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DISTRIBUTION OF THE CANNABINOID COMPONENTS DURING DEVELOPMENT OF THE CEREBELLAR CORTEX AND THE IMPACT OF CB1 LACKING IN PARALLEL FIBRE TERMINALS

I. Buceta1, N. Puente1, L. Reguero1, Guerrikagoitia I1, J.L. Mendizabal-Zubiaga1, G. Marsicano2, I. Elezgarai1 and P Grandes1.

1Department of Neurosciences, Faculty of Medicine and Nursery, Basque Country University, Bilbao. 2"Endocannabinoids and Neuroadaptation", INSERM U862, NeuroCentre Magendie, Université Bordeaux 2, Bordeaux.

The cerebellar cortex is subjected to morphological changes during postnatal development. Recent works point out the role of endocannabinoids in processes such as axonal growth and guidance. Despite it is known that CB1, DAGL-α and MGL are present in the cerebellar cortex at least at the second postnatal week, there is a lack of knowledge about what happens at earlier stages, as well as if the lack of CB1 affects to the phenotype of the parallel fibre terminals (PFT). For these purposes, we performed immunohistochemical confocal and preembedding immuno-electron microscopy assays to determine the localization of CB1, DAGL-α and MGL at P5, P12, P21 and adult. Moreover, we assess the morphology of the PFT in the absence of CB1 in CB1-WT and CB1-KO adult mice by electron miscroscopy. Our results indicate that while CB1 and DAGL-α co-localized in the membrane of axonal compartment of PF, the MGL, also present at these profiles, is localized in the membrane and in the cytoplasm of them. The co-localization between CB1 and DAGL-α is diminished with age, due to the CB1 gets to synaptic terminal position once synaptogenesis occurs, at P12, and the DAGL-α starts to express at the postsynaptic site, in the dendrites and dendritic spines of Purkinje cells (PC). The MGL, since P12, acquires its final location in the cytoplasm of the PFT. These results, suggest that endocannabinoid signalling could participate at maturation processes of the cerebellum during the postnatal development. Regarding to the morphological features of the PFT, we demonstrate that in CB1-KO mice there is less number of synaptic contacts with PC in the lobe 5 and does not differ in the lobe 10. Moreover, the PFT are bigger in size and there is less number of vesicles close to the active zone at both lobes. Taken together, our findings suggest that the absence of CB1 impairs the acquisition of some ultrastructural features of the PFT.