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Developmental Regulation of SSeCKS Expression in Rat Brain

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Abstract SSeCKS (src suppressed C kinase substrate) was identified as a PKC substrate/PKC-binding protein, which plays a role in mitogenic regulatory activity and has a function in the control of cell signaling and cytoskeletal arrangement. Previous studies showed that expression of SSeCKS mRNA and protein levels were developmentally regulated in rat testis and the molecular might have some effects on the process of spermiogenesis. Here we carried out experiments to investigate the expression of SSeCKS in rat brain. Western blot analysis indicated that SSeCKS could be detected in the whole brain of developing rat embryos and reached its peak at 1 week after birth, while during mature period, its level was decreasing. Regional-distribution analysis showed that the expression pattern of SSeCKS in telencephalon, hippocampus and diencephalons was in accordance with the result from whole brain both in mRNA and protein level. However, in cerebellum, SSeCKS was almost in the same level, and in brainstem, the expression level was higher in 4-week-old rat brain than in 1-week-old one. Immunohistochemistry results showed SSeCKS was in diffused and granule-like distribution. Double immunofluorescence staining showed that it was expressed by some GFAP positive cells. All the results suggested that SSeCKS might affect brain development and further research is needed to have a good understanding of its function and mechanism.

Keywords SSeCKS · Brain development · Rat

Introduction

Protein kinase C (PKC) and many of its substrates play a central role in shaping actin-based cytoskeletal architecture during cell migration, cytokinesis and tissue development (Jaken 1996; Kiley et al. 1995). SSeCKS was identified by Jaken et al. (Chapline et al. 1996, 1998) and Gelman et al. (Lin et al. 1995, 1996) as a PKC substrate/PKC-binding protein. Evidence was presented that SSeCKS played a role in regulating the actin-based cytoskeletal network. Chapline et al. (1998) showed that SSeCKS was phosphorylated by PKC and that there was a strong correlation between phosphorylation of the protein and actin-based cytoskeletal rearrangements. Their results showed that phosphorylated SSeCKS, but not actin, accumulated in membrane protrusions and ruffles in REF52 rat embryo fibroblasts, indicating that PKC activation and SSeCKS may be involved in membrane-cytoskeletal remodeling in the cultured cells.

The studies from Jaken's laboratory indicated that PKC-interacting proteins were primary targets for PKC phosphorylation and that phosphorylation of these proteins might be related to the role of PKC in regulating cell

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