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SYNTHETIC CANNABINOID USE IN THE WORKPLACE

Drug Testing 2011–2015: Use Patterns and Prevalence

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The introduction of synthetic cannabinoid chemicals into the United States in 2009 provided an alternative for abusers of traditional plant marijuana. These products were labeled "Not for Human Consumption" to avoid control by the U.S. Food and Drug Administration (FDA) or Drug Enforcement Administration (DEA). Because the effects of synthetic cannabinoid chemicals are similar to tetrahydrocannabinol (THC), parolees were quick to adopt these products in an effort to avoid detection by law enforcement because the metabolite Carboxy-THC was absent when tested. This trend quickly moved into the workplace as individuals could now use marijuana-like products without the possibility of detection using standard THC screening and confirmation procedures.

The naming convention for these compounds is unique. The early investigators named the compounds using their initials (e.g. John W. Huffman developed the JWH-series of compounds), universities, or pharmaceutical companies. The newer compounds are now a series of letters describing the compound chemically.[1,2,3]

The psychological effects of these drugs are intended to mimic the effects of THC in the brain. Depending on the dose, self-reported effects range from mild euphoria to hyperventilation, paranoia, hallucinogenic effects, vomiting and seizures. Physiologically, the effects include slurred speech, poor motor coordination, lightheadedness, red eyes, pupil dilation, elevated pulse and blood pressure.[4]

The Kansas City metro area became a significant manufacture and distribution point for synthetic cannabinoids. A seven-member drug distribution ring was created stretching into Missouri, California, Texas, Georgia, and Colorado with the intention of distributing controlled substances, which included synthetic cannabinoids, bath salts, and counterfeit drugs. This

group sold at least $16 million worth of these drugs over a period of two years. Sentencing is not yet completed but the primary individuals are facing prison terms of 20 years and $1 million in fines.[5]

Laboratory Study

Due to the prevalence of synthetic cannabinoid use in 2011, numerous laboratories developed screening and confirmation testing methods. Based on the early positive rates, the testing quickly expanded from being primarily reasonable suspicion and post-accident testing to include random and pre-employment testing categories as well. Synthetic cannabinoid compounds in circulation have changed significantly over the past 4½ years. As a result, the synthetic cannabinoid panel composition should also change. In 2011, one synthetic panel contained 8 compounds and the testing data was presented in the winter 2013 edition of *DATIA focus*. This data reflected an overall positive rate of 19.8%.[6] In 2014, this panel contained 21 compounds and its testing data was presented in

Figure 1

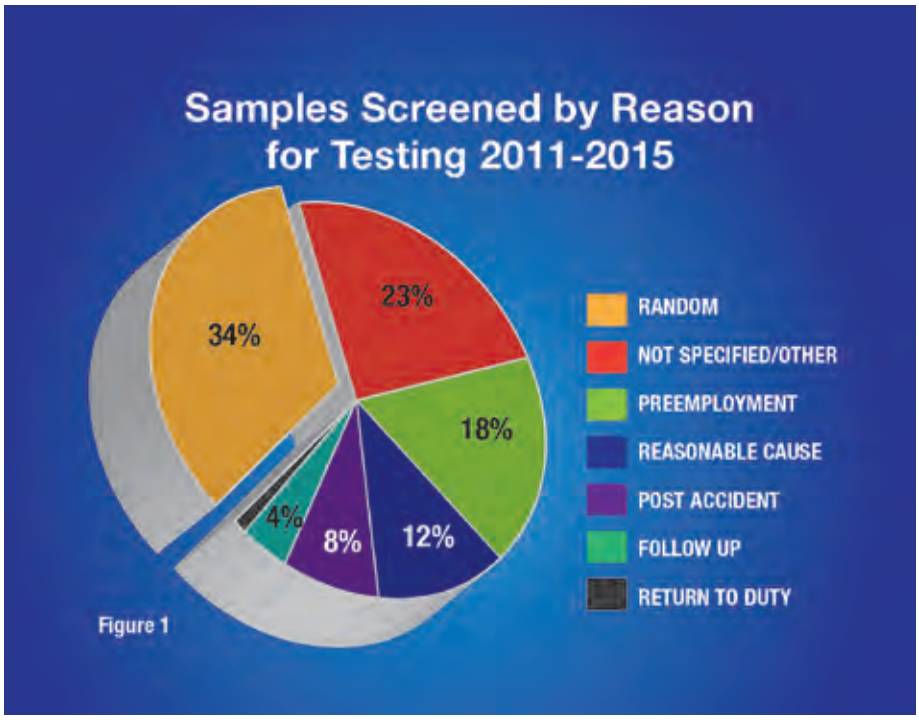
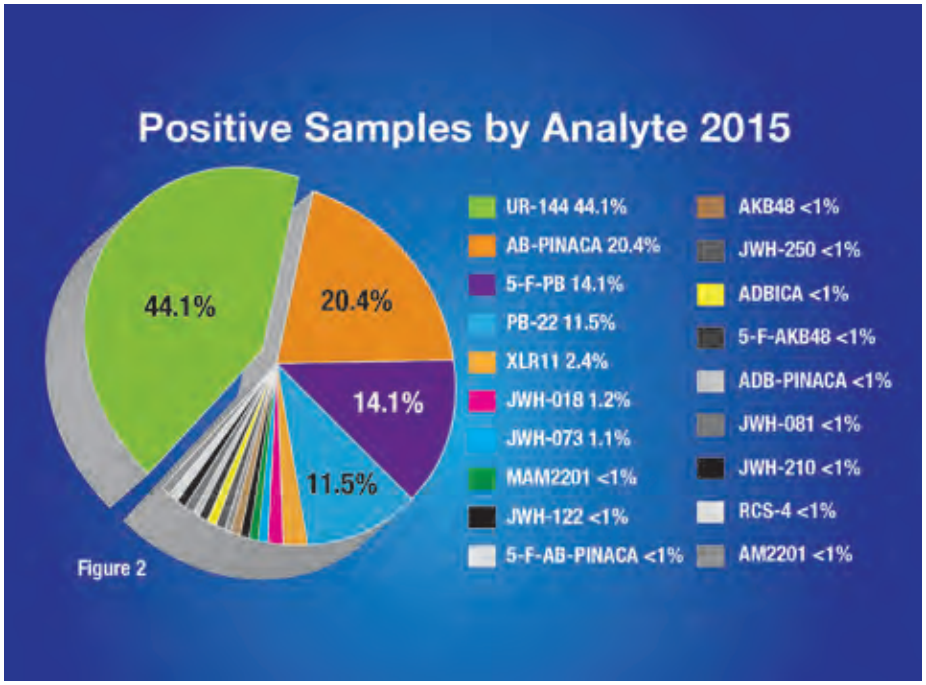


Figure 2



the spring 2015 *DATIA focus*. The current panel contains metabolites for 28 compounds and includes the most recently released compounds and updates through December 2015.

To ensure effectiveness, the testing cutoffs for each of these compound metabolites must be as low as possible based on available technology for confirmation and the availability of a second laboratory for reconfirmation of a Bottle B.

Results

The following graphs reflect 4.5 years of testing and 200,000 workplace drug testing specimens performed by Clinical Reference Laboratory, Inc.

Figure 1 contains a pie-chart summarizing the reason for test by category for calendar years 2011–2015. Over this 4 year period, the percentage of testing by category has remained relatively constant with Random and Pre-Employment combining for 52% of the total tests. Twenty-three percent of the testing was conducted under the testing category "Not-Specified" or "Other." There were no attempts to contact these collection sites or employers for additional information. The next largest categories were "Reasonable Cause" (12%),"Post-Accident" (8%), "Follow-up" (4%), and "Return to Duty" (1%).

Figure 2 "Positive Samples by Analyte 2015" graph illustrates the positive percentages for each of the primary synthetic cannabinoids tested. This graph is comprised of 2015 testing data only as earlier years have been previously published (1,6). The four most commonly found synthetics, UR-144, AB-PINACA, 5-F-PB, and PB-22 collectively account for approximately 90% of all positives. The remaining synthetic compounds account for the final 10% of positive samples. Interestingly, the original synthetic

compounds JWH-018 and JWH-073 accounted for 2.3% of all positives in 2015 as compared to 94.5% of all positives in 2011. This highlights the importance of updating the composition of your synthetic panel to sustain the ability to identify abusers and recognize when to add new synthetic compounds.

Figure 3 illustrates the frequency in which samples positive for synthetic cannabinoids are also positive for an additional drug of abuse. The data indicates 89.8% of all positive specimens were only positive for synthetic cannabinoids. While only 5.6% were dual positives for both synthetic cannabinoids and marijuana, only 1.8% of the positives

Figure 3

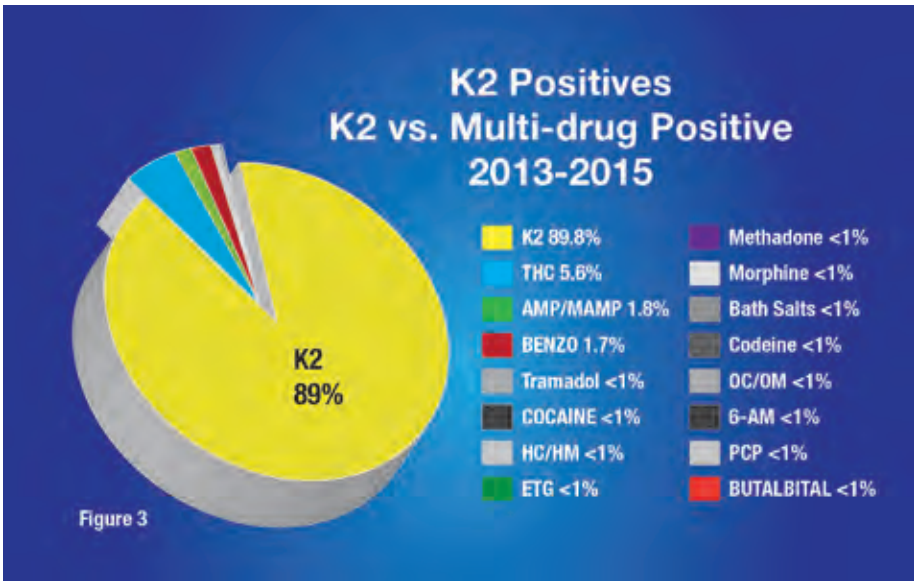
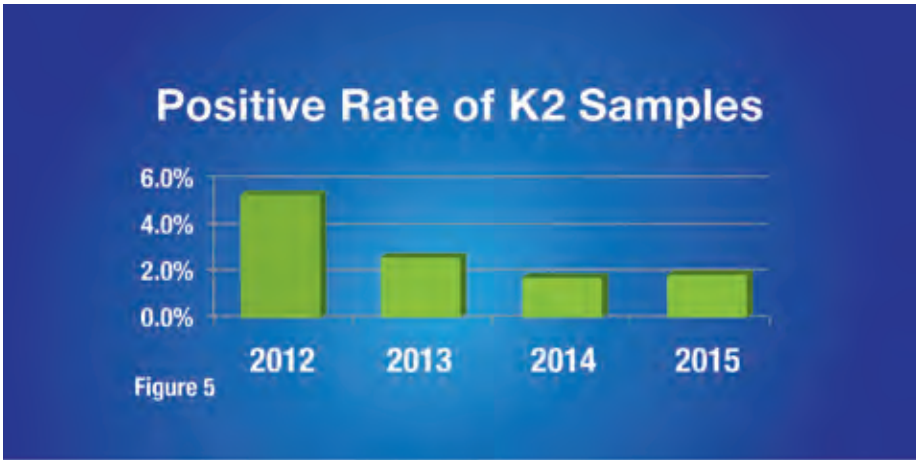


Figure 4

Figure 5



were dual positives for both synthetic cannabinoids and methamphetamine. And, only 1.7% were dual positives for both synthetic cannabinoids and benzodiazepines. The remainder of the dual positives, less than 1%, are other illegal drugs (e.g., heroin, PCP, and bath salts), or prescription medications. This data indicates that these individuals were nearly all single drug abusers of synthetic cannabinoids.

Figure 4 demonstrates that 55% of all positive samples would be missed if a higher cutoff (i.e. 10 ng/mL) were used in place of the lower CRL cutoffs. Specifically for compounds JWH-018, UR-144, and AB-FUBINACA, choosing a 10 ng/mL cutoff would have resulted in a loss of 60%, 57%, and 81%, of all positives, respectively. Establishing the proper cutoff relies on equipment, the analytical ability to identify the compound and selection of the proper metabolite. Consideration should also be given to the availability and ability of additional laboratories to reconfirm test results.

Figure 5 reflects the positive rates for synthetic cannabinoids from 2012 through 2015. The positive rate in 2012 was 5.3%. However since that time, the positive rate has stabilized around 2%. In 2015 the positive rate was 1.8% even with the federal scheduling of these compounds and eliminating these compounds from over the counter purchasing. These synthetic compounds have largely moved into illegal distribution and international Internet sales distribution.

Summary

The data indicates all synthetic cannabinoid panels are not the same. Panel composition and cutoffs have a direct impact on the effectiveness of synthetic cannabinoid testing to identify abuse.

As private employers modify drug testing panels to account for recreational and synthetic drugs beyond those traditionally covered by the DOT panel, it will be important for them to select a panel with proper composition and cutoffs. Employers in the oil and gas industry recognized this need and have developed a panel with lower cutoffs that included synthetic cannabinoids to identify those employees who pose a risk to public safety through misuse of drugs in the workplace. These synthetic drugs are the new "normal" as they are extremely prevalent and difficult for the laboratory to detect when used by workplace employees.

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