Role of Sema3E/PlexinD1 signaling during the migration of pioneer neurons in developing cerebral cortex

Abstract

During the development of the cerebral cortex, pioneer Cajal-Retzius (CR) cells settle in the preplate and coordinate the precise growth of the neocortex. Indeed, CR-cells migrate tangentially from specific proliferative regions of the telencephalon (e.g., the cortical hem) to populate the entire cortical surface. This is a very finely tuned process regulated by an emerging number of factors that has been sequentially revealed recent years. However, the putative participation of one of the major families of axon guidance molecules in this process, the Semaphorins, was not explored. In this seminar, we show that a member of the secreted Semaphorin family Semaphorin-3E (Sema3E) is a natural negative regulator of the migration of PlexinD1-positive CR-cells originating in the cortical hem. Our results indicate that Sema3E/PlexinD1 signaling controls the motogenic potential of CR-cells in vitro and in vivo. In addition, this modulation implies negative effects on CXCL12/CXCR4 signaling and increased ADF/Cofilin activity.