune system have been identified, and two are present in lung cancer. When they combine, the reaction signals it’s time to slow down.

- PD-1 is a receptor involved with telling T-cells to die and to reduce the death of regulatory T-cells, which slow down the immune system after an immune response and inhibit T-cells that attack normal, healthy cells that weren't eliminated before leaving the thymus. PD-1 can tell the immune system to slow down only if it connects with PD-L1.
- PD-L1 is a protein that, when combined with PD-1, sends a signal to reduce the production of T-cells and enable more T-cells to die.

The goal of immune checkpoint inhibitors is to prevent PD-1 and PD-L1 from connecting so that the immune system does not slow down. Checkpoint inhibitor drugs prevent these connections by targeting and blocking PD-1 or PD-L1, and the immune cells continue fighting the cancer. If either checkpoint is blocked, the immune system will not slow down and T-cells can continue to attack antigens and cancer cells.

**QUESTIONS TO ASK YOUR MEDICAL TEAM**

- Would you recommend immunotherapy for my type of lung cancer?
- Why is immunotherapy the best treatment for me?
- Have you had success treating patients with immunotherapy?
- How will we determine what the goals of treatment will be?
- How will we know if it is working?
- Will I be able to receive other types of treatment if immunotherapy fails at some point?
- Will I still be able to work, travel and do regular activities during treatment?
- Should I consider a clinical trial?
- What are the side effects of the recommended treatment, and how are these managed?
However, cancer is smart and tries to hide from the immune system. One of the ways a cancer cell can outsmart the immune system is by producing PD-L1 on its own surface and using it as camouflage so that T-cells will see it as a normal cell. T-cells expect only normal cells to produce PD-L1, so when a T-cell encounters PD-L1 on a cancer cell, it is tricked into signaling the immune system to slow down. When an immune checkpoint inhibitor is given, it’s as if the immune system develops X-ray vision and sees through the cancer cell’s camouflage. This keeps the immune response from slowing down and also helps the immune system recognize cancer cells as foreign cells.

Although cancer cells can be clever, the immune system has a long memory when it comes to battling dangerous cells. When your immune system encounters a virus, such as chickenpox, the memory T-cells check to see if that virus has any characteristics of cells they have attacked in the past. If so, your memory T-cells offer you immunity from that virus, and most of the time you don’t get chickenpox again. The memory T-cells alert the rest of the immune system, telling it to make more immune cells to attack the virus and keep you from getting the disease again. Memory T-cells stay alive and store this information for a long time, remaining effective long after treatment ends. Investigators believe that effective immunotherapy can result in cancer-specific memory cells that provide long-term protection against cancer.

### ADDITIONAL RESOURCES
- **Society for Immunotherapy of Cancer:**
  - www.sitcancer.org
- **American Society of Clinical Oncology:**
  - www.cancer.net
- **GO Foundation for Lung Cancer:**
  - go2Foundation.org
- **LUNGevity Foundation:**
  - www.lungevity.org
- **National Cancer Institute:**
  - www.cancer.gov
  - Immunotherapy for Cancer
  - Lung Cancer

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**MOLECULAR TESTING**

### BIOMARKERS IN IMMUNOTHERAPY FOR LUNG CANCER

- **Cancer is caused by mutations** in your genes, which are pieces of DNA. Research has found several specific genetic mutations that lead to lung cancer. Doctors can test for these mutations as part of the diagnostic process by looking for biomarkers, which are the molecules produced by the cancer cells or other cells in the body in response to cancer. Testing for biomarkers is known as molecular testing. It may include testing for specific genes, proteins or molecules of the tumor and can be measured in the blood, plasma, urine, cerebrospinal fluid or other body fluids or tissues. Biomarkers are also known as tumor markers, molecular markers, biological markers or serum markers.

Most molecular testing for lung cancer looks for epidermal growth factor receptor (EGFR) mutations and anaplastic lymphoma kinase (ALK) fusions, for which several targeted therapies have been developed. Researchers have identified other biomarkers that are involved in some types of lung cancers. National guidelines currently recommend the following genes be tested if lung cancer is suspected: ALK, BRAF, EGFR, MET, ERBB2 (HER2), NTRK, RET and ROS1.

Next-generation sequencing (NGS) is used to test these genes. This technique is capable of processing multiple DNA sequences simultaneously with more speed and accuracy. NGS can be done on both tumor tissue and blood and, at present, can detect abnormalities associated with specific therapies.

To find out if you are a candidate for immunotherapy, your doctor may also look for the following factors along with molecular testing:

- **PD-L1 expression** may be tested to determine if the tumor cells or immune cells in the tumor’s microenvironment contain a higher level, which may mean you could be a good candidate for immune checkpoint inhibitors.

- **Tumor mutational burden (TMB)** is an assessment of the number of genetic mutations in a tumor. It can also help doctors determine if you will respond to immunotherapy. It is believed that the higher the TMB level is, the more likely you will be to respond.

- **Microsatellite instability-high (MSI-H)** or deficient mismatch repair (dMMR) may be tested to determine if the cancer is caused by genes that have problems repairing themselves. MSI-H describes cancer cells that have a greater than normal number of genetic markers called microsatellites, which are short, repeated sequences of DNA. Every time a cell reproduces itself, it makes a copy of its genes and DNA. During the process, errors in duplication can be made, much like a misspelled word. The body normally corrects the error, but sometimes it isn’t caught and fixed. It then becomes a mutation that is reproduced in later versions of the cell. Cancer cells that have large numbers of microsatellites may have defects in the ability to correct mistakes that occur when DNA is copied. Cancers with MSI-H features appear to respond better to immunotherapy.

Research has shown that people with a high level of PD-L1 expression also typically respond better to immunotherapy. In addition, the level of expression will help your doctor determine whether to give immunotherapy alone or in combination with chemotherapy. People who have tumors with 50 percent or more PD-L1 expression are usually considered good candidates for immunotherapy as a single treatment. If the amount is less than 50 percent, people may be treated with a combination of one or two types of chemotherapy along with an immunotherapy. However, not everyone with a high PD-L1 expression should be given immunotherapy, especially someone with an active EGFR mutation.

Not all people who receive immunotherapy respond. In some cases, people with high expressions of PD-L1 do not respond to immunotherapy. Some people with a low PD-L1 expression do respond but less often. Researchers are not sure why this happens and more research is needed so immunotherapy is not given to someone who may not respond to it.

Inform your doctor if you have an autoimmune disorder, such as Crohn’s disease, ulcerative colitis or lupus. An autoimmune condition means you have an overactive immune system, and introducing immunotherapy may increase potential safety risks and life-threatening toxicities. Also let your doctor know if you’ve received immunotherapy before because previous treatments may affect your doctor’s treatment decisions.
The role of clinical trials for people with lung cancer

Today's strategies available for treating lung cancer are the result of the medical community's commitment to find new and better ways to prevent, diagnose and treat cancer. This is accomplished through structured research studies known as clinical trials.

Some clinical trials investigate whether a new type of treatment, such as a drug, surgery or radiation therapy or a combination of them, is better than the current standard of care. Researchers are also evaluating how various substances in tumors affect the body's immune responses, and are creating ways to reduce treatment side effects. Lung cancer clinical trials are exploring novel diagnostic tools, additional targeted therapies, improved surgical techniques, more effective radiation therapy and combinations of different approaches for early- and late-stage cancers. Such crucial research fuels advances that continue to transform cancer care, giving more people the chance to live longer and have better quality lives after a cancer diagnosis.

Once thought of as a last resort, clinical trials are increasingly becoming the first treatment option for people diagnosed with cancer. Ask your doctor if you should consider a clinical trial. You can also search for them online. However, that can be complicated because thousands of trials are in progress across the country.

The mock search site below explains how to navigate the process. Before you begin, have your exact diagnosis, pathology report and details of previous treatments handy to determine if you qualify.

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Searching for a clinical trial

Be an active participant in your own care by looking online at available trials. These step-by-step instructions will help guide you. Once you feel comfortable with the search process, use the list of clinical trial resources below to look for a trial that may apply to you.

**STEP 1**

FILL IN YOUR INFORMATION

**YOUR DIAGNOSIS:** For example, enter “lung cancer.” To create more options, you can also search for “non-small cell lung cancer” or “NSCLC” and compare results.

**DESIRE LOCATION:** If you prefer a clinical trial close to home, use your address. Enter additional locations if you’re willing and able to travel for treatment.

**OTHER TERMS:** You can refine your search by adding a treatment type such as immunotherapy, a specific drug or a National Clinical Trial (NCT) identifier. During your research, you may notice that an NCT identifier is assigned to each clinical trial. Identifiers begin with the letters “NCT” followed by eight numbers.

**STEP 2**

READ YOUR SEARCH RESULTS

**RECRUITMENT STATUS:** This indicates whether the trial is actively seeking patients, not yet recruiting or otherwise inactive. The status will change, so check for updates.

**SUMMARY OF STUDY:** Here you’ll find details about the purpose of the clinical trial and the treatment being studied. This section is usually written for health care providers, so it may be difficult to understand. In that case, print out the information to discuss with your doctor.

**ELIGIBILITY CRITERIA:** This outlines the conditions you must meet to be eligible for the trial, such as the stage of disease, sites of metastasis, overall health requirements and previous treatments.

**CONTACTS AND LOCATIONS:** This may contain contact information for the clinical trial investigators, staff or sponsors who may be able to provide more details about the study. Trial locations may be included.

**SPONSOR:** This is the organization responsible for the clinical trial. It may be a pharmaceutical or biotechnology company, a university or the National Cancer Institute.

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**What a clinical trial can do for you…**

In some situations, a trial may offer the best option among treatments. Additionally, you may benefit from the following:

- Access to leading-edge treatments that aren’t yet available for your type or stage of disease.
- An alternative strategy if your cancer has become resistant to your current treatment.
- Another option if your type of cancer is rare and doesn’t have as many standard treatments.
- A higher level of care because you will be closely monitored by your regular oncologist and the clinical trial medical team. This extra attention may help identify and then treat side effects or other problems earlier.
- The role of being an active partner in your care. It is always your decision to participate. And if the trial doesn’t meet your expectations at any time or for any reason, you may leave the trial and return to standard-of-care treatment. A clinical trial will not jeopardize your care.

And what you can do for a clinical trial…

- Your involvement is an opportunity to help advance cancer treatments. Not all participants have the same experience, even if the treatment is the same, and all the information gathered from a trial is valuable.
- Many survivors look for opportunities to give back. You may feel a sense of accomplishment at being able to contribute to the future of cancer care.

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**CLINICAL TRIAL RESOURCES:**

ACCESS: cantria.com/access  /  AccrualNet: accrualnet.cancer.gov


National Cancer Institute (NCI) Contact Center (cancer information service): 800-422-6237  /  National Institutes of Health (NIH): 800-411-1222
Discover how case management can work for you

A valued, and often untapped, resource is case management, usually a free program designed to help manage the practical issues and problems associated with a cancer diagnosis and treatment. Your case manager is your personal advocate, acting on your behalf by collaborating with medical professionals and non-medical personnel to help overcome various financial, logistical and other common barriers to care.

Your case manager, who may be a social worker, trained financial counselor, nurse or some combination of these areas of expertise, works in various ways to ensure you receive quality services, from screening and assessment to care coordination and discharge planning. Dealing with a serious illness involves much coordination, such as filing insurance claims, paying medical bills and arranging for transportation. It is difficult to focus on these items when you are more concerned with understanding your diagnosis and making treatment decisions. Although these issues may feel secondary, they often become critical. Your case manager helps navigate and address these responsibilities to reduce or eliminate your stress and anxiety so you can focus on healing.

Case management comes in many different forms. It is sometimes very specific and short term, confined to a period of time or specific issue, or it may be a long-term engagement based on a particular patient’s needs.

Alan Balch, PhD, Chief Executive Officer at Patient Advocate Foundation (PAF), understands the value of helping patients find solutions to the problems they face during treatment.

“Our case management program is a process of directly assisting patients and their caregivers in finding and securing appropriate resources or dealing with specific barriers. In our experience, the areas in which patients need help most are transportation, paperwork and finding financial assistance to cover various costs.”

Fran Castellow, MSEd, PAF, believes no patient should have to struggle with financial obstacles alone. “Our expert case managers work alongside the patient or caregiver to identify solutions to problems surrounding insurance, medical debt and many other challenges, as well as helping them better afford their out-of-pocket costs.”

Your case manager can help you carefully review your insurance policy, including the items covered by Medicare Parts A, B, C and D, so you know the rules and procedures to follow and what is covered. You are encouraged not to dismiss potential treatment options until you’ve looked into the financial resources that are available, even if you are uninsured or underinsured.

Case management sometimes offers indispensable services surrounding end-of-life needs. If you choose to be at home at this time, a case manager may be available to arrange for door-to-door transportation from the medical facility to your home and ensure a hospice company, necessary equipment and a nurse are on site before you arrive. The goal is to help you feel secure and comfortable, surrounded by people who care, in the last moments of life. If your health care team doesn’t offer case management services, ask for a referral.

Much of the information available to help you is found online, but not everyone has a computer. If you don’t have access to one or if you need assistance searching for information, ask your case manager, nurse navigator, family members or friends to help you. You’re not in this alone. A variety of resources are available, from helping you learn more about your specific diagnosis and offering valuable suggestions for caregivers to connecting you with support programs so you can talk with someone who has had a similar experience. To ensure everyone has access to trusted resources, the following organizations also offer phone numbers. Most are staffed weekdays during standard business hours.

American Cancer Society, Cancer Helpline: 800-227-2345 / American Lung Association: 800-586-4872
GO, Foundation for Lung Cancer, Lung Cancer Helpline: 800-298-2436
LUNGevity, Lung Cancer HELPLine: 844-360-5864 / National Cancer Institute: 800-422-6237
Patient Empowerment Network, Cancer Support Helpline: 888-793-9335

Myths vs. Facts

- If immunotherapy is recommended as a treatment option for your lung cancer, you’ll want to know the facts about this leading-edge cancer therapy.

  **MYTH:** Immunotherapy is a risky treatment because it's so new.
  **FACT:** Immunotherapy is not new. The first immunotherapy to treat cancer was approved more than 30 years ago by the U.S. Food and Drug Administration (FDA). Using the body’s immune system to fight disease was first considered in the 1890s.

  **MYTH:** Doctors reserve newer treatments for younger cancer patients.
  **FACT:** Age alone is not a determining factor when considering immunotherapy. A result of a recent research study evaluating the effectiveness of an immune checkpoint inhibitor on more than 530 cancer patients indicated that the responses in people older than 62 were as good as or considerably better than in younger patients; however, side effects may be more severe in the elderly.

  **MYTH:** Immunotherapy is way too expensive for the average person.
  **FACT:** All cancer therapies have associated costs and some are greater than others, so it’s essential to know this information before you start treatment. However, your health insurance, Medicare or Medicaid (in some states) may cover or partially cover the costs. Financial resources may also be available through patient assistance programs from pharmaceutical companies, your treatment facility or cancer advocacy groups.

Additional Resources

- Society for Immunotherapy of Cancer: www.sitcancer.org
- American Society of Clinical Oncology: www.cancer.org
- Spotlight On Cancer: Case Managers www.sitcancer.org
- LungCancer.org: www.lungcancer.org
- The Value of Oncology Social Workers: www.sitcancer.org
- National Cancer Institute: www.cancer.gov
- Managing Costs and Medical Information: www.sitcancer.org
- Survivorship A to Z: www.sitcancer.org
- Social Workers: An Overview: www.sitcancer.org
Early care strategies can improve your quality of life

The day-to-day challenges of living with lung cancer are often physically exhausting and emotionally overwhelming. That’s why it’s important to take advantage of the services referred to as supportive care. They’re designed to improve the overall well-being of you and your loved ones from diagnosis through survivorship. Research has shown receiving supportive care as early as possible improves quality of life and may make it easier to stick with and complete scheduled therapies.

A primary focus of supportive care is to help manage treatment-related side effects and cancer symptoms. It also addresses emotional, social, practical and spiritual concerns.

Like most cancer treatments, immunotherapy can have side effects. Some can be prevented and others can be minimized. Ask your health care team for a list of symptoms specific to your treatments and for strategies to help manage them. Learn what to watch for, and how to respond. Find out when to contact your doctor’s office, go to an emergency room or call 911. The key is reporting symptoms as soon as they occur – even if they seem trivial – so your doctor can treat them early and prevent serious complications. Let any health care provider you see know if you are receiving or have received immunotherapy.

IMMUNE-RELATED ADVERSE EVENTS

Severe side effects from immunotherapy are not common but can occur. Called immune-related adverse events (irAEs), they can develop rapidly, becoming severe and even life-threatening without swift medical attention.

These irAEs can result if the treatment overstimulates the immune system. This may cause inflammation, redness or swelling, which can be painful. You may not be able to physically feel these symptoms at first, so it’s important to schedule and keep all medical appointments as irAEs may be diagnosed in routine laboratory tests. Be sure to contact your health care team if symptoms occur between appointments. Remain alert to the possibility of irAEs for six months to a year after treatment ends, and report symptoms immediately to your doctor.

Following are body systems that may potentially be affected by certain immunotherapy drugs, along with the irAE and its symptoms.

- Cardiovascular (myocarditis): chest pain, shortness of breath, leg swelling, rapid heartbeat, changes in EKG reading, impaired heart pumping function
- Endocrine (endocrinopathies): hyperthyroidism, hypothyroidism, diabetes, extreme fatigue, persistent or unusual headaches, visual changes, alteration in mood, changes in menstrual cycle
- Gastrointestinal (colitis): diarrhea with or without bleeding, abdominal pain, bowel perforation
- Liver (hepatitis): yellow skin or eyes (jaundice), nausea, abdominal pain, fatigue, fever
- Nervous system (neuropathies): numbness, tingling, pain, a burning sensation or loss of feeling in the hands or feet, sensory overload, sensory deprivation
- Neurologic (encephalitis): confusion, hallucinations, seizures, changes in mood or behavior, neck stiffness, extreme sensitivity to light
- Pulmonary/lung (pneumonitis): chest pain, shortness of breath, unexplained cough
- Renal/kidneys (nephritis): decreased urine output, blood in urine, swollen ankles, loss of appetite
- Skin (dermatitis): rash, skin changes, itching, blisters, painful sores

Take care of your emotional well-being

You may be feeling intense and unfamiliar emotions as a result of your diagnosis and the uncertainties and challenges you and your loved ones are facing. Various supportive care resources and services are designed to help you and your loved ones cope, including counselors and therapists with expertise in working with people living with cancer. Don’t hesitate to ask your health care team for a referral. You can also try these helpful strategies: get regular physical exercise, keep a journal, enjoy nature’s beauty, join a local or online cancer support group or participate in phone-based peer-to-peer counseling with other lung cancer survivors.

Following are some emotions you may experience and suggestions for managing them.

- Anger is common before, during and after cancer treatment. Allow yourself to express your feelings. To avoid releasing bottled-up anger in unhealthy ways, find safe alternatives. Explain your feelings to a trusted friend or participate in intense physical activity.
- Anxiety and worry may interfere with your ability to cope with treatment and function day to day. Explore relaxation techniques, such as meditation, muscle relaxation, yoga or guided imagery. Peer-to-peer cancer support volunteers are good listeners who can offer insight into what to expect — either by phone or online.
- Depression is most likely to occur when people with cancer have pain or other unrelieved symptoms. It’s extremely important to talk with your doctor about feeling hopeless, helpless, “numb” or worthless. If these feelings last more than a few days or if you have thoughts of death or of attempting suicide, seek medical attention immediately.
- Emotional overload is common because so much of what you’re experiencing is unfamiliar and beyond your control. Yoga, meditation or guided imagery may help calm your mind. Take charge of things you can control, delegate tasks to others who can lend a hand, and ask loved ones to handle routine decision-making.
- Fear occurs because of all the sudden uncertainties, including financial worries, possible changes in your appearance or sexuality and how you’ll respond to treatment. Knowledge helps reduce fear. Learn as much as you can about all aspects of your treatment plan so you’ll have an idea of what to expect. Share your fears with a friend you trust.
- Grief is natural as you may mourn the unexpected changes in your life and the loss of a future without the cloud of recurrence. Your diagnosis may also trigger past grief if you’ve lost a loved one to cancer. Give yourself permission to grieve, feeling a full range of emotions. Talking with a grief counselor may be helpful.
- Guilt may occur if you blame yourself for getting cancer because of actions you did or didn’t take, if you feel you’re a burden to loved ones or if your prognosis is better than that of others living with lung cancer. Talk with a therapist about these feelings.
- Loneliness may occur at various times throughout treatment, especially if you feel no one understands what you’re going through or if friends or family members have stopped calling or visiting because they don’t know what to say. Consider reaching out for a conversation unrelated to cancer. Be open to meeting other survivors.
MANAGING SIDE EFFECTS

Everyone responds differently to immunotherapy, including combinations of immunotherapy with chemotherapy or other treatments. Following are common side effects and suggestions to help manage them.

Alopecia (hair loss) can affect all parts of the body. Caps, hats, turbans, scarves and wigs are available as head coverings. If you go natural, use a sunscreen with a sun protection factor (SPF) of at least 30. Contact your health insurance provider to see if the cost of a wig is covered with a doctor’s prescription for a "cranial prosthesis due to alopecia caused by cancer treatment." Eb beauty (www.eBeauty.com) offers a free wig exchange program. Your nurse navigator may also have information about resources for free wigs.

Bone loss may occur when lung cancer spreads to the bone, which can then become thin, porous and brittle. Your doctor can monitor your bone mass through bone density scans taken before, during and after treatment and may also prescribe bone-modifying agents to help prevent or delay bone fractures. Maintain a healthy weight. Minimize fall risks such as loose rugs, cluttered walkways and poor lighting.

Cognitive dysfunction, often called chemobrain, occurs when people have trouble with memory, concentration or processing information during or after cancer treatment. Though associated with chemotherapy, it can result from other treatments and can last for months or years. Try carrying a daily planner to help stay on track. Use to-do lists, and focus on doing one thing at a time.

Constipation can be very uncomfortable and can lead to serious medical issues. Eat high-fiber foods, drink plenty of clear fluids throughout the day and establish regular bowel habits. It’s important to discuss this condition with your doctor, and always check first before taking over-the-counter laxatives.

Coughing is a common symptom of lung cancer and occurs with some types of immunotherapy. A cough may signal pneumonitis (inflammation of the lungs), and cancer therapy will be more effective. A common and potentially serious side effect of immune checkpoint inhibitors is pneumonitis (inflammation of the lungs), and smoking can further complicate this condition. Additional benefits of quitting follow:

- Decreased heart rate and lower blood pressure
- Less risk of infection
- Faster healing from surgery and a potentially shorter hospital stay
- Less severe side effects from chemotherapy
- Less chance of developing secondary cancers

Quitting is difficult, but you don’t have to do it alone. Ask your health care team about local resources and check out these resources that are ready to assist you.

Injection site reactions can be painful, so discuss solutions with your health care team. Your doctor may modify your treatment.

Muscle and joint pain ranging from mild to severe may affect the whole body or only certain areas. Immunotherapy-related pain typically resolves when treatment ends. If pain persists or worsens, discuss pain management options with your doctor.

Nausea is much easier to prevent than to resolve once it progresses, so ask your doctor about prescribing antiemetic (anti-nausea) medication before you begin treatment. Avoid unpleasant odors. Try eating dry foods such as cereal, crackers or plain toast first thing in the morning. Getting fresh air at the onset of nausea may help.

Pain caused by a tumor pressing on organs, tissues or joints, or by cancer that has metastasized to bone, may occur. Contact your medical team right away to discuss ways to reduce and manage the pain.

Skin reactions may include severe itching and bumpy or itchy red rashes. Be alert to changes in skin color, inflammation, blistering, hives, dryness, cracked fingertips, sun sensitivity, flushing or redness. Moisturize skin twice a day with a thick cream. Avoid detergents, body soap or moisturizers containing alcohol, perfume or dyes. Your doctor may recommend a corticosteroid or numbing medication or prescribe an antihistamine, medicated creams or antibiotics.

Being smoke-free reduces risk of complications

If you’re a tobacco user diagnosed with lung cancer, you may believe there’s no reason to quit now. This is not true.

The most important reason to stop smoking if you’re undergoing treatment is that your cancer therapy will be more effective. A common and potentially serious side effect of immune checkpoint inhibitors is pneumonitis (inflammation of the lungs), and smoking can further complicate this condition. Additional benefits of quitting follow:

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- Less severe side effects from chemotherapy
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Quitting is difficult, but you don’t have to do it alone. Ask your health care team about local resources and check out these resources that are ready to assist you.

ADDITIONAL RESOURCES

American Cancer Society: www.cancer.org, 800-227-2345
BecomeAnEx: www.becomeanex.org
Freedom from Smoking: www.lung.org/stop-smoking/join-freedom-from-smoking
National Cancer Institute Smoking Quitline: 877-448-7848
QuitStart: teen.smokefree.gov
Smokefree.gov: smokefree.gov, 800-784-8669
SmokefreeTXT: smokefree.gov/smokefreebt
Support and financial resources available for you

**BASIC LIVING EXPENSES**
- Bringing Hope Home ........................................................................................................... www.bringinghopehome.org, 484-580-8395
- Family Reach Foundation ..................................................................................................... www.familyreach.org, 973-394-1411
- Hugs and Kisses Foundation ................................................................................................. www.hugsandkissesinc.org, 561-819-9471
- Life Beyond Cancer Foundation ............................................................................................. www.needhelppayingbills.com, 800-282-5223
- Team Continuum ..................................................................................................................., www.teamcontinuum.net, 845-200-7094

**CANCER EDUCATION**
- American Cancer Society ...................................................................................................... www.cancer.org
- American Society of Clinical Oncology ................................................................................ www.cancer.net
- CANCER101 .......................................................................................................................... www.cancer101.org
- CancerCare ............................................................................................................................ www.cancercare.org
- CancerQuest .......................................................................................................................... www.cancerquest.org
- Centers for Disease Control and Prevention (CDC) .............................................................. www.cdc.gov
- The Gathering Place .............................................................................................................. www.touchedbycancer.org
- Get Palliative Care .................................................................................................................. www.getpalliativecare.org
- Global Resource for Advancing Cancer Education (GRACE) .............................................. www.cancergrace.org
- The Hope Light Foundation ................................................................................................... www.hopeflightproject.com
- LIVESTRONG Foundation .................................................................................................... www.livestrong.org
- National Cancer Institute ...................................................................................................... www.cancer.gov
- National Comprehensive Cancer Network (NCCN) .............................................................. www.nccn.org
- National LGBT Cancer Network .......................................................................................... cancer-network.org
- NCI Contact Center (cancer information service) ................................................................. 800-422-6277
- Oncolink .................................................................................................................................. www.oncolink.org
- Patient Power .......................................................................................................................... www.patientpower.info
- Patient Resource .................................................................................................................... www.patientresource.com
- PearlPoint Nutrition Services ............................................................................................... www.pearlpoint.org
- Pine Street Foundation .......................................................................................................... www.pinetreetfoundation.org
- Scott Hamilton Cares Foundation ......................................................................................... www.scottcares.org
- Triage Cancer .......................................................................................................................... triagecancer.org

**ANGEL**
- 4th Angel Patient & Caregiver Mentoring Program ............................................................... www.4thangel.org
- CanCare .................................................................................................................................... www.cancercare.org
- CANCER101 .......................................................................................................................... www.cancer101.org
- Cancer and Careers .............................................................................................................. www.cancerandcareers.org
- CancerCare ............................................................................................................................ www.cancercare.org
- Cancer Connection ................................................................................................................ www.cancer-connection.org
- Cancer Hope Network .......................................................................................................... www.cancerhopeorganizationalnetwork.org
- Cancer Information and Counseling Line ............................................................................. 800-525-3777
- Cancer Really Sucks! ............................................................................................................... www.cancerreallysucks.com
- Cancer Support Community .................................................................................................. www.cancersupportcommunity.org
- Cancer Support Helpline ....................................................................................................... 888-793-9355
- Cancer Survivors Network ..................................................................................................... www.csn.cancer.org
- Caregiver Action Network .................................................................................................... www.caregiveraction.org
- CaringBridge .......................................................................................................................... www.caringbridge.org
- Center to Advance Palliative Care ........................................................................................ www.capc.org
- Chemango ............................................................................................................................... www.chemango.com
- The Children’s Treehouse Foundation .................................................................................. www.childrenstreehousefoundation.org
- Cleaning For A Reason .......................................................................................................... www.cleaningforareason.org
- Cooking with Cancer ............................................................................................................ www.cookingwithcancer.com
- Cuddle My Kids ..................................................................................................................... www.cuddlemykids.org
- Family Caregiver Alliance ..................................................................................................... www.caregiver.org
- Fighting Chance ..................................................................................................................... www.fightingchance.org
- Friend for Life Cancer Support Network ............................................................................... www.friendforlife.org, 866-374-3634
- The Gathering Place .............................................................................................................. www.touchedbycancer.org
- Guide Posts of Strength, Inc. .................................................................................................. www.cancerpops.org
- The Hope Light Foundation ................................................................................................... www.hopeflightproject.com
- Irmanan Angels ....................................................................................................................... www.irmananangels.org
- Leona Loft .................................................................................................................................. www.leonaloft.org
- The LGBT Cancer Project – Out With Cancer ...................................................................... www.lgbtcancer.org
- LIVESTRONG Foundation .................................................................................................... www.livestrong.org
- LivingWell Cancer Resource Center ..................................................................................... www.livewelllrc.org
- Losta Helping Hands .............................................................................................................. www.lostahelpinghands.com
- LUNGevity Caregiver Resource Center ................................................................................ www.lungevity.org/caregiver
- The Lydia Project ..................................................................................................................... themelydiaproject.org
- MyLifeline ............................................................................................................................... www.mylifeline.org
- Patient Empowerment Network ............................................................................................ www.powerfulpatients.org
- Patient Power ........................................................................................................................ www.patientpower.info

**SHARE**
- Caregiver Circle ...................................................................................................................... www.sharecancersupport.org/caregivers-support
- Stronghold Ministry ............................................................................................................... www.mystronghold.org
- Support Groups ..................................................................................................................... www.supportgroups.com
- Traie Cancer ............................................................................................................................ triagecancer.org
- Vital Options International ..................................................................................................... www.vitaloptions.com
- Well Spouse Association ....................................................................................................... www.wellspouse.org
- wSPARK Cancer Support Center .......................................................................................... www.wespark.org

**CLINICAL TRIALS**
- ACCESS .................................................................................................................................... cantri.a.com/access
- AccuNet .................................................................................................................................... www.acciunet.com
- ACT (About Clinical Trials) ...................................................................................................... www.learningaboutclinicaltrials.org
- Center for Information & Study on Clinical Research Participation ..................................... www.searchclinicaltrials.org
- CenterWatch ........................................................................................................................... www.centerwatch.com
- ClinicalTrials.gov .................................................................................................................... www.clinicaltrials.gov
- Lazzarex Cancer Foundation ................................................................................................. www.lazzarex.org
- LIVESTRONG Foundation ..................................................................................................... www.livestrong.org
- LUNGevity Clinical Trial Search ........................................................................................... clinicaltrials.lungevity.org
- National Cancer Institute ...................................................................................................... www.cancer.gov/cancinfo
- NCI Contact Center (cancer information service) ................................................................... 800-422-6277

**FINANCIAL ASSISTANCE**
- American Cancer Society (Hope Lodge) ............................................................................... www.cancer.org/treatment/supportprogramsservices/hopelodge
- BenefitsCheckUp ..................................................................................................................... www.benefitscheckup.org
- Bringing Hope Home ............................................................................................................. www.bringinghopehome.org
- CancerCare ............................................................................................................................ www.cancercare.org
- Cancer Financial Assistance Coalition ................................................................................... www.cancerfac.org
- HealthWell Foundation .......................................................................................................... www.healthwellfoundation.org
- Medicare.gov .......................................................................................................................... www.medicare.gov
- NeedyMeds .............................................................................................................................. www.needymeds.com
- Partnership for Prescription Assistance ................................................................................ www.ppprx.org
- Patient Advocate Foundation ................................................................................................. www.patientadvocate.org
- Patient Services, Inc. ............................................................................................................... www.patientpaymentsnc.com
- RxAssist ..................................................................................................................................... www.rxassist.org
- ReHope ...................................................................................................................................... www.rehope.com
- Social Security Administration ............................................................................................. www.ssa.gov
- Social Security Disability Resource Center ............................................................................ www.ssdrc.com
- State Health Insurance Assistance Programs ......................................................................... www.sshia.org
- U.S. Department of Veterans Affairs ..................................................................................... www.va.gov/health

**GOVERNMENT ASSISTANCE**
- Benefits.gov ............................................................................................................................. www.benefits.gov, 800-333-4636
- Centers for Medicare & Medicaid Services .......................................................................... www.cms.gov
- Eligibility.com (Medicare resources): .................................................................................... eligibility.com/medicare-resources
- Legal Services Corporation ..................................................................................................... www.lsc.gov, 202-295-1500
- Medicare Rights Center ......................................................................................................... www.medicarerights.org, 800-333-4114
- National Council for Aging Care .......................................................................................... www.ncoa.org, 571-527-3900
- Social Security Administration .............................................................................................. www.ssa.gov, 800-772-1213
- Social Security Disability Resource Center ............................................................................ www.ssdrc.com
- State Health Insurance Assistance Programs ......................................................................... www.sshia.org
- U.S. Department of Veterans Affairs ..................................................................................... www.va.gov/health

**IMMUNOTHERAPY**
- The Answer to Cancer ............................................................................................................ www.theanswerstocancer.org
- Cancer Research Institute ....................................................................................................... www.cancerresearch.org
- Immuno-Oncology ................................................................................................................. www.immunooncology.com
- Society for Immunotherapy of Cancer .................................................................................... www.sitcancer.org

**LUNG CANCER**
- American Lung Association .................................................................................................... www.lung.org
- Caring Ambassadors Lung Cancer Program ........................................................................... www.lungcancercap.org
- G0 Foundation for Lung Cancer ............................................................................................. www.g0foundation.org
- International Association for the Study of Lung Cancer ......................................................... www.iasc.org
- Lung Cancer Action Network ................................................................................................ www.lungcan.org
- Lung Cancer Foundation of America ...................................................................................... www.lcfamerica.org
- LungCancer.org ..................................................................................................................... www.lungcancer.org
- Lung Cancer Research Foundation ....................................................................................... www.lungcancerresearchfoundation.org
- LUNGevity Foundation ........................................................................................................... www.lungevity.org
Still have questions about cancer immunotherapy?

Whether you are battling cancer or serving as a dedicated caregiver, being informed can be critical to a successful treatment plan.

The Society for Immunotherapy of Cancer’s (SITC) free online patient course, Understanding Cancer Immunotherapy provides resources and basic education about cancer and immunotherapy for patients and caregivers. The course’s interactive modules offer easy-to-understand information about immunotherapy as a cancer treatment option by covering the following areas:

- Your treatment options and care providers
- Education on cancer and the immune system
- Types of cancer immunotherapy treatments
- The importance of reporting side effects
- Links to other helpful patient and caregiver resources

To access this self-guided course, please visit sitcancer.org/patient#course
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