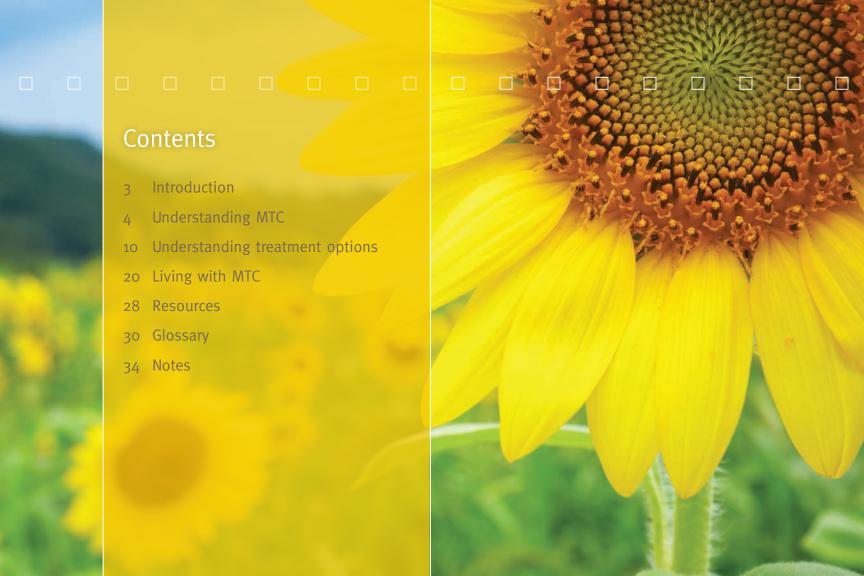


A Guidebook for Patients & Families

Understanding Medullary Thyroid Cancer (MTC)

A Focus on MTC and Its Treatments





Introduction

A cancer diagnosis has an enormous impact—not just on the person with cancer, but on friends, family, and caregivers, too. But being diagnosed with a rare form of cancer, like medullary thyroid cancer (MTC), carries its own set of challenges.

People with a rare disease may feel isolated, angry, and scared. They may feel in danger of being ignored because of the uncommon nature of their disease.

But while MTC is rare, there are treatment options available. If treated early, MTC has been curable in some people. For others, MTC is not curable, but treatment may help slow the growth or spread of the disease for as long as possible.

People with MTC also have access to resources with advice on how to approach the disease and communities where they can connect with others affected by the disease. With this guidebook, you'll have help in getting a better understanding of MTC—and what you can do about it.

Medical terms are indicated in *italics* when they first appear in each section. You'll find a glossary for these words on page 30.

If you have questions as you read this, write them down in the Notes section located on page 34. You can ask your doctor or health care provider these questions at your next visit.

MTC is a rare disease with treatment options.

Understanding MTC

Medullary thyroid cancer (MTC) is a type of *thyroid* cancer. Thyroid cancer occurs in a part of the body called the thyroid gland, or simply the thyroid. This is a butterfly-shaped gland located in the lower front part of the neck.

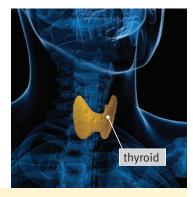
What does the thyroid do?

In adults, the thyroid produces thyroid *hormone* through specialized *cells* called follicular cells. Thyroid hormone helps to control your metabolism, which contributes to a wide range of functions in the body, from how much you weigh to when you go to sleep.

The thyroid gland also makes cells called C cells, or parafollicular cells. In turn, C cells make *calcitonin*, a hormone that helps control how your body uses calcium.

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MTC is a type of thyroid cancer.



Types of thyroid cancer

There are several types of thyroid cancer. As a whole, thyroid cancer is not rare, but some types of thyroid cancer are more common than others.

Papillary carcinoma

This is the most common thyroid cancer by far, accounting for about 80% of all thyroid cancers. Papillary carcinomas tend to grow slowly and generally have high rates of survival.

Follicular carcinoma

This is the next most common thyroid cancer, affecting about 10% of all people with thyroid cancer. While the *prognosis*, or outlook, for people with follicular carcinomas is lower compared with papillary carcinomas, it's still very good in most cases.

Papillary and follicular carcinomas are part of a group of thyroid cancers known as differentiated thyroid cancers. Few people with papillary or follicular carcinomas need treatment beyond surgery and therapy with *radioactive iodine*. In rare cases of advanced or severe disease, doctors may treat the cancer with *chemotherapy* or *targeted therapy*.

Together, papillary and follicular carcinomas account for about 90% of all thyroid cancer cases.

MTC

MTC accounts for about 4% of all thyroid cancers. It's an uncommon type of thyroid cancer, and an uncommon form of cancer overall. On the next several pages, you'll learn more about the different types of MTC, prognosis, treatment options, and more.

Other types

Anaplastic carcinoma, thyroid lymphoma, and thyroid sarcoma make up the rest of thyroid cancers. These cancer types are even more rare than MTC.

MTC accounts for about 4% of all thyroid cancers.

Types of MTC

There are 2 types of medullary thyroid cancer (MTC):

- **Spontaneous,** or sporadic, MTC accounts for about 75% of all MTC. In some people, sporadic MTC may be caused by an unexpected genetic change, or *mutation*, that was not passed down by a family member
- Inherited, or hereditary, MTC accounts for about 25% of all MTC cases. Hereditary MTC is passed down from a family member who has 1 of 3 syndromes that affect certain genes in the body:
 - Multiple endocrine neoplasia (MEN) type 2A, the most common syndrome
 - MEN type 2B
 - Isolated familial MTC

If a person has a genetic mutation that can cause MTC, there is a 50% chance that he or she will pass it on to each of his or her children.

Both types of MTC begin in the C cells in the thyroid. This is known as *local disease*. If the cancer spreads to nearby tissue or lymph nodes, it's said to be *locally advanced cancer*. In some people with MTC, cancer may further spread, or *metastasize*, to other parts of the body. This *metastatic* disease is called advanced MTC.

Depending on where the cancer is located in the body, doctors may not be able to surgically remove it. This means the cancer is *unresectable*.

MTC begins in the thyroid, but may travel to other parts of the body.

Signs and symptoms

Typically, people with MTC develop a *nodule*, or lump, on their thyroid. But some people with early MTC may not notice this lump, and most don't experience any symptoms. Their MTC is only discovered while they are seeing their doctor for an unrelated problem.

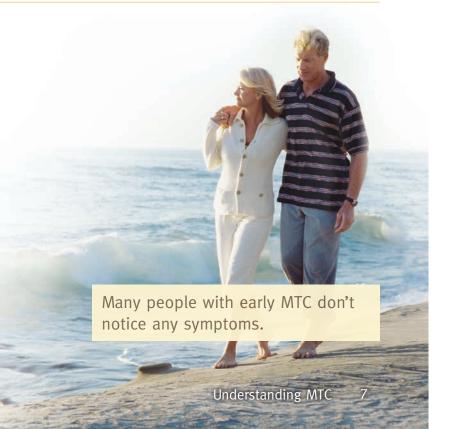
In other cases, MTC does cause symptoms. These symptoms can include:

Hoarseness

- Difficulty swallowing
- Choking sensations
- Swelling in the neck
- Difficulty breathing

With advanced MTC, after the cancer has spread outside of the thyroid to other places in the body, other symptoms may occur. Those symptoms can vary depending on where the cancer has spread.

People with MTC should always keep their doctor informed of any new symptoms.



Common tests

In patients with medullary thyroid cancer (MTC), various tests may be used to evaluate the disease. A doctor will perform these tests to determine whether or not a thyroid lump is cancerous, whether or not the cancer has spread to other locations, and more.

Below, you'll find a list of different tests performed on people with MTC. Your doctor will determine the number and types of tests that you need.

Biopsy: the removal of a small piece of tissue. In many cases, a biopsy is done on a person with MTC to confirm a doctor's diagnosis. If a person has metastatic disease, where the MTC has spread beyond the thyroid, a biopsy may be used to see if the *metastasis* matches the original cancer.

Calcitonin test: a blood test to check the level of calcitonin, a hormone secreted by C cells that affects bone formation and calcium. A higher-than-normal level of calcitonin may indicate that a person has MTC, so this test can be used to help confirm the diagnosis of MTC. It can also confirm if the disease is recurring, or coming back, after treatment.

Carcinoembryonic antigen (CEA) test: measures the amount of CEA, a protein, in a person's blood. People with MTC often have high levels of CEA in their bodies.

Computed tomography (CT) scan: produces detailed pictures of the body by combining multiple x-ray images. This test can be used to help show the location and size of cancers in the thyroid, as well as metastases in organs outside the thyroid area.

Fine needle aspiration (FNA) biopsy: a type of biopsy involving the insertion of a very thin needle into a thyroid nodule, or lump. FNA biopsy is the most accurate test (between 95%-98% accurate) for evaluating whether or not a thyroid nodule is cancerous.

Genetic testing: a method for looking for certain gene mutations. When a person has hereditary MTC, it means that they inherited from a family member a syndrome that affects certain genes in the body. Other family members should be tested for the same syndrome. Genetic testing should be carried out at centers with experience in evaluating rare genetic diseases like MTC.

Magnetic resonance imaging (MRI) scan: uses magnets and radio waves to create a clear image of the body. An MRI can help doctors examine cancer in the thyroid or look for cancer that may have spread to other parts of the body.

Positron emission tomography (PET) scan: the use of radioactive material to detect *tumor* cells in the body. Radioactive material collects more in tumor cells than healthy cells. By injecting a small dose of radioactive material into the blood, and then examining the body with a special camera, doctors can more easily detect cancer.

Ultrasound: the use of sound waves to see an accurate picture of the thyroid gland, as well as any enlarged lymph nodes. While an ultrasound can't differentiate between *malignant* (or cancerous) and *benign* (or non-cancerous), tumors on the thyroid, it can detect tumors in the lymph nodes. Lymph nodes are often the first site of metastasis in advanced MTC.

Understanding treatment options

Today, there are a variety of treatment options available for medullary thyroid cancer (MTC). These treatments help contribute to the *prognosis*, or outlook, of people with MTC:

- Over 95% of people with MTC only in the thyroid, known as local disease, survive for at least 10 years after their diagnosis
- For people with advanced MTC, meaning the disease can't be removed with surgery or has spread to other parts of the body, between 20% to 40% survive for at least 10 years after their diagnosis

In the past, people with MTC had limited treatment options. MTC doesn't respond to a treatment for other thyroid cancers called *radioactive iodine* (RAI) *ablation*, which uses radioactive iodine to destroy cancerous *cells* in the thyroid. Advanced MTC also doesn't respond well to *chemotherapy*, a common treatment for other cancers that uses drugs to kill cancer cells.

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Rare diseases like MTC often have fewer treatments than common diseases. But thanks to the support and hard work of today's doctors and researchers, people with MTC have more options for treatment than ever before.

When it comes to treating MTC, you and your doctor will put together a plan based on your health, the state of your disease, possible side effects, and your individual goals and preferences.

Today, people with MTC have more options than ever before.

Surgery

Surgery is considered to be the best way to treat MTC and is typically the first treatment doctors recommend.

To see if someone with MTC is a candidate for surgery, doctors use various tests to estimate how advanced the MTC is. The goal of surgery is to completely remove all disease from the body. Sometimes, surgery cannot be performed if a *tumor* is too difficult or dangerous to remove. Cancer that has spread, or *metastasized*, to other areas may also be difficult to remove with surgery.

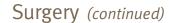
If surgery is possible, the operation recommended for MTC is a total thyroidectomy. In this surgery, the whole thyroid gland is removed, along with some lymph nodes.

What to expect with surgery

A total thyroidectomy is performed under general anesthesia. After the surgery is over, the patient stays in the hospital for 1-2 days before going home.

The thyroid gland produces thyroid *hormone*. Because the body cannot function properly without thyroid hormone, people who undergo a total thyroidectomy must take a hormone replacement. This is usually a daily pill prescribed by a doctor.

After surgery, blood levels for *calcitonin* and *carcinoembryonic antigen* should be checked, usually every 6 months to a year. If levels rise above the levels recorded immediately after the surgery, more tests should be performed to see if the disease has returned. If it has, another operation may be needed.



Possible side effects

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Thyroid surgery is generally a safe procedure. However, there are rare but serious risks involved. Risks involved with thyroid surgery include:

- Injury to nerves that can lead to temporary hoarseness, permanent hoarseness, or rarely, the insertion of a tube into the trachea to allow breathing
- Injury to the parathyroid glands, which can lower the level of calcium in the blood. This is easily treated with calcium supplements
- Injury to structures in the neck such as the esophagus, trachea, and blood vessels that take blood to and from the brain

It's normal to have some temporary hoarseness after a thyroidectomy. This usually subsides after 1-2 weeks.

Like many other surgeries, thyroid surgery also carries a risk of possible reactions to general anesthesia and sedation.

Some possible reactions to general anesthesia include:

Nausea

Sore throat

Vomiting

- Headache
- Urinary retention

More serious risks related to general anesthesia include:

- Heart attack
- Pneumonia

Stroke

In any type of surgery, there is a risk of infection, bleeding, and skin scarring. There is also a risk of developing blood clots in the legs, which can form due to inactivity during and after the surgery. In rare cases, these blood clots can detach from the leg and travel to the lungs.

Be sure to talk with your doctor about the risks of thyroid surgery.

Here are some questions you can ask your doctor to help you better understand surgery:

- Is surgery an option for me? If so, why?
- What can I expect from my surgery?
- After surgery, what kind of follow-up care will I need?

Targeted therapy

Targeted therapies are a way to treat advanced medullary thyroid cancer (MTC). These treatments focus on inhibiting specific genes or *kinases* (proteins) that the cancer needs to survive and grow. This is a different approach than standard chemotherapy, which attacks all rapidly growing cells in the body, both cancerous and non-cancerous.

Targeted therapies are typically used in advanced MTC, when the cancer has spread outside of the thyroid (for example, to the liver, lungs, or bones) or cannot be removed surgically.

What to expect with targeted therapy

Targeted therapies can take on different forms. In advanced MTC, they are most commonly pills prescribed by a doctor that can be taken at home, without having to go to the doctor's office or a treatment center.

The goal of targeted therapy is to help control the cancer, and increase the amount of time before the cancer progresses.

It is not yet known if current targeted therapies can increase the time that people with advanced MTC survive. The length of treatment varies by therapy and by person.

Deciding on targeted therapy

There are multiple targeted therapies available to treat advanced MTC. You and your doctor will decide which one is right for you. Some of the factors to consider include:

- Effectiveness and safety of available treatment options
- Previous treatment experience
- Your age and other health conditions
- Your preferences, as well as those of your doctor

The goal of targeted therapy is to help control the cancer.

Possible side effects

Generally, targeted therapies may have fewer side effects than chemotherapy. However, targeted therapies can still cause side effects. Some may be severe. Specific side effects vary by therapy, but can include:

- Diarrhea
- Constipation
- Mouth sores
- Rash
- Nausea
- High blood pressure
- Headache

- Fatigue
- Decreased appetite
- Weight loss
- Stomach (abdominal) pain
- Loss of hair color
- Hand-foot syndrome
 (redness, pain, and swelling of the hands and feet)

Rarely, targeted therapies can lead to serious side effects that can cause death. These include:

- Problems with heart rhythm
- Severe bleeding

Infection

Holes in the intestine

Talk to your doctor about what side effects you can expect and how you can manage them if they occur.

Here are some questions you can ask your doctor to help you better understand targeted therapy for advanced MTC:

- Is targeted therapy an option for me? If so, why?
- What type of targeted therapy is right for me? Why?
- How will the targeted therapy be given to me?
- How many treatments will I need?
- What are the side effects? How long will these side effects last?
- What can I do to help manage the side effects?

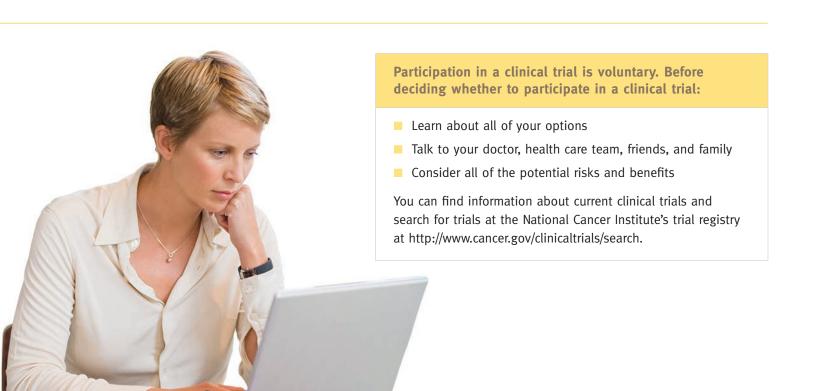
Clinical trials

Clinical trials, also known as research studies, are used to test a new treatment to determine if it is safe, effective, and possibly better than standard treatments. Talk to your doctor to determine if a clinical trial might be an option for you.

Each clinical trial has a specific policy on what type of patients should be included and excluded. Factors such as age, gender, type of disease, prior treatments, or medical history may determine if the patient is appropriate for a given clinical trial. In addition, every trial has specific rules and guidelines for when patients need to have tests and procedures, as well as when they will receive medications and at what doses.

In addition, patients will be seen regularly by the research team to monitor and determine if the treatment is working and if the patient is experiencing any side effects. Testing of treatments occurs in phases. Most clinical trials are categorized as phase I, II, III, or IV.

- Phase I trials are often the first studies to test a new drug in people. Phase I trials typically evaluate how a new drug should be given and how much of the drug may be given safely in a small group of people
- Phase II trials further test the safety of the drug and begin to measure how well the drug works in a larger group of patients
- Phase III trials typically compare the safety and efficacy of the new treatment with the current standard treatment. Phase III trials often enroll a large number of patients at different sites
- Phase IV trials are conducted after a new treatment has been approved and is available to be prescribed. These trials typically evaluate the safety and efficacy of a drug over a longer period of time in a larger number of patients



Clinical trials (continued)



Things to consider when choosing to participate in a clinical trial:

Pros

- Care provided by leading cancer researchers
- Access to new drugs and interventions before they are widely available
- Close monitoring of your health care and any side effects
- An opportunity to make a valuable contribution to cancer research

Cons

- Potential side effects of the treatment
- The new treatment may not work as well as current treatment options
- Additional tests and doctor visits may be required

Here are some questions you can ask your doctor to help you better understand clinical trials:

- Is a clinical trial an option for me?
- What types of clinical trials can I join?
- What are my other treatment options if I don't enroll in the trial?
- What is the purpose of the trial?
- Why is this approach being tested? Why do researchers think this treatment might be better than the treatments that are already available?
- What are the pros and cons of clinical trials?
- What are the possible short- and long-term risks and side effects?

- How long will the clinical trial last?
- How and how often will the safety and effectiveness of the treatment be checked?
- What other kinds of extra tests, treatments, or doctor's visits are needed during the trial?
- What are the costs for participating? Will insurance cover the costs of the clinical trial?
- Will I still be able to take my other medications during the trial?

Living with MTC

Although medullary thyroid cancer (MTC) is a rare cancer, it's still a disease that affects people every year. Each one of these people has something in common—they all must learn to cope with many aspects of cancer that are not just limited to their disease.

Treatment is just the first step in living with MTC. In this section of the guidebook, you'll also learn about coping with cancer in other important ways, from tips to improve general health to information on how to best communicate with a health care team.

With dedication, smart choices, and good support, living with MTC is possible.

Living with MTC

Treatment is just the first step in living with MTC.

Coping with side effects and symptoms

Cancer treatment can affect normal, healthy *cells*, which can result in side effects. These side effects and symptoms can be different for every patient.

Many effects of the cancer and its treatment can be managed, so it's important to talk to your health care team about any side effects, pain, or discomfort. For example, some treatments can help:

- Relieve pain
- Fight infections
- Treat diarrhea and constipation
- Reduce nausea and vomiting
- Treat depression

In addition to standard medical treatments, some complementary treatments may help patients feel better. Examples of complementary treatments include acupuncture or massage therapy. Talk to your doctor first before using any complementary therapies.



Improving overall health and wellness

Making healthy choices is a good idea for everyone, but it's especially important for people with medullary thyroid cancer (MTC). See below for some suggestions, and ask your doctor for more specific advice.

- Staying active may lessen nausea, help reduce fatigue, and lower your risk of being anxious and depressed. It may also improve your self-esteem and allow you to be less dependent on others for help with daily activities. Before beginning any exercise program, it's very important to talk to your doctor
- Good nutrition can help keep strength up and make it easier to cope with side effects. Additionally, a healthy diet may help lower the risk of infection. To change diet habits safely, be sure to talk to a dietitian or nutritionist

- Meditation, relaxation therapy, and massage may help relieve anxiety and stress
- Taking time for yourself is also very important. You may need to plan ahead for times when you need more rest
- Ask for help. Friends and family can help support you with practical things such as doing chores and arranging transportation to treatment. Don't be afraid to cut back on extra commitments that may drain your time and energy



Getting support

When diagnosed with cancer, many people feel a range of emotions: shock, disbelief, fear, anxiety, sadness, anger, and depression. Getting support from friends, family, and other patients can help.

Some people with MTC join a support group or online community for cancer patients. Others find groups focusing on certain stages of cancer, such as *metastatic* disease, especially helpful. On pages 28-29, you'll find a list of MTC support communities and organizations that may help you.

Spirituality may comfort some people with MTC. For them, talking with a trusted religious leader can help. Mental health professionals also may provide important psychological relief. Ask your doctor if he or she has any recommendations.

Everyone is different. Take time to find something that works for you.



Taking control

Communication with your doctor is an essential part of learning about medullary thyroid cancer (MTC). Here are some tips you and your family may find helpful as you go through the treatment process.

- Prepare for each doctor visit. Write a list of questions and take it to your next visit
- Make a list of the medications you're taking (including over-the-counter medications, vitamins, and herbal supplements), the doses you take, and the number of times a day you take the medications. If you're unsure of any of this information, take the medication bottles with you

- Consider taking a family member or friend with you. They can offer support, help you remember questions you may forget, and provide another perspective on what you're hearing
- Ask your doctor to clearly explain anything you don't understand or information with which you are not comfortable
- Make a list of side effects that may have developed since your last appointment

Make the most of each doctor visit.

You and your health care team

Throughout your treatment process, you may encounter many different health care professionals, such as physicians, oncologists, surgeons, pathologists, endocrinologists, nurses, nutritionists, psychologists, and social workers. Each one can provide you with services and resources to maximize your health and well-being.

It is important to remember that you're at the center of your health care team, no matter how big it is. That means sharing your concerns and decisions with everyone involved in your care. Your team works best when everyone has the same information.

To help keep the lines of communication open, consider:

- Asking your oncologist for a **treatment summary** with your medical history and cancer treatment. A treatment summary can be a useful tool to make sure everyone on your treatment team knows your history and the cancer treatments you have had
- Keeping copies of test results and medical records so that you can share them with all members of your health care team



Staying on track with treatment

To get the most out of treatment, patients with medullary thyroid cancer (MTC) need to stick to their treatment plan. Here are some practical suggestions:

- Try not to miss any doctor visits, especially when cancer treatment will be given
- Take prescribed medication at the same time every day.Some tips for remembering to take medications include:
 - Taking pills along with daily events, such as brushing your teeth
 - Using special pillboxes that are divided into days of the week. You can find these pillboxes at any pharmacy

- Asking people who are close to you to remind you to take the pills
- Keeping a medicine calendar near your pills and making a note every time you take your dose
- Call your doctor if you have side effects. Many side effects can be managed. Do not stop taking your medication on your own without talking to your doctor first

It's critical for people with MTC to stick to their treatment plan.



Dealing with financial issues

Paying for treatment can create a financial burden for people with MTC and their families, even with insurance. However, it's important not to panic or stop treatment.

If you are having trouble paying for medications, talk to your insurance provider or someone at your doctor's office to learn about your benefits and additional resources that can help you pay for treatment.

In addition, many organizations can help people with MTC look for financial assistance or support services. Some possible sources for information on financial assistance are:

National Cancer Institute (NCI)

www.cancer.gov/cancertopics/coping/financial-legal

American Cancer Society (ACS)

www.cancer.org/treatment/findingandpayingfortreatment/index

American Association for Cancer Research (AACR)

www.aacr.org/home/survivors--advocates.aspx

Cancer Financial Assistance Coalition (CFAC)

www.cancerfac.org/

Cancer Care

www.cancercare.org/get_help/assistance/cc_financial.php

Many organizations can help with financial assistance or support.

Resources

Resources

The medullary thyroid cancer (MTC) community may help you understand and cope with your cancer. There are many helpful resources available for people with MTC and their caregivers.

The following information is offered as an educational resource. MedImmune, Specialty Care Division of AstraZeneca, does not endorse these organizations and is not responsible for the contents of any Web site listed.

ThyCa: Thyroid Cancer Survivors' Association, Inc. www.ThvCa.org | 1-877-588-7904

Educates and supports patients and families through website, support groups, one-to-one



support, free patients' booklets and packets, newsletters, downloadable Low-lodine Cookbook, webinars, workshops, and conferences. Sponsors Thyroid Cancer Awareness Month, plus thyroid cancer research fundraising and grants.

American Thyroid Association (ATA) www.thyroid.org/patient-thyroid-information 1-703-998-8890



Leading worldwide organization dedicated to advancing the understanding, prevention, diagnosis, and treatment of thyroid disorders and thyroid cancer.

CaringBridge

www.caringbridge.org 1-651-789-2300 CORING BRIDGE! Free, personal, and private Web sites that connect people experiencing a significant health challenge to family and friends, making each health journey easier.

Light of Life Foundation

www.checkvourneck.com 1-609-409-0900

The mission of the foundation is to improve 👤 Light of Life Foundation the quality of life of thyroid cancer patients through continual education of the lay public and the medical

community, and by promoting research and development to improve thyroid care.

National Organization for Rare Disorders (NORD)



www.rarediseases.org | 1-800-999-6673

A national nonprofit organization dedicated to helping people with rare diseases.

National Cancer Institute (NCI)

www.cancer.gov | 1-800-4-CANCER (422-6237)

US government organization that conducts and supports research and other programs about all aspects of cancer and the continuing care of patients with cancer and their families.

CancerNet (American Society of Clinical Oncology)



www.cancer.net | 1-888-651-3038

With more than 30,000 members who are leaders in advancing cancer care, the American Society of Clinical Oncology (ASCO) is the voice of the world's cancer physicians. ASCO's patient information website brings the expertise and resources of ASCO to people living with cancer and those who care for and care about them.

 $\mathsf{ASCO}^{\circledast}$ is a registered trademark of the American Society of Clinical Oncology $\!\!^{\$}\!.$

American Cancer Society (ACS)

www.cancer.org | 1-800-227-2345

The American Cancer Society is the nationwide, community-based, voluntary health organization dedicated to eliminating cancer as a major health problem by preventing cancer, saving lives, and diminishing suffering from cancer, through research, education, advocacy, and service.

Cancer Care

www.cancercare.org | 1-800-813-HOPE (4673)
CancerCare is a national organization providing emotional support, resources, and financial assistance to anyone affected by cancer. All services, including counseling, support groups, resources, and financial assistance, are provided by professional oncology social workers and are completely free of charge.

American Association of Endocrine Surgeons (AAES) www.endocrinesurgery.org | 1-310-986-6452

The AAES is dedicated to the advancement of the science and art of endocrine surgery, providing surgical expertise in diseases of the thyroid, parathyroid, and adrenal glands, as well as in neuroendocrine tumors of the pancreas and GI tract.

Americar

Glossary

ABLATION (a-BLAY-shun): the removal or destruction of a body part or tissue or stopping how it works in the body. Ablation may be done by surgery, hormones, drugs, radiofrequency, heat, or other methods.

BENIGN (beh-NINE): not cancerous. A tumor that is benign may grow, but will not spread to other parts of the body. Also called nonmalignant.

BIOPSY (BY-op-see): a procedure where a small piece of tissue is removed and then examined for the presence of disease, such as cancer.

CALCITONIN (KAL-sih-TOH-nin): a hormone produced in the thyroid gland by C cells. Calcitonin helps to prevent the level of calcium in a person's blood from getting too high.

CARCINOEMBRYONIC ANTIGEN (KAR-sih-noh-EM-bree-AH-nik AN-tih-jen) **(CEA) TEST**: a measurement of the amount of CEA in a person's blood. People who have cancer may have a higher amount of CEA. Measuring CEA may also help keep track of how well cancer treatments are working or if cancer has come back.

CELL (sel): the building block of every part in a person's body. All living things are made up of one or more cells.

CHEMOTHERAPY (kee-mow-THER-a-pee): a treatment with drugs that attack cancer cells but may also temporarily harm some types of healthy cells.

GENE (jeen): a unit in the body that passes hereditary traits from a parent to a child. Genes are pieces of DNA. Most genes contain the information for making specific proteins in the body to help it function.

HEREDITARY (heh-REH-dih-tayr-ee): refers to something passed down from a parent to a child by information in the parent's genes.

HORMONE (HOR-mone): a substance produced by glands in a person's body. Hormones control the actions of certain cells or organs. Some hormones can also be made artificially to help people who can't produce them on their own.

KINASE (KY-nays): a type of protein that adds chemicals called phosphates to other molecules. This can activate or deactivate those molecules. Some cancer treatments act on specific kinases with links to cancer.

LOCAL DISEASE (LOH-kul di-zeez): a malignant cancer that is located in the organ where the cancer began and has not spread to other parts of the body.

LOCALLY ADVANCED CANCER (LOH-kuh-lee ad-VANST KAN-ser): cancer that has spread out beyond its starting point to nearby tissue or lymph nodes.

MALIGNANT (muh-LIG-nunt): cancerous. Malignant cells can invade and destroy normal, healthy cells nearby, and can also spread to other parts of the body.

METASTASIS (me-TAS-tuh-sis): a cancer that has spread beyond the original site of the cancer to other parts of the body.

METASTASIZE (meh-TAS-tuh-size): when cancer cells break off from the tumor where they started and spread to other areas of the body and form additional tumors of the same type.

METASTATIC (met-uh-STA-tik): something that has metastasized.

Glossary (continued)

MUTATION (myoo-TAY-shun): a change to a cell's DNA that may cause the cell to behave abnormally. Mutations may be caused by mistakes that happen when cells divide. They may also be caused by substances in the environment outside the body that may damage parts of a person's DNA. Mutations can be harmful, helpful, or have no effect. Some mutations are inherited, and certain mutations may lead to cancer or other diseases.

NODULE (NAH-jool): a growth or lump that may be malignant (cancerous) or benign (not cancerous).

PARATHYROID GLAND (PAYR-uh-THY-royd): a gland on the surface of the thyroid that's about the size of a pea. There are four glands in all. The hormone they make (called parathyroid hormone) helps increase the amount of calcium in a person's blood.

PROGNOSIS (prog-NO-sis): the likely result of a disease or how it will affect the body. Also refers to the chance of recovery from the disease, or the chance of the disease coming back.

RADIOACTIVE IODINE (RAY-dee-oh-AK-tiv I-oh-dine): a chemical often used in small doses to detect certain cancers, such as thyroid cancer. Larger doses of radioactive iodine can be used to treat some thyroid cancers.

SYNDROME (SIN-drome): a group of symptoms or conditions that happen together. A syndrome may mean that a person has a certain disease, or a higher chance of developing the disease.

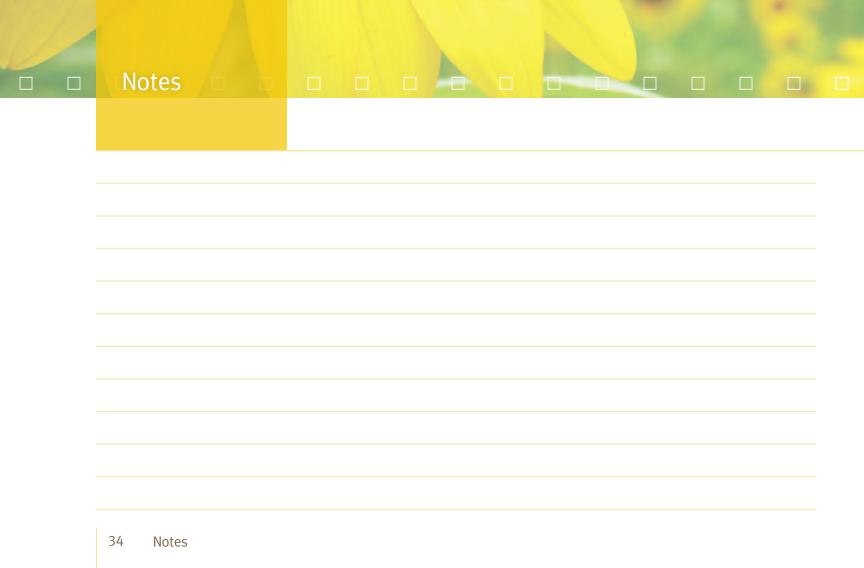
TARGETED THERAPY (TAR-geh-ted THAYR-uh-pee): This treatment specifically attacks cancer cells. Compared to some other types of treatments, targeted therapy may result in fewer side effects.

THYROID (THY-royd): a gland located under the larynx (voice box) that makes thyroid hormone and calcitonin. The thyroid helps control growth and metabolism. Also called thyroid gland.

TUMOR (TOO-mer): a mass of abnormal tissue caused by cells growing more quickly than normal tissue or not dying when they should. Tumors may be benign or malignant.

UNRESECTABLE (UN-ree-SEK-tuh-bul): unable to be removed with surgery.





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