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Effects of 4-Methylcatechol, a Stimulator of Endogenous Nerve Growth Factor Synthesis, on Experimental Acrylamide-Induced Neuropathy in Rats.

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Acrylamide monomer (ACR) causes central-peripheral distal axonopathy. We induced neuropathy in rats by means of ACR injection as an experimental model of the dying-back type of peripheral neuropathy to assess the potential efficacy of 4-methylcatechol (4-MC), a potent stimulator of endogenous nerve growth factor (NGF) synthesis, as a therapeutic agent for the axonal lesion. ACR-induced neuropathy in rats resulted in a dying-back type of axonal degeneration, and statistically significant reduction in motor nerve conduction velocity (MNCV) and density of large myelinated fibers. We administered 4-MC and ACR together to rats intraperitoneally and found improved clinical signs, and significantly more NGF centent in sciatic nerves, faster MNCV, and greater myelinated fiber density than in rats given ACR alone. These findings suggest that 4-MC can prevent the progression of ACR-induced neuropathy and decreased NGF levels may be involved in the pathogenisis of ACR neuropathy.

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Construction and Characterization of Adenoviral Vector Expressing Biologically Active Brain-Derived Neurotrophic Factor

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To deliver brain-derived neurotrophic factor (BDNF) to the central nervous system, we sought to attain a adenovirus-mediated transfer and expression of the gene in both in vitro and in vivo experiments. For this purpose, we constricted AxCA-BDNF, a recombinant adenoviral vector containing the BDNF cDNA expression cassette. Reverse transcription polymerase chain reaction analyses of the infected HeLa cells and the transduced mouse brain revealed successful expression of the BDNF gene both in vitro and in vivo. The results of a survival assay of chick dorsal root ganglion cells showed that the produced BDNF was biologically active. We consider therefore, this newly constructed recombinant adenovirus to be a useful tool to deliver BDNF to degenerating neurons and to be applicate to gene therapy of neurodegenerative disease and nerve trauma.

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Changes in Ciliary Neurotrophic Factor Content in the Rat Brain after Continuous Intracerebroventricular Infusion of β-Amyloid (1-40) Protein

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We have previously shown that the continuous intracerebroventricular infusion of β -amyloid (1-40) protein results in memory impairments in rats, associated with a reduction of choline acetyltransferase activity in the frontal cortex and hippocampus. In the present study, we examined whether the infusion of β - amyloid (1-40) protein affected the content of ciliary neurotrophic factor (CNTF) in the rat brain. The β -amyloid (1-40) infusion increased CNTF content in the frontal cortex, hippocampus, and the cerebellum, but decreased its content in the brain stem. These results suggest that accumulation of β -amyloid (1-40) in the brain may affect CNTF production in vivo.