

Anatomy of the Eye

External (Extraocular) Anatomy

EXTRAOCULAR MUSCLES:

There are six muscles that attach to the eye to move it. These muscles originate in the eye socket (orbit) and work to move the eye up, down, side to side, and rotate the eye.

The **superior rectus** is an extraocular muscle that attaches to the top of the eye. It moves the eye upward. The **inferior rectus** is an extraocular muscle that attaches to the bottom of the eye. It moves the eye downward. The **medial rectus** is an extraocular muscle that attaches to the side of the eye near the nose. It moves the eye inward toward the nose. The **lateral rectus** is an extraocular muscle that attaches to the side of the eye near the temple. It moves the eye outward.

The **superior oblique** is an extraocular muscle that comes from the back of the orbit. It travels through a small pulley (the trochlea) in the orbit near the nose and then attaches to the top of the eye. The superior oblique rotates the eye inward around the long axis of the eye (front to back). The superior oblique also moves the eye downward.

The **inferior oblique** is an extraocular muscle that arises in the front of the orbit near the nose. It then travels outward and backward in the orbit before attaching to the bottom part of the eyeball. It rotates the eye outward along the long axis of the eye (front to back). The inferior oblique also moves the eye upward.

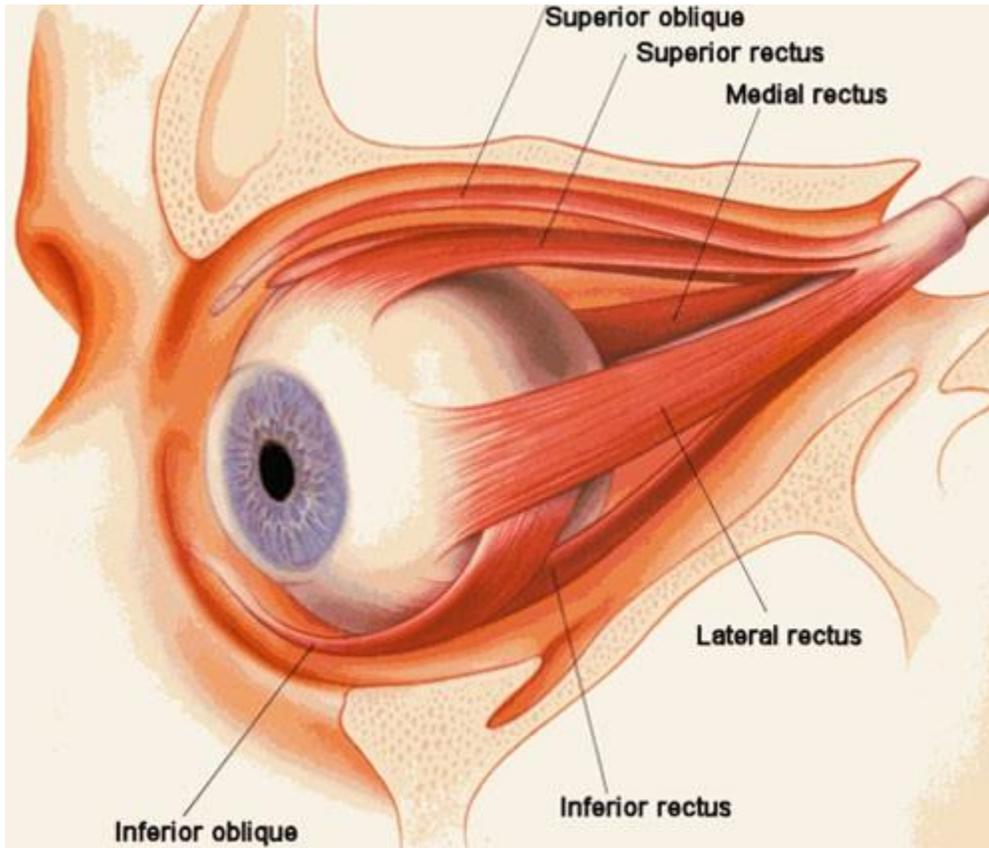


Fig. 1: Extraocular Muscle Anatomy

CONJUNCTIVA:

The conjunctiva is a transparent mucous membrane that covers the inner surface of the eyelids and the surface of the eye. When it is inflamed or infected it becomes red or pink. This is called [conjunctivitis](#) or “pink eye”.

LACRIMAL GLAND:

The lacrimal gland produces tears that lubricate the eye. It is located under the outer edge of the eyebrow in the orbit.

TENON’S CAPSULE:

Tenon’s capsule is a layer of tissue that lies between the conjunctiva and the surface of the eye.

SCLERA:

The sclera is the white outer wall of the eye. It covers nearly the entire surface of the eyeball. It is a strong layer made of collagen fibers. The tendons of the six extraocular muscles attach to the sclera.

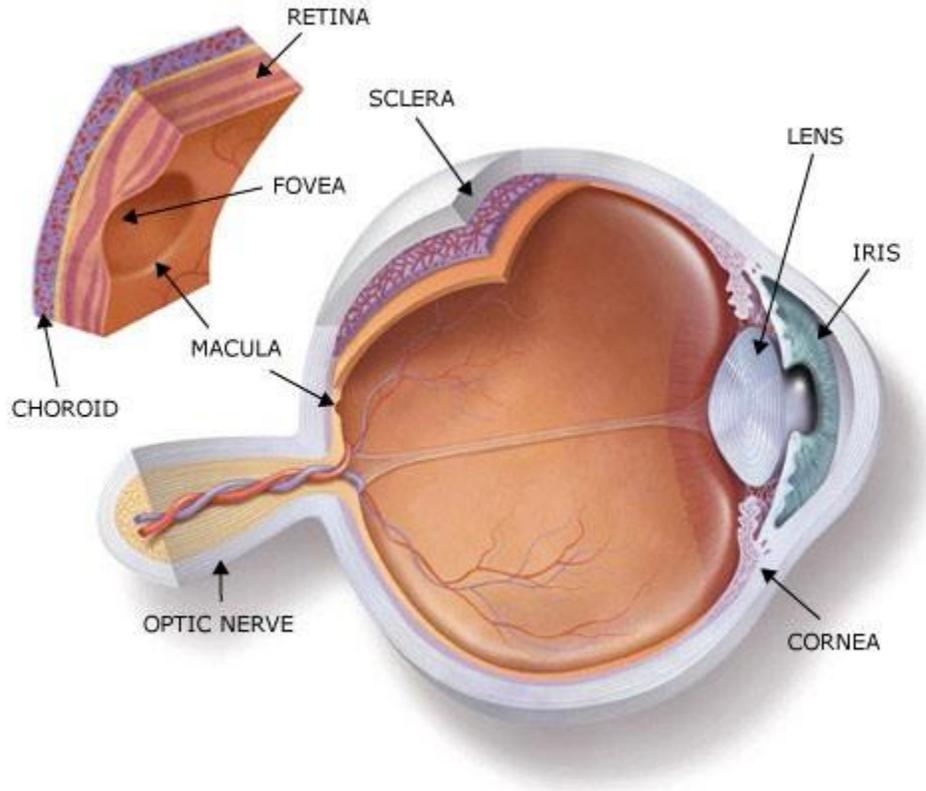


Fig. 2: The cornea is the front clear part of the eye in the center part of the outer wall of the eye.

CORNEA:

The cornea is the front clear part of the eye in the front center part of the outer wall of the eye. It is made of collagen fibers in a very special arrangement so that the cornea is clear. Through the cornea you can see the iris and pupil. The cornea bends light coming into the eye so that it is focused on the retina. The cornea is the part of the eye on which contact lenses are placed.

Internal (Intraocular)Anatomy

ANTERIOR CHAMBER:

The anterior chamber is a fluid (aqueous humor) filled space inside the eye. The cornea lies in front of the anterior chamber, and the iris and the pupil are behind it.

IRIS/PUPIL:

The iris is the colored part of the eye. It is disc shaped with a hole in the middle (the pupil). Muscles in the iris cause the pupil to constrict in bright light and to dilate in dim light. The change in pupil size regulates the amount of light that reaches the posterior (back) part of the eye.

LENS:

The lens of the eye is located directly behind the pupil. The lens bends light coming into the eye to help focus it on the retina. It changes shape to help the eye focus to see objects clearly at near. The lens is suspended from the wall of the eye by many small fibers (zonules) that attach to its capsule.

CILIARY BODY:

The ciliary body is attached to the outer edge of the iris near the wall of the eye. The ciliary body produces the fluid (aqueous humor) that fills the eye and nourishes its structures. It also helps to change the shape of the lens when focusing occurs.

VITREOUS:

The vitreous cavity lies between the lens and the retina and fills 4/5 of the space inside the back part of the eye. A jelly like substance known as the vitreous humor fills the cavity. This plays an important role in nourishing the inner structures of the eye. Light comes into the eye through the pupil and passes through the vitreous to be projected on the retina.

RETINA:

The retina is a thin, transparent structure that covers the inner wall of the eye. The eye works like a camera, and the retina is like the film in the camera. It is where images are first projected before they are transmitted through the optic nerve to the brain. It is a very complex structure with 10 layers of specialized cells including the photoreceptor cells (rods and cones).

PHOTORECEPTORS:

Photoreceptors are highly specialized cells of the retina that receive light impulses and change them into chemical energy that can be transmitted by nerve cells to the brain. The two types of photoreceptors are rods and cones.

Rods perceive black and white and serve night vision primarily. Cones are responsible for color perception and central vision.

MACULA:

The macula is a small, specialized area of the retina that has very high sensitivity and is responsible for central vision.

RETINAL PIGMENT EPITHELIUM (RPE):

The retinal pigment epithelium is a layer of cells deep in the retina. This single layer of cells helps maintain the function of the photoreceptor cells in the retina by processing vitamin A products, turning over used photoreceptor segments, absorbing light, and transporting nutrients in and out of the photoreceptor cells.

CHOROID:

The choroid is a tissue layer that lies between the retina and the sclera. The choroid has a rich supply of blood vessels that nourish the retina.

UVEAL TRACT:

The uveal tract is a pigmented component of the eye that is comprised of 1) the iris, 2) the ciliary body, and 3) the choroid.

OPTIC NERVE:

The optic nerve connects each eye to the brain. It is a structure (like a video cable) that sends the picture seen by the eye to the brain so that the images can be processed. The optic nerves end in a structure called the optic chiasm. In an adult, the optic nerve is about the diameter of a pencil. There are over 1 million individual nerve cells in the optic nerve.

OPTIC CHIASM:

The optic chiasm is the place in the brain where the two optic nerves meet. The individual nerve fibers from each nerve are sorted in the chiasm. The sorting occurs in such a way that the right side of the brain controls the view of objects in left visual space and the left side of the brain controls the view of objects in right visual space [See figure 3].

VISUAL CORTEX:

This is an area of the brain in the posterior occipital lobe to which the neurons in the retina ultimately give visual information. The visual cortex helps to process information regarding the image such as its color, composition, and relation in space to other objects. This information is then sent to other parts of the brain that serve higher visual functions.

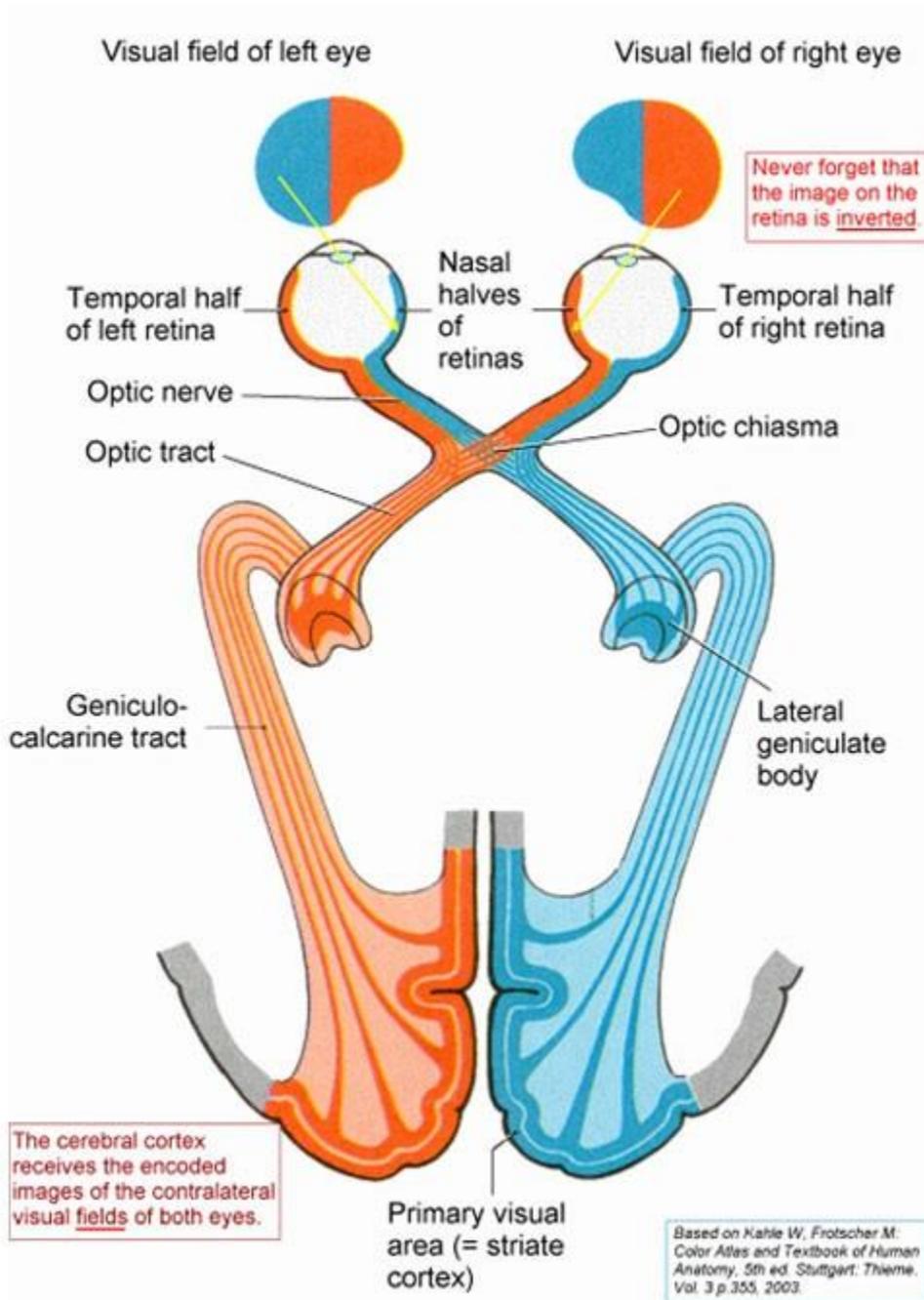


Fig. 3: The optic chiasm is the place in the brain where the two optic nerves meet.

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