



# **THE 2ND INTERNATIONAL SYMPOSIUM OF FORENSIC DRUG TESTING LAB DIRECTORS**

Organized by the Colombo Plan Secretariat on behalf of  
The Bureau of Narcotics and Law Enforcement Affairs (INL),  
United States Department of State  
Singapore

July 22 - 25, 2019

## *Summary of Proceedings*



Pictured here are participants and resource persons from the 2nd International Symposium of Forensic Drug Testing Lab Directors held on July 22-25, 2019 in Singapore. The Symposium, organized by the Colombo Plan Secretariat on behalf of INL, included lab directors and toxicologists from Argentina, Brazil, Brunei, Colombia, Chile, Ecuador, Guatemala, Indonesia, Korea, Lao PDR, Honduras, Jordan, Malaysia, Mexico, Nigeria, Paraguay, Philippines, Singapore, South Africa, Sri Lanka, Thailand, Tunisia, Uruguay, and the United States.

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## EXECUTIVE SUMMARY

The 2nd International Symposium of Forensic Drug Testing Lab Directors, organized by the Colombo Plan Secretariat on behalf of INL, was convened in Singapore from July 22 – 25, 2019. The Symposium was attended by 40 lab directors and forensics experts from 24 countries: Singapore, Brunei, Indonesia, Korea, Lao PDR, Malaysia, Philippines, Sri Lanka, Thailand, Nigeria, South Africa, Tunisia, Jordan, Argentina, Brazil, Colombia, Chile, Ecuador, Paraguay, Uruguay, Guatemala, Honduras, Mexico, and the United States.

The Colombo Plan Global Toxic Adulterant Project, which employs state-of-the-art technologies for testing street drugs internationally and domestically for toxic adulterants, has detected an unprecedented trend of drugs being cut along the entire supply chain (source, transit, and consumer countries) with highly toxic adulterants which have serious public health implications for affected countries. Further, these toxic adulterants and impurities, alone or in combination, can cause poisonous medical effects, including overdose, death, and near- and long-term public health problems.

The Colombo Plan Project results to date additionally indicate that opioids and other drugs, including cocaine and methamphetamine, are now increasingly cut with *multiple, highly toxic adulterants, in some cases as many as ten different adulterants, in addition to impurities from the drug manufacturing process*. The implications of this information are significant to both law enforcement and public health communities worldwide and warrant a coordinated response.

During the four-day Symposium, lab directors shared their respective experiences and findings to gain a better understanding of the global threat of toxic adulterants increasingly being used to cut drugs of abuse. Presentations included details on countries' sample preparation; analytical platforms and equipment capabilities; drug testing and reporting formats; those specific toxic adulterants being identified, including Levamisole, Aminopyrine, Phenacetin, Quinidine, Lidocaine, and others; country reports on adulterant research studies; briefings on the challenges of new psychoactive substances; and identification of new toxic forms of cocaine.

The Symposium concluded with a roundtable discussion and an agreement on the need to continue the development of a shared database (the International Toxic Adulterant Database or ITAD) to routinely collect information from a range of countries. The Colombo Plan, the Center for Forensic Science Research and Education, and JMJ Technologies will continue their work with Symposium participants to determine what information should be collected and methods for maximizing the best use of the data. This global database will eventually serve as a global early warning system for the emergence of new toxic adulterants and their potentially injurious or fatal combinations.

## **DETAILED PROCEEDINGS**

The following proceedings present a summary of key points related to the emergence of toxic adulterants in drugs of abuse in regions around the world. The proceedings also summarize the continuing steps of a collaborative effort to establish a global toxic adulterant database which would lend support to the public health community in its effort to alert, diagnose, and treat drug users for adulterant-induced health conditions which are currently going undetected and unaddressed.

# UPDATE ON THE GLOBAL TOXIC ADULTERANT PROJECT

**Thom Browne Jr.**

CEO

Colombo Plan Secretariat

## *The Charge of the Meeting:*

*Mr. Browne encouraged the assembled laboratory directors to embrace the fact that they are in possession of a wealth of information pertaining to adulterants and their very serious health consequences. While lab directors are traditionally aligned with the law enforcement community, the information that is emerging on toxic adulterants is of tremendous value to the public health sector. A major challenge of this meeting is to work together to use the information collected by labs around the world to create a global toxic adulterant database as a foundation for an early warning system. This early warning system will inform public health workers, improve medical and public health service delivery, and potentially save thousands of lives, in addition to informing law enforcement on new drug combinations, emerging cutting agents, and additional information to identify trafficking routes and traffickers by the unique cutting agents used in their products.*

“  
*A major challenge of this meeting is to work together to use the information collected by labs around the world to create a global toxic adulterant database as a foundation for an early warning system.*  
”

Mr. Browne presented several power points around the theme: “Adulteration of Drugs with Toxic Cutting Agents: A Rapidly Developing Global Public Health Emergency,” which he has presented to members of the US Congress, international conferences on law enforcement and public health, and criminal and public health officials in various countries around the globe. His presentation provided an overview of nine years of information (since 2010) collected from both law enforcement and public health communities, and documented in the scientific literature. The presentation covered adulterants detected in illicit street drugs worldwide, in addition to known health effects of selected drug/adulterant combinations (e.g., cocaine & levamisole, heroin & acetaminophen).



### Key points of the presentation included the following:

- The genesis and expansion of the Global Toxic Adulterant project from 2010 to the present.
- In 2010, Brazil treatment centers at a national conference asked INL for assistance in finding the cause of unusual infections, diseases, and health problems among cocaine-using clients
- INL contacted Brazil Federal Police (DPF) National Institute of Criminalistics drug testing lab for information on composition of cocaine samples seized throughout Brazil
- DPF chemists had analyzed thousands of cocaine samples (HCl & Crack) and published numerous articles on cocaine composition in peer-reviewed journals
- Data showed that aminopyrine, phenacetin, and levamisole were new toxic adulterants being added to cocaine since 2010
- Adulterants which reduce white blood cells (aminopyrine & levamisole) could explain infections & diseases due to compromised immune systems
- In 2014, INL received reports of toxic adulterant expansion throughout the Andean and Southern Cone regions of South America
- Reporting also indicated that adulterants were spreading along the cocaine trafficking route from South America to Africa and Asia
- INL expanded the project in late 2015 to test street and wholesale drugs for toxic adulterants on a global basis in collaboration with the Colombo Plan
- Drug testing for adulterants was conducted in Argentina, Brazil, Peru, Ecuador, Guatemala, Honduras, South Africa, Thailand, and Sri Lanka.
- Realizing that the same source countries for Latin America, Asia, and Africa also supplied the United States with drugs, INL and Colombo teamed with JMJ Technologies, NMS Labs and the Center for Forensic Science Research and Education to test U.S. street-level drug samples for the same toxic adulterants detected worldwide
- NMS Labs obtained over 500 street-level drug samples from drug testing labs in the U.S. States of Vermont and Kentucky
- Analysis at the Center for Forensic Science Research and Education showed that opioids and other drugs are now frequently cut with multiple, potentially toxic substances, in some cases as many as **ten (10)** adulterants, other controlled drugs, and impurities from the heroin manufacturing process, in addition to fentanyl and its analogs.
- Results of this analysis indicated a ‘hidden’ adulterant epidemic that adds a new, unforeseen dimension to the U.S. opioid overdose crisis

### Other Key points in the presentation:

- When drugs containing toxic adulterants are smoked, as in the case of crack, which users report smoking up to 15 or more times a day, the health effects are even more rapid and serious.
- The synergistic effects of adulterants are significant; there are reported health effects and fatalities due to a combination of adulterants which may not be as serious when ingested separately, but are often lethal when combined.
- Combinations of multiple stimulant and depressant drugs in the same street sample are producing “super speedball” effects that can lead to overdose.



- Levamisole has emerged as an ideal cutting agent for cocaine. A decade of research has shown that levamisole and its metabolite, aminorex, potentiate the euphoria and extend the psychostimulant effects of cocaine.
- Levamisole will be difficult to control internationally as it is used as an anthelmintic agent in veterinary medicine worldwide; is a widely-used de-worming agent by the cattle industry worldwide; is used as a WHO essential medicine (used in minimal doses) for expelling parasites in children in developing countries; and because of its immunomodulatory effects has been used to treat immune-mediated and inflammatory disorders, such as rheumatoid arthritis, nephritic syndrome, inflammatory bowel disease, aphthous ulcers, and colon cancer.
- Traffickers are now looking for an ideal cutting agent for heroin (similar to what levamisole does for cocaine). Some studies have suggested that metamizole/dipyrone (a pain reliever/fever reducer) when combined with morphine produces supra-additive effects and results in analgesic potentiation.
- Placing more restrictive controls on metamizole will also be challenging because although it is banned in some countries, it is available over-the-counter or by prescription in other countries.
- Emerging Cocaine Threat, including a new form of high-purity cocaine which can be snorted and is adulterated with phenacetin and translucent in appearance. This form is extremely potent and is luring intranasal users who may be avoiding the stigmas associated with injection of cocaine and smoking crack.
- In some countries, the stimulant/hallucinogenic, 2-CB, is dyed pink, but sold under the street name “pink cocaine.” Users mistakenly think they are taking cocaine, but in fact are taking 2-CB which is 6 times more potent.
- In the absence of 2-CB, some local traffickers are combining cocaine, MDMA/Ecstasy, and ketamine to create a similar effect (often called ‘dragonfly cocaine’).
- Cutting of drugs with toxic adulterants is happening at the source, transit, and consumer stages of the drug supply chain.
- Technological Developments
  - World’s first ever instant urine test strips for phenacetin and aminopyrine
  - Months away from an instant urine test for levamisole
  - GEMINI- portable machine for field testing (presumptive test only)
  - G510 – portable GC/MS version for use in the field (being evaluated for quantification)
  - Medical flow diagrams for 5 adulterants (phenacetin, levamisole, aminopyrine, diltiazem, and metamizole/dipyrone) developed to assist medical professionals to detect and treat exposure to adulterants.
  - In early stages of developing procedures to test for adulterants in umbilical cord tissues

## OPENING REMARKS

### Sebastian Tan

Deputy Director  
Central Narcotics Bureau (CNB)  
Singapore

Deputy Director Tan warmly welcomed the Lab Directors to Singapore and expressed his pleasure to join the 2nd International Symposium of Forensic Drug Testing Lab Directors. He also thanked Colombo Plan for giving the opportunity to host the Symposium and for being a strong partner to Singapore and many countries around the world. He welcomed the lab directors to share their expertise and experiences in forensic drug testing and highlighted that the forensic drug testing laboratories are important partners for drug enforcement agencies in capacity building and strengthening of detection capabilities. In this partnership with law enforcement agencies, forensic drug testing laboratories enhance the ability of drug enforcement agencies to implement policies, enforce drugs laws, and protect society from the scourge of drugs.

“*Beyond the challenges posed by toxic adulterants, there are many new and emerging challenges in the global drug landscape.*”

Mr. Tan reiterated that the theme for this symposium is on toxic adulterants found in street drugs as well as the development of an international database of toxic adulterants among global laboratory experts. This database will provide an early warning/alert system of new adulterants added to street drugs, enabling public health officials to publish alerts to health and treatment officials.

The adulterants are often deliberately added to increase the bulk of drugs, enhance or mimic the effects of drugs or facilitate drug delivery. Traditionally, adulterants included are inactive agents such as caffeine, sugars and talc; or readily available compounds like paracetamol and aspirin. He added that however in recent years, it appears that some adulterants are even more potent than the actual drug and have the capacity to cause serious health issues, including and increasing rate of fatalities among drug users. Therefore, this symposium is therefore timely to allow laboratories to come together and gain a better understanding of the global threat of toxic adulterants within illicit drugs. Forensic drug laboratories help to circulate information on the particular adulterants discovered. This information helps to alert other laboratories on the presence of such substances and improve toxicology detection. In turn, these alerts can help to prevent unnecessary injuries and deaths arising from toxic adulterants.

Mr. Tan mentioned that beyond the challenges posed by toxic adulterants, there are many new and emerging challenges in the global drug landscape. Some of these challenges are New Psychoactive substances (NPS) and Online Drug Trafficking.

In conclusion, he thanked the U.S. State Department's Bureau of International Narcotics and Law Enforcement Affairs (INL), the Colombo Plan Drug Advisory Programme, and all participants, reiterating that the Symposium will serve as a good platform for countries to share experiences, knowledge and challenges. He closed his remarks by wishing all a fruitful and enjoyable time in Singapore.

## Jenna Lefler

Drug Supply Reduction Advisor  
Bureau of International Narcotics and Law Enforcement Affairs (INL)  
U.S. Department of State

Ms. Lefler thanked the Central Narcotics Bureau (CNB) of Singapore for hosting the 2nd International Symposium of Forensic Drug Testing of Lab Directors. She also thanked the Colombo Plan Drug Advisory Programme for organizing the Symposium and welcomed all participants.

Ms. Lefler stated that no country is immune to the effects of drug abuse and it is a global issue. Further, she explained that the U.S. is currently facing an unprecedented drug crisis that is taking tens and thousands of lives every year. A trend is seen in the increasing adulteration of drugs with toxic cutting agents such as levamisole. People are unknowingly being exposed to dangerous chemicals. The countries in attendance each have techniques and practices in place to analyze the chemical content of street drugs and seizures. It is increasingly rare to find a sample of pure heroin or cocaine. A key factor out of many cases is the identification of the components of the sample and the wealth of information and hidden in the sample which can play a vital role in informing our comprehensive responses.

She thanked everyone for their support and dedication and stated that the Lab Directors from 24 countries represent the very best of forensic chemical analysis from all over the world and US Department of State is happy to be partner at the Symposium. She closed by saying that the Lab Directors expertise and dedication to creating a global database are essential to ensuring effective response to the global challenge of toxic adulterants.

*“ People are unknowingly being exposed to dangerous chemicals. ”*

## COUNTRY REPORTS

Each Lab Director or designee from each participating country presented a 30-minute overview on how their respective laboratory performs analyses on seized drug material, specifically:

- Sample preparation: extraction, dilution
- Analytical Platforms: GC/MS, LC/MS, IR, etc.
- Drugs tested and reporting format
- Toxic adulterant reporting e.g., Levamisole, Aminopyrine, Phenacetin, Quinidine, Lidocaine, and others.
- Data retention and possible retrospective analysis for toxic adulterants
- Following are points of note from the various country presentations:

### Panel 1 - AFSN Country Presentations



#### Brunei

##### Reported Adulterants

Sugar and caffeine were detected in tablet samples of ecstasy and ketamine

##### Point of Note:

- There are no requirements to test for adulterants in drugs. However, no adulterants were detected in crystal meth.
- Only provide scientific analysis for all Brunei government enforcement agencies
- Types of Drugs Analyzed: Methamphetamine, Cannabis, Ecstasy MDMA and Erimin 5 Nimetazepam



#### Indonesia

##### Reported Adulterants

Levamisole was detected in cocaine.

##### Point of Note:

- ATS (methamphetamine) is the main drug of abuse in Indonesia. NPS mainly consists of synthetic cannabinoids. Of the tablet form of drugs, 85% consists of MDMA/Ecstasy; however, meth and NPS are also significant in tablet form. N-Ethylpentylone was detected in blue tablet form in February and November 2018. [NOTE: It is a new cathinone derivative with psychostimulant effects that killed a dozen users in KZN, South Africa in April 2016]. One tablet of concern is known as "PCC" or Paracetamol Caffeine Carisoprodol. It is a schedule-1 drug in Indonesia that has caused overdose death and brain damage in the Kendari section of the country.
- 74 different NPS are identified till present and 66 NPS have already been scheduled by Narcotic and Psychotropic Law, but 8 other NPS are not scheduled.
- Tramadol samples were also analyzed.



## Korea

### Reported Adulterants

None mentioned

### Point of Note:

- Meth has spread in the domestic market and become the most frequently abused drug since the 1980's and at the present.
- The first of the NPS appeared in Korea in 2009 and has increased rapidly.
- Seized drugs in 2018 included primarily meth, followed by cannabis, cocaine, and some opiates. The primary NPS detected were synthetic cannabinoids. However, they decreased in 2018.
- Types of Drug Encountered to NFS (2017) – Meth (60%), Cannabis (19%), Opiates (18%) and NPS (2%).



## Lao PDR

### Reported Adulterants

None mentioned

### Point of Note:

- Narcotics tested declined in 2019 from 406 to 91 samples. Primary drugs detected were meth and then heroin.



## Philippines

### Reported Adulterants

Cutting agents/adulterants are constantly changing; the current top cutting agent for meth is IBA (Isopropyl benzylamine). Increase in NPS being used to cut MDMA. Seizures of cocaine bricks cut with levamisole.

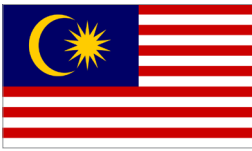
### Philippines (National Reference Lab)

### Point of Note:

- Conducts urine drug tests. In the past, only meth and THC were required. In 2018, the Senate required a 5-panel test: meth, THC, MDMA, cocaine, and opiates. Most urines test positive for meth and THC. The lab wants to also test saliva, blood, and hair for drugs.

### Philippines (DDB Lab)

- The primary drug in the Philippines is meth. Cutting agents/adulterants are constantly changing; the current top cutting agent for meth is IBA (Isopropyl benzylamine). The number two drug of choice is marijuana, followed by MDMA/Ecstasy. There are some cases of synthetic marijuana. Increase in NPS being used to cut MDMA. Seizures of cocaine bricks, mostly through coastlines, increased in 2019, from 89 kg to 258 kg. DEA informs that the bricks originate in Colombia and are cut with levamisole.



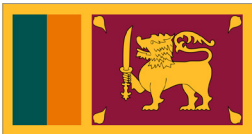
## Malaysia

### Reported Adulterants

Heroin (caffeine, chloroquine, paracetamol, and dextromethorphan); meth (Dimethyl Sulfone or DMS); and Ecstasy (NPS, caffeine).

### Point of Note:

- Malaysia has 13 drug testing labs. They analyzed 57,500 cases consisting of nearly 1.1 million samples. Main drugs of choice in descending order are heroin, meth, other drugs (kratom, cocaine, ecstasy, etc.), and cannabis.
- MDMA first appeared in 1996, NPS appeared in 2012, Kratom appeared in 2014, and 2C-B appeared in 2015. The first clandestine MDMA lab was seized in 2011.



## Sri Lanka

### Sri Lanka (Government Analyst Lab)

### Reported Adulterants

The principle drugs in Sri Lanka are cannabis, heroin, tramadol, meth, cocaine, ecstasy, and LSD. Forty (40) cocaine samples were analyzed for impurities and adulterants. Purity ranged from 2.5 to 63%. Fourteen (14) impurities and five (5) adulterants were detected. The adulterants in descending order were: (levamisole (26), lidocaine (17), caffeine (13), acetaminophen (10), and phenacetin (8).

### Sri Lanka (NDDCB Lab)

### Reported Adulterants

Most used drugs in Sri Lanka are cannabis, heroin, and pharmaceutical drugs (tramadol, diazepam, etc.). There is some NPS use in the form of 2C-C. Principal adulterants analyzed by the lab in 2017 and 2018 are: heroin (acetaminophen, Benadryl, theophylline, etofylline, and tramadol); meth (Dimethyl Sulfone or DMS); cocaine (benzocaine), and MDMA (MDHOET which is very toxic and synthesized by Alexander Shulgin).

### Point of Note:

- Polly drug use is common among drug users.



## Thailand

### Reported Adulterants

Meth tablets primarily adulterated caffeine. DMS was the major ICE adulterant. Primary heroin adulterants/impurities are: paracetamol, acetyl codeine, 6-MAM, morphine, caffeine, and dextromethorphan.

### Point of Note:

- ONCB lab noted that the following drugs were seized in 2018: heroin, cocaine (53 kg), ecstasy, meth, ICE, cannabis, kratom, and ketamine. Of 517 meth tablets analyzed in 2018, purity range was 15 – 20% and 70 – 80% were adulterated, primarily with caffeine. Meth crystal or ICE was 90% pure and DMS was the major ICE adulterant.
- Heroin seizures have increased from 2015 to 2018. The heroin is 83% pure on average. Primary adulterants/impurities are: paracetamol, acetyl codeine, 6-MAM, morphine, caffeine, and dextromethorphan. Cocaine during the same time period averaged 88% purity.

## Panel 2 – Africa/Middle East Country Presentations



**Nigeria**

### Reported Adulterants

Methamphetamine (phenacetin, DMS, Safrole); cocaine (levamisole, phenacetin, lidocaine, caffeine, and paracetamol), and heroin (aminopyrine, caffeine, codeine, and MDMA)

### Point of Note:

- The NDLEA Lab reported the following adulterants in Nigeria: meth (phenacetin, DMS, Safrole); cocaine (levamisole, phenacetin, lidocaine, caffeine, and paracetamol), and heroin (aminopyrine, caffeine, codeine, and MDMA).



**South Africa**

### Reported Adulterants

Adulterants detected in heroin: dextromethorphan, acetaminophen, phenacetin, caffeine, and diphenhydramine. Adulterants detected in cocaine: phenacetin, levamisole, lidocaine, caffeine, acetaminophen, and benzocaine. Other drugs such as methaqualone (mandrax) are adulterated with diphenhydramine and diazepam. Meth is mostly cut with DMS.

### Point of Note:

- South Africa Police Lab only conducts qualitative analysis versus quantitative analysis. Focus on heroin and cocaine for adulterants; other drugs are mostly pure.
- Adulterants detected in heroin: dextromethorphan, acetaminophen, phenacetin, caffeine, and diphenhydramine. Adulterants detected in cocaine: phenacetin, levamisole, lidocaine, caffeine, acetaminophen, and benzocaine. One new NPS is N-Ethylpentylone. As previously noted, it is a new cathinone derivative with psychostimulant effects that killed a dozen users in KZN, South Africa in April 2016.
- Other drugs such as methaqualone (mandrax) are adulterated with diphenhydramine and diazepam. Meth is mostly cut with dimethylsulfone (DMS). Most cocaine is found in Gauteng (GP) part of South Africa, with heroin concentrated in Gauteng and Kwazulu-Natal (KZN).



**Tunisia**

### Reported Adulterants

Benzocaine

### Point of Note:

- Drugs of abuse include cannabis, benzocaine, and tramadol. A study of 39,468 urine samples from 2010 – 2018 reported that 45% tested positive for drugs (mostly THC – 89%), and almost 98% were male.





**Jordan**

### Reported Adulterants

Heroin is adulterated with impurities from the manufacturing process (6-MAM, acetyl codeine, papaverine, noscapine, etc.), caffeine, and meconates (a constituent of opium). Synthetic cannabis is cut with tramadol. Cocaine is cut with caffeine. Captagon is cut with theophylline, caffeine, acetaminophen, and diphenyl methanol.

### Point of Note:

- Drugs of abuse in descending order include synthetic cannabinoids, cannabis, tramadol, amphetamine, clonazepam, alprazolam, heroin, and NPS. Heroin is adulterated with impurities from the manufacturing process (6-MAM, acetyl codeine, papaverine, noscapine, etc.), caffeine, and meconates (a constituent of opium). Synthetic cannabis is cut with tramadol. Cocaine is cut with caffeine. Captagon is cut with theophylline, caffeine, acetaminophen, and diphenyl methanol.

## Panel 3 – South America Country Presentations



**Argentina**

### Reported Adulterants

In April 2019, a study of 1,259 cocaine samples was conducted. Adulterants included levamisole, phenacetin, aminopyrine, metamizole, caffeine, lidocaine, benzocaine, diphenhydramine, and procaine.

### Point of Note:

- Four main drugs of abuse are cocaine, cannabis, LSD, and MDMA. Approximately 500 kilograms of cocaine are seized per year in Buenos Aires, while 10 – 12 tons of cannabis are seized per year. The Buenos Aires Provincial Lab receives 120,000 samples of cocaine per year.
- In April 2019, a study of 1,259 cocaine samples was conducted. Adulterants included levamisole, phenacetin, aminopyrine, metamizole, caffeine, lidocaine, benzocaine, diphenhydramine, and procaine. Street cocaine purity ranged from 1 – 99% pure. Pink cocaine in Argentina consists of ketamine or MDMA.



**Chile**

### Reported Adulterants

Levamisole, caffeine, acetaminophen, aminopyrine, lidocaine, benzocaine, and procaine.

### Point of Note:

- Phenacetin has not been legal in Chile for 30 years. Caffeine is found in cocaine base. Seventy (70) percent of cocaine is adulterated with levamisole, caffeine, acetaminophen, and aminopyrine. Lidocaine, benzocaine, and procaine are also found in cocaine. In 2016, there were 6 – 7 adulterants on average in cocaine. From 2006 – 2016, as cocaine purity decreased, levamisole levels increased. Chile has found that levamisole doubles the effect of cocaine.



## Ecuador

### Reported Adulterants

Adulterants for cocaine base include phenacetin, guaifenesin and aminopyrine. Heroin contains caffeine, aminopyrine, phenacetin, and diltiazem. MDMA contains ketamine and caffeine.

#### Point of Note:

- There are 7 drug testing labs in Ecuador. Marijuana is the most used drug followed by cocaine base. Cocaine hydrochloride consumption is lower. Adulterants for cocaine base include phenacetin, guaifenesin, and aminopyrine. Heroin contains caffeine, aminopyrine, phenacetin, and diltiazem. MDMA contains ketamine and caffeine.



## Paraguay

### Reported Adulterants

Adulterants detected in cocaine base include phenacetin (the main adulterant), lidocaine, caffeine, benzocaine, acetaminophen, and levamisole. Adulterants detected in Cocaine HCl include caffeine (the main adulterant), lidocaine, benzocaine, phenacetin, levamisole, and acetaminophen.

#### Point of Note:

- A 2009 – 2019 study on cocaine (sample unknown) consisted of 53% cocaine base samples with a purity range of 50 – 70% and 46% cocaine HCl samples with a purity range of 50 – 70%. Adulterants detected in base included phenacetin (the main adulterant), lidocaine, caffeine, benzocaine, acetaminophen, and levamisole. Adulterants detected in HCl included caffeine (the main adulterant), lidocaine, benzocaine, phenacetin, levamisole, and acetaminophen.



## Uruguay

### Reported Adulterants

Phenacetin, diphenhydramine, aminopyrine, benzocaine, diltiazem, levamisole, lidocaine, caffeine, and clenbuterol.

#### Point of Note:

- In 2018, main drug seizures were cannabis, cocaine, and MDMA. Adulterants included phenacetin, diphenhydramine, aminopyrine, benzocaine, diltiazem, levamisole, lidocaine, and caffeine. Uruguay is trying to inhibit the sale of caffeine to the public. It is important to note that a veterinary product, clenbuterol, has been detected in cocaine. In humans, it has serious effects on the heart, including palpitations, atrial fibrillation (abnormal heart rhythm), increased blood pressure, increased heart rate, and cardiac hypertrophy.

## Panel 4 – Central America/Mexico Country Presentations



### Guatemala

#### Reported Adulterants

Lidocaine, benzocaine, procaine, caffeine, levamisole, and acetaminophen.

#### Point of Note:

- The controlled substances lab primarily analyzes cocaine, marijuana, and heroin. One to two meth cases per year are seen.
- Adulterants detected include lidocaine, benzocaine, procaine, caffeine, levamisole, and acetaminophen. Adulterants usually are not reported in Guatemala as they are not controlled.



### Honduras

#### Reported Adulterants

Levamisole, lidocaine, caffeine, piperazine, benzocaine, procaine, sufentanil, atropine, and verapamil.

#### Point of Note:

- It was noted that coca leaf planting was seen in the department of Colon. Levamisole is the most prominent cocaine adulterant. Other adulterants include lidocaine, caffeine, piperazine, benzocaine, and procaine. Adulterants of concern included sufentanil (which is 5 to 10 times more potent than fentanyl and 500 times more potent than morphine), atropine (which is used to treat bradycardia or slow heart rate), and verapamil (which is used to treat high blood pressure). It was noted that some adulterants effect health more than the drug itself.



### Mexico

#### Reported Adulterants

Levamisole, benzocaine, caffeine, diphenhydramine, phenacetin, and creatine.

#### Point of Note:

- There are 63 drug testing labs across Mexico. Cocaine adulterants include levamisole, benzocaine, caffeine, diphenhydramine, phenacetin, and creatine. Most samples have several adulterants and 80% of cocaine samples contain levamisole.

## SUMMARY MATRIX OF ADULTERANTS

COUNTRY	ADULTERANTS REPORTED
<b>Argentina</b>	In April 2019, a study of 1,259 cocaine samples was conducted. Adulterants included levamisole, phenacetin, aminopyrine, metamizole, caffeine, lidocaine, benzocaine, diphenhydramine, and procaine
<b>Brazil</b>	Phenacetin, aminopyrine, levamisole, caffeine, lidocaine, and benzocaine in cocaine samples.
<b>Brunei</b>	Sugar and caffeine were detected in tablet samples of ecstasy and ketamine.
<b>Chile</b>	Levamisole, caffeine, acetaminophen, aminopyrine, lidocaine, benzocaine, and procaine.
<b>Colombia</b> (Ministry of Justice and Law) –	The following adulterants were detected in cocaine: levamisole, caffeine, lidocaine, phenacetin, aminopyrine, diltiazem, and hydroxyzine. Main adulterants in heroin are: caffeine, diltiazem, lidocaine, levamisole, and acetaminophen. Impurities from the heroin manufacturing process included 6-MAM, acetyl codeine, and papaverine.
<b>Colombia</b> (National Institute of Legal Medicine & Forensic Sciences)	Adulterants detected in cocaine from 2015 – 2018 were levamisole, phenacetin, caffeine, lidocaine, and aminopyrine. Drug samples can average about 3 to 11 adulterants.
<b>Colombia</b> (Office of the Attorney General of the Nation)	The following adulterants were detected in the 474 adulterated drug samples: caffeine, phenacetin, levamisole, lidocaine, aminopyrine, imipramine, and diltiazem. (0.4%). [NOTE: 29% of analyzed samples had 3 or more adulterants].
<b>Ecuador</b>	Adulterants for cocaine base include phenacetin and aminopyrine. Heroin contains caffeine, aminopyrine, phenacetin, and diltiazem. MDMA contains ketamine and caffeine.
<b>Guatemala</b>	Lidocaine, benzocaine, procaine, caffeine, levamisole, and acetaminophen.
<b>Honduras</b>	Levamisole, lidocaine, caffeine, piperazine, benzocaine, procaine, sufentanil, atropine, and verapamil.
<b>Indonesia</b>	Levamisole was detected in cocaine.
<b>Jordan</b>	Heroin is adulterated with impurities from the manufacturing process (6-MAM, acetyl codeine, papaverine, noscapine, etc.), caffeine, and meconates (a constituent of opium). Synthetic cannabis is cut with tramadol. Cocaine is cut with caffeine. Captagon is cut with theophylline, caffeine, acetaminophen, and diphenyl methanol.
<b>Korea</b>	None mentioned
<b>Lao PDR</b>	None mentioned

<b>Malaysia</b>	Major adulterants are as follows: heroin (caffeine, chloroquine, paracetamol, and dextromethorphan); meth (Dimethyl Sulfone or DMS); and Ecstasy (NPS, caffeine).
<b>Mexico</b>	Levamisole, benzocaine, caffeine, diphenhydramine, phenacetin, and creatine.
<b>Nigeria</b>	Methamphetamine (phenacetin, DMS); cocaine (levamisole, phenacetin, lidocaine, caffeine, and paracetamol), and heroin (aminopyrine, caffeine, codeine, and MDMA).
<b>Paraguay</b>	Adulterants detected in cocaine base include phenacetin (the main adulterant), lidocaine, caffeine, benzocaine, acetaminophen, and levamisole. Adulterants detected in Cocaine HCL include caffeine (the main adulterant), lidocaine, benzocaine, phenacetin, levamisole, and acetaminophen.
<b>Philippines</b>	Cutting agents/adulterants are constantly changing; the current top cutting agent for meth is IBA (Isopropyl benzylamine). Increase in NPS being used to cut MDMA. Seizures of cocaine bricks cut with levamisole.
<b>Singapore</b>	Some ecstasy tablets are adulterated with NPS. Other adulterants detected in such tablets include paracetamol, fentanyl, and lidocaine.
<b>South Africa</b>	Adulterants detected in heroin: dextromethorphan, acetaminophen, phenacetin, caffeine, and diphenhydramine. Adulterants detected in cocaine: phenacetin, levamisole, lidocaine, caffeine, acetaminophen, and benzocaine. Other drugs such as methaqualone (mandrax) are adulterated with diphenhydramine and diazepam. Meth is mostly cut with dimethylsulfone (DMS).
<b>Sri Lanka (Government Analyst Lab)</b>	Forty (40) cocaine samples were analyzed for impurities and adulterants. Purity ranged from 2.5 to 63%. Fourteen (14) impurities and five (5) adulterants were detected. The adulterants in descending order were: (levamisole (26), lidocaine (17), caffeine (13), acetaminophen (10), and phenacetin (8).
<b>Sri Lanka (NDDCB Lab)</b>	Principal adulterants analyzed by the lab in 2017 and 2018 are: heroin (acetaminophen, Benadryl, theophylline, etofylline, and tramadol); meth (Dimethyl Sulfone or DMS); cocaine (benzocaine), and MDMA (MDHOET which is very toxic and synthesized by Alexander Shulgin).
<b>Thailand</b>	Meth tablets primarily adulterated caffeine. DMS was the major ICE adulterant. Primary heroin adulterants/impurities are: paracetamol, acetyl codeine, 6-MAM, morphine, caffeine, and dextromethorphan.
<b>Tunisia</b>	Benzocaine
<b>United States</b>	Benzocaine, dimethyl sulfone (DMS), levamisole, diphenhydramine, lidocaine, caffeine, phenacetin, diltiazem, aminopyrine, dipyrone, acetaminophen, quinine, gabapentin, and nicotinamide.
<b>Uruguay</b>	Phenacetin, diphenhydramine, aminopyrine, benzocaine, diltiazem, levamisole, lidocaine, caffeine, and clenbuterol.

## COUNTRY STUDIES ON ADULTERANTS AND NPS

Three countries provided presentations on scientific studies they conducted on either adulterants or New Psychoactive Substances (NPS), specifically:

- Brazil: two studies on adulterants
- Colombia: three studies on adulterants
- Singapore: one study on NPS Trends
- Singapore: one study on challenges and techniques in identifying unknowns

Following are points of note from the various country study presentations:



**Brazil**

### The Brazil PeQui Project and Detection of Adulterants

- The Brazil Federal Police representative, Elvio Botelho, provided a presentation on Brazil's analysis of adulterants since 2010 which served as the genesis of the global toxic adulterant project. He noted that the Federal Police has 26 labs throughout Brazil. They analyzed 5,137 samples of cocaine from 8 states of Brazil from 2009 to 2018, consisting of 2,382 cocaine HCL samples and 2,675 cocaine base samples. These were wholesale-level samples, as the Federal Police does not analyze street samples.
- A presentation was then made regarding cocaine adulterants detected by the Brazil PeQui project from 2017 to 2018, in which adulterants such as phenacetin, aminopyrine, and levamisole decreased, and uncut or pure samples increased. While adulterants in wholesale drugs were going down, the concentrations in individual samples were increasing. [NOTE: David Martin of JMJ Technologies noted that his 2019 analysis of urine samples of cocaine users in Porto Alegre showed that more levamisole and phenacetin was being detected at the street level cocaine].

### Public Health Implications of Adulterants in Brazil

- Dr. Ronaldo Laranjeira of CRATOD noted that cocaine prevalence in Brazil is 1.7%, while cannabis prevalence is 3.4%. Brazil is estimated to have 1 million crack cocaine users 2.6 million cocaine HCL users, and 2 million users of both cocaine and cannabis (1.3% of the population).
- In 2015, testing of urine samples for cocaine revealed that 77% were positive for phenacetin, 54% for aminopyrine, and 26% for levamisole.
- In 2019, of 114 urine samples, 66% had phenacetin, levamisole, or aminopyrine.
- It is important to note that 2019 urine samples had more cocaine and less adulterants than 2015 samples.



## Colombia

### Colombia Studies on Adulterants

#### Colombia (National Institute of Legal Medicine & Forensic Sciences)

- The lab analyzes around 4,000 – 6,000 samples per year as follows: 49% cocaine, 35% cannabis, and other drugs such as amphetamines (16%). Heroin use is low (less than 1%). There was one case of synthetic cannabis.
- Cocaine cultivation increased 50% from 2010 – 2017.
- Adulterants detected in cocaine from 2015 – 2018 were levamisole, phenacetin, caffeine, lidocaine, and aminopyrine. Drug samples can average about 3 to 11 adulterants.

#### Colombia (Office of the Attorney General of the Nation) –

- Lab receives mostly cocaine and cannabis. Adulterants have not been detected in cannabis. An analysis of 754 drug samples since May 2019 revealed 63% were adulterated and 37% were not adulterated.
- The following adulterants were detected in the 474 adulterated samples: caffeine (72%), phenacetin (51%), levamisole (15%), lidocaine (8.4%), aminopyrine (5.1%), Imipramine (0.6%), and diltiazem (0.4%). [NOTE: Imipramine causes tachycardia and hypertension and is a tricyclic antidepressant]. It is also important to note that 32.5% of samples were “Duda” or unidentified NPS.
- Finally, 29% of analyzed samples had 3 or more adulterants.

#### Colombia (Ministry of Justice and Law) – Four adulterant studies were presented on cocaine, cannabis, heroin, and NPS.

- Cocaine study – In 2012, 377 samples were analyzed. 70% consisted of cocaine base. Adulterants detected included levamisole, caffeine, lidocaine, phenacetin, aminopyrine, diltiazem, and hydroxyzine. Half (50%) of the samples had 2 or more adulterants. In 2017, 167 cocaine base samples were analyzed. Purity ranged from 1 – 69%. Levamisole was found in 90% of samples. Phenacetin was also detected.
- Cannabis study – In 2015, 316 samples were analyzed. No adulterants were detected. THC levels ranged from 0.1% to 19%.
- Heroin study – In 2014, 136 samples were analyzed with a purity range of 31 – 50%. Main adulterants were caffeine, diltiazem, lidocaine, levamisole, and acetaminophen. Impurities from the heroin manufacturing process included 6-MAM, acetyl codeine, and papaverine. Speed-balling (concurrent use of cocaine and heroin) is popular in Medellin.
- NPS study – Some NPS (MDMA) contain cocaine and levamisole. [NOTE: Thom Browne of Colombo Plan asked about “pink cocaine” in Colombia. It was noted that the main component is ketamine. It was also noted that levamisole and phenacetin are not controlled in Colombia].





## Singapore

### Singapore Studies/Presentations

- The **Illicit Drugs Laboratory of the Health Sciences Authority** gave a presentation on an **Overview of NPS trends in Singapore**. Major drugs of use consisted of ICE, heroin, cannabis and spices. Some ecstasy tablets and benzodiazepines were also detected. NPS was first encountered in Singapore in 2011 and since then the number of such seizures has increased significantly. Two types of NPS commonly detected are synthetic cathinone and synthetic cannabinoids. In addition, some ecstasy tablets are found to be adulterated with NPS. Other adulterants detected in such tablets also include paracetamol, fentanyl, and lidocaine.

- The **Illicit Drugs Laboratory of the Health Sciences Authority** gave a second presentation on **Challenges and Techniques in Identifying Unknowns** in Singapore. The presentation highlighted the challenges posed by the rapid evolution of new drugs and changing drug trends.

The following challenges were addressed:

- lack of reference materials and published literature
- different forms with different sample matrices
- highly complex sample matrix (e.g., multiple cutting agents with drugs, NPS, adulterants, etc.)
- presence of trace levels of deadly adulterants (e.g., fentanyl) and the need for instruments with high sensitivity for their detection
- structural and positional isomers

The following strategies to counter challenges were presented:

- enhance staff competency
- enlarging technical capability
- engaging stakeholders

### International Toxic Adulterant Database (ITAD): Development and Progress

- Dr. David Martin of JMJ Technologies and Dr. Eric Rieders of NMS Labs and the Center for Forensic Science Research and Education gave a 90-minute presentation on the ITAD Development and Progress. Their power point presentation provided screen shots of data on drugs/adulterants (provided by participating countries) that were loaded onto the ITAD database.
- This database is designed to serve as a global early warning alert system for new and emerging toxic adulterants added to drugs of abuse. The presentation also highlighted the various summary reports generated by the ITAD.

### Equipment Demonstration of Gemini and G510 Systems

- All attendees for the symposium attended a demonstration of drug testing capabilities of portable drug testing devices, namely Gemini and FLIR G510 at the Health Sciences Authority (HSA). The Illicit Drugs Laboratory provided about 8 drug samples (e.g., cocaine, meth) containing adulterants for testing which was conducted by representatives from FLIR, JMJ, and Colombo Plan.

## **ROUNDTABLE DISCUSSION:**

### **Improvement of the International Toxic Adulterant Database**

#### **Points of Note:**

- To be able to compare the similarities of drugs with South East Asia and other drugs globally
  - Ensure accuracy of identification
- To have a platform that is user friendly to all members
  - Standardized nomenclature
- Spreadsheet needs to accommodate changes in adulterants (type, concentration, etc.) over time
- To ensure the security of the platform from cyberattacks and consider legal frameworks and how they will share the information
- To be able to acquire information globally from all members
- Database should be viewed as early warning of health effects; adulterants in seized drugs could be first sign of something new and something lethal
- Database information should be shared with treatment centers, health clinics, etc.
- Forum to share internationally

## **NEXT STEPS**

### **For Lab Directors Symposium**

All attendees agreed to have an International Symposium of Forensic Lab Directors Biennial.

## CLOSING REMARKS

### Phan Kieu Thu

Secretary- General  
The Colombo Plan  
Sri Lanka

Secretary General Thu expressed her deep appreciation to the Singapore Narcotics Bureau and US State Department of International Narcotics and Law Enforcement Affairs (INL) for hosting of the 2nd International Symposium of Forensic Drug Testing Lab Directors together with the Colombo Plan.

She highlighted that the contributions from the participants have been outstanding. The dissemination of knowledge on toxic adulterants gives the right direction in identifying new highly toxic adulterants that cause severe public health hazards in the affected countries and the past days have been a very good platform for learning and sharing of the dangers on the “hidden” toxic adulterants that can not only hinder the accuracy of clinical diagnosis but also can impede the accurate identification of underlying causes for national-level drug epidemics. These toxic adulterants and impurities can also cause numerous medical consequences, including death. Unfortunately, these adulterants are often going undetected by forensic laboratories when testing seized materials or by clinicians working with individuals undergoing treatment.

She was pleased to state that over the last four years, the Colombo Plan Drug Advisory Programme, with funding provided by U.S. Department of State’s Bureau of International Narcotics and Law Enforcement Affairs, has initiated a global project using state of the art technologies to test street drugs internationally and domestically for toxic adulterants. This project has uncovered an unprecedented trend of cutting drugs along the entire supply chain (source, transit, and consumer countries) with new highly toxic adulterants which cause severe public health problems for affected countries. Results to date have indicated that opioids and other drugs (e.g., cocaine) are now increasingly cut with multiple, highly toxic adulterants, in some cases as many as ten different adulterants, in addition to impurities from the drug manufacturing process.

She was also convinced that this second international Symposium has been a very good step in moving forward with accomplishing the Colombo Plan’s global toxic adulterant project goals. She thanked all of the participants present at this Symposium for contributing to this progress. She concluded her remarks by conveying her thanks to everyone responsible in organizing the Symposium, with sincere appreciations to the Government of Singapore. All attendees agreed to have an International Symposium of Forensic Lab Directors Biennial.

“  
*The second international Symposium has been a very good step in moving forward with accomplishing the Colombo Plan’s global toxic adulterant project goals.*

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## APPENDIX: PARTICIPANT CONTACT INFORMATION

2<sup>nd</sup> International Symposium of Forensic Drug Testing Lab Directors

22-25 July 2019

Singapore



NO	COUNTRY PAÍS	NAME OF ATTENDEE NOMBRE DEL ASISTENTE	DESIGNATION AND NAME OF ORGANIZATION DESIGNACIÓN Y NOMBRE DE LA ORGANIZACIÓN	E-MAIL	PHONE NUMBER NÚMERO DE TELÉFONO
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