Cogs 17: Vision

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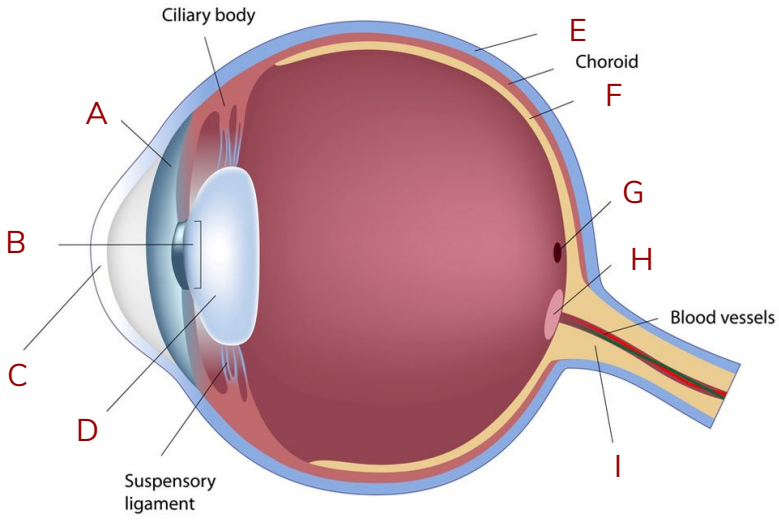
7.12.17

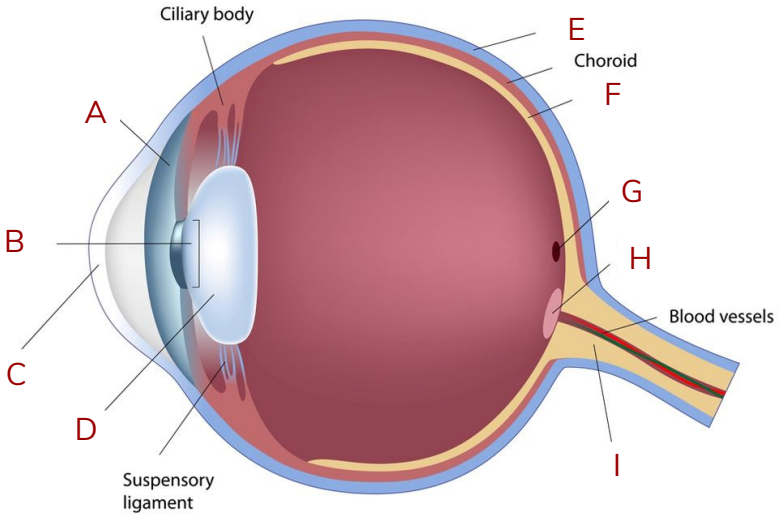
Slides found here

tinyurl.com/s1cogs17

Label the parts of the eye

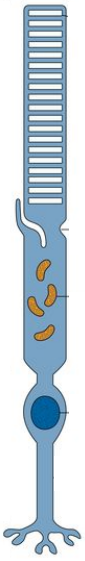


Label the parts of the eye



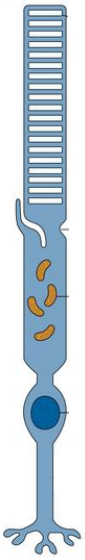
A. **Iris**
B. **Pupil**
C. **Cornea**
D. **Lens**
E. **Sclera**
F. **Retina**
G. **Fovea**
H. **Blind Spot**
I. **Optic Nerve**

Visual Receptors: _____



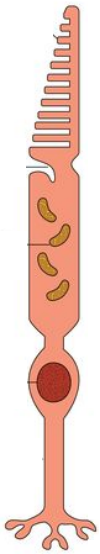
- Outer segment contents:
- Size:
- How many in eye:
- Distribution:
- Color:
- Light sensitivity:
- Motion detection:
- Connectivity:
- Acuity:
- Pathway:

Visual Receptors: Rods



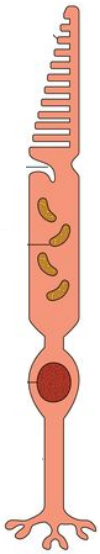
- Size: **Larger**
- How many in eye: **~120 million/eye**
- Distribution: **None in fovea, high concentration in periphery**
- Color: **None**
- Light sensitivity: **High**
- Motion detection: **Great**
- Connectivity: **High convergence**
- Acuity: **Low**
- Pathway: **Dorsal**

Visual Receptors: _____



- Size:
- How many in eye:
- Distribution:
- Color:
- Light sensitivity:
- Motion detection:
- Connectivity:
- Acuity:
- Pathway:

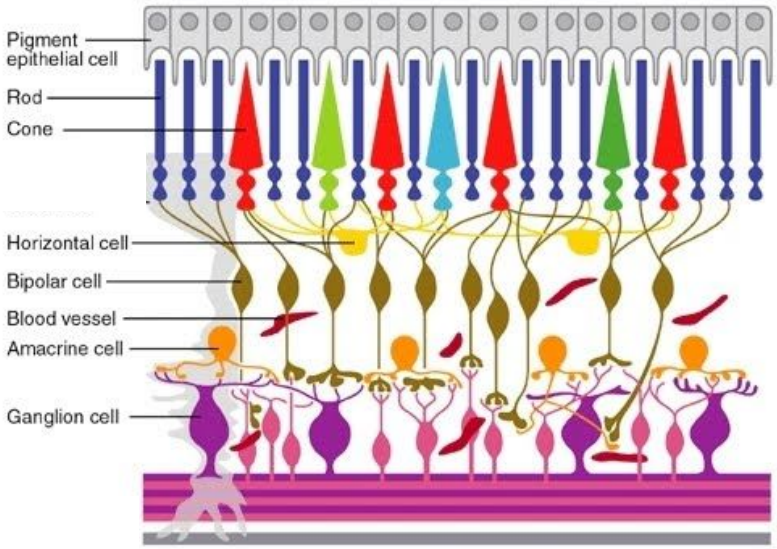
Visual Receptors: Cones



- Size: **Smaller**
- How many in eye: **~6.5 million/eye**
- Distribution: **High concentration in fovea, disperse in periphery**
- Color: **Red, green, blue**
- Light sensitivity: **Low**
- Motion detection: **Poor**
- Connectivity: **Low convergence**
- Acuity: **High**
- Pathway: **Ventral**

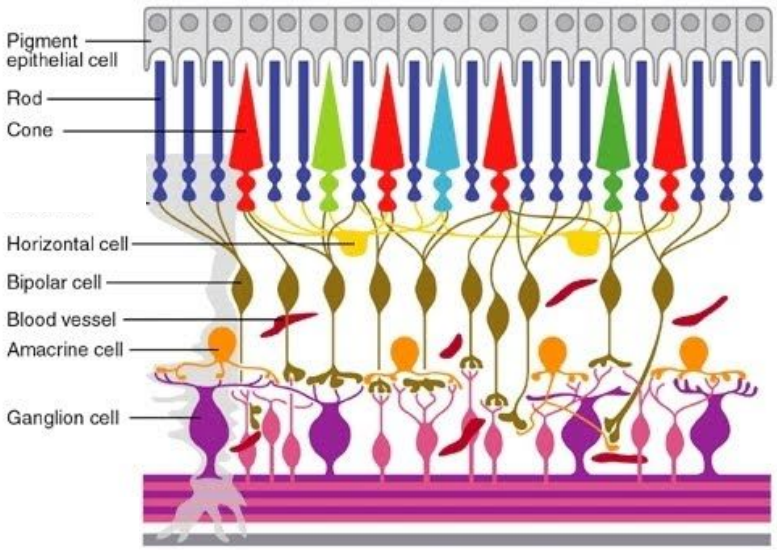
Are these inhibitory or excitatory?

- Rods and Cones:
- Horizontal cell:
- Bipolar cell:
- Amacrine cell:
- Ganglion cell:



Are these inhibitory or excitatory?

- Rods and Cones: **Inhibitory**
- Horizontal cell: **Inhibitory**
- Bipolar cell: **Excitatory**
- Amacrine cell: **Inhibitory**
- Ganglion cell: **Excitatory**

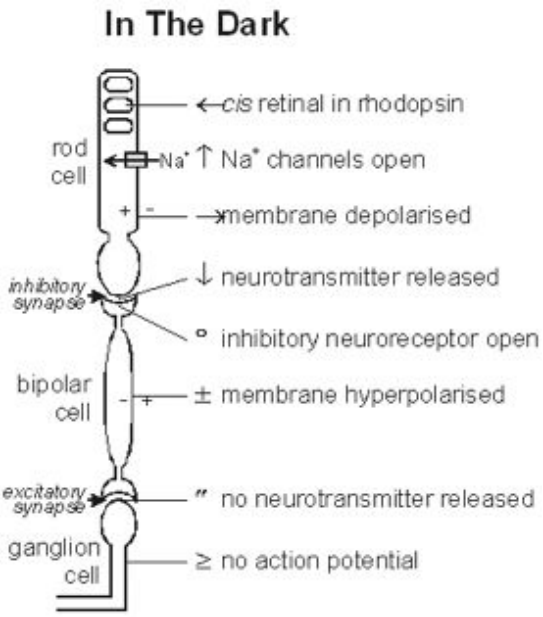


In the dark...

- _____ holds Na+ gates open
- ____ and ____ ions enter the cell
- The Na+ current ("dark current") _____ the cell
- Rod cells release _____ in the dark
- Synapse with bipolar cells is _____ and doesn't generate an action potential

In the dark...

- **cGMP** holds Na+ gates open
- **Na+** and **Ca++** ions enter the cell
- The Na+ current ("dark current") **depolarizes** the cell
- Rod cells release **Glutamate** in the dark
- Synapse with bipolar cells is **inhibitory** and doesn't generate an action potential

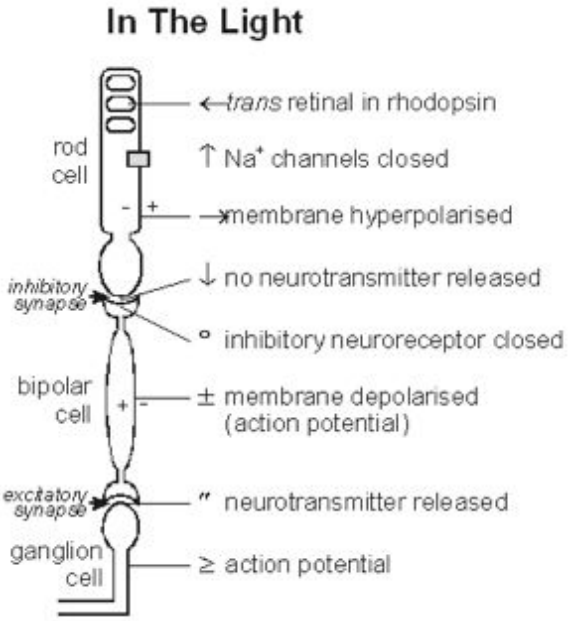


In the light…

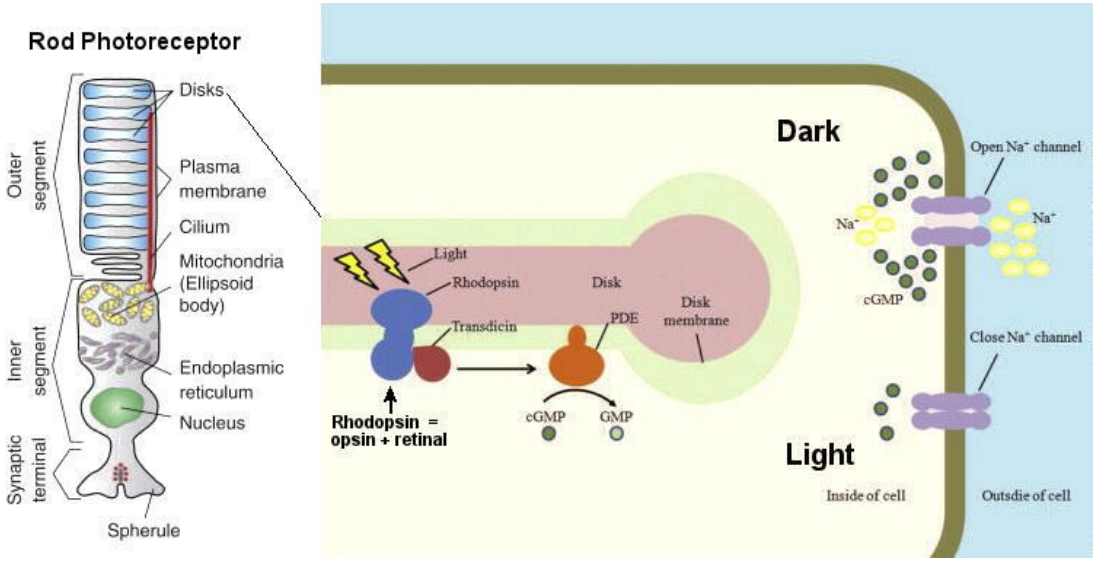
- _____ initiates chain reaction that changes cGMP to _____, which doesn't hold Na+ channels open
- Less NT released
- If threshold is reached, bipolar cell _____ and will fire an action potential
- Action potential then passed to ganglion cell

In the light…

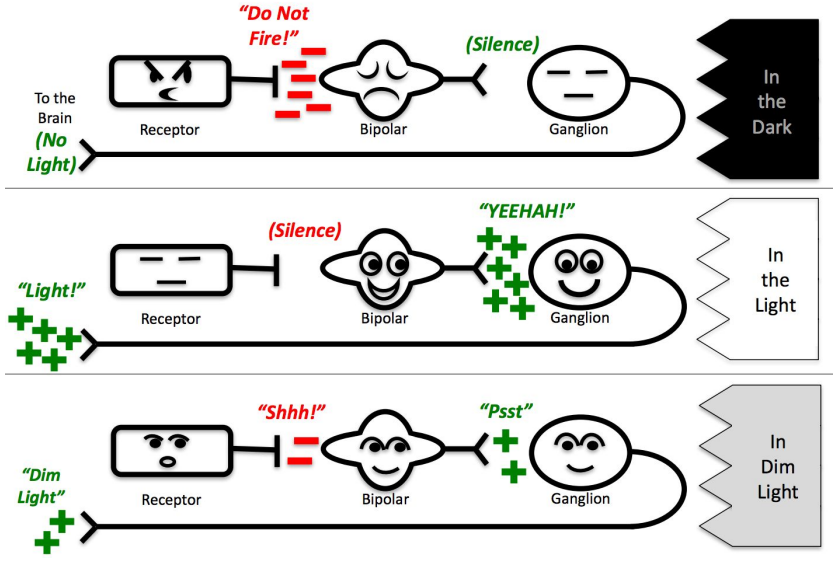
- **Isomerization** initiates chain reaction that changes cGMP to **GMP**, which doesn't hold Na+ channels open
- Less NT released
- If threshold is reached, bipolar cell **depolarizes** and will fire an action potential
- Action potential then passed to ganglion cell



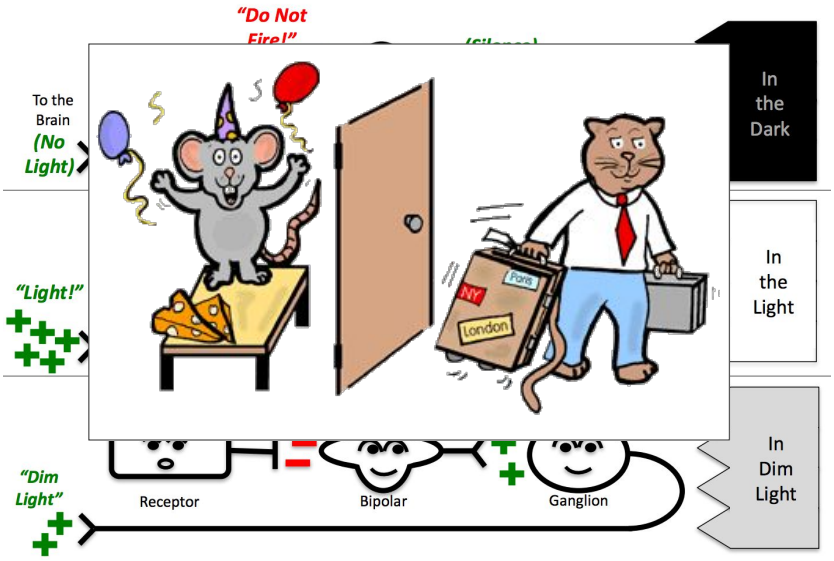
Rhodopsin: “Visual purple”

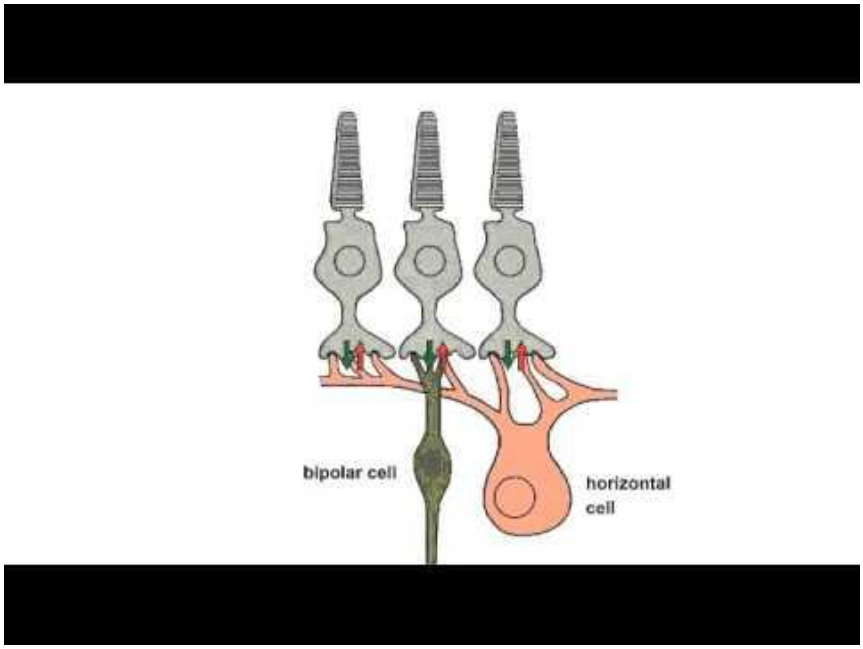


Receptors are turned off by light



“When the cat’s away, the mice will play”





https://www.youtube.com/watch?v=9ptnmfpDThk