

## Dynamics of focal adhesions and reorganization of F-actin in VEGF-stimulated neural stem cells under varying differentiation states

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Precise migration of neural stem/progenitor cells (NSCs) is crucially important for neurogenesis and repair in the nervous system. However, the detailed mechanisms are not clear. Our previous results showed that NSCs in varying differentiation states possess different migratory ability to vascular endothelial growth factor (VEGF). In this study, we demonstrate the different dynamics of focal adhesions (FAs) and reorganization of F-actin in NSCs during spreading and migration stimulated by VEGF. We found that the migrating NSCs of 0.5 and 1 day differentiation possess more FAs at leading edge than cells of other states. Moreover, the phosphorylation of focal adhesion kinase (FAK) and paxillin in NSCs correlates closely with their differentiation states. VEGF promotes FA formation with broad lamellipodium generation at the leading edge in chemotaxing cells of 0, 0.5, and 1 day differentiation, but not in cells of 3 days differentiation. Furthermore, cells of 1 day differentiation show a maximal asymmetry of FAs between lamella and cell rear, orchestrating cell polarization and directional migration. Time-lapse video analysis shows that the disassembly of FAs and the cell tail detachment in NSCs of 1 day differentiation are more rapid, along with the concurrent enlarged size of FAs at the leading edge, leading to the most effective chemotactic response to VEGF. Collectively, these results indicate that the dynamics of FAs and reorganization of F-actin in NSCs that undergo directional migration correlate closely with their differentiation states, contributing to the different chemotactic responses of these cells to VEGF.

### Biography

Huanxiang Zhang has completed his Ph.D. at the age of 28 years from Beijing Normal University, China and postdoctoral studies from Geneva University School of Medicine, Switzerland. He is now working in the Department of Cell Biology, Medical College of Soochow University, China. His research focuses on the control of the directed migration and differentiation of stem cells, including neural stem cells, mesenchymal stem cells and embryonic stem cells, and tissue engineering, especially the interaction between stem cells and the silk fibroin scaffolds with a variety of physical and chemical properties. He has published more than 50 papers in reputed journals. Recently, his group demonstrated the close relationship between the chemoattractant-stimulated chemotaxis of stem cells and their differentiation states.

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