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Distribution of choline acetyltransferase (ChAT) immunoreactivity in the CNS of the common carp *Cyprinus carpio*

Arianna Casini[1], Rosa Vaccaro[1], Mattia Toni[2], Carla Cioni[2]

[1] Sapienza University of Rome, Department of Anatomical, Histological, Forensic Medicine, and Orthopedics Sciences, Rome, Italy - [2] Sapienza University of Rome, Department of Biology and Biotechnology "Charles Darwin", Roma, Italy

Cholinergic systems play a role in basic cerebral functions and a number of human neurodegenerative disorders. Mechanisms involved in human brain diseases, including Parkinson's disease (1), are often approached by using fish models, especially cyprinids, given basic similarities of the fish brain to that of mammals. In the present paper, the organization of central cholinergic systems have been described in the cyprinid *Cyprinus carpio*, the common carp, by using specific polyclonal antibodies against ChAT, the synthetic enzyme of acetylcholine, that is currently used as a specific marker for cholinergic neurons in all vertebrates. In this work, serial transverse and sagittal sections of the brain and the spinal cord were immunostained for ChAT. Results showed that positive neurons are present in several nuclei. In particular, ChAT-immunoreactive (ir) neurons were found in the forebrain (preoptic region, habenula), the midbrain (optic tectum, oculomotor nucleus, rostral tegmental nucleus), the hindbrain and the spinal cord (reticular formation, nucleus isthmi, secundary gustatory nucleus, cranial nerve motor nuclei from IV to X, spinal cord motoneurons). Moreover, ChAT-ir neurons were detected in the synencephalon (nucleus of the medial longitudinal fascicle) and in the cerebellum. In addition to neuronal bodies, afferent varicose fibers were stained for ChAT in the ventral telencephalon, the preoptic area, the hypothalamus and the posterior tuberculum. No neuronal cell bodies were present in the telencephalon.

The comparison of ChAT-ir distribution observed in the present study with that reported in other CNS of cyprinids (2,3) has revealed a number of similarities and also some interesting differences. Our results provide additional information on the cholinergic system from a phylogenetic point of view, suggesting that cholinergic systems of the common carp show many primitive features that have been conserved during evolution, together with characteristics that are exclusive. In addition, the present study may add new perspectives to physiological roles of cholinergic system during evolution and the neuroanatomical basis of neurological diseases.

References

[1] Panula et al. (2010). Neurobiol Dis 40:46-57.
[2] Clemente et al. (2004). J Comp Neurol 474:75-107.
[3] Clemente et al. (2005). Brain Res Bull 66:546-549.

Keywords
ChAT; immunohistochemistry; cyprinid; CNS.