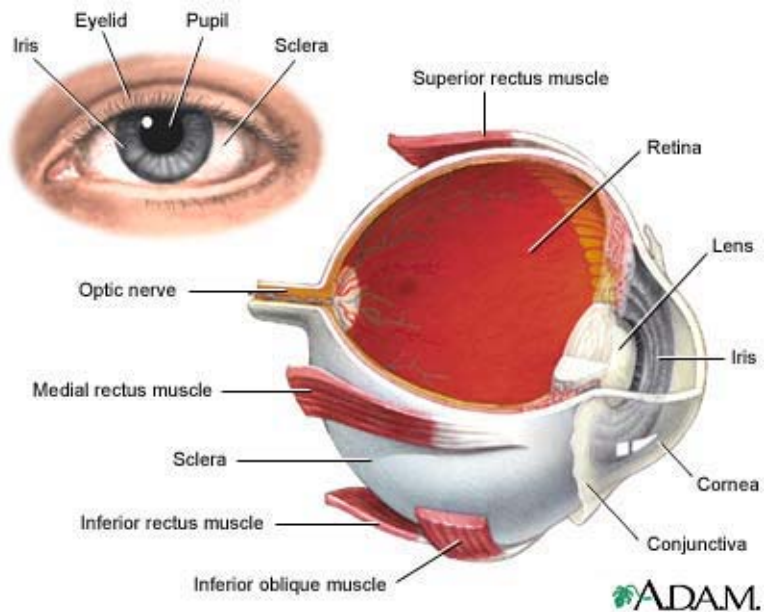


# THE EYE

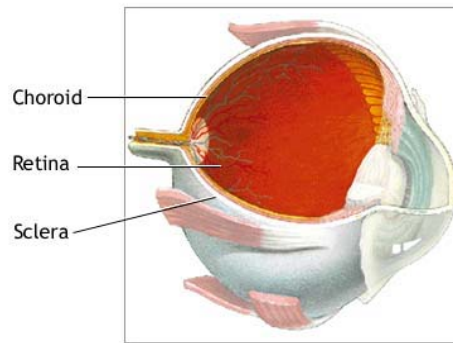
The eye is the organ of sight, a nearly spherical hollow globe filled with fluids (humors). The outer layer or tunic (sclera, or white, and cornea) is fibrous and protective. The middle tunic layer (choroid, ciliary body and the iris) is vascular. The innermost layer (the retina) is nervous or sensory. The fluids in the eye are divided by the lens into the vitreous humor (behind the lens) and the aqueous humor (in front of the lens). The lens itself is flexible and suspended by ligaments which allow it to change shape to focus light on the retina, which is composed of sensory neurons.



## Definition

### CHOROID

The choroid is the middle layer of the eye that contains blood vessels and connective tissue that supplies nutrients to the inner portion of the eye.



ADAM.

The layer of blood vessels and connective tissue between the [sclera](#) (white of the eye) and [retina](#). It is part of the [uvea](#) and supplies nutrients to the inner parts of the eye. Inflammation of the choroid is known as [choroiditis](#).

### SCLERA

The white portion of the eye. A tough, fibrous tissue that extends from the cornea to the optic nerve. It is commonly referred to as the "white of the eye."

### RETINA

Internal layer of the eye that receives and transmits focused images. The retina is normally red due to its rich blood supply. It can be seen with an ophthalmoscope, which allows the examiner to see through the pupil and lens to the retina. Changes in color of the retina or changes in the appearance of retinal blood vessels may indicate disease. Changes in color perception and in vision also indicate disease and indicate the need for a retinal examination.

### UVEA

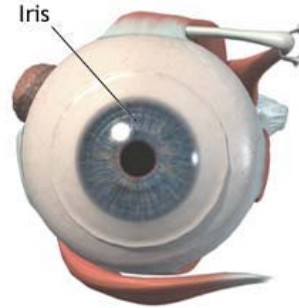
Vascular tunic; Middle coat of the eyeball

## Definition

Vascular layer of the eye beneath the sclera. It consists of the iris, ciliary body, and choroid, which form a pigmented layer.

## IRIS

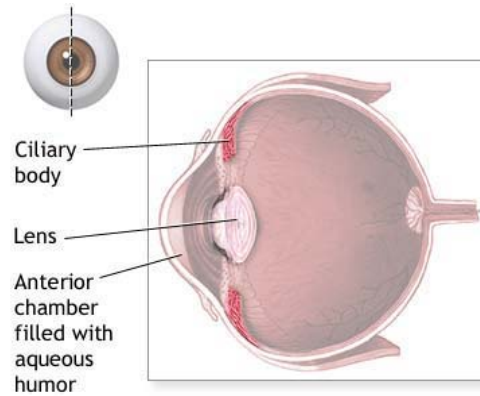
The colored portion of the eye. A membrane located between the cornea and lens. Its round, central opening (the pupil) regulates the entrance of light into the eye by contracting and dilating



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## CILIARY BODY

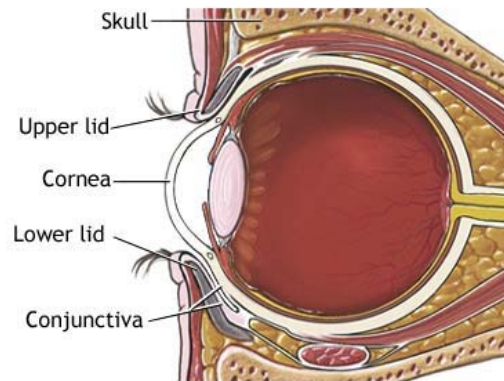
Vascular structure of the eye that secretes the transparent liquid within the eye (aqueous humor) and contains the ciliary muscle, responsible for changing the shape of the lens.



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## CORNEA

The cornea is the clear layer covering the front of the eye. The cornea works with the lens of the eye to focus images on the retina

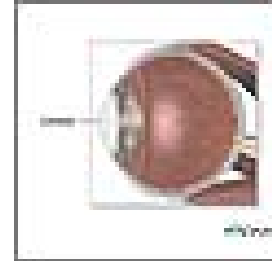


# **CORNEAL INJURY**

**Definition** An injury to the cornea, the curved transparent covering at the front of the eye. See also [corneal ulcers and infections](#).

## **Causes, incidence, and risk factors**

The cornea is the clear covering of the front of the eye. It works with the lens of the eye to focus images on the [retina](#). Injuries to the cornea are common.



Superficial corneal injuries, called corneal abrasions, may be caused by foreign bodies (such as sand or dust), overuse of contact lenses or exposure to ultraviolet radiation. Risk factors include working in a dusty environment, prolonged exposure to the sun or artificial ultraviolet light sources, and overuse of contact lenses or ill-fitting contact lenses.

Penetrating corneal injuries may occur with major trauma. High speed particles, such as chips from hammering metal on metal, are particularly dangerous.

## **Symptoms**

- Blurred vision
- Abnormal sensitivity to light
- Sensation of foreign body in the eye
- Eye pain
- Redness of the eye
- Swollen eyelids

## **Signs and tests**

- Standard ophthalmic exam
- Slit lamp examination of the eye
- Fluorescein dye staining of the surface of the eye

## **Treatment**

Anyone with severe eye pain needs to be evaluated in an emergency care center or by an ophthalmologist immediately. Simple corneal injuries are treated by removing the foreign material if present, and covering the eye with a patch to let the cornea heal itself. Antibiotic drops or ointments are often used to prevent infection.

DO NOT try to remove a lodged foreign body in the eye without professional assistance. (See first aid for eye emergencies.) The risk of further injury is great. A particle that is large enough to damage the cornea may not be visible without magnification or staining of the eye.

Antibiotic ointment or drops may be prescribed until a corneal abrasion has healed. Getting rest and placing a patch over the affected eye may help. Driving and other potentially dangerous situations should be avoided while the eye is patched, since depth perception is altered.

Any suspicion of a penetrating injury to the eye requires immediate evaluation by an ophthalmologist or emergency physician.

Chemical burns may occur with acids or alkalis splashed in the eye. Many household chemicals are strong acids or alkalis. Drain cleaners and oven cleaners are particularly dangerous. If chemicals are splashed in the eye, the eye should be IMMEDIATELY flushed with tap water for 15 minutes, and the patient should then be rushed to the nearest emergency facility.

### **Expectations (prognosis)**

Superficial corneal injuries normally heal very rapidly with treatment, and the eye should be back to normal within 2 days. Penetrating corneal injuries are much more serious and the prognosis will depend on the nature of the specific injury.

**Complications** Severe corneal injury may require extensive surgery or even corneal transplantation surgery.

**Calling your health care provider** Call your health care provider if the injury has not significantly improved in 2 days with treatment.

### **Prevention**

Safety goggles should be worn at all times when using hand or power tools, when using chemicals, during high impact sports, or in other situations where there is a potential for eye injury. Sunglasses designed to screen ultraviolet light should be worn during prolonged exposure to sunlight, even during the winter.

# ***CORNEAL ULCERS and INFECTIONS***

## **Alternative names**

Bacterial keratitis; Fungal keratitis; Acanthamoeba keratitis; Herpes simplex keratitis

## **Definition**

A non-penetrating erosion or open sore in the outer layer of the cornea, the transparent area at the front of the eyeball. See also corneal injury.

## **Causes, incidence, and risk factors**

Corneal ulcers are most commonly caused by an infection with bacteria, viruses, fungi or amoebae. Other causes are abrasions or foreign bodies, inadequate eyelid closure, severely dry eyes, severe allergic eye disease, and various inflammatory disorders.

Contact lens wear, especially soft contact lenses worn overnight, may be a precipitating factor. Herpes simplex keratitis is a serious viral infection. It may have recurrences that are triggered by stress, exposure to sunlight, or any condition which impairs the immune system.

Fungal keratitis can occur after a corneal injury involving plant material, or in immunosuppressed people. Acanthamoeba keratitis occurs in contact lens users, especially those who attempt to make their own homemade cleaning solutions.

Risk factors are dry eyes, severe allergies, history of inflammatory disorders, contact lens wear, immunosuppression, trauma and generalized infection.

## **Symptoms**

- Eye pain
- Impaired vision
- Eye redness
- White patch on the cornea
- Sensitivity to light (photophobia)
- Watery eyes
- Eye burning, itching and discharge

## **Signs and tests**

- Visual acuity
- Refraction test
- Tear test
- Slit-lamp examination
- Pupillary reflex response
- Keratometry (measurement of the cornea)
- Scraping the ulcer for analysis or culture
- Fluorescein stain of the cornea

Blood tests to check for inflammatory disorders may also be needed.

## **Treatment**

Treating corneal ulcers and infections depends on the cause. They should be treated as soon as possible to prevent further injury to the cornea. Broad antibiotic coverage is started and then more specific antibiotic, antiviral, or antifungal eye drops are prescribed (as soon as the agent which causes the ulcer has been identified).

Corticosteroid eye drops may be used to reduce inflammation in certain conditions. Severe ulcers may need to be treated with corneal transplantation.

## **Expectations (prognosis)**

Untreated, a corneal ulcer or infection can permanently damage the cornea. Untreated corneal ulcers may also perforate the eye, resulting in spread of the infection inside, increasing the risk of permanent visual impairment.

## **Complications**

- Corneal scarring
- Severe vision loss

## **Calling your health care provider**

Call your health care provider if impaired vision or eye pain occur.

## **Prevention**

Prompt, early attention by an ophthalmologist for an eye infection may prevent the condition from worsening to the point of ulceration. Wash hands and pay rigorous attention to cleanliness while handling contact lenses, and avoid wearing contact lenses overnight.



# ***EYE EMERGENCY***

## **Definition**

Any condition, which if untreated, may lead to visual loss. Eye emergencies include chemical exposure, cuts, scratches, foreign bodies in the eye, burns, and blunt injuries to the eye.

## **Considerations**

It is important to get medical attention for all significant eye problems. Since the eye is easily damaged, a delay in getting medical attention can cause permanent eye damage and loss of sight.

Many eye problems that are not due to injury (such as a painful red eye) have no appropriate first aid, but do need urgent medical attention.

Chemical injury to the eye can be caused by an occupational accident or by common household products such as cleaning solutions, garden chemicals, solvents, or many other types of chemicals. Fumes and aerosols can also cause chemical burns.

With acidic burns, the hazing of the cornea often clears with a good chance of recovery. Alkaline substances such as lime, lye, commercial drain cleaners, and sodium hydroxide found in refrigeration equipment present great danger of permanent corneal damage. Ongoing damage may occur in spite of prompt treatment. Risk factors are exposure to these chemicals.

A foreign body such as dust or sand can enter the eye at any time. Certain occupations such as metal or wood working may have a higher risk. The injury may be limited to the conjunctiva and the cornea, or it may affect the sclera.

Persistent pain and redness are indicators that professional treatment is needed. A foreign body may be a threat to sight if the object enters the eye itself or damages the cornea or lens. Foreign bodies propelled at high speed by machining, grinding, or hammering metal on metal present the highest risk.

A black eye is usually caused by direct trauma to the eye or face. Certain types of skull fractures can result in bruising around the eyes, even in the absence of direct trauma to the eye(s). Bleeding under the skin causes a bruise and the discoloration associated with it.

The tissue surrounding the eye turns black and blue, and then it gradually becomes purple, green, and yellow before the abnormal coloring disappears within 2 weeks. Usually, swelling of the eyelid and tissue around the eye occurs as well.

Occasionally, serious damage to the eye itself occurs from the pressure of the swollen tissue. Bleeding inside the eye can reduce vision, cause glaucoma, or damage the cornea. Accidents, occupational injuries, sports injuries, and violence are some of the risk factors associated with black eyes.

## **Causes**

- Head injury

- Acute iritis
- Acute conjunctivitis
- Acute glaucoma
- Orbital cellulitis
- Eyelid laceration
- Corneal abrasion
- Foreign body or object in the eye
- Chemical injury
- Blow or laceration to the eye

## Symptoms

- Eye pain
- Loss of vision
- Decreased vision
- Double vision
- Redness -- bloodshot appearance
- Sensitivity to light
- Bleeding
- Bruising
- Cuts or wounds
- Headache
- Itchy eyes
- Pupils of unequal size
- Stinging and burning
- Sensation of foreign body in the eye

## First Aid

### FOREIGN BODY IN THE EYE

Often, the eye will clear itself of a tiny object through blinking and tearing. If not, here are some first aid measures:

1. Do not rub the eye. Wash your hands before examining the eye.
2. Examine the affected eye in a well-lighted area. To find a foreign body, have the victim look up and down, and then side to side.
3. If you can't find the object, grasp the eyelid and gently pull down on the lower lid to expose the fold between the eyelid and the globe of the eye. If necessary, pull up on the upper lid.
4. If the foreign body can be seen on the inner surface of either the lower or upper lid, try to gently flush it out with water or use a cotton-tipped swab to invert the eyelid and inspect the underside.
5. If the foreign object is embedded in the eyeball, cover the victim's eyes with a sterile pad or clean cloth. DO NOT try to remove the object. Get medical help.
6. If you cannot locate the foreign body, or if you remove it, but the victim still has discomfort or blurred vision, cover the victim's eyes with a sterile pad or clean cloth. Get medical help.

### FOR AN OBJECT STUCK IN THE EYE

1. Leave the object in place. Do not touch it or apply any pressure to it.
2. Wash your hands.

3. Calm and reassure the victim.
4. Bandage the eye. If the object is large, place a paper cup or cone over the injured eye and tape it in place. If the object is small, cover both eyes with a clean cloth or sterile dressing.
5. Try to keep the victim calm and quiet until you have medical help.

#### FOR CHEMICAL INJURY TO THE EYE

1. Irrigation with tap water should begin IMMEDIATELY. Turn the victim's head so the injured eye is down and to the side. Holding the eyelid open, pour fresh water in the eye for 15 minutes, or until you have medical help. You may have to force the victim's eyes open.
2. If both eyes are affected, or if the chemicals are also on other parts of the body, have the victim take a shower.
3. Remove contact lenses -- but only after the eyes have been rinsed.
4. Cover both eyes (even if only one eye is affected) with a clean dressing, and avoid any rubbing of the eyes. Even if only one eye is affected, covering both eyes will help discourage eye movement.
5. After following the above instructions, seek medical help urgently.

#### FOR EYE BURNS

1. Flush the eyes with cool water (unless it is painful to do so) to reduce swelling and to help relieve the pain.
2. Apply a cool compress to the eyes, but avoid applying pressure.
3. If there is swelling in or around the eyes, if the lashes or lid skin is burned, or if there is any change in vision, seek medical help.

#### FOR CUTS OR BLOWS TO THE EYE

1. If the eyeball has been injured, get medical help immediately.
2. Gently apply cold compresses to reduce swelling and help stop any bleeding. Do not apply pressure to control bleeding.
3. If blood is pooling in the eye, cover both of the victim's eyes with a clean cloth or sterile dressing, and get medical help immediately.

#### FOR EYEBALL (CORNEA) CUTS OR SCRATCHES

1. Get medical help.
2. Avoid applying pressure to the eye.

#### FOR EYELID CUTS

1. If the eyelid is injured, carefully wash the eye. Apply a thick layer of bacitracin or mupirocin ointment on the eyelid and on the exposed eyeball, if the victim cannot close his eyelid. Place a patch over the eye. Seek immediate medical attention.
2. If the cut is bleeding, apply direct pressure with a clean, dry cloth until the bleeding subsides.
3. Rinse with water, cover with a clean dressing, and place a cold compress on the dressing to

reduce pain and swelling.

4. If the cut is more than several millimeters, or if the cut goes across the edge of the lid, seek medical help.

#### FOR CONJUNCTIVITIS (pink or red eye)

An itchy red or pink eye is often caused by a viral infection. Other causes may include a bacterial infection, allergy, something in the eye, or irritation. If the eye has been infected by a virus or bacteria, symptoms include: tearing; itching; runny yellow or greenish pus; crusted eyelids and lashes; and swollen eyelids.

1. Rinse the eye several times daily with artificial tears (which can be purchased without a prescription). You can place a cool washcloth over the closed eyelids to help relieve any itching or swelling. If there is yellowish pus, you may have a bacterial infection. A doctor may prescribe antibiotic eyedrops for 4 to 5 days.

2. If the symptoms do not improve, or if you have difficulty with vision, get medical help.

3. If there is considerable discharge from the eyes, or if there is swelling of the eyelids, get medical help. If there is pain (rather than itching), extreme sensitivity to light, visual loss, or nausea, the cause may be a more serious condition, and immediate medical attention should be obtained.

#### **Do Not**

- DO NOT press on an injured eye, or allow the victim to rub the eye(s).
- DO NOT remove contact lenses unless rapid swelling is occurring, or you cannot get prompt medical help.
- DO NOT attempt to remove a foreign body that is resting on the cornea (the clear surface of the eye through which we see), or that appears to be embedded in any part of the eye -- get medical help.
- DO NOT use dry cotton (including cotton swabs) or sharp instruments (such as tweezers) on the eye.
- DO NOT attempt to remove an embedded object.
- DO NOT let a burn become contaminated. Avoid breathing or coughing on the burned area.

#### **Call immediately for emergency medical assistance if**

- There appears to be any scratch, cut, or penetration of the eyeball
- Any chemical gets into a victim's eye
- Eye pain persists
- There are any vision problems
- Nausea accompanies eye pain

#### **Prevention**

- Supervise children carefully.
- Teach safety.
- Always wear protective eye wear when using power tools, hammers, or other striking tools.
- Always wear protective eye wear when working with toxic chemicals.