Abstract

Aims. The main goal was to describe interneuronal population expressing calcium binding proteins calretinin (CR) and parvalbumin (PV) in the perirhinal (PRC) and retrosplenial (RSC) cortex of the rat. These two cortical areas differ strikingly in their connectivity and function, which could be caused also by different composition of the interneuronal populations. Having a precise knowledge of the cellular composition of any cerebral area forms one of the basic input parameters and tenets for computational modeling of neuronal networks and for understanding some pathological conditions, like generating and spreading of epileptic activity.

Methods. The brains of 8 male 3-month-old Wistar rats were used in this study. The brains were cut into 50 μm thick coronal section and these were stained for NISSL (cresyl violet), CR and PV. We performed qualitative and quantitative analysis on these sections, using stereological and densitometric approach. All data acquired were statistically evaluated.

Results. PRC possesses higher absolute and relative densities of CR+ and PV+ neurons than RSC, but the CR : PV ratio is higher in the RSC, which is similar to the neocortex. The bipolar/bitufted neurons are most common type of CR+ population, while the majority of PV+ neurons show multipolar morphology.

Conclusion. In our study we described the pattern of CaBP immunoreactivity, the density of CR+ and PV+ neurons as well as the overall neuronal density in rat perirhinal and retrosplenial cortex. Current results indicate that main difference between analyzed areas is in density of CR+ neurons, which was significantly higher in the PRC. Our results coupled with works of other authors show that there are significant differences in the interneuronal composition and distribution of heretofore seemingly similar cortical areas. These results may contribute to the better understanding of the mechanism of function of this cortical region in normal and diseased states.