CASE REPORT

Paul L. Cary,[1] B.S.; Charles A. Johnson;[1] Rodger L. Foltz,[2] Ph.D.; and Brian E. Pape,[1] Ph.D.

Driving Under the Influence of Phenobarbital

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ABSTRACT: A driving-under-the-influence (DUI) case with an unusually high phenobarbital concentration is presented. Significant toxicologic findings include a blood phenobarbital level of 132 μg/mL. Toxicology data relevant to interpretation are discussed.

KEYWORDS: toxicology, phenobarbital, driving

Case Report

A 27-year-old female involved in a single vehicle traffic accident at 2:30 p.m. was arrested for driving while intoxicated or driving under the influence of drugs, or both. Police at the scene described her as "extremely unsteady on her feet" and that her speech was "slow and slurred." Although officers reported not being able to detect the odor of alcohol on her breath, the subject could not perform a standard field sobriety test.[3] The subject stated she had not been drinking, however, she did admit taking a Darvon® (propoxyphene hydrochloride) tablet for a "headache." Ambulance paramedics reported the subject was lethargic, ataxic, and had constricted pupils. They suggested that her condition could not be adequately explained by the minor facial lacerations suffered in the accident or by the ingestion of a therapeutic dose of propoxyphene. After refusing further medical assistance, the subject was taken into custody. She subsequently consented to urine and blood tests to determine alcohol and drug content. At no point after the accident did the subject become comatose.

Toxicology

Blood ethanol was none detected (<0.01% w/v) by gas-liquid chromatography (GLC) [*1,2*].

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[1]Supervisor, chemist, and director, respectively, Toxicology and Therapeutic Drug Monitoring Laboratory, Health Sciences Center, University of Missouri, Columbia, MO.

[2]Associate director, Center for Human Toxicology, University of Utah, Salt Lake City, UT.

[3]The field sobriety test administered by police at the scene of the accident included the following components: recitation of the phrase "around the rugged rock, the ragged rascal ran," finger-to-nose touching with eyes closed, heel-to-toe walking, standing on one foot, and standing with feet together with arms at side.

Urine drug screening by thin-layer chromatography [3,4] and GLC [5,6] indicated the presence of phenobarbital, nicotine and metabolite, and caffeine. Compounds determined as "none detected" at an analytical sensitivity limit of 1 μg/mL included: narcotic analgesics, nonnarcotic analgesics, other barbituates, sedatives and hypnotics, stimulants, and psychoactive drugs. Enzyme-immunoassay analysis of urine was positive for cannabinoid metabolites at a concentration of 195 ng/mL [7].

Plasma quantitation for tetrahydrocannabinol (Δ^9—THC) and its 11-hydroxy metabolite were done by gas chromatography/mass spectrometry [8]. Concentrations were 1.8 and 0.5 ng/mL, respectively.

Phenobarbital was quantitated by two immunochemical techniques in duplicate analyses of undiluted and diluted sera: concentrations of 134 and 130 μg/mL were obtained by Automatic Clinical Analyzer (ACA®) and Enzyme Multiple Immunoassay Technique (EMIT®), respectively [9,10]. GLC confirmed phenobarbital at a serum concentration of 128 μg/mL [11].

Discussion

Phenobarbital is widely used as an anticonvulsant, and to a lesser extent as a sedative. The generally accepted therapeutic range is 15 to 40 μg/mL [12]. Toxic reactions, which include excessive sedation, lethargy, and stupor, are associated with plasma concentrations >40 μg/mL [12]. Plasma concentrations as low as 60 μg/mL can cause coma; however, there is considerable interpatient variability in such concentration-effect relationships [13]. In fatalities involving phenobarbital, one compendium containing seven deaths reported blood concentrations ranging between 78 to 116 μg/mL [14].

The pharmacological effects of Δ^9-THC, which include altered sensory and psychomotor functions, are well documented [15]. Laboratory driving simulator studies and accident surveys indicate that driving performance is impaired by marihuana [16]. Additionally, it has been reported that Δ^9-THC enhances the central nervous system depressant effects of barbiturates [15]. However, these data bases do not definitively describe a concentration-effect relationship; therefore, it is not possible to assess the physiologic effect of the relatively low concentrations of Δ^9-THC and metabolites found in this case.

A blood phenobarbital concentration of 111 μg/mL was determined in an unpublished case involving an individual arrested for driving under the influence (DUI).[4] With the exception of this single report, we know of no other situations in which phenobarbital concentrations exceeding 100 μg/mL have been associated with DUI cases.

This individual's decreased responsiveness to the pharmacologic effects of phenobarbital can be rationalized by (1) unique individual resistance because of genetic variance or biochemical abnormality or (2) an acquired drug-dependent tolerance associated with chronic self-administration [17]. Given the limited case history, it is impossible to determine adequately the causative biochemical and physiological processes in this case.

Conclusion

In a recent study of people arrested for impaired driving, sedative-hypnotic drugs were found in 30 to 50% of the bloods tested [18]. The necessity for identifying and quantitating drugs, other than alcohol, is essential for those laboratories offering analytical services to law enforcement officials in impaired driving cases. One goal of this analytical support is to build a usable data base in which the relationship between drug concentration and degree of deterioration of driving capabilities can be evaluated.

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Address requests for reprints or additional information to
Paul L. Cary
Supervisor, Toxicology Laboratory
University of Missouri
Health Sciences Center
Columbia, MO 65212