Inhibition of proteoglycan synthesis affects dopaminergic neuronal outgrowth

Hong Sung Chun, Jung-Sup Lee
Department of Biotechnology and Research Center for Proteineous Materials, Chosun University
TEL: +82-62-230-6609, FAX: +82-62-230-6619

We have determined potential factors produced by the astrocytes that attract the second wave of TH-positive dopaminergic neuronal outgrowth. Astrocytes produce a large number of extracellular matrix molecules (ECM) such as proteoglycans, and it is known that proteoglycans may modulate neuritic growth.[1,2,3] Therefore we studied TH-positive neuronal growth in cultures treated with the proteoglycan synthesis inhibitor, methyl-umbelliferyl-β-D-xyloside. The treatment with proteoglycan synthesis inhibitor significantly reduced the distance that the glial-guided TH-positive nerve fibers outgrowth reached. Furthermore, the proliferation and migration of astrocytes from the tissue slice were significantly reduced. The initially formed TH-positive nerve fibers were not affected by the presence of methyl-umbelliferyl-β-D-xyloside. Thus, proteoglycans appear to affect the later dopaminergic glial-guided growth only. These results revealed the modulation of fiber outgrowth during development.

[This work was supported by the SRC/ERC program of MOST/KOSEF (RCPM of Chosun University grant # R-11-2000-083-00000-0)]

References

1. Carulli, D., Laabs, T., Geller, HM. and Fawcett, JW., Chondroitin sulfate proteoglycans in neural development and regeneration. (2005), Curr. Opin. Neurobiol., 15, 252.
2. Snow, DM., Smith, JD., Cunningham, AT., McFarlin, J. and Goshorn, EC., Neurite elongation on chondroitin sulfate proteoglycans is characterized by axonal fasciculation. (2003), Exp. Neurol., 182, 310-321.
3. Faissner, A., Clement, A., Lochter, A., Streit, A., Mandl, C. and Schachner, M., Isolation of a neural Chondroitin sulfate proteoglycan with neurite outgrowth promoting properties. (1994), J. Cell Biol., 126, 783-799.