Urinary Dextroamphetamine in Adult Attention Deficit/Hyperactivity Disorder

To the Editor:

Attention Deficit/Hyperactivity Disorder (ADHD) is a well-recognized behavioral disorder estimated to affect 2–9% of school-age children (1,2). Historically, ADHD was not thought to continue beyond adolescence; however, long term follow-up studies in the 1980s showed that disabling core symptoms persist into adulthood in 11–50% of cases. Hence, 1–3% of adults may currently have symptoms of ADHD, which is referred to as adult ADHD (AADHD). As with children, AADHD patients exhibit the classic behavioral triad of inattention and distractibility, impulsiveness, and hyperactivity. Symptoms of AADHD include marked inattention, easy distractibility, impulsiveness, poor concentration, daydreaming, forgetfulness, low frustration tolerance, temper tantrums, intrusiveness, and extreme impatience.

As with children, stimulants are generally the most effective pharmacotherapy for AADHD, particularly methylphenidate and pemoline. Some patients who do not respond to methylphenidate may be successfully managed with dextroamphetamine. A typical starting dosage of dextroamphetamine is 2.5–5 mg once daily. The dosage may be increased gradually to a maximum of 40 mg/day with a typical regimen being 10–20 mg/day (2). Because the maximum therapeutic benefit of amphetamine is associated with its absorption phase, patients divide the dose over two or three administrations daily or ingest a sustained-release formulation. To date, however, no studies are available concerning the long-term efficacy or adverse effects of sustained-release dextroamphetamine dosage forms in AADHD patients. There is an increased incidence of a history of ADHD and AADHD in populations of alcoholics and other drug abusers. However, with proper management strategies, the “dual diagnosis” of AADHD and substance abuse may be successfully treated (3).

Approximately 30% of patients do not respond to or are unable to tolerate stimulants. Other drugs that have proved effective in controlling various symptoms in these patients include the antidepressants imipramine, desipramine, bupropion, venlafaxine, pargyline, and deprenyl and the antihypertensives clonidine and propanolol (1–3).

To determine concentrations of dextroamphetamine that may be present in urine from such patients, six random urine specimens were obtained with informed consent over a 3-day period from a 29 year old, 6 ft. tall, white male outpatient weighing 200 lbs. who was being treated for AADHD with 30 mg/day of dextroamphetamine. The subject was in good health, drank coffee, and smoked one pack of cigarettes daily. For two months preceding and at the time of the specimen collection, the patient was ingesting 10-mg Dexedrine® sustained-release capsules twice daily (two in the morning and one after lunch). Amphetamine quantitation was performed by liquid–liquid extraction and HFBA derivatization followed by GC–MS analysis as previously described (4). The results of these analyses are presented in Table I. In five of the six specimens, amphetamine urine concentration far exceeded those determined in my laboratory as part of a controlled study following single 20-mg doses (5). In that study, the highest dextroamphetamine urine concentration observed in all the urines collected from seven subjects was 4,500 ng/mL. However, it should be noted that the AADHA subject in this present report was at pharmacokinetic “steady-state” for two months. The range of concentrations in Table I (1100–17,800 ng/mL) should caution toxicologists against making assumptions as to ingested drug dose based upon the results of a single random urine drug test.

Forensic toxicologists, particularly those involved with regulated and nonregulated pre-employment and employee urine drug testing, should be aware of the recent medical indication of dextroamphetamine pharmacotherapy for AADHA.
Additionally, Fargason and Ford (1) noted that “some clinicians anecdotally report that the long-acting form of methamphetamine hydrochloride provides the only consistently long duration of action” of stimulant formulations for the treatment of ADHD.

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References