



PROJECT ECHO: OD-FIT

Overdose Fatality Investigation Techniques

Toxicological Investigation of Drug Overdose Deaths

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Role of Toxicology in the MDI Process

- Necessary to definitively establish the cause and manner of death – rule-in and rule-out the role of intoxicants
- Assist with the public health surveillance of emerging psychoactive substances
- In some jurisdictions, drug testing is required

Toxicology Laboratory Request

Age: ___ yo / Sex: Male Female / Race: Cauc. Black Other: _____ / Decomp?

Comments: _____

Drugs Suspected: _____

Specimens Submitted:

- Blood (source: _____)
- Urine
- Bile
- Vitreous Humor
- Stomach Contents
- Other: _____

Analyses Requested:

- Volatiles only
- Comprehensive Toxicology (includes volatiles)
- Drug Quantitation – _____
- Carboxyhemoglobin
- Cyanide
- Other: _____
- Vitreous Chemistries
- Hepatitis B
- Hepatitis C
- HIV (ELISA Screen)
- PRIORITY CASE**

Information for the Toxicologist

- Decedent name and demographics
- Relevant/condensed MDI history
- Drugs suspected including over-the-counter, prescription, illicit and NPS
- Other relevant information (scene findings, paraphernalia)

Drug Toxidrome

The ME/C should correlate the constellation of signs and symptoms associated with the ingestion of a specific drug or drug class:

- Stimulants
- Depressants
- Others

Specimens

- Most common – blood (with source specified), urine
- Others – bile, vitreous humor, stomach contents, tissue
- Ante-mortem – blood, serum, plasma, urine
 - Record pseudonym, collection date/time
- Alternative – oral cavity fluid, injection site, hair, nails, maggots
- Paraphernalia

Specimen Receipt

- Assign unique identifier to the **case**
- Assign unique identifier to each **specimen**
- Inventory all specimens (type) – volume, weight, and/or amount
- Note specimens received with seals intact

Analytical Approach

As a general matter of scientific and forensic principle, the detection or initial identification of drugs and other toxins should be confirmed whenever possible by a second technique based on a different chemical principle.

SOFT/AAFS Lab Guidelines

Analytical Approach

Choose appropriate specimens for testing to support the medicolegal death investigation

Analytical Algorithm
Immunoassay Screen
Routine Drug Screen
Comprehensive Drug Screen
Targeted Analyses

Analytical Algorithm Considerations

Which specimen(s) to test

Triage the submission

Contact the ME/C if necessary

Analytical Approach

Colorimetry

Immunoassay

Gas Chromatography

Liquid Chromatography

Mass Spectrometry

High Resolution Mass Spectrometry

Specific Drugs Tested

CNS Depressants

CNS Stimulants

Others

Illicit Drugs and NPS

- Cannabis, cocaine, **fentanyl**, heroin, methamphetamine and phencyclidine
- New psychoactive substances (NPS) including aminoindanes; synthetic cannabinoids; synthetic cathinones; phenethylamines; piperazines; plant-based substances; tryptamines; other substances

Progressive Testing Algorithm

- Volatiles (other than ethanol)
- Other Sedative Hypnotics
 - Z drugs
 - Carisoprodol
 - OTC Antihistamines
- New Psychoactive Substances

Targeted Analysis

- New Psychoactive Substances (NPS)
 - Synthetic cannabinoids
 - Cathinones
 - Synthetic benzodiazepines and opioids
- 6-Acetylmorphine (heroin)
- 4-ANPP (IMF)

Reporting

- Name of decedent and demographics
- Specimens submitted
- Results of analyses
- Relevant notes regarding analyses

Multi-Drug Substance Use

- Fatal intoxication is common amongst prescription and illicit drug users
- Number of drugs ingested is directly related to incidence of fatal overdose
- Fatal overdoses include accidental and intentional overdose

Toxicological Considerations

- Predominant drug effect
 - depressant/stimulant
- Combined drug effect
 - additive and synergistic
- Frequency of drug administration
 - acute and chronic (tolerance)
- Use of an antagonist

Common Opioid Drug-Drug Combinations

- Opioids + Alcohol
- Opioids + Benzodiazepines
- Fentanyl/Fentanyl Analog + Cocaine
- Fentanyl/Fentanyl Analog + Methamphetamine

Message for the ME/C (!)

- Know the capabilities of the laboratory
 - must know what is and is not tested
 - scope of testing does not include all possible substances
- Choose the most appropriate test to meet the needs of the investigation
- Have your toxicologist on speed dial

Negative Toxicology in an Apparent Overdose

Discuss the case with the toxicologist -

- Query toxicologist regarding analytical limitations
- Request additional testing enhancing the scope of analysis (e.g., targeted analysis, high resolution MS)
- Request testing of scene evidence including paraphernalia
- Send case to referral laboratory for peer assessment

Other Considerations

- Final interpretation of toxicology findings is complex and must be evaluated contextually
- Postmortem drug redistribution can potentially affect blood drug concentrations
 - Source of the specimen, postmortem interval, and decomposition are important considerations
- Some drugs are not stable and will breakdown (e.g., cocaine)

Final Determination of Death

- Potency/lethality of drug(s) and consideration of drug-drug interaction
- Significance of autopsy, microscopic, and toxicological findings
- Interaction of natural disease and drugs
- Consideration of MDI findings

Contact Information

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Case Scenario

Home death of 61 year old female

Extensive medical history including severe COPD with chronic bronchitis, emphysema and pulmonary disease with severely compromised lung function and continues to smoke.

She is on multiple medications and has an extensive additional psychiatric history for which she has several antidepressant medications prescribed to her.





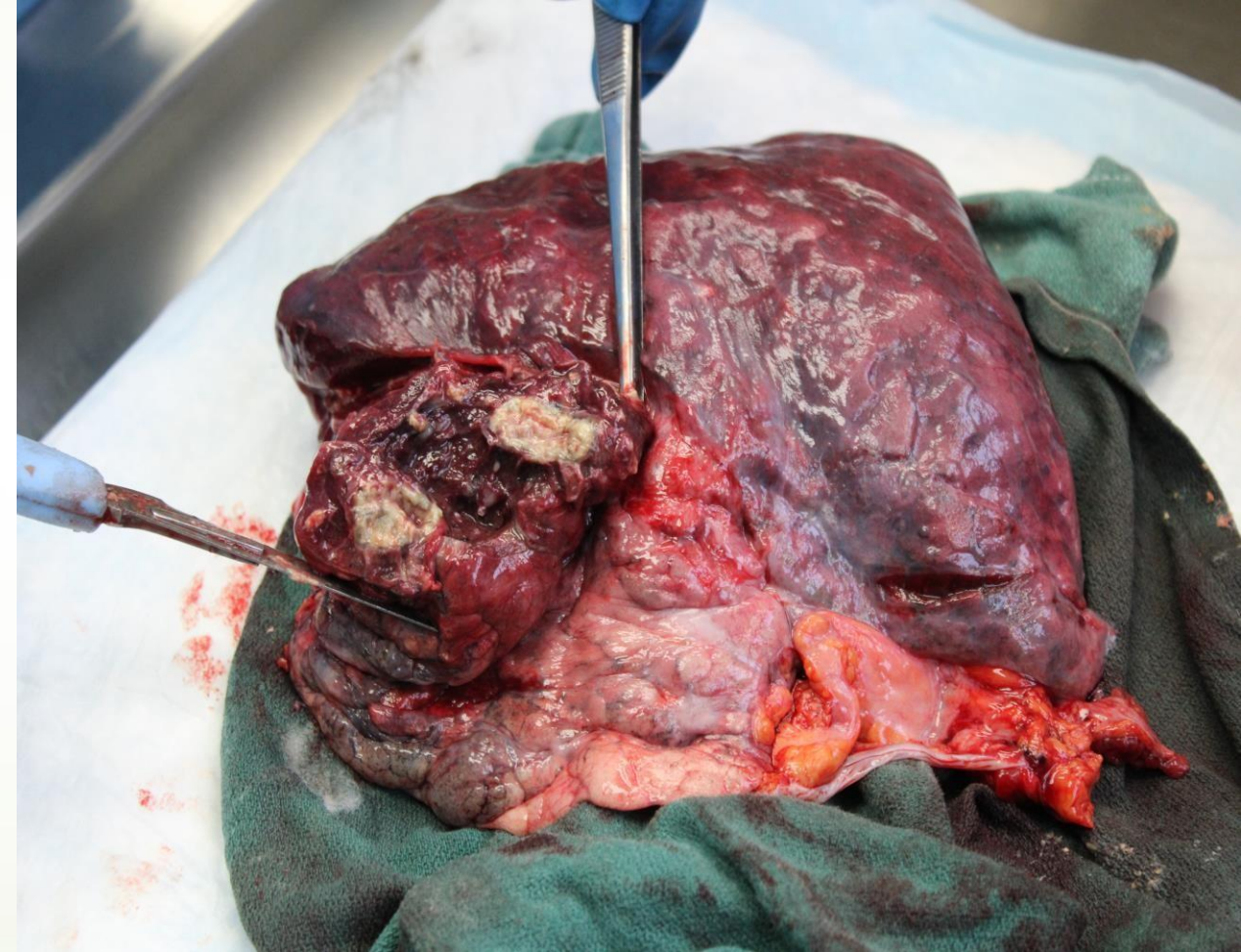






ADDITIONAL FINDINGS

1. Massive right lung abscess/infection (8cm) with history of mycobacterium avium infection with cavitation
 - A. Additional smaller infectious foci identified in both lungs
2. Atherosclerotic heart disease with stent in proximal circumflex vessel
3. Liver lesions (calcified) – one in each lobe
4. Right renal cyst, inferior pole





TOXICOLOGY

Post Mortem blood sample

1. Sertraline – 6901 ng/mL (ref. range 30-200)
2. Fluoxetine - 4397 ng/mL (ref. range 50-480)
3. Trazodone – 1.6 mcg/mL (ref. range 0.8-1.6)

At least 25 minimally digested pills in gastric contents
with additional pill sediment



OTHER FACTORS TO COMPLICATE MATTERS

There are two adult sons (NOK) -

One is incarcerated in Texas (we are in Wisconsin)

One ("**GE**") is accusing his aunt of murdering his mother

"**GE**" is refusing to sign any paperwork for the funeral home including a Family Authorization for cremation until he "**talks to his lawyer**".

The decedent will be eligible for state assistance to pay for any funeral expenses, but paperwork must be authorized, which "**GE**" will not sign.

"**GE**" is hostilely calling the funeral home, the investigator, our office, the **Sheriff's Office**, etc. at 1 am, 4am expounding on his conspiracy theories and our lack of pursuing his leads. He continually says "**this better not be ruled a suicide**".

Mother has now been dead for 2 weeks and still no cremation authorization. The accused **Aunt's** daughter has called and offered to pay for and handle arrangements, but the funeral home is wary, given the harassing, abusive nature of "**GE**".



Questions

Wisconsin State Stats, in dealing with **“unclaimed remains”** use the phrase **“within a reasonable time”** before the ME can authorize cremation. What is a reasonable time? What time frame do other states use?

Had the toxicology come back negative, the chances of her severe lung issues along with the loose plastic bag very likely could have caused her death. If so, what would the manner of death be?



OUTCOME

COD: Mixed suicidal drug overdose (predominantly sertraline and fluoxetine)

Manner of Death: SUICIDE

After 28 days, incarcerated brother worked with funeral home to get necessary papers signed to authorize the cremation.

Ironically, he authorized the ashes to go to his accused Aunt. This sent **"GE"** over the top, calling the police to report a theft (?) and threatening to sue the funeral home. **Haven't** heard anything from him since.