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### Basic research about the neural connections between the eye and the neuroendocrine system

mple evidence indicates that both retinofugal (classical visual and the retinohypothalamic pathway) and retinopetal  $\hat{\mathbf{A}}$  connections (centrifugal visual system) are found between the eye and the central nervous system. The most important retinofugal connection is the classical visual pathway. Scharrer hypothesized that photic stimuli from the eye are conjucted not only to the main visual centers, but also to some hypothalamic neurons and then to neuroendocrine effector cells. He called this system as photoneuroendocrine. The anatomical basis of this system is the retinohypothalamic tract. The main retinorecipient area of the hypothalamus is the suprachiasmatic nucleus which regulates biological rhythms (biological clock). More than hundred years ago, Cajal and Dogiel described termination pattern of the fibers deriving from the avian central nervous system. However, the location of nerve cell bodies was not known at that time. In the last century many data accumulated about these neurons not only in lower vertebrates but in mammals as well. The structures where the neurons give rise to the centrifugal visual fibers in mammals are the following: The pretectum, midbrain, dentate gyrus, hippocampus, olfactory tubercle, habenula, indusium griseum, and the hypothalamus. The centrifugal visual fibers enter the optic nerve layer, then reach the inner plexiform layer and terminate in the inner nuclear layer of the retina in the vicinity of the amacrine cells. A series of neuropeptides and neurotransmitters have been described in the origin of the centrifugal visual system i.e., luteinizing hormone releasing hormone, pituitary adenylate cyclase activating polypeptide, vasoactive intestinal polypeptide, serotonin, histamine and leu-enkephalin. Several hypotheses exist on the function of this system. Centrifugal visual system arising from the histaminergic mammillary neurons modifies the sleep/wake cycle. Hallucinogenic drugs through the limbic system may cause disturbance of visual function and result in seeing visual hallucinations or distorted images.

#### **Biography**

Professor Katalin Köves MD, PhD, DSc graduated from Medical University of Pécs, Hungary and she was employed by the Department of Anatomy, Histology and Embryology. Later she moved to the Department of Anatomy, Histology and Embryology of Semmelweis University, Budapest, Hungary. She received a four- year scholarship in Dr. Arimura's laboratory (Tulane University, New Orleans, LA) where Pituitary Adenylate Cyclase Activating Polypeptide(PACAP) was discovered. After returning to Hungary she investigated the presence of PACAP in various organs and its role in the gonadotropic hormone secretion. Now she is mainly interested in studying neuronal connections using various tracing techniques and immunohistochemistry.

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