

GUEST LECTURE FROM A CLASS IM NOT A PART OF (Totally not secretly notes in case Abi misses something)

Theme: Forensic Toxicology by Nathalie Desrosiers

What is it?

Testing of bodily fluids for the presence or absence of alcohol, drugs and poisons as it relates to criminal investigations.

Areas of Knowledge

- Analytical chemistry
- Pharmacology and/or toxicology
- Human physiology
- Applicable law

Case Types

1. Coroners' cases (OD, Unkown)
2. Impaired driving
 - Alcohol
 - Drugs
3. Sexual assaults
4. Assaults
5. Administratin a noxious substance
6. Poisonings
7. Homicides

Exhibits by case types

Impaired driving:

- Blood
- Urine
- Request for Independent opinion
 - No exhibits are collected but an explanation of effects may be required

Assaults, including sexual assaults:

- Blood
- Urine
- Cups, cans and other drinking receptacles
- Food items, including drinks

Homicides, Post-mortem cases

- Blood
 - Urine
 - Vitreous humour (liquid in the eyes)
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Impaired driving Requests

Alcohol:

- Typically done by breath analysis, unless a person is physically incapable of doing so
- Can also have hospital samples seized under specific conditions identified in the criminal code

Drugs:

- If there are clear signs of impairment, officer may demand a blood sample
- Can also have hospital samples seized

Impaired Driving - DRE = Drug Recognition Evaluator:

- Specifically trained officer trained to administer a standardized and step-wise evaluation to identify impairment and determine which class of drugs may have been the cause of the impairment
- 12-step evaluation also rules out medical condition
 - Diabetes often show similar symptoms to being intoxicated

Impaired Driving - per se

- Specifically for drugs listed under the Blood Drug Regulations
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What are the 12 steps:

1. rule out alcohol
 2. Interview arresting officer
 3. Preliminary examination and first pulse
 4. Eye examination
 5. Divided attention psychophysical tests
 - Modified Romberg Balance
 - Walk and turn
 - One leg stand
 - Finger to nose test
 6. Vital signs and second pulses
 7. Dark room examination
 8. Muscle tone examination
 9. Check for injection sites
 10. Subject's statement and other observations
 11. Analysis and opinions of the evaluator
 12. Toxicological examination
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Look up DRE Matrix

Positions

- Lab Assistant type role
 - Technologist 2 / 3 / 4
 - 2 - day to day analyses
 - 3 - + Instrument maintenance and may testify
 - 4 - + technologist supervisor, instrument manager
 - Toxicologist - Interprets results and possible effects and writes up a report.
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Analysis

Clean up sample:

- Protein precipitation
- Liquid-liquid extraction
- Solid-phase extraction

Separate from other components:

- Gas Chromatography
- Liquid Chromatography

Analyse, confirm, quantitate:

- Flam Ionization Detector
- Diod-array detector
- Mass Spectrometry

Types of methods

Screening methods:

- Used a preliminary testing
- used to identify the possible presence of a drug or class of drugs
- Can lack specificity

Confirmation methods:

- More specific in nature
- Confirms the identity of a drug
- Often used a quantitative methods (Determine concentration)

Screening Methods:

ELISA - Enzyme-linked immunnnosorbent Assay

- Competitive assay
- Uses antiegn-antibody reaction

Liquid Chromatography with quadrupole time-of-flight mass spectrometry (High resolution Mass Spectrometry) (Goes to 4 d.p)

Detection/Confirmation of volatiles

- Alcohol and other volatiles are detected using headspace GC-FID, or gas chromatography with flame ionization detector, usually with two different GC Columns

Gas chromatography - mass spectrometry

GC-MS:

- Drugs identified by their retention time and their characteristic

Mass spectrum - analyzed as full spectrum or selected-ion chromatogram (SIM)

Liquid Chromatography with tandem mass-spectrometry:

- tends to be more sensitive and more specific
 - Ionizes, filters, fragments, filters and then detects which provides a more specific result that would however take more time
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Testimony

- Usually for impaired cases
 - Called to speak for effects
 - May also be called in homicides and sex assault cases to speak to the possible state of mind of the alleged victim/deceased individual
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She did research on having students smoke some cannabis to have blood, urine and oral fluid collected and performed physical and computer tests to judge impairment to be compared between regular vs occasional smokers of cannabis.