K2 An Evaluation of Screening for Drug Use Using Postmortem Prolactin (PRL) Levels in Serum and Cerebrospinal Fluid (CFS)

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Learning Overview: The goal of this presentation is to show the significance and practicability of measuring PRL as a drug screen by means of a biochemical examination.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing the utility of drug screening examinations using PRL as an index.

Introduction: PRL is a hormone primarily secreted by lactotrophs in the anterior pituitary gland. PRL secretion can be controlled by PRL-inhibiting factors such as psychiatric drugs, including anti-dopamine agents. The use of Dopamine (DA) antagonists to increase PRL levels may lead to hyperprolactinemia under clinical circumstances. On the other hand, as a screening method for drug use, detection of the drug in question has been the main approach to date, and reports using hormone levels in body fluids as indices have been lacking. It is speculated that PRL would offer a marker in autopsy cases with unknown details of drug abuse. The goal of this study was to investigate postmortem PRL levels in serum and CSF as potential markers of drug abuse in autopsy cases.

Materials and Methods: One hundred twenty-one autopsy cases were examined, after excluding cases involving acute hypoxia/ischemia such as asphyxia, because PRL concentrations are reportedly increased under hypoxic conditions. Detected drugs were classified as DA antagonists (n=10), stimulants (e.g., methamphetamine and amphetamine; n=10), psychotropic drugs other than DA antagonists (n=23), other non-psychotropic drugs (n=28), and no detected drugs (n=50). Samples comprised of blood collected from the right heart chamber and CSF. PRL was measured by chemiluminescent enzyme immunoassay. *PRL* gene expression in the anterior pituitary of autopsy cases was analyzed by Reverse Transcription-Polymerase Chain Reaction (RT-PCR). The PRL-positive cell ratio in the anterior pituitary gland was measured by immunohistochemical analysis. Gynecomastia was also evaluated using Computed Tomography (CT), and compared with serum and CSF levels of PRL.

Results: Serum PRL levels in the present cases, except for DA antagonist cases, were similar to clinical reference levels (3.1–29.3ng/mL). PRL levels in serum and CSF were higher in DA antagonist cases (serum: range 18.8–200ng/mL, median 41.0ng/mL; CSF: range 11.7–394ng/mL, median 34.1ng/mL) than in other cases (serum: range 1.99–217ng/mL, median 20.3ng/mL; CSF: range 1.23–97.2ng/mL, median 9.26ng/mL). Significant differences in *PRL* gene expression in the anterior pituitary were evident between DA antagonist cases and other drug cases (p <0.0001). However, no significant difference in immunohistochemical PRL-positivity ratio in the anterior pituitary gland was evident between drug-detected and drug-undetected cases. PRL levels in serum and CSF correlated with PRL messenger RNA (mRNA) expression in cases with abuse of DA antagonists. No relationships were identified between serum or CSF PRL level and gynecomastia using CT in any groups using drugs.

Discussion: Use of DA antagonists increased PRL levels in both serum and CSF from autopsy cases. High RT-PCR expression of PRL with high serum and CSF levels of PRL were suggested to be controlled by *PRL* gene expression response. These results suggest that postmortem measurements of PRL may prove useful for diagnosing cases of DA antagonist use.

Prolactin, Dopamine Antagonist, Drug Screening

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