K31 The Chinese Influence on the Novel Psychoactive Substances (NPS) Movement in the United States

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After attending this presentation, attendees will be able to describe the influence that legislation both within and outside the United States has on NPS popularity, availability, and positivity in forensic casework.

This presentation will impact the forensic science community by detailing the change in popularity of NPS in reaction to legislation, which underscores the need for a comprehensive and current scope of toxicological testing and increased awareness by investigators, forensic scientists, and legislators.

One of the hallmarks of the NPS movement is the ebb and flow of the drugs. The active ingredients in products such as K2 and bath salts sold for recreational abuse are constantly changing, creating a significant challenge for the forensic science community. The changing landscape of NPS has been heavily influenced by legislation in the United States (for example, the rapid disappearance from circulation and forensic casework in 2013 of the stimulant 1,3-Dimethylamylamine (DMAA) after pressure was placed on supplement manufacturers by the Food and Drug Administration (FDA) to reformulate their products after a series of deaths). Changes in legislation generally precipitate changes in positivity in tests that cover NPS, which constantly require updates to their scope. It appears that recent Chinese legislation has also had an impact on the drug landscape in the United States, as an October 2015 ban of 116 chemicals by the Chinese Food and Drug Administration was followed by a change in positivity for NPS in the United States, as many of these substances were originating from China and being sold as bulk research chemicals over the internet.

As soon as the Chinese ban went into effect, web forums dedicated to the use of NPS detailed what substances were no longer available and recommended alternatives. The list of banned substances included stimulants, psychedelics, sedatives, and synthetic cannabinoids. While positivity for some substances declined sharply, the ban also created opportunities for others to emerge.

The change in popularity for the use of alpha pyrrolidinovalerophenone (alpha PVP) was probably the most dramatic example of the influence the Chinese legislation had on the United States drug market. Alpha PVP quickly gained popularity as an alternative to Methylenedioxypyrovalerone (MDPV) after its ban through the United States' Synthetic Drug Abuse Prevention Act of 2012. From 2013 to 2015, alpha PVP was the most popular synthetic stimulant detected in an expansive toxicological screen for NPS. In 2013 and 2014, alpha PVP accounted for roughly a quarter of all positive analytes. Use in 2015 peaked, when it accounted for 34.7% of positives, but has dropped drastically so far in 2016, accounting for seven positives in nearly 400 cases.

Ethylone was also specifically outlawed in the Chinese legislation. Ethylone gained popularity as an alternative to methylone, which was also banned in 2012. Methylone's use prevailed in 2013, accounting for 26.3% of the positive results; however, in 2014, the positivity for methylone dropped to 13.8%, which coincided with a rise in ethylone, which increased approximately 16% between 2013 and 2014. In 2015, ethylone accounted for 24.7% of the positives, but has only been confirmed in five cases so far in 2016. Similar trends were seen in samples collected from attendees at electronic dance music festivals in the United States.

Several synthetic cannabinoids were covered by the Chinese ban, including AB-FUBINACA, AB-CHMINACA, and 5F-AMB. In October 2015, AB-CHMINACA accounted for roughly 20% of the positive toxicology findings. By June of 2016, AB-CHMINACA was only detected in approximately 3% of positive synthetic cannabinoid cases. Many of these synthetic cannabinoids continue to maintain some kind of presence in the United States; this could be explained by multiple source countries.

A number of fentanyl analogues were also outlawed in the ban; these include acetyl-, butyryl-, and β-hydroxythiofentanyl. This ban has possibly played a role in the rise in popularity of other fentanyl analogues that are causing increasing numbers of fatal and non-fatal overdoses in the United States, with many states reporting findings of analogues, including furanyl fentanyl, para-fluorofentanyl, and other designer opioids, including U-47700. The earliest known reports of these substances are from November/December 2015.

The continuously changing landscape of NPS is a challenge for the forensic community as it requires an enormous amount of resources to stay abreast of the drug trends as they change in reaction to legislation at home and abroad.

NPS, Legislation, China