

# 2015 APHL<sup>TM</sup> ANNUAL MEETING

and ninth government environmental laboratory conference



*Performance  
Driven —  
Racing to  
Results*



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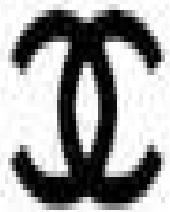


## Designer drug crisis: the Rhode Island experience

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**RI State Health Laboratories**



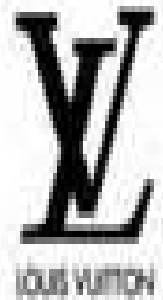
# Designer drugs?



GUCCI



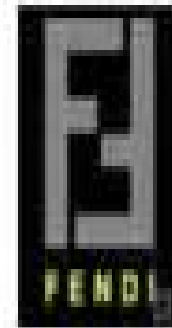
Christian Dior



PRADA



Chloé



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YVES SAINT LAURENT



JIMMY CHOO

# 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

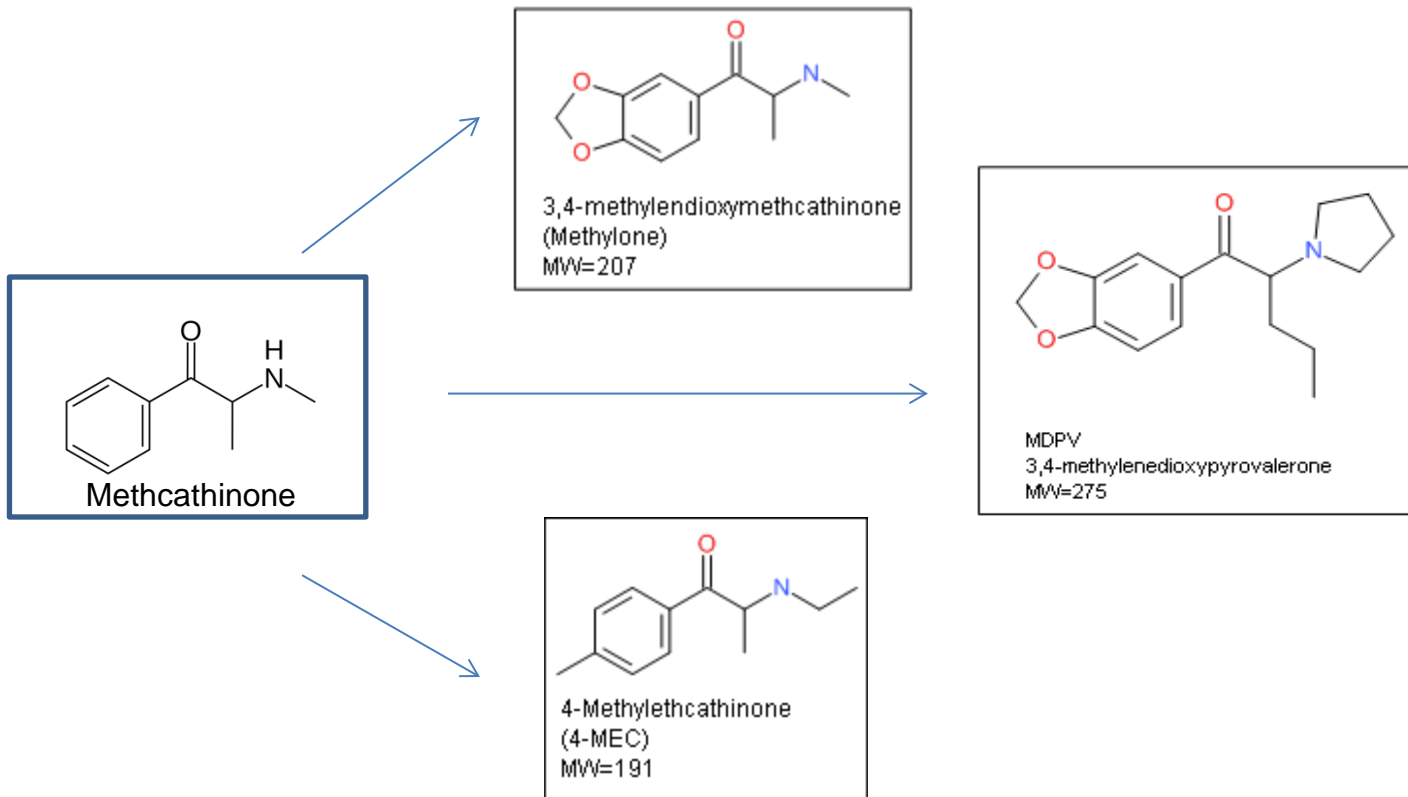
- **Opioids**  
example: fentanyl analogues
- **Piperazines**  
simulating the effects of MDMA (ecstasy)
- **Synthetic cannabinoids and cathinones**  
effects similar to cannabis and khat  
commonly know as “bath salts”

# 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



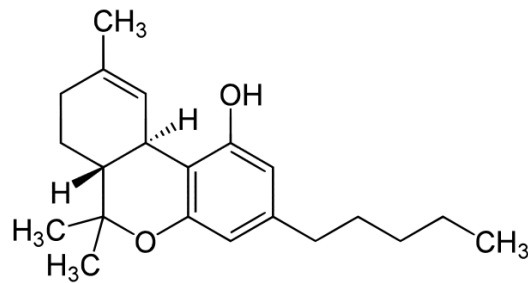
# “Bath salts”



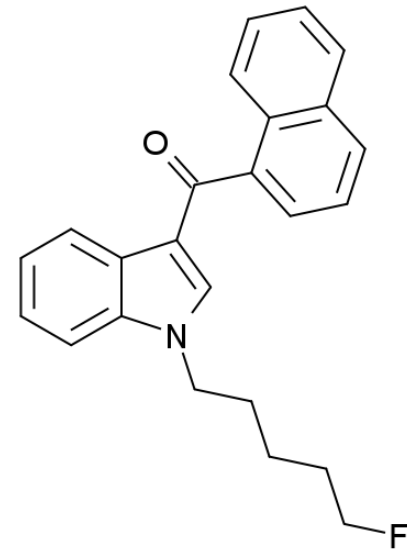
# “Bath salts” and “incense”

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

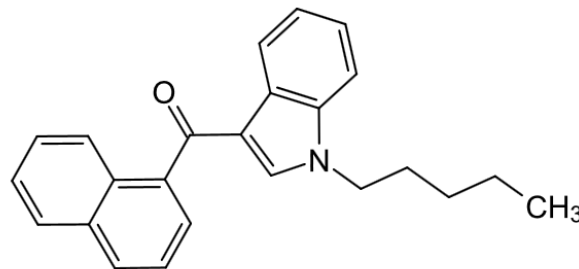
THC



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 (Immunoanalysis 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**

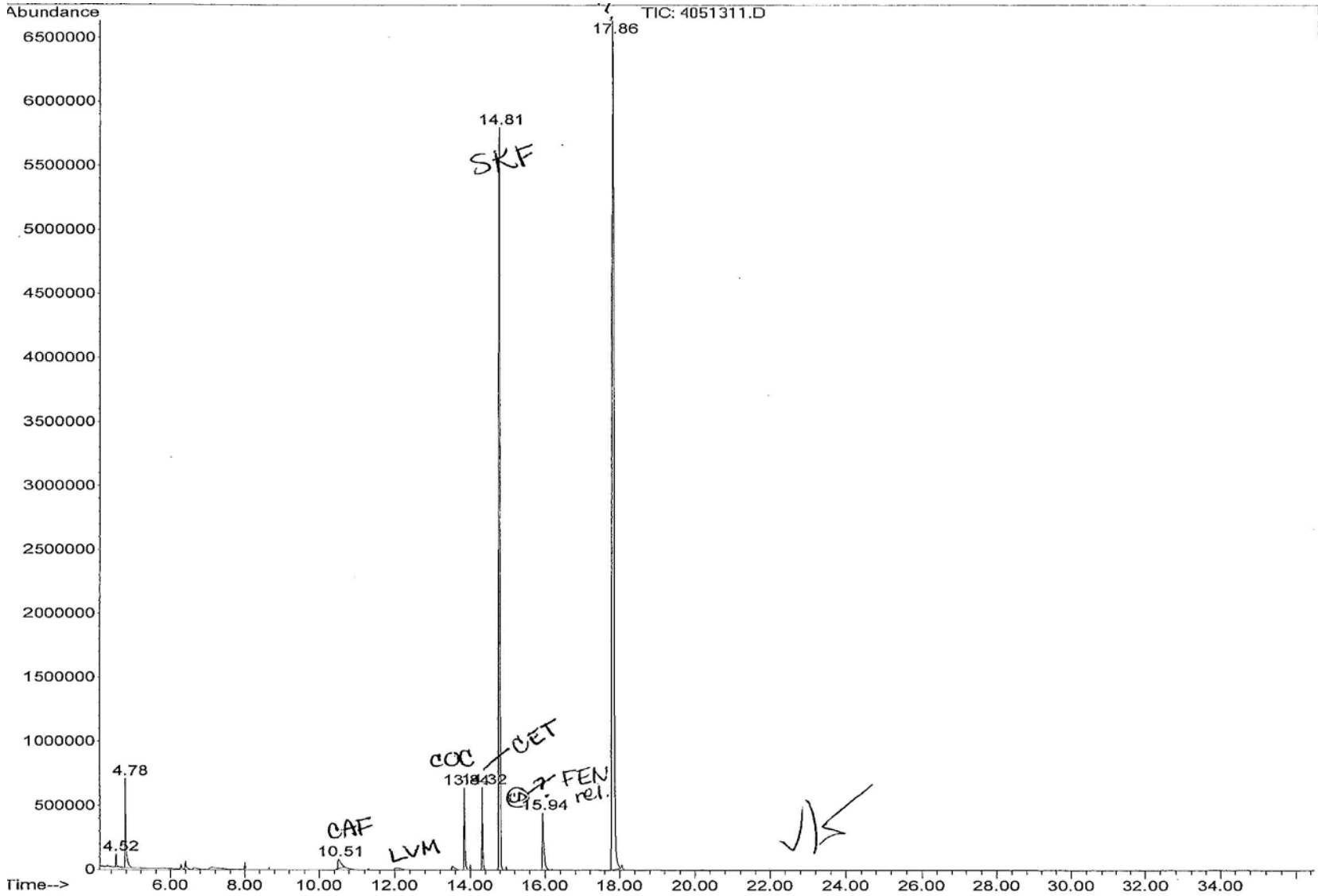
**Propoxyphene**

# Mystery drug?

- **On Monday, May 8<sup>th</sup>, 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**



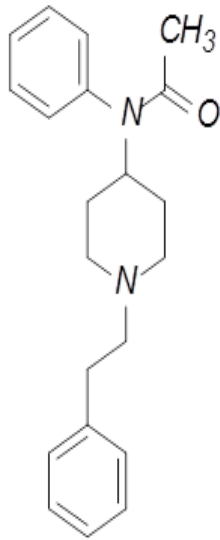
# Mystery drug?

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 **acetyl analog of fentanyl**
- 4-anilino-N-phenethylpiperidine (4-ANPP), a precursor of fentanyl

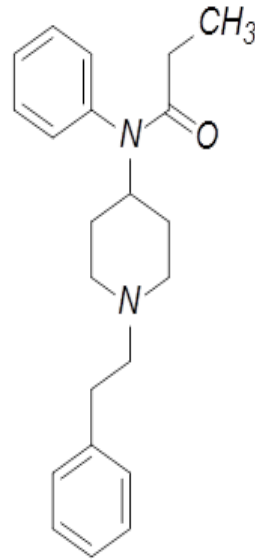


# Fentanyl and acetyl fentanyl

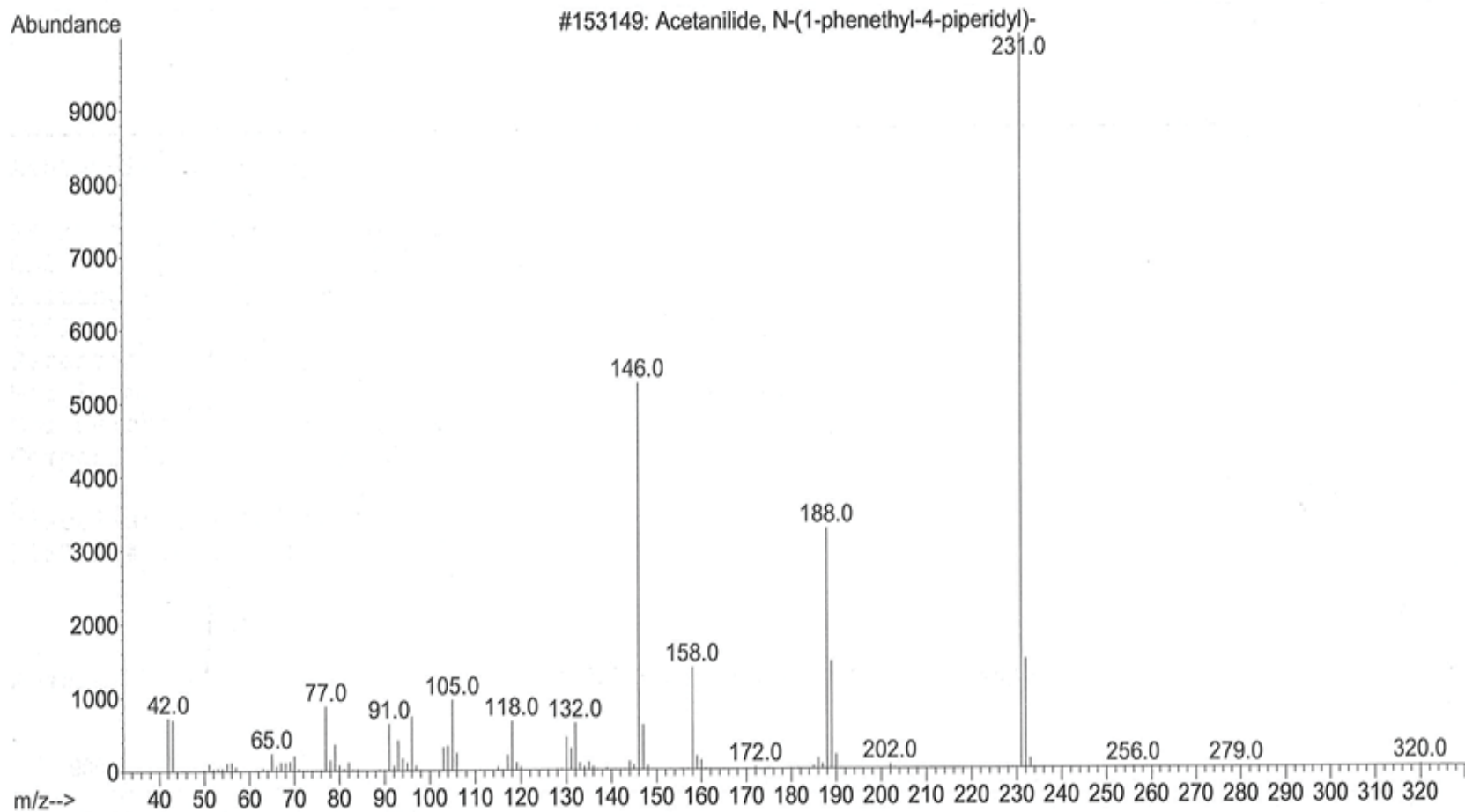


*Acetyl fentanyl*

(Desmethylenfentanyl)



*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!**

# Acknowledgments

- **Staff, RI Forensic Toxicology Laboratory**
- **Staff, RI Drug Chemistry Laboratory**
- **Office of the State Medical Examiners**
- **DEA, Special Testing and Research Laboratory, Dulles, VA**