

In vitro recapitulation of neuronal somal translocation and mechanism of external triggers

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Neuronal somal migration during cortex development determines the final position of neuron and cortical layer formation. It is difficult to figure out mechanism of external environment for somal translocation *in vivo*, because the cell-cell interaction and multi-component Extracellular matrix (ECM). Recent studies have shown that there is spontaneous neuron migration observed by chance *in vitro*, however, the somal migration is rarely observed and the external triggers from the environment remain unknown. By coupling of different ECM components or peptides (Polylysine, IKVAV, Reelin, fibronectin, collagen and RGD) in restricted region of substrate separately, we triggered directional somal migration to preselected positions on the substrate and examined the mechanism underlying the external cues for somal translocation. Through controlling the protein type, we were able to systematically study the influence of different protein on somal translocation. Further, somal translocation can be triggered by changing the “adhesiveness” of the substrate through polylysine gradient. All features of somal translocation *in vivo* were observed, including the spreading of the growth cone at the leading process tip being a crucial step for triggering somal translocation. This platform allows *in vitro* studies of directional neuron somal translocation, a very important step towards understanding the molecular mechanisms underlying cortical layer formation during embryogenesis and their disturbance in human migration disorders.

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