



Clinical Update: August 2019

What Did My Patient Actually Take? Unexpected Causes of Cocaine Results

The interpretation of cocaine results differs when considering presumptive vs. definitive testing methods, and may also differ among laboratories. The information provided here is intended to assist providers with deciphering positive cocaine results from Aegis, which have undergone definitive testing by liquid chromatography / tandem mass spectrometry prior to reporting.

Cocaine use dates as far back as 5,000 years ago, with the chewing of coca leaf in South America. It was isolated from the *Erythroxylum coca* plant in 1860 by a pharmacist in Germany, Albert Niemann, and became widely used in medical practice as a local anesthetic after an ophthalmologist from Vienna, Carl Koller, demonstrated its use as a local anesthetic in an ophthalmologic surgery in 1884.^{1,2} This event laid the foundation for cocaine's use as a regional and local anesthesia.² The following topics should be considered when evaluating a positive cocaine result from Aegis:

Medical Use

Cocaine is available for medical use as a 4% or 10% topical solution³ and is still sometimes utilized in select medical settings for its vasoconstrictive and anesthetic properties. Known medicinal uses of cocaine include otolaryngologic procedures (ear, nose, throat [ENT]), epistaxis, minor lacerations, dermatologic procedures and gynecologic procedures.⁴⁻⁸ However, given concerns for its CNS and cardiovascular adverse effects, regulatory issues, and addiction potential, its use in medical practice has significantly declined and use of safer alternatives has been encouraged in literature.^{2,4,5,9} A 2004 survey of otolaryngologists revealed that 65% had administered cocaine in the previous 10 years compared to 92% in a similar 1977 survey.⁵ Application of topical cocaine during a medical procedure may result in a cocaine positive result, likely up to a few days post-procedure.^{10,11}

Coca Tea

Coca tea (or "Mate de Coca") is derived from the same plant that is used to synthesize cocaine; coca leaves may contain cocaine, along with other related alkaloids. It is commonly ingested legally in South American countries, particularly Peru and Bolivia.¹² Ingestion of coca tea, which can contain cocaine, may cause mild stimulation and euphoria.¹³ Importation of coca leaf requires registration with the DEA, although coca teas containing cocaine are readily available on the internet despite their illegal status.

Natural coca leaf contains 2 to 6 mg of cocaine per "tea bag."¹²⁻¹⁴ As a comparison, a line of cocaine usually contains 20-30 mg of cocaine. Based on research at the National Institute on Drug Abuse (NIDA), on average, it takes about 0.5 to 1 mg of cocaine to produce a positive urine test at 300 ng/mL (the threshold for cocaine at Aegis is 50 ng/mL for confirmation). Studies of coca tea ingestion have demonstrated positives for the metabolite of cocaine, benzoylecgonine (BZE), at urinary concentrations over 4,000 ng/mL.¹² The leaves of the coca plant can be decocainized, much like coffee can be decaffeinated. However, if a patient is ingesting coca tea and they test positive for cocaine, they should be informed that their tea is illegal in the US.

Occupational Exposure

Certain occupations involving excessive and/or frequent exposure to cocaine, such as crime laboratory personnel or providers administering cocaine during (ENT) procedures, may result in cocaine detection on a

urine drug test. However, proper use of personal protective equipment (PPE) reduces the likelihood of positive results due to occupational exposure.

In a study involving physicians administering a single dose of cocaine to a patient, the maximum BZE concentration in the group of physicians wearing a mask (but no gloves) was 53 ng/mL at eight hours following exposure; however, BZE results were negative in the group wearing gloves. One physician in this study was asked to handle cocaine for two minutes and wait 15 minutes before hand washing, repeating every two hours for six hours on day one and every hour for six hours on day two. This physician experienced a maximum BZE concentration of 245 ng/mL at 18 hours following exposure.¹⁵

A study of crime laboratory workers showed three out of nine subjects had levels of BZE \geq 50 ng/mL after analyzing solid dosage forms of cocaine (maximum of 227 ng/mL). Levels in two criminalists working with large amounts of cocaine in a small room with no fume hood were measured up to 278 ng/mL when wearing a face mask and gloves and up to 1,570 ng/mL when wearing gloves only. Another group transferring cocaine back and forth to each other over 25 times had positives above 50 ng/mL while wearing gloves, mask, goggles, a disposable gown, and a cap.¹⁶ Although not common, occupational exposure to cocaine should be ruled out.

Passive Exposure

Passive exposure is a common excuse used for unexpected illicit positive results in urine; however, the majority of passive exposure claims are unlikely to cause a positive result. Subjects exposed to heated cocaine in a small unventilated room for one hour had urinary BZE concentrations up to 123 ng/mL at five hours following exposure, with BZE concentrations for all individuals falling below the Aegis threshold by 15 hours.¹⁷ An earlier study exposing an individual to similar unventilated conditions and amounts of volatilized cocaine for 30 minutes showed no positive findings above the Aegis threshold for BZE.¹⁸ In a more realistic scenario, individuals were passively exposed to someone smoking cocaine with occasional ventilation for at least two hours and there were no positive results above the Aegis threshold of 50 ng/mL.¹⁷ Additionally, a study involving touching a cocaine-coated product all day and another involving application of topical cocaine without washing for 13 hours resulted in low levels of BZE up to 72 ng/mL and 55 ng/mL, respectively.^{19,20}

Patients have reported a multitude of passive exposure scenarios, such as disposing of a family member's cocaine, helping a friend cut cocaine, and being in the presence of individuals smoking cocaine. While these scenarios are unlikely to cause a positive result, these excuses offer insight into the patient's social environment, which may be considered when utilizing risk assessment tools.

Adulterant

Cocaine has been described as being adulterated with or contaminated by other drugs. The Drug Enforcement Administration (DEA) has reported seizing cocaine laced with fentanyl or fentanyl analogs.²¹ In addition, there are anecdotal reports of individuals lacing their own marijuana with cocaine. While these may not be common occurrences, certain individuals may be more likely than others to be at risk for this type of exposure to cocaine.

Oral Fluid Testing Considerations

Cocaine has been reported to be on many public surfaces. A small study published in 2011 analyzed public surfaces in a working-class to upper-middle class area of New Haven, CT. While they used an immunoassay technology, which may be subject to false positives, most fuel pump handles, ATM buttons, shopping carts and shopping mall doors tested presumptive positive for cocaine.²² A study conducted in 1996, found that cocaine was on 79% of US paper currency at a threshold of 100 ng and in 54% of currency above a threshold of 1,000 ng.²³ While the amount on currency may be too small to give any stimulant effect, the possibility exists for the cocaine to be transferred to an individual's hands.



Because an individual who does not necessarily use cocaine can have it on their hands by touching contaminated surfaces or money, it is advised that individuals should wash their hands thoroughly before touching the oral fluid collection device. For more information and an instruction document on proper oral fluid collection technique, please contact the Clinical Team at clinical@aegislabs.com.

NOTICE: The information above is intended as a resource for health care providers. Providers should use their independent medical judgment based on the clinical needs of the patient when making determinations of who to test, what medications to test, testing frequency, and the type of testing to conduct.

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