PDGFR-β plays a key role in the ectopic migration of neuroblasts in cerebral stroke

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Data summary

Stroke remains a major cause of death and disability worldwide. Many therapeutic strategies have been extensively studied, which target neuroprotective agents and endogenous neurogenesis. However, nerve tissue regeneration is not sufficient to induce nerve functional recovery. In this study, we established a middle cerebral artery-occlusion mouse model using a neural stem/progenitor cells (NSPCs) specific conditional knockout (N-PRβ-KO) and a tamoxifen-induced systemic KO (E-PRβ-KO) of PDGFR-β. The role of PDGF signaling on neuronal cell propagation was examined. Redirected migration of the DCX^+ neuronal progenitor cells from the subventricular zone toward the ischemic core was highly increased in N-PRβ-KO, but not in E-PRβ-KO mice as compared to PDGFR-β preserved control mice. Upregulation of lesion-derived CXCL12/SDF-1 expression involved in chemotactic migration of CXCR4-expressing NSPCs, and upregulation of integrin α3 in NSPCs mediating cellular attachment and migration to type IV collagen rich cerebral blood vessels and fibronectin rich injured brain were identified as underlying mechanisms. We believe that a coordinated regulation of lesion-induced migration as well as intrinsic signal of NSPCs may be able to improve neurogenesis in injured brain for further functional recovery.