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Perspective

A Brief Note on Whale Visual System

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ABOUT THE STUDY

The whale's eye provides a unique opportunity to examine the evolution of the visual system and its adaption to aquatic conditions. However, due to the difficulty in getting samples of cetaceans, little research has been done on them. The aim of this commentary was to use immunohistochemistry and a variety of genetic markers to characterize the various neurons and glial cells in the whale retina. RGCs, photoreceptors, bipolar and amercing cells were all labeled on the whale retinal neurons. Finally, astrocytes, Müller cells, and microglia were identified as glial cells.

Thioflavin S was also employed to identify miss folded protein oligomers and plaques. The specific structures in the whale retinas were labeled using molecular markers, just like in terrestrial mammalian retinas. Whale cones, on the other hand, do not express the cone markers that are seen in the retinas of most land mammals. It's critical to emphasize the size of whale RGCs. As in the pig and human retinas, all of the NeuroFilament (NF) antibodies employed labeled whale RGCs, although not all RGCs were marked by all of the NF antibodies utilized. It's also worth noting that in the whale retina, intrinsically photosensitive RGCs labeled with melanopsin create a remarkable network. Melanopsin-positive cells of the M1, M2, and M3 classes were identified.

Cetaceans are a mammalian group that includes some of the world's largest animals, and they provide a unique opportunity to study how the visual system adapts to life in the water. Despite its importance, the cetacean visual system has received little research, and the morphological and anatomical properties of several cetacean species' eyes and retinas remain unknown. We believe that researching the structure and morphological aspects of these enormous mammals' retinas will aid in our understanding of how their eyesight has evolved to cope with the deep water.

The neurons that transport vision information from the retina to the brain, known as Retinal Ganglion Cells (RGCs), have been studied in a range of cetacean species to evaluate their visual acuity. Most marine cetaceans have similar visual acuity, but their retinal resolving power is lower than that of terrestrial mammals. It's also worth noting that RGCs are known as gigantic cells because their cell bodies can measure up to 75 meters in diameter. The Neuro Filament (NF) expression in the RGCs was examined due to the large size of these cetaceans, their massive RGCs, and their extremely long axons.

Photoreceptors, like RGCs, respond to light and have been investigated in cetacean retinas. The various optical pigments in the cone photoreceptors allow most terrestrial mammals to see color. Cone-based color vision is rare in terrestrial mammals, and it is mostly seen in nocturnal animals. However, a variety of marine species, including toothed whales, have consistently shown the absence of S-cones. Unlike terrestrial cone monochrome's, however, these marine mammals have daylight activity phases.

In comparative anatomy and physiology, the visual system of cetaceans is of tremendous interest.

CONCLUSION

Other retinal cells, such as RGCs, as well as bipolar and a marine cells, were studied in addition to their RGCs and photoreceptors. The glial cells that support and protect the retinal neurons, such as astrocytes, Müller cells, and microglia, has to be studied. Furthermore, rat and pig retinas were used to compare the whale retina to that of terrestrial mammals in order to characterize cetacean retinas more thoroughly.

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