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Microglial integrins switch jobs during cortical development

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Early in brain development microglia invade the brain. Once entered, microglia migrate in the growing cortex following a specific colonization pattern, apparently avoiding the cortical plate. In the course of finding a final position, microglia gradually increase branching and decrease migration speed, suggesting changing interactions with the microenvironment. The extracellular matrix is an anchor point enabling cellular migration, leading to our aim to identify integrins and the extracellular matrix molecule fibronectin as molecular determinants for microglial migration in the embryonic mouse brain. We focused on microglia-fibronectin interactions mediated through the fibronectin receptor α5β1 integrin because in vitro work indirectly suggested a role for this ligand-receptor pair. Using 2-photon time-lapse microscopy on acute ex vivo embryonic brain slices, it was shown that migration occurs in a saltatory pattern and is developmentally regulated. Most importantly, there is an age-specific function of the α5β1 integrin during microglial cortex colonization. At embryonic day (E)13.5, α5β1 facilitates migration while as from E15.5, it inhibits migration. These results indicate a developmentally regulated function of α5β1 integrin in microglial migration during colonization of the embryonic brain.