



NAME
West Palm Beach October 2018

**Novel Illicit Opioid Proliferation in
Postmortem Investigations: 2017- 2018
Experience**

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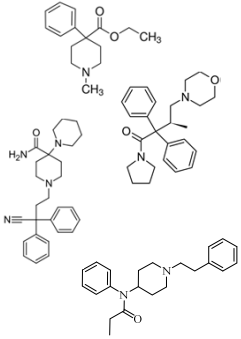



Opioids

- 1804 Freidrich Sertürner isolated **morphine**.
- 1832 Pierre Robiquet isolated **codeine**
- 1853 Hypodermic syringe invented
- 1874 Alder-Wright synthesized **diacetylmorphine**
- 1916 Freund and Speyer synthesize **oxycodone**
- 1920 Mannich and Lowenhein synthesize **hydrocodone**
- 1937 **Methadone** synthesized at IG Farben
- 1939 **Meperidine** synthesized
- 1955 **Propoxyphene** synthesized
- 1960 Jannsen patents **Fentanyl**

Fentanyl

- N-phenyl-N-[1-(2-phenylethyl)piperidin-4-yl]propanamide
- Invented in 1960's by Paul Janssen
- SAR inspired by meperidine, led to dextromoramide, piritramide then fentanyl (R4263)



Fentanyl Analogs

- Acetylfentanyl
- (Fentanyl)
- F/Butyrylfentanyl
- F/Isobutyrylfentanyl
- Valerylfentanyl
- Tetrahydrofuranlylfentanyl
- 2/3-Furanylfentanyl
- Acrylfentanyl
- Crotonylylfentanyl
- Methoxyacetylfentanyl
- Cyclopropylfentanyl
- Tetramethylcyclopropylfentanyl
- Cyclopentylfentanyl
- Cyclohexylfentanyl
- Phenylfentanyl
- ...

- o-Fluorofentanyl
- p-Fluorofentanyl
- ...
- Carfentanil
- Alfentanil
- Sufentanil
- Remifentanil
- 3-methylfentanyl
- α-methylfentanyl
- β-hydroxyfentanyl
- β-hydroxy/Thiofentanyl
- Ethylfuranlylfentanyl

Phenylethyl piperidine

Fentanyl Analogs

- More potent or longer acting analogs
Alfentanil, Sufentanil, Carfentanil, synthesized by Paul Janssen in the mid 1970's
- Analgesic potencies in mouse models of 0.25 to 500 times that of fentanyl

Identifying the New Substances

- The Proliferation of New Substances
 - Over 600 fentanyl analogs have been described
 - More classes of drugs with opioid effects are being pirated.

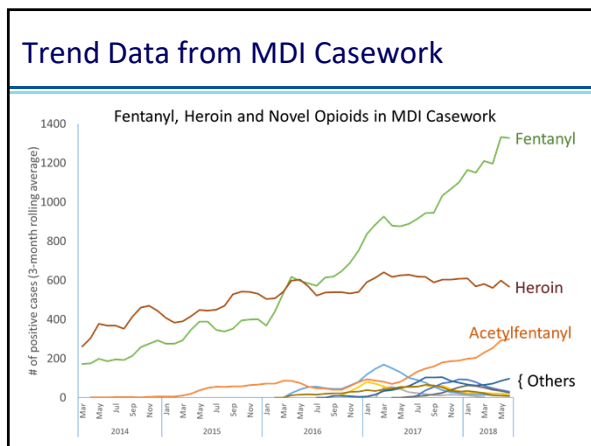
Other μ Opioid Agonists

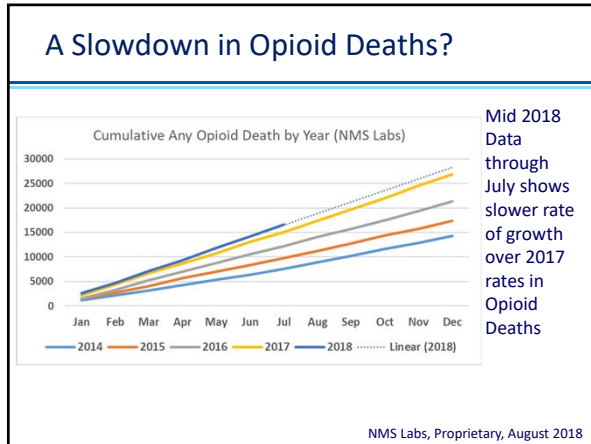
- Opioid analgesic drugs developed at Upjohn in the 1970s.
- Cyclohexyl-N-methylbenzamides
- Mixed mu and kappa agonism
- Derived from AH-7921
- More potent than Morphine, less potent than fentanyl

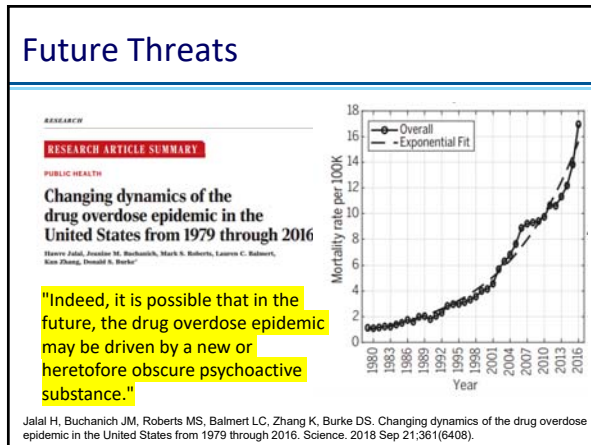
Right: U-47700, U-49900, methylenedioxy U-47700, ... U-50488, U-48753, U-51754

Opioids Testing Menu 2018

Opiates	Morphine, codeine
Semi-synthetics	Heroin, oxycodone, oxymorphone, hydrocodone, hydromorphone
Synthetics	(meperidine, propoxyphene) methadone
Fentanyl derivatives and precursors	Fentanyl, Remifentanyl, Sufentanyl, Carfentanyl, Alfentanyl, Lofentanyl, Ocfentanyl, Acetylfentanyl, F/Butyrylfentanyl, F/Isobutyrylfentanyl, Valerylfentanyl, Tetrahydrofuranlylfentanyl, 2/3-Furanylfentanyl, Acrylfentanyl, Crotonylylfentanyl, Methoxyacetylfentanyl, Cyclopropylylfentanyl, Tetramethylcyclopropylylfentanyl, Cyclopentylylfentanyl, Cyclohexylylfentanyl, 3-methylfentanyl, α -methylfentanyl, β -hydroxyfentanyl, β -hydroxy/Thiofentanyl, Ethylfuranlylfentanyl, Fluorofentanyl, 4-ANPP, Benzylfentanyl...
Cyclohexyl-N-methylbenzamides	U-47700, U-49900, U-48800, isopropyl-U-47700, 3,4-methylenedioxy-U47700
Arylcyclohexylamines	Tramadol, Tapentadol, Bromadol...








Case Study: "Santa Muerte" Outbreak

- Mass overdoses are reported in Philadelphia
 - Fri July 20th to Sun July 22nd, 2018
 - Estimated more than 160 overdoses in West Kensington, Phila.
 - Following administration of naloxone, patients were reported to be agitated and confused
 - Attributed to Santa Muerte stamped Heroin


Case Study: "Santa Muerte" Outbreak

- Opioid Toxidrome
 - Pinpoint pupils
 - Respiratory depression
 - Unresponsiveness
- Anticholinergic Toxidrome
 - Tachycardia
 - Warm and dry skin
 - Dilated pupils
 - Mental status change
 - Characteristic hallucinations

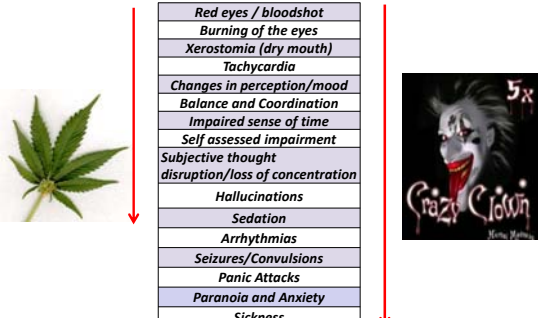


Case Study: "Santa Muerte" Outbreak

- Timeline – July 2018
 - Tues July 24nd
 - CFSRE received and analyzed seized powder; results reported by end of business day – Heroin, Fentanyl, 5F-ADB
 - Thurs July 26th
 - CFSRE received biological samples and additional seized powder - Heroin metabolite, Fentanyl, 5F-ADB
 - Results reported by end of Friday, July 27th
 - Data reported to DOJ, CBP, DEA, CDC, NDEWS, NJDMI, NAME, ASCLD, Public Health, ACMT, Poison Control Centers.



Cannabis vs Synthetic Cannabinoids



Red eyes / bloodshot
Burning of the eyes
Xerostomia (dry mouth)
Tachycardia
Changes in perception/mood
Balance and Coordination
Impaired sense of time
Self assessed impairment
Subjective thought disruption/loss of concentration
Hallucinations
Sedation
Arrhythmias
Seizures/Convulsions
Panic Attacks
Paranoia and Anxiety
Sickness

Dissemination Strategies

- Providing identification, analytical data, library updates, dates of seizure and identification.

Timely Emergent Drug Data for DEWS

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<https://www.forensicscienceeducation.org/resources/nps-discovery/>
