[J. Neurosci. Res., 50, 1023-1029 (1997)]

[Lab. of Molecular Biology]

Lipopolysaccharide Enhances Synthesis of Brain-derived Neurotrophic Factor in Cultured Rat Microglia.

Tetsuya MIWA, Shoei FURUKAWA,* Kazuyuki NAKAJIMA, Yoshiko FURUKAWA and Sin-ichi KOHSAKA

Expression of neurotrophins in pure micriglia cultured from embryonic rat brain and the effects of lipopolysaccharide (LPS) on the expression were investigated. In untreated cultures nerve growth factor (NGF), brain-derived neurotrophic factor (BDNF), and neurotrophin (NT)-4/5 mRNAs were detected by use of the reverse transcriptase-polymerase chain reaction, but NT-3 mRNA was not. LPS stimulation caused a marked increase in BDNF mRNA expression in addition to a slight increment of the NT-4/5 mRNA level; however, the NGF mRNA level was not affected. LPS also increased BDNF-like immuinoreactivity in cultured microglia, an action consistent with an elevation of BDNF mRNA. These results demonstrate that LPS stimulates synthesis of BDNF and probably NT-4/5, specific ligands for tyrosine kinase receptor TrkB, suggesting that activated microglia, which appear in the damaged brain, participate neuronal regeneration via production of such neurotrophins.

[Neurosci. Lett., 226, 115-118 (1997)]

[Lab. of Molecular Biology]

Administration of Corticosterone Alters Intracellular Localization of Brainderived Neurotrophic Factor-like Immunoreactivity in the Rat Brain.

Atsumi NITTA, Hidefumi FUKUMITSU, Hiroshige KATAOKA, Hiroshi NOMOTO and Shoei FURUKAWA*

We investigated the distribution of immunoreactivity for brain-derived neurotrophic factor (BDNF) in rat brain after peripheral administration of corticosterone or vehicle. In the immunohistochemical study, BDNF-like immunoreactivity (LI) was observed predominantly in the nucleus of the cortical and hippocampal neurons in the brain of vehicle-treated rats. In corticosterone-treated rats, BDNF-LI was markedly reduced in the nucleus and concomitantly increased in cytoplasm. Western immunoblot study also demonstrated that corticosterone significantly reduced BDNF-LI in the nuclear fraction of the cerebral cortex and hippocampus. These results indicate that corticosterone regulates the intracellular localization of BDNF and/or its derivatives in the rat brain.

[Brain Res., 777, 228-230 (1997)]

[Lab. of Molecular Biology]

Stimulation of NGF Production by Tryptophan and Its Metabolites in Cultured Mouse Astroglial Cells.

Lee DONG-RYUL, Hiromichi KONDO, Shoei FURUKAWA* and Kiwao NAKANO

Effects of various amino acids and tryptophan metabolites on the synthesis of nerve growth factor (NGF) in cultured mouse astroglial cells were evaluated. L-Tryptophan stimulated NGF producion in a dose-dependent manner. Serotonine and quinolinic acid slightly increased NGF synthesis. L-Kynurenine had a marked stimulatory effect on NGF production at a dose of 10 micromole. In contrast, kynurenic acid had no effect on the reaction. L-Glutamine, L^glutamic acid, L-phenylalanine and L-methionine produced no significant change in NGF synthesis. These results were discussed in relation to the treatment of Alzheimer's disease.

[Jpn. J. Pharmacol., 73, 51-57 (1997)]

[Lab. of Molecular Biology]

Continuous Infusion of β -Amyloid Protein into the Rat Cerebral Ventricle Induces Learning Impairment and Neuronal and Morphological Degeneration.

Atsumi NITTA,* Taneo FUKUTA, Takaaki HASEGAWA and Toshitaka NABESHIMA

To investigate the toxicity of β -amyloid protein, a component of the senile plaques in Alzheimer's disease, it was infused into the cerebral ventricle of rats by a mini-osmotic pump. Performances in the water maze and passive avoidance tasks in β -amyloid protein-treated rats were impaired. ChAT activity significantly desreased in the hippocampus both immediately and 2 weeks after the cessation of the infusion. These results suggest that β -amyloid protein produces some damage in the central nervous system in vivo.