Cell proliferation and apoptosis during histogenesis of the guinea pig and rabbit cerebellar cortex

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SUMMARY
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Cell proliferation and apoptosis are essential for development of the nervous system. In this study we have investigated the histogenesis of the cerebellar cortex in guinea pig (a precocial species) and rabbit (an altricial species) at different stages of pregnancy and postnatal life.

Proliferating cells were identified after labeling with antibodies against the proliferating cell nuclear antigen (PCNA) and/or the Ki-67 antigen.

Apoptotic cells were visualized \textit{in situ} by the TUNEL method and by immunodetection of cleaved caspase 3 and 9.

In guinea pigs, both proliferating and apoptotic cells were detected during pre-natal life (E0-E40). Conversely, cell proliferation and apoptosis in rabbits were temporally restricted to early post-natal weeks (P0-P20). In both species cell proliferation was mainly linked to differentiation and migration of the granule cells. In both species, the majority of cells undergoing programmed cell death likely corresponded to granule cells. They were mainly detected in the external granular layer, and were by far more common than previously reported in other locations of the postnatal brain.

This study shows that apoptosis is a shared process of cell death during cerebellar development in both altricial and precocial animals, and that there is a direct spatial and temporal correlation between cell proliferation and death in two mammals with different time tables in cerebellar maturation.