Nuclear factor one b regulates neural stem cell differentiation and axonal projection of corticofugal neurons.

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Public Summary:
During development of the cerebral cortex, neural stem cells divide to expand the progenitor pool and generate basal progenitors, outer radial glia and cortical neurons. As these newly born neurons differentiate, they must properly migrate toward their final destination in the cortical plate, project axons to appropriate targets, and develop dendrites. However, a complete understanding of the precise genetic mechanisms regulating these steps is lacking. Here we show that a member of the nuclear factor one (NFI) family of transcription factors, NFIB, is essential for many of these processes in mice. We performed a detailed analysis of NFIB expression during cortical development, and investigated defects in cortical neurogenesis, neuronal migration and differentiation in NfiB-/- brains. We found that NFIB is strongly expressed in radial glia and corticofugal neurons throughout cortical development. However, in NfiB-/- cortices, radial glia failed to generate outer radial glia, subsequently resulting in a loss of late basal progenitors. In addition, corticofugal neurons showed a severe loss of axonal projections, while late-born cortical neurons displayed defects in migration and ectopically expressed the early-born neuronal marker, CTIP2. Furthermore, gene expression analysis, by RNA-sequencing, revealed a misexpression of genes that regulate the cell cycle, neuronal differentiation and migration in NfiB-/- brains. Together these results demonstrate the critical functions of NFIB in regulating cortical development. J. Comp. Neurol., 2013. (c) 2013 Wiley Periodicals, Inc.

Scientific Abstract:
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