Thesis: Distribution of calretinin-positive interneurons in the dorsal and ventral striatum of rats

The striatum is the largest structure in the circuit of basal nuclei (ganglia) of the telencephalon and at the same time the site of convergence of cortical, thalamic and brainstem inputs. The striatum is part of the basal ganglia circuit, in which integrated signals from the striatum are routed to the thalamus and back to the cerebral cortex. The striatum is divided into the dorsal (striatum dorsale) and ventral part (striatum ventrale). The dorsal striatum is functionally oriented to motor learning and the selection of optimal behavioral responses. The ventricular striatum is an important center of addictive behavior and is active in situations that represent reward situations for the body. Most striatal neurons are inhibitory (GABAergic). These neurons are divided into predominant GABAergic projection neurons, whose axons project to the globus pallidus and substantia nigra, and local GABAergic interneurons (5–10% in rodents), whose axons branch and have terminations within the striatum. Interneurons have a significant effect on the resulting activity of striatal projection neurons. GABAergic interneurons are further subdivided according to the co-expression of neuropeptides and calcium-binding proteins. Immunoreaction to calcium-binding proteins allowed the detection of three subpopulations of interneurons expressing parvalbumin, calretinin (CR) and calbindin. CR+ neurons represent a significant population in striatum of primates. In rodent striatum, they are often described as small or medium neurons, although some authors also mention neurons of larger dimensions. More detailed data on the morphology of dendritic arborization and on the penetration of dendrites into the surrounding structures are missing. Densitometric data on the amount of proteins in the perikarya of neurons are also missing. Data on the distribution and other characteristics of these neurons in the ventral striatum are completely missing.
The aim of the proposed project is to provide missing and to assess conflicting data on the distribution and metric characteristics of CR+ neurons in the dorsal striatum and to provide densitonetric data on neuropil positivity in individual sections of the striatum. Also to obtain missing data on the distribution of CR+ neurons in the ventral striatum, including data on the metric characteristics of neurons and the densitometric characteristics of the neuropil in individual sections of the ventral striatum.
Detection of CR+ neurons and neuropil density in the dorsal and ventral striatum will be performed on material processed by a standard immunocytochemical method using a primary anti-CR monoclonal antibody.