

Neural precursor cell

Resident neural precursor cells (NPCs) activation is a promising therapeutic strategy for brain repair. This strategy involves stimulating multiple stages of NPCs development, including proliferation, self-renewal, migration, and differentiation. Metformin, an FDA-approved diabetes drug, has been shown to promote the proliferation and differentiation of NPCs. However, it is still unclear whether metformin promotes the migration of NPCs. EVOS living cell imaging system was used for observing the migration of primary NPCs dynamically in vitro after metformin treatment. For in vivo study, a mouse model of ischemic stroke was established through middle cerebral artery occlusion (MCAO). To label the proliferating cell in the subventricular zone, BrdU was injected intraperitoneally into the mice. After co-staining with BrdU and doublecortin (DCX), a marker for NPCs, the migration of BrdU and DCX double-positive NPCs were detected along the rostral migratory stream (RMS) and around the infarct area using frozen brain sections. Finally, the rotarod test, corner test, and beam walking were performed to evaluate the motor functions of the mice after stroke in different groups. The results showed that metformin enhanced NPCs migration in vivo and in vitro by promoting F-actin assembly and lamellipodia formation. What's more, metformin treatment also significantly reduced the infarct volume and alleviated functional dysfunction after stroke. Mechanistically, metformin promoted NPCs migration via up-regulating the CDC42 expression. Taken together, metformin represents an optimal candidate agent for neural repair that is capable of not only expanding the adult NPC population but also subsequently driving them toward the destination for neuronal differentiation ¹⁾

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Zhang L, Zhang J, Zhu X, Jiao W, Yang Y, Wu Y, Yang L, Wang Y. Metformin enhances neural precursor cells migration and functional recovery after ischemic stroke in mice. Exp Brain Res. 2023 Jan 8. doi: 10.1007/s00221-023-06547-3. Epub ahead of print. PMID: 36611122.

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