LAMINAR DISTRIBUTION OF CALRETININ NEURONS IN THE MONKEY PREFRONTAL CORTEX

Sedmak D[1], Petanjek Z[1], Esclapez M[2]
[1]*University of Zagreb School of Medicine, Department of Anatomy and Clinical anatomy and Croatian Institute for Brain Research, Zagreb, Croatia*
[2]*Aix Marseille University, Inserm, INS, Institut de Neurosciences des Systémes, Marseille, France*

Previous studies in primate associative cortex have shown that calretinin neurons represent 12% of the total neuronal pool whereas in rodents their proportion does not exceed 3%. It is still unclear if such an increase is reflected in laminar distribution and present in entire cortex. In this study, we have compared phylogenetically and functionally different areas of the macaque monkey prefrontal cortex (Brodmann areas 24, 32 and 9).
Stereological analysis of serially cut sections, immunohistochemically stained for the neuronal nuclear marker (NeuN) and calretinin (CR), revealed that calretinin neurons are mostly located (80%) in the upper cortical layers. Across all analysed areas, upper cortico cortical layers have a higher proportion of calretinin neurons: in layer III 20%, in layer II 30% and in layer I almost 50% of neurons express calretinin. The increased number of calretinin neurons in the lower part of the layer I of the primate prefrontal cortex might be the reason for the increased cellularity (3% of total neuronal number) of this layer.
Our data showed that in the primate prefrontal areas, GABAergic neurons are overrepresented in upper layers, implying more complex network organization and information processing. Absence of differences between prefrontal areas in macaque monkeys confirms that principal neocortical input and output cell types are a conserved feature of the dorsal telencephalon.
Comparison of orbito-medial prefontal cortex (Džaja et al. 2014, Society for neuroscience 446.19) with lower densities in dorso-medial parts suggests that during primate evolution increase in neuron complexity and connections precedes in dorsal areas of prefrontal cortex.

This work was supported by the Croatian Science Foundation project No. 5943