ABSTRACT

Neural stem cells (NSCs) are present in the mammalian adult nervous system and are found in two specific regions: the subventricular zone of the forebrain and the subgranular zone in the dentate gyrus of the hippocampus. NSCs undergo fate specification, maturation and functional integration before they can take part in neuronal circuits. Less is known about the mechanisms controlling these processes or the function of the newly born neurons in the adult brain. A large number of molecular and environmental factors can regulate various aspects of proliferation, maturation and differentiation of adult stem cells in adult nervous system. NSCs can give rise to three main types of neural cells: neurons, astrocytes and oligodendrocytes. It is suggested that astrocytes may play critical role in regulating neurogenesis in both the intact adult brain and after injury. Therefore, determining how astrocytes regulate adult neurogenesis at the molecular level is an essential step toward understanding the regulation of adult neurogenesis. To find out how genetic alteration of astrocytic intermediate filament will affect neural stem cells of postnatal mice, the neurosphere assay was performed in order to compare the proliferative and differentiation characteristics of neural stem/progenitor cells in $GFAP^{-/-}Vim^{-/-}$ and wild type mice. The results indicate that the absence of intermediate filaments in astrocytes enhances or promotes stem/progenitor cell survival and neuronal differentiation in $GFAP^{-/-}$ $Vim^{-/-}$ mice by modifying the astroglial environment within the neurogenic niche.

Key words: neural stem/progenitor cell, neurogenesis, neurosphere, GFAP, vimentin, astrocytes