## K19 A 5-Year Stability Study on Phencyclidine and Zolpidem in Postmortem Blood Samples

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The goal of this presentation is to evaluate the stability for both phencyclidine and zolpidem over a 5-year time period in postmortem blood samples.

This presentation will impact the forensic community by demonstrating the effects of storage conditions and time on postmortem blood samples containing either phencyclidine or zolpidem and contributing additional knowledge to the proper interpretation of reanalyzed samples containing these drugs.

Phencyclidine, or PCP, is a dissociative anesthetic but exhibits stimulant, depressant, hallucinogenic, and analgesic properties. Phencyclidine is an illicit, Schedule II drug. Zolpidem is a sedative- hypnotic, Schedule IV drug, classified as a derivative of the imidazopyridines. Zolpidem is available by prescription and is used in the treatment of short-term insomnia. Due to the abuse of phencyclidine and the increase in popularity and overdose potential of zolpidem, it is essential to show how stable these drugs are in postmortem samples.

The stability for drugs in postmortem samples is extremely critical in establishing the validity of scientific results. Stability for the analyzed drug should be considered in order to justify the precision of the analytical method and the reliability of the results. Factors that may influence drug stability in stored samples include: storage temperature, storage time, addition of preservatives, and initial condition of the collected sample. Storage conditions may vary depending on the analyte of interest. This study will test the research hypothesis of whether drug concentrations for either phencyclidine or zolpidem remain stable, when samples are frozen at –20°C for up to five years. The quantitative examination for stability of 23 positive phencyclidine cases and 26 positive zolpidem cases from the Maricopa County Office of the Medical Examiner (OCME) is presented here.

This study re-analyzes postmortem blood samples quantitatively for any changes in concentration of phencyclidine and zolpidem, over 5 years. The postmortem blood samples were collected at autopsy, preserved with sodium fluoride, and stored at 4°C until initially analyzed. After the analysis the samples were stored frozen at –20°C until the samples were reanalyzed for this study. The methods of quantitation used in the re-analysis study are the same methods used when initially quantitated. For phencyclidine (n=23) liquid-liquid extraction is used followed by quantitation by gas chromatography/mass spectrometry (GC/MS). For zolpidem (n=26) liquid-liquid extraction is used followed by quantitation by gas chromatography with a nitrogen-phosphorous detector (GC-NPD).

The results obtained for phencyclidine show a tendency for concentrations to decrease over a period of 5 years. Table 1 shows the initial and final concentration ranges obtained (reported to two significant figures), along with the average decreases observed for samples stored for 5 years.

Table 1. Phencyclidine Concentration Changes

| Storage Time (Since Collection) | N | Initial Concentration Range (mg/L) | Final Concentration Range (mg/L) | Percent Average Decrease |
|---|---|---|---|---|
| +1 year | 8 | (0.01 – 0.22) | (<0.01 - 0.20) | 10.9% |
| +2 years | 5 | (0.03 – 0.11) | (0.02 – 0.10) | 8.6% |
| +3 years | 3 | (0.09 – 0.23) | (0.07 – 0.18) | 21.5% |
| +4 years | 3 | (0.02 – 0.14) | (0.01 – 0.13) | 18.8% |
| +5 years | 4 | (0.04 – 0.73) | (0.03 – 0.48) | 20.3% |

For the phencyclidine cases (n=23), there were 12 cases showing a decrease of 10% or more, of which 9 of these cases had a decrease of 20% or more. The results indicate that phencyclidine remains sufficiently stable to be detected within 5 years of storage at 4°C, then – 20°C. However, there is a significant decrease in concentration after 3 years of storage at 4°C, then –20°C.

The results obtained for zolpidem show a tendency for concentrations to both increase and decrease over a period of 5 years. Table 2 shows the initial and final concentration ranges obtained (reported to two significant figures), along with the average decreases and increases observed for samples stored for 5 years.

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Table 2. Zolpidem Concentration Changes

| Storage Time (Since Collection) | N | Initial Concentration Range (ng/L) | Final Concentration Range (ng/L) | Percent Average Decrease | Percent Average Increase |
|---|---|---|---|---|---|
| ± 1 year | 12 | (0.06 – 34.44) | (0.07 – 34.60) | 24.1% (n=5) | 12.6% (n=7) |
| ± 2 years | 8 | (0.15 – 0.97) | (0.15 – 0.80) | 16.1% (n=3) | 10.1% (n=5) |
| ± 3 years | 2 | (0.29 – 3.39) | (0.20 – 3.46) | 29.6% (n=1) | 2.3% (n=1) |
| ± 4 years | 2 | (1.20 – 8.42) | (0.73 – 5.20) | 38.6% (n=2) | - |
| + 5 years | 2 | (0.10 – 0.28) | (0.09 – 0.23) | 9.5% (n=2) | - |

For the zolpidem cases (n=26), there were 11 cases showing a decrease of 10% or more, of which 4 of these cases had a decrease of 20% or more. The results also show that for 7 cases the concentrations increased 10% or more over time, of which 3 of these cases had a 20% or more increase. The results indicate that zolpidem remains sufficiently stable to be detected within 5 years of storage at 4°C, then –20°C. However, there is a significant decrease in concentration within 1-year of storage at 4°C, then –20°C.

**Stability, Phencyclidine, Zolpidem**

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