

Specimen Validity Testing (SVT) — Effects of Oxidizing Agents on Drugs in Urine and Procedures for Detection

REFERENCE: Paul BD, Dunkley CS: Specimen validity testing (SVT) — Effects of oxidizing agents on drugs in urine and procedures for detection; *Forensic Sci Rev* 19:29–47; 2007.

ABSTRACT: Since the inception of the drug-testing program in the U.S. Armed Forces in 1982, urine adulteration with the intent to conceal drug use has been a serious problem to forensic scientists. Initially, drug users tried almost anything that was available at the collection sites. Soon they recognized that certain chemicals could be used to destroy some drugs and interfere with the testing procedures. Some drug analytes, in particular morphine and 11-nor-delta-9-tetrahydrocannabinol-9-carboxylic acid, a metabolite of delta-9-tetrahydrocannabinol, could not be detected in presence of some oxidizing agents. As the use of adulterants increased, specimen validity testing was introduced by the Department of Health and Human Services in 2004. While specific reagents could be used to test nitrite, chromate, and iodine, test procedures for many other oxidizing agents were not available. In an attempt to detect most oxidants, a different approach has been introduced to identify urines adulterated with oxidizing adulterants. In this approach, the oxidizing property of normal urine is compared with that of urine containing oxidizing agents. In the procedure, samples are allowed to interact with excess ferrous (Fe^{2+}) ions and then with chromogenic compounds. In the presence of oxidants, Fe^{2+} ions with low reduction potential (E^0 0.771 V) are immediately oxidized to ferric (Fe^{3+}) ions, which then change the chromogenic compounds to colored chromogens. Specific spectral pattern and intensity are the keys in quantification of oxidants in urine (milliEquivalent/liter, mE/L). The method appeared to be promising in differentiating normal urine from urine adulterated with oxidizing agents. Some oxidizing adulterants in urine are unstable. If reduced, it could be reconverted to the oxidizing agents and tested by the general oxidant test.

KEY WORDS: Oxidizing adulterants, testing oxidizing compounds, urine drug testing.
