

# Symposium on Novel Psychoactive Substances

Challenges of Diagnosing and Treating NPS  
Intoxications in the Emergency Department

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# Conflicts of Interest

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- Expert witness in impaired driving cases
- Consultant for the National Highway Traffic Safety Administration

# Objectives

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- Understand the complexity of evaluating patients in the emergency department with drug-induced altered mental status
- Understand the strengths and limitations of the traditional “toxidrome” approach to examining NPS intoxicated patients
- The patient is never right, when it comes to drug identification

# An Eclectic House

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- A 21 year-old male with no PMH was found unresponsive in bed 10 hours post-ingestion of reported “Molly”.
- Bystander CPR was initiated- an AED advised and administered defibrillation twice for ventricular tachycardia.
- The patient achieved ROSC and was intubated by EMS.
- Eleven other patients were taken to a local emergency department for reported ingestion of the same “Molly”

# An Eclectic House

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- The patient had an unexplained core temperature of 31.6°C and was hypotensive, 80/49.
- He was comatose and had 3mm fixed pupils. There was no hyperreflexia or clonus, and no posturing.
- Blood pressure was supported with norepinephrine and therapeutic hypothermia initiated for neuroprotection.

# An Eclectic House

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- Simultaneously, of the 11 patients involved, 3 other patients are deemed critically ill and transferred to tertiary care
- 2 patients with normal vital signs and severe lethargy but arousable
- One patient presented with tachycardia and status epilepticus (continuous seizure activity requiring deep sedation and intubation)

# An Eclectic House

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- The sedated patients were monitored overnight and discharged home
- The seizure patient was extubated and discharged home on day 3
- The cardiac arrest patient had a successful outcome and was discharged from hospital within 8 days of cardiac arrest with no neurologic sequelae.

# An Eclectic House

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- Urine was analyzed by LC/MS-MS
- Found to have AB-FUBINACA
  - This was corroborated by state lab analysis of seized drug capsules
  - 3 other simultaneous cases had confirmed AB-FUBINACA in urine

# Synthetic Cannabinoid Receptor Agonists (SCRA)

- Variations in SCRA intoxication make identification nearly impossible
  - Myocardial infarction
  - Cerebrovascular Accident
  - Acute kidney injury
  - Seizure
  - Excited delirium/Psychosis
  - Sedation

McKeever, R. G., Vearrier, D., Jacobs, D., LaSala, G., Okaneku, J., & Greenberg, M. I. (2015). K2—not the spice of life; synthetic cannabinoids and ST elevation myocardial infarction: a case report. *Journal of Medical Toxicology*, 11(1), 129-131.

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Takematsu, M., Hoffman, R. S., Nelson, L. S., Schechter, J. M., Moran, J. H., & Wiener, S. W. (2014). A case of acute cerebral ischemia following inhalation of a synthetic cannabinoid. *Clinical Toxicology*, 52(9), 973-975.

Lapoint, J., James, L. P., Moran, C. L., Nelson, L. S., Hoffman, R. S., & Moran, J. H. (2011). Severe toxicity following synthetic cannabinoid ingestion. *Clinical Toxicology*, 49(8), 760-764.

# A Dark Web

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- A previously healthy 23-year-old man was found unresponsive
- First responders observed symptoms consistent with opioid toxicity;
  - 4 mg of intramuscular (IM) naloxone.
- Following naloxone administration, the patient awoke, becoming tremulous and tachycardic
- Received 2 mg of IM lorazepam for agitation and tremor.

# A Dark Web

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- In the emergency department, the patient's initial vital signs:
  - heart rate of 155 beats per min,
  - respiratory rate of 36 breaths per min, and
  - oxygen saturation of 90% on a non-rebreather mask
- The patient was admitted to a critical care setting for hypoxic respiratory failure and non-cardiogenic pulmonary edema.
- With supportive care his clinical status improved
- He was discharged on hospital day 3.

# A Dark Web

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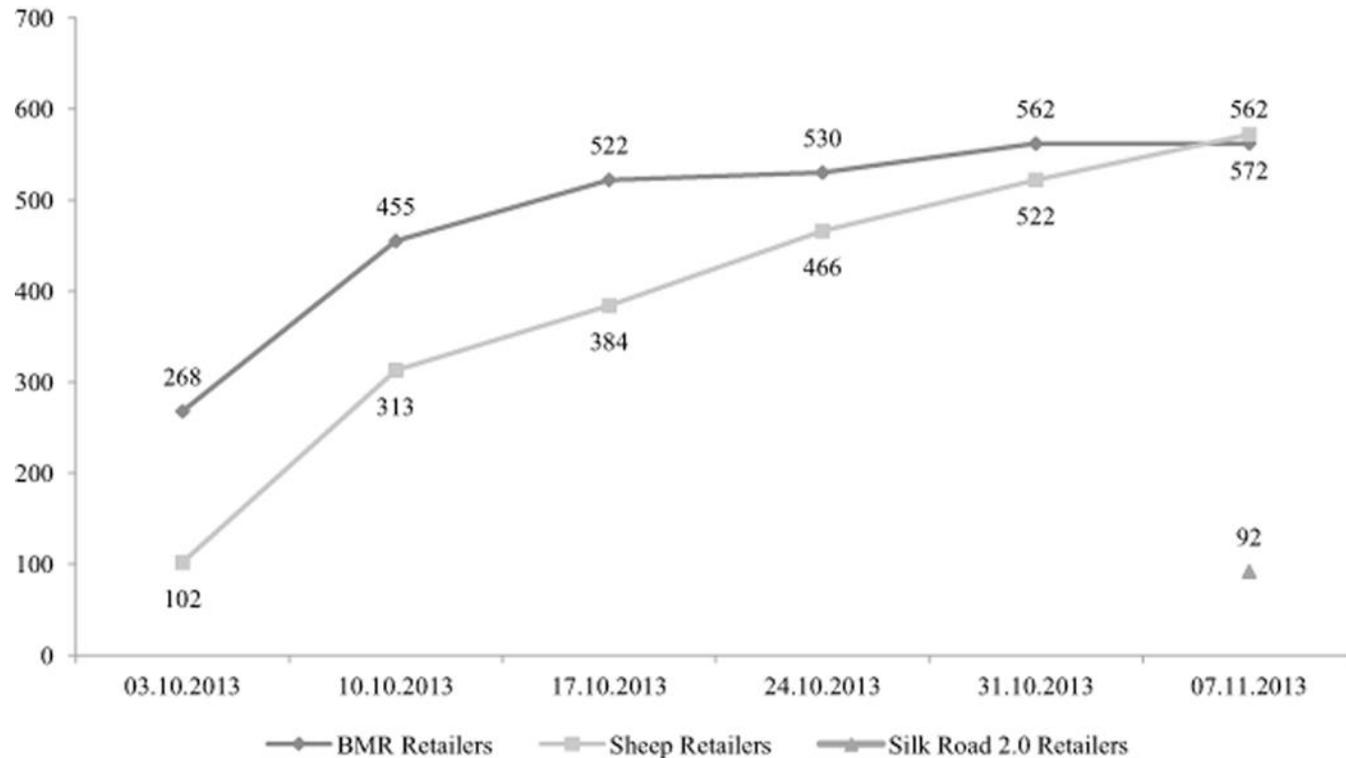
- “Synthetic China White Heroin #4”
- Urine analysis confirmed Furanyl Fentanyl
- Purchased from cryptomarket, AlphaBay, with the intent to purchase fentanyl.
- His knowledge of AlphaBay and the “Dark Web” stemmed from news articles about the discovery and termination of the original Silk Road marketplace.

# A Dark Web

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- Used reddit.com as an educational resource
  - How to access cryptomarkets securely and privately.
- He downloaded “The Onion Router” (TOR, an anonymizing proxy network) and
- Purchased a Virtual Private Network (VPN) to further obscure his IP address and true location. To complete the transaction, he
- Purchased a cryptocurrency, Bitcoin, from coinbase.com.
- The Bitcoin was transferred through a series of online wallets until ultimately being deposited to AlphaBay

# The Closure of Silk Road



Van Buskirk, J., Roxburgh, A., Farrell, M., & Burns, L. (2014). The closure of the Silk Road: what has this meant for online drug trading?. *Addiction*, 109(4), 517-518.

# Dark Web Illicit Drug Sales

The screenshot shows a product listing on a Darknet market. The listing title is "1g Canadian MDA - white powder - 97% purity". The vendor is "northernconnect" with a 100.0% reputation and a level of 111. The price is listed as "BTC 0.0804". The item is in stock and can be purchased with a "Buy It Now" button. The shipping country is "Canada". The description includes details about the purity and production process. The shipping destination is "Worldwide".

**1g Canadian MDA - white powder - 97% purity** *Title of the listing*  
By northernconnect ( 100.0% ) **Level 1 (111)** *Vendor name - Reputation*

**BTC 0.0804** *Price*

In stock.

Postage Option

Escrow No, this listing requires FE.

Class Physical

**Ships From Canada** *Shipping country*

Qty: 1

**Buy It Now**

Favorite Question

Details Feedback Return Policy

**Description**  
97% purity MDA - 1g

- produced from PMK oil
- crystalline white powder
- minimal odor
- lab analyzed at over 97% purity
- reagent tested (see photo)
- free shipping on all orders

We only supply the highest quality MDA available on the Canadian market.

See our profile for vendor terms before placing an order. By ordering you agree to these terms.

**Ships To Worldwide** *Shipping destination*

Broséus, J., Rhumorbarbe, D., Mireault, C., Ouellette, V., Crispino, F., & Décary-Héту, D. (2016). Studying illicit drug trafficking on Darknet markets: structure and organisation from a Canadian perspective. *Forensic science international*, 264, 7-14.

# Living Atop a Bakery

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- The Silk Road opened up the drug market to people who may not be comfortable buying drugs in person
- Accessibility created complex drug use patterns
  - attempts at self-regulation in setting of over-abundance
- Most report a period of intense drug use the first month after the initial successful purchase of illicit drug

Barratt, M. J., Lenton, S., Maddox, A., & Allen, M. (2016). 'What if you live on top of a bakery and you like cakes?'—Drug use and harm trajectories before, during and after the emergence of Silk Road. *International Journal of Drug Policy*, 35, 50-57.

# The Halfway House

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- 36-year-old male was brought to the ED by emergency medical services (EMS), who were called to his residence for suspected overdose.
- The patient was initially agitated but alert, with tachycardia, tactile hyperthermia, and spontaneous clonus in the extremities.
- En route to the ED, the patient had a generalized tonic-clonic seizure, treated with midazolam and naloxone.
- This was followed by cardiac arrest. Transient return of spontaneous circulation (ROSC) was obtained several times during transport followed by recurrent arrest.
- The patient was endotracheally intubated, and received epinephrine, atropine, dopamine, amiodarone, and ultimately transcutaneous pacing by EMS.

# The Halfway House

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- On arrival to the ED, the patient had a heart rate of 44, blood pressure of 55/43, and rectal temperature of 42C (107.6F).
- He was manually ventilated by EMS with FiO<sub>2</sub> 100% at a rate of 26; pulse oximetry was 98%.
- Resuscitative efforts in the ED included active cooling, paralysis, multiple vasopressors, calcium chloride, and sodium bicarbonate.
- With active cooling, the patient's core body temperature reduced from a maximum of 43C (109.4F) to 36.2C (97.2F).
- Despite aggressive supportive care, the patient suffered asystolic cardiac arrest soon after arrival to the intensive care unit and expired.

# The Halfway House

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- Blood samples obtained in the ED were sent to the Center for Forensic Science Research and Education
- Confirmed presence of
  - THF- fentanyl,
  - fentanyl,
  - norfentanyl,
  - 4-anilino-N-phenethylpiperidine,
  - naloxone,
  - methadone,
  - tramadol,
  - methamphetamine,
  - amphetamine, and
  - midazolam

# Opioids and Serotonin Syndrome

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- Serotonin syndrome is a drug interaction leading to life-threatening muscle hyperactivity and fever
- Synthetic opioids have been known to contribute to this syndrome- see the case of Libby Zion
- Little is known about clandestine opioid activity on serotonin receptors

Kirschner, R., & Donovan, J. W. (2010). Serotonin syndrome precipitated by fentanyl during procedural sedation. *The Journal of emergency medicine*, 38(4), 477-480.

# The Sleepy School Bus

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- a 17-year-old male became apneic and unresponsive while enroute to school.
- Bystanders administered 4 mg of intranasal naloxone, reversing his altered mental status and respiratory depression.
- The patient was transported to an emergency department (ED) where his initial vital signs were:
  - heart rate of 125 beats per minute,
  - respiratory rate of 18 breaths per minute, and
  - oxygen saturation of 100% on room air.
  - His pupils were 4 mm in diameter, and his neurologic exam was nonfocal.
- The patient reported insufflating a white substance he believed to be “crushed Xanax<sup>®</sup>” shortly before symptom onset.

# The Sleepy School Bus

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- After six hours of ED observation, the patient exhibited no signs of recurrent toxicity and was discharged.
- Routine GC/MS analysis reported caffeine only

# The Sleepy School Bus

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- Due to discordance between the reported ingestion and the presenting toxidrome, urine specimens were sent to a reference laboratory
- Advanced analysis by LC-QTOF-MS confirmed the presence of the parent compound U-47700, as well as its metabolites *N*-desmethyl-U-47700 and *N,N*-didesmethyl-U-47700, in the urine and blood specimens

# Identifying clandestine opioids

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- Heroin users are unable to identify fentanyl in supply
  - Of 30 patients requiring Narcan reversal, only 55% were able to identify fentanyl
  - 96% of street heroin is contaminated with fentanyl or analogues in this cohort
- Adolescents are at significant risk of adverse events due to misidentified drugs

Griswold, M. K., Chai, P. R., Krotulski, A. J., Friscia, M., Chapman, B., Boyer, E. W., ... & Babu, K. M. (2018). Self-identification of nonpharmaceutical fentanyl exposure following heroin overdose. *Clinical Toxicology*, 56(1), 37-42.

# References

1. McKeever, R. G., Vearrier, D., Jacobs, D., LaSala, G., Okaneku, J., & Greenberg, M. I. (2015). K2—not the spice of life; synthetic cannabinoids and ST elevation myocardial infarction: a case report. *Journal of Medical Toxicology*, 11(1), 129-131.
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# Thank You!

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