



### K44 Nine Xylazine Related Deaths in Puerto Rico

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After attending this presentation, attendees will understand the nature of lethal risks posed by xylazine and will be familiarized with toxicological and pathological findings of nine xylazine related deaths. The presentation will raise awareness among the forensic community, law enforcement, clinicians and the general public regarding the potential lethality of xylazine used alone or in combination with other drugs.

This presentation will impact the forensic community by providing a better understanding regarding the lethal risks of xylazine and increasing awareness of the presence of this substance as an adulterant of illicit drugs and its role as a cause of death.

Xylazine is a phenylaminothiazine derivative, structurally related to clonidine that is employed as a veterinary sedative, analgesic, and anesthetic that has been proven harmful to humans. In the mid 1960's xylazine was investigated as a sedative hypnotic/analgesic premedication in humans, but was rejected because of its frequent association with severe hypotension. In humans, toxicity consists of central nervous system depression, bradycardia, and hypotension. Its pharmaceutical action results in sympathetic discharge via stimulation of alpha-2-adrenoreceptors.

Xylazine has been frequently found as an adulterant of illicit drugs, mainly heroin. Both drugs are dangerous to humans, and due to their similar pharmacologic effects, drug synergy can occur.

Researchers reviewed nine cases occurring within the period 2003- 2007 at the Puerto Rico Institute of Forensic Sciences (PRIFS) in which xylazine was detected and determined to be the cause of death. Xylazine was detected and quantified in blood using Liquid Chromatography/Mass Spectrometry (LC/MS).

The nine cases of xylazine related deaths are summarized in Table

1. In eight of the nine cases, the individuals were found unresponsive and pronounced dead at the scene. The scene was the decedent's residence in five of the eight cases, in two cases it was the street, and in one case a hospital room. Case #9 complained of shortness of breath, had a witnessed collapse at his residence, and died minutes later. History of drug abuse was present in all cases. Five were males and four were females whose ages ranged from 23 to 70 years. At autopsy there was no external or internal trauma in any of the cases. Recent venipuncture sites in the upper extremities were found in two cases. Internal examination was remarkable for moderate to severe pulmonary congestion and edema, a common finding for all cases. No additional pertinent autopsy findings were noted. Toxicological analyses disclosed the presence of blood xylazine levels (range 0.29 – 5 µg/mL) and morphine (range 0.08 – >1 µg/mL) in all cases. Cocaine was detected in three cases and ethanol in four cases. The cause of death was determined to be toxic effects of xylazine and opioids for all cases. Additionally cocaine and alcohol were included in cases in which they were detected. The manner of death was accidental in all nine cases.

According to a recent study of the street heroin samples analyzed by the Control Substance Laboratory of the PRIFS, xylazine was found in 36% of the cases as a heroin adulterant. Given the potential toxicity and lethality of xylazine when used alone or in combination with heroin or other drugs, it is necessary to be aware of the emergence of this substance in the community and consider methods of improving its detection. There are limited reports of human toxicity and deaths related to xylazine. The toxicological and pathological aspects of nine cases are reported and discussed with all of the literature available to date.



Table 1: Nine PRIFS Xylazine Related Deaths

Cases	Gender	Age	Drugs	Blood (µg/mL)
1	M	29	Xylazine	0.29
			Morphine	0.17
			Cocaine	0.13
			Benzoylcegonine	0.66
2	F	35	Xylazine	0.50
			Morphine	0.21
			Benzoylcegonine	0.13
			Ethanol	0.20%
3	M	23	Xylazine	0.70
			Morphine	0.07
4	F	45	Xylazine	0.70
			Morphine	> 1.00
			6-Monoacetylmorphine	0.03
			Cocaine	0.08
5	M	53	Xylazine	0.30
			Morphine	0.26
			6-Monoacetylmorphine	0.01
			Cocaine	0.10
			Benzoylcegonine	> 1.00
6	F	70	Ethanol	0.14%
			Xylazine	1.90
			Morphine	0.08
			Cocaine	0.19
7	M	40	Benzoylcegonine	0.43
			Xylazine	5.00
			Morphine	0.27
			6-Monoacetylmorphine	0.01
			Ethanol	0.12%
8	F	30	Xylazine	2.00
			Morphine	0.43
			6-monoacetylmorphine	0.02
			Benzoylcegonine	0.11
			Ethanol	0.36%
9	M	30	Xylazine	0.41
			Morphine	0.13
			6-Monoacetylmorphine	0.02
			Benzoylcegonine	0.10

Xylazine, Heroin, Cause of Death