

Comparison of Common Commercial Immunoassay Kits for Effective Application in Workplace Drug Urinalysis

REFERENCE: Liu RH: Comparison of common commercial immunoassay kits for effective application in workplace drug urinalysis; *Forensic Sci Rev* 6:19–57; 1994.

ABSTRACT: Workplace drug urinalysis protocols include an initial immunoassay followed by a confirmatory gas chromatography/mass spectrometry (GC/MS) test of immunoassay-positive samples. (Drug categories that are commonly tested include: amphetamines, barbiturates, benzodiazepines, cannabis, cocaine, lysergic acid diethylamide, methadone, methaqualone, opiates, phencyclidine, and propoxyphene. Not all drug categories are tested by all workplace drug urinalysis programs.) Only those samples that are tested positive by both the initial and the confirmatory procedures can be reported as positive. Thus, when adopting an immunoassay, one must have knowledge of the assay's cross-reacting characteristics and the assay's apparent analyte concentration that corresponds to a specific analyte concentration determined by the GC/MS procedure.

The underlying principles of the commonly used radioimmunoassay, enzyme immunoassay, fluorescence polarization immunoassay, and particle immunoassay are outlined. Cross-reacting characteristics of these immunoassays as reported by the manufacturers and independent laboratories are tabulated. This information shows that commercial immunoassay kits for drug categories that are included in workplace drug urinalysis programs are generally more specific than those kits that are for clinical use only. Furthermore, recently manufactured immunoassay kits targeted for use in workplace drug urinalysis programs are more specific than those manufactured earlier.

Reported effects of adulterants, such as salt, cleaning agents, etc., on commonly used immunoassays are summarized. Without more comprehensive and systematic studies, it is difficult to make general statements concerning the superiority of one methodology over the others. It is clear, however, that cannabinoid assays are the most susceptible to the influence of adulterants.

Reported immunoassay–GC/MS correlation data are reviewed. Significant correlations exist in all cases. The immunoassay apparent analyte concentration corresponding to a specific GC/MS analyte concentration may be approximated based on the resulting regression equations. Since the corresponding immunoassay apparent analyte concentrations vary with the specificities of the reagents used, the immunoassay reagent manufacturers should carefully study specificity characteristics of each manufacturing batch and provide these correlation data for users' evaluation and adaptation.

KEY WORDS: Adulteration, cross-reactivity, drug testing, enzyme immunoassay, fluorescence polarization, immunoassay, immunoassay, radioimmunoassay.
