• Bemidji Bureau of Criminal Apprehension (BCA) Forensic Science Laboratory
  – Located in Bemidji, MN
  – No Alcohol or Toxicology testing at this site
  – Kits submitted to this location are delivered to St. Paul

• St. Cloud now has a processing site for submission of evidence
  – No Alcohol or Toxicology testing at this site
  – Kits submitted to this location are delivered to St. Paul

• St. Paul BCA Forensic Science Laboratory
  – Alcohol and Toxicology analysis completed in the Toxicology Laboratory section
ST. PAUL BCA TOXICOLOGY LAB SECTION

• Staff of:
  • 1 supervisor
  • 2 technical leads
  • 10 scientists
    - 2 who only complete alcohol/inhalant analysis
    - 8 who are trained in alcohol and toxicology analysis
• Human Performance Forensic Toxicology
  – Did drug use impact behavior?
  – Alcohol: Blood, breath, and urine
  – Drugs: Blood (preferred) and urine
TOXICOLOGY LABORATORY SERVICES

- Analyze blood/urine for alcohol, inhalants, and drugs
  - Open bottles
- Screen and confirm primarily a limited menu of Scheduled drugs on urine and blood
  - At this time urine screening has a larger menu than blood screening
- Issue reports
- Interpret analytical results
- Expert witness
WORKFLOW OF TOXICOLOGY SAMPLES

• Perform alcohol testing –
  – Alc is <0.08x, and Tox testing is indicated on kit sheet → drug screening
    (some drugs have a magnified effect when alcohol is present, ie. Benzos or cocaine)
• DWI, and alcohol is >0.08x, generally stop drug screening/testing.
  – Factors that may influence this: certainty factor, time between incident and collection, warrant
  – PBT - <0.08? May influence testing decisions
WORKFLOW OF TOXICOLOGY SAMPLES

• Perform inhalant testing at the same time as alcohol testing
• Note – check for type of inhalant present in vehicle – note this on kit sheet. Recording of CAS# from container is also helpful.
• Look around the vehicle for cans!!
CASE DECISION POINTS

• Review of any PBT of <0.08 by scientist
• PBT = .000, or valid DMT test (<0.08), move ahead to drug screening.
• Uncertainty with .08x BAC/UAC/Tox request
• Urine drug screens are batched – every other week
• Blood screens are batched – run weekly
• Once screen results are posted in lab computer, the confirmatory analysis begins
• Not all scientists are trained to perform all tox testing
ALCOHOL WITH OTHER DRUGS

• Synergistic effect  \(1 + 1 = 10\)
  - Drug + Alcohol > Drug or Alcohol alone
  - Drug class is important in combination with alcohol (low PBT)
BLOOD VS. URINE

• Blood Advantages
  – Impaired?
  – Prescription abuse?
    • Check for pill bottles and count pills

• Urine Advantages
  – Synthetics
  – Larger menu
  – Easy to obtain
  – Longer drug detection time

• Inhalants – get a blood or urine

• What drugs are suspected?
  – This could drive decision about which matrix to collect based on testing capabilities.
• Drug screening run as batch analysis
• Blood – enzyme immunoassay (EIA) or enzyme linked immunoassay (ELISA)
• Urine – uses LC-MS/MS (Q-Trap)
  – Liquid chromatography triple quad mass spectrometry
• Need to utilize two distinct types of analytical methods – one to screen and another to confirm.
DRUG SCREENING

• Samples are batched
• Batching is cost effective & efficient.
• Each batch analysis includes:
  – Negative, low and high controls in the batch
LIMITATIONS WITH CURRENT BLOOD SCREENING TECHNIQUES

• Lack of specificity
  – Drug classes
  – Looking for specific drug metabolite(s) in sample

• Limitation of reagents
  – vendors don’t make reagents for every scheduled or prescribed or OTC drug on market

• Cost

• Batch analysis of blood drug screening
CONFIRMATIONS

Done by Mass Spectrometry

- GC/MS
  - Scan all ions
  - SIM (Selective Ion monitoring)

- LC/MS/MS
  - MRM – Multiple Reaction monitoring
CONFIRMATORY TESTING

- Batch analysis
- Labor and time intensive – follow standard procedures to separate drug from urine or blood matrix
- Limited menu of what can be confirmed based on current approved procedures in use
- Limited number of instruments available in Tox lab vs. # of staff doing confirmatory testing
- Balance of lab time and court time
GC-MS
LC-MS/MS
“WHAT AM I READING?”

POINTERS ON READING THE ALCOHOL AND TOXICOLOGY REPORTS

• No Schedule listed for the drug results on the Toxicology reports
• Certainty reported for any quantification (blood and vitreous samples) for Tox
• Only Alcohol is quantified for urines
REPORTS

• Blood reports contain quantification (number value with certainty range)
• Urine tox reports only presence – exception is UAC
• Urine Cannabinoids not confirmed – Only screen results reported
• Reports do not contain reference to the Schedules*

*Read all the pages and comments
WHY THE BCA’S TOX RESULTS ARE ACCURATE AND RELIABLE

• BCA Lab is accredited by ASCLD/LAB (American Society of Crime Laboratory Directors/Laboratory Accreditation Board)
  – Standardized methods/procedures
  – Latest accreditation on 12/2014 (5 yr period)

• High number of calibrators and quality control in use (more than is recommended in current forensic literature) ensures accuracy

• Proficiency testing – “purchased unknowns”

• Continuing education of staff

• Board certification of staff
1970 – Act divided drugs into categories ("Schedules") on the basis of their medical uses and potential for physical and psychological abuse

5 Schedules – I through V

Generally, the states have adapted the federal schedule.
• **169A.20 DRIVING WHILE IMPAIRED.**
  
  Subdivision 1. **Driving while impaired crime.** It is a crime for any person to drive, operate, or be in physical control of any motor vehicle within this state or on any boundary water of this state:

• (7) when the person's body contains **any amount** of a controlled substance listed in schedule I or II, **or its metabolite**, other than marijuana or tetrahydrocannabinols.
609.21 CRIMINAL VEHICULAR HOMICIDE AND INJURY.

Subdivision 1. Criminal vehicular homicide. A person is guilty of criminal vehicular homicide resulting in death and may be sentenced to imprisonment for not more than ten years or to payment of a fine of not more than $20,000, or both, if the person causes the death of a human being not constituting murder or manslaughter as a result of operating a motor vehicle:
(1) in a grossly negligent manner;
(2) in a negligent manner while under the influence of:
   (i) alcohol;
   (ii) a controlled substance or
   (iii) any combination of those elements;
(3) while having an alcohol concentration of 0.08 or more;
(4) while having an alcohol concentration of 0.08 or more, as measured within two hours of the time of driving;
(5) in a negligent manner while knowingly under the influence of a hazardous substance;
(6) in a negligent manner while any amount of a controlled substance listed in schedule I or II, or its metabolite, other than marijuana or tetrahydrocannabinols, is present in the person's body; or
(7) where the driver who causes the accident leaves the scene of the accident in violation of section 169.09, subdivision 1 or 6.
DRUG IMPAIRMENT

• No per se amount
  – Tolerance
  – Prescription use vs. Abuse
• Blood versus Urine
• DRE evaluation!!!!!!!!!!!!

• Observations are very important.
• Document, document, document these.
EXPANDED TESTING REQUESTS

• Synthetic cannbinoids
  – Screened for in urine
  – No blood test available

• Bath Salts
  – Currently screened for in urine (available upon request in blood)

• Fentanyl
  – Currently screened for in urine (available upon request in blood)

• Methylphenidate
  – Currently screened for in urine (available upon request in blood)

• Diphenhydramine
  – Currently screened for in urine (available upon request in blood)

• Cyclobenzaprine
  – Currently screened for in urine (available upon request in blood)
THINGS OF NOTE

• Unscheduled drugs that could cause impairment not currently tested for at the BCA
  – Doxylamine, Trazodone*, Dextromethorphan
  – Other drugs may be impairing at excessive doses or in combination
  • *Confirm test on the way...

• Retests

• eCharging - tied to **kit sheet** number
1,1 DIFLUOROETHANE’S GREATEST HITS
INCREASING CONCERN

2006: 2 cases
2008: 12 cases
2011: 30 cases
2015: 25 cases

Court of Appeals Decision regarding Inhalants:
State of MN vs. Chantel Lynn Carson
Steel County District Court
A15-1678

Other inhalants of interest: Dimethyl ether, Toluene,
Inhaled anesthetics: Sevoflurane, Isoflurane, Desflurane
IMPORTANT THINGS OF NOTE FOR INHALANTS!

• Check the vehicle!! – cans (full or empty), record CAS number from can

• Inhalant testing NEEDS to be done before drug screening – LET US KNOW IF YOU SUSPECT INHALANT!
  – If every category circled– Inhalant testing won’t be completed
  – Lab does not test for Nitrous Oxide
CHALLENGES TO BRING NEW TESTING ONLINE

- Limitations in screening methods
  - Availability from manufacturers

- What do we look for?
  - Parent drug vs. metabolite
  - What does the drug metabolize to?
  - How long does the drug stay in the system?

- Strict validation guidelines
  - Labor intensive
  - Time away from casework and court
• Highest BAC in 2015 = 0.510
• Number of UAC & BACs reported in 2015: 4544
• Average alcohol concentration = 0.15 (in 2015)
• 1 case of dimethyl ether in 2015
• 1922 Blood samples screened in 2015
• 1527 Urine samples screened in 2015
• 4544 Alc cases in 2015
• 3689 Tox cases in 2015
TOXICOLOGY LAB SECTION
INCREASE IN WORKLOAD

- 2013 Toxicology – 1044 urine & 1347 blood samples screened
- 2014 Toxicology – 1294 urine & 1795 blood samples screened
- 2015 Toxicology – 1527 urine & 1922 blood samples screened
- Tox only testing is over 45% of all samples we receive and increasing
  – Over 55% of all samples receive tox testing
  – Longer testing time = longer turnaround time = triage
2015/2016 IN REVIEW FOR ALCOHOL/TOX SECTION

- Down 2 FS positions for over 1 year
- OTS funded scientist positions
  - Allows time for full-time toxicology scientists to work on urine drug screening project in addition to casework
- BCA hired 2 dedicated alcohol scientists
  - Online in October of 2016
CHECK THE MN BCA WEBSITE

• BCA Website
  ➢ Forensic Science Services
  ➢ Forensic Testing Services
  ➢ Toxicology/Alcohol

➢ Click on drugs of abuse in first paragraph

• List of current drugs of abuse and matrix (blood or urine) that are able to be analyzed

  ➢ https://dps.mn.gov/divisions/bca/bca-divisions/forensic-science/Pages/drugs-of-abuse.aspx
OTHER IMPORTANT LINKS

• MN Board of Pharmacy
• MN Drug Schedules Statute152.02
• MN Rules Chapter 6800
THANK YOU!

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