LESsON ONE: ANATOMY OF THE HUMAN EYE

FOCUS:
To explore the basics of vision, Positively Aging™ lessons start with a knowledge of the anatomy of the eye. After this lesson, students should know the structures of the eye, be able to locate them, and explain their basic function.

ACTIVITY 1A: ANATOMY OF THE HUMAN EYE
Pass out the unlabeled line drawing of the eye to each student. Using the overhead of the drawing have the students name the parts of the eye and label them on their picture. Ask the students to determine what the function is of each part of the eye. For each function, ask the students what vision problems might occur if there was a defect in each individual anatomic area.

Examples of anatomic sites, associated defects, and visual problems:

<table>
<thead>
<tr>
<th>Anatomic Site</th>
<th>Defect</th>
<th>Visual Problem</th>
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</thead>
<tbody>
<tr>
<td>Lens</td>
<td>Becomes cloudy or opacified (cataract)</td>
<td>Blurry or smudged vision</td>
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<tr>
<td>Cornea</td>
<td>Scratched or abraded (usually from trauma)</td>
<td>Pain, tearing, and obstructed vision</td>
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<tr>
<td>Extra–ocular muscles</td>
<td>Paralyzed</td>
<td>Double vision (diplopia)</td>
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<tr>
<td>Pupil and iris</td>
<td>Paralyzed (this is what happens temporarily when an optometrist dilates the eye)</td>
<td>Trouble focusing (accommodation)</td>
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<tr>
<td>Aqueous humor</td>
<td>Increased pressure (glaucoma)</td>
<td>Blind spots, that is, areas in visual field you can’t see</td>
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<tr>
<td>Retina</td>
<td>Tears or bleeds</td>
<td>Blurry or lost vision</td>
</tr>
<tr>
<td>Macula</td>
<td>Degenerates</td>
<td>Loss of central vision</td>
</tr>
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</table>

Materials:
1. Unlabeled line drawing of the eye
2. Labeled line drawing of the eye
3. Overhead of unlabeled line drawing of the eye
4. Glossary of anatomic terms and definitions
ANATOMY OF THE HUMAN EYE — LABELED

EXTERNAL STRUCTURES:
- iris, pupil, sclera, cornea, muscles of the eye, optic nerve, fat pads, conjunctiva

INTERNAL STRUCTURES:
- choroid, ciliary body, iris, pupil, lens, muscles of the lens, vitreous humor (in vitreous body), retina, anterior chamber (in front of iris), posterior chamber (in front of lens, behind iris), aqueous humor, blood vessels
**ANATOMY OF THE HUMAN EYE — UNLABELED**

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Description and Function of Parts of the Human Eye

AQUEOUS HUMOR:
clear, watery fluid circulating in both chambers of eye, associated with the chamber outside the lens.

CHOROID:
a thin, highly vascular membrane on which the retina rests; between the retina and sclera.

CILIARY BODY:
part of the eye that joins the iris with the anterior portion of the choroid.

CONES:
photoreceptor cells in the retina used under conditions of bright illumination; are color coded (red, green, and blue); mediate fine detail vision; contain photopigments with low sensitivity to light (i.e., cannot see colors in dim illumination).

CONJUNCTIVA:
thin layer of mucous membrane lining the inner surface of each eyelid, moves over the eyeball as a protective cover.

CORNEA:
convex, transparent coating of the eye (made up of collagen-rich epithelial cells) which covers the pupil and iris, consisting of five layers allowing light to pass through to the lens; it is dense, nonvascular, uniform in thickness, and projects like a dome beyond the sclera; the degree of corneal curvature varies in different individuals and in the same person at different ages; curvature is more pronounced in youth than in advanced age.

EYELID:
movable fold of skin over the eye with lashes and glands along its margin

FOVEA (FOVEA CENTRALIS):
area at the center of the retina where cone cells are concentrated and there are no rod cells; “blind spot.”

IRIS:
circular, opaque, contractile diaphragm controlling the diameter of the pupil; divides the space between the lens and the cornea into an anterior and a posterior chamber; the colored part of the eye surface containing dark pigment cells variously arranged in different people to produce different colored irises; pigment absent in albinos.

INTRAOCULAR PRESSURE:
pressure of the eye, regulated by resistance to the flow of aqueous humor through a fine sieve-like trabecular meshwork (eye’s drainage system); the older the person, the more likely it is that the trabecular meshwork becomes hardened and obstructed, preventing the normal flow of aqueous humor from passing out at the proper rate and causing an increase in the intraocular pressure (IOP).
LENS (CRYSTALLINE LENS):
a transparent, colorless, firm structure of the eye, enclosed in a capsule, located between the iris and the vitreous humor; refracts light to focus images onto the retina at the back of the eye; in old age the lens becomes flattened, more dense, slightly opaque, and amber-tinted.

MACULA LUTEA:
an oval yellow spot at the center of the retina, near the optic nerve; around fovea (blind spot); region of retina richest in photoreceptors; contains a pit, fovea centralis, and has no blood vessels; central vision occurs when an image is focused directly on the fovea centralis.

MUSCLES OF THE EYE:
CILIARY MUSCLE — controls the diameter of the pupil (how much light passes through the lens); ciliary muscle adjusts the shape of the lens (and hence focal length) by varying the tension of the muscle
LATERAL RECTUS MUSCLE — contraction of this muscle rotates the eye in the orbit toward the ear
MEDIA L RECTUS MUSCLE — contraction of this muscle rotates the eye in the orbit toward the nose
ORBITALIS OCULI MUSCLE — controls opening and closing of eyelid

OPTIC NERVES:
either of a pair of second cranial nerves; transmits visual data from retina to brain.

PUPIL:
the “hole” or circular opening in the iris through which light passes to the lens and the retina; located slightly to the nasal side of the center of the iris; lies behind the anterior chamber of the eye and the cornea and in front of the lens; diameter changes with contraction and relaxation of the muscular fibers of the iris as the eye responds to changes in light, emotional states and other kinds of stimulation.

RETINA:
a ten-layered, delicate, membrane of light-sensitive nervous tissue at the back of the eye; contains photoreceptors (rods and cones) and the neurons which transmit visual impulses from sensory cells through the optic nerve to the brain; is in contact with the choroid, the inner surface with the vitreous body; is soft, semi-transparent, and contains rhodopsin, which gives it a purple tint; becomes clouded and opaque if exposed to direct sunlight.

RODS:
one of the photoreceptor cells in the retina; contain photopigments which are very sensitive to low light levels; located mainly around the periphery of the retina; do not code for color.

SCLERA:
tough, opaque membrane of the eyebulb which maintains the size and form of the bulb and attaches to muscles that move the bulb; the whites of the eyes.

VITREOUS HUMOR:
transparent, semigelatinous fluid in the chamber filling the cavity behind the crystalline lens of the eye.