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Angie Molina, Fabienne Pituello



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Playing with the cell cycle to build the spinal cord

Angie MOLINA¹, Fabienne PITUELLO¹

**Centre de Biologie du Développement (CBD), Centre de Biologie Intégrative (CBI),
Université de Toulouse, CNRS, UPS, France**

fabienne.pituello@univ-tlse3.fr,

angie-patricia.molina-delgado@univ-tlse3.fr

*Corresponding authors: Tel.: +(33)5 61 55 83 49; fax: +(33)5 61 55 65 07.

Abstract

A fundamental issue in nervous system development and homeostasis is to understand the mechanisms governing the balance between the maintenance of proliferating progenitors versus their differentiation into post-mitotic neurons. Accumulating data suggest that the cell cycle and core regulators of the cell cycle machinery play a major role in regulating this fine balance. Here, we focus on the interplay between the cell cycle and cellular and molecular events governing spinal cord development. We describe the existing links between the cell cycle and interkinetic nuclear migration (INM). We show how the different morphogens patterning the neural tube also regulate the cell cycle machinery to coordinate proliferation and patterning. We give examples of how cell cycle core regulators regulate transcriptionally, or post-transcriptionally, genes involved in controlling the maintenance versus the differentiation of neural progenitors. Finally, we describe the changes in cell cycle kinetics occurring during neural tube patterning and at the time of neuronal differentiation, and we

¹ Postal address: Angie MOLINA - Fabienne PITUELLO, Centre de Biologie du Développement, CBD-UMR5547, 118 route de Narbonne, F-31062 Toulouse, cedex 9 France.

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