Integrity of Urine Specimens for Toxicologic Analysis — Adulteration, Mechanisms of Action, and Laboratory Detection

REFERENCE: Wu AHB: Integrity of urine specimens for toxicological analysis — Adulteration, mechanisms of action, and laboratory detection; *Forensic Sci Rev* 10:47–65; 1998.

ABSTRACT: Drug testing in urine for employees is an important deterrent for drug abuse. Because of the dire consequences of a positive result, many individuals who might otherwise test positive will go to great lengths to escape detection. The term "adulteration" in this context refers to: substitution of drug-free urine, purposeful ingestion of agents or fluids designed to either accelerate drug clearance or dilute urine such that drug concentrations are below administrative cutoffs (in vivo adulterants), and adding foreign substances after urine collection (in vitro adulterants) to interfere with drug assays (immunoassay screening and gas chromatography/mass spectrometry confirmation). For immunoassays, adulterants can interfere photometrically or alter antibody-antigen binding. For GC/MS analysis, in vitro adulterants can chemically alter the targeted drug to an undetectable derivative. The laboratory must use different schemes to detect adulterants, including physical observations and tests (e.g., color, odor, and pH), and chemical analyses (e.g., creatinine or glutaraldehyde). If the identity of the donated urine sample itself is in question, DNA tests can be performed. The laboratory must continue to develop new adulteration detection schemes as new adulterants are encountered.

KEY WORDS: adulteration, DNA analysis, gas chromatography/mass spectrometry, immunoassay screening.