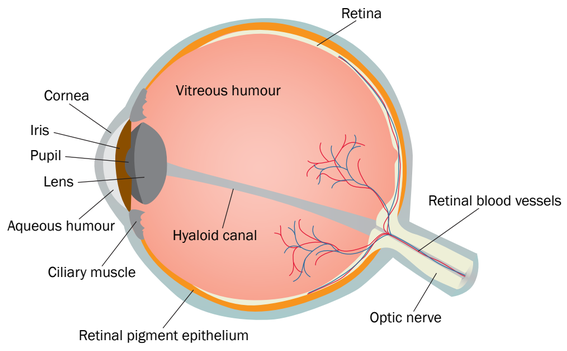
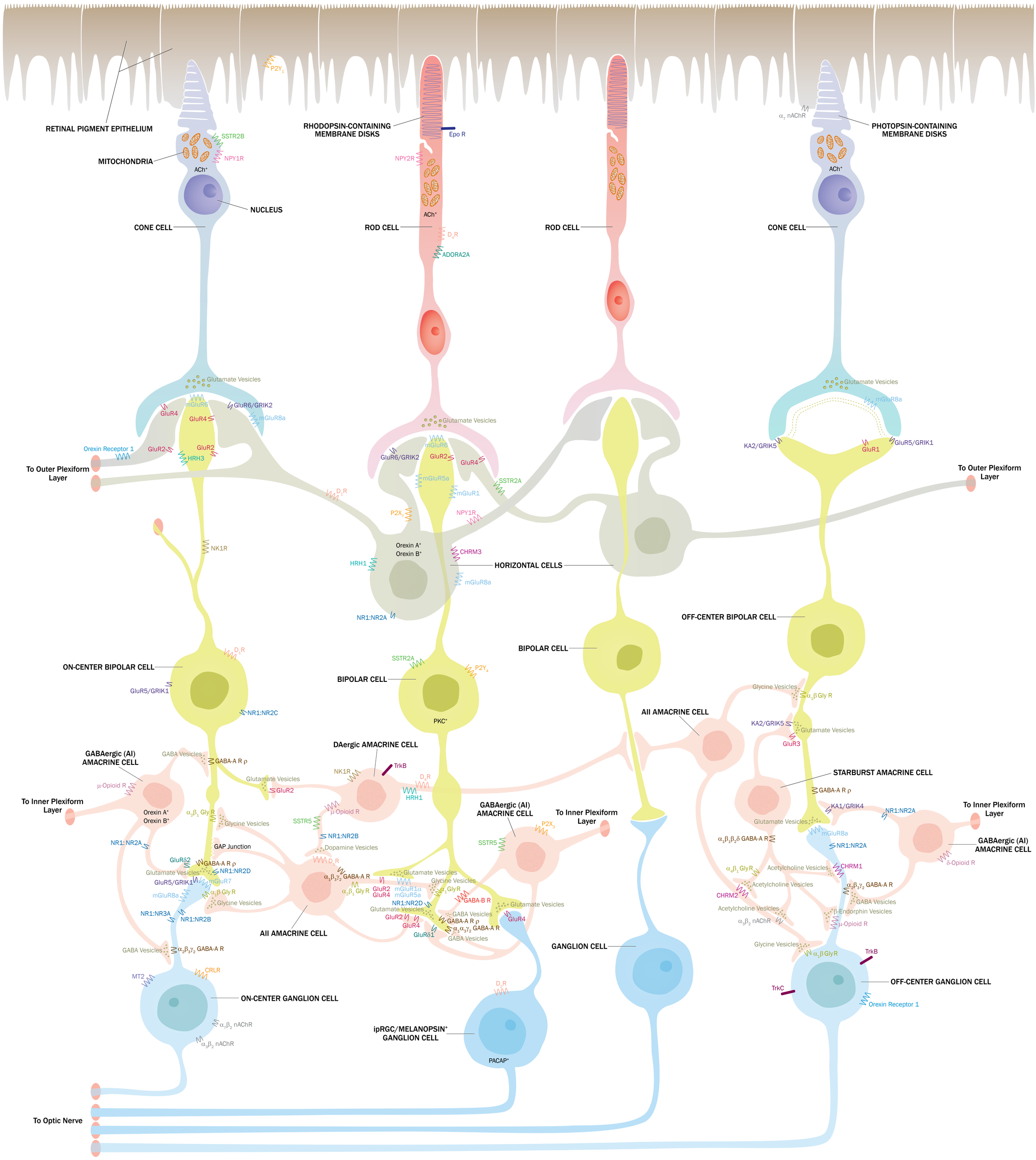
# Neurotransmitter Receptors in the Retina

The retina, a light-detecting structure, occupies approximately 75% of the inner surface of the eye. Approximately 20-30 mm in diameter, the retina represents the only component of the central nervous system that can be observed without intervention. In humans, the retina is 0.5 mm in depth and composed of nine to ten definitive layers. These layers contain at least seven general cell types, including retinal pigment epithelial cells, photoreceptors, bipolar cells, horizontal cells, ganglion cells, Müller (glia) cells, and amacrine cells. Multiple subtypes also exist for each of these cell types. To date, there are at least 10 distinct bipolar cells, between 10 and 15 ganglion cells, and between 25 and 30 different amacrine cells. Additionally, two types of photoreceptors, rod and cone cells, are found in the retina. Rod cells account for about 95% of all photoreceptors and are concentrated at the outer edges of the retina while cone cells are concentrated near the center of the retina around an area called the macula. Rod and cone cells contain a light-sensitive pigment called Rhodopsin and Photopsin, respectivley. These photopigments are comprised of Opsin, a seven transmembrane G protein-coupled receptor, covalently bound to a Vitamin A derivative termed Retinal, and absorb specific wavelengths of light. Rhodopsin is sensitive to blue-green light while Photopsins, depending on their exact structure, will absorb red, green, or blue light. Rod cells are highly sensitive photoreceptors and are associated with scotopic (night) vision. Cone cells, which contain only one of the three possible Photopsin molecules, are less sensitive to light and are responsible for color vision. An additional photopigment, known as Melanopsin or Opn4, has been detected in specialized ganglion cells. This photopigment detects light in the blue spectrum and relays information to the non-image forming part of the visual system.

Phototransduction begins when light falls on photoreceptors and activates the photopigment. This initiates a signal transduction cascade in photoreceptors, which is then transmitted to horizontal cells and bipolar cells. Bipolar cells subsequently interact with ganglion cells and amacrine cells, and the resulting processed information leaves the retina via ganglion cell axons, which merge to form the optic nerve. This schematic depicts potential neuronal processes, their interactions, and associated neurotransmitter receptors in the retina. R&D Systems currently offers antibodies to many of these molecules.




**KEY:**

- Adenosine A2A Receptor (ADORA2A)
- AMPA Receptor (GluR)
- Calcitonin Receptor-like Receptor (CRLR)
- Dopamine Receptor (DR)
- Erythropoietin Receptor (Epo R)
- GABA-A Receptor
- GABA-B Receptor
- Glutamate Receptor, delta (GluRδ)
- Glycine Receptor (Gly R)
- Histamine Receptor (HRH)
- Kainate Receptor (GluR/GRIK and KA/GRIK)
- Melatonin Receptor 1B (MT2)
- Metabotropic Glutamate Receptor (mGluR)
- Muscarinic Acetylcholine Receptor (CHRM)
- Neurokinin-1 Receptor (NK1R)
- Neuropeptide Y Receptor (NPY R)
- Nicotinic Acetylcholine Receptor (nAChR)
- NMDA Receptor (NR)
- Opioid Receptor
- Orexin Receptor 1
- Purinergic Receptor (P2X and P2Y)
- Somatostatin Receptor (SSTR)
- Trk Receptor Kinase (Trk)

**NOTE:** This poster conveys a general overview and should be considered neither comprehensive nor definitive. The details of the process are understood to be subject to interpretation. 

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