



K37 A Rapid Increase in Fentanyl-Related Deaths in Detroit — A Twelve Month Review

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After attending this presentation, attendees will be aware of the statistics associated with a large increase in fentanyl-related deaths in the Detroit area in the past year.

This presentation will impact the forensic community and/or humanity by raising awareness of a public health issue related to the dangers in the use of street drugs and by making the toxicologist aware of the need to include fentanyl in their drug abuse screens.

Beginning in late August 2005 there was a rapid increase in fentanyl-related deaths observed by the Wayne County Medical Examiner's Office (WCMEO). Most of these deaths were also associated with cocaine and/or heroin use. A year later there have been a total of 132 deaths associated with fentanyl in combination with these drugs.

Reports from crime laboratories from the analysis of exhibits and seizures from clandestine laboratories suggested that illicit fentanyl was being manufactured and sold by itself or mixed with heroin or cocaine. Street names for the drug combinations have included "suicide," "drop dead", "reaper", "penicillin", "lethal injection" or "crazy" stamped on the packets.

The WCMEO has routinely looked for fentanyl in its GC/MS screen (LOD 5 ng/mL) since 1999 in cases pending for toxicology and deaths due to accident or suicide. Prior to 2002, the incidence of fentanyl never exceeded 10 per year. Due largely to increased use and abuse of fentanyl patches and lollipops the incidence of fentanyl (defined as confirmed in any specimen) in postmortem examinations has gradually increased to 12 (2002), 20 (2003), and 29 (2004). For the first 8 months of 2005 there was an incidence of 15 cases in which fentanyl was detected, but by the end of the year that number rose to 63. For the first eight months of 2006 the incidence surged to 159. Due to the large increase in fentanyl associated cases, the WCMEO has since instituted a blood fentanyl screen by ELISA (Immualysis®, Pomona, CA). This allows the laboratory to perform a rapid screen for the drug in more cases than before using a cutoff of 2 ng/mL. The assay shows good separation around the cutoff when using controls at 1 and 4 ng/mL.

Since May 2005, confirmation and quantitation of fentanyl has been performed at the WCMEO using GC/MS SIM (LOD = 1 ng/mL). Prior to that date, fentanyl was quantitated at a referral laboratory. Table 1 shows a statistical break down of the fentanyl concentrations determined in cases attributed to the fentanyl-laced deaths. In most cases heart blood was available. When iliac blood was available it was analyzed and the heart blood to peripheral blood ratio was calculated. Some of these ratios were quite high. Although post-mortem redistribution of fentanyl is possible, some of these deaths involved finding the decedent with a syringe still in the arm or groin, suggesting that early, partial drug distribution may also play a role in some high blood to peripheral blood ratios.

Table 1: Fentanyl concentrations (ng/mL) and Heart / Peripheral concentration ratios

	Heart Blood	Iliac Blood	Ratio Heart/
Mean	33	17	2.7
Median	23	14	2.0
Range	3 – 190	3 – 69	0.47 – 10.7
N	155	85	80

From the first combined drug death on August 28, 2005 – August 31, 2006 the following number of cases were reported: fentanyl and heroin (as 6-acetylmorphine in blood or vitreous humor) (50), fentanyl and morphine (suspected heroin) (5), fentanyl and cocaine (includes benzoylcegonine) (36), fentanyl, heroin, and cocaine (41). Excluding hospital-administered fentanyl, another 41 deaths were due to fentanyl intoxication by itself or in combination with other prescription drugs. The fentanyl in most of these cases was suspected to be from illicit sources although a few of these cases included patch abuse and lollipop abuse. The overall incidence of ethyl alcohol in these cases is quite low (21%).

The demographics of the population were interesting and suggested widespread use of the combination of drugs throughout the metropolitan area. The WCMEO serves all of Wayne County (population 2 million) which includes Detroit (population 885,000). In the 2005 census, the population of Wayne County as a whole was 54% white and 42% black with City of Detroit population being 12% white



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and 82% black. For the fentanyl-related deaths the majority of decedents were male (67%), white (62%), were non-Detroit residents (53%), and between 40-59 years of age (64%). Only five cases were under the age of 20 although 17% of cases were between 20 and 29 years of age. Most were found dead at the scene (35%) or in their home (41%). Relatively few made it to hospital and many were dead on arrival.

In most cases, the medical examiners have reported the cause of death by listing the drugs present (e.g. cocaine, heroin and fentanyl intoxication) although if additional prescription drugs were present they may report the cases as multiple drug intoxication. The manner of death was accident in all of the cases.

After excluding hospital administered fentanyl, the relative lethality of fentanyl (defined as the percent of cases signed out as a drug related death when the drug is present) is exceeded only by carbon monoxide when present in blood. For all cases in which fentanyl was present acutely in addition to cocaine and / or heroin during this 12- month study period, only one case, a pedestrian, did not die directly from the drug combination.

Fentanyl, Heroin and Cocaine, Deaths