

SPECIAL SENSES

WHAT CHANGES OCCUR IN EYE WHEN FOCUSED ON NEAR OBJECT?

Accommodation REFLEX

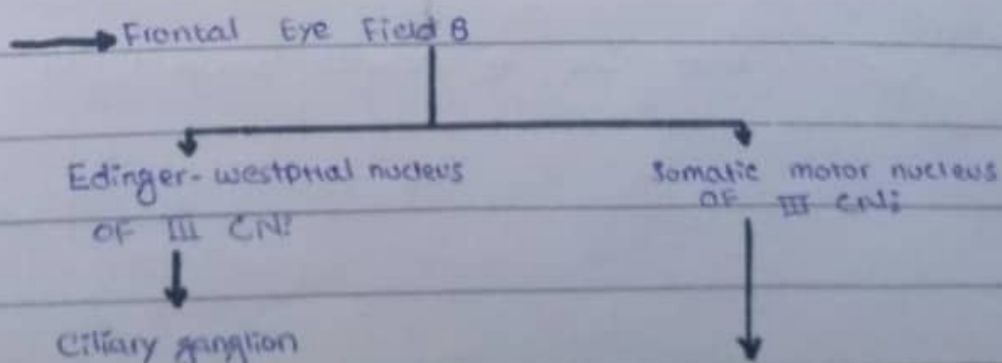
It is a ability of Eye to keep image Focused on retina as the distance b/w image and object varies. Particular used for near vision.

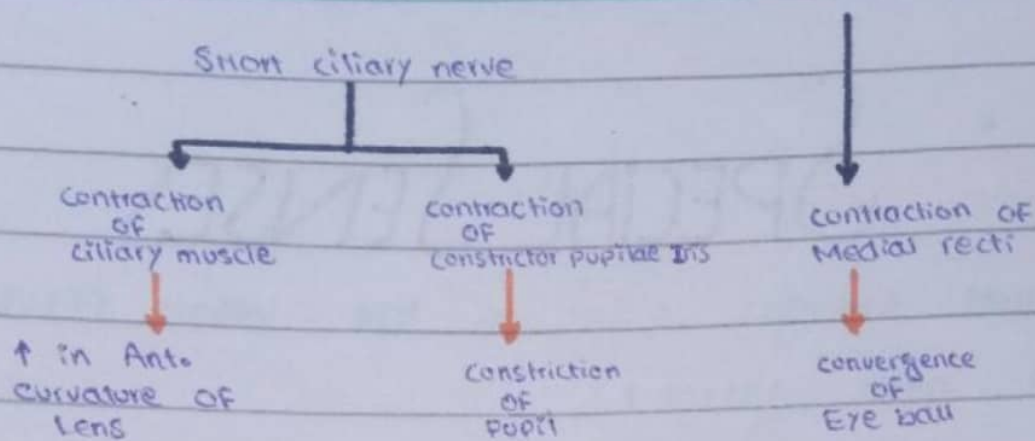
Changes occur:

1. Convergence of Eyeballs due to contraction of Medial Recti.
2. Constriction of pupil due to contraction of Constrictor Pupil of Iris.
3. ↑ in Ant. curvature of lens due to contraction of Ciliary muscle.

Pathway:

Eye → optic nerve → optic chiasma → optic tract → lateral Geniculate body → optic radiation → visual cortex (area no. 17)





Explain nervous system of accommodation REFLEX?

Autonomic Control of Accommodation:

(1) Parasympathetic control:

Stimulation of Parasympathetic nerves to eyes

↓
Ciliary muscle contract

↓
Lens ligament relax

↓
Lens become more spherical

↓
↑ Refractive power

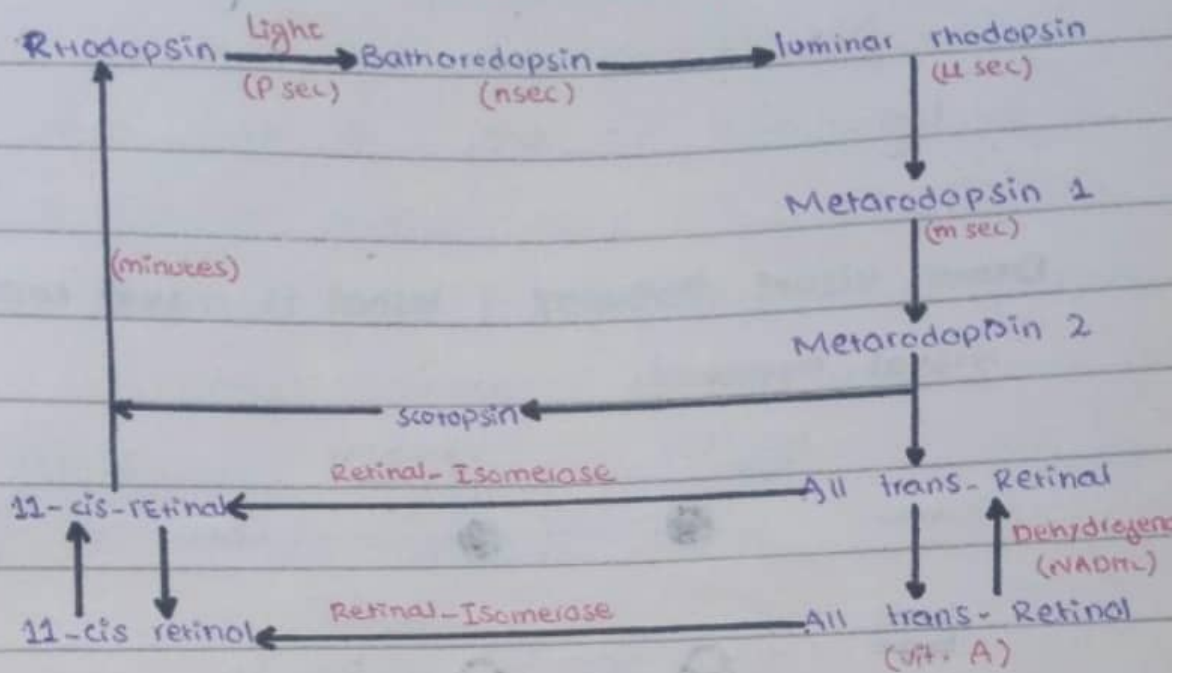
↓
Eye become capable of focusing on nearer object.

(2) Sympathetic control:

Sympathetic stimulation has weak effect in relaxing ciliary muscle

↓
play role in normal accommodation.

Draw Rhodopsin visual cycle?



What is Dark Adaptation?

DARK ADAPTATION: occur in cones only.

If a person enter dim light from bright light room. He is unable to see object. He become blind sometimes but later he able to see object.

The process by which person is able to see object in dim light is called **Dark Adaptation**.

→ Maximum duration for Dark Adaptation 20 min

Causes:

(1) **↑ sensitivity of rods as result of resynthesis rhodopsin**

(a) **In Bright light:** much of pigments is being broken

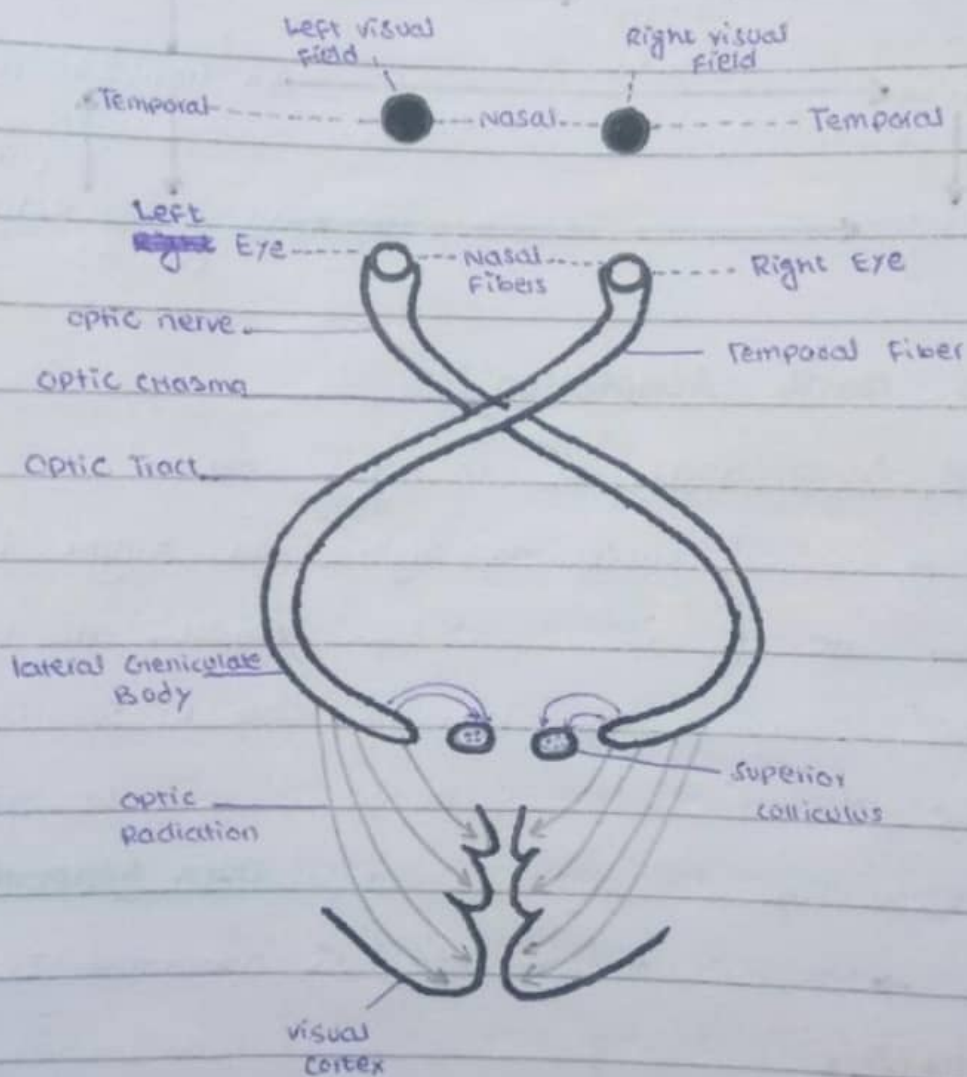
(b) **In Dim light:** It require sometimes for regeneration of certain amount of Rhodopsin, which is essential for optimal rod function.

(2) Dilatation of Pupil:

Dilatation of Pupil allow more and more Light enter the Eye.

Draw visual Pathway ? what is visual cortex,

visual Pathway:



Visual Cortex

Primary cortical center for vision is called visual cortex that is located on medial surface of occipital lobe.

It forms walls and lips of Calcarine Fissure in medial surface of occipital lobe.

Areas:

P^o visual area Area 17

Visual association area Area 18

Occipital Eye Field Area 19

Functions:

P^o visual area → concerned with perception of visual impulse

Visual association area → interpretation of visual impulse.

Occipital Eye Field → concerned with eye movement.

Explain light reflex ?

Light rays on Eye

↓
optic nerve

↓
optic chiasma

↓
optic tract

↓
pretectal nucleus

↓
Edinger-westphal nucleus

↓
ciliary ganglion

→ Short ciliary nerve

→ contraction of constrictor pupillae and constrictor of pupil iris

Draw Taste Bud ? Give location on Tongue

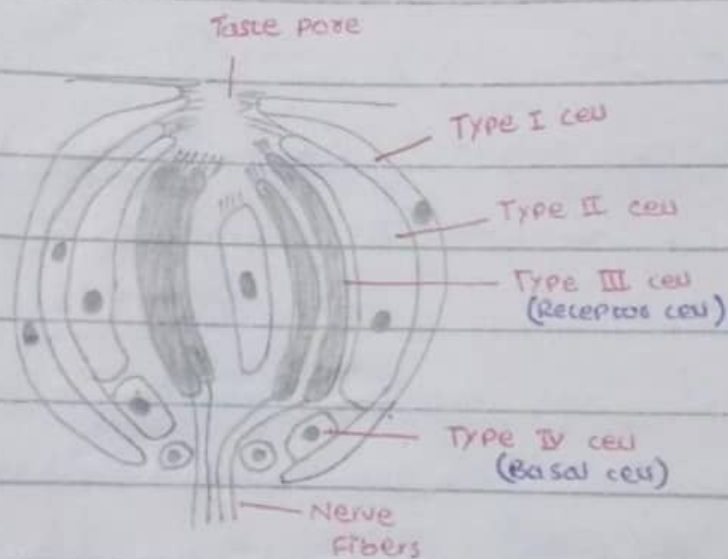
Describe Mechanism of stimulation of Taste?

Taste Bud; Sense organ for Taste is Taste bud.

Taste bud composed of

→ Supporting sustentacular cells

→ Receptor Taste cells



location on Tongue:

3 Type of Papillae on Tongue.

Filiform Papillae; over Dorsum of Tongue

Fungiform Papillae; Ant. surface of Tongue near Tip

Circumvallate; Post. Part of Tongue.

MECHANISM OF Stimulation:

Receptor of Taste sensation are "Chemoreceptor".

Which is Stimulated by substances dissolved in mouth by saliva.

The dissolved substance act on microvilli of Taste receptor Exposed in taste pore. It causes Development of receptor potential in Receptor cells.

Mechanism involved in development of potential Potential is different each Taste receptor cell.

(a) In Sweet receptor cell:

Cyclic AMP causes "Depolarization"

(b) In Sour receptor cell:

Acid Depolarizes Sour receptors by blocking Potassium channel with hydrogen ion.

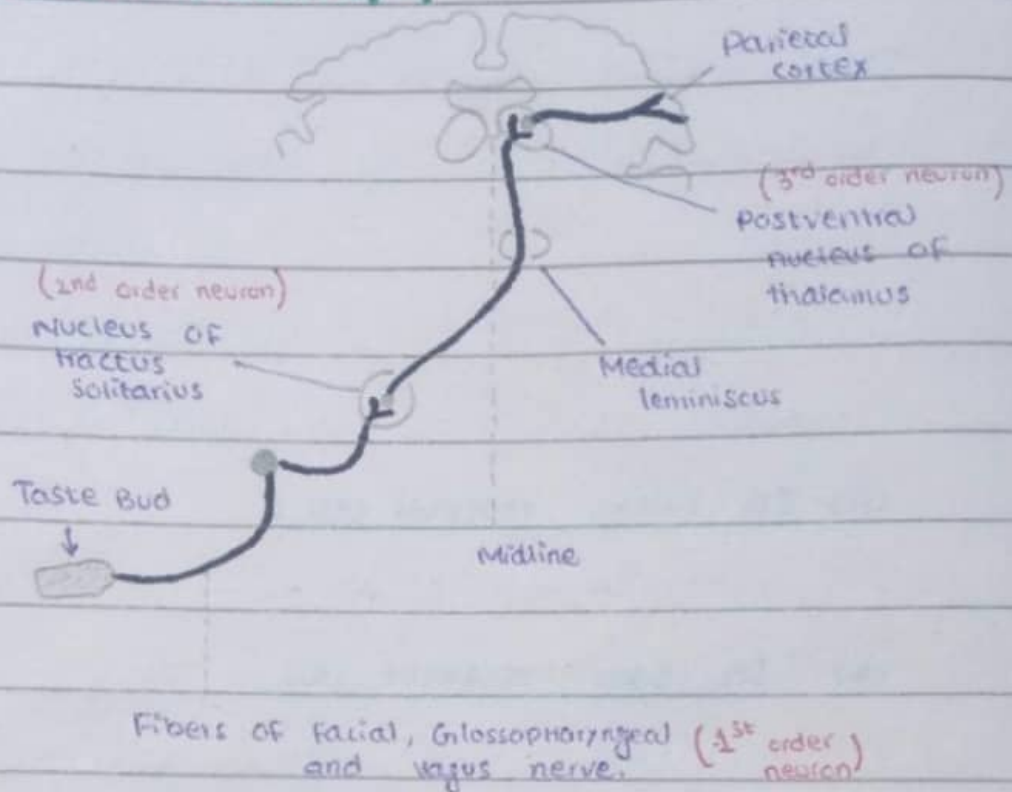
(c) In Salt receptor cell:

Salt stimulus cause "Depolarization" by \uparrow Passive transport of Na^+ ion through opened channel.

(d) In Bitter receptor cell:

Stimulating agent activate "Phospholipase C" through G protein. Cause production of Inositol Triphosphate which release Ca^{2+} ion and develop "Depolarization".

Trace Taste Pathway ?



Receptor → Type III cells.

Reduced Eye ?

IF all refractive surface of eye are algebraically added together & then considered to be one single lens, optics of normal eye may be simplified.

Characteristic :

- (i) To have total refractive power of 59 diopters
- (ii) To exist with its central point 17 mm in front of retina

Place Principle:

It is a principle to determine Sound Frequency by determining the position along basilar membrane that is most stimulated.

MECHANISM:

(a) low Frequency sound: Cause Maximal stimulation of Basilar membrane near Apex of cochlea.

(b) High Frequency sound:
Near Base of cochlea.

(c) Intermediate frequency sound:
At middle of cochlea.

Write down Clinical Abnormalities associated with Smell?

(1) Anosmia;

↓
loss of sensation of Smell

(2) Hyposmia;

↓
Reduction in olfactory sensation Due to constant Exposure to a Particular odor.

(3) Hyperosmia;

↓
↑ olfactory sensation.

A Bomb blast occur in the vicinity of House a woman Present in Home Started feeling that her Hearing is slightly affected but complete Examination revealed no auditory Damage.

What is the mechanism which protect the ear From damage due to loud Sound?

Attenuation Reflex: It is a reflex that occur When loud Sounds are transmitted thru ossicular System into CNS. It occur after latent period of 40-80 ms.

Reflex

Tensor Tympani muscle pulls Handle of malleus, inward
Stapedius pulls stapes out of oval window.

↓
These two forces oppose each other

↓
Cause entire ossicular system to become highly rigid.

↓
Reduce ossicular conduction of low frequency sound &

↓
Reduce sound intensity by 30-40 decibels

Exact area OF Hypothalamus that regulates Body Temperature:

It is an area located Bilateral Posterior Hypothalamus at level of mamillary Bodys.

MECHANISM:

Thermostate signal from all detector areas of body Temperature combined in this area, and provide Heat lose & Heat Producing Mechanism.

Heat lose Mechanism:

When body Temperature \uparrow Excess Heat lost by

- (i) vasodilation of skin blood vessels
- (ii) Sweating
- (iii) \downarrow heat production by shivering, thyroxin.

Heat Produce Mechanism:

When body Temperature \downarrow heat produced by

- (i) vasoconstriction of skin blood vessels
- (ii) Pilo-erection; this entraps a thick layer of "insulator air" next to skin. \downarrow Heat.
- (iii) \uparrow in heat production by shivering
Sympathic Excitation of chemical thermogenesis.