

1 Corneal Reflex

◆ Definition

Protective reflex causing blinking of both eyes when the cornea is touched.

◆ Pathway

- Stimulus: Touch cornea (cotton)
- Afferent: CN V (Trigeminal)
- Center: Pons
- Efferent: CN VII (Facial)
- Response: Bilateral blinking

◆ Importance

- Protective
- Used to assess depth of anesthesia
- Tests integrity of CN V & VII



2 Pupillary Light Reflex

◆ Stimulus

Light in one eye.

◆ Response

- Same eye constricts → Direct reflex
- Opposite eye constricts → Consensual reflex

◆ Nervous Pathway (Very Important)

1. Retina
2. Optic nerve
3. Optic chiasma
4. Optic tract
5. **Pretectal nucleus (midbrain) → reflex center**
6. Edinger-Westphal nuclei (both sides)
7. Oculomotor nerve (III)
8. Ciliary ganglion
9. Constrictor pupillae → **Miosis**

📌 Darkness inhibits this pathway → Mydriasis

◆ Abnormal Pupillary Reflex

- Encephalitis / Alcoholism → reflex lost
- Argyll Robertson pupil → reacts to accommodation, NOT light

(Lesion in pretectal region – neurosyphilis)

- Reverse Argyll Robertson → reacts to light, NOT accommodation
- Horner's syndrome → persistent miosis (sympathetic lesion)

3 Accommodation Reflex (Very Important)

◆ Definition

Adjustment of the eye to focus on near objects (< 6 m).

◆ Stimulus

Blurred image on retina.

◆ Components (Triad of Accommodation)

1 Miosis

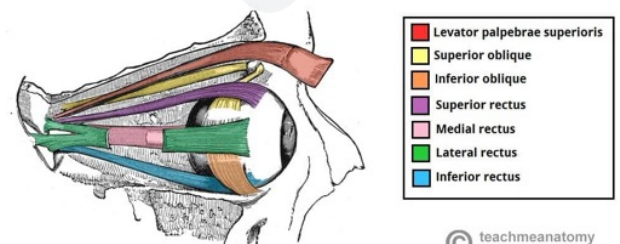
- Constrictor pupillae contraction
- Increases depth of focus
- Reduces aberrations
- Focuses image on fovea

2 Convergence

- Both medial recti contract
- Brings image to fovea
- Controlled by area 19 → area 8 → oculomotor nucleus

3 Increased Lens Convexity (Most Important Mechanism)

- Ciliary muscle contracts
- Suspensory ligaments relax
- Lens becomes more spherical
- Dioptric power increases



◆ Nervous Pathway of Accommodation

1. Retina
 2. Optic nerve
 3. Optic tract
 4. Lateral geniculate body
 5. Area 17
 6. Area 18 & 19
 7. Occipitotectal tract
 8. Edinger-Westphal nucleus
 9. CN III → Ciliary ganglion
 10. Short ciliary nerves
- Miosis + Lens thickening

Convergence pathway:

Area 19 → Area 8 → Corticonuclear tract → CN III → Medial recti

◆ Power of Accommodation (Age Related)

- 15 D at age 20
- 2 D at age 50
- 1 D at age 60

Near point increases with age → due to loss of lens elasticity.

4 Visual Pathway (Core Concept)

Retina

- Optic nerve
- Optic chiasma (nasal fibers cross)
- Optic tract
- Lateral geniculate body
- Optic radiation
- Area 17 (Primary visual cortex)

Then → Area 18 & 19 (association areas)

◆ Functions of Visual Cortex

Area 17

- Visual perception
- Fusion of two images
- Localization in space
- Color perception

Area 18



- Understand meaning of objects
- Recognize written words

Area 19

- Integration
- Eye movements (accommodation support)



5 Visual Acuity

◆ Definition

Ability to distinguish two separate points.

◆ Requirement

- Two cones stimulated
- One unstimulated cone between
- Visual angle = 1 minute ($1/60^\circ$)

🧠 Why?

If the two light points fall on adjacent cones, the brain thinks it is one object.

If there is a gap (one unstimulated cone), the brain recognizes them as two separate points.

👉 This is called retinal resolution.

◆ Measurement

- Snellen chart
- Landolt broken circle chart

Test at 6 meters to avoid accommodation.

◆ Expression

Distance between the patient and the chart

Visual acuity = N / D

Distance at which a normal person can read that same line

Example:

6/6 = normal

Patient sees at 6 m what normal person sees at 6 m.

If severe:

- CF → Counting fingers
- HM → Hand movement
- PL → Perception of light

6 Errors of Refraction

◆ Myopia (Short Sight)

- Image in front of retina
- Causes:
 - Long eyeball
 - Increased curvature
 - Strong ciliary muscle
- Correction → Concave lens

◆ Hypermetropia (Far Sight)

- Image behind retina
- Causes:
 - Short eyeball
 - Flat cornea/lens
 - Weak ciliary muscle
- Correction → Convex lens

◆ Astigmatism

- Unequal corneal curvature
- Multiple focal points
- Correction → Cylindrical lens

◆ Presbyopia

- Age > 40
- Loss of lens elasticity
- Difficulty near vision
- Correction → Convex lenses for reading

7 Color Vision Tests

1. Color matching test
2. Ishihara chart

Used to detect color blindness.

🔥 Most Important Exam Points

- ✓ Afferent light reflex = CN II
- ✓ Efferent light reflex = CN III
- ✓ Accommodation triad = Miosis + Convergence + Lens thickening
- ✓ Area 17 = perception
- ✓ 6/6 = normal vision
- ✓ Myopia = concave lens
- ✓ Hypermetropia = convex lens
- ✓ Presbyopia = loss of elasticity