

The human eye

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The eye is a rather small part of the body that makes up seventy percent of the humans total sensory ability. That is why we chose to describe the eye. Each part of the eye works together as a whole. Within and outside of the eye there are many working parts functioning around the clock.. The cornea is a very important part of the eye, but you can hardly see it because it's made of clear tissue. Like glass, the cornea gives your eye a window in which to view the world. The a cornea is a transparent tissue covering the front of the eye. The cornea covers both the pupil and he iris eye, and it is partially responsible to focus light.

The cornea is part of the external structure of the eyeball. The external layer of the eyeball is formed by the cornea, and the sclera. The cornea is a dome-shaped structure. The cornea does not have any blood vessels that is why it appears clear. The cornea does have nerves. The cornea is the first and most powerful lens in the eye's optical system. The cornea is the first part of the eye to focus. When a ray of light hits the eye, the cornea is the first structure the light encounters. Then the light rays travel through your eye through a hole called the pupil.

As light rays from an object enter your eye, they are bent inward by the cornea and lens. Light rays are focused through the transparent cornea and lens. Light rays focused by the cornea and lens produce an image on the retina that is upside down. The cornea is made up of five layers: the epithelium, Bowman's layer, the stroma, Descement's membrane, and the endothelium. The cornea obtains oxygen through absorption from the tear film layer, and from the aqueous humor. The tears that flow over the cornea

help to keep it nourished and moist. {draw: frame} The anterior chamber lies between the iris and the back surface of the cornea.

There are three chambers of fluid in the eye. The anterior chamber, which is between the cornea and iris. The posterior chamber, which is between the iris and lens. And, the vitreous chamber, which is between the lens and the retina. The fluid filled substance is called the aqueous humor. It is a clear fluid that fills the anterior chamber and the posterior chamber of the anterior cavity of the eye. The aqueous humor bathes the lens and gives nourishment to the lens. The aqueous humor is produced by the ciliary body. {draw: frame} {draw: frame} The colored part of the eye is called the iris.

It controls light levels inside the eye similar to the hole on a camera. The round opening in the center of the iris is called the pupil). The iris is embedded with tiny muscles that dilate (widen) and constrict (narrow) the pupil size. The sphincter muscle lies around the very edge of the pupil. In bright light, the sphincter contracts, causing the pupil to constrict. The dilator muscle runs radially through the iris, like spokes on a wheel. This muscle dilates the eye in dim lighting. The iris is flat and divides the front of the eye (anterior chamber) from the back of the eye (posterior chamber).

Its color comes from microscopic pigment cells called melanin. The color, texture, and patterns of each person's iris are as unique as a fingerprint. The pupil is the black circle in the center of the iris. But, the pupil is really a clear opening. The pupil appears black because the light which the pupil allows to enter the eye is absorbed on the retina and does not exit the eye. Light enters the eye through the cornea; it then travels through the opening called

the pupil. Light then enters the eye's lens. The pupil changes size in order to adapt to the quantity of light rays that reach it.

The pupils constrict in response to increased light, this makes your pupils smaller. When the pupils are smaller, it allows in as little light as possible. The pupil dilates in response to decreased light, this makes your pupils larger. When the pupils are larger, it allows in as much light as possible. The pupil size is determined by a reflex action that allows less light into the eye during bright conditions, so the person is not dazzled. The pupil size is determined by a reflex action that allows more light into the eye during dim conditions; this will make vision possible for the person.

To see how this works, use a small flashlight to see how your eyes or a friend's eyes respond to the changes in brightness. The pupils will get smaller when the light shines near them and they'll open wider when the light is gone. {draw: frame} {draw: frame} {draw: frame} * Dilated* Pupil * Constricted* Pupil The lens is part of the internal structure of the eyeball. The lens is transparent. The lens is the flexible curved part of the eye that sits behind the iris and in front of the vitreous humor. The lens of the eye is made of mostly water and protein. Light which passes through the pupil opening, will enter the lens. The lens focuses light rays on the back of the eye. The lens' purpose is to focus images onto the retina. It works like the lens of a camera that records the picture. The lens turns the images upside down. Then the picture is transmitted by the optic nerve to the brain. In young people, the lens changes shape to adjust for close or distance vision. The lens changes shape when looking at objects at different distances to keep

the images in focus. The lens changes its shape by bending. The adjustment of the lens of the eye is similar to the focusing of a camera.

This adjustment of the lens is known as accommodation. As we become older adults, the lens gradually hardens, and it becomes harder for the lens to accommodate. {draw: frame} {draw: frame} The Ciliary Body and the Ciliary Muscle, separates the Aqueous Humor, the fluid and, the Anterior Chamber. The vitreous humor is located in the posterior chamber of the eye. The posterior chamber is a space behind the iris and it is in front of the retina. This space behind the lens is filled with a jellylike substance called the vitreous humor. The vitreous humor helps to shape the eyeball.

As we age and get to be older adults, the vitreous humor changes from a gel to a liquid like fluid and it gradually shrinks and separates from the retina. {draw: frame} The retina is the innermost layer of the eye. The retina is made up of two parts: an optical part in the fundus of the eye that is sensitive to light, and a nonsensitive pigmented part that lines the ciliary body and iris. The light-sensitive neurons are arranged in three layers; the first layer is made up of rods and cones and the other two transmit impulses from the rods and cones to the optic nerve.

The rods are sensitive to dim light of a variety of wavelengths, and the cones are sensitive to bright light of more restricted wavelengths and are responsible for color vision. Visual acuity is greatest in the central part of the retina. {draw: line} {draw: frame} {draw: frame} The retina is a stack of several neuronal layers. Light is concentrated from the eye and passes across these layers (from left to right) to hit the photoreceptors (right layer).

This causes a chemical transformation of light to nerve impulse to the bipolar and horizontal cells (middle yellow layer).

The signal is then transmitted to the amacrine and ganglion cells. This pattern of spikes determines the raw input from the eyes to the brain. The optic disc is a whitish spot on the retina. The optic disc is called the blind spot. The optic disc is the spot on the retina that the optic nerves come from. The optic disc marks the point where nerve fibers leave the eye. The optic disc lacks light sensitive cells. There are no sensory cells here that are why it creates a blind spot. The macula lutea is an irregular yellowish spot near the center of the retina.

The macula lutea lies slightly below the optic disc. The macula lutea is part of the retina and it is the most light sensitive. The size of the macula lutea is 7mm or about 1/4 inch. The macula lutea is responsible for our reading vision. It is this part of the retina that makes our vision 20/20. If you do not have a macula lutea, you would not be able to see. Cranial Nerve II, or more familiarly known as the optic nerve, is the nerve that controls the sense of vision. Without this the human race could not see, it acts as a passageway of the object you see, to be transferred as a nervous impulse to the brain.

The part of the brain the nervous impulses are sent to is the visual cortex, this is a section of the brain where all of the information is processed. The optic nerve is formed out of axons. An axon is the long processes of retinal cells at the back of the eye. These join together to form the nerve, which exits the eyeball at a point called the optic disc. The optic nerve fibers, originate in the retina, then enter the optic nerve which again passes

through the eye socket. This then heads to the optic canal, the opening in the skull which receptors pass from the eye to the brain.

The optic nerve fibers the join together to form the optic charisma, this trade in fibers allows for binocular vision, they continue until it makes contact with the lateral geniculate. The optic nerve radiates back to the visual where the image is processed. To sum this up the optic nerve carries information to the brain from the eye. This concludes the internal mechanism of the eye. Next is a discussion of the external anatomy of the eye and component's surrounding it. There are three layers of the eyeball. The external layer of the eyeball is formed by the sclera, and the cornea.

The sclera is the white part of the eye. The sclera is continuous with the cornea. The sclera is the outermost layer, and the sclera is the thickest layer of the eyeball. The sclera has the important job of covering most of the eyeball. The conjunctiva is a mucus membrane which covers the sclera that you can see through and lines the eyelids as the palpebral conjunctiva, and reflects or folds back over the anterior of the eyeball, as the ocular, or in some cases this can be called the bulbar conjunctiva. The bulbar conjunctiva only covers the white of the eye not the cornea.

The ocular conjunctiva is very thin, blood vessels are visible beneath it, when irritated the eye becomes " bloodshot. " When the eyelids are shut a slit like space appears between the covered eyeballs and eyelids. When you are wearing contacts, the contact lies in the conjunctival sac, this is where most eye medications are placed also. The conjunctiva's main job is to protect the eye from anything that may penetrate the eye. Certain eye problems that

may relate to the conjunctiva include the inflammation of the conjunctiva which is called conjunctivitis. Pinkeye which is probably the most familiar to people living in America.

Pinkeye consist of a bacteria or virus that is, in most cases , on your hands and you do not wash them then it is spread around the eye. All infections in this area are contagious. The sclera is also a supportive and protective layer of the eye. The sclera forms a tough shell that helps protect the inner structures of the eyeball. There are three pairs of muscles attached to the sclera. These muscles are named extra-ocular muscles. {draw: frame} There are six extra-ocular muscles on each eye. Each muscle has a different form of movement or function in the eye.

The Lateral Rectus is the muscle that moves the eye outward. The Inferior Rectus muscle is the muscle that pulls the eyeball towards the ground. The Inferior Oblique muscle raises the eye, and pivots the eyeball outwards. The Superior Oblique muscle pulls the downwards and outwards, while abducting the eye. The tendon-like Trochlea, acts like a pulley which the superior oblique muscle passes through. The Superior Rectus muscle pulls the eye upwards and inwards. The Palpebrae Superioris muscle pulls the upper eyelid upwards. The Medial Rectus muscle moves the eyes inward horizontally.

The Tendinous Ring is a band of rough, fiber-filled tissue, that holds the eye muscles in place. The second layer of the eye is called the uvea. The uvea contains many blood vessels and pigmented cells. The uvea is divided into three main sections: the choroid, the ciliary body and the iris. The choroid extends from where the optic nerve meets the eye-ball to the front of the

eye, where it forms both the ciliary body and the iris. The third layer is the retina. The Lacrimal glands are located above each eye. The Lacrimal gland lies underneath the upper eyelid. The Lacrimal gland has the important job to produce tears.

The Lacrimal gland continually produces tears that are distributed over the surface of the eyes. The tears drain through the Lacrimal canals into the Lacrimal sac and into the nose from the Lacrimal duct. The tears are constantly being made in the Lacrimal glands and through the action of blinking the tears drain. Every time the eyelid blinks, it causes tears to flow from the Lacrimal glands. The tears keep the cornea moist and provide oxygen to the cornea. The tear production increases when you cry or if the eye is irritated by foreign particles. The Lacrimal gland also produces other protective fluids onto the surface of the eye. draw: frame} Cranial Nerve III, the oculomotor nerve controls the eye muscles, or two-thirds of them anyway. This Nerve Mainly carries the motor fibers to the eye muscles, this controls the movement of the eye and where the eye's position is located. The oculomotor contains fibers from the nervous system which constrict the pupil and also alter the lenses' shape. The oculomotor nerve originates midbrain, is part of the brainstem and leaves the cranial cavity through the eye socket into the superior orbital fissure. From the superior orbital fissure, this is split into two parts, the superior and inferior divisions.

Problems associated with the oculomotor nerve, are damage to the nerve, in which case all but two of the eye muscles will be paralyzed, occasionally when this happens the eyelid will drop. Also the eye will not move sideways. Cranial Nerve IV, the trochlear nerve, only supplies one muscle for

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movement to the eye. This nerve transmits both the motor information of the eye and the sensory information of the eye. The nerve originates about midbrain, around the brainstem and finally ends up through the center of the eye socket into the superior orbital fissure. The trochlear nerve controls the muscle that moves the eye up and down.

Cranial Nerve VI, is the abducent nerve, this leads to the lateral rectus muscle in the eye. The abducent nerve contains both motor fibers and sensory fibers. The fibers of the abducent nerve originate in a part of the brainstem called the Pons. The nerve arrives at the eye socket then passes through the superior orbital fissure. This moves the eye out to the side. The eye is a important and fascinating organ. It is made up of many different kinds of tissues. Each has a very important and individualized function. It's many parts work together to form the phenomenon of sight. This allows us to perceive the world.