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Performance Driven — Racing to Results
Designer drug crisis: the Rhode Island experience

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Designer drugs?
What is a designer drug?

- Structural or functional analog of a controlled substance
- **Designed** to mimic the pharmacological effects of the original drug
- **Designed** to avoid being classified as a controlled substance
Many classes of designer drugs

• Opioids
  example: fentanyl analogues

• Piperazines
  simulating the effects of MDMA (ecstasy)

• Synthetic cannabinoids and cathinones
  effects similar to cannabis and khat
  commonly known as “bath salts”
Snorted, Smoked or Injected

- Extreme Agitation
- Hallucinations & Delusions
- Chest Pain
- Suicidal Thoughts
- High Blood Pressure
- Acute Toxicity
- Hyperthermia
- Delirium
- Violent Behavior
- Foaming at the Mouth
- Extreme Paranoia
- Delusional Paracitosis
- Parkinson-Type Limb Twitching
- Paranoia
- Severe Insomnia
"Bath salts"

- Methcathinone
- 3,4-methylenedioxymethcathinone (Methyline) \( \text{MW}=207 \)
- MDPV
  - 3,4-methylenedioxypyrovalerone
  - \( \text{MW}=275 \)
- 4-Methylmethcathinone (4-MEC)
  - \( \text{MW}=191 \)
“Bath salts” and “incense”

Spice, K2 and other herbal smoking blends
plant material sprayed with synthetics
cannabinoids

THC

AM-2201

JWH-018
Designer Drugs problem in RI
(pop. 1,053,354)

• In 2014, 232 deaths were attributed to drug overdose: 90% involved at least one opioid and fentanyl was implicated in over 70%.

• In 2014, “bath salts” were the fourth most frequently identified drug class by our Drug Chemistry Laboratory (after heroin, cocaine, marijuana)

• In 2013, 13 overdose deaths due to a novel designer drug-acetyl fentanyl
Forensic Drug Chemistry and Toxicology Laboratories

• Located within the Forensic Sciences section of the RI State Health Laboratories

• Drug Chemistry Laboratory identifies substances seized by the police

• Toxicology Laboratory provides toxicology testing for the OSME to help determine the cause of death
Toxicology testing algorithm

The usual laboratory procedure involves:

1. Screening by ELISA (Immunalysis test kits)

2. Confirmation and/or quantitation by GC/MS (extraction required-e.g. basic n-butyl) or HPLC

3. Testing for unusual/rarely detected drugs may be sent out to a reference laboratory
ELISA screening

Drugs/classes of drugs detected

Cannabinoids
Opiates
Amphetamine
Barbiturates
Methamphetamine
Cocaine
Benzodiazepines
Oxycodone
Fentanyl

Tricyclic
Antidepressants
Acetaminophen
Salicylate
Carisoprodol
Methadone
Zolpidem
Propoxyphene
Mystery drug?

• On Monday, May 8\textsuperscript{th}, 2013 the Toxicology lab noticed a new, unusual drug was present in the post-mortem samples taken from 10 different individuals.

• All deceased were from three Northern Rhode Island communities

• All deaths were clustered within 2-3 weeks in March and early April
Mystery drug?

- Samples from all cases tested strongly positive for fentanyl in the preliminary ELISA screen
- No peak corresponding to fentanyl observed—fentanyl not confirmed
- Two unidentified peaks in all chromatograms
- No match using standard library search
Mystery drug?

The use of specialized drug mass spectral library tentatively indicated the following:

- N-Phenyl-n[1-(2-phenylethyl)-4-piperidinyl]acetamine; N-(1-phenethyl-4-piperidyl)-acetanilide or acetylated analog of fentanyl
- 4-anilino-N-phenethylpiperidine (4-ANPP), a precursor of fentanyl
Fentanyl and acetyl fentanyl

![Fentanyl and Acetyl Fentanyl](image)

*Acetyl fentanyl*  
(Desmethyl fentanyl)
But is this what it really is?

- Both mass spectra and retention time data is needed to confirm the identity of a chemical
- **No certified standards available commercially**
- A sample of the implicated drug was obtained from powders (and drug paraphernalia) found at crime scenes and submitted to the Drug Chemistry for analysis
Identity confirmed!

• A few weeks later, DEA provided reference standards “for identification only”
• Once analyzed, mass spectrum and RT matched the unknown substance
• Final report issued, reporting the presence of acetyl fentanyl
Is acetyl fentanyl in your state?

- ELISA screening for drugs used in many laboratories, but does not always include fentanyl
- Cross-reactivity is common in ELISA
- Positive screening results should be confirmed using a more specific technique
- Acetyl fentanyl is now commercially available!
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