

Department of Clinical Laboratory Sciences

Graduate Masters Theses

The Effects Of Consumption Of Herbal Dietary Supplements On Amphetamine & Metamphetamine Urinalysis - The Herbal Dietary Supplement Defense.

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ABSTRACT

Workplace urine drug testing is an increasingly common practice involving both private and public sectors and is one way used in the attempt to deter illicit drug use. A positive urine analysis result for a military member can result in severe allegations that may lead to punitive measures being taken against that member. These measures may include incarceration, loss of rank, and loss of salary/benefits. The United States military is the single most active agency in which several million-drug tests are performed each year. For instance, Brooks Air Force Drug Testing Laboratory analyzed approximately 380,000 urine specimens for fiscal year 2000. Specimens are routinely tested for the presence of marijuana metabolites, cocaine metabolites, opiates, phencyclidine, barbiturates, and LSD. All of the approximate 380,000 specimens submitted were analyzed for members of the amphetamine class of drugs including amphetamine, methamphetamine, methylenedioxyamphetamine (MDA), 3, 4-methylenedioxymethamphetamine (MDMA), and 3, 4-methylenedioxyethylamphetamin (MDEA). The average positive rate for the amphetamine class is 0.04-0.06% per year. After identification of a positive urine test, the result is reviewed by the Medical Review Officer (MRO) to ascertain if there is any possible explanation for the result other than illegal drug use. Due to the increase in inquiries concerning herbal dietary supplements and the effect they may have on amphetamine/methamphetamine urinalysis, the Air Force Drug Testing Laboratory at Brooks Air Force Base, along with Forensic Toxicology Laboratory, Bexar County Medical Examiner's Office in San Antonio, Texas, conducted a research study to evaluate the possibility of herbal products exhibiting a positive amphetamine/methamphetamine urinalysis result. Three popular herbal dietary supplements (Metabolife, Diet Phen, and ECA Stack) were evaluated using eight healthy human volunteers. Baseline urine specimens were collected before any herbal products were administered and subsequent specimens were collected twice a day during each weeklong drug administration period. The 268 urine samples collected throughout the study were analyzed using three common immunoassay systems: Abbot AxSYM[®] System (FPIA), STC & Orasure Technologies Microplate (EIA), and Roche ONLINE[®] (KIMS). All results were subsequently analyzed for amphetamine/methamphetamine, ephedrine/pseudoephedrine concentrations using a basic drug extraction, acetic anhydride derivitization method by Gas Chromatography/Mass Spectrometry (GC/MS). All three immunoassay systems showed varying degrees of cross reactivity for the amphetamine/methamphetamine drug class. However, none of the specimens were found to be positive for any of the illicit amphetamine analogs using the

GC/MS method. The samples that did result in a positive immunoassay result were not consistent with the use of an illicit amphetamine analog and revealed no direct correlation between ephedrine concentration, pseudoephedrine concentration, or the concentration ratio of these two compounds and the apparent amphetamine/methamphetamine concentration indicated by the immunoassay response. In an effort to evaluate the relative effect of the presence of ephedrine and/or pseudoephedrine (licit substance found in some of the herbal products studied) on each of the respective immunoassay systems employed, the response for each "positive" specimen was converted into an amphetamine or methamphetamine equivalent concentration to determine at what concentration range or ratio of ephedrine/pseudoephedrine concentrations a "false" positive amphetamine/methamphetamine result occurred. This information is important in that it will provide the basis for a Medical Review Officer (MRO) to evaluate the validity of explanations of herbal product use, especially those containing ephedrine, from individuals who have positive amphetamine urinalysis results.