Fraudulent Methods Causing False Negatives In Urine Drug Testing

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ARTICLE INFO

Received: January 25, 2019
Published: February 04, 2019


SUBSTANCE ANALYZES ARE CARRIED OUT TO DETERMINE DRUG USE. THERE IS A WORKFLOW PLAN THAT SHOULD APPLY FOR DRUG USE TESTS CARRIED OUT FOR MEDICO-LEGAL PURPOSES. THE MOST IMPORTANT THING ABOUT THIS IS THE PRESERVATION OF URINARY INTEGRITY. THESE TESTS MOSTLY PERFORM FOR SECURITY-SENSITIVE PROFESSIONS OR FORENSIC SITUATIONS. THEREFORE, DRUG USERS TRY FRAUDULENT WAYS TO HIDE THEIR DEPENDENCIES. EASILY OBTAINED CHEMICALS ARE USED FOR THIS PURPOSE. EXAMPLES INCLUDE NITRITE, SOME COMMERCIAL PRODUCTS SUCH AS PEROXIDE, OR HOUSEHOLD CHEMICALS SUCH AS TABLE SALT OR BLEACH. ALWAYS BE AWARE OF ADULTERANTS USE. PROPER MONITORING DURING URINE COLLECTION WILL GREATLY PREVENT FRAUDULENT CONDITIONS.

Another important point is to conduct urine integrity tests (pH, nitrite, density, and creatinine). Samples which urine integrity test (pH, nitrite, density, and creatinine) results in an acceptable range should be analyzed. We use immunoassay screening and GC-MS validation methods for analysis. Immunoassay screening tests are affected by these adulterants than false negative results obtain due to the deteriorate antigen-antibody relationship. GC-MS verification tests should perform in case of clinical suspicion.

ABSTRACT

Substance analyzes are carried out to determine drug use. There is a workflow plan that should apply for drug use tests carried out for medico-legal purposes. The most important thing about this is the preservation of urinary integrity. These tests mostly perform for security-sensitive professions or forensic situations. Therefore, drug users try fraudulent ways to hide their dependencies. Easily obtained chemicals are used for his purpose. Examples include nitrite, some commercial products such as peroxide, or household chemicals such as table salt or bleach. Always be aware of adulterants use. Proper monitoring during urine collection will greatly prevent fraudulent conditions.

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Oxidizing Chemicals

Nitrites: Nitrite in urine is caused by nitrate reducing pathogens in urinary tract infections. However, the commercial products KLEAR and Whizzies can purchase from markets and they contain potassium nitrite (KNO₃) and sodium nitrite (NaNO₂), respectively [6]. The advantage of nitrite adulterant is that it is easy to use and does not cause any changes in urine appearance. Nitrite analysis can be performed semiquantitatively by urine test strips or quantitatively by automated colorimetric methods. According to the increasing level of nitrite in urine when kept in room temperature for 6 or 8 days, it can be differentiated from the externally added commercial nitrite [7]. Nitrite ion can cause inconsistent results especially for cannabis testing, between the immunoassay screening and gas chromatographic-mass spectrometric (GC-MS) confirmation in urine. False negative immunoassay and GC-MS results obtain due to acidic pH and urine waiting time (more than four hours). However, in the alkaline pH urine, the immunoassay results were not significantly altered, while GC-MS results were affected. For this reason, we can alkalize urine to prevent false negative results in the immunoassay screening tests [7].

Peroxides: Peroxide-containing urine adulterants are highly effective for masking the presence of cocaine and opiates on screening and confirmatory assays. If we add four or five drops peroxide in urine, a dark brown color is performed due to the reduction of heptavalent chromium by hydrogen peroxide. Stealth is a combination of peroxide and peroxidase. The extent of successful concealment of opiates was inversely related to opiate concentration [8,9].

Pyridinium Chlorochromate (PCC): PCC was found to effectively produce false negative results for cocaine and amphetamine in Both Screening and Confirmatory Assays. PCC is commercially sold as Urine Luck, Klear II. The interference mechanism appears not to be a chemical change in the target drug but a decrease in standard pH levels of samples adulterated with PCC [9].

Glutaraldehyde: It was one of the earliest commercially adulterants, has sold as Clean X or Urine aid. These products cause interferences in immunoassay methods by decreasing absorbance rates, especially in cannabis tests. Additionally, glutaraldehyde didn’t affect GC-MS results [10].

Non-oxidizing Adulterants

Table salt: Drug binding by changing protein structures [11]. Therefore, table salt affects the immunoassay results and its high doses produce false negative results. Studies have shown that sodium chloride increases urine density, which is one of the urine validation tests [12].

Detergent/Soap: These cleaning products are including surfactants and alkaline builders. Soap affects the drug binding on immunassays by changing the pH of the urine sample. Soaps and detergents cause false negative results for amphetamine, barbiturate, cannabis and cocaine [12].

Sodium Hydroxide: Drano drain cleaner is solid sodium hydroxide and it is consisting in variations of sodium hydroxide (lye), sodium hypochlorate (bleach), sodium nitrate, sodium chloride (salt) and aluminum. Sodium hydroxide is a caustic strong base. It causes change to alkaline pH in urine samples, then it effects the drug binding and solubility and produces false negative urine results [13].

Vinegar: Vinegar is a hydrous solution of acetic acid and called ethanoic acid or methane carboxylic acid. It decreases the urine pH levels, then effects the drug binding on immunoassay methods. Drug addicts use vinegar as a drug detox product. Vinegar disrupts the antigen-antibody association and effects especially amphetamine and cannabis results [11]. It was suggested that GC-MS confirmation test results aren’t affected by non-oxidizing adulterants. Adding sodium hydrosulfide or sulfamic acid to the GC-MS method can help remove excess oxidizing additive and may prevent further oxidation of unchanged opium analytes in the sample, thus the accuracy of GC-MS results is less affected by oxidizing adulterants [13].

Conclusion

To prevent false negative results, it is important to apply the appropriate urine collection procedure. Not to forget the importance of surveillance while obtaining the sample because it is hard to detect the adulterants in analytical and post-analytical phase. Specimen integrity tests reduce false negative results. Also, in case of clinical suspicion, a validation test should be performed with the GC-MS method.

References


