K55 Can Synthetic Urine Replace Authentic Urine to Cheat Drug Testing?

Victor J. Kim, BBA, Tripler Army Medical Center, Honolulu, HI 96859; Catherine K. Okano, PhD, Tripler Army Medical Center, Tripler Army Medical Center, HI 96859; Caroline Osborne, BS, Tripler Army Medical Center, Honolulu, HI 96859; Deanna Frank, BS, Tripler Army Medical Center, Honolulu, HI 96859; Christopher Meana, BS, NCIS Hawaii Field Office, Honolulu, HI ; Marisol Castaneto, MS, Ewa Beach, HI 96706-6430*

Learning Overview: After attending this presentation, attendees will understand what Synthetic Urine (SU) is, if it can really beat workplace drug testing, and its negative effect to our community and society.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing that drug testing can be fooled with the substitution of SU products, which could bring about meaningful changes to make workplace drug testing as effective as possible.

Background: Urine is still the most common matrix utilized in workplace drug testing. Workplace drug testing in the United States Department of Defense was established to deter service members from illicit drug use and ensure personnel readiness. Federal civilian employees in drug testing positions also undergo Urine Drug Testing (UDT) before and during employment. Attempts to obscure illicit drug use have been observed in UDT programs with excessive hydration, urine adulterants, and urine substitutions with or without the use of prosthetic sex part (e.g., "Whizzinator"). SU is utilized by drug testing laboratories as a matrix for quality control preparations. However, SU products are now commercially sold as "novelty" and/or "fetish urine."

Objective: To determine if SU can pass as authentic urine, this study challenged Army UDT collection and testing procedures using eight different commercial SUs.

Material and Methods: Eight SU products purchased from local smoke shops or online vendors were poured in plastic collection urine bottles. Adulterated/substituted samples such as 10% bleach in water (1:5 dilution), 10% bleach in urine (1:5 dilution), 10% hydrogen peroxide in urine (1:5 dilution), apple cider vinegar, and apple juice were also individually poured in collection bottles. These samples were placed randomly in boxes with other negative urine specimens. Three laboratory technicians were instructed to process the samples and pour sample aliquot to undergo immunoassay screening per standard operating procedures. Aliquots were screened in the Beckman AU5800 analyzers for cannabinoids, cocaine, amphetamines, codeine/morphine, hydrocodone/hydromorphone, oxycodone/oxymorphone, benzodiazepines, and synthetic cannabinoids. All SU, five adulterated urine samples, and two donor urine specimens were sent to a separate drug testing laboratory for specimen validity testing. None of the technicians in either laboratory had prior knowledge of which were adulterated or SU samples. Additionally, on-site SU (Synthetic UrineCheck™) and adulteration strips (Sciteck® AdultaCheck® 6) provided by Sciteck® were challenged with SU, adulterated urine, and negative authentic urine. Water and donor urine samples were used as controls for the Synthetic UrineCheck™. The Sciteck® AdultaCheck® 6 strips tested for oxidant, creatinine, nitrite, glutaraldehyde, pH, and chromate.

Results: Drug laboratory personnel identified five of eight SU products during accessioning. All SU products screened negative in the drug immunoassay and additionally passed the specimen validity testing as valid urine. The SU detection test strips were able to discriminate between authentic urine and SU products, although the test strip was not able to distinguish between diluted urine and SU. When the diluted urine and SU samples were tested with the Sciteck AdultaCheck® 6, all passed the adulteration test strips and were identified as authentic urine.

Conclusion: Direct observation during the collection process is critical to deter donors from adding or substituting their own urine specimens. In the civilian UDT, temperature strips may be affixed to the collection bottles or placed on the bottles immediately after collection to measure urine temperature. The specimen's temperature must read between 90°F–100°F (32°C–38°C). In contrast, military UDT do not use temperature strips and rely on randomly selected observers to monitor any foul play during the collection process. In either circumstance, the use of "Whizzinator," a prosthetic penis, has become an option for drug users. The prosthetic penis is attached to a bladder with a temperature strip. To deter SU use, UDT programs need to enforce optimal environment and direct observation during the collection process.

Synthetic Urine, Workplace Drug Testing, Urine