

## Distribution of Tyrosine hydroxylase immunoreactivity in the CNS of the common carp *Cyprinus carpio*

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Catecholamines, including dopamine, are the principal neurotransmitters mediating a variety of functions in the CNS, such as motor control, cognition, emotion, memory processing, and endocrine modulation. Dysfunctional catecholamine neurotransmission is also implicated in neurologic and neuropsychiatric disorders. Human brain diseases, such as Parkinson's disease (1), have been recently approached by using fish models, especially cyprinid teleosts, given basic similarities of the fish brain to that of mammals. The distribution of the catecholaminergic system has been studied in the forebrain of several teleosts, but relevant information are not available for the common carp, *Cyprinus carpio*, which is a model species in several studies. In this study, we have analyzed the distribution of catecholaminergic neurons in the carp brain by immunohistochemistry using a specific antibody to tyrosine hydroxylase (TH) on transverse serial frozen sections of the whole brain. In the carp brain, TH-immunoreactive (ir) neurons were present in several nuclei. In particular, positive neurons were detected in the ventral nucleus of the ventral telencephalic area. In addition, neuronal bodies and varicose fibers were stained for TH in the preoptic region, from the anterior to the posterior nuclei, in the suprachiasmatic nucleus, in the ventrolateral and ventromedial thalamic nuclei. Moreover TH-ir neurons were also distributed in the periventricular pretectum and locus coeruleus. TH-ir structures were localized not only in recognizable catecholaminergic nuclei, corresponding to those of mammalian brain, but also in regions that are uniquely organized in teleosts, including the ventral telencephalon, the anterior and posterior preoptic region, the ventromedial thalamus, suggesting that they may be useful in elucidating homologies between fish and mammal brain. The present study partially confirmed TH distribution in other CNS of cyprinids (2), and provided more detailed information to a better understanding of the evolution of catecholaminergic system in vertebrates.

### References

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- [2] Kumar et al. (2014) Tyrosine hydroxylase in the olfactory system, forebrain and pituitary of the Indian major carp, *Cirrhinus cirrhosus*: organisation and interaction with neuropeptide Y in the preoptic area. *J Neuroendocrinol* 26:400–411.

### Keywords

TH; immunohistochemistry; cyprinid; CNS.