K9 Quantitation of Quetiapine in Human Blood by Solid Phase Extraction and High-Performance Liquid Chromatography

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After attending this presentation, attendees will learn a simple but effective means of identifying and quantitating quetiapine in blood that can be implemented into their own laboratories.

This presentation will impact the forensic community and/or humanity by providing a simple, sensitive, and selective means of identifying and quantitating quetiapine at a range of therapeutic, toxic and fatal blood concentrations.

Quetiapine is an atypical antipsychotic drug indicated as monotherapy for the management of manic episodes associated with bipolar disorder and for the treatment of schizophrenia. Therapeutic concentrations of quetiapine have been reported to range from approximately 0.2 to 1 mg/L. Fatalities attributed to quetiapine overdose have been reported to occur at blood concentrations of 7 mg/L and greater. The incidence of detection of quetiapine, or its indication in case history in death investigations in Ontario, has increased progressively on a year-to-year basis between 1998 and 2004. Therefore, a sensitive and selective high-performance liquid chromatography (HPLC) assay employing solid phase extraction (SPE) has been developed and validated to analyze for quetiapine over a forensicallyrelevant range of blood concentrations. Selective detection of the analyte is achieved by utilizing an ultraviolet photodiode array detector (UV-DAD) to identify the distinctive UV spectra of quetiapine at a monitoring wavelength of 215 nm at the appropriate retention time. Carbinoxamine maleate, an antihistamine marketed in the United States but is not available in Canada, is used as an internal standard at a concentration of 1.0 mg/L. The limit of detection for quetiapine in this assay is 0.03 mg/L with a lower limit of quantitation of 0.125 mg/L. This method provides a linear response to quetiapine concentrations ranging from 0.125 to 4 mg/L, above which the sample can be diluted and quantitated using an external calibration curve. The extraction recoveries of quetiapine and carbinoxamine were 70±10% and 84±6% (mean± S.D.), respectively. Intra-assay linear regression analysis of the calibration curves in blood (n=5) had r^2 values ranging from 0.987 to 1.00. Inter-assay linear regression analysis of the calibration curves in blood (n=6) had r^2 values ranging from 0.990 to 0.999. The intraassay precision in blood calibration standards (n=5) at each calibration level ranged from 4 to 8% relative standard deviation (RSD) over the concentration range 0.125 to 1.0 mg/L. The inter-assay precision in blood calibration standards over six days ranged from 6 to 9% RSD at each calibration level over the concentration range 0.125 to 1.0 mg/L. As a measure of accuracy, the percent difference from target concentrations ranged from 0 to 11% (mean 6%) based on the analysis of two internally-prepared, single-blind samples (0.25 and 0.50 mg/L) and one zero-blind sample (1.0 mg/L). This assay provides a simple, sensitive and selective means of identifying and quantitating quetiapine over a range of therapeutic, toxic, and fatal blood concentrations.

Quetiapine, HPLC, Solid Phase Extraction

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