



Eye Cancer (Melanoma and Lymphoma)

What is cancer?

The body is made up of hundreds of millions of living cells. Normal body cells grow, divide, and die in an orderly fashion. During the early years of a person's life, normal cells divide faster to allow the person to grow. After the person becomes an adult, most cells divide only to replace worn-out or dying cells or to repair injuries.

Cancer begins when cells in a part of the body start to grow out of control. There are many kinds of cancer, but they all start because of out-of-control growth of abnormal cells.

Cancer cell growth is different from normal cell growth. Instead of dying, cancer cells continue to grow and form new, abnormal cells. Cancer cells can also invade (grow into) other tissues, something that normal cells cannot do. Growing out of control and invading other tissues are what makes a cell a cancer cell.

Cells become cancer cells because of damage to DNA. DNA is in every cell and directs all its actions. In a normal cell, when DNA gets damaged the cell either repairs the damage or the cell dies. In cancer cells, the damaged DNA is not repaired, but the cell doesn't die like it should. Instead, this cell goes on making new cells that the body does not need. These new cells will all have the same damaged DNA as the first cell does.

People can inherit damaged DNA, but most DNA damage is caused by mistakes that happen while the normal cell is reproducing or by something in our environment. Sometimes the cause of the DNA damage is something obvious, like cigarette smoking. But often no clear cause is found.

In most cases the cancer cells form a tumor. Some cancers, like leukemia, rarely form tumors. Instead, these cancer cells involve the blood and blood-forming organs and circulate through other tissues where they grow.

Cancer cells often travel to other parts of the body, where they begin to grow and form new tumors that replace normal tissue. This process is called *metastasis*. It happens when the cancer cells get into the bloodstream or lymph vessels of our body.

No matter where a cancer may spread, it is always named for the place where it started. For example, breast cancer that has spread to the liver is still called breast cancer, not liver cancer. Likewise, prostate cancer that has spread to the bone is metastatic prostate cancer, not bone cancer.

Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. That is why people with cancer need treatment that is aimed at their particular kind of cancer.

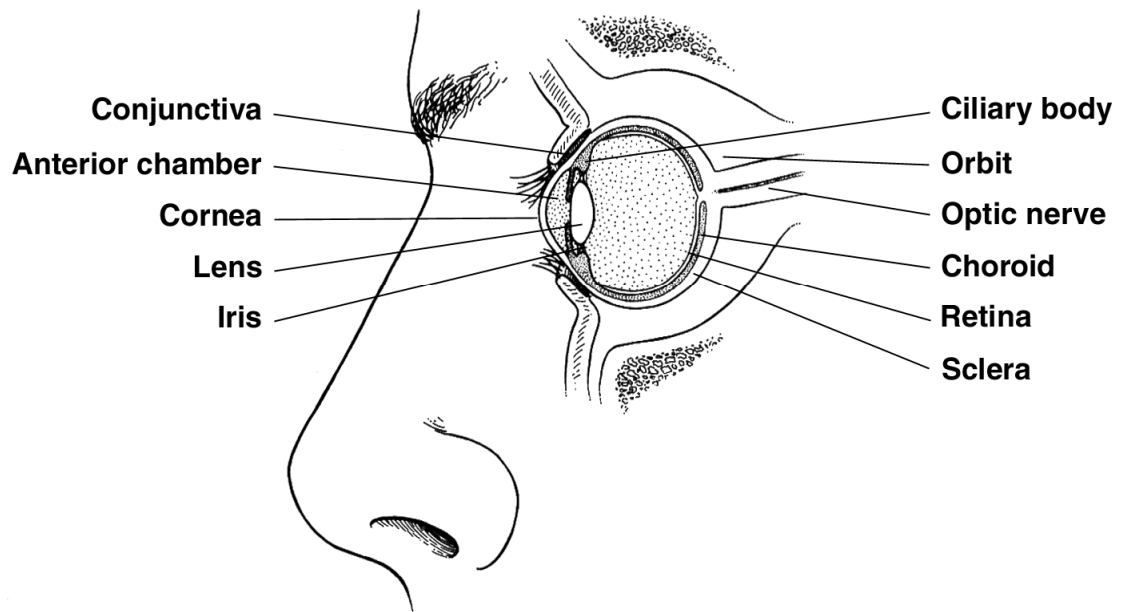
Not all tumors are cancerous. Tumors that aren't cancer are called benign. Benign tumors can cause problems — they can grow very large and press on healthy organs and tissues. But they cannot grow into (invade) other tissues. Because they can't invade, they also can't spread to other parts of the body (metastasize). These tumors are almost never life threatening.

What is eye cancer?

An eye cancer is a cancer that starts in the eye. There are different types of eye cancers. To understand eye cancers, it helps to know something about the normal structure and function of the eye.

Parts of the eye

The eye has 3 major parts: the eyeball (globe), the orbit, and the adnexal structures.



Eyeball

The main part of the eye is the eyeball (also known as the *globe*), which is mostly filled with a jelly-like material called *vitreous humor*. The eyeball has 3 main layers: the sclera, the uvea, and the retina.

Sclera: The sclera is the tough, white covering over most of the outside of the eyeball. In the front of the eye it is continuous with the cornea, which is clear to let light through.

Uvea: The uvea is the middle layer of the eyeball. It is where most melanomas of the eye develop. The uvea has 3 main parts:

- The **iris** is the colored part of the eye (most often blue or brown). It surrounds the pupil, the small opening that lets light enter the eyeball.
- The **choroid** is a thin, pigmented layer lining the eyeball that nourishes the retina and the front of the eye with blood.
- The **ciliary body** contains the muscles inside the eye that change the shape of the lens so that the eye can focus on near or distant objects. It also has cells that make aqueous humor, the clear fluid in the front of the eye between the cornea and the lens.

Retina: The retina is the inner layer of cells in the back of the eye. It is made up of specialized nerve cells that are sensitive to light. These light-sensing cells are connected to the brain by the optic nerve. Light enters the eye and passes through the lens, which focuses it on the retina. The pattern of light (image) appearing on the retina is sent through the optic nerve to an area of the brain called the visual cortex, allowing us to see.

Cancers that affect the eyeball are called *intraocular* (within the eye) cancers.

Orbit

The second part of the eye, called the orbit, consists of the tissues surrounding the eyeball. These tissues include muscles that move the eyeball in different directions and the nerves attached to the eye.

Cancers of these tissues are called *orbital* cancers.

Adnexal structures

Finally, there are adnexal (accessory) structures such as the eyelids and tear glands. Cancers that develop in these tissues are called *adnexal* cancers.

Cancers in the eye (intraocular cancers)

Two types of cancers can be found in the eye.

Primary intraocular cancers are cancers that start inside the eyeball. In adults, melanoma is the most common primary intraocular cancer, followed by primary intraocular lymphoma.

In children, retinoblastoma (a cancer arising from cells in the retina) is the most common primary intraocular cancer, and medulloepithelioma is the next most common (but is still extremely rare). These childhood cancers are discussed in our separate document, *Retinoblastoma*.

Secondary intraocular cancers start somewhere else and then spread to the eye. These are not truly "eye cancers," but they are actually more common than primary intraocular cancers. The most common cancers that spread to the eye are breast and lung cancers. Most often these cancers spread to the part of the eyeball called the uvea. For more information on these types of cancers, look at the specific American Cancer Society documents on these cancers.

Intraocular melanoma (melanoma of the eye)

Intraocular melanoma is the most common type of cancer that develops within the eyeball in adults, but it is still fairly rare. Melanomas of the skin are much more common than intraocular melanomas.

Melanomas develop from pigment-making cells called *melanocytes*. When melanoma develops in the eyeball, it is usually in the uvea, which is why these cancers are also called *uveal melanomas*. About 9 out of 10 intraocular melanomas develop in the choroid (which is part of the uvea). Choroid cells make the same kind of pigment as melanocytes in the skin, so it is not surprising that these cells sometimes form melanomas.

Nearly all of the remaining intraocular melanomas start in the iris (also part of the uvea). These are the easiest for the patient and doctor to see because they often start in a pigmented spot on the iris that has been present for many years and then begins to grow. These melanomas usually are fairly slow growing, and they rarely spread to other parts of the body. For these reasons, people with iris melanomas generally have a good prognosis (outlook).

Intraocular melanomas are generally made up of 2 different kinds of cells.

- **Spindle cells:** These are long, thin cells.
- **Epithelioid cells:** These cells are almost round but with some straight edges.

Most tumors are composed of both kinds of cells. The outlook is better if the tumors are mostly spindle cells as opposed to mostly epithelioid cells. Epithelioid tumors are more likely to metastasize (spread) to distant sites (such as the liver). If you have intraocular melanoma, your doctor can tell you which type of cells were found.

Primary intraocular lymphoma (lymphoma of the eye)

Lymphoma is a type of cancer that starts in immune system cells called lymphocytes. It usually starts in lymph nodes, which are bean-sized collections of immune system cells scattered throughout the body. Lymphomas can also start in internal organs such as the stomach, lungs, and rarely, in the eyes.

There are 2 main types of lymphoma: Hodgkin disease and non-Hodgkin lymphoma. Primary intraocular lymphoma is always a non-Hodgkin lymphoma. Most people with primary intraocular lymphoma are elderly or have immune system problems such as the acquired immunodeficiency syndrome (AIDS). Primary intraocular lymphoma is often seen along with lymphoma of the brain, known as *primary central nervous system (CNS) lymphoma*.

Orbital and adnexal cancers

Cancers of the orbit and adnexa develop from tissues such as muscle, nerve, and skin around the eyeball and are like their counterparts in other parts of the body. These are described in other American Cancer Society documents on cancers of muscle, nerve, skin, etc. For example, cancers of the eyelid are usually skin cancers, which are described in our documents on skin cancers (*Melanoma Skin Cancer* and *Skin Cancer: Basal and Squamous Cell*). Muscle cancer, called rhabdomyosarcoma, is described in our document, *Rhabdomyosarcoma*.

Most of the rest of this document focuses on intraocular melanomas and lymphomas.

What are the key statistics for eye cancer?

The American Cancer Society's most recent estimates for the United States are for 2012:

- 2,610 new cases of cancers (primarily melanoma) of the eye and orbit: 1,310 in men and 1,300 in women.
- 270 deaths from cancer of the eye: 120 in men and 150 in women.

Primary eye cancers can occur at any age, but most occur in people over age 50. The incidence of eye melanomas has been fairly stable over the past few decades. Cancers that spread to the eye from another part of the body (secondary eye cancers) are actually more common than primary eye cancers.

Most cancers of the eye and orbit in adults are melanomas, with lymphomas being the next most common. Both of these cancers start more often in other parts of the body. More than 9 out of 10 melanomas start in the skin, while most lymphomas begin in lymph nodes.

What are the risk factors for eye cancer?

A risk factor is anything that affects your chance of getting a disease such as cancer. Different cancers have different risk factors. For example, smoking is a risk factor for cancer of the lung and many other cancers.

But risk factors don't tell us everything. Having a known risk factor, or even several risk factors, does not mean that you will get the disease. And many people who get the disease may not have had any known risk factors.

Risk factors for primary intraocular melanoma

Race/ethnicity

The risk of intraocular melanoma is much higher in whites than in African Americans or Asian Americans.

Eye color

People with light colored eyes also have an increased risk of intraocular melanoma. People with blue eyes are somewhat more likely to develop melanoma of the eye than are people with brown eyes.

Certain inherited conditions

Dysplastic nevus syndrome, in which people have abnormal moles of the skin and an increased risk of skin melanoma, may also increase the risk for developing melanoma of the eye.

People with abnormal brown spots on the uvea (known as *oculodermal melanocytosis* or *nevus of Ota*) also have an increased risk of developing eye melanoma.

Eye melanomas can run in some families who do not have these conditions, but this is very rare.

Sun exposure

Although too much exposure to sunlight (or sunlamps) has been proposed as a possible risk factor for melanoma of the eye, it has never been proven.

Certain occupations

Some studies have suggested that welders, farmers, fishermen, chemical workers, and laundry workers may have a higher risk of eye melanoma, but none of these links has been proven conclusively.

Risk factors for primary intraocular lymphoma

The only known risk factor for primary lymphoma of the eye is having a weakened immune system. Examples include patients with the acquired immunodeficiency syndrome (AIDS) as well as people who take anti-rejection drugs after organ or tissue transplants.

Do we know what causes eye cancer?

Researchers still do not know exactly what causes most eye cancers. But they have found some risk factors (see the section, "What are the risk factors for eye cancer?") and are beginning to understand how some of these factors may cause cells in the eye to become cancerous.

In recent years, scientists have made progress in understanding how certain changes in a person's DNA can cause cells to become cancerous. DNA is the chemical in each of our cells that makes up our *genes*, the instructions for how our cells function. We usually look like our parents because they are the source of our DNA. However, DNA affects more than how we look. It also can influence our risk for developing certain diseases, such as some kinds of cancer.

Some genes contain instructions for controlling when cells grow and divide. Genes that help cells grow and multiply are called *oncogenes*. Genes that slow down cell division or cause cells to die at the right time are called *tumor suppressor genes*. Cancers can be caused by DNA changes that turn on oncogenes or turn off tumor suppressor genes.

Some people with cancer have DNA changes they inherited from a parent that increase their risk for the disease. Usually, however, these DNA changes are acquired during life rather than inherited before birth.

Scientists have found some changes in oncogenes and tumor suppressor genes in cells from eye cancers such as melanoma and lymphoma. For example, recent research has shown that about 4 out of 5 eye melanomas have changes in either of 2 related genes,

GNA11 or *GNAQ*, which appear to be oncogenes. Other, as of yet unknown, gene changes are probably needed for these cancers to develop as well.

However, it is still not exactly clear what causes changes in these and other cancer-related genes to occur in some people and not others.

Can eye cancer be prevented?

Because we do not yet know what causes most cancers of the eye, it is not known how to prevent them.

We know there is a link between sunlight and melanomas of the skin, and there are things you can do that might reduce your risk of these cancers, including limiting exposure to intense sunlight, covering up with protective hats and clothing, and using sunscreen. The American Cancer Society also recommends wearing UV-protected sunglasses when outside in strong sunlight. Wrap-around sunglasses with 99% to 100% UVA and UVB absorption provide the best protection for the eyes and their surrounding areas. This might help reduce the risk of developing cancers of the skin around the eyes. The link between sunlight and eye melanomas is not proven, but some doctors think that sunglasses might also reduce eye melanoma risk.

Many people with eye lymphoma have no recognized risk factors for this disease. For now, the only way to limit the risk of eye lymphoma is to try to avoid infection with HIV, the virus that causes AIDS.

Can eye cancer be found early?

Eye cancer is uncommon, and there is no widely recommended screening test for this cancer in people at average risk. (Screening is testing for a disease like cancer in people without any symptoms.) Still, in some cases eye cancer can be found early. Some doctors may recommend yearly eye exams for those who may be at higher risk of eye melanoma, such as people with dysplastic nevus syndrome.

People who notice a dark spot on their iris (colored part of the eye) should have a doctor look at it, especially if it is getting bigger.

Regular eye exams are an important part of everyone's health care, even if they have no symptoms. Often melanomas of the eye are found during a routine eye exam. When the doctor looks through the pupil at the back of the eye, he or she may be able to see a dark spot that may be an early melanoma.

Many doctors feel that most melanomas start from a *nevus* (mole), which is a benign (non-cancerous) tumor of pigment cells. If an eye nevus is present, it should be looked at regularly by an ophthalmologist (a doctor who specializes in eye diseases).

How is eye cancer diagnosed?

Certain signs and symptoms might suggest that a person may have eye cancer, but tests are typically needed to confirm the diagnosis.

Diagnosing melanoma of the eye

Signs and symptoms of eye melanoma

Many patients with eye melanoma don't have symptoms unless the cancer grows in certain parts of the eye or becomes more advanced. Signs and symptoms of eye melanomas can include:

- Problems with vision (blurry vision or sudden loss of vision)
- Floaters (spots or squiggles drifting in the field of vision) or flashes of light
- Visual field loss (losing part of your field of sight)
- A growing dark spot on the iris
- Change in the size or shape of the pupil
- Change in position of the eyeball within its socket
- Bulging of the eye
- Change in the way the eye moves within the socket

Pain is rare except in cases of massive spread outside the eye. In such cases, bulging or a change in the position of the eye may also be noted.

Other, less serious conditions can also cause many of these symptoms. For example, floaters may occur as a normal part of the aging process. Still, if you have any of these symptoms, it's important to see a doctor right away so the cause can be found and treated, if needed.

Eye exam

Examination of the eye by an ophthalmologist (a medical doctor specializing in diseases of the eye) is often the most important step in diagnosing melanoma of the eye. The doctor will ask if you are having any symptoms and check your vision and eye movement. The doctor will also look for enlarged blood vessels on the outside of the eye, which can be a sign of a tumor inside the eye.

The ophthalmologist may also use special instruments to get a good look inside the eye for a tumor or other abnormality. You may get drops in your eye to dilate the pupil before the doctor uses these instruments.

- An **ophthalmoscope** (also known as a *direct ophthalmoscope*) is a hand-held instrument consisting of a light and a small magnifying lens.
- An **indirect ophthalmoscope** and a slit lamp is more like a large microscope. For this exam, you sit down and rest your chin on a small platform, while the doctor looks into your eye through magnified lenses. This exam can often provide a more detailed view of the inside of the eye than the direct ophthalmoscope.
- A **gonioscopy lens** is a specially mirrored lens that is placed on the cornea (after it is numbed). This lets the doctor see the deep structures in the angle of the front of the eye near the iris. It can provide information on tumor growth into areas of the eye that would otherwise be hard to see.

Most of the time, an eye exam alone can make the diagnosis. In some cases, imaging tests such as ultrasound may be required to confirm the diagnosis. Very rarely a biopsy will also be needed.

Many people have a benign tumor in the eye called a *choroidal nevus*, which can sometimes be mistaken for an eye melanoma. A small number of these will eventually turn into melanomas. If your ophthalmologist spots one of these, he or she will likely advise regular eye exams to see if it grows.

Even if you have recently had your eyes examined by an ophthalmologist or optometrist, if you start to have any of the symptoms listed above, get another exam. Sometimes these tumors are missed or grow so fast that they weren't there when you were last examined.

If symptoms and/or the results of the eye exam suggest you might have eye cancer, more involved tests will likely be done. These might include imaging tests or other procedures.

Imaging tests

Imaging tests use sound waves, x-rays, or magnetic fields to create pictures of the inside of your body. Imaging tests may be done for a number of reasons, including to help find a suspicious area that might be cancerous, to learn how far cancer may have spread, or to help determine if treatment has been effective.

Ultrasound: This is an important test for helping to diagnose eye melanomas. Ultrasound is a very common test that uses high-frequency sound waves to take pictures of parts of the body. For this test, which is also known as *echography*, a small instrument is placed up against the eyeball and high frequency sound waves are sent through the eye. The instrument picks up the pattern of echoes that comes back, which is converted into an image on a computer screen. This test is especially useful for diagnosing eye melanomas because they have a specific appearance on ultrasound. Using this test, doctors can confirm a diagnosis of melanoma of the eye in most cases. This test can also tell the doctor the location and the size of the tumor.

Ultrasound biomicroscopy (UBM) is a special type of ultrasound that uses sound waves at even higher frequency to image the front of the eye.

If you have already been diagnosed with eye melanoma, ultrasound may also be used to look for tumors in the liver, which is a common site of spread of this cancer.

Fluorescein angiography: This is another test used to help diagnose melanoma of the eye. An orange fluorescent dye (fluorescein) is injected into the bloodstream through a vein in the arm. Pictures of the back of the eye are then taken using a light that causes the dye to fluoresce (glow). This lets the doctor see the blood vessels inside the eye. Although melanomas do not have a special appearance with this test, some other eye problems do. Doctors can use this method to tell if something is not a melanoma.

When a special green dye is used to look at the blood vessels, this test is known as *indocyanine green (ICG) angiography*.

Chest x-ray: If you have been diagnosed with eye melanoma, a plain x-ray of your chest may be done to see if the cancer has spread to your lungs. This is very unlikely unless your cancer is far advanced. This x-ray can be done in any outpatient setting. If the results are normal, you probably don't have cancer in your lungs.

Computed tomography (CT or CAT) scan: The CT scan is an x-ray test that produces detailed cross-sectional images of your body. Instead of taking one picture, like a standard x-ray, a CT scanner takes many pictures as it rotates around you. A computer then combines these pictures into detailed images of the part of your body being studied.

CT scans are sometimes used to see if a melanoma has spread outside of the eye into nearby structures. It may also be used to look for spread of the cancer to distant organs such as the liver.

Before the scan, you may be asked to drink a contrast solution and/or get an intravenous (IV) injection of a contrast dye that helps better outline abnormal areas in the body. You may need an IV line through which the contrast dye is injected. A blood test that measures kidney function will be done before dye is given, as it can sometimes harm the kidneys. The injection can also cause some flushing (redness and warm feeling). Some people are allergic and get hives or, rarely, more serious reactions like trouble breathing and low blood pressure. Be sure to tell the doctor if you have any allergies or have ever had a reaction to any contrast material used for x-rays.

CT scans take longer than regular x-rays. You need to lie still on a table while the scan is being done. During the test, the table slides in and out of the scanner, a ring-shaped machine that completely surrounds the table. You might feel a bit confined by the ring you have to lie in while the pictures are being taken. *Spiral CT* (also known as *helical CT*) is now used in many medical centers. This type of CT scan uses a faster machine that reduces the dose of radiation and yields more detailed pictures.

Magnetic resonance imaging (MRI) scan: Like CT scans, MRI scans provide detailed images of soft tissues in the body. But MRI scans use radio waves and strong magnets instead of x-rays. The energy from the radio waves is absorbed and then released in a pattern formed by the type of body tissue and by certain diseases. A computer translates the pattern into very detailed images of parts of the body. A contrast material called gadolinium is often injected into a vein before the scan to better see details.

MRI images are often used to determine the extent of a tumor's growth and spread. They are particularly useful in examining eye tumors. They are also helpful in finding cancer that has spread to the brain or spinal cord, as well as any spread of melanoma outside the eye orbit.

MRI scans take longer than CT scans — often up to an hour. You have to lie inside a narrow tube, which can be confining and may upset people with a fear of enclosed spaces. Newer, open MRI machines might help with this, but they might provide less detailed images and can't be used in all cases. The machine also makes buzzing and clicking noises that may be disturbing. Some people might need medicine to help them relax for the test.

Biopsy

This procedure may be done with either sedation and local anesthesia (numbing medicine) or while a person is under general anesthesia (in a deep sleep). A thin, hollow needle is passed into the eye, and cells from the tumor are sucked up into a small syringe. The sample is sent to a lab, where a doctor called a *pathologist* looks at the cells under a microscope.

A biopsy is needed to confirm the diagnosis of most cancers, but it is not often used for eye melanomas. The main reason for this is that it is hard to get a sample of the tumor without damaging the eye. Also, the biopsy could possibly spread the tumor outside the eye. For these reasons, and because almost all cases can be accurately diagnosed by the eye exam and imaging tests, most people with melanoma of the eye are treated without having a biopsy first. This may change in the future. New technology may make biopsy safer in situations where the diagnosis is uncertain.

Blood tests

Blood tests can't be used to diagnose melanoma of the eye, but they may be done once a diagnosis is made.

Liver function tests: If you have been diagnosed with eye melanoma, your doctor may order blood tests to see how well your liver is functioning. Abnormal test results can sometimes be a sign that the cancer has spread to the liver.

Diagnosing intraocular lymphoma

Signs and symptoms of intraocular lymphoma

The possible signs and symptoms of eye lymphomas include:

- Blurred vision or loss of vision
- Seeing floaters (spots or squiggles drifting in the field of vision)
- Redness or swelling in the eye

- Sensitivity to light
- Eye pain (uncommon)

Intraocular lymphoma most often affects both eyes, but it can cause more symptoms in one eye than in the other.

Most often, these symptoms are caused by other, less serious conditions. For example, floaters may occur as a normal part of the aging process. Still, if you have any of these symptoms, it's important to see a doctor right away so the cause can be found and treated, if needed.

Many of the exams and tests mentioned below are described in more detail in the section on diagnosing intraocular melanomas.

Eye exam

The doctor will ask about any symptoms you are having and may check your vision and eye movements. During the eye exam, the doctor will use an ophthalmoscope (an instrument with a light and a small magnifying lens) to get a good look inside the eye. If lymphoma is present, the doctor may see that the vitreous (the jelly-like substance that fills most of the inside of the eye) is cloudy.

Imaging tests

Ultrasound: Ultrasound is usually done to assess the nature of the mass (tumor), especially if the back of the eye can't be seen during the eye exam.

MRI scan: MRI is often done not only to see the eye better, but also to look for lymphoma in the brain or meninges (the thin layers of tissue that cover the brain and spinal cord), which are common sites of spread of this cancer.

CT scan: CT scans are used less often than MRI scans for eye lymphoma because they do not provide as much detail.

Positron emission tomography (PET) scan: For a PET scan, a radioactive substance (usually a type of sugar related to glucose, known as *FDG*) is injected into the blood. The amount of radioactivity used is very low. Because cancer cells in the body are growing quickly, they absorb larger amounts of the sugar than most other cells. A special camera can then create a picture of areas of radioactivity in the body. The picture is not finely detailed like a CT or MRI scan, but it can provide helpful information about whether abnormal areas seen on other tests (such as MRIs) are likely to be cancer.

A PET scan can help give the doctor a better idea of whether the cancer has spread to lymph nodes or other parts of the body. A PET scan can also be useful if your doctor thinks the cancer may have spread but doesn't know where.

Often, a machine is used that can do both a PET and CT scan at the same time (PET/CT scan). This lets the doctor compare areas of higher radioactivity on the PET scan with the more detailed appearance of that area on the CT.

Biopsy

Symptoms and the results of exams and tests might suggest you have intraocular lymphoma, but a biopsy is usually needed to confirm the diagnosis. To biopsy the eye, an ophthalmologist most often does a procedure called a *vitrectomy*. You may be sedated and get local anesthesia (numbing medicine) or you may get general anesthesia (which puts you in a deep sleep). The doctor takes a sample of the vitreous gel from inside the eye by inserting very small instruments into the eye, cutting the vitreous, and then sucking some of it out. The cells in the biopsy sample are then sent to a lab to be looked at under a microscope and tested by other special techniques. For more information on the lab tests done on suspected lymphoma specimens, see our document, *Non-Hodgkin Lymphoma*.

Lumbar puncture (spinal tap)

This procedure is used to look for lymphoma cells in the fluid that surrounds the brain and spinal cord (called *cerebrospinal fluid* or *CSF*). It is done in cases of known or suspected eye lymphomas because these cancers often affect the brain or spinal cord.

For this test, you lie on your side on a bed or exam table with your knees up near your chest. The doctor first numbs an area in the lower part of the back near the spine. A small, hollow needle is then placed between the bones of the spine to withdraw some of the fluid.

The fluid is then examined under a microscope to look for lymphoma cells. Other tests may be done on the fluid as well.

How are eye cancers staged?

Staging is the process of finding out how far a cancer has spread. The stage (extent) of an eye cancer is one of the most important factors in selecting treatment options and estimating a patient's outlook for recovery and survival (prognosis).

The stage of a cancer is determined from the results of eye exams, imaging tests (ultrasound, CT or MRI scan, etc.) and other tests, which are described in the section, "How is eye cancer diagnosed?"

A staging system is a standardized way for the cancer care team to summarize information about how far a cancer has spread. The most common systems used to describe the stages of eye melanomas are the American Joint Committee on Cancer (AJCC) TNM system and the system used by the Collaborative Ocular Melanoma Study (COMS) group.

AJCC TNM staging system for melanoma of the eye

The TNM system is based on 3 key pieces of information:

- **T** describes the size of the primary **tumor** and/or whether it has invaded into nearby structures.
- **N** describes whether the cancer has spread to nearby (regional) lymph **nodes** (bean-sized collections of immune system cells located throughout the body).
- **M** indicates whether the cancer has **metastasized** (spread) to other organs of the body. (The most common site of eye melanoma spread is the liver.)

Numbers or letters appear after T, N, and M to provide more details about each of these factors:

- The numbers 0 through 4 indicate increasing severity. Lower case letters after the numbers divide these groups further.
- The letter X means "cannot be assessed" because the information is not available.

Most eye melanomas start in the uvea, which includes the iris, ciliary body, and choroid (see "What is eye cancer?"). The T categories for iris melanomas are different from the T categories for ciliary body and choroidal melanomas. But the N and M categories are the same for melanomas in all 3 parts of the uvea.

T categories for iris melanoma

TX: The main (primary) tumor cannot be assessed; information not known.

T0: No evidence of a primary tumor.

T1: Tumor is only in the iris.

- **T1a:** The tumor is only in the iris and touches 1/4 or less of the iris.
- **T1b:** The tumor is only in the iris and touches more than 1/4 of the iris.
- **T1c:** The tumor is only in the iris and is causing an increase in the eye pressure (glaucoma).

T2: Tumor has grown into the ciliary body or choroid (or both).

- **T2a:** Tumor has grown into the ciliary body and/or choroid and is causing glaucoma.

T3: Tumor has grown into the ciliary body and/or choroid and into the sclera.

- **T3a:** Tumor has grown into the ciliary body and/or choroid and into the sclera and is causing glaucoma.

T4: Tumor extends outside the eyeball.

- **T4a:** The part of the tumor that is outside the eyeball is 5 millimeters (mm) — about 1/5 of an inch — or less across in size.
- **T4b:** The part of the tumor that is outside the eyeball is greater than 5 mm (about 1/5 of an inch) across in size.

T categories for ciliary body and choroidal melanoma

TX: The main (primary) tumor cannot be assessed; information not known.

T0: No evidence of a primary tumor.

T1: Tumor size is either:

- No more than 3 mm deep and no more than 12 mm across, OR
- From 3.1 to 6 mm deep and no more than 9 mm across

T1a: The tumor is T1 in size and is not growing into the ciliary body or growing outside the eyeball.

T1b: The tumor is T1 in size and is growing into the ciliary body.

T1c: The tumor is T1 in size and is not growing into the ciliary body but is growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T1d: The tumor is T1 in size and is growing into the ciliary body. It is also growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T2: Tumor size is one of the following:

- No more than 3 mm deep and from 12.1 to 18 mm across.
- From 3.1 to 6 mm deep and 9.1 to 15 mm across
- From 6.1 to 9 mm deep and no more than 12 mm across

T2a: The tumor is T2 in size and is not growing into the ciliary body or growing outside the eyeball.

T2b: The tumor is T2 in size and is growing into the ciliary body.

T2c: The tumor is T2 in size and is not growing into the ciliary body but is growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T2d: The tumor is T2 in size and is growing into the ciliary body. It is also growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T3: Tumor size is one of the following:

- From 3.1 to 6 mm deep and between 15.1 and 18 mm across
- From 6.1 to 9 mm deep and between 12.1 and 18 mm across
- From 9.1 to 12 mm deep and 18 mm or less across

- From 12.1 to 15 mm deep and 15 mm or less across

T3a: The tumor is T3 in size and is not growing into the ciliary body or growing outside the eyeball.

T3b: The tumor is T3 in size and is growing into the ciliary body.

T3c: The tumor is T3 in size and is not growing into the ciliary body but is growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T3d: The tumor is T3 in size and is growing into the ciliary body. It is also growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T4: Tumor size is one of the following:

- Greater than 15 mm deep and any width
- Greater than 18 mm across and any depth
- Between 12.1 and 15 mm deep and between 15.1 and 18 mm across

T4a: The tumor is T4 in size and is not growing into the ciliary body or growing outside the eyeball.

T4b: The tumor is T4 in size and is growing into the ciliary body.

T4c: The tumor is T4 in size and is not growing into the ciliary body but is growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T4d: The tumor is T4 in size and is growing into the ciliary body. It is also growing outside of the eyeball. The part of the tumor that is outside the eyeball is 5 mm (about 1/5 of an inch) or less across in size.

T4e: The tumor can be any size. It is growing outside the eyeball and the part of the tumor that is outside the eyeball is greater than 5 mm across.

N categories for iris, ciliary body, and choroidal melanomas

NX: Lymph nodes cannot be assessed.

N0: Cancer has not spread to nearby lymph nodes.

N1: Cancer has spread to nearby lymph nodes.

M categories for iris, ciliary body, and choroidal melanomas

M0: Cancer has not spread to distant parts of the body.

M1: Cancer has spread to distant parts of the body.

M1a: The largest area of cancer spread is 3 centimeters (cm) — a little over an inch — across or smaller.

M1b: The largest area of cancer spread is between 3.1 and 8 cm across (8 cm is a little over 3 inches).

M1c: The largest area of cancer spread is 8.1 cm or more across.

Stage grouping

To assign an overall stage, information about the T, N, and M categories is combined by a process called *stage grouping*. The stages are described by Roman numerals from I (the least advanced) to IV (the most advanced). Some stages are further divided with letters.

Stage I	T1a, N0, M0
Stage IIA	T1b to T1d, N0, M0 OR T2a, N0, M0
Stage IIB	T2b or T3a, N0, M0
Stage IIIA	T2c or T2d, N0, M0 OR T3b or T3c, N0, M0 OR T4a, N0, M0
Stage IIIB	T3d, N0, M0 OR T4b or T4c, N0, M0
Stage IIIC	T4d or T4e, N0, M0
Stage IV	Any T, N1, M0 OR Any T, any N, M1

COMS staging of melanoma of the eye

The TNM system is very detailed, but many doctors use the simpler staging system devised by the Collaborative Ocular Melanoma Study (COMS) group, which has done most of the clinical research on how to treat intraocular melanoma. This system divides eye melanomas into small, medium, and large.

Type	Thickness	Diameter
Small	1.0 mm to 2.5 mm	5 mm or less
Medium	2.5 mm to 10 mm	5 mm to 16 mm
Large	10 mm or more	16 mm or more

Staging of intraocular lymphoma

Intraocular lymphoma does not have a unique staging system. These cancers may be staged with the system used for other non-Hodgkin lymphomas, which is described in our separate document, *Non-Hodgkin Lymphoma*.

Treatment options are generally based on the type of lymphoma, as well as on whether the lymphoma is limited to the eye or is also in other areas of the body.

Because eye lymphoma is rare, accurate survival statistics for this cancer are hard to find. In one review of patients whose lymphoma was confined to the eye, about half of the patients were still alive 5 years after diagnosis. Unfortunately, in many cases the lymphoma has already reached the brain at the time of diagnosis, in which case the outlook is not as good.

Eye melanoma survival rates

Survival rates are often used by doctors as a standard way of discussing a person's prognosis (outlook). Some patients with cancer may want to know the survival statistics for people in similar situations, while others may not find the numbers helpful or may even not want to know them. Whether or not you want to read about the survival statistics below for ocular eye melanoma is up to you.

The 5-year survival rate refers to the percentage of patients who live *at least* 5 years after their cancer is diagnosed. Of course, many people live much longer than 5 years (and many are cured).

In order to get 5-year survival rates, doctors have to look at people who were treated at least 5 years ago. Improvements in treatment since then may result in a more favorable outlook for people now being diagnosed with this cancer. Five-year *relative* survival rates, such as the numbers below, assume that some people will die of other causes and compare the observed survival with that expected for people without the cancer. This is a more accurate way to describe the prognosis (outlook) for patients with a particular type and stage of cancer.

Survival rates are often based on previous outcomes of large numbers of people who had the disease, but they cannot predict what will happen in any particular person's case.

Other factors may affect a person's outlook, such as the type of cells in the tumor (spindle or epithelioid), as well as the patient's age and general health. Your doctor can tell you how the numbers below may apply to you, as he or she is familiar with the aspects of your particular situation.

The numbers below come from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) database, and are based on about 1,500 patients who were diagnosed with melanoma of the eye between 1988 and 2001.

Overall, about 3 out of 4 people with eye melanoma survive for at least 5 years. Survival rates tend to be better for earlier than for later-stage cancers, but accurate survival rates for eye melanomas based on a specific stage are hard to determine because these cancers are fairly rare.

In patients whose cancer is confined to the eye, the 5-year survival rate is about 80%. This is in stark contrast to melanomas that have spread to distant parts of the body, where the 5-year survival rate is about 15%.

How is eye cancer treated?

This information represents the views of the doctors and nurses serving on the American Cancer Society's Cancer Information Database Editorial Board. These views are based on their interpretation of studies published in medical journals, as well as their own professional experience.

The treatment information in this document is not official policy of the Society and is not intended as medical advice to replace the expertise and judgment of your cancer care team. It is intended to help you and your family make informed decisions, together with your doctor.

Your doctor may have reasons for suggesting a treatment plan different from these general treatment options. Don't hesitate to ask him or her questions about your treatment options.

The next few sections describe the various types of treatments used for eye melanomas and lymphomas. This is followed by a description of the most common approaches used based on the situation.

Making treatment decisions

After an eye cancer is found and staged, the cancer care team will discuss your treatment options with you. In choosing a treatment plan, factors to consider include the location and stage of the cancer, your overall health, the chances of curing the disease, and the possible impact of the treatment on vision.

It is important to take time and think about your choices. Because intraocular melanomas and lymphomas are rare, no matter what treatment you decide on, it should be done by doctors who are experienced in treating people with these cancers. If time permits it is often a good idea to seek a second opinion from an experienced doctor as well. A second opinion can provide more information and help you feel more confident about the treatment plan that is chosen.

Treatments of the eye might interfere with or cause complete loss of vision. Doctors have developed treatments to try to preserve vision whenever possible, but these treatments may not always be the best choice. Eye cancers can often be fatal if left untreated, and some patients must be given treatment regardless of the possible damage to the eye. On the other hand, some eye melanomas are small, grow very slowly (if at all), and can be watched carefully without treatment. This is why it is important to get the opinion of a skilled specialist in this field before deciding on treatment.

Surgery for eye cancer

Surgery is used to treat some intraocular melanomas but is not used to treat intraocular lymphoma. It is used less often than in the past as the use of radiation therapy has grown.

The type of surgery depends on the location and size of the tumor. Patients are under general anesthesia (in a deep sleep) during these operations, and they usually leave the hospital 1 or 2 days afterward. The operations used to treat people with melanoma include:

Iridectomy: Removal of part of the iris. This operation may be an option for very small iris melanomas.

Iridotrabeculectomy: Removal of part of the iris, plus a small piece of the outer part of the eyeball. Small iris melanomas may be treated with this technique.

Iridocyclectomy: Removal of a portion of the iris and the ciliary body. This operation is also used for small iris melanomas.

Resection: Doctors in some cancer centers may try to surgically resect (remove) a melanoma of the ciliary body or choroid. This can be done for small melanomas but it is hard to remove the tumor without damaging the rest of the eye. This can lead to severe vision problems.

Enucleation: Removal of the entire eyeball. This is used for larger melanomas (T4 or large T3 tumors), but it may also be done for some smaller melanomas if other treatment options would destroy useful vision in the eye anyway. During the same operation, an orbital implant is usually put in to take the place of the eyeball. The implant is made out of silicone or hydroxyapatite (a substance similar to bone). It is attached to the muscles that moved the eye, so it should move the same way as the eye would have. Within a few weeks after surgery, you visit an ocularist (a specialist in eye prostheses) to be fitted with an artificial eye that will match the size and color of the remaining eye. The artificial eye is a thin shell that fits over the orbital implant and under the eyelids. Once the eye is in place, it will be hard to tell it apart from the real eye.

Possible risks and side effects of surgery

All surgery carries some risk, including the possibility of bleeding, infections, and complications from anesthesia.

Surgery on the eye can lead to the loss of some or all of the vision in that eye. Enucleation results in complete and immediate vision loss in that eye. Other surgeries can also cause problems leading to a loss of vision, which can occur later on. In some cases, vision may have already been damaged or lost because of the cancer.

Removal of the eyeball (enucleation) obviously can affect a person's appearance. As noted above, an artificial eye can be put in place to help minimize this.

Radiation therapy for eye cancer

Radiation therapy uses high-energy radiation to kill cancer cells. It is a common treatment for intraocular melanoma. Radiation therapy can often preserve some vision, although sometimes this is lost anyway because radiation damages other parts of the eye. Its main advantage is that the eye structure is preserved, which may result in a better appearance for the patient.

Different types of radiation therapy can be used to treat eye cancers.

Brachytherapy (episcleral plaque therapy)

This form of radiation therapy places small pellets (sometimes called *seeds*) of radioactive material directly into or very close to the cancer. This has become the most commonly used radiation treatment for most eye melanomas. Studies have shown that in many cases it is as effective as surgery (enucleation).

The pellets of radioactive material (usually radioactive iodine, ruthenium, or palladium) are attached to a small carrier (shaped like a very small bottle cap), which is placed on the outside of the eyeball with tiny stitches to keep it in place. The carrier is made of gold or lead to shield nearby tissues from the radiation. The radiation from the pellets travels a very short distance, so most of it will be focused only on the tumor.

An operation is needed to put the plaque (radioactive element and carrier) in place. This surgery usually takes 1 or 2 hours. The plaque is usually kept there for 4 to 7 days, depending on the size of the tumor and the strength of the radiation source. You will probably remain in the hospital during this time. Surgery to remove the plaque usually takes less than an hour, and you will probably be able to go home the same day. The full effect of the radiation on the tumor is not seen for 3 to 6 months.

This therapy cures about 9 out of 10 small tumors and can preserve vision in some patients, depending on what part of the eye the melanoma is in. The outlook for vision is less favorable if the tumor is located very close to the optic nerve, which carries signals from the eye to the brain.

External beam radiation therapy

In this approach, radiation from a source outside the body is focused on the cancer. This is the type of radiation therapy used to treat eye lymphomas. For melanoma the use of

this type of radiation therapy is generally limited to newer methods that focus narrow beams of radioactivity on the tumor. These techniques have not yet been widely used.

Conformal proton beam radiation therapy: Instead of using x-rays as in standard radiation therapy, this approach focuses proton beams on the cancer. Protons are positive parts of atoms. Unlike x-rays, which release energy both before and after they hit their target, protons cause little damage to tissues they pass through and then release their energy after traveling a certain distance. This means that proton beam radiation may be able to deliver more radiation to the tumor and do less damage to nearby normal tissues.

Getting treatment is much like getting an x-ray, but the dose of radiation is much higher. In most cases, the total dose of radiation is divided into daily fractions (usually given Monday thru Friday) over several weeks. The treatment is not painful.

The machines needed to make protons are expensive, and there are only a handful of them in use in the United States at this time.

Stereotactic radiosurgery: This is a type of radiation treatment that delivers a large, precise radiation dose to the tumor area in a single session. (There is no actual "surgery" involved in this treatment.) The radiation may be delivered in one of two ways.

In one approach, radiation beams are focused at the tumor from hundreds of different angles for a short period of time. The machine used to deliver this type of radiation is known as a Gamma Knife.

A similar approach uses a movable linear accelerator (a machine that creates radiation) that is controlled by a computer. Instead of delivering many beams at once, this machine moves around the head to deliver radiation to the tumor from many different angles. Several machines do stereotactic radiosurgery in this way, with names such as X-Knife, CyberKnife, and Clinac.

Possible side effects of radiation therapy

The main concern with radiation therapy is damage to other parts of the eye, leading to problems such as cataracts, retinal detachment, glaucoma, and bleeding into the eye. These can result in loss of vision or other problems, which may not happen right away. The risk depends on the size and location of the tumor.

Laser therapy for eye cancer

Lasers are highly focused beams of light that can be used to destroy tissue. Laser therapy is sometimes used to treat intraocular melanoma, but it is not used to treat intraocular lymphoma.

Transpupillary thermotherapy (TTT)

This is the most commonly used type of laser treatment for intraocular melanoma. It uses infrared light to heat the tumor and cause it to die. It works well for choroidal melanomas

because the melanin in these cells absorbs the light energy. TTT may be useful for treating small choroidal melanomas. It is not usually the main treatment, but it may be used as an adjuvant (additional) treatment after brachytherapy (plaque radiotherapy). Usually 1 to 3 treatments are given to kill the tumor.

Laser photocoagulation

This treatment uses a highly focused, high-energy light beam to burn tissue. This type of treatment was first tried in the 1950s, but it is rarely used now to treat intraocular melanoma. It can be effective for very small melanomas, but it is more often used to treat side effects from radiation. Several laser treatments are usually given 6 or 8 weeks apart to treat a tumor.

Possible side effects of laser therapy

As with radiation therapy, the main concern with laser therapy is damage to parts of the eye that result in loss of vision. The risk depends on the size and location of the tumor.

Chemotherapy for eye cancer

Systemic chemotherapy (chemo) is the use of anti-cancer drugs that are injected into a vein or are taken by mouth. These drugs enter the bloodstream and reach throughout the body, making this treatment very useful for cancers that may be in more than one part of the body. Chemo can be useful for treating intraocular lymphoma, but it is used less often for intraocular melanoma.

Chemotherapy for lymphoma of the eye

Depending on the type and the stage of the lymphoma, chemo may be used alone or in combination with radiation therapy. There are several routes by which chemo may be given:

Intraocular: Some chemo drugs may be injected directly into the eye. This concentrates the chemotherapy at the site of the cancer, allowing higher doses to be given without causing severe side effects in other parts of the body.

Intrathecal: If the lymphoma may have spread to the brain or spinal cord, chemo may be given directly into the cerebrospinal fluid (the fluid surrounding the brain and spinal cord). Often, the chemo is given into this fluid during a lumbar puncture (spinal tap). Another option is to place a special type of catheter (an Ommaya reservoir) into the fluid through a small hole in the skull. The end of the catheter, which has a dome-shaped reservoir, stays just under the scalp. Doctors and nurses can use a thin needle to give chemo drugs through the reservoir

Systemic: Chemo drugs may be injected into a vein (usually in the arm) or taken as pills, after which they will reach all areas of the body. This route is especially useful if the cancer might have spread to parts of the body beyond where it started.

Many drugs are useful in treating patients with intraocular lymphoma. Methotrexate is a chemo drug often used to treat lymphoma of the eye. It can be given directly into the eye, intrathecally, and systemically. It is often given in combination with other drugs to treat lymphoma.

Doctors give chemo in cycles, with each period of treatment followed by a rest period to give the body time to recover. Chemotherapy cycles generally last about 3 to 4 weeks. Most chemo treatments are given on an outpatient basis (in the doctor's office or hospital outpatient department), but some require hospital admission. Sometimes a patient may take one chemotherapy combination for several cycles and later switch to a different one if the first combination does not seem to be working well.

High-dose chemo followed by stem cell transplant: Doctors are limited in the doses of chemotherapy they can give because of the side effects these drugs can cause. High doses of chemo can especially damage the bone marrow (where new blood cells are made), which can be life-threatening.

In certain cases, such as where standard doses of chemo are no longer working, doctors sometimes give high doses of chemo that they know will likely destroy the bone marrow. To do this, they take blood stem cells from the patient's body before the treatment, and then infuse them back into the body after the chemotherapy. These cells settle in the bone marrow, where they make new blood cells.

This technique can be useful in some situations, but it can be hard for the patient to go through and can cause serious side effects. For more detailed information on stem cell transplants, see our documents, *Non-Hodgkin Lymphoma* and *Bone Marrow and Peripheral Blood Stem Cell Transplant*.

Chemotherapy for melanoma of the eye

Melanoma usually does not respond well to chemotherapy. Chemo is used only when the cancer has become widespread. The treatment is the same as for melanoma of the skin. For more information on treatment of widespread melanoma, refer to our document, *Melanoma Skin Cancer*.

Possible side effects of chemo

Chemo drugs attack cells that are dividing quickly, which is why they work against cancer cells. But other cells in the body such as those in the bone marrow, the lining of the mouth and intestines, and the hair follicles, also divide quickly. These cells are likely to be affected by chemo, which can lead to side effects.

The side effects of chemo depend on the type and dose of drugs given and the length of time they are taken. These side effects can include:

- Hair loss
- Mouth sores

- Loss of appetite
- Nausea and vomiting
- Diarrhea
- Increased chance of infections (due to low white blood cell counts)
- Easy bruising or bleeding (due to low blood platelet counts)
- Fatigue (due to low red blood cell counts)

These side effects are usually short-term and go away after treatment is finished. There are often ways to lessen these side effects. For example, there are drugs to help prevent or reduce nausea and vomiting. Some drugs may also have specific side effects not listed above. Be sure to ask your doctor or nurse about medicines to help reduce side effects, and let him or her know when you do have side effects so they can be managed effectively.

For more information on chemotherapy, see our document, *Understanding Chemotherapy: A Guide for Patients and Families*.

Monoclonal antibodies for lymphoma

Antibodies are proteins normally made by the immune system to help fight infections. Man-made versions, called *monoclonal antibodies*, can be designed to attack a specific target, such as a substance on the surface of lymphocytes (the cells in which lymphomas start).

Several monoclonal antibodies are now being used to treat lymphoma. In some cases they may be used to help treat lymphoma of the eye.

Rituximab (Rituxan[®]) is an antibody that attaches to a substance called CD20 that is found on the surface of many lymphoma cells. This attachment seems to make the lymphoma cell die. Rituximab may be given by intravenous (IV) infusion or injected directly into the eye. The treatments can be given in the doctor's office or clinic. Common side effects are usually mild but may include chills, fever, nausea, rashes, fatigue, and headaches. Even if these symptoms occur during the first rituximab infusion, it is very unusual for them to recur with later doses. Rituximab is often combined with chemotherapy.

Newer forms of monoclonal antibodies, such as ibritumomab tiuxetan (Zevalin[®]) and tositumomab (Bexxar[®]), are similar to rituximab but have radioactive molecules attached to them, which may help them work better. Because of the radiation, these drugs are somewhat harder for doctors to give than rituximab. Another limitation is that they cannot be used along with chemo because they also lower blood counts. At this time they are generally used if chemo and/or rituximab are no longer working.

Clinical trials for eye cancer

You may have had to make a lot of decisions since you've been told you have cancer. One of the most important decisions you will make is choosing which treatment is best for you. You may have heard about clinical trials being done for your type of cancer. Or maybe someone on your health care team has mentioned a clinical trial to you.

Clinical trials are carefully controlled research studies that are done with patients who volunteer for them. They are done to get a closer look at promising new treatments or procedures.

If you would like to take part in a clinical trial, you should start by asking your doctor if your clinic or hospital conducts clinical trials. You can also call our clinical trials matching service for a list of clinical trials that meet your medical needs. You can reach this service at 1-800-303-5691 or on our Web site at www.cancer.org/clinicaltrials. You can also get a list of current clinical trials by calling the National Cancer Institute's Cancer Information Service toll-free at 1-800-4-CANCER (1-800-422-6237) or by visiting the NCI clinical trials Web site at www.cancer.gov/clinicaltrials.

There are requirements you must meet to take part in any clinical trial. If you do qualify for a clinical trial, it is up to you whether or not to enter (enroll in) it.

Clinical trials are one way to get state-of-the-art cancer treatment. They are the only way for doctors to learn better methods to treat cancer. Still, they are not right for everyone.

You can get a lot more information on clinical trials in our document called *Clinical Trials: What You Need to Know*. You can read it on our Web site or call our toll-free number and have it sent to you.

Complementary and alternative therapies for eye cancer

When you have cancer you are likely to hear about ways to treat your cancer or relieve symptoms that your doctor hasn't mentioned. Everyone from friends and family to Internet groups and Web sites may offer ideas for what might help you. These methods can include vitamins, herbs, and special diets, or other methods such as acupuncture or massage, to name a few.

What exactly are complementary and alternative therapies?

Not everyone uses these terms the same way, and they are used to refer to many different methods, so it can be confusing. We use *complementary* to refer to treatments that are used *along with* your regular medical care. *Alternative* treatments are used *instead of* a doctor's medical treatment.

Complementary methods: Most complementary treatment methods are not offered as cures for cancer. Mainly, they are used to help you feel better. Some methods that are used along with regular treatment are meditation to reduce stress, acupuncture to help relieve pain, or peppermint tea to relieve nausea. Some complementary methods are

known to help, while others have not been tested. Some have been proven not to be helpful, and a few have even been found harmful.

Alternative treatments: Alternative treatments may be offered as cancer cures. These treatments have not been proven safe and effective in clinical trials. Some of these methods may pose danger, or have life-threatening side effects. But the biggest danger in most cases is that you may lose the chance to be helped by standard medical treatment. Delays or interruptions in your medical treatments may give the cancer more time to grow and make it less likely that treatment will help.

Finding out more

It is easy to see why people with cancer think about alternative methods. You want to do all you can to fight the cancer, and the idea of a treatment with few or no side effects sounds great. Sometimes medical treatments like chemotherapy can be hard to take, or they may no longer be working. But the truth is that most of these alternative methods have not been tested and proven to work in treating cancer.

As you consider your options, here are 3 important steps you can take:

- Look for "red flags" that suggest fraud. Does the method promise to cure all or most cancers? Are you told not to have regular medical treatments? Is the treatment a "secret" that requires you to visit certain providers or travel to another country?
- Talk to your doctor or nurse about any method you are thinking about using.
- Contact us at 1-800-227-2345 to learn more about complementary and alternative methods in general and to find out about the specific methods you are looking at.

The choice is yours

Decisions about how to treat or manage your cancer are always yours to make. If you want to use a non-standard treatment, learn all you can about the method and talk to your doctor about it. With good information and the support of your health care team, you may be able to safely use the methods that can help you while avoiding those that could be harmful.

Treating intraocular melanoma by location and size

The main factors in determining treatment for eye melanoma include the location and size of the cancer, as well as the likelihood of saving vision in the eye. There is no major advantage in saving an eye if a small melanoma in a crucial place has completely destroyed vision. And doctors will not necessarily want to remove an eye that functions normally even if the tumor is large. Therefore, the statements below about treatment can only be general and may not apply to every situation.

It is important to keep in mind that patients who have had enucleation (removal of the eyeball) and those who have had radiation therapy respond similarly when asked about

the quality of their lives after treatment. The most important outcome for these people was surviving this cancer.

Choroidal melanomas

Treating these cancers depends on their size and how well the eye functions. The smaller the tumor, the less likely surgery will be needed unless the eye is badly damaged or vision is lost.

Small melanomas: There are often several options for treating small choroidal melanomas. Both you and your doctor should decide which option is best for you.

- Careful observation (also known as *watchful waiting*). If the tumor is very small, it may be watched for some time and only treated if it starts to grow.
- Radiation therapy, such as brachytherapy, proton beam therapy, or stereotactic radiation therapy
- Laser therapy, including transpupillary thermotherapy (TTT)
- Surgery, which may require removing only the tumor or may need to be as extensive as enucleation (removing the entire eye). This may be necessary if the eye is severely damaged by the tumor (for example, causing severe glaucoma).

Medium-sized melanomas: These tumors can usually be treated by most approaches listed above with the exception of laser therapy or TTT (although TTT might be used after radiation). Once again, the choice of treatment is a decision that should be made by both you and your doctor. Radiation and surgery appear to be about equally effective. Radiation offers the best chance of preserving eyesight, but some people who have radiation may eventually need surgery.

Large melanomas: The standard treatment for these cancers is surgery, which often needs to be more extensive than for smaller melanomas. Enucleation (removal of the entire eye) is the preferred surgery.

Some doctors have begun treating large melanomas with plaque radiotherapy with fairly good results. The cure rate appears to be about as high as with surgery, but it is important to have a doctor experienced in using this procedure for large melanomas. This allows patients to avoid the cosmetic effect of losing their eye, but most patients still end up with poor vision in the eye. Other options that may be considered include proton beam radiation and stereotactic radiosurgery.

Melanomas of the iris

Melanomas of the iris are usually small, slow-growing tumors. One option for people with an early stage iris melanoma is to wait and see if it grows. A series of special photographs are taken to help monitor the tumor. If it begins to grow, treatment may be surgery or radiation therapy (in certain situations).

If surgery is recommended, the amount of eye tissue to be removed depends on the extent of the cancer. Types of surgery for early iris melanomas include:

- Iridectomy (removal of part of the iris)
- Iridotrabeculectomy (removal of part of the iris, plus a small piece of the outer part of the eyeball)
- Iridocyclectomy (removal of a portion of the iris and the ciliary body)
- Enucleation (removal of the eyeball)

Ciliary body melanoma

These cancers can be treated with either surgical removal of the tumor, if it is small enough, or radiation therapy. In more advanced cases or if there is serious eye damage, enucleation may be needed.

Recurrent melanomas

Cancer that comes back after treatment is called *recurrent*. Recurrence can be local (in or near the same place it started) or distant (spread to organs such as the lungs or liver). Treating melanomas that come back after the initial treatment depends on several factors, including where the cancer recurs and what type of treatment was used initially.

Cancers that recur within the eye (intraocular recurrence) are usually treated by enucleation. When intraocular melanoma recurs outside of the eye (called *extraocular recurrence*), it most often comes back as spread to the liver. It might also come back as spread to other areas, like the lungs or bone. These recurrences, like skin melanomas that recur at distant sites, are often hard to treat. Immunotherapy (drugs that boost the immune system) and/or chemotherapy are the most commonly used treatments. Surgery may be an option in rare cases if the recurrence is only in one spot. For more detailed information on treating advanced melanomas, see our document, *Melanoma Skin Cancer*.

Treating intraocular lymphoma

These lymphomas are often linked with lymphomas of the brain, which are known as *primary central nervous system (CNS) lymphomas*. Because lymphomas of the eye often spread to the brain or have already spread when the cancer is first diagnosed, in many cases both the eye and the brain are treated. For more detailed information on the treatment of CNS lymphomas, see our document, *Non-Hodgkin Lymphoma*.

Because these cancers are rare, they have been hard to study. A number of approaches can be used to treat this disease, but the best course of treatment is not known, so it is important to go to a doctor experienced in treating eye lymphoma. The main goals of treatment are to get rid of the cancer in the eye and to try to prevent it from spreading to the brain or spinal cord.

Surgery is not used to treat intraocular lymphomas because it is likely that the disease has already spread beyond the eye at the time of diagnosis. In most cases, doctors treat these cancers with external radiation therapy, chemotherapy, or a combination of the two.

The radiation therapy may be directed only at the eye, or it may also include the brain and spinal cord. Radiation to both eyes may also be recommended because often the cancer is in both eyes. Radiation therapy to the brain and spinal cord can help prevent the cancer from spreading there (or help destroy cancer cells that may already be there but haven't been detected). But it can also cause side effects, leading to problems with thinking, learning, and memory.

Chemotherapy is most often given either into a vein (systemic chemotherapy) or directly into the cerebrospinal fluid (intrathecal chemotherapy). It can also be given directly into the eye (intraocular chemotherapy). This gets higher doses of the drug to the tumor. Methotrexate is usually the main chemotherapy drug used. Monoclonal antibodies such as rituximab may also be given this way. The best combination and dosage of drugs is not yet known, and the choice may be influenced by the exact cell type (classification) of lymphoma. Because recurrence rates are high if chemotherapy is given only systemically (into a vein), therapy is usually given directly to the eye with either radiation or intraocular chemotherapy as well. If the lymphoma does not respond to treatment or if it comes back (recurs), high-dose chemotherapy followed by a stem cell transplant may be an option in some cases.

More treatment information

For more details on treatment options — including some that may not be addressed in this document — the National Cancer Institute (NCI) and the National Comprehensive Cancer Network (NCCN) are good sources of information.

The NCI provides treatment information via its telephone center (1-800-4-CANCER) and its Web site (www.cancer.gov). Detailed treatment information intended for use by cancer care professionals is also available on www.cancer.gov.

The NCCN, made up of experts from many of the nation's leading cancer centers, develops cancer treatment guidelines for doctors to use when treating patients. These are available on the NCCN Web site (www.nccn.org). The NCCN has treatment guidelines for melanoma of the skin and different types of lymphoma, but not specifically for cancers of the eye.

What should you ask your doctor about eye cancer?

As you cope with cancer and cancer treatment, we encourage you to have honest, open discussions with your doctor. Feel free to ask any question on your mind, no matter how small it might seem. Here are some questions you might want to ask. Nurses, social

workers, and other members of the treatment team may also be able to answer many of your questions.

- What kind of eye cancer do I have?
- Has my cancer spread beyond the eye?
- What is the stage (extent) of my cancer, and what does that mean?
- Will I need to have other tests done before we can decide on treatment?
- How much experience do you have treating this type of cancer?
- Should I get a second opinion?
- What treatment choices do I have?
- What do you recommend and why?
- What is the goal of my treatment (cure, prolonging life, relieving symptoms, etc.)?
- What risks or side effects are there to the treatments you suggest? What is the risk of losing vision from the different treatments?
- What should I do to be ready for treatment?
- How long will treatment last? What will it involve? Where will it be done?
- How will treatment affect my daily activities?
- What are the chances my cancer will recur with these treatment plans?
- What would we do if the treatment doesn't work or if the cancer recurs?
- What type of follow-up might I need after treatment?

Along with these sample questions, be sure to write down some of your own. For example, you might want more information about recovery times so you can plan your work or activity schedule. You might also want to ask about clinical trials for which you may qualify.

What happens after treatment for eye cancer?

For many people with eye cancer, treatment may remove or destroy the cancer. Completing treatment can be both stressful and exciting. You may be relieved to finish treatment, but find it hard not to worry about cancer growing or coming back. (When cancer comes back after treatment, it is called *recurrence*.) This is a very common concern in people who have had cancer.

It may take a while before your fears lessen. But it may help to know that many cancer survivors have learned to live with this uncertainty and are leading full lives. Our document, *Living With Uncertainty: The Fear of Cancer Recurrence*, gives more detailed information on this.

For other people, the eye cancer may never go away completely. These people may get regular treatments with chemotherapy, radiation therapy, or other therapies to help keep the cancer in check. Learning to live with cancer as a more of a chronic disease can be difficult and very stressful. It has its own type of uncertainty.

Follow-up care

If you have completed treatment, your doctors will still want to watch you closely. It is very important to keep all follow-up appointments. During these visits, your doctors will ask about symptoms, do physical exams, and may order blood tests or imaging tests such as MRI or CT scans.

Follow-up is needed to check for cancer recurrence or spread, as well as possible side effects of certain treatments. This is the time for you to ask your health care team any questions you need answered and to discuss any concerns you might have.

Almost any cancer treatment can have side effects. Some may last for a few weeks to several months, but others can last the rest of your life. Don't hesitate to tell your cancer care team about any symptoms or side effects that bother you so they can help you manage them.

Follow-up after treatment of intraocular melanoma

Following treatment, your doctor will most likely want to see you fairly often (every couple of months or so) at first. The time between visits may be extended if there are no problems.

During these doctor visits, physical exams (including careful eye exams) are done to look for tumor recurrence or side effects of treatment as early as possible. Imaging tests such as chest x-rays, ultrasound, CT scans, or MRI scans may be done to watch for recurrence or metastasis. Most recurrences can be treated more effectively if they are found early. The liver and lungs are the most common sites of distant recurrence of melanoma of the eye.

If cancer does recur at some point, further treatment will depend on the location of the cancer, what treatments you've had before, and your health. For more information on how recurrent cancer is treated, see the section "Treating intraocular melanoma by location and size" For more general information on dealing with a recurrence, you may also want to see our document, *When Your Cancer Comes Back: Cancer Recurrence*. You can get this document by calling 1-800-227-2345.

Treatments for eye cancers such as surgery, radiation therapy, and laser therapy can cause some side effects. Your doctors will check your treated eye for complications and may

recommend medicines or operations to help control side effects and help to keep your vision as clear as possible. For example, radiation therapy may cause cataracts to form or injure muscles around the eye, resulting in blurred or double vision. In either case, surgery may be able to help with these problems.

Follow-up exams and tests are also important for people who have had an eye removed, because melanomas can still sometimes recur in the area around the eye or in distant parts of the body.

Follow-up after treatment of intraocular lymphoma

Physical exams are usually done about every 3 months for the first few years after treatment. Other tests may include lumbar punctures (spinal taps) to look for lymphoma cells in the spinal fluid and MRI scans of the brain to look for recurrence or metastasis.

Seeing a new doctor

At some point after your cancer diagnosis and treatment, you may find yourself seeing a new doctor who does not know anything about your medical history. It is important that you be able to give your new doctor the details of your diagnosis and treatment. Make sure you have this information handy:

- A copy of your pathology report(s) from any biopsies or surgeries
- Copies of imaging tests (CT or MRI scans, etc.), which can usually be stored on a CD, DVD, etc.
- If you had surgery, a copy of your operative report(s)
- If you were in the hospital, a copy of the discharge summary that doctors prepare when patients are sent home
- If you had radiation therapy, a summary of the type and dose of radiation and when and where it was given
- If you had chemotherapy, a list of the drugs, drug doses, and when you took them

It is also important to keep health insurance. Tests and doctor visits cost a lot, and even though no one wants to think of their cancer coming back, this could happen.

Lifestyle changes

You can't change the fact that you have had cancer. What you can change is how you live the rest of your life – making choices to help you stay healthy and feel as well as you can. This can be a time to look at your life in new ways. Maybe you are thinking about how to improve your health over the long term. Some people even start during cancer treatment.

Making healthier choices

For many people, a diagnosis of cancer helps them focus on their health in ways they may not have thought much about in the past. Are there things you could do that might make you healthier? Maybe you could try to eat better or get more exercise. Maybe you could cut down on the alcohol, or give up tobacco. Even things like keeping your stress level under control may help. Now is a good time to think about making changes that can have positive effects for the rest of your life. You will feel better and you will also be healthier.

You can start by working on those things that worry you most. Get help with those that are harder for you. For instance, if you are thinking about quitting smoking and need help, call the American Cancer Society for information and support. This tobacco cessation and coaching service can help increase your chances of quitting for good.

Eating better

Eating right can be hard for anyone, but it can get even tougher during and after cancer treatment. Treatment may change your sense of taste. Nausea can be a problem. You may not feel like eating and lose weight when you don't want to. Or you may have gained weight that you can't seem to lose. All of these things can be very frustrating.

If treatment caused weight changes or eating or taste problems, do the best you can and keep in mind that these problems usually get better over time. You may find it helps to eat small portions every 2 to 3 hours until you feel better. You may also want to ask your cancer team about seeing a dietitian, an expert in nutrition who can give you ideas on how to deal with these treatment side effects.

One of the best things you can do after cancer treatment is put healthy eating habits into place. You may be surprised at the long-term benefits of some simple changes, like increasing the variety of healthy foods you eat. Getting to and staying at a healthy weight, eating a healthy diet, and limiting your alcohol intake may lower your risk for a number of types of cancer, as well as having many other health benefits.

Rest, fatigue, and exercise

Extreme tiredness, called *fatigue*, is very common in people treated for cancer. This is not a normal tiredness, but a "bone-weary" exhaustion that doesn't get better with rest. For some people, fatigue lasts a long time after treatment, and can make it hard for them to exercise and do other things they want to do. But exercise can help reduce fatigue. Studies have shown that patients who follow an exercise program tailored to their personal needs feel better physically and emotionally and can cope better, too.

If you were sick and not very active during treatment, it is normal for your fitness, endurance, and muscle strength to decline. Any plan for physical activity should fit your own situation. An older person who has never exercised will not be able to take on the same amount of exercise as a 20-year-old who plays tennis twice a week. If you haven't exercised in a few years, you will have to start slowly – maybe just by taking short walks.

Talk with your health care team before starting anything. Get their opinion about your exercise plans. Then, try to find an exercise buddy so you're not doing it alone. Having family or friends involved when starting a new exercise program can give you that extra boost of support to keep you going when the push just isn't there.

If you are very tired, you will need to balance activity with rest. It is OK to rest when you need to. Sometimes it's really hard for people to allow themselves to rest when they are used to working all day or taking care of a household, but this is not the time to push yourself too hard. Listen to your body and rest when you need to. (For more information on dealing with fatigue, please see *Fatigue in People With Cancer* and *Anemia in People With Cancer*.)

Keep in mind exercise can improve your physical and emotional health.

- It improves your cardiovascular (heart and circulation) fitness.
- Along with a good diet, it will help you get to and stay at a healthy weight.
- It makes your muscles stronger.
- It reduces fatigue and helps you have more energy.
- It can help lower anxiety and depression.
- It can make you feel happier.
- It helps you feel better about yourself.

And long term, we know that getting regular physical activity plays a role in helping to lower the risk of some cancers, as well as having other health benefits.

Can I lower my risk of the cancer progressing or coming back?

Most people want to know if there are specific lifestyle changes they can make to reduce their risk of cancer progressing or coming back. Unfortunately, for most cancers there is little solid evidence to guide people. This doesn't mean that nothing will help — it's just that for the most part this is an area that hasn't been well studied. Most studies have looked at lifestyle changes as ways of preventing cancer in the first place, not slowing it down or preventing it from coming back.

At this time, not enough is known about eye cancer to say for sure if there are things you can do that will be helpful. Adopting healthy behaviors such as not smoking, eating well, and maintaining a healthy weight may help, but no one knows for sure. However, we do know that these types of changes can have positive effects on your health that can extend beyond your risk of cancer.

How about your emotional health?

During and after treatment, you may find yourself overcome with many different emotions. This happens to a lot of people.

You may find yourself thinking about death and dying. Or maybe you're more aware of the effect the cancer has on your family, friends, and career. You may take a new look at your relationships with those around you. Unexpected issues may also cause concern. For instance, you may see your health care team less often after treatment and have more time on your hands. These changes can make some people anxious.

Almost everyone who is going through or has been through cancer can benefit from getting some type of support. You need people you can turn to for strength and comfort. Support can come in many forms: family, friends, cancer support groups, church or spiritual groups, online support communities, or one-on-one counselors. What's best for you depends on your situation and personality. Some people feel safe in peer-support groups or education groups. Others would rather talk in an informal setting, such as church. Others may feel more at ease talking one-on-one with a trusted friend or counselor. Whatever your source of strength or comfort, make sure you have a place to go with your concerns.

The cancer journey can feel very lonely. It is not necessary or good for you to try to deal with everything on your own. And your friends and family may feel shut out if you do not include them. Let them in, and let in anyone else who you feel may help. If you aren't sure who can help, call your American Cancer Society at 1-800-227-2345 and we can put you in touch with a group or resource that may work for you.

What happens if treatment is no longer working?

If cancer keeps growing or comes back after one kind of treatment, it may be possible to try another treatment plan that might still cure the cancer, or at least shrink the tumors enough to help you live longer and feel better. But when a person has tried many different treatments and the cancer has not gotten any better, the cancer tends to become resistant to all treatment. If this happens, it's important to weigh the possible limited benefits of a new treatment against the possible downsides, including treatment side effects. Everyone has their own way of looking at this.

This is likely to be the hardest part of your battle with cancer – when you have been through many medical treatments and nothing's working anymore. Your doctor may offer you new options, but at some point you may need to consider that treatment is not likely to improve your health or change your outcome or survival.

If you want to continue to get treatment for as long as you can, you need to think about the odds of treatment having any benefit and how this compares to the possible risks and side effects. In many cases, your doctor can estimate how likely it is the cancer will respond to treatment you are considering. For instance, the doctor may say that more treatment might have about a 1 in 100 chance of working. Some people are still tempted

to try this. But it is important to think about and understand your reasons for choosing this plan.

No matter what you decide to do, it is important that you feel as good as you can. Make sure you are asking for and getting treatment for any symptoms you might have, such as nausea or pain. This type of treatment is called *palliative care*.

Palliative care helps relieve symptoms, but is not expected to cure the disease. It can be given along with cancer treatment, or can even be cancer treatment. The difference is its purpose – the main purpose of palliative care is to improve the quality of your life, or help you feel as good as you can for as long as you can. Sometimes this means using drugs to help with symptoms like pain or nausea. Sometimes, though, the treatments used to control your symptoms are the same as those used to treat cancer. For instance, radiation might be used to help relieve bone pain caused by cancer that has spread to the bones. Or chemo might be used to help shrink a tumor and keep it from blocking the bowels. But this is not the same as treatment to try to cure the cancer.

At some point, you may benefit from hospice care. This is special care that treats the person rather than the disease; it focuses on quality rather than length of life. Most of the time, it is given at home. Your cancer may be causing problems that need to be managed, and hospice focuses on your comfort. You should know that while getting hospice care often means the end of treatments such as chemo and radiation, it doesn't mean you can't have treatment for the problems caused by your cancer or other health conditions. In hospice the focus of your care is on living life as fully as possible and feeling as well as you can at this difficult time. You can learn more about hospice in our document called *Hospice Care*.

Staying hopeful is important, too. Your hope for a cure may not be as bright, but there is still hope for good times with family and friends — times that are filled with happiness and meaning. Pausing at this time in your cancer treatment gives you a chance to refocus on the most important things in your life. Now is the time to do some things you've always wanted to do and to stop doing the things you no longer want to do. Though the cancer may be beyond your control, there are still choices you can make.

What's new in eye cancer research and treatment?

Many medical centers across the nation are doing research on the causes and treatment of eye cancers. These are challenging diseases to study because they are not common. But each year scientists find out more about what causes them and how to improve treatment.

Genetics

Learning more about the gene changes involved in these cancers will likely play an important role in treating intraocular melanomas, intraocular lymphomas, and other eye cancers in the future. As we learn about the gene changes in these cancers, we may be

able to develop tests to identify people who are more likely to get them and carefully screen those people.

Genetic profiles of tumors may also help predict the likelihood of the tumor spreading. For example, in uveal melanoma, certain genetic changes, such as the loss of one copy of chromosome 3, have been linked to an increased risk cancer spread. Some doctors may test for these changes to try to identify patients who might benefit from more aggressive treatment.

Identifying gene changes might also provide specific targets for which newer drugs may work (see targeted therapy below). This is an active area of research.

Immunotherapies

Immunotherapies are treatments that boost the body's own immune system in an attempt to get it to attack the cancer. Cytokines, monoclonal antibodies, vaccines, and other immunotherapies are among the most promising approaches for treating melanoma and lymphoma. Although most clinical trials of these treatments include people with melanomas of the skin and lymphomas that begin in lymph nodes, results of these studies may help treat people with intraocular melanoma and lymphoma as well.

An example is ipilimumab (Yervoy), a type of drug called a *monoclonal antibody* that boosts the overall activity of the immune system. It has been shown to help people with advanced melanomas of the skin live longer, although it can also have some serious side effects. It is not yet clear if this or similar drugs may help against melanomas of the eye.

Targeted therapy

As researchers have learned more about some of the changes in cells that cause them to become cancerous, they have begun to develop drugs that target these changes. These new targeted drugs work differently from standard chemo drugs. They tend to have different (and often less severe) side effects. They can be used alone or along with other drugs.

Most targeted cancer therapies do not damage bone marrow or blood cells like most standard chemo drugs do. But even though they mainly target the cancer cells, these drugs can still cause side effects and sometimes serious reactions.

Many targeted drugs are already in use to treat other types of cancer. Some of these drugs are now being studied for use against melanoma of the eye as well, including sunitinib (Sutent[®]), imatinib (Gleevec), and everolimus (Afinitor[®]).

A newer drug called *vemurafenib*, which targets a mutation in the BRAF gene, shows great promise for melanoma. This mutation is found in about half of patients with skin melanoma, but only in about 5% of patients with intraocular melanoma.

Other drugs target the blood vessels that allow tumors to grow. These are known as anti-angiogenesis drugs. One example is bevacizumab (Avastin[®]), which is already used to treat some other types of cancer. It may help prevent some of the side effects from

radiation, which may help patients retain more vision after treatment. It is also being studied for use along with chemotherapy.

Additional resources for eye cancer

More information from your American Cancer Society

We have some related information that may also be helpful to you. These materials may be ordered from our toll-free number.

After Diagnosis: A Guide for Patients and Families

Caring for the Patient With Cancer at Home: A Guide for Patients and Families (also available in Spanish)

Clinical Trials: What You Need to Know

Imaging (Radiology) Tests

Living With Uncertainty: The Fear of Cancer Recurrence

Melanoma Skin Cancer

Non-Hodgkin Lymphoma

Pain Control: A Guide for People With Cancer and Their Families (also available in Spanish)

Surgery (also available in Spanish)

Understanding Radiation Therapy: A Guide for Patients and Families (also available in Spanish)

Understanding Chemotherapy: A Guide for Patients and Families (also available in Spanish)

When Cancer Comes Back: Cancer Recurrence

The following books are available from the American Cancer Society. Call us at 1-800-227-2345 to ask about cost or to place your order.

American Cancer Society Complete Guide to Complementary & Alternative Cancer Therapies

American Cancer Society Complete Guide to Nutrition for Cancer Survivors

American Cancer Society's Guide to Pain Control, Second Edition

Cancer in the Family: Helping Children Cope with a Parent's Illness

Caregiving: A Step-By-Step Resource for Caring for the Person With Cancer at Home

What Helped Get Me Through: Cancer Patients Share Wisdom and Hope

What to Eat During Cancer Treatment

When the Focus Is on Care: Palliative Care and Cancer

National Organizations and Web Sites*

In addition to the American Cancer Society, other sources of patient information and support include:

Collaborative Ocular Melanoma Study

Telephone: 1-410-955-8318

Internet Address: www.jhu.edu/wctb/coms/

National Cancer Institute

Toll-free number: 1-800-422-6237 (1-800-4-CANCER)

TTY: 1-800-332-8615

Internet Address: www.cancer.gov

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

No matter who you are, we can help. Contact us anytime, day or night, for cancer-related information and support. Call us at 1-800-227-2345 or visit www.cancer.org.

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