National Comprehensive Cancer Network®

2026

NCCN Guidelines for Patients®

Cancer care recommendations from leading experts at the National Comprehensive Cancer Network® (NCCN®)

Systemic Mastocytosis



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NCCN Guidelines for Patients®

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Reviewed and revised every year.

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Because cancer care is always evolving, NCCN develops and frequently updates evidence-based cancer care recommendations used by health care providers worldwide. These recommendations are known as the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®).

The NCCN Guidelines for Patients plainly explain these expert recommendations, so you can talk with your care team about the best care for you.

These NCCN Guidelines for Patients are based on the NCCN Guidelines® for Systemic Mastocytosis, Version 3.2026 — July 10, 2026.

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National Comprehensive Cancer Network (NCCN) and NCCN Foundation
3025 Chemical Road, Suite 100, Plymouth Meeting, PA 19462 USA

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About systemic mastocytosis

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Systemic mastocytosis (SM) is a rare blood disorder that occurs when too many mast cells build up in your body. This can cause a variety of symptoms depending on where and how it occurs. This patient guideline will break down the different types of systemic mastocytosis and how they're treated.

What is systemic mastocytosis?

Systemic mastocytosis (SM) is a rare and chronic blood disorder that happens when too many mast cells build up in your skin, bone marrow, gastrointestinal (GI) tract, liver, spleen, and/or other organs. SM is typically activated by an error (mutation) in one of the main genes of mast cells called *KIT* (see more about *KIT* in "Causes").

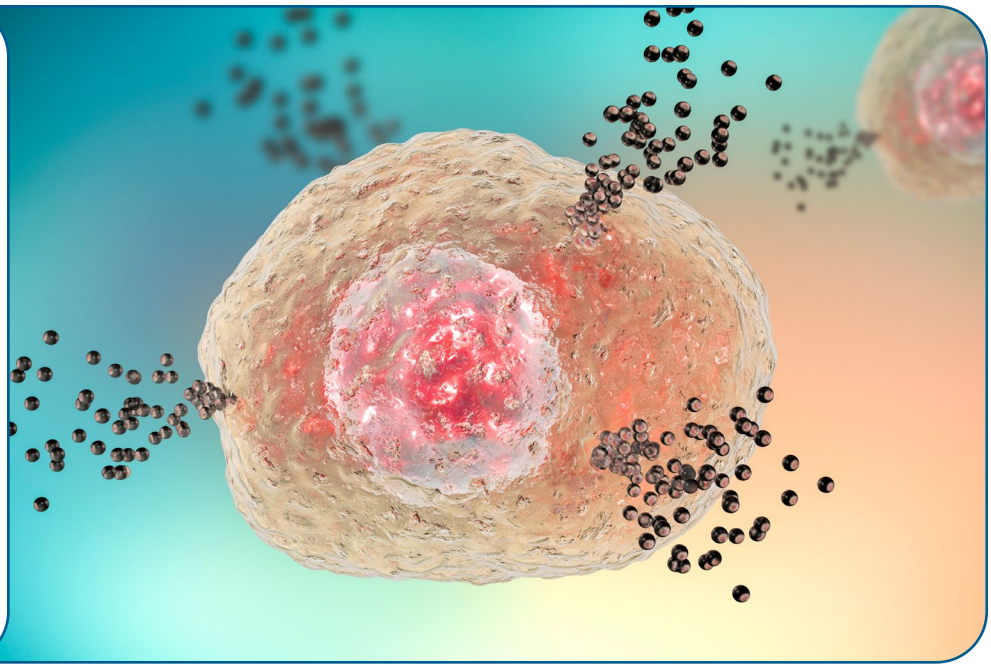
Mast cells are made in your bone marrow. They're a type of white blood cell located in your bone marrow and tissues throughout your body. They're less commonly found in the blood that circulates around your body (called peripheral blood). Mast cells play a major role in your immune system and are responsible for your body's reaction to allergies as well as inflammation and infections.

When your immune system detects bacteria, viruses, or allergens, mast cells help fight back by releasing inflammatory chemical mediators. Tryptase, histamine, prostaglandins, and leukotrienes are types of powerful mast cell mediators.

Mast cell mediators can cause your blood vessels to leak, decreasing your blood pressure and making your skin itchy and swollen. They can also create a buildup of

Mast cell releasing mediators

Mast cells are a type of white blood cell. They release chemical mediators (seen here) in response to an allergen, causing an allergic reaction.



mucus. This causes the airways to narrow and can produce swelling of the lining of the stomach and intestines, leading to bloating and diarrhea. These inflammatory responses aim to protect your body from foreign invaders.

In SM, abnormal mast cells multiply, causing inflammation and continuous release of the chemical mediators. This oversupply of mast cells can cause them to build up in organs like the liver, spleen, lymph nodes, bone marrow, bones, and GI tract.

Causes

SM is most often caused by an error (mutation) in the *KIT* gene, called *KIT* D816V.

The *KIT* gene provides instructions for making a protein. It's important for the development and role of certain cell types. This includes white blood cells (mast cells), as well as reproductive cells (germ cells), early blood cells (hematopoietic stem cells), cells in the GI tract called interstitial cells of Cajal, and cells in the skin called melanocytes.

How *KIT* influences SM

KIT is a receptor on the surface of normal mast cells. When the chemical messenger, called stem cell factor (SCF), binds to *KIT*, it triggers *KIT* to send signals from the outside of the cell to the inside. This signaling controls cell growth, division, survival, and activation. Think of SCF like a faucet slowly turning on a controlled water stream that is *KIT*.

But when the *KIT* D816V mutation happens, it signals on its own and stays on (activated), causing an overproduction of mast cells. It doesn't need SCF to help activate it because it's already activated. So, the faucet is stuck in a wide-open position, and it's flooding mast cells.

Most cases of SM are not inherited, but sometimes families have more than one member with mastocytosis, either cutaneous (skin) or systemic. In other words, it's an acquired (or somatic) mutation—happening at some point in a person's life.

The difference between SM and allergies

Although both SM and allergies cause reactions, there's a big difference. Allergic reactions are acute responses to specific allergens, like cat dander or pollen. They can create local, corresponding reactions like runny nose, hives, or itchy eyes. Allergies cause a systemic (all over) reaction such as anaphylaxis only in rare cases. These reactions trigger more than one organ system at the same time and can lead to life-threatening symptoms.

In contrast, the continued release of mast cell mediators in SM causes chronic symptoms, which can occur daily, and triggers are specific to each person. Triggers can include bee stings, stress, lack of sleep, changes in temperature, surgery, alcohol, certain foods, and medications. The severe, life-threatening reaction of anaphylaxis is more common in people with SM.

Symptoms

The symptoms of systemic mastocytosis tend to reflect where mast cells have built up. For example, mast cells that build up in the skin can cause flushing, itching, and hives, whereas mast cells that build up in the GI tract can cause abdominal (belly) pain, bloating, and diarrhea.

People with SM generally have an increased risk of anaphylaxis—and about half experience it. This is because they have more mast cells, and those mast cells are abnormally active.

Systemic mastocytosis can happen at any point in life, but it usually affects adults. It's not common in children below the age of 18.

Another form of mastocytosis, cutaneous mastocytosis (CM), is more common among children. It tends to resolve in most children at puberty, without progressing to SM. The majority of adults with SM also have CM. This guide focuses on systemic mastocytosis.

Types

Once you're diagnosed with SM, it will be labeled as 1 of the following 6 types (including 1 subtype):

Non-advanced SM

Non-advanced SM types are chronic blood conditions.

- **Indolent systemic mastocytosis (ISM)** – The most common form of SM. Most symptoms are mild, although anaphylaxis can be the first symptom you have. It has a low risk of progressing to more severe types of SM and typically doesn't affect survival. People with ISM have a normal to near-normal life expectancy.
  - **Bone marrow mastocytosis (BMM)** – This is a subtype of ISM where the mast cells abnormally build up in the bone marrow but not in the skin or other organs. Anaphylaxis with BMM can be more frequent and severe than with ISM.
- **Smoldering systemic mastocytosis (SSM)** – More mast cells build up in this type than in ISM and BMM. Life expectancy in people with SSM may be decreased because of the mast cell buildup (called burden). It also has a higher risk of progressing to advanced SM.

Advanced SM

Advanced SM types are blood cancer.

- **Aggressive systemic mastocytosis (ASM)** – This type involves a higher number of mast cells building up in the body. The buildup can cause organ damage (usually liver, GI tract, bone, spleen, or bone marrow).
- **Systemic mastocytosis with an associated hematologic neoplasm (SM-AHN)** – This type refers to a mast cell buildup that occurs together with another blood disease (referred to as an associated hematologic neoplasm, AHN), usually myelodysplastic syndromes (MDSs), myeloproliferative neoplasm (MPN), or acute myeloid leukemia (AML).
- **Mast cell leukemia (MCL)** – A very rare but aggressive form of advanced SM that has a poor prognosis (outlook). It occurs when more than one-fifth of the fluid portion of the bone marrow (aspirate) is made of mast cells. In some cases, mast cells can be found in circulating (peripheral) blood, which has a worse prognosis.

How is SM treated?

While there's no cure for SM, most people have mild to moderate symptoms they can manage with treatments and by avoiding triggers. But people at risk for anaphylaxis need to carry emergency epinephrine devices (EpiPens) at all times. See *Chapter 3: Diagnosing SM*.

For information on the range of treatments available, see *Chapter 4: Types of treatment*.

This guide also describes treatment for your specific type of systemic mastocytosis.

For non-advanced types of SM, which include ISM and SSM, see *Chapter 5: Treatment for non-advanced types of SM*.

For advanced types of SM, which include ASM, SM-AHN, and MCL, see *Chapter 6: Treatment for advanced types of SM*.

How can I get the best care?

Advocate for yourself. You have an important role to play in your care. Many people feel more satisfied when they actively take part in planning their cancer care.

The NCCN Guidelines for Patients will help you play a larger role in your care. Discuss the recommendations in this guide with your care team. Ask questions about your options and share your goals and concerns.

Don't know what to ask? You're not alone. That's why we include suggested questions to ask at the end of chapters.

Keep reading to find the best care for you.

How this guide can help you

Making decisions about cancer care is stressful. There's a lot to learn, and you don't know what the future holds.

Use this guide to get the information and support you need.

Patients, doctors, and other health care professionals trust the NCCN Guidelines for Patients. This guide uses clear, everyday language to explain current cancer care recommendations made by respected experts in the field. Their recommendations are based on the latest research and practices at leading cancer centers.

Your health is unique to you, so your cancer care should be, too. As you read this guide, you'll learn which treatments are likely to provide the best results for you. And you'll be better prepared to talk with your care team.

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Testing for SM

10 General health tests

12 Blood tests

13 Biopsies

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20 Quality-of-life assessment

21 Key points

21 Questions to ask

Accurate testing is part of what's needed to diagnose and treat systemic mastocytosis. This chapter presents an overview of the tests you might receive and what to expect.

Systemic mastocytosis (SM) is diagnosed based on a series of test results related to your symptoms. See the next chapter about identifying your symptoms and triggers.

To diagnose SM, biopsies (testing tissue samples) are often done to measure mast cells in tissues. In addition, blood or urine tests can detect mast cell mediators. Mast cell mediators are molecules, like proteins, that are released as part of an inflammatory response. Tryptase, histamine, prostaglandins, and leukotrienes are types of mast cell mediators.

It's important you understand what these test results mean, so be sure to ask questions.

General health tests

Medical history

A medical history is a record of all health issues and treatments you've had in your life. It gives your health care provider an overall picture of your health, and that information helps guide your treatment.

For new or follow-up appointments, be prepared to list any illness or injury and when it happened. Bring a list of old and new medicines and any over-the-counter medicines, herbals, or supplements you take. Tell your health care provider about any symptoms you have. You may also want to bring in pictures of allergic skin reactions and talk about your history with them, as well as your history of anaphylaxis and potential triggers.

Family history

Some diseases can run in families. Your provider will ask about the health history of family members who are blood relatives. This information is called a family history. Ask family members about their health issues like heart disease, cancer, and diabetes, and at what age they were diagnosed.

Physical exam

During a physical exam, a provider may:

- Check your temperature, blood pressure, pulse, and breathing rate.
- Check your weight and ask if you've had unexplained weight loss.
- Listen to your lungs and heart.
- Look in your eyes, ears, nose, and throat.
- Feel and apply pressure to parts of your body to see if organs—particularly your spleen and liver—are of normal size, are soft or hard, or cause pain when touched. Tell your provider if you feel pain.
- Feel for swollen lymph nodes in your neck, underarm, and groin. Tell your provider if you've felt any lumps or have any pain.
- Conduct a complete skin exam to uncover the presence or absence of cutaneous mastocytosis, including visible red, brown, or raised spots (urticaria pigmentosa).

For a list of possible tests, see **Guide 1**.

Guide 1
Common tests for systemic mastocytosis*

Medical history and physical exam, including history of mast cell activation symptoms
Comprehensive metabolic panel with uric acid, LDH, and LFTs
Serum tryptase level
CBC with differential
Examination of blood smear
Bone marrow aspirate and biopsy with flow cytometry, immunohistochemistry, and cytogenetics
FISH test and/or multigene panel testing
Molecular testing using a high-sensitivity assay for *KIT* D816V
Myeloid mutation panel, also referred to as next-generation sequencing (NGS) panel
Assess for distress level
CT/MRI or ultrasound of the abdomen/pelvis
DEXA scan (bone density test)
Skeletal survey (plain x-rays of the bones)
Organ-directed biopsy
Upper and lower endoscopy (for patients with GI symptoms like diarrhea, weight loss)
24-hour urine studies (useful in some cases)
HLA testing (useful in some cases)
Assessment of symptom burden and quality of life (QOL) (useful in some cases)
*Note: Not all these tests are needed for systemic mastocytosis.

Blood tests

Blood tests check for signs of disease and how well organs are working. They require a sample of your blood, which is removed through a needle placed into your vein.

Comprehensive metabolic panel

A comprehensive metabolic panel (CMP) is a test that measures 14 different substances in your blood. A CMP provides important information about how well your kidneys and liver are working, among other things. If those organs are not performing right, then systemic mastocytosis could be the reason.

- **Uric acid** – A uric acid test measures the amount of uric acid, a normal waste product, in your blood. It's also known as a serum urate test or a uric acid level. In some people, high levels of uric acid can cause gout and affect kidney function.
- **Lactate dehydrogenase (LDH)** – LDH is a type of protein in blood, known as an enzyme. It's found in most of the body's tissues. When these tissues are damaged, they release LDH into the bloodstream or other body fluids. If your LDH levels are high, it may mean certain tissues in your body have been damaged by disease or injury.
- **Liver function tests (LFTs)** – LFTs look at the health of your liver by measuring chemicals made or processed by the liver. Levels that are too high or low signal that the liver is not working well or that the bile ducts are blocked. This could mean mast cells are affecting the liver.

Complete blood count with differential

A complete blood count (CBC) measures the number of red blood cells, white blood cells, and platelets in your blood. Systemic mastocytosis can show as a shortage of red blood cells (anemia) or platelets (thrombocytopenia), as well as too many white blood cells (eosinophilia or monocytosis).

There are several types of white blood cells. A differential counts the number of each type of white blood cell. It also checks if the counts are in balance with each other.

Serum tryptase level

This type of blood test can help figure out if a severe allergic reaction has occurred. It measures the amount of tryptase in the blood. Tryptase is an enzyme released from mast cells.

Urine mediator test

Urine mediator tests are often used to help determine the presence of mast cell mediators in your body. The state of mast cell activation can be measured by urine levels of N-methyl histamine, prostaglandin D2, and leukotriene E4. Mast cells release mediators as part of a normal immune response or an allergic reaction.

The test evaluates mediator production in urine provided over a 24-hour period, a longer time frame than a blood test.

Blood smear

A blood smear is often used for further testing if the results of your CBC are abnormal. This test is used to evaluate and measure the different types of blood cells as well as the presence of mast cells. It can be used to diagnose other blood disorders occurring in association with systemic mastocytosis.

Biopsies

A biopsy is the removal of a sample of tissue or group of cells for testing. It's an important part of an accurate diagnosis. Your sample should be reviewed by a pathologist who is an expert in the diagnosis of systemic mastocytosis. The pathologist will note the overall appearance and the size, shape, and type of your cells. Tests will be done on the biopsied cells. These tests are discussed next.

Bone marrow aspiration and biopsy

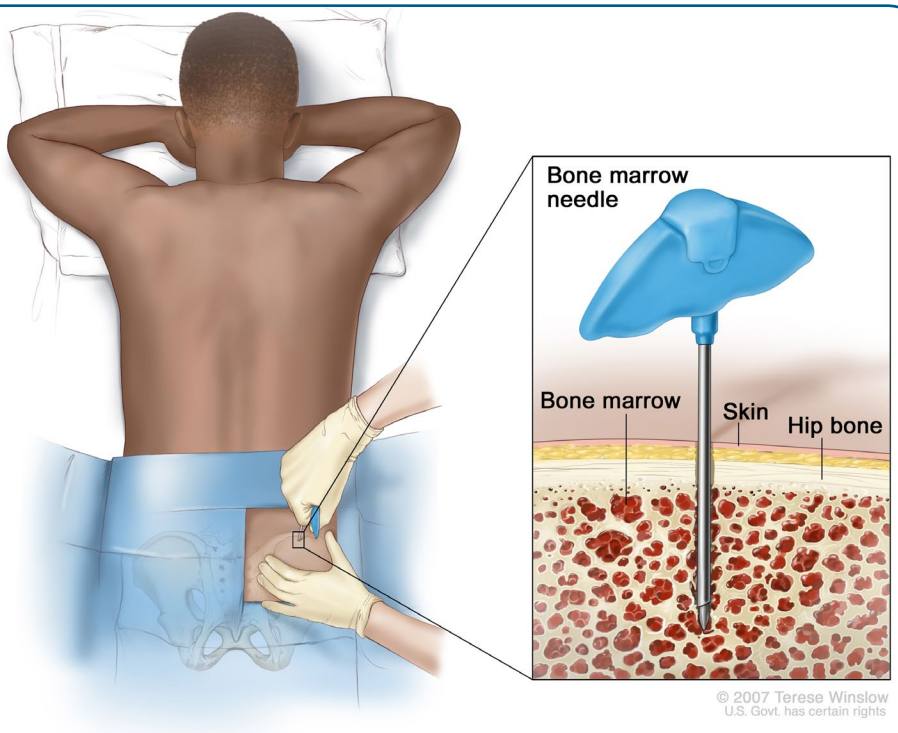
Your provider might order a bone marrow aspiration and biopsy to look for increased mast cells in the bone marrow. Bone marrow is like a sponge holding liquid. A bone marrow aspiration takes some of the liquid out of the sponge; a biopsy takes a piece of the sponge. For aspiration, a hollow needle is pushed through your skin and into the bone. Liquid bone marrow is then drawn into a syringe.

For the biopsy, a needle is used to remove a core sample (usually 1 to 2 centimeters in length) of the solid part of marrow. The sample will be sent to a lab for testing. You may feel pain at your hip bone for a few days. Your skin may bruise.

Ask your provider about the type of bone marrow test you might have and where the sample will be taken from. The bone marrow is usually taken from the back of the pelvic bone on the right or left side of the upper buttocks (called the posterior superior iliac crest). Also, it's important to ask about your options for medicine to help you relax and block pain involved with the procedure. Many specialists now offer mild sedation for bone marrow biopsies.

Bone marrow aspiration and biopsy

Here you see a hollow needle inserted through the bone to remove a sample.



Organ-directed biopsies

With systemic mastocytosis, you can expect to receive one of the following organ-directed biopsies, depending on your symptoms.

Skin biopsy

If you have brown or tan spots that become inflamed and red upon touching (called Darier's sign), it's likely you have urticaria pigmentosa (UP). This is the cutaneous (skin) form of mastocytosis. The rash typically appears on the upper thighs and can involve the abdomen, trunk, and chest. A skin punch biopsy can confirm the diagnosis. A skin punch biopsy is a small, circular biopsy that takes a sample of affected skin. The sample is then sent to a lab to be examined. The biopsy will leave a scar, so be sure to ask your provider about it if you're concerned.

Upper GI endoscopy

If you have abdominal symptoms (like pain, nausea, vomiting, and diarrhea), your provider might order an endoscopy to examine your upper gastrointestinal (GI) tract.

This procedure uses a long, tube-like device, called an endoscope, with a built-in light and miniature video camera. After being given a sedative (medicine to help you relax for the procedure) and a numbing medicine for your throat, the endoscope is guided down the throat.

It then goes into the esophagus, stomach, and upper parts of the small intestine and can take painless biopsies of suspicious areas along the way. This allows your provider to visually inspect the lining of these organs and to look for any signs of cancer or other abnormalities, such as dilated blood vessels or ulcers, that can result from the buildup of mast cells.

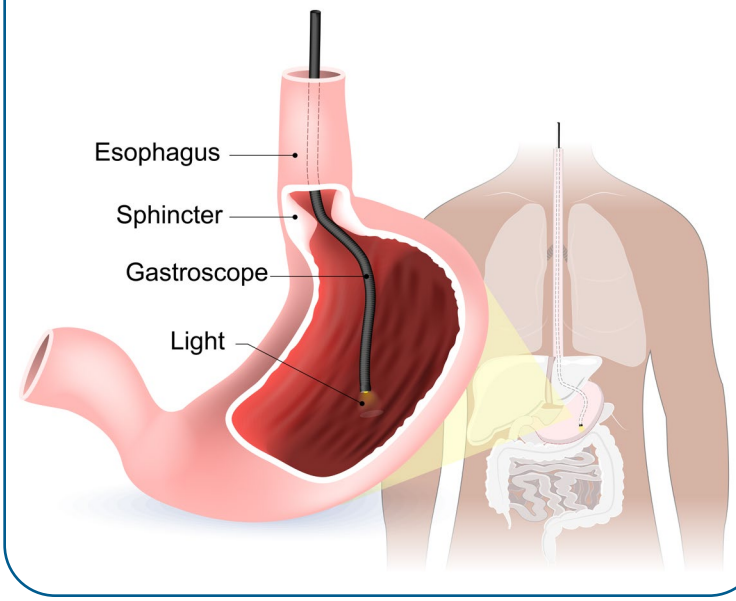
During the endoscopy, your doctor will take biopsies to identify buildups of mast cells. The biopsies will be sent to the lab for analysis. After the procedure, your throat may feel sore, and you may have some swelling.

Liver biopsy

An enlarged liver may be a sign of SM—but it's also a sign of many other illnesses. To help figure out the cause, your provider might order a liver biopsy. In a liver biopsy, a needle may be inserted through the skin of the abdomen to remove a liver sample. Or a needle may be inserted through a large vein in your neck (jugular) and threaded down to a vein (inferior vena cava) near your liver. You'll receive local anesthesia to fully numb the area before receiving the needle.

Upper GI endoscopy

Upper GI (gastrointestinal) endoscopy allows your doctor to see the inner wall of your stomach and esophagus. If ultrasound is used, your doctor will be able to see the deeper wall layers and nearby organs.



Immunophenotyping

Immunophenotyping is a type of diagnostic test that looks for the presence or absence of specific white blood cell antigens. These antigens are proteins that can be found on the surface of or inside white blood cells and help identify the specific type of blood cells.

A complete blood test can count the number of white blood cells, but it cannot detect the subtle differences between different types of blood cancers. These differences are detected by immunophenotyping.

There are 2 methods of immunophenotyping:

- Flow cytometry
- Immunohistochemistry

Flow cytometry

Flow cytometry is a laboratory method used to detect, identify, and count specific cells. Flow cytometry involves adding a light-sensitive dye to cells. The dyed cells are passed through a laser beam in a machine. The machine measures the number of cells, their size and shape, and other unique features. Flow cytometry may be used on cells from circulating (peripheral) blood or from a bone marrow aspirate.

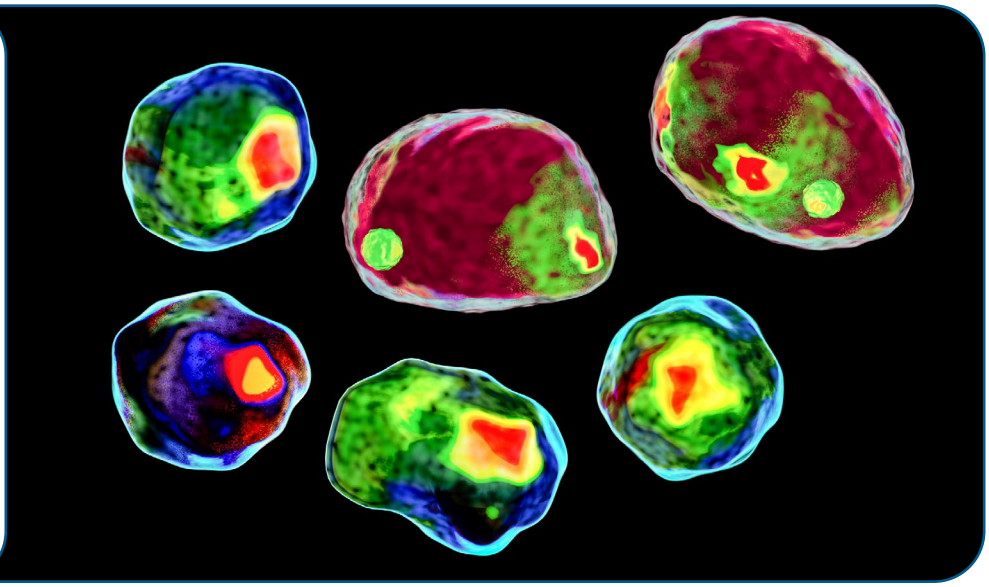
Biomarkers of mastocytosis found by flow cytometry include the proteins CD2, CD25, CD30, CD34, and CD117.

Immunohistochemistry

Immunohistochemistry (IHC) is a special staining process that involves adding a chemical marker to cells in a tissue biopsy. The cells are then studied using a microscope to identify specific proteins. Proteins that help diagnose SM include tryptase as well as CD2, CD25, CD30, and CD117.

Cells studied with flow cytometry

Lasers light up the dye in the cell that gives specific details about them.



Genetic tests

Your health care provider may suggest testing for gene mutations. Genes tell cells what to become and what to do. In a process called mutation, something goes wrong in the genetic code. This can cause cells to grow and divide out of control.

Genetic testing looks for the presence or absence of certain gene mutations. It can be done on bone marrow or a blood sample. Test results help your treatment team learn more about your disease and to make a treatment plan.

Cytogenetics

Cytogenetics is a type of genetic test that uses samples of tissue, blood, or bone marrow to look for changes in chromosomes. A chromosome is a long DNA molecule that contains the genetic material of an organism. The test specifically looks for broken, missing, rearranged, or extra chromosomes. In advanced SM, cytogenetic changes may be found on bone marrow chromosome analysis. Cytogenetic changes are usually associated with a less favorable prognosis (outlook).

Myeloid mutation panel

A myeloid mutation panel is a blood test used to identify mutated genes. This panel can evaluate 50 to more than 200 genes. It helps to diagnose and manage diseases such as acute myeloid leukemia (AML), myelodysplastic syndrome (MDS), myeloproliferative neoplasm (MPN), and MDS/MPN.

It also helps identify mutations in genes like *SRSF2*, *ASXL1*, and *RUNX1*. This is important because these mutations signal more advanced mast cell disease.

KIT gene mutations

A mutation in the *KIT* gene (called *KIT* D816V) is the most common genetic change found in people with systemic mastocytosis (SM) and is a diagnostic marker of the disease. See more about the *KIT* gene in *Chapter 1: About systemic mastocytosis*.

With high-sensitivity tests, the mutation can be found in nearly every person with SM.

The *KIT* D816V mutation is important to find because targeted therapies (like avapritinib and midostaurin), called KIT inhibitors, can help treat SM in people who have this mutation.

It should be noted that this panel is not sensitive enough to detect a low-level *KIT* D816V mutation that occurs with SM. If the panel is negative for the *KIT* D816V mutation but your care team still suspects you might have SM, you'll need additional, more sensitive testing. Possibilities include droplet digital PCR (ddPCR) or allele-specific PCR for *KIT* D816V (discussed next).

PCR

A polymerase chain reaction (PCR) test makes millions of exact copies of a specific genetic (DNA) sample. This allows pathologists to get a closer look at the DNA.

Two highly sensitive types of PCR include **droplet digital PCR (ddPCR)** and **allele-specific PCR (AS-PCR)**. They both detect the *KIT* D816V mutation but in different ways.

ddPCR allows scientists to measure the absolute number of DNA molecules by splitting the sample into 20,000 microscopic droplets. It can find one mutation in that total and tell the exact amount.

AS-PCR can help scientists find a gene mutation. An allele is a specific version of a gene. If the test finds the *KIT* D816V mutation, the PCR test makes millions of copies of it. If it doesn't find it, the test is negative.

FISH test

Fluorescence in situ hybridization (FISH) is a method that involves special dyes called probes that attach to pieces of DNA. FISH can look for translocations (parts that are switched between 2 chromosomes) and inversions (parts that are switched within 1 chromosome) that are too small to be seen with other methods. However, it can only be used for known changes. It cannot detect all the possible changes found within your chromosomes (karyotype). This test may be used as part of the diagnostic workup for other blood cancers when systemic mastocytosis is suspected.



Hereditary alpha-tryptasemia

Hereditary alpha-tryptasemia (HαT) refers to a genetic variant (called a polymorphism). People with HαT inherited an extra copy of the gene (*TPSAB1*) that makes a protein called tryptase.

Since they have extra genes making the protein, they end up with more tryptase. And too much tryptase can mean too many mast cells or systemic mastocytosis (SM).

People with SM are more likely to have HαT. But people without SM also can have it.

HαT may or may not lead to symptoms, and in most cases it doesn't. But when symptoms occur, they may include:

- Itchy skin, flushing, hives, and anaphylaxis
- Gastrointestinal (GI) symptoms, such as bloating, abdominal pain, diarrhea and/or constipation, heartburn, and difficulty swallowing
- Connective tissue symptoms, such as hypermobile joints and scoliosis
- Cardiac symptoms, such as a racing or pounding heartbeat or blood pressure swings with/without fainting

HLA typing

Human leukocyte antigens (HLAs) are proteins found on the surface of most cells. They play an important role in your body's immune response.

HLAs are unique to each person. They mark your body's cells. Your body detects these markers to tell which cells are yours. Each person's set of HLAs is called the HLA type or tissue type.

HLA typing is a blood test that detects a person's HLA type. This test is done to identify the best match between a donor (allogeneic) and the recipient before a hematopoietic cell transplant (a treatment for advanced types of systemic mastocytosis). To find a donor match, which is most commonly a sibling or an unrelated donor, your HLA type will be compared to the donor's HLA type to see how many proteins are the same.

Imaging

Imaging tests take pictures (images) of the inside of your body. You might need imaging to get more details about organs that might be affected and cause symptoms of systemic mastocytosis. A radiologist, an expert in interpreting test images, will write a report and send it to your provider. Your test results will be discussed with you.

CT scan

A computed tomography (CT or CAT) scan is when many pictures are taken from different angles of the same body part by a computerized x-ray machine. The pictures are merged to form a 3D image.

In some cases, contrast material is used to make the pictures of the inside of the body clearer. Contrast materials are not dyes, but substances that help enhance and improve the images of several organs and structures in the body. Contrast might be taken by mouth (oral)

CT machine

A CT machine is large and has a tunnel in the middle. During the test, you will lie on the table that moves slowly through the tunnel.



or given through a vein (IV). The contrast is not permanent and leaves the body through your urine immediately after the test.

You should be instructed to drink about 8 to 10 glasses of water for 24 hours after you have the contrast. This helps to flush the contrast from your system, including the kidneys.

Tell your providers if you've had allergic reactions to contrast in the past. This is important. You might be given medicines, such as diphenhydramine (Benadryl) and prednisone (corticosteroids) to avoid the effects of those allergies. Contrast might not be used if you have a serious allergy or if your kidneys are not working well.

For patients with SM, a CT scan may be used to detect:

- Enlargement of the spleen or liver (which could mean smoldering SM).
- Increased number or size of lymph nodes (lymphadenopathy, which can indicate infections or cancer).
- Increased fluid in the abdominal cavity, referred to as ascites, which may indicate more advanced SM.
- Portal hypertension (high blood pressure in the portal vein), which is suggested by changes in the appearance of the liver and surrounding blood vessels.
- Sclerotic (becoming denser) or lytic (becoming weaker) changes in the bones, which can be further evaluated by dedicated x-rays.

MRI scan

Magnetic resonance imaging (MRI) is when strong magnets and radio waves take digital pictures of the inside of the body. An MRI does not use x-rays. Contrast might be used. Similar findings may be found on MRI as noted above by CT. MRI can be useful for taking 3D measurements of the spleen and liver. People with pacemakers, metal clips, or other metal foreign bodies may not be candidates for an MRI scan, so a CT may be another option.

Ultrasound

An ultrasound uses high-energy sound waves to form pictures of the inside of the body. A probe will be pressed onto your abdomen. This is like the sonogram used for pregnancy. Ultrasound is painless and does not use x-rays, so it can be repeated as needed. Sometimes, an ultrasound or CT is used to guide a biopsy. An ultrasound can be used to evaluate the size of the spleen or liver, as well as the presence of ascites, portal hypertension, and other SM-related findings in the abdomen (belly).

DEXA scan

A dual x-ray absorptiometry (DEXA) scan is an imaging test that measures bone strength (density). DEXA scans are used to determine your risk for osteoporosis (bone loss) and osteopenia (weakened bones). Osteoporosis and osteopenia are common complications of mast cell disease.

Skeletal survey

A skeletal survey, also referred to as a bone survey, is a series of plain x-rays taken to look at all the bones in your body. This test is used to determine if bone disease is present, specifically the presence of sclerotic lesions (thickened areas of bone), lytic lesions (punched out, weakened areas of bone), and pathological fractures (bone breaks). Sclerotic lesions are common in mast cell diseases. But lytic lesions, especially large lesions, indicate advanced disease and may lead to bone fractures. This can be especially challenging in weight-bearing areas like the pelvis and hips, legs, ankles, and feet.

Quality-of-life assessment

You may be asked to complete a quality-of-life assessment. It's a questionnaire designed specifically for people with mastocytosis. It's used to identify your current physical and mental wellness, as well as your ability to function in your daily activities. It also tracks how treatment improves or affects your quality of life.

Quality of life refers to a person's overall enjoyment of life, including their sense of well-being and ability to participate in their usual activities.

"Be your own advocate. Talk to someone who has gone through the same thing as you. Ask a lot of questions, even the ones you are afraid to ask. You have to protect yourself and ensure you make the best decisions for you, and get the best care for your particular situation."

Key points

- Systemic mastocytosis (SM) is diagnosed based on a series of test results. Your diagnosis will determine your treatment plan. It's important you understand what these tests mean.
- Blood tests and urine tests check for signs of disease and how well organs are working. They require a sample of your blood, which is removed through a needle placed into your vein, and a sample of your urine.
- A biopsy is the removal of a sample of tissue or group of cells for testing. It's an important part of an accurate diagnosis.
- Immunophenotyping uses antibodies to detect the presence or absence of white blood cell antigens. These antigens are proteins that can be found on the surface of or inside white blood cells and are used to detect the abnormal mast cells found in SM.
- Genetic testing looks for the presence or absence of certain gene mutations. Test results will help your treatment team learn more about your disease and make a treatment plan.
- Imaging tests, such as a CT scan, MRI, or ultrasound, take pictures of the inside of your body. They can measure the size of the spleen, liver, and lymph nodes and identify other potential issues related to SM.
- Identifying the *KIT* D816V mutation is an important part of genetic testing for SM. That's because once this mutation is found, it can be targeted with therapies like KIT inhibitors.

Questions to ask

- What tests do I need? What other tests do you recommend?
- What are my options to make me comfortable during testing?
- How do I prepare for testing?
- How and where will the tests be done?
- How soon will I know the results and who will explain them to me?

What's next?

This chapter gave an overview of the different types of tests that can be used to diagnose systemic mastocytosis and guide its treatment. The next chapter addresses signs and symptoms as well as triggers that need to be considered (along with test results) in your diagnosis.

3
Diagnosing SM

23 Signs and symptoms

24 Triggers

25 Diagnosis

26 Key points

26 Questions to ask

Diagnosis of systemic mastocytosis (SM) depends on your signs, symptoms, and triggers. If it's determined you have SM after evaluating your symptoms and testing, you'll be diagnosed with 1 of 6 types of SM.

Signs and symptoms: What's the difference?

Signs are the effects of a health problem that other people can see (like rashes, bleeding, or swelling), and **symptoms** are those that the person experiences and others can't see (like pain, nausea, or feeling tired).

Signs and symptoms

Signs and symptoms of systemic mastocytosis (SM) are key to diagnosis, management, and treatment. Symptoms of SM differ and are based on the part of the body affected by the buildup (accumulation) of mast cells. It's always important to let your health care provider know about any symptoms you're experiencing.

Signs and symptoms can include any one or many of the following.

Skin signs and symptoms

- Flushing (skin redness and warmth)
- Macules (flat, brown or tan discolored spots less than 1 centimeter wide—about the width of a pencil)
- Itching
- Hives (also called urticaria; raised, itchy welts or bumps)
- Swelling (due to leaky blood vessels called angioedema)

Gastrointestinal (GI) signs and symptoms

- Abdominal pain
- Bloating
- Nausea
- Reflux
- Vomiting
- Diarrhea

Heart signs and symptoms

- Rapid heart rate
- Shortness of breath
- Chest pain
- Arrhythmia (irregular heartbeat, which may feel like palpitations)
- Low blood pressure, which can lead to lightheadedness and fainting

Mood and behavior symptoms

- Brain fog
- Anxiety
- Inability to concentrate
- Short memory span

Other signs and symptoms

- Wheezing, shortness of breath
- Nasal congestion and itching
- Bone/muscle pain
- Fatigue
- Dizziness
- Frequent headaches
- Anaphylaxis

You may also have swelling of the lymph nodes, liver, and spleen as well as anemia (low iron in your blood).

Triggers

Symptoms of systemic mastocytosis can happen on their own (spontaneously), but they are more likely to occur if triggered.

Common triggers can include what you eat, drink, do, or take:

- Spicy foods
- Alcohol
- Exercise
- Certain medications and vaccinations
- Surgery and other medical procedures

Triggers can also come from your environment or within your body:

- Insect stings and animal venoms
- Extreme temperatures or sudden temperature changes
- Sun/sunlight

A life-threatening anaphylactic reaction can happen as a complication of systemic mastocytosis. Your provider will want you to keep 2 injectable forms of epinephrine with you at all times.



- Natural or chemical fumes and odors
- Friction or vibrations on the skin
- Physical and emotional stress
- Infections

Complications

Effectively managing symptoms and triggers can help avoid complications from systemic mastocytosis. Complications are an unwanted result of a disease or treatment that's not well controlled. They may negatively affect outcomes. Some complications of systemic mastocytosis include:

- **Anaphylactic reaction (anaphylaxis)** – Rapid heartbeat, fainting, loss of consciousness, and shock. This type of severe allergic reaction may require a shot of epinephrine. An epinephrine injection (EpiPen) is an emergency treatment for life-threatening anaphylaxis.
- **Blood disorders** – Anemia (not enough red blood cells), cytopenia (low numbers of white blood cells, red blood cells, and/or platelets), and poor blood clotting (not enough platelets).
- **Peptic ulcer disease** – Ulcers and pain in your GI tract.
- **Reduced bone density** – Osteoporosis and osteopenia.
- **Bone fractures** – Caused by weakened bones.
- **Liver, spleen, and lymph node problems** – Swelling and issues with how these organs function.
- **Organ failure** – Swelling/enlargement and resulting damage to organs.

Diagnosis

Systemic mastocytosis is often diagnosed by the signs and symptoms mentioned above, or if you experience anaphylaxis and your health care provider recommends more testing. After a physical exam, your provider may recommend a bone marrow biopsy or bone imaging, and blood and/or urine tests to measure the levels of specific chemicals or substances related to mast cells.

If tests show high levels of these substances or the presence of atypical (unusual) mast cells, you're likely to be diagnosed with SM.

You may also receive other tests to confirm or define your diagnosis. These include other types of imaging like MRI and CT scans, a GI workup, or genetic testing to confirm a *KIT* gene mutation. See *Chapter 2: Testing for SM* for the variety of tests you could have.

Test results will identify 1 of 6 types (including 1 subtype) of systemic mastocytosis that are either non-advanced or advanced:

Non-advanced

- Indolent SM (ISM)
  - Bone marrow mastocytosis (BMM, a subtype of ISM)
- Smoldering SM (SSM)

Advanced

- Aggressive SM (ASM)
- SM with associated hematologic neoplasm (SM-AHN)
- Mast cell leukemia (MCL) with or without AHN

Key points

- Signs and symptoms are key to diagnosing systemic mastocytosis (SM).
- Triggers are what can cause symptoms.
- Complications can result from symptoms that are not well controlled.
- Once tests have been completed, you'll be diagnosed with 1 of 6 types of SM.

Questions to ask

- Can you explain my diagnosis as simply as possible?
- How manageable is my type of systemic mastocytosis?
- Is there a cancer center or hospital nearby that specializes in systemic mastocytosis?
- Will I need more testing?
- Is there a member of your team who can help with the emotional and financial challenges I might experience?

"It's OK to have bad days but don't let yourself stay there. A positive attitude goes a long way."

What's next?

Once you receive your diagnosis and know your type of SM, you'll be treated based on this information. The next chapter is an overview of the different types of treatments for SM. Keep in mind this is just an overview, and you won't receive all treatments for your type of SM. For more specific treatments, go to the chapter for your type of systemic mastocytosis (either non-advanced or advanced).



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NCCN.org/patients/comments

4

Types of treatment

28 Care team

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38 Key points

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This chapter presents an overview of the different treatments for systemic mastocytosis. Together, you and your care team will choose a treatment plan that's best for you.

Several treatments are available to help manage systemic mastocytosis (SM). This often means combining medicines to treat the various symptoms that result from mast cell activation (called anti-mediator drug therapy). Treatments and other information are discussed ahead and listed in **Guide 2**. You won't have all treatments included in this chapter.

Most importantly, treatment starts with talking with your care team.

Care team

Treatment decisions should involve a multidisciplinary care team. This is a team of health care providers from different professional backgrounds who have knowledge (expertise) and experience with SM. This team is united in planning and implementing your treatment. Ask who will coordinate your care.

You know your body better than anyone. Help your care team members understand:

- How you feel
- What you need
- What's working and what's not

Once you work with your care team, treatment for SM is next.

Treatment level of preference

All treatments listed in this guide are recommended and appropriate. When helpful, NCCN experts also assign a level of preference to their recommendations for certain systemic therapies like chemotherapy and targeted therapies to treat systemic mastocytosis:

- **Preferred therapies** have the most evidence they may work better and be safer than other therapies.

Guide 2
Common treatments for systemic mastocytosis (in alphabetical order)

Allogeneic hematopoietic cell transplant (HCT)
Antihistamines
Bisphosphonates
Chemotherapy
Clinical trials
General supportive care
Immunosuppressants
Mast cell stabilizer (cromolyn sodium)
Monoclonal antibody (omalizumab)
Observation
Targeted therapy

- **Other recommended therapies** can provide effective results but may have less evidence, more side effects, or may not work quite as well as preferred therapies.
- **Therapies used in certain cases** work best for individuals with specific cancer features or health circumstances.

Observation

Observation may be mentioned as part of your treatment. It's a plan that closely watches your condition. Observation may also be referred to as surveillance, monitoring, or watch-and-wait. During this time, you'll have tests on a regular basis to look for any new or changing symptoms. You won't have any treatment during observation.

Supportive care

Supportive care includes a wide range of services available to you. Supportive care prevents or manages the symptoms of cancer and the side effects of cancer treatment, like pain and cancer-related fatigue. It also addresses the mental, social, emotional, and spiritual concerns faced by people with cancer.

Supportive care provides help with additional needs, such as:

- Making treatment decisions
- Coordinating your care
- Paying for care
- Planning for advance care and end of life



Your care team

Treating systemic mastocytosis takes a team of doctors and other experts. Your care team may include:

Dermatologists diagnose and treat skin diseases.

Hematologists diagnose and treat blood diseases and cancers.

Pathologists evaluate and test blood and tissue to diagnose and classify disease.

Gastroenterologists diagnose and treat diseases that occur in the gastrointestinal system.

Allergists diagnose and treat asthma and other allergic diseases.

Immunologists diagnose and treat conditions related to the immune system.

Endocrinologists diagnose and treat hormone-related conditions, like osteoporosis.

Neurologists evaluate and treat nerve symptoms and pain.

Mental health therapists can help manage distress and provide support.

Some health care professionals refer to palliative care as supportive care. They think these types of care are alike or overlap. Others think there are important differences, but both help people with cancer to live as well as they can. Your cancer center may have palliative care specialists, who can give you additional support and help coordinate your supportive care needs.

Read more about the types of support you may receive in *NCCN Guidelines for Patients: Palliative Care*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



Supportive care can help ease a variety of SM symptoms, including those listed below.

Diarrhea

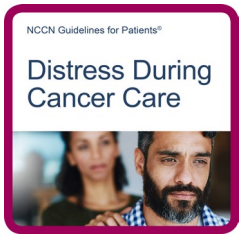
Diarrhea is frequent and watery bowel movements (poop). Your care team will tell you how to manage diarrhea and may recommend medicines to stop it. It's important to drink lots of fluids. Changes to your diet might help.

Distress

Distress is an unpleasant experience of a mental, physical, social, or spiritual nature. It can affect how you feel, think, and act. Distress might include feelings of sadness, fear, helplessness, worry, anger, and guilt.

Depression, anxiety, and sleeping problems are common in people with cancer. Talk to your provider and those with whom you feel most comfortable about how you're feeling. There are services and people who can help you.

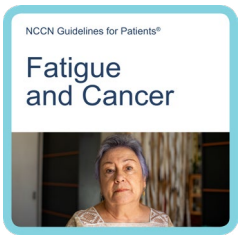
For more information, see *NCCN Guidelines for Patients: Distress During Cancer Care*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



Fatigue

Fatigue is a feeling of weariness, tiredness, or a lack of energy. There are treatments for fatigue. Let your care team know how you're feeling and if fatigue is getting in the way of doing the things you enjoy. Eating a balanced diet, exercise, yoga, and massage therapy can help. You might be referred to a dietitian (an expert in nutrition and food) to help with fatigue.

For more information, see *NCCN Guidelines for Patients: Fatigue and Cancer*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.

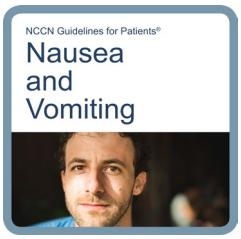


Fertility

Fertility is the ability to have children. While SM doesn't affect fertility, its treatments might. In order to preserve your fertility, action may be needed before starting treatment. But this isn't always possible. People who want to have children in the future should be referred to a fertility specialist to discuss the options.

Nausea and vomiting

Nausea and vomiting could be a sign of SM but are not specific to the disease. There are medicines to treat nausea and vomiting. For more information, see *NCCN Guidelines for Patients: Nausea and Vomiting*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



Trouble eating

Sometimes the symptoms of systemic mastocytosis might cause you to feel not hungry or sick to your stomach (nauseated). You might have a sore mouth. Healthy eating is important during treatment. It includes eating a balanced diet, eating the right amount of food, and drinking enough fluids.

A registered dietitian can help. Speak to your care team if you have trouble eating or maintaining your weight.

Pain

Pain is common in systemic mastocytosis. It might be caused by nausea and vomiting or abdominal cramps from diarrhea. It can also be in a bony area that's painful from mast cells causing destruction there. Tell your care team about any pain or discomfort. You might meet with a palliative care or pain specialist to manage pain.

Epinephrine

Epinephrine, also known as adrenaline, is in a class of medicines called alpha- and beta-adrenergic agonists (sympathomimetic agents) used in emergencies to treat allergic reactions. It's a hormone made in the adrenal glands. Epinephrine quickly improves breathing; stimulates the heart; raises blood pressure; reverses hives; and reduces swelling of the face, lips, and throat. An EpiPen is a form of epinephrine you can inject yourself through your skin—often in the thigh—to reverse anaphylaxis (a life-threatening allergic reaction and a medical emergency). NCCN experts recommend always keeping 2 EpiPens with you in case of anaphylaxis.

Antihistamines

Antihistamines, also referred to as allergy medicine, block histamines to stop allergy symptoms. A histamine is a chemical that your immune system releases to defend against an allergen. Antihistamines are used to treat systemic mastocytosis because many of its symptoms are like an allergic reaction. Antihistamines can control itchy skin, watery eyes, and other allergic symptoms of SM.

Common antihistamines used for treating symptoms of systemic mastocytosis include (in alphabetical order):

- Cetirizine hydrochloride (Zyrtec)
- Cimetidine (Tagamet)
- Desloratadine (Clarinex)
- Doxylamine (Unisom)
- Famotidine (Pepcid)
- Fexofenadine (Allegra)
- Hydroxyzine (Atarax, Vistaril)
- Ketotifen (Zaditen)
- Levocetirizine (Xyzal)
- Loratadine (Claritin)

Mast cell stabilizer

Cromolyn sodium is a mast cell stabilizer that helps reduce inflammation. Mast cell stabilizers prevent the release of histamine and other chemical mediators by mast cells. They can be used to prevent or treat a variety of symptoms of systemic mastocytosis. Cromolyn sodium can be taken by mouth, as eye drops, as a topical ointment, and as a nasal spray; it can also be inhaled using a nebulizer.

Monoclonal antibody

Monoclonal antibody treatment is a type of immunotherapy that can reduce the release of allergy-causing substances in your body. By doing this, it can shrink airway inflammation and make it easier to breathe. Omalizumab (Xolair) is a monoclonal antibody that treats allergic asthma, chronic hives, and food allergies. It's given as an injection by your provider in a hospital or clinic.

Bisphosphonates

Bisphosphonates are medicines that help strengthen bones and prevent bone loss from osteoporosis and other conditions. You might need bisphosphonates if you have a DEXA scan that shows osteoporosis or osteopenia.

Common bisphosphonates include:

- Alendronate (Fosamax)
- Ibandronate (Boniva)
- Risedronate (Actonel)
- Zoledronic acid (Reclast)

"Having a chronic, rare disease comes with so much uncertainty. Providers need to be reminded sometimes that the emotional component is real and is as important as the physical one."

Immunosuppressants

Immunosuppressive therapy (IST) uses materials made either by the body or in a lab to improve, target, or restore immune system function. IST is a type of drug therapy that lowers the body's immune response to allow bone marrow stem cells to grow and make new blood cells. Immunosuppressants can be topical (on your skin) or systemic (works throughout your body).

ISTs used to treat systemic mastocytosis include:

- Biologic response modifiers
- Corticosteroids (prednisone)

Biologic response modifiers

Biologic response modifiers (BRMs) are a type of treatment that activates the body's immune system to fight cancer. BRMs are also referred to as immunotherapy. They help the immune system do its job.

Peginterferon alfa-2a (Pegasys), is a BRM used to treat systemic mastocytosis. It's an interferon formulation that helps regulate the immune system. Your body makes the protein interferon to help fight viruses. Peginterferon alfa-2a helps boost that ability and can be used in more advanced types of systemic mastocytosis. It's injected into the skin (subcutaneously). It can be used with or without prednisone. Because of emerging new treatments, peginterferon alfa-2a is used less frequently now.

Corticosteroids

Corticosteroids, or steroids, are lab-made immunosuppressants used to reduce inflammation. Steroids can be applied to the skin as an ointment or gel, inhaled through the mouth, used as a mouth (oral) rinse, taken as a pill, or given as an infusion through an IV.

Steroids

In systemic mastocytosis, corticosteroids (steroids) are used to help reduce allergies and inflammation. The most common types of steroids are tablets, liquid, or intravenous (injection into a vein).



Steroids can cause short-term and long-term side effects. Ask your care team about possible side effects.

Steroids used to treat systemic mastocytosis include:

- Prednisone
- Beclomethasone dipropionate (Diprolene)
- Dexamethasone/dexamethasone sodium phosphate
- Hydrocortisone (Cortef)
- Methylprednisolone (Solu-Medrol)

Targeted therapy

Targeted therapy is a form of systemic therapy that works throughout your body. It focuses on specific or unique features of cancer cells. Targeted therapies seek out how cancer cells grow, divide, and move in the body. These drugs stop the action of molecules that help cancer cells grow and/or survive.

Tyrosine kinase inhibitors

A tyrosine kinase inhibitor (TKI) is a type of targeted therapy that works by blocking the signals that cause cancer to grow and spread or by blocking proteins that cause mast cells to build up in systemic mastocytosis. In systemic mastocytosis, TKIs are targeted against the mutated *KIT* D816V protein, the major disease driver. So, they are also referred to as KIT inhibitors.

TKIs are typically used alone. But in severe cases of SM that advance to acute myeloid leukemia, or systemic mastocytosis with an associated hematologic neoplasm, TKIs could be used with other systemic therapies, like chemotherapy.

TKIs used to treat systemic mastocytosis include:

- Avapritinib (Ayvakit)
- Imatinib mesylate (Gleevec), if negative for the *KIT* mutation
- Midostaurin (Rydapt)

Chemotherapy

Chemotherapy kills fast-growing cells throughout the body, including cancer cells and normal cells. Chemotherapy drugs used to treat systemic mastocytosis damage the DNA of cells, which causes them to die.

Cladribine (Leustatin) is a chemotherapy drug used to treat advanced types of systemic mastocytosis. Because of emerging new treatments, it's used less frequently than in the past.

Cladribine is typically used when TKIs stop working, or when patients have rapidly progressing mast cell leukemia or systemic mastocytosis advances to acute myeloid leukemia.

Clinical trials

Sometimes people with systemic mastocytosis can be enrolled in a clinical trial as another form of treatment. Because SM is a rare condition, clinical trials are highly encouraged to identify new drugs that show promise in the disease.

A clinical trial is a type of medical research study. After being developed and tested in a lab, potential new ways of fighting cancer need to be studied in people.

If found to be safe and effective in a clinical trial, a drug, device, or treatment approach may be approved by the U.S. FDA.

Everyone with cancer should carefully consider all of the treatment options available for their cancer type, including standard treatments and clinical trials. Talk to your doctor about whether a clinical trial may make sense for you.

Phases

Most cancer clinical trials focus on treatment and are done in phases.

- **Phase 1** trials study the safety and side effects of an investigational drug or treatment approach.
- **Phase 2** trials study how well the drug or approach works against a specific type of cancer.
- **Phase 3** trials test the drug or approach against a standard treatment. If the results are good, it may be approved by the FDA.
- **Phase 4** trials study the safety and benefit of an FDA-approved treatment.



Finding a clinical trial

In the United States

NCCN Cancer Centers

NCCN.org/cancercenters

The National Cancer Institute (NCI)

cancer.gov/about-cancer/treatment/clinical-trials/search

Worldwide

The U.S. National Library of Medicine (NLM)

clinicaltrials.gov

Need help finding a clinical trial?

NCI's Cancer Information Service (CIS)

1.800.4.CANCER (1.800.422.6237)

cancer.gov/contact

Who can enroll?

It depends on the clinical trial's rules, called eligibility criteria. The rules may be about age, cancer type and stage, treatment history, or general health. They ensure that participants are alike in specific ways and that the trial is as safe as possible for the participants.

Informed consent

Clinical trials are managed by a research team. This group of experts will review the study with you in detail, including its purpose and the risks and benefits of joining. All of this information is also provided in an informed consent form. Read the form carefully and ask questions before signing it. Take time to discuss it with people you trust. Keep in mind that you can leave and seek treatment outside of the clinical trial at any time.

Will I get a placebo?

Placebos (inactive versions of real medicines) are almost never used alone in cancer clinical trials. It is common to receive either a placebo with a standard treatment, or a new drug with a standard treatment. You will be informed, verbally and in writing, if a placebo is part of a clinical trial before you enroll.

Are clinical trials free?

There is no fee to enroll in a clinical trial. The study sponsor pays for research-related costs, including the study drug. But you may need to pay for other services, like transportation or childcare, due to extra appointments. During the trial, you will continue to receive standard cancer care. This care is often covered by insurance.

Allogeneic HCT

Hematopoietic cell transplant (HCT) (also referred to as a bone marrow transplant or stem cell transplant) replaces diseased bone marrow with new, healthy blood cells. An allogeneic HCT uses healthy stem cells from a donor. (This is the opposite of an autologous HCT, which uses your own stem cells.) The donor may or may not be related to you.

Allogeneic HCT may help cure mast cell diseases, but it's used only in very specific cases because of its serious risks and long recovery periods compared with other effective treatment options.

Before an allogeneic HCT, you'll receive a procedure called conditioning. Conditioning uses chemotherapy (and/or radiation therapy) to destroy your bone marrow cells. This procedure creates room for the healthy stem cells and weakens the immune system, so your body doesn't kill the transplanted cells.

Stem cell transfusion

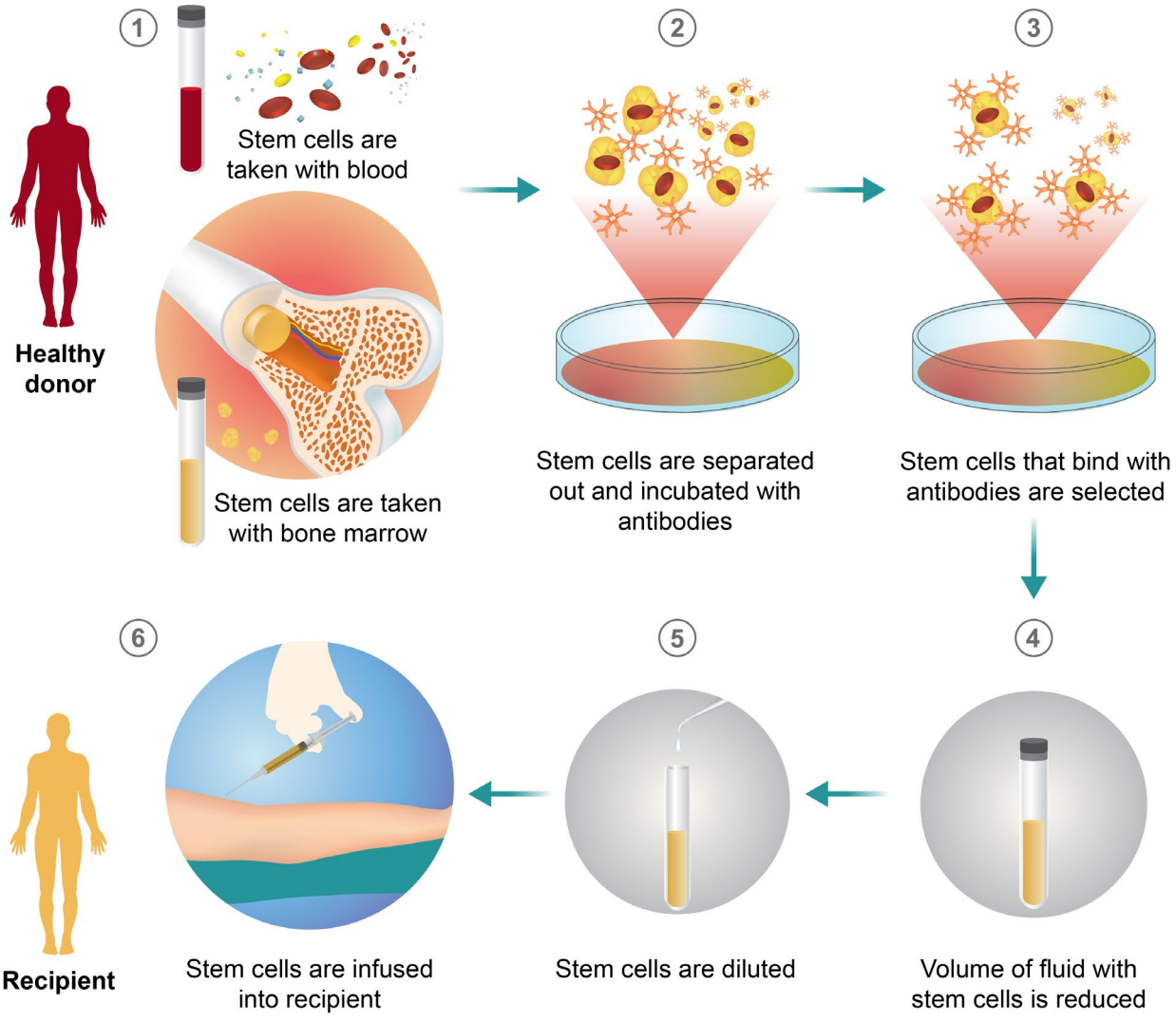
After conditioning, you'll receive the healthy stem cells through a transfusion. This is when blood or parts of blood are slowly pushed through an intravenous (IV) catheter into a vein. This can take several hours.

New, healthy blood cells will form over time. This is called engraftment. It usually occurs about 2 to 4 weeks after the transplant.

Until the new, healthy blood cells form, you'll have little or no immune defense. You may need to stay in a very clean room at the hospital or be given antibiotics to prevent or treat infection. While waiting for the cells to engraft, you'll likely feel tired and weak.

The procedure carries risks that include infection, bleeding, graft-versus-host disease, secondary cancers, heart complications, and even death.

Allogeneic HCT: Pictured are the steps of a hematopoietic cell transplant



Key points

- Treatment decisions should involve a multidisciplinary care team. This is a team of health care providers from different professional backgrounds who have knowledge and experience with systemic mastocytosis (SM).
- Antihistamines, also referred to as allergy medicine, reduce or block histamines to stop allergy symptoms. Antihistamines can control itchy skin, watery eyes, and other allergic symptoms of SM.
- Anaphylaxis is a life-threatening allergic reaction and a medical emergency. NCCN experts recommend keeping 2 EpiPens with you in case of anaphylaxis.
- Tyrosine kinase inhibitors, specifically KIT inhibitors, are forms of oral targeted therapy against the mutated *KIT* D816V protein that is the major driver of SM.
- Chemotherapy kills fast-growing cells throughout the body, including cancer cells and normal cells.
- Supportive care is health care that relieves symptoms and improves quality of life. It might include pain relief (palliative care), emotional or spiritual support, financial aid, or family counseling.
- Immunosuppressive therapy (IST) uses materials made either by the body or in a laboratory to improve, target, or restore immune system function.

Questions to ask

- What side effects can I expect from treatment?
- Could the treatment affect my fertility or pregnancy? If so, should I speak to a fertility specialist before treatment?
- How often will I need follow-up visits?
- How will I be involved in making decisions for my treatment?
- I plan to bring someone with me to my appointments. Will they have full access to be with me?

What's next?

This chapter gave an overview of possible treatments for systemic mastocytosis. The next chapter discusses the two most common types: indolent systemic mastocytosis (ISM) and smoldering systemic mastocytosis (SSM). They tend to be less advanced. For advanced types of systemic mastocytosis, see *Chapter 6: Treatment for advanced types of SM*.

5

Treatment for non-advanced types of SM

40 ISM and SSM

41 Treatment options

41 Observation

43 Key points

44 Questions to ask

The more common types of systemic mastocytosis (SM) are also less advanced and referred to as non-advanced. This chapter focuses on the treatment of those types of SM. You may need ongoing treatment or none at all depending on what's happening with your type of SM.

Indolent systemic mastocytosis (ISM) and smoldering systemic mastocytosis (SMM) are considered less severe types of SM. They're chronic blood conditions that, in many cases, do not result in organ damage from an overproduction of mast cells. But people can still have severe mediator symptoms.

ISM and SSM are generally treated the same way. But SSM has a higher risk of progressing to advanced forms of SM. Keep reading to find out how they're treated and see **Guide 3**.

ISM and SSM

Indolent systemic mastocytosis

ISM is the most common type of systemic mastocytosis. It has a low risk of developing into a more aggressive disease.

ISM refers to an abnormal buildup of mast cells that happens slowly (indolent means chronic without significant worsening). Mast cells build up more often in the bone marrow, as well as in other organs and skin.

But the mast cell buildup in ISM doesn't typically lead to organ problems. Normally functioning organs are what sets ISM apart from more aggressive types of systemic mastocytosis.

Still, ISM can lead to decreased quality of life due to symptoms of mast cell buildup and mediator release.

In most cases, ISM is associated with cutaneous (skin) mastocytosis in the form of urticaria pigmentosa (UP). This is the presence of lesions in the skin, including red or brown spots or patches that can be flat or slightly raised.

In addition, people with ISM may experience flushing, a swollen liver or spleen, recurrent allergic reactions, pain and discomfort

Guide 3
Possible tests and treatments for ISM and SSM

Referral to centers with expertise in SM
Managing symptoms and triggers
Carrying 2 epinephrine self-injectors
Baseline DEXA scan
Skeletal survey
Assess quality of life
Observation
Clinical trial
Avapritinib (for ISM)
Cladribine (useful in some cases)
Peginterferon alfa-2a with or without prednisone (useful in some cases)
Midostaurin (useful in some cases)

within the gastrointestinal (GI) tract, brain fog, anxiety, inability to concentrate, and anaphylactic episodes.

Bone marrow mastocytosis

Bone marrow mastocytosis (BMM) is a subtype of ISM. This is where mast cells are found only in bone marrow and not in the skin or other organs. BMM is more likely to cause anaphylaxis than ISM. BMM is often linked with osteoporosis, which may be its only symptom.

Smoldering systemic mastocytosis

SSM is a more severe form of systemic mastocytosis than ISM. SSM refers to a greater buildup of mast cells in your internal organs leading to more symptoms, but this buildup happens slowly (smoldering means moving gradually). People with SSM can remain stable for years, but some can develop a more advanced type of systemic mastocytosis.

Symptoms of SSM typically include swollen lymph nodes, spleen, and liver; an increase of mast cells in bone marrow (as seen in anemia or certain cancers); and skin rashes, such as urticaria pigmentosa (raised, red, itchy, brown tanned small lesions).

Treatment options

Because systemic mastocytosis is rare, your health care provider will likely recommend you visit a specialized center with providers who have expertise in treating SM. Much of the treatment of ISM and SSM is about managing your symptoms (with what's called anti-mediator drug therapy) and avoiding your specific triggers. Read *Chapter 4: Types of treatment* for the kinds of treatments you might receive as part of anti-mediator drug therapy.

To be safe, your provider may encourage you to carry 2 epinephrine self-injectors (EpiPens) to prevent anaphylaxis, which is a severe allergic reaction that can be life-threatening. In patients with anaphylaxis, omalizumab can be used to decrease the frequency and severity of the events.

In addition, you might need a baseline DEXA (dual-x ray absorptiometry) scan to check for signs of osteoporosis (bone loss) or osteopenia (weakening bones). You might also need a metastatic skeletal survey, which is a series of x-rays that check for bone disease throughout your body.

Your provider should also educate you on the signs and symptoms of the disease and assess how they're affecting your quality of life.

Observation

If you remain asymptomatic—meaning you're not having any current symptoms—your provider might recommend observation. This is a period of monitoring your health and quality of life and not receiving any treatment.

During this period, you'll have:

- Regular physical examinations
- Blood tests at least annually
- Periodic DEXA scans to check for osteoporosis

Or your provider might suggest you participate in a clinical trial.

Managing triggers and symptoms

If you've been experiencing ISM or SSM symptoms, primary treatment will start with managing them with anti-mediator therapy. For example, you'll be treated using medicines for your specific symptoms, like antihistamines, bisphosphonates (bone-building drugs), or asthma medicine. Your provider will recommend you always carry 2 epinephrine self-injectors in case of anaphylaxis.

Besides managing triggers and symptoms, the preferred treatments for symptomatic ISM or SSM are the following:

- Clinical trial
- Avapritinib (a tyrosine kinase inhibitor that's only for people with ISM who have a platelet count of at least 50,000/μL)

Preferred therapies have the most evidence they work better and may be safer than other therapies.

Testing after treatment

After treatment, your care team will want to know how well the treatment worked. So, you'll see your provider for a physical exam and blood work at least every 6 to 12 months, or sooner if new issues arise.

Your provider will check the severity of your symptoms and your quality of life. You might have additional DEXA scans.

If you're responding well to the treatment, then it will be continued.

But if the treatment is not working well or not working at all, then the next preferred treatment is a clinical trial.

Otherwise, you might receive one of the following treatment options that are useful in some cases. They're used less frequently because they're not as effective or cause more side effects. Therapies used in certain cases work best for people with specific cancer

Even though systemic mastocytosis is a rare disorder, there are many effective treatments available.



features or health circumstances. These therapies include:

- Cladribine
- Peginterferon alfa-2a with or without prednisone
- Midostaurin (not formally approved for ISM, but it may be used on an off-label basis)

If testing shows your disease has progressed (worsened), you'll have further testing to find out if it's at a more advanced stage. This may include a bone marrow biopsy, blood work (serum tryptase testing), and other tests or imaging based on your symptoms. If the tests confirm progression, then you'll be treated based on the new, advanced stage. More advanced stages of the disease include:

- Aggressive systemic mastocytosis
- Systemic mastocytosis with associated hematologic neoplasm (AHN), or SM-AHN
- Mast cell leukemia with or without AHN

More information on advanced types of systemic mastocytosis is in the next chapter.

Key points

- Systemic mastocytosis is often diagnosed by its signs or symptoms, including the presence of urticaria pigmentosa (UP) skin lesions.
- Indolent systemic mastocytosis (ISM) is a mild, slow-growing type of systemic mastocytosis.
- Smoldering systemic mastocytosis (SSM) is a type of systemic mastocytosis where mast cells slowly and gradually build up in your internal organs.
- It's important to carry at least 2 EpiPens in case of anaphylaxis.
- Anti-mediator medicines are the most common treatment for symptomatic ISM.
- If you're still having symptoms despite treatment with anti-mediator medicines, a tyrosine kinase inhibitor, like avapritinib, will be considered.
- If your disease doesn't respond to treatment, it may be re-evaluated to see if it's still ISM or if it has progressed to SSM or advanced forms of mast cell disease.

Questions to ask

- Can I get a copy of the pathology report and other test results?
- Who will talk with me about the next steps? When?
- Should my mast cells be tested for the *KIT* mutation?
- Would you explain my different treatment options and side effects as simply as possible?
- When is the right time to consider tyrosine kinase inhibitors rather than just anti-mediator treatment?

What's next?

This chapter described the 2 types of systemic mastocytosis (and 1 subtype) that are most common and considered less severe: ISM and SSM. The next chapter discusses the 3 advanced types of systemic mastocytosis and how they're treated. These types can form, grow, or spread quicker than the common types and can sometimes be life-threatening.

"If you don't have access to a specialist in your type of systemic mastocytosis, know that most specialists will do a telehealth consult with your local doctor and you."

6

Treatment for advanced types of SM

46 Aggressive SM

47 SM with AHN

49 Mast cell leukemia with or without AHN

52 Key points

52 Questions to ask

Advanced systemic mastocytosis (SM) is more severe and can be life-threatening. Advanced SM is blood cancer. This chapter explains the 3 types of advanced SM and how they're treated.

Advanced systemic mastocytosis means some organ damage has occurred. It is blood cancer and involves 3 types: Aggressive systemic mastocytosis (ASM), systemic mastocytosis with AHN (SM-AHN), and mast cell leukemia (MCL) with or without AHN.

Aggressive SM

Aggressive systemic mastocytosis (ASM) is when mast cells take over organs and/or bones (usually liver, spleen, lymph nodes, gut, bone, and bone marrow), resulting in a loss of function. This means you might have low numbers of white blood cells, anemia, low platelets, liver dysfunction, enlargement of lymph nodes and/or spleen, and bone fractures.

When systemic mastocytosis is considered aggressive, your provider will likely recommend you go to a center with expertise in treating systemic mastocytosis, if you're not going to one already .

Your provider will make sure you're aware of the signs and symptoms of the disease and how to avoid triggers. Your care team will also suggest always carrying 2 epinephrine self-injectors (EpiPens) in case of anaphylaxis. See **Guide 4** for other possible treatments.

Treatment options

Preferred primary treatment options for ASM include:

- Clinical trial
- Avapritinib (for people with a platelet count of at least 50,000/µL)
- Midostaurin

Other treatment options may include:

- Cladribine
- Peginterferon alfa-2a with or without prednisone
- Imatinib (used only in some cases)

Guide 4
Possible treatments for aggressive systemic mastocytosis (ASM)

Referral to centers with expertise in SM
Managing symptoms and triggers
Carrying 2 epinephrine self-injectors
Clinical trial (preferred)
Avapritinib (preferred for people with at least 50,000/µL platelets)
Midostaurin (preferred)
Cladribine (also recommended)
Peginterferon alfa-2a with or without prednisone (also recommended)
Imatinib (for *KIT* D816V mutation-negative, useful in some cases)
Allogeneic HCT

If your mastocytosis responds to primary treatment, your provider may recommend continuing it. Still, depending on any organ damage, your provider might talk to you about having an allogeneic hematopoietic cell transplant (HCT). Because of its risks, allogeneic HCT is used only in some cases.

Poor response

If your primary treatment is not working very well or not working at all, or you have symptoms of worsening disease, then your disease will be restaged.

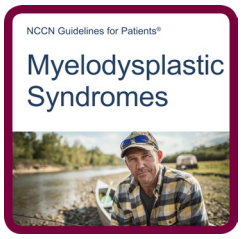
Restaging means being retested to find out if your disease is now at a more advanced stage. Tests may include bone marrow biopsy, blood work (serum tryptase testing), and other tests or imaging based on your symptoms. If the tests confirm a more advanced stage, then you'll be treated based on your new stage of disease.

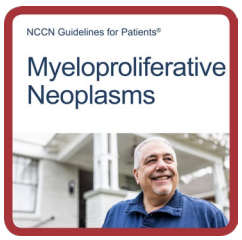
Your provider might talk to you about other treatment options that you haven't already tried. Additionally, you and your care team might discuss having an allogeneic HCT.

SM with AHN

Systemic mastocytosis with associated hematologic neoplasm (SM-AHN) refers to a mast cell buildup that occurs along with another blood disorder, usually a myelodysplastic syndrome (MDS), a myeloproliferative neoplasm (MPN), or acute myeloid leukemia (AML). MDS and MPN are the most common AHNs associated with SM-AHN.

For more information, see *NCCN Guidelines for Patients: Myelodysplastic Syndromes* or *Myeloproliferative Neoplasms*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.





Because SM-AHN is so rare, your provider may refer you to a specialized center with expertise in mastocytosis. You'll also be advised to know the signs and symptoms of the disease as well as how to avoid its triggers. And your provider will recommend that you always carry 2 epinephrine self-injectors (EpiPens) in case of anaphylaxis. See **Guide 5** for other potential treatments.

Guide 5
Possible treatments for systemic mastocytosis with AHN (SM-AHN)

Referral to centers with expertise in SM
Managing symptoms and triggers
Carrying 2 epinephrine self-injectors
AHN-directed therapy and consideration of allogeneic HCT while managing SM
Clinical trial (preferred)
Avapritinib (preferred for people with at least 50,000/µL platelets)
Midostaurin (preferred)
Cladribine (also recommended)
Peginterferon alfa-2a with or without prednisone
Allogeneic HCT

Treatment options

When you have SM-AHN, you'll work with your care team to decide whether the SM or AHN is more advanced, and which should be treated first.

If AHN causes more symptoms than SM, then you'll have AHN-directed therapy, which includes consideration of an allogeneic HCT. But your SM will also be managed and monitored for any new symptoms or disease progression (worsening).

However, if SM is causing more symptoms than AHN, the preferred treatments are:

- Clinical trial
- Avapritinib (only for people with a platelet count of at least 50,000/μL)
- Midostaurin

Other treatment options may include:

- Cladribine
- Peginterferon alfa-2a with or without prednisone

If the treatment reduces your symptoms, your provider may suggest continuing the treatment and/or consider evaluating you for an allogeneic HCT. Because it's a risky procedure, an allogeneic HCT is only used in some cases.

Worsening disease

If AHN gets worse, you may be given AHN-directed therapy based on your specific blood disorder. An allogeneic HCT may also be an option while the SM is being managed.

If your treatment isn't working very well or isn't working at all, and there's evidence of SM-related organ damage or your condition is worse overall, you'll have more testing to restage your disease. A poor response to treatment means any of the following:

- Return or worsening of organ damage
- Swelling of the spleen or liver
- Worsening of systemic mastocytosis symptoms
- Intolerance to drug therapy (too many side effects for you)

Restaging means additional tests, like a bone marrow biopsy, blood work (serum tryptase testing and myeloid gene panel testing), and other tests or imaging, to find out if your disease is now at a more advanced stage. If it is, then you'll be treated based on your new stage of disease.

Your provider might consider therapies you haven't already tried and may consider you for allogeneic HCT if no other treatments seem like a good option.

Mast cell leukemia with or without AHN

Mast cell leukemia (MCL) is the rarest and most aggressive (fast-growing) type of systemic mastocytosis. MCL leads to the buildup of immature mast cells in the fluid part of the bone marrow (the bone marrow aspirate). This buildup of abnormal mast cells can cause severe organ damage and bone pain. Although MCL has a poor prognosis (outlook) and can be life-threatening, the prognosis is improving with many treatments being available. See **Guide 6** for potential treatments.

Guide 6
Possible treatments for mast cell leukemia with or without AHN

Referral to centers with expertise in SM
Managing symptoms and triggers
Carrying 2 epinephrine self-injectors
Clinical trial (preferred)
Avapritinib (preferred for people with at least 50,000/µL platelets)
Midostaurin (preferred)
Cladribine (also recommended)
AML-based therapy with consideration of cladribine or midostaurin
Allogeneic HCT
AHN-directed therapy

What is leukemia?

Leukemia is cancer caused by cells in your bone marrow that overproduce abnormal or underdeveloped blood cells. There are many types of leukemia, each based on the type of affected blood cells.

MCL is a rare type of leukemia identified by an abnormal growth of immature mast cells in the bone marrow.

MCL with AHN

MCL with associated hematologic neoplasm (AHN) is a leukemia diagnosis that includes another blood disorder, usually a myelodysplastic syndrome (MDS), a myeloproliferative neoplasm (MPN), or acute myeloid leukemia (AML). The prognosis tends to be worse in people who have MCL with AHN than just MCL.

There's no clear reason why MCL develops, but several mutations in the *KIT* gene have been linked to it. It can arise suddenly (called de novo) or as a progression of systemic mastocytosis.

Symptoms of MCL may include:

- Hot flashes
- Fever
- Rapid heartbeat
- Low blood pressure
- Losing more than one-tenth of body weight
- Fatigue
- Anaphylaxis

Symptoms related to organ involvement are:

- Bone pain or fractures
- Diarrhea and other gastrointestinal issues

If you have a diagnosis of MCL with or without AHN, your care team may refer you to a specialized center with expertise in mastocytosis, if you're not going to one already. They'll recommend you become familiar with the signs and symptoms of the disease as well as its triggers. Your care team will also advise you to always carry 2 epinephrine self-injectors (EpiPens) in case of anaphylaxis.

Treatment options

Preferred treatment options for MCL include:

- Clinical trial
- Avapritinib
- Midostaurin

Other treatment options may include:

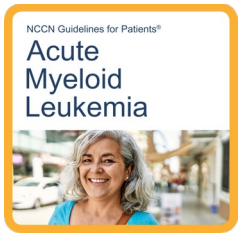
- Cladribine
- Acute myeloid leukemia-based therapy with consideration of cladribine or midostaurin

If your primary treatment is effective, you may be asked to continue it and/or consider an allogeneic HCT.

Worsening disease

If your disease gets worse (progresses to AHN or transforms into acute myeloid leukemia), you may be given AHN-directed therapy. AHN-directed therapy is based on your specific hematologic neoplasm and may have more specific treatments. It may include multiagent chemotherapy (a combination of chemotherapy drugs) and/or consideration of an allogeneic HCT while MCL is being managed.

For more information, see *NCCN Guidelines for Patients: Acute Myeloid Leukemia*, available at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.



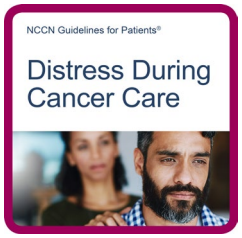
If your treatment is not working very well or not working at all, you can have more testing to restage your disease. When your disease is restaged, your provider might suggest a treatment you haven't tried before and/or an allogeneic HCT.

A poor response to treatment means any of the following:

- Return or worsening of organ damage
- Swelling of the spleen or liver
- Worsening of systemic mastocytosis symptoms
- Intolerance to drug therapy (too many side effects for you)

Treatment at this stage often focuses on supportive care. This includes symptom relief, an emphasis on quality of life, and longer survival. It's important to ask your health care provider about your prognosis. See *Chapter 4: Types of treatment* for more information on how supportive care can help.

If you're feeling stress or anxiety related to your cancer, you're not alone and help is available. For more information about coping with distress related to your cancer, read *NCCN Guidelines for Patients: Distress During Cancer Care* at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cancer app.





Let us know what you think!

Please take a moment to complete an online survey about the NCCN Guidelines for Patients.

NCCN.org/patients/response

Key points

- Aggressive systemic mastocytosis (ASM) is described as a loss of organ function (usually liver, gut, spleen, lymph nodes, bone, and bone marrow) due to mast cells taking over.
- When you have both SM and an associated hematologic neoplasm, you'll work with your care team to decide which condition should be the first focus of treatment.
- Participating in a clinical trial is always an option for people with advanced SM.
- For any advanced type of SM, an allogeneic hematopoietic cell transplant (HCT) may be considered after other treatments are tried.
- Mast cell leukemia (MCL) is a very rare and aggressive type of SM.

Questions to ask

- What symptoms and signs of disease are related to the SM vs. AHN disease in my SM-AHN?
- What is my prognosis?
- What is the goal of each treatment?
- What indicates that my treatment is working or has stopped working?
- What side effects should I expect from treatment?

What's next?

This chapter detailed the advanced forms of systemic mastocytosis and their treatment. A chronic, progressive disease like advanced systemic mastocytosis can be difficult to deal with due to the many unknowns. You may want more information, so be sure to read *Chapter 8: Other resources* that provides helpful websites and other ideas.

7
Treatment for *KIT*-negative SM

54 Treatment options

55 Non-advanced SM

55 Advanced SM

56 Key points

56 Questions to ask

While systemic mastocytosis (SM) is a rare disorder, having SM but being negative for the *KIT* D816V gene is even less common. What does that mean when it comes to treatment?

Most people with systemic mastocytosis (SM) (about 9 in 10) have a mutation in the *KIT* gene, which is usually *KIT* D816V. It's rare for people to be diagnosed with systemic mastocytosis and have a mutation in the *KIT* gene other than *KIT* D816V, or no mutations (they have a normal *KIT* gene called wild-type *KIT*). People with SM who don't have the *KIT* D816V mutation are known as KIT-negative or *KIT* D816V-negative.

To be certain you have a normal *KIT* gene, it's important that *KIT* mutation testing sequences the whole *KIT* gene. And it should be performed on the bone marrow (or other organ affected by mast cell disease) with a highly sensitive test like the droplet digital PCR (see *Chapter 2: Testing for SM*).

If the test comes back as *KIT* D816V-negative, this means that SM can be happening despite having no mutation detected in the *KIT* gene. In other words, the body has other pathways that can trigger SM even though the *KIT* gene is normal.

Treatment options

Medicines like avapritinib that can help people who are *KIT* D816V-positive tend to be less effective for people who are *KIT* D816V-negative because those medicines target the *KIT* D816V mutation. Instead, multi-targeted tyrosine kinase inhibitors (TKIs) like imatinib and midostaurin can be helpful because they can bind to wild-type *KIT* or *KIT* with other mutations besides D816V.

Below, treatment is broken down by non-advanced systemic mastocytosis types (indolent systemic mastocytosis or smoldering systemic mastocytosis) or advanced SM (like aggressive SM and systemic mastocytosis with AHN). See **Guide 7**.

Guide 7
Possible treatments for *KIT*-negative systemic mastocytosis

Imatinib (preferred for non-advanced SM)
Clinical trial
Midostaurin
Cladribine (preferred for advanced SM)
Chemotherapy (high dose)
Allogeneic HCT

Non-advanced SM

If you're *KIT*-negative and given a diagnosis of ISM or SSM or chronic mast cell leukemia (MCL) without organ damage, then you have one of two treatment options:

- Imatinib
- Clinical trial

Advanced SM

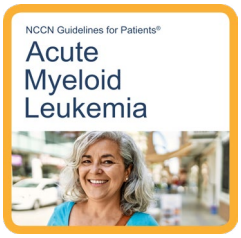
But if you have a diagnosis of advanced SM (excluding MCL) then you'll have more next-generation sequencing (NGS) testing. If NGS shows a *KIT* mutation that's not D816V, then you'll receive:

- Imatinib
- Clinical trial

Still, if that extra NGS test doesn't show any *KIT* mutation (you're truly *KIT*-negative), your preferred treatment option is cladribine. Other recommended options include:

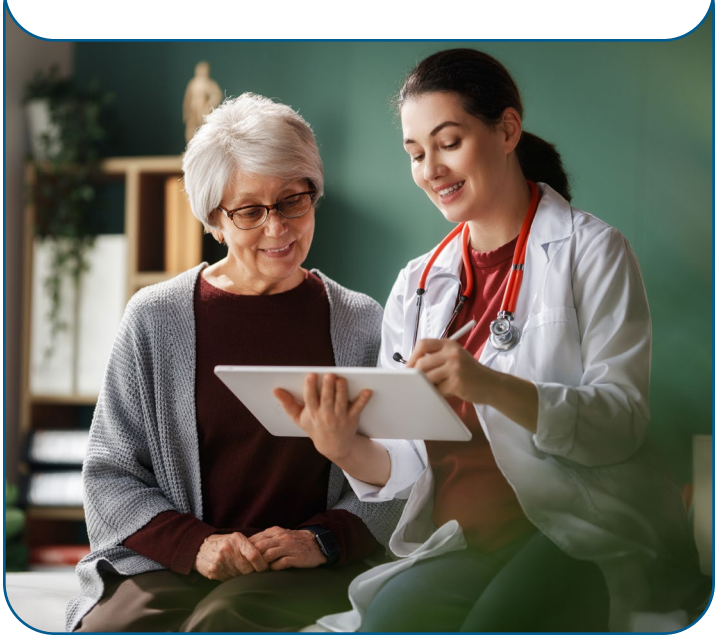
- Clinical trial
- Midostaurin
- Intensive induction chemotherapy (high-dose chemotherapy treatment)

For more information on intensive induction chemotherapy, see *NCCN Guidelines for Patients: Acute Myeloid Leukemia* at NCCN.org/patientguidelines and on the NCCN Patient Guides for Cance app.



If you respond to treatment, your care team may recommend a hematopoietic cell transplant (HCT).

It's important to work closely with your care team. If you have any questions about your systemic mastocytosis or your treatment, be sure to ask your doctor.



Key points

- Having systemic mastocytosis (SM) and being *KIT*-D816V-negative is very rare.
- Treatments for *KIT*-D816V-positive SM don't work for *KIT*-D816V-negative SM.
- Tyrosine kinase inhibitors that are not specific for *KIT* D816V or participation in a clinical trial can be helpful for *KIT*-D816V-negative SM.

Questions to ask

- How do I know I am negative for the *KIT* gene?
- Has all the proper testing been done to ensure that I'm truly *KIT* D816V-negative, including highly sensitive KIT testing and sequencing that involves the rest of the *KIT* gene?
- Should I still be controlling my symptoms with over-the counter (anti-mediator) medicines?
- Can you recommend any clinical trials for me?

What's next?

You've learned about the importance of the *KIT* gene and how it influences treatment. For more information and help with systemic mastocytosis, check out the next chapter that provides useful websites.

"Never. Lose. Hope. Tomorrow could be the day you have been waiting for."

8
Other resources

58 What else to know

58 What else to do

58 Where to get help

58 Questions to ask

Want to learn more? Here's how you can get additional help.

What else to know

This guide helps you know your options so you can make informed decisions and improve your cancer care. But it's not the only resource that you have.

Ask for as much information and help as you need. Many people are interested in learning more about:

- The details of systemic mastocytosis, its treatment and side effects
- Being a part of a care team
- Getting financial help
- Finding a cancer care professional who's an expert in their field
- Coping with systemic mastocytosis and other health problems

What else to do

Your health care center can help you with next steps. It often has on-site resources to help meet your needs and find answers to your questions. Health care centers can also inform you of resources in your community.

In addition to help from your providers, the resources listed in the next section provide support for many people like yourself.

Where to get help

Look through the list below and visit the provided websites to learn more about these organizations.

Blood Cancer United
bloodcancerunited.org

Cancer*Care*
cancercare.org

Imerman Angels
imermanangels.org

TargetCancer Foundation
targetcancer.org

The Mast Cell Disease Society
tmsforacure.org

Triage Cancer
triagecancer.org

Questions to ask

- Who can I talk to about help with housing, food, and other basic needs?
- What assistance is available for transportation, childcare, and home care?
- How much will I have to pay for treatment?
- What help is available to pay for medicines and other treatment?
- What other services are available to me and my caregivers (like translation services)?



Words to know

acute myeloid leukemia (AML)
A fast-growing cancer that starts in the bone marrow and causes too many young white blood cells to be made.

allogeneic hematopoietic cell transplant (HCT)
Cancer treatment that replaces abnormal blood stem cells with healthy donor cells.

anemia
A health condition in which the amount of healthy red blood cells is too low to carry enough oxygen to the rest of your body.

antihistamines
A medicine that reduces or blocks histamines to stop allergy symptoms. It can control itchy skin and watery eyes as well as other allergic symptoms of mastocytosis.

anti-mediator therapy
Treatments that help lessen the release (and the effects) of mast cell mediators, like histamine.

biomarker
Any chemical, substance, or other sign in your body that can be measured to assess your health.

biopsy
Removal of small amounts of tissue from your body to test for disease.

blood stem cell
A blood-forming cell from which all other types of blood cells are formed. Also called a hematopoietic stem cell.

bone marrow
The sponge-like tissue in the center of most bones where blood cells are formed.

bone marrow aspiration
The removal of a small amount of liquid bone marrow to test for disease.

chemotherapy
Drugs that kill fast-growing cells, including normal cells and cancer cells.

clinical trial
A research study of how safe and helpful new tests and treatments are for people with a specific condition.

complete blood count (CBC)
A lab test that measures the number of blood cells.

contrast
A substance put into your body to make clearer pictures during imaging tests.

cytogenetic testing
A test that uses a microscope to examine a cell's chromosomes.

dermatologist
A doctor who specializes in the diagnosis and treatment of skin diseases.

DNA
A chain of chemicals in cells that contain coded instructions for making and controlling cells.

diagnosis
Identification of a disease based on tests.

differential
A measure of the different types of white blood cells in a blood sample.

fatigue
Severe tiredness that limits the ability to function.

fluorescence in situ hybridization (FISH)
A lab test that uses special dyes to look for abnormal changes in a cell's genes and chromosomes.

gene
A set of coded instructions in cells for making and controlling cells.

hematopoietic cell transplant (HCT)
A type of treatment that destroys cells in the bone marrow, then replaces them with new, healthy blood-forming cells. Also called stem cell transplant or bone marrow transplant.

human leukocyte antigen (HLA)
A cell protein that helps your body know its own cells from foreign cells.

immune system
The body's natural defense against infection and disease.

immunotherapy
A medicine that increases the activity of your body's disease-fighting system.

liver function test
A test that measures chemicals made or processed by the liver.

mast cell
A cell of the immune system responsible for allergic reactions and immune responses.

mast cell activation
When mast cells release a large number of mediators, like histamine.

mast cell mediators
Molecules that are released when mast cells activate. They're responsible for inflammation and allergic reactions. Histamine and tryptase are mast cell mediators.

myelodysplastic syndrome (MDS)
A group of rare bone marrow disorders.

myeloproliferative neoplasm (MPN)
Cancer in which the bone marrow makes too many red blood cells, white blood cells, or platelets.

mutation
A change in a gene that alters the genetic message carried by that gene.

palliative care
Specialized medical care aimed at increasing quality of life and reducing pain and discomfort for people with serious, complex illness.

pathologist
A doctor who is an expert in testing cells and tissue to find disease.

platelet
A type of blood cell that helps control bleeding. Also called a thrombocyte.

red blood cell
A type of blood cell that carries oxygen from the lungs to the rest of the body. Also called an erythrocyte.

side effect
An unhealthy or unpleasant physical or emotional response to treatment.

supportive care
Care that includes symptom relief but not cancer treatment. Also called palliative care.

systemic therapy
Treatment that works throughout the body.

targeted therapy
A drug treatment that identifies and attacks a specific feature of cancer cells and causes less harm to normal cells.

white blood cell
A type of blood cell that helps fight infections in the body. Also called a leukocyte.

NCCN Contributors

This patient guide is based on the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Systemic Mastocytosis, Version 3.2026. It was adapted, reviewed, and published with help from the following people:

Dorothy A. Shead, MS
Assistant Vice President
Patient Information

Christine McLaughlin
Medical Writer

Lisa Diehl
Production Layout Artist

The NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Systemic Mastocytosis, Version 3.2026, were developed by the following NCCN Panel Members:

Aaron T. Gerds, MD, MS/Chair
Case Comprehensive Cancer Center/ University Hospitals Seidman Cancer Center and Cleveland Clinic Taussig Cancer Institute

*Jason Gotlib, MD, MS/Vice-Chair
Stanford Cancer Institute

Peter Abdelmessieh, DO, MSc
Fox Chase Cancer Center

Haris Ali, MD
City of Hope National Medical Center

*Mariana Castells, MD, PhD
Adjunct Panel Member
Mass General Brigham Cancer Institute

Brian J. Chernak, MD
Memorial Sloan Kettering Cancer Center

Manuel R. Espinoza-Gutarra, MD
O'Neal Comprehensive Cancer Center at UAB

*Ruth Fein, BS
Patient Advocate

Steven Green, MD
Roswell Park Comprehensive Cancer Center

Krishna Gundabolu, MBBS, MS
Fred & Pamela Buffett Cancer Center

Elizabeth Hexner, MD, MS
Abramson Cancer Center at the University of Pennsylvania

Tania Jain, MBBS
Johns Hopkins Kimmel Cancer Center

Catriona H. Jamieson, MD, PhD
UC San Diego Moores Cancer Center

Irum Khan, MD
Robert H. Lurie Comprehensive Cancer Center of Northwestern University

Andrew T. Kuykendall, MD
Moffitt Cancer Center

Yazan F. Madanat, MD
UT Southwestern Simmons Comprehensive Cancer Center

Lucia Masarova, MD
The University of Texas MD Anderson Cancer Center

Brandon McMahon, MD
University of Colorado Cancer Center

Sanjay R. Mohan, MD, MSCI
Vanderbilt-Ingram Cancer Center

Kalyan V. Nadiminti, MD
University of Wisconsin Carbone Cancer Center

Stephen Oh, MD, PhD
Siteman Cancer Center at Barnes-Jewish Hospital and WashU Medicine

Jeanne Palmer, MD
Mayo Clinic Comprehensive Cancer Center

Ami B. Patel, MD
Huntsman Cancer Institute at the University of Utah

Anand A. Patel, MD
The UChicago Medicine Comprehensive Cancer Center

Nikolai Podoltsev, MD, PhD
Yale Cancer Center/Smilow Cancer Hospital

Lindsay Rein, MD
Duke Cancer Institute

Rachel Salit, MD
Fred Hutchinson Cancer Center

Mary Sehl, MD
UCLA Jonsson Comprehensive Cancer Center

Moshe Talpaz, MD
University of Michigan Rogel Cancer Center

*Martha Wadleigh, MD
Dana-Farber Cancer Institute

Sarah A. Wall, MD, MPH
The Ohio State University Comprehensive Cancer Center - James Cancer Hospital and Solove Research Institute

NCCN

Mary Anne Bergman
Guidelines Coordinator

Cindy Hochstetler, PhD
Oncology Scientist/Senior Medical Writer

* Reviewed this patient guide. For disclosures, visit NCCN.org/disclosures.

NCCN Cancer Centers

For contact information, visit NCCN.org/cancercenters.

Abramson Cancer Center
at the University of Pennsylvania
Philadelphia, Pennsylvania

Case Comprehensive Cancer Center/
University Hospitals Seidman Cancer Center and
Cleveland Clinic Taussig Cancer Institute
Cleveland, Ohio

City of Hope National Medical Center
Duarte, California

Dana-Farber Cancer Institute
Boston, Massachusetts

Duke Cancer Institute
Durham, North Carolina

Fox Chase Cancer Center
Philadelphia, Pennsylvania

Fred & Pamela Buffett Cancer Center
Omaha, Nebraska

Fred Hutchinson Cancer Center
Seattle, Washington

Huntsman Cancer Institute at the University of Utah
Salt Lake City, Utah

Indiana University Melvin and Bren Simon
Comprehensive Cancer Center
Indianapolis, Indiana

Johns Hopkins Kimmel Cancer Center
Baltimore, Maryland

Mass General Brigham Cancer Institute
Boston, Massachusetts

Mayo Clinic Comprehensive Cancer Center
Phoenix/Scottsdale, Arizona
Jacksonville, Florida
Rochester, Minnesota

Memorial Sloan Kettering Cancer Center
New York, New York

Moffitt Cancer Center
Tampa, Florida

O'Neal Comprehensive Cancer Center at UAB
Birmingham, Alabama

Robert H. Lurie Comprehensive Cancer Center
of Northwestern University
Chicago, Illinois

Roswell Park Comprehensive Cancer Center
Buffalo, New York

Siteman Cancer Center at Barnes-Jewish Hospital
and WashU Medicine
St. Louis, Missouri

St. Jude Children's Research Hospital/
The University of Tennessee Health Science Center
Memphis, Tennessee

Stanford Cancer Institute
Stanford, California

The Ohio State University Comprehensive Cancer Center -
James Cancer Hospital and Solove Research Institute
Columbus, Ohio

The UChicago Medicine Comprehensive Cancer Center
Chicago, Illinois

The University of Texas MD Anderson Cancer Center
Houston, Texas

UC Davis Comprehensive Cancer Center
Sacramento, California

UC San Diego Moores Cancer Center
La Jolla, California

UCLA Jonsson Comprehensive Cancer Center
Los Angeles, California

UCSF Helen Diller Family Comprehensive Cancer Center
San Francisco, California

University of Colorado Cancer Center
Aurora, Colorado

University of Michigan Rogel Cancer Center
Ann Arbor, Michigan

University of Wisconsin Carbone Cancer Center
Madison, Wisconsin

UT Southwestern Simmons
Comprehensive Cancer Center
Dallas, Texas

Vanderbilt-Ingram Cancer Center
Nashville, Tennessee

Yale Cancer Center/Smilow Cancer Hospital
New Haven, Connecticut

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3025 Chemical Road, Suite 100
Plymouth Meeting, PA 19462
215.690.0300

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