

# OCULAR ONCOLOGY

The Ocular Oncology service at Bascom Palmer Eye Institute is dedicated to helping you and your family cope effectively from the time of the initial diagnosis of eye cancer through treatment and the follow-up period.

Because eye tumors are so rare, patients may have to travel long distances to seek expert opinion and treatment from an ophthalmologist who specializes in the diagnosis and management of eye cancer. Patients travel from all regions of the United States and from around the world because of Dr. Timothy Murray's years of experience in treating eye tumors, his international reputation, and his excellence in professional and compassionate patient care.

Bascom Palmer Eye Institute of the University of Miami School of Medicine is recognized throughout the world as a leading center for ophthalmic care, research and education. Its full-time faculty of internationally respected physicians and scientists encompasses every ophthalmic subspecialty and, through the years, has contributed fresh insight and direction to many of today's advanced ophthalmic techniques, diagnoses and treatments. Consequently, the facility has been rated one of the best eye hospitals in the nation for 12 consecutive years based on a survey of board-certified ophthalmologists conducted by U.S. News & World Report.

This information is intended to help patients and their families better understand a diagnosis of eye cancer and prepare for treatment. The information presented is for educational purposes only and should not be relied upon as medical advice. This information is also available on our website at [www.eyecancermd.org](http://www.eyecancermd.org).

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# OCULAR ONCOLOGY



Information for patients with eye cancer & those who love them

Most people have never heard of cancer of the eye. Ocular cancer is very rare; in North America, only about 2500 people will get the most common type of eye cancer, choroidal melanoma, each year.

Cancer is a scary diagnosis, and any threat to our vision is a cause of great anxiety. It is difficult to understand or remember complicated medical explanations. Our aim is to help you and your family learn how to cope effectively at the time of the initial diagnosis, during treatment and throughout the follow-up period.

This site would not be possible without the generous support of the:



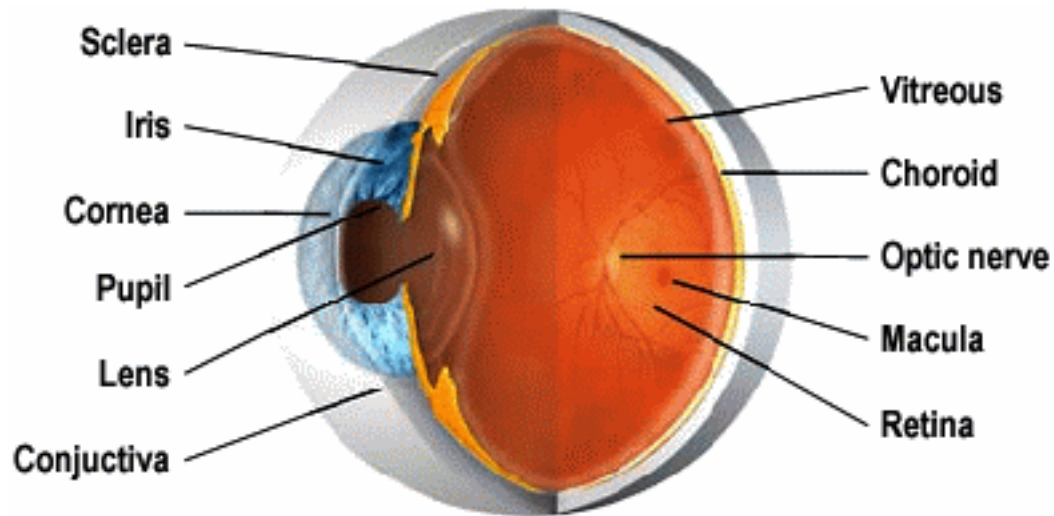
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# ANATOMY OF THE EYE

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In many ways, our eyes resemble an extraordinarily sensitive camera. Much like a camera lens, the lens of the eye can change shape to focus on near or distant objects. The lens projects images on the retina, a layer of light sensitive cells on the back of the eye, functions much like the film in a camera.



The eye is connected to the brain by the optic nerve, a bundle of over one million nerve fibers. The cornea (the clear portion of the front of the eye) bends light rays through the pupil to the lens. The pupil is the black opening in the iris. The iris, the colored ring of tissue, regulates the amount of light entering the eye by adjusting the size of the pupil. The eye also has fluids that bathe the various parts of the eye and help to maintain the correct pressure within the eye. The anterior chamber, in the front of the eye, is filled with aqueous humor, a watery fluid. The back portion of the eye is filled with a clear jelly like substance, called the vitreous humor.

The eye can be divided into three layers (or tissues). The white outer coat of the eye, the sclera, is similar to the shell of an egg. Along with the cornea, the sclera protects the eye from trauma and maintains the delicate structure of the internal eye tissues. The middle tissue layer, the choroids, is the blood supply to the eye wall and outer retinal structures. This tissue is responsible for transporting nutrients and oxygen to the outer sclera and inner retinal tissue.

The innermost layer of the eye is the retina, a thin translucent tissue composed of ten microscopic layers. The retina is responsible for translating light images into electrical impulses that can be recognized and processed by the brain. The macula is the area of the retina that is responsible for central vision. The center of the macula is called the fovea, and it is responsible for very sharp vision. The retina receives images of light and transmits them to the brain via the optic nerve. The brain interprets these messages as sight.

# EYE TUMORS

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## Choroidal Hemangioma

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A hemangioma is a tumor comprised of blood vessels and can grow within the choroid, the blood vessel layer beneath the retina. Choroidal hemangiomas are not cancers and never metastasize. However, if the hemangioma is located in the area of central vision of the eye it can leak fluid that causes a retinal detachment and visual function may be affected.

Many choroidal hemangiomas can be safely monitored by your eye doctor without the need of further treatment. Photographs can be used to document evidence of growth or leakage and the need for treatment. Treatment options may include photodynamic therapy, laser photocoagulation to decrease the amount of fluid leakage, or low doses of external beam radiation therapy.

## Choroidal Melanoma

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Choroidal melanoma is the most common primary intraocular (occurring inside the eye) tumor in adults. It arises from the pigmented cells of the choroid of the eye and is not a tumor that started somewhere else and spread to the eye.

A choroidal melanoma is malignant, meaning that the cancer may metastasize and eventually spread to other parts of the body. Because choroidal melanoma is intraocular and not usually visible, patients with this disease often do not recognize its presence until the tumor grows to a size that impairs vision by obstruction, retinal detachment, hemorrhage, or other complication. Pain is unusual, except with large tumors. Periodic retinal examination through a dilated pupil is the best means of early detection.

Cutting out the tumor and leaving the rest of the eye is not routinely advised for this type of cancer. Opening the eye during surgery would allow the tumor cells to float around into the spaces around the eye, which could spread cancer cells to other parts of the eye. In addition, some studies have shown that up to 50% of choroidal melanomas invade the sclera. Therefore if the tumor is removed from the eye there is a high possibility that cancer cells will remain within the sclera. Lastly, many eyes do not tolerate this procedure and severe complications may occur such as detachments of the retina, hemorrhages, and recurrence of the tumor which may result in having to remove the eye anyway.

Treatment recommendations for choroidal melanoma usually are based on the size of the tumor. Small suspicious melanomas usually are closely watched for evidence of growth before treatment is recommended. Medium-size tumors may be treated with either radioactive plaque therapy or enucleation (removal) of the eye. The Collaborative Ocular Melanoma Study (COMS), supported by the National Eye Institute of the National Institutes of Health, has documented equal success rates for plaque radiation therapy or enucleation for preventing the spread of cancer. Large-size tumors usually are best treated by enucleation. This is because the amount of radiation required to treat the tumor is too much for the eye to tolerate. The COMS study found no benefit to large-size tumor patients having radiation therapy prior to enucleation.

## **Choroidal Metastasis**

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Malignant tumors from other parts of the body can spread in and around the eye. Metastatic cancers that appear in the eye usually come from a primary cancer of the breast in women and the lungs in men. Other, less common, sites of origin include the prostate, kidneys, thyroid, and the gastrointestinal tract. Blood cell tumors (lymphomas and leukemia) also can spread to the eye. The care of patients with metastasis to the eye should be coordinated between the eye cancer specialist, medical oncologist, and radiation oncologist. Treatment options may include chemotherapy, external beam radiation therapy, or, more rarely, enucleation.

## **Choroidal Nevus**

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Like a raised freckle on the skin, a nevus can occur inside the eye. And, like a skin nevus, a choroidal freckle can become malignant, so should be closely monitored. A choroidal nevus should be examined by an ophthalmologist every four to six months to check if the pigmentation or size of the nevus has changed. In most cases, the only treatment recommended is close observation and monitoring by an ocular oncologist.

## **Conjunctival Tumors**

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Conjunctival tumors are malignant cancers that grow on the outer surface of the eye. The most common types of conjunctival tumors are squamous cell carcinoma, malignant melanoma, and lymphoma. Squamous cell carcinomas rarely metastasize, but can invade the area around the eye into the orbit and sinuses. Malignant melanomas can start as a nevus (freckle) or can arise as newly formed pigmentation. Lymphoma of the eye can be a sign of systemic lymphoma or be confined to the conjunctiva.

Both squamous cell carcinomas and malignant conjunctival melanomas should be removed. Most small conjunctival tumors can be photographed and followed for evidence of growth prior to treatment. Small tumors can be completely removed surgically. In other instances cryotherapy (freezing therapy) may be necessary or chemotherapy eye drops may be used to treat the entire surface of the eye.

## **Eyelid Tumors**

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Tumors of the eyelid may be benign cysts, inflammation, or malignant skin cancers. The most common type of eyelid cancer is basal cell carcinoma. Most basal cell carcinomas can be removed with surgery. If left untreated, these tumors can grow around the eye and into the orbit, sinuses and brain. A simple biopsy can determine if an eyelid tumor is malignant. Malignant tumors are completely removed and the eyelid is repaired using plastic surgery techniques. Additional cryotherapy (freezing-therapy) and radiation therapy sometimes are required after surgery.

## **Iris Tumors**

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Tumors can grow within and behind the iris. Though many iris tumors are cysts or a nevus, malignant melanomas can occur in this area. Most pigmented iris tumors do not grow. They are photographed and monitored with a special slit lamp and high frequency ultrasound to establish a baseline for future comparisons. When an iris tumor is documented to grow, treatment is recommended. Most small iris melanomas can be surgically removed. Radiation plaque therapy or enucleation may be considered for larger iris tumors.

## **Lymphoma/Leukemia**

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Lymphoma tumors can appear in the eyelid tissue, tear ducts and the eye itself. In most patients with large cell non-Hodgkin's lymphoma, the disease is confined to the eye and central nervous system. In these patients, symptoms appear in the eye an average of two years before they are seen elsewhere. The disease itself as well as treatment, which may include external beam radiation chemotherapy, or both (chemoradiation) to the central nervous system, can affect visual functioning.

## **Melanocytoma**

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This extremely slow-growing tumor usually is found on the surface of the optic disc. Almost all cases of melanocytoma are benign and malignant transformation is rare. It is probably present at birth and typically, there are no symptoms. Under clinical examination and fluorescein angiographic studies, melanocytoma appears as a deeply pigmented area located over the optic disc. In the majority of cases, close observation is recommended and no treatment is required. If malignant transformation does occur, enucleation, may be considered.

## **Orbital Tumors**

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Tumors and inflammations can occur behind the eye. These tumors often push the eye forward causing a bulging of the eye called proptosis. The most common causes of proptosis are thyroid eye disease and lymphoid tumors. Other tumors include hemangiomas (blood vessel tumors), lachrymal (tear) gland tumors, and growths that extend from the sinuses into the orbit. Though CT scans, MRI's and ultrasounds help in determining the probable diagnosis, most orbital tumors are diagnosed by a biopsy.

When possible, orbital tumors are totally removed. If they cannot be removed or if removal will cause too much damage to other important structures around the eye, a piece of tumor may be removed and sent for evaluation. If a tumor cannot be removed during surgery, most orbital tumors can be treated with external beam radiation therapy. Certain rare orbital tumors may require removal of the eye and orbital contents. In certain cases, orbital radiotherapy may be used to treat any residual tumor.

# DIAGNOSIS

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A retinal oncologist (an eye cancer specialist) can determine if you have an eye cancer by performing a complete clinical examination. The examination may include asking questions about your medical history, examining both eyes, looking into the eye at the tumor, doing an ultrasound examination, and obtaining specialized photographs. Biopsy, which is often indicated to diagnose tumors in other parts of the body, is rarely needed with eye cancer. Though occasionally necessary, biopsies are usually avoided because they require opening the eye which risks spreading of the tumor cells.

## Eye Examination

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Your ophthalmologist may be able to recognize an eye cancer by its appearance, including the degree of pigmentation of the tumor, its shape and location, and by other features. Unlike tumors in other parts of the body, many eye cancers, including choroidal melanoma, may be directly visible through the "window" provided by the pupil.

## Ultrasound (Echography)

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During an ultrasound examination, sound waves are directed towards the tumor by a small probe placed on the eye. The patterns made by reflection of the sound waves helps to confirm that tumors are present. Ultrasound can determine if there is extraocular involvement (if the tumor has spread outside the eye) and helps to determine the thickness or height of the tumor. Black and white pictures of the ultrasound images may be taken for your physician to review.

*(Above) The ultrasound examination helps the ophthalmologist diagnose and measure ocular tumors.*

## Photography

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There are two types of special photographs ophthalmologists use to assist in diagnosis: fluorescein angiography and fundus photographs.

- In **fluorescein angiography**, a special dye is injected into a vein in the arm. As the dye passes through the blood vessels in the back of the eye, this allows for a view of the circulation of the retina and the layers beneath the retina, highlighting any abnormalities. Although fluorescein angiography is not diagnostic, it is useful to exclude other possible disorders.
- The fundus of the eye includes the retina, macula, fovea, optic disc and retinal vessels. In **fundus photography**, the inner lining of the eye is photographed with specially designed cameras through the dilated pupil. This is a non-invasive and painless procedure that produces a sharp view of the retina, the optic nerve and the retinal vessels.

## Additional Evaluations

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Your doctor may request that you have a complete physical examination and specific tests depending upon what he sees inside your eye. Tests may include magnetic resonance imaging (MRI), a computerized tomography (CT) scan, chest x-ray, and complete blood count.

- A **Computerized Tomography (CT) scan** involves a series of X-ray images that provide a very clear picture of the eyes, the surrounding tissue and the brain. Unlike an ordinary X-ray machine, which takes one picture at a time, the scanner takes a number of small pictures as it rotates around the patient.
- **Magnetic Resonance Imaging (MRI)** uses magnetic fields and radio waves linked to a computer to create pictures of areas inside the body. Because MRI can "see" through bone, it can provide clearer pictures of tumor located near bone and in the orbit.



# TREATMENT

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Your doctor will recommend treatment based on your medical history and the findings from the eye examination. It is not always necessary to treat all eye cancers immediately. If a tumor is very small or very slow growing, sometimes the doctor will closely monitor the tumor. If there are any concerns, then treatment can be started. Treatment usually is recommended when your physician determines that the tumor shows evidence of growth or if there is the possibility of spreading to other parts of the body if left untreated.

## Chemotherapy

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Although it is rarely used for eye cancer, chemotherapy is the most common type of treatment for many other types of cancer. Chemotherapy is the treatment of disease by means of drugs that have a specific toxic effect upon the cancer cells. Chemotherapy selectively destroys cancerous tissue.

There are many chemotherapeutic drugs available. Each type of drug has potential side effects such as skin problems, nausea, vomiting, and infections. Chemotherapy sometimes is recommended for choroidal metastasis, conjunctival tumors and lymphoma.

## Cryotherapy

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Cryotherapy is the use of low temperatures to treat disease. Cryotherapy is applied under local anesthesia. The goal of cryotherapy is to freeze the malignant tissues in order to stimulate inflammation and scarring of this tissue. Cryotherapy may be recommended for conjunctival or eyelid tumors.

## External Beam Radiation Therapy

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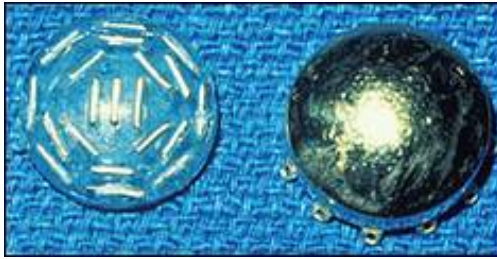
Radiation therapy uses high-energy radiation from x-rays and other sources to kill cancer cells and shrink tumors. Radiation that comes from a machine outside the body is called external-beam radiation therapy as opposed to radiation that is administered by placing a radiation plaque over or very near the tumor (internal radiation therapy or brachytherapy). External beam radiation therapy may be recommended for some choroidal metastasis, eyelid tumors, choroidal hemangiomas, lymphomas and orbital tumors.

## Radiation Plaque Therapy (Brachytherapy)

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Radiation plaque therapy is the most commonly used "eye-sparing" treatment for choroidal melanoma. A radioactive plaque is a small, gold covered, dish-shaped device that contains a radioactive source. Standard low-energy radioactive eye-plaques contain rice-sized radiation seeds that emit low energy photons. The gold coat of the plaque helps to aim the radiation photons directly at the tumor and decrease radiation damage to surrounding tissues. As the cells die, the tumor shrinks, although it usually does not disappear entirely. Radiation plaque therapy may be recommended for choroidal melanomas or iris melanomas.

Eye plaques are custom made to the dimensions of the tumor, usually ranging in size from about 12 to 22 mm. in diameter (about the size of a quarter). Careful calculations determine how long the plaque must remain in place to give the tumor the proper amount of radiation.



*A custom-made radiation plaque. On the left is the inside of a plaque with the radiation seeds. On the right is the gold coating on the outside of the plaque.*

Surgical placement of the plaque lasts about an hour and usually is performed under local anesthesia. During surgery, an incision is made in the conjunctiva and the radioactive plaque is sutured to the sclera, outside of the eye, over the tumor. The conjunctiva is then sewn back over the plaque. Patients remain in the hospital for about three to five days at which time the plaque is surgically removed.

Most patients have no problems associated with plaque surgery. As with any ocular surgery, there can be secondary complications such as retinal detachments, hemorrhages, or infections. There are also risks associated with anesthesia.

The effects of radiation on the tumor typically are first evident three months after treatment. Eventually, eye melanomas shrink to about 40% of their pretreatment size. After successful treatment, although the tumors rarely completely disappear, they are considered to be inactive.

After radioactive plaque treatment, many patients note some dryness and irritation of the eye. In some instances, eyelashes may be permanently lost. In rare instances, the outside layer of the eye (sclera) may become very thin. Occasionally, prolonged redness, irritation, or infection may occur. Some patients may experience double vision, which can last a few days or several months. Radiation plaque therapy may cause eventual blurring, dimming, or rarely a total loss of vision in the treated eye. Plaque radiation does not affect the vision in the other eye. The amount of vision loss depends on what your vision was before treatment, how close the tumor is to the area of central vision of the eye, and how sensitive your tissues are to radiation. Most people maintain some central vision, and almost all retain peripheral vision.

## **Enucleation**

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The term enucleation may sound like an atomic bomb will be used to remove the eye, but the term simply means surgery for the removal of the eye. Enucleation is the surgical removal of the eye, leaving eye muscles and the contents of the eye socket intact. The eyelids, lashes, brow and surrounding skin all remain.

This procedure is done when there is no other way to remove the cancer completely from the eye. Unfortunately, loss of vision for the eye removed is permanent because an eye cannot be transplanted. The eye is removed, and a spherical implant made of coral or hydroxyapatite is placed into the orbit. This allows the blood vessels to grow into the porous coral material. The muscles that help give movement to the eye are then sutured to the implant, which will allow for some movement of the prosthesis.



After the eye is removed, an implant made of hydroxyapatite is implanted into the orbit.

The eye is surrounded by bones; therefore, it is much easier to tolerate removal of an eye as compared to the loss of other organs. After a healing period, a temporary ocular prosthesis (plastic-eye) is inserted. The prosthesis is a plastic shell painted to match the other eye. It is inserted under the eyelid, much like a big contact lens. After a final prosthetic fitting most patients are happy with the way they look, and say others can't even tell they have vision in only one eye.

After enucleation, there is reduced visual field on the side of the body when looking straight ahead, and there is a loss of depth perception. Many of the skills of depth perception can be relearned and with time, almost all patients are able to do all the things they used to do before losing their eye. A few people who did very well with only one eye include: President Theodore Roosevelt, Israeli military leader Moshe Dayan, Congressman Morris Udall, entertainer Sammy Davis Jr., actor Peter Falk, painter Edgar Degas, aviator Wiley Post, inventor Guglielmo Marconi and British naval hero Horatio Nelson.



*Can you tell which is the artificial eye?*

## Photodynamic Therapy

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Photodynamic therapy (also called PDT) is a treatment that can potentially destroy unwanted tissue and is sometimes used to treat choroidal hemangiomas. PDT destroys cancer cells with a fixed-frequency laser light in combination with a photosensitizing agent that is injected into the bloodstream. The photosensitizing agent alone is harmless and has no effect on either healthy or abnormal tissue. However, when laser is directed onto tissue containing the drug, the drug becomes activated and the tissue is rapidly destroyed. The laser light used in PDT is directed through a fiber-optic placed close to the hemangioma to deliver the proper amount of light and selectively target only the abnormal tissue.

An advantage of PDT is that it causes minimal damage to healthy tissue. However, PDT makes the skin and eyes sensitive to light for about 6 weeks after treatment. Patients are advised to avoid direct sunlight for at least 6 weeks after PDT treatment.

# FREQUENTLY ASKED QUESTIONS

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## Eye Cancer

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### **My doctor says I have a nevus in my eye. Will it become a cancer?**

Just like a raised freckle on the skin, a nevus can occur inside your eye. And, like a nevus on the skin, a choroidal nevus can grow into a melanoma. This is why your ophthalmologist will examine your eyes on a regular basis (at least every six months) and use photography and echography to check if the nevus has changed in size.

### **Is ocular melanoma the same as skin melanoma?**

Melanoma is the term used to describe a cancer that develops from cells called melanocytes. Melanocytes are the cells that produce a dark colored pigment called melanin and this pigment is responsible for the color of our skin. These cells are found in many places in our body including the skin, hair and lining of the internal organs. Although, most melanomas develop within the tissue of the skin, it is possible for it to arise in other parts of the body, such as the eye.

### **What causes ocular melanoma?**

Unlike skin melanoma, there is no convincing evidence to show that sunlight causes choroidal melanomas. Like many other forms of cancer, the exact cause is unknown. Ocular melanoma is more common in people with lighter skin and in those over sixty years of age (although a significant number of patients are thirty or younger). Other predisposing factors that have been identified include exposure to ultraviolet radiation, genetics, or having a nevus (freckle). It occurs equally in men and women, and in left and right eyes. As far as we know, there is nothing you could have done to prevent ocular melanoma.

### **Will a biopsy be performed to make sure that the tumor is a cancer?**

Biopsies are performed with some types of eye cancers, for example eyelid tumors, but are not recommended for choroidal melanomas. Fine-needle biopsy of a suspected melanoma is rarely done because the risks far outweigh the benefits. Tumor seeding (spread of the cancer cells) has been reported with fine-needle biopsy. Experienced ocular oncologists can diagnosis ocular melanoma without a biopsy.

### **Can the laser be used to treat ocular melanoma?**

Studies show that the laser just burns the surface of the melanoma, which can leave cancer cells under the surface and in the wall of the eye. If the cancer is not killed or removed, there is a possibility that it will spread to the rest of your body.

### **Can an ocular melanoma tumor be surgically removed without radiation therapy or removing my eye?**

Surgery to remove just the tumor could allow tumor cells to float into the spaces around the eye. Furthermore, studies have shown that up to 50% of choroidal melanomas already have invaded the sclera, therefore the entire tumor would not always be removed or treated. Lastly, many eyes do not tolerate this procedure and will suffer detachments of the retina, hemorrhages, and end up having to be removed anyway.

**Will the cancer spread to other parts of my body?**

Only about 2% of patients are found to have the cancer spread (metastasize) at the time they are diagnosed with a choroidal melanoma. Before surgery, you may be seen by a radiation oncologist and have medical testing to see if there are any signs of cancer elsewhere in your body. Unfortunately however, after treatment some people do develop metastasis. This is thought to be due to undetectable microscopic cancer cells present at the time of treatment that cannot be detected by current testing. While your doctor may be able to give you an approximate chance of developing metastasis based on your tumor's size and location, no one can give you an absolute guarantee that the cancer will not spread.

**I just had a physical examination a few months ago. Why do I need to see a radiation oncologist before plaque surgery?**

A radiation oncologist can give you a thorough physical examination and, in coordination with your eye doctor, specify the amount of radiation you will receive and the total number of treatment days.

## **Radiation Plaque Therapy**

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**What can I expect during radiation plaque surgery?**

Procedures differ from hospital to hospital, but usually you will be asked to arrive at the hospital several hours before the time of your scheduled surgery. A member of the surgical team will meet with you to answer any questions and prepare you for your operation. After changing into a hospital gown, the anesthesiologist will meet with you and begin to administer the anesthetic.

Anesthesia is used so that surgery can be performed without unnecessary pain. Local anesthesia selectively numbs only a part of your body. During general anesthesia you will be unconscious during the entire surgery. Because general anesthesia is associated with a higher risk for patients both during and after surgery, in most cases, local anesthesia is recommended for radiation plaque surgery. Under local anesthesia you are "awake" during the surgery, but will be given medication to relax and you will not be in pain. While you may be aware of sounds in the operating room, your "good" eye will be covered so you will not see what is happening during surgery.

**What will it be like during my hospital stay after radiation plaque therapy?**

Again, hospital procedures vary, but usually after close post-surgery monitoring, you will return to your hospital room. Many patients are tired and hungry after surgery, and after eating typically rest for several hours while the anesthesia wears off.

Most patients report that they have some discomfort the first night after surgery. Your doctor will leave orders for appropriate pain medication to keep you as comfortable as possible. There will be a patch over the operated eye and the nurse will administer eye medication to prevent infection. The day after surgery you probably will be encouraged to get out of bed and sit up for a while.

Some patients suggest bringing a Walkman and listening to audiobooks (available at bookstores or your local library) is more comfortable than reading or watching television. Most hospitals permit visitors during hospital visiting hours. If you have a radiation plaque, visitors may be requested not to come into close contact with you for any length of time. Young children and expectant mothers should not visit. You will need to arrange for transportation home, since you will be unable to drive immediately following surgery.

### **What are the side effects of the radiation therapy?**

The type of radiation used in eye-plaque therapy should not cause hair loss, nausea, brain damage, or affect your other eye. Once the radiation plaque is removed, there will be no radiation left in your body, on your clothing, or on any of your personal belongings.

The effects of the radiation delivered to your tumor and eye will continue to be observed for months and years after treatment. Radiation plaque therapy may cause eventual blurring, dimming, or rarely a total loss of vision in the treated eye. Plaque radiation does not affect the vision in the other eye. The amount of vision loss depends on what your vision was before treatment, how close the tumor is to the center of your eye, and how sensitive your tissues are to radiation. Most people maintain some central vision, and almost all retain peripheral vision.

### **What happens after I leave the hospital?**

Your doctor will probably prescribe eye drops to help your eye heal more safely and quickly. For the first week after surgery, your eye may tear and the tears may contain a little blood. This is normal. Your doctor will give you detailed instructions before you are discharged from the hospital. These may include instructions to gently wash the outside of your eyelid with a warm, clean, soapy wash cloth. Most doctors recommend that you should not lift any objects greater than 10 pounds or rub your eye for the first two weeks after surgery. You may wear a protective eye patch for the first week or so after surgery. In most cases you can resume normal activities and return to school or work 2 to 4 weeks after you leave the hospital.

### **When will the doctor know if the radiation plaque treatment has been successful?**

Since the goal of radiation therapy is to prevent the tumor from growing, don't be concerned if your tumor shrinks slowly. A tumor can swell and become temporarily larger after radiation. Most tumors shrink to about 40% of their original size but rarely disappear. A residual lump of dark, shrunken tumor often persists for years after treatment.

### **How often will I need to see my eye doctor after surgery?**

You will need to be followed closely in case of a recurrence or metastasis from this primary cancer. Most physicians recommend that patients be seen at least every four to six months by an ocular oncologist (eye surgeon). These examinations may include repeat fundus photography and ultrasound examinations. In addition, most doctors recommend that you have a liver function blood test, chest X-rays and a systems evaluation by a medical oncologist at least once a year.

# Enucleation

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## **What should I expect during surgery to remove my eye?**

The enucleation procedure is usually performed under local anesthesia, which involves numbing the entire eye and socket tissues prior to surgery. The operation is relatively simple to perform. Immediately after the eyeball is removed, an orbital implant, only slightly smaller than the natural eye, is inserted deep in the socket. In some instances a plastic shell called a conformer is placed over the implant to preserve the shape of the eye. The conformer would later be replaced by a permanent prosthesis.

After enucleation, a pressure patch is applied over the eyelid. This patch is intended to minimize the swelling of the socket tissues. The pressure patch is generally kept in place for about 12 hours after the surgery. While the pressure patch is in place, you may have difficulty opening the lids of the unoperated eye. Fortunately, the difficulty in opening the eyelids generally resolves itself after the first post-operative day. It may hurt when you jerk your good eye to one side or another because the muscles of both eyes always move together and although your eye has been removed, your eye muscles move as if your eye was still there. Moderate post-enucleation pain in the socket generally occurs during the first 24 hours; pain relievers are prescribed as needed to reduce this discomfort.

## **What will I look like after my eye is removed?**

Keep in mind that your eyeball helps to keep the eyelid up. Therefore, when the eye is removed the eyelid simply stays shut as if you are winking. This should not cause you any discomfort, although you may be self-conscious about it and may want to wear an eye patch or sunglasses until you get your prosthesis. The eyelid may be swollen and bruised for a few days.

Initially if you open your eyelid, you will see the moist, pink socket lined with conjunctiva. It will look like the inside of your mouth. If there is a conformer (shell) in place, you will see the clear plastic with a hole in the center. The shell is only there temporarily until the socket heals and an artificial eye can be fitted.

## **What will my prosthesis look like?**

An ocular prosthesis is an artificial eye that is made and fitted by a specialist in artificial eyes (an Ocularist). At first, you will be fitted with a temporary prosthesis (that looks similar to, but not exactly like, your remaining eye) while your prosthetic eye is being custom-made. The prosthesis looks somewhat like a giant contact lens. It will match the shade of the sclera (white part of the eye), the iris color, veins, and the shape of your eyes as much as possible.



*Your prosthesis is custom-made to match your remaining eye exactly.*



**What's involved in taking care of a prosthesis?**

In most cases, the prosthesis can be left in place for months at a time. Artificial eyes can be cleaned with mild soap and water, but should be professionally cleaned and polished by the Ocularist about every 4 to 6 months and should be replaced every 3 to 5 years.

**How soon after enucleation surgery can I return to normal activity?**

Check with your doctor but usually you should not lift, strain, or rub your eye for at least 2 weeks after surgery. The orbit should heal quickly and you should be able to return to school or work within 2 to 4 weeks after surgery.

**Will I be able to lead a normal life with only one eye?**

It will take some time to adjust to using one eye, but almost everyone learns to compensate during the first year after surgery. After enucleation, there is reduced visual field on the side of the body when looking straight ahead, and there is a loss of depth perception. Many of the skills of depth perception can be re-learned and with time, almost all patients are able to do all the things they used to do before losing their eye. If the vision in your remaining eye is good, you will still be able to drive, read, play sports, and perform all your usual daily activities.

## Visual Impairment

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**Will I be blind or visually impaired from my eye cancer?**

Most people who have an eye cancer do NOT become blind or significantly visually impaired. Our visual function usually is described in terms of visual acuity and visual fields in BOTH eyes.

Visual acuity is expressed as a fraction; the top number refers to the distance you are from the eye chart (usually 20 feet). The bottom number indicates the distance at which a person with normal eyesight could read the line. For example, 20/40 means that the line you correctly read at 20 feet could be read by a person with normal vision at 40 feet. Normal visual acuity is 20/20.

Visual fields, or fields of vision, refers to the full extent of the area visible to an eye that is looking straight ahead. A normal visual field is 170 degrees.

A person is considered LEGALLY blind when the best corrected vision in BOTH eyes is 20/200 or more or if the visual field is 20 degrees or less. Low vision usually refers to those who have a visual acuity of 20/70 or worse in the better eye with correction. Many people with vision problems benefit from an evaluation at a Low Vision Center to learn about magnification aids, electronic reading technology, and print enhancing computer software.

**My vision is 20/50 in my better eye. Is it okay for me to drive?**

Driving laws vary from state to state and from country to country. In the State of Florida, drivers must have at least 20/40 vision in both eyes, with or without corrective lenses. If vision is 20/200 or worse in one eye, drivers must have 20/40 vision or better in the other eye. A doctor's referral may be required.

Remember, just because you can legally drive doesn't mean that it is safe for you to drive.

## Coping with Cancer

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**I have been so worried since I was diagnosed with cancer that I haven't been able to think about anything else. Is this normal?**

For most people, diagnosis of cancer creates emotional distress. Fear of treatment and fear of the future can produce apprehension, anxiety, confusion and depression.

Some degree of depression is common in people diagnosed with cancer. About a fourth of those with cancer suffer from a clinical depression that interferes with day-to-day activities. Feelings of sadness that interfere with normal functioning, a change in eating or sleep patterns, difficulty concentrating, or a loss of interest in ordinary activities, may be symptoms of clinical depression. You should consult a physician about treatment options, including counseling and/or medication to improve your quality of life. Clinical anxiety also can interfere with daily functioning. Symptoms of clinical anxiety include uncontrollable worrying, difficulty concentrating, feelings of restlessness, racing heart, shortness of breath, sweating, dry mouth, irritability and changes in eating and sleeping. Counseling and/or medication can be helpful for clinical anxiety.

**My spouse has just been diagnosed with ocular melanoma. I keep trying to reassure him that he's going to be fine, but nothing I say seems to help. Is this normal?**

When someone you care about is dealing with emotional distress, it's important to remember that you can't "fix" someone else's feelings. However, you can listen carefully to your loved one's feelings and provide reassurance and support. Encourage, but do not force, communication. You may want to encourage your loved one to consult a doctor about counseling or using medications if there is no improvement. Moreover, it's just as important to recognize and deal with your own feelings of sadness, fear or frustration.

# RESEARCH

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Scientific research investigation seeks to establish facts, answer questions, or collect information about a topic. There are many types of research attempting to find better ways to prevent, diagnose and treat cancer, including eye cancers.

Two important types of research studies are retrospective and prospective studies. Retrospective studies look at data relating to past events while prospective studies focus on the future. Another important type of research is a clinical trial that tests how well a medical treatment or intervention works. For example, a clinical trial may see if one type of treatment, or combination of treatments, is more effective than another. You can learn more about clinical trials for all types of cancer at the National Institutes of Health.

Bascom Palmer Eye Institute has been part of a fifteen year multi-center clinical trial on choroidal melanoma, the Collaborative Ocular Melanoma Study (COMS). COMS is designed to evaluate which treatment alternative, enucleation or radiation plaque therapy, better prolongs life. In addition, if the two alternative treatments were found to provide similar expectations of survival, the study wanted to determine which treatment offers the patient the longer cancer-free life and the better prognosis for vision overall.

Of the 1,317 patients who participated in the COMS Medium-Size Choroidal Melanoma Trial, 660 patients were assigned to receive radiation plaque therapy and 657 were enucleated. The two treatment alternatives were found equally effective. The COMS Large Choroidal Melanoma Trial enrolled 1,003 patients. Of these, 506 patients were randomized to standard enucleation and 497 to pre-enucleation radiotherapy followed by enucleation. No statistically significant difference was noted for either treatment outcome based on the selected treatment of pre-enucleation radiotherapy followed by enucleation or enucleation alone.

In addition to the two randomized trials, a number of pilot studies and ancillary studies have been conducted by COMS investigators. In the absence of a survival outcome difference between treatments, along with the known decrease in visual function associated with plaque therapy, patient psychological and physical well-being become increasingly more pivotal to making treatment decisions.

The COMS Medium-Tumor Trial Quality of Life Study (QOLS) was designed to measure the impact of disease and its treatment on quality of life, and compare how the quality life differs for enucleated and plaque patients. Patients are interviewed at selected intervals during follow-up visits to assess health status, visual function, anxiety and depression. Quality of life data is pending from the COMS and remains the major outcome variable yet to be reported. You can find a complete list of COMS publications at their website.

If you are interested in reading research articles about eye cancer, a good resource is the National Library of Medicine .

# RESOURCES

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The Internet has a great deal of valuable information but does NOT replace an eye examination or talking with your doctor. It is important to be discriminating when "surfing the net" and to remember that the information on some websites may not be accurate or may not apply to your specific condition or circumstances.

## Medical Sites

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### **American Cancer Society**

Health information, coping with cancer, new treatment and research, locate resources in your community.

Phone: 1-800-227-2345

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

### **The Association for Research in Vision and Ophthalmology**

Encourages and assists research, training, publication and dissemination of knowledge in vision and ophthalmology.

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

### **National Cancer Institute**

The U.S. Government's primary agency for cancer research and information.

Phone: 1-800-4-CANCER

[www.nci.nih.gov](http://www.nci.nih.gov)

### **Eye Cancer Network**

Educational, diagnostic and treatment information about ocular cancers.

[www.eyecancer.com](http://www.eyecancer.com)

### **National Eye Institute**

The National Eye Institute (NEI), one of the Federal government's National Institutes of Health (NIH), conducts and supports research that helps prevent and treat eye diseases and other disorders of vision. The Website has health and research information in English and Spanish.

Phone: 301-496-3655

[www.nei.nih.gov](http://www.nei.nih.gov)

### **American Association of Ophthalmologists**

The website of the professional association for eye doctors provides patient information and public education.

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

### **The Collaborative Ocular Melanoma Study**

General information about ocular melanoma and patient information about the clinical study.

[www.jhu.edu/wctb/coms](http://www.jhu.edu/wctb/coms)

### **SNG Prosthetic Eye Institute**

Information about your visit to an Ocularist, fitting techniques and the care of artificial eyes

Phone: 1-800-972-1354

[www.prostheticeye.com/index2.html](http://www.prostheticeye.com/index2.html)

## Visual Impairment Sites

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### **Florida Division of Blind Services (DBS)**

This agency provides vocational rehabilitation and employment services for visually impaired and blind Florida residents. Services include school to work transition, job placement, counseling, vocational and academic training, orientation and mobility training, personal and social adjustments services and talking books services.

Phone: 1-800-342-1330

[www.state.fl.us/dbs](http://www.state.fl.us/dbs)

### **Lighthouse International**

Worldwide organization provides resources on vision impairment and vision rehabilitation. Catalog of low-vision aids.

Phone: 1-800-829-0500

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

### **National Association of the Visually Handicapped**

Dedicated to promoting an understanding of the difference between visual impairment and blindness. Catalog of low vision aids and a lending library of large-print books.

Phone: 888-205-5951

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

### **Blind Links**

Links to sites with information about adaptive technology, advocacy and training, books and magazines, commercial sites, employment information, medical links and others.

[www.seidata.com/~marriage/rblind.html](http://www.seidata.com/~marriage/rblind.html)

### **Eye Resources on the Internet**

Large resources list provided by the Association of Visual Science Librarians.  
[webeye.ophth.uiowa.edu/dept/websites/eyeres.htm](http://webeye.ophth.uiowa.edu/dept/websites/eyeres.htm)

### **The Eye: Information About Vision Loss and Blindness**

Information about many aspects of visual impairment and blindness including lists of national and international organizations, adaptive technology and low vision products.

[www.99main.com/~charlief/blindness.html](http://www.99main.com/~charlief/blindness.html)

### **Lost Eye**

Support, information and helpful tips for people with one eye.

[www.losteye.com](http://www.losteye.com)

## Journals

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Journals are good sources for current, peer-reviewed research.

- Ophthalmology, Journal of the American Academy of Ophthalmology
- Archives of Ophthalmology
- American Journal of Ophthalmology

# TIPS FOR LOW VISION USERS

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To make it easier for people with low vision to use our website, you can change the font size automatically within our site by using the Change Font Size dropdown box on the left-side of every page.

If you have difficulty using other Internet sites, several features may be included in your existing system that may be helpful for people with low vision. Microsoft Windows users can go to [www.microsoft.com/enable/guides/vision.htm](http://www.microsoft.com/enable/guides/vision.htm) for a step-by-step low vision tutorial for Windows (2000, 98, XP, and Me), Microsoft Word 2002 and 2000, Outlook 2002 and 2000, and Internet Explorer 5 and 6.

Apple also includes accessibility features as part of the Macintosh's system software (System 7.x, 8.x, and 9.x). You can download the Easy Access and CloseView utilities and get step-by-step instructions to help you install and operate these built-in features at [www.apple.com/disability/easyaccess.html](http://www.apple.com/disability/easyaccess.html)

A simple tip for low vision users of Internet Explorer: Go to 'View', 'Text Size' then select an option: smallest, smaller, medium, larger, or largest.

In Netscape Navigator: Go to 'View' and 'Increase Font' or 'Decrease Font' as desired.

# CONTACT INFORMATION

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## **Mailing Address:**

Bascom Palmer Eye Institute  
University of Miami School of Medicine  
Ocular Oncology Service  
Timothy G. Murray, MD  
900 Northwest 17th Street  
Miami, Florida 33136

## **Phone Number:**

305-326-6000

## **Toll Free:**

800-329-7000

## **Fax:**

305-326-6551

## **Email:**

For questions about eye cancer or to request an appointment at Bascom Palmer Eye Institute please visit: [www.bpei.med.miami.edu/contact/index.asp](http://www.bpei.med.miami.edu/contact/index.asp).

Please note: It would be inappropriate for us to try to diagnose or treat any illness via e-mail. Please visit a doctor to receive the attention and care necessary for proper treatment.