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The Effects of Aging on Neuroblast Proliferation in the Lateral Ventricle Region: A Canine Model

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Through the studies of legendary neuroscientist Santiago Ramón y Cajal, it was previously thought that the adult brain lacks the ability to regenerate neurons. In modern science, adult neurogenesis has been well established in the hippocampal region of rodents. Since this landmark, many studies of adult neurogenesis in the hippocampus of gyrencephalic species, such as bovine, have been conducted. However, the ontogeny of neurogenesis in the canine brain, particularly in the lateral ventricle region, is poorly understood. Data concerning the importance of the lateral ventricle and its accompanying cerebrospinal fluid in trauma repair, nutrient delivery and waste removal is burgeoning. Therefore, it is vital to elucidate the neurogenic properties of this region, and the tissue surrounding it. Here, we evaluate the relationship between age and proliferation of neuroblasts, or immature neuronal precursors, in the Subventricular Zone (SVZ) of the lateral ventricle region of the canine brain. The SVZ is a proven hotspot for robust neuroblast proliferation, and thus an excellent target for evaluation. Also, considering the canine brain is similar to humans in that it contains many gyri, there is ample opportunity for neuroblasts to migrate through the SVZ via the Rostral Migratory Stream (RMS). We hypothesize that as age increases, the robustness of neurogenesis in the canine brain will decrease, as indicated by decreasing numbers of DCX and Ki67 immunopositive cells. To address this, formalin fixed brains from dogs of various ages submitted for postmortem examination and with known pathologies were evaluated. Immunohistochemical staining of transverse sections of forebrain for doublecortin protein (DCX) and Ki67 were performed in order to assess the density of migrating neuroblasts, and general cell proliferation, respectively.