K8 Gastric Fentanyl Concentrations in Fentanyl-Related Deaths: A Study of 11 Cases

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After attending this presentation, attendees will have a greater understanding of the role that the analysis of gastric concentrations of fentanyl has in fentanyl-related deaths.

This presentation will impact the forensic community by providing toxicological data and insights on potential relationships between gastric fentanyl concentration, blood fentanyl concentration, route of administration, and cause and manner of death.

Given that fentanyl is a short acting and potent narcotic, there is potential risk for abuse and fatalities. Interpreting postmortem toxicology in suspected narcotic overdoses, including fentanyl, can be difficult for medical examiners due to the variety of drug use and abuse and the development of tolerance in the user/abuser. The unfortunate "creative" abuses of the patch (including snorting, smoking and chewing) only complicate the issue. A strategy utilized in postmortem toxicological evaluation has been to analyze gastric contents for the amount of drug present to ascertain a potential route of administration and/or the cause and manner of death. One would expect that oral consumption would lead to higher levels of gastric concentrations in general. If that were so, would one be able to use the gastric concentrations to determine the route of administration (including inappropriate use of the transdermal patch) as well as the manner of death (intentional versus accidental overdose)? The purpose of this current study was to determine the gastric concentrations of fentanyl and norfentanyl in fentanyl-related deaths and to attempt to relate these levels with blood concentrations, route of administration, and cause and manner of death.

From January 2007 to June 2009, eleven fentanyl-related deaths in which gastric samples were available were identified through routine toxicology testing in the El Paso County Coroner's Office toxicology laboratory in Colorado Springs, Colorado. Routine toxicological testing was performed on all cases. Ethanol and related alcohols were detected using headspace Gas Chromatography/Flame Ionization Detection (GC/FID), urine was screened for drugs of abuse by ELISA and Gas Chromatography-Mass Spectrometry (GC/MS), and GC/MS was used to quantitate the blood and gastric contents after a liquid-liquid basic extraction.

The age of the decedents ranged from 23 to 60 years and consisted of three men and eight women. The blood concentration of fentanyl ranged from 2.1 to 30.7 µg/L (mean 17.5 µg/L) while the total gastric fentanyl concentration ranged from 2.9 to 432.4 µg (mean 85.1 µg). The analytical data for norfentanyl concentrations in the gastric samples were inconclusive as the samples calculated below the detection level of 5 µg/L. The cause of death was acute fentanyl intoxication in six out of eleven cases while five cases were ruled mixed drug overdoses. The manner of death was accidental in eight cases and undetermined in three cases. The route of administration was by transdermal patch in nine cases, oral (by chewing the patch) in one case, and unknown in one case.

In conclusion, there did not appear to be any correlations between the gastric and blood concentrations of fentanyl, the route of administration, or the cause and manner of death. It did not appear to be helpful to determine if the individual had intentionally or accidentally overdosed, nor did it provide insight into the route of administration (e.g. inappropriate use of the patch). Although the case with oral route of administration had the highest gastric concentration of fentanyl, the level was not impressively higher than the next highest concentration, where the route of administration was transdermal application. Additionally, the oral route of administration did not yield the highest total gastric fentanyl concentration. A limiting factor in our study was the small subject number. Perhaps a larger study (e.g., a multi-centered study) focusing on the analysis of gastric concentration of fentanyl would be useful and illuminate any useful patterns or trends.

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