ABSTRACT

The canonical Wnt/β-catenin signalling pathway plays an important role in proliferation and differentiation of neural progenitors during embryogenesis as well as postnatally. In the present study, the effect of the Wnt signalling pathway on the differentiation potential of neonatal and adult neural stem cells (NS/PCs) isolated from subventricular zone (SVZ) of lateral ventricles and their membrane properties were studied eight days after the onset of *in vitro* differentiation. To manipulate Wnt signalling at different cellular levels, three transgenic mouse strains were used, which enabled inhibition or activation of the pathway using the Cre-loxP system. We showed that the activation of the Wnt signalling pathway leads to higher expression of β-catenin in both postnatal as well as adult NS/PCs, while Wnt signalling inhibition results in the opposite effect. To follow the fate of NS/PCs, the patch-clamp technique, immunocytochemistry, and Western blot were employed. After eight days of NS/PCs differentiation we identified three electrophysiologically and immunocytochemically distinct cell types of which incidence was significantly affected by the canonical Wnt signalling pathway, only in differentiated neonatal NS/PCs. Activation of this pathway suppressed gliogenesis, and promoted neurogenesis, while its inhibition led to the adverse effect. Surprisingly, manipulation of Wnt signalling in NS/PCs isolated from the SVZ of adult mouse brains had no effect on their differentiation potential. Therefore, the transgenic mouse strains used in this study represents suitable animal model for manipulating Wnt/β-catenin signalling in the SVZ of postnatal mouse brain.

Key words: Wnt/β-catenin signalling pathway, neonatal mice, adult mice, neural stem cells, neurogenesis, gliogenesis, patch-clamp technique