



A200 Taiwan Banknote Drug Contamination

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After attending this presentation, attendees will understand some potential forensic implications of banknote drug contamination focusing on specific results from the analyses of New Taiwan Dollar (NTD) banknotes, comparing these data with drug-use demographics and drug seizures in Taiwan, as well as published reports concerning currency from the U.S. and other countries.

This presentation will impact the forensic science community by furthering the understanding of external contamination issues, which may be germane to medico-legal investigators who evaluate the significance of drug test results in: (1) questioned deaths; (2) public health concerns/forensic epidemiology; (3) drug crimes; and, (4) drug-use toxicological tests where reliability is based on assumptions about external contamination, particularly when forensic investigators rely on examinations of surfaces in the workplace and elsewhere to interpret the significance of the presence of drugs on these surfaces.

New Taiwan dollars (n = 200, \$100 denomination) were collected from five major metropolitan areas representing a geographical distribution within the Republic of China (Taipei, Taipei County, Taoyuan, Taichung City, and Kaohsiung), taking precautions to insure the integrity of collection procedures. From each general location, multiple bills were retrieved from actual transactions in commercial locations including outdoor markets near temples, food stands, betel nut outdoor stands, convenience stores, hotels (including in red-light district), fuel stations, private karaoke and movie booth rentals, entertainment, and gaming locations (slot machines).

Initial presumptive testing of banknotes was conducted using disposable Drugwipe II immunoassay devices (formerly Securetec, now Affiniton LLC) for the following classes of controlled substances/metabolites: cannabis, amphetamines, cocaine, and opiates. Further extraction followed for instrumental confirmation. Negative and positive controls were included as additional tests to exclude false-positive results from laboratory contamination. Deuterated internal standards

(d₃-cocaine, d₅-amphetamine, d₅-methamphetamine, d₅-methylenedioxymethamphetamine, d₄-ketamine, d₃-morphine, and d₃-Δ⁹-tetrahydrocannabinol) were added to the banknotes, and they were air dried. Analytes were removed from specimens using 10mL 0.1 N hydrochloric acid, and then separated using solid phase (SPE) columns, derivatized using pentafluoropropionic anhydride, and analyzed by ion trap CI-GC/MS.

When extracted and screened with Drugwipe II, a significant number of bills showed positive results for cannabis (69.6%), amphetamines (65.2%), opiates (26.1%), and cocaine (8.7%). Since Taiwan is an island-nation located on the edge of Southeast Asia and Northeast Asia, with a well-developed shipping system (both maritime and air transport) and extensive movement of goods within these regions and worldwide, there is ample opportunity for drug trafficking. The relationship between illicit drug seizures and drug-use demographics within Taiwan provide insight into NTD banknote analyses reported in this research. These data show quantities of controlled substances (ng/banknote) which exceed the limits of detection and limits of quantification for analyses of other external surface matrices such as hair (expressed in ng/mg) and sweat (expressed in ng/mL extract), as well as inanimate objects, for which there is no mandated standard practice or cutoff for reporting a surface as "positive" for a drug. These results suggest caution when ascribing drug use conclusions based on surface testing when contamination cannot be excluded.

Drugs, Contamination, Currency