P-6

The Neurotoxicological Alterations Induced by Narcotic Drugs and Industrial Chemicals in the Rat are Associated with Quantitative Changes of Glial Fibrillary Acidic Protein

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Diverse neurotoxic insults result in proliferation and hypertrophy of astrocytes, a subtype of central nervous system glia. The hallmark of this response, often terms "reactive gliosis", is the enhanced expression of the major intermediate filament protein of astrocytes, glial fibrillary acidic protein(GFAP). These changes suggest that GFAP may be a useful biochemical indicator of neurotoxicity. To investigate this possibility, we administered prototype nerotoxicants methamphetamine(MAP, 5mg/kg), cocaine(30mg/kg), N-buthylbenzene sulfonamide(NBBS, 300mg/kg) and trimethytin (TMT, 8mg/kg) to experimental animals (Wistar Rat) and then assessed the effects of these agents on the tissue content of GFAP, as determined by sandwich ELISA and evaluated neurotoxic symptoms, quantitative light microscopic image analysis of GFAP immunoreactivity in specific regions. We found that assay of GFAP revealed time-, and region-dependant patterns of neurotoxicity at toxicant dosages. The GFAP immunoreactivity of the rat brain was increased in substatia nigra and hippocampus by MAP, NBBS and TMT and in medial septal nucleus and nucleus accumbens, it was also increased by NBBS. Sandwich ELISA method showed that GFAP levels of cerebrum in all groups on 3 days and 7 days and that of cerebellum in MAP, NBBS groups on 1 day and 3 days were increased. A review of the background, design and results of these experiments are presented in this paper. Our findings indicate that GFAP is a sensitive and specific biomarker of neurotoxicity.

KEYWORDS : methamphetamine, cocaine, NBBS, trimethyltin, GFAP, Sandwich ELISA, immunohistochemical staning.

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