

# STRAIGHT TOX

## Capsaicin and Cocaine Lethality: Correlation, Causation, or Coincidence?

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*“It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts.”—Sherlock Holmes*

I try to refrain from criticizing the work of others. The whole “Judge not that thou be not judged” thing, however, there are times that I feel that silence may be seen as tacit agreement. Such is the case



with a recent article published in the journal, Forensic Toxicology, the official publication of the Japanese Association of Forensic Toxicology. The article is entitled, *Capsaicin, an active ingredient in pepper sprays, increases lethality of cocaine*. In this article the authors correlated intraperitoneal injections of capsaicin in mice with an increased lethality of coadministered intraperitoneal cocaine. The ultimate purpose of this experiment was to investigate whether the use of pepper spray on cocaine-intoxicated individuals may contribute to their death.

Oleoresin capsicum (OC) spray, also known as pepper spray, contains the primary ingredient, capsaicin and has been in use by police for almost two decades. OC spray is but one of the “less-than-lethal” techniques employed by police for subduing and restraining violent and/or uncooperative individuals.

When I first read the media accounts alleging a connection between cocaine, capsaicin and increased cocaine lethality, I was skeptical; the news media seldom gets these things right. As I read the actual article, that skepticism became a palpable discomfort. If you have not read the article yourself, I encourage you to do so. I do not wish to sound overly

critical; I do not know the authors of this article nor do I have any reason to question their motives, these are my opinions, so please bear with me.

The authors of the article conducted an experiment on mice to determine if the intraperitoneal coadministration of cocaine and capsaicin would result in increased lethality above the expected additive effects of each compound. The experiment seems to have been conducted in a relatively reasonable manner, with the notable exception that the capsaicin and cocaine were administered intraperitoneally rather than a dermal or respiratory exposure of capsaicin, which would have better represented the type of exposure one would expect by being sprayed with OC spray. Be that as it may, the authors found that an intraperitoneal injection of 10 mg/kg of capsaicin increased the lethality of a coadministered dose of cocaine at 60 mg/kg from 13% to 53% ( $P < 0.01$ ) and from 53% to 90% ( $P < 0.001$ ) at a dose of 75 mg/kg.

What was troubling was the second part of the article in which the authors performed a retrospective analysis of 26 cases involving human males who died after being sprayed with OC spray. The mere inclusion of this analysis, which has no connection to the experimental data, suggests that there is a clear extrapolation from intraperitoneally injected mice to dermal and respiratory OC spray exposure in humans. The authors even make the statement, "The animal experiments together with the retrospective analysis support the idea that exposure to OC spray in cocaine-intoxicated individuals potentiates cocaine lethality." While the authors make some disclaimers later in the paper, they return to their assertions in the next-to-last paragraph with even greater fervor, this time including methamphetamine, in the statement, "Although mostly safe, reports of sudden death following OC exposure in people intoxicated on cocaine or methamphetamine suggest (along with our animal study) a pharmacological interaction between capsaicinoids and psychostimulants."

Of further concern is how these 26 subjects for retrospective analysis were selected. Rather than gleaning cases to be considered from medical examiner or other files using some non-biased scientific selection criteria, the source of these subjects was the American Civil Liberties Union (ACLU) of Southern California. No other qualifying criteria are stated in the article. In fact, a Mr. John Crew of the American Civil Liberties Union of Northern California is acknowledged in the paper. Mr. Crew, according to an internet search, is the Director of the Police Practices Project for the ACLU of Northern California.

Of these 26 subjects, six had cocaine alone, nine had methamphetamine alone, three had both cocaine and methamphetamine, and one had "potentially toxic levels of pseudoephedrine." Of the 26 individuals, no drugs were detected in two individuals and one individual's drug status was unknown. Strangely, one included individual died as the result of a suicidal gunshot wound just after being sprayed with OC spray, which begs the question as to how one comes to be included in the ACLU's selection of cases. This information was not provided. Based on the breakdown of toxicology results, only the six cocaine-alone cases could even remotely be connected to the subject of this article, that being increased lethality of cocaine by capsaicin. Of further interest are the levels of stimulants found in these individuals postmortem. The mean blood cocaine level in the cocaine positive individuals was  $3.29 \mu\text{g/mL} \pm 7.06$ ,  $n=6$ , and the mean plasma

methamphetamine level was  $13.8 \mu\text{g/mL} \pm 12.0$ ,  $n=12$ . Some of these individuals were positive for ethanol as well.

One is made to wonder, how many of these individuals would have died without being sprayed with OC? Or further, how many stimulant intoxicated individuals, who were not included in this study because they were not sprayed with OC subsequently died? I think we know the answer to some degree. These are the deaths that are, or have been, attributed to choke holds, positional asphyxia, police brutality, and most recently Tasers; those not associated with these police interventions go down as simply drug overdose deaths.

Although the paper says, "Blood toxicology results were available for all decedents", only 20 results were included in the toxicology breakdown, presumably these 20 cases represent the cases that were autopsied. No case by case data were presented to allow the reader to determine if the six excluded cases would have been significant to the conclusions reached by the authors.

Do some people needlessly die at the hands of the police? Of course; it would be foolish to claim this never happens. However, I believe that what this retrospective analysis shows us most clearly is, one, people who are intoxicated by stimulants and are violent and uncontrollable often have encounters with the police. Two, when the police must deal with violent and uncooperative individuals, it often does not end well for the offender. Three, people who progress through steps one and two, sometimes die from their stimulant intoxication, their altercation with the police, a combination of both, or none of the above.

In my opinion, the authors should have entitled the paper, "Intraperitoneal injection of capsaicin, an active ingredient in pepper sprays, increases lethality of cocaine in mice" and stopped right there.

#### References:

Capsaicin, an active ingredient in pepper sprays, increases lethality of cocaine. Forensic Toxicology, DOI: 10.1007/s11419-0079-9, Published online October 2, 2009

John M. Crew, <http://www.cahro.org/html/policingthecomm.html>

