Mouse mAb to Rhodopsin MCA-A531

Ordering Information
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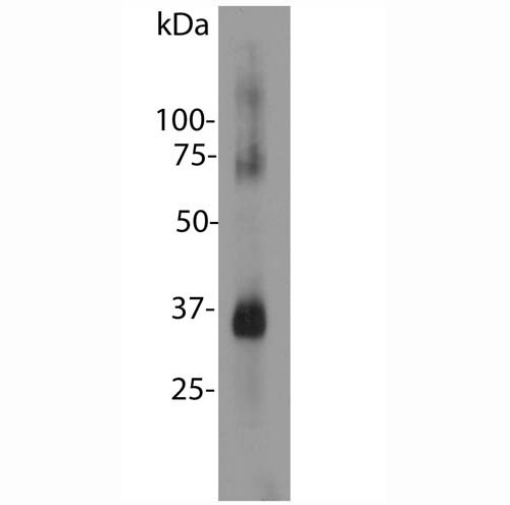
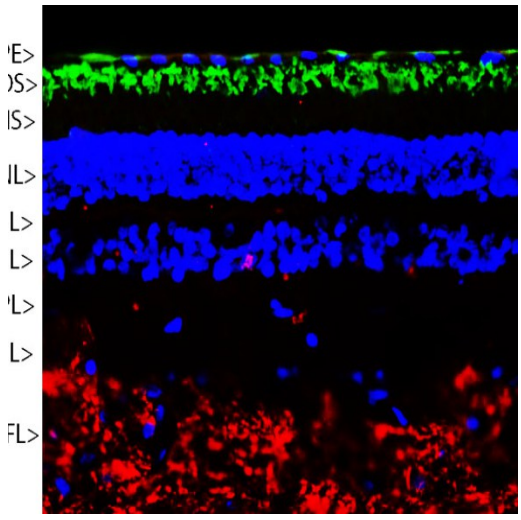
HGNC name: RHO
RRID: AB_2572378
Immunogen: Purified bovine rhodopsin
Format: Purified antibody at 1mg/mL in 50% PBS, 50% glycerol plus 5mM NaN_3
Storage: Shipped on ice. Store at 4°C for short term, for longer term at -20°C. Avoid freeze / thaw cycles.
Recommended dilutions:
Western blot:1:5,000 .
ICC/IF and IHC: 1:1,000.

Applications	Host	Isotype	Molecular Wt.	Species Cross-Reactivity
Western blot, ICC/IF, IHC	**Mouse**	**IgG1**	**35 kDa (higher MW aggregates detected on SDS-PAGE)**	**Hu, Rt, Ms, Bo, Po, Ho**



Blot of bovine retinal extracts probed with MCA-A531. The antibody stains a band corresponding to retinal rhodopsin at about 35kDa. Bands about 70kDa and 140kDa are aggregated forms of rhodopsin. Note, due to the highly hydrophobic nature of rhodopsin, it is important not to boil a sample containing it in SDS-PAGE sample buffer, as this will result in aggregation of the rhodopsin protein.



Pig retinal section stained with MCA-A531 (green) and counterstained with EnCor rabbit polyclonal antibody to neurofilament RPCA-NF-M (red) and DNA (blue). Rhodopsin is most abundant in the outer segments of retina (OS), NF-M is abundant in the optic nerve fiber layer (ONFL), but seen in processes and neurons in other regions also. Other layers are pigmented epithelium (PE), outer and inner nuclear layers (ONL, INL), outer and inner plexiform layers (OPL, IPL) and ganglion cell layer (GCL).

Background: Rhodopsin is the protein in the mammalian retina responsible for the light sensitivity of rod cells, which are responsible for vision in low light levels. Somewhat surprisingly, the rhodopsin protein turned out to be a typical member of the seven transmembrane G protein-coupled receptor (GPCR) superfamily. Whereas other GPCRs initiate signaling on binding a specific ligand, rhodopsin exists with a ligand already bound, specifically the vitamin A related substance retinal.

Retinal can exist in two isomeric forms, 11-cis and 11-trans retinal. In the dark, rhodopsin is associated with 11-cis retinal, but photons cause the 11-cis form to flip to the 11-trans form, and this causes an alteration in the structure of the rhodopsin making it catalytically active. Activated rhodopsin in turn activates the GTP binding protein G protein transducin by favoring the loss of GDP and the addition of GTP.

Transducin is a typical member of the family of heterotrimeric G proteins, and consists of an α and a βγ subunit. The α subunit is responsible for the GTP binding and the GTP bound form activates a phosphodiesterase (PDE) enzyme which hydrolyses cyclic GMP. This in turn increases the membrane potential of the rod cell and reduces the rate of synaptic signaling. So light stimulation actually results in a reduced rate of photoreceptor synaptic release. This information is transmitted through neurons of the retina to the visual centers of the brain (see review 1, 2).

References:

1. Molday RS. Photoreceptor membrane proteins, phototransduction, and retinal degenerative disease. The Frienwald lecture. Invest Ophthalmol Vis Sci. 39:2491-513 (1998).
2. Yau KW. Phototransduction Mechanism in Retinal Rods and Cones. The Frienwald lecture. Invest Ophthalmol Vis Sci. 35:9-32 (1994).
3. Wilden U, Hall SW, Kühn H. Phosphodiesterase activation by photoexcited rhodopsin is quenched when rhodopsin is phosphorylated and binds the intrinsic 48-kDa protein of rod outer segments. Proc Natl Acad Sci USA 83:1174-8 (1986).
4. Smith WC, Mc Dowell JH, Dugger DR, Miller R, Arendt A, Popp MP, Hargrave PA. Identification of regions of arrestin that bind to rhodopsin. Biochemistry Mar 38:2752-61 (1999).

Abbreviation Key:
mAb—Monoclonal Antibody **pAb**—Polyclonal Antibody **WB**—Western Blot **IF**—Immunofluorescence **ICC**—Immunocytochemistry **IHC**—Immunohistochemistry **E**—ELISA **Hu**—Human **Mo**—Monkey **Do**—Dog **Rt**—Rat **Ms**—Mouse **Bo**—Cow **Po**—Pig **Ho**—Horse **Ch**—Chicken **Dr**—*D. rerio* **Dm**—*D. melanogaster* **Ce**—*C. elegans* **Sc**—*S. cerevisiae* **Sa**—*S. aureus* **Ec**—*E. coli.*

Rhodopsin activity is shut off by phosphorylation under the influence of rhodopsin kinase, the activity of which results in binding of visual arrestin (a.k.a. arrestin-1 and S-antigen), which prevents rhodopsin from interacting with and activating more transducin molecules (3, 4). This basic signaling paradigm proved to be a prototype for understanding how other GPCRs function, as proteins similar to transducin, arrestin and rhodopsin kinase are found in these pathways.

MCA-A531 was generated against whole purified bovine rhodopsin and shows convincing staining for rhodopsin both on western blots and on sections of retina.