RECOVERY OF SIGHT AFTER 
TRANSPLANTATION OF EYES AND 
REGENERATION OF RETINA AND 
OPTIC NERVE

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GENERAL CONSIDERATIONS

The eye of the newt and eye of the salamander, once noted for magical potencies, have been shown experimentally to possess regenerative capacity far beyond that found elsewhere among the vertebrates. For example, Stone and Farthing (30) succeeded in transplanting the same eye of an adult newt repeatedly to four different animals. In each new host the eye was left in place until visual function was recovered. Counting the original owner, this single eye thus served the vision of five different animals.

In each new host the lens, retina, and optic nerve of the transplanted eyeball underwent degeneration, as regularly happens in adult newt eyes when the blood supply is interrupted. A new lens and retina regenerate from a reserve of undifferentiated cells in surviving portions of the eyeball after vascularization of the transplant has been re-established. The newly regenerated retina then sends out its own new optic nerve fibers that grow centrally to connect with the brain.

It was also demonstrated by Stone (27) that explanted eyes of the adult newt can be stored in the refrigerator for up to seven days and still retain their capacity to regenerate visual function when transplanted to the denuded orbit of a new host. The eyes of the urodele amphibians have also been successfully transplanted in larval stages to different related species. Large eyes can be transplanted to a small-eyed species and vice versa, with the possibility of thereby improving somewhat the vision with which an animal is normally endowed (29). In this connection, however, the in-

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In the retinal input, the excitatory inputs from different regions of the visual system variously modulate the activity of ganglion cells. This diverse input allows different visual features, such as edges and textures, to be represented in the retinal circuitry. The visual system is organized in a hierarchical manner, with lower-level features like edges and textures being processed in the retina and higher-level features like object recognition being processed in the cerebral cortex. This hierarchical organization allows for the efficient processing of complex visual information.

In the cerebral cortex, the visual information is further processed and integrated with other sensory modalities. The visual cortex is divided into several areas, each specialized for a particular type of visual processing. For example, the primary visual cortex (V1) processes basic visual attributes like light intensity and color, while higher-order visual cortex areas process more complex visual features like shape and motion.

The integration of visual information with other sensory inputs, such as auditory and somatosensory information, allows for a more complete and accurate perception of the environment. This multisensory integration is critical for the development of a robust and adaptive sensory system, enabling the organism to respond effectively to a wide range of environmental stimuli.
The potential for visual recovery is one of the major challenges in the field of normal vision and the study of human visual processing. However, recent findings have suggested that normal vision can be recovered to a certain extent following injury or loss. This recovery is not only possible but can also lead to significant improvements in visual function.

The recovery of visual function is a complex process that involves both neural and psychological factors. The neural basis of visual recovery is thought to involve changes in the structure and function of the visual cortex, as well as changes in the connectivity between different brain regions. These changes are thought to be mediated by processes such as plasticity and neurogenesis.

Psychological factors also play a significant role in visual recovery. The motivation and readiness of the individual to undergo visual rehabilitation programs can greatly influence the extent and rate of recovery. Additionally, the provision of appropriate support and resources can also enhance the likelihood of successful visual recovery.

In conclusion, the potential for visual recovery is a promising area of research that holds significant implications for the treatment and management of visual impairments. Further research is needed to better understand the mechanisms underlying visual recovery and to develop effective strategies for promoting successful visual rehabilitation.

Reciprocal Brain Recovery
Recovery of Signal after Transmission

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