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Recently hair analysis has been taken great interest because it provides a wider window of drug detection. Once drug incorporated into the hair, it moves along hair shaft at a rate of approximately 1cm/month as the average rate of hair growth.
In this study, the relationship between the distribution of methamphetamine (MA) in hair and drug history was investigated. The scalp hair samples of five MA abusers (6~12cm in length) were obtained for sectional analysis. Hair strand was cut into 2 or 3cm sections from the root side, and drug concentrations of each segment were evaluated by GC/MS. For quantitative determinations, the following ions were used: m/z 140 (AM), 144 (AM-d_5), 154 (MA), and 158 (MA-d_5).
The concentrations of MA and AM in hair segment were exhibited variable patterns according to their drug consumption histories. In case 4, MA consumption in the last 2 months could be proved because the last-grown segment (0~2) was positive and the previously grown segments (2~4 and 4~7) were negative. These results suggest that sectional analysis of hair is useful in determining past drug histories in the field of forensic science. However, it also has to be taken into account that the growth rate of hair can vary between 0.8 and 1.4 cm/month and that the telogen partition of the hair can increase to 20%.

[PA4-16] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

Metallothionein-III Inhibits hydroxyl radical-induced DNA damage and scavenges superoxide radicals

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Metallothionein (MT)-III is a member of a brain specific MT family, in contrast to MT-I and MT-II that are found in most tissues and are implicated in metal ion homeostasis and antioxidant. To investigate the defensive role of MT-III in terms of hydroxyl radical-induced DNA damage, we used purified human MT-III. DNA damage was detected by single strand breaks of plasmid DNA and deoxyribose degradation. In this study, we show that MT-III is able to protect against the DNA damage induced by ferric ion-nitrilotriacetic acid and H2O2, and that this protective effect is inhibited by the alkylation of the sulfhydryl groups of MT-III by treatment with EDTA and N-ethylmaleimide. MT-III was also able to efficiently remove the superoxide anion, which was generated from the xanthine/xanthine oxidase system. These results strongly suggest that MT-III is involved in the protection of reactive oxygen species-induced DNA damage, probably via direct interaction with reactive oxygen species, and that MT-III acts as a neuroprotective agent.

[PA4-17] [04/18/2002 (Thr) 14:00 - 17:00 / Hall E]

Role of Increases of Glutamine Synthetase in Primary Culture of Mixed Gilal Cells (MGC) and Purified Astrocytes (AST) on Methylmercury Toxicity

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Methylmercury (MeHg) is a highly neurotoxic compound producing neuronal death that is partially mediated by glutamate. Although MeHg produces the neuronal death and malfunction, MeHg toxicity in glial cells is not clear. Glutamine synthetase (GS), known as a glial-specific enzyme, catalyzes the synthesis of glutamine from glutamate and ammonia and is associated with ischemic injury and several neurological diseases. Dysregulation of glutamate, an excitatory neurotransmitter, may cause excitotoxicity. Objective of this experiment is to investigat whether MeHg exposure has adverse effects on GS and whether glutamate plays a role in MeHg-induced toxicity of the MGC and AST. To MGC and AST cultured from the cerebral cortex of one day-old rats, MeHg (0, 5 and 10 μM) was exposed for 6 days from 5 days in vitro. MeHg exposure produced dose-dependent increases of GS activity in MGC and AST. Cell viability, total cell