Drugs in Society
and in Vehicle Operation
Working Definition of “Drug”

• VC§ 312 . Drug

•The term "drug" means any substance or combination of substances, other than alcohol, which could so affect the nervous system, brain, or muscles of a person as to impair, to an appreciable degree, his ability to drive a vehicle in the manner that an ordinarily prudent and cautious man, in full possession of his faculties, using reasonable care, would drive a similar vehicle under like conditions.
Seven Categories of Drugs

• Based on signs and symptoms which are easily observable or simple to test.
Central Nervous System
Depressants

Examples:

• Alcohol
• Barbiturates
• Anti-Depressants
• Anti-Anxiety Tranquilizers
Central Nervous System Stimulants

Examples:

• Amphetamine
• Cocaine
• Methamphetamine
• Ritalin
Hallucinogens

Examples:

- LSD
- MDMA (Ecstasy)
- Peyote
- Psilocybin
Dissociative Anesthetics

Examples:

- Dextromethorphan
- Ketamine
- PCP (Phenyl Cyclohexyl Piperidine)
Narcotic Analgesics

Examples:

- Codeine
- Demerol
- Heroin
- Methadone
- Morphine
- OxyContin
Inhalants

Examples:

• Volatile Solvents
  (Glue, Gasoline, Paint, etc.)

• Aerosols
  (Hairspray, Insecticides, etc.)

• Anesthetic Gases
  (Nitrous Oxide, Amyl Nitrite, etc.)
Cannabis

• Active ingredient:
  – Tetrahydrocannabinol (THC)

• Examples:
  – Marijuana
  – Hashish
  – Marinol
Drug Combinations

\[ \text{Soma Tablets} \quad 350 \text{ mg} \]
\[ \text{CARISOPRODOL} \]
\[ \text{Generic SOMA} \]
Incidence and Characteristics of Drug Use in America

• In 2004, 19.1 million Americans aged 12 years or older, were current illicit drug users
• Marijuana was the most commonly used illicit drug in 2004, with 14.6 million users
• In 2004, 6 million people were users of psychotherapeutic drugs taken non-medically

Source: National Survey on Drug Use and Health (NSDUH)
Drug Impaired Driving Facts

• Fact: About 11 million illicit drug users admitted driving after using an illicit drug in 2002

• Fact: In 2002, between 10% and 18% of drivers age 17 to 21 years reported driving under the influence of an illicit drug during the past year

Source: National Survey on Drug Use and Health (NSDUH)
Incidence of Drug Impaired Driving

California - A study of young male drivers fatally injured in crashes found that 51% had used drugs other than alcohol.

Source: Compton, NHTSA 1985
University of Tennessee Study

40% of crash injured drivers had drugs other than alcohol in their system.
Development and Effectiveness of the Drug Evaluation and Classification Program
The Three-Step Drug Evaluation Process

Step One
Establish that the subject is impaired

Step Two
Rule out medical impairment

Step Three
Determine the category of drugs involved
Two Stages of Validation

Stage One: Laboratory Validation Study
   Johns Hopkins University

Stage Two: Field Validation Study
   Los Angeles
1. Laboratory Study Results

1. Correctly identified 95% of drug-free subjects as "unimpaired"
2. Classified 98.7% of high-dose subjects as "impaired"
3. Correctly identified the category of drugs for 91.7% of high-dose subjects
4. DRE officers were less successful in classifying low-dose subjects
2. The Los Angeles Field Validation Study

- 173 drivers
- Blood tests confirmed:
  - One suspect had no drugs or alcohol
  - 10 had alcohol only
  - 37 (21%) had one drug
  - 82 (47%) had two drugs
  - 43 (25%) had three or more drugs
- Blood tests confirmed the presence of at least one “predicted” category of drugs for more than 90% of the suspects
Case Law Review

- “Frye” Standard
- Minnesota v Klawitter
- Colorado v Hernandez
- Washington v Baity
- New Mexico v Aleman
- Nebraska v Cubrich
HGN Case Law

- State (AZ) v Blake
Drug Evaluation Steps

1. The breath alcohol test
2. Interview of the arresting officer
3. The preliminary examination
# 3. Preliminary Examination

![Drug Influence Evaluation Form]

## Drug Influence Evaluation

<table>
<thead>
<tr>
<th>Evaluator</th>
<th>DRE No</th>
<th>Rolling Log No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorder/Witness</td>
<td>Crash: □ None □ Fatal □ Injury □ Property</td>
<td></td>
</tr>
<tr>
<td>□ None □ Fatality □ Injury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrestee’s Name (Last, First, MI)</td>
<td>DOB</td>
<td>Sex</td>
</tr>
<tr>
<td>Date Examined/Time/Location</td>
<td>Breath Results: □ Refused Instrument #</td>
<td>Chemical Test □ Urine □ Blood</td>
</tr>
<tr>
<td>□ Refused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miranda Warning Given: □ Yes □ No</td>
<td>What have you eaten today?</td>
<td>When?</td>
</tr>
<tr>
<td>By:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time now?</td>
<td>When did you last sleep?</td>
<td>How long?</td>
</tr>
<tr>
<td>Do you take insulin? □ Yes □ No</td>
<td>Do you have any physical defects? □ Yes □ No</td>
<td>Are you under the care of a doctor or dentist? □ Yes □ No</td>
</tr>
<tr>
<td>Are you taking any medication or drugs? □ Yes □ No</td>
<td>Attitude</td>
<td>Coordination</td>
</tr>
<tr>
<td></td>
<td>Breath</td>
<td></td>
</tr>
<tr>
<td>Speech</td>
<td>Eyes: □ Reddened Conjunctiva □ Normal □ Bloodshot □ Watery</td>
<td>Blindness: □ None □ L Eye □ R Eye</td>
</tr>
<tr>
<td>□ Unequal (explain)</td>
<td>Tracking: □ Equal □ Unequal</td>
<td></td>
</tr>
<tr>
<td>Corrective Lens: □ None □ Glasses □ Contacts, if so □ Hard □ Soft</td>
<td>Pupil Size: □ Equal □ Unequal (explain)</td>
<td>Able to follow stimulus: □ Yes □ No</td>
</tr>
<tr>
<td>Eyelids: □ Normal □ Droopy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Examination of the eyes
5. Psychophysical Tests

- Romberg
- Walk & Turn
- One Leg Stand
- Finger to Nose
6. Examination of vital signs
7. Dark room examinations
Pupil Adjustment

Diaphragm at a medium aperture
EYE ANATOMY

Pupillary dilator muscles (radial)
Dilators contract

Pupillary constrictor muscles (sphincter)

Constrictors contract
Driving
Driving on Narcotic Analgesic
Driving on CNS Stimulant
Driving on Hallucinogen
EYE TERMS

HIPPUSS

Pulsate within fixed limits

REBOUND

Pulsate and expand over 2 mm total
PUPIL SIZE ESTIMATION

- In Room Light
- In Near Total Darkness
- In Direct Light
PUPIL SIZE

• Pupilometer Device – 1.0 to 9.0

• Population PUPIL MEAN
  – Room Light – 4.0
  – Near Total Darkness – 6.5
  – Direct Light – 3.0
The farther away from the Average Value, the smaller is the Percentage of People with a specific value or size.
Room Light Estimation
Near Total Darkness Estimation
Direct Light Estimation
Check Oral and Nasal Areas in the Dark
8. Examination of muscle tone
9. Check for Injection Sites (3rd pulse)
10. Suspect's statements and other observations
11. The opinion of the evaluator

<table>
<thead>
<tr>
<th>Opinion of Evaluator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule Out</td>
</tr>
<tr>
<td>Alcohol</td>
</tr>
<tr>
<td>Stimulant</td>
</tr>
<tr>
<td>Dissociative Anesthetic</td>
</tr>
<tr>
<td>Inhalant</td>
</tr>
<tr>
<td>Medical</td>
</tr>
<tr>
<td>Depressant</td>
</tr>
<tr>
<td>Hallucinogen</td>
</tr>
<tr>
<td>Narcotic Analgesic</td>
</tr>
<tr>
<td>Cannabis</td>
</tr>
</tbody>
</table>
12. The toxicological examination
Central Nervous System
Depressants

KAVA

GHB
Major Types of Non-alcohol CNSDepressants

- Barbiturates
- Non-Barbiturates
- Anti-Anxiety Tranquilizers
- Anti-Depressants
- Anti-Psychotic Tranquilizers
- Combinations
Possible Effects of CNS Depressants

- Reduced inhibitions
- Divided attention impairment
- Slowed reflexes
- Impaired judgment and concentration
- Impaired vision
- Lack of coordination
- Slurred mumbled or incoherent speech
- Emotional instability
Evaluation of Subjects Under the Influence of CNS Depressants

- Horizontal Gaze Nystagmus - present
- Vertical Gaze Nystagmus may be present (with high doses for that individual)
- Lack of Convergence - present
- Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose
Evaluation of Subjects Under the Influence of CNS Depressants

Vital Signs

- Blood pressure – down*
- Pulse - down*
- Body temperature – normal*

* Quaaludes and ETOH may elevate pulse
* Anti-depressants may elevate BP, P, T
Evaluation of Subjects Under the Influence of CNS Depressants

Dark Room Examinations

- Pupil size - normal*
- Pupillary reaction to light - slow

*Methaqualone, Soma and anti-depressants may cause pupil dilation
Evaluation of Subjects Under the Influence of CNS Depressants

General Indicators

- Disoriented
- Droopy eyelids (Ptosis)
- Drowsiness
- Drunk-like behavior
- Flaccid muscle tone
- Gait Ataxia
- Slow, sluggish reactions
- Thick, slurred speech
- Uncoordinated
Central Nervous System
Stimulants
Subcategories of CNS Stimulants

• **Cocaine**
Subcategories of CNS Stimulants (Continued)

- Amphetamines
  - Methamphetamine
  - Amphetamine Sulfate
  - Desoxyn
Subcategories of CNS Stimulants (Continued)

- Others
  - Ritalin
  - Preludin
  - Cylert
  - Ephedrine
  - Caffeine
Methods of Ingesting Stimulants
Possible Effects of CNS Stimulants

- Euphoria
- Hyperactivity
- Inability to concentrate
- Misperception of time and distance
- Release of inhibitions
Cocaine Time Factors

• Smoked (freebase)
  – Virtually immediate effects
  – Very intense “rush”
  – Effects last 5-10 minutes

• Injected
  – Effects are felt within seconds
  – Very intense “rush”
  – Effects last 45-90 minutes

• Snorted
  – Effects are felt within 30 seconds
  – Intense “rush”
  – Effects last 30-90 minutes

• Orally
  – Effects begin within 3-5 minutes
  – Effects are less intense
  – Effects last 45-120 minutes
Evaluation of Subjects Under the Influence of CNS Stimulants

- HGN or VGN - none
- Lack of Convergence - none
- Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose
Evaluation of Subjects Under the Influence of CNS Stimulants

Vital Signs:

- Blood pressure - up
- Pulse - up
- Body temperature - up
Evaluation of Subjects Under the Influence of CNS Stimulants

Dark Room Examinations:

• Pupils - dilated (Mydriasis)

• Pupillary reaction to light - slow
Evaluation of Subjects Under the Influence of CNS Stimulants

General Indicators

- Anxiety
- Body tremors
- Bruxism
- Dry mouth
- Euphoria
- Exaggerated reflexes
- Eyelid and Leg tremors
- Irritability
- Redness to nasal area
- Restlessness
- Running nose
- Talkative
Hallucinogens
Synesthesia:

A transposition of senses

• “Seeing sounds”
• “Hearing colors”
“Flashback”

A vivid recollection of a hallucinogenic experience
Common Hallucinogens

Peyote (Mescaline)

Psilocybin

(Both are grown naturally)
Common Hallucinogens (Continued)

- Synthetically manufactured
  - LSD (Lysergic Acid Diethylamide)
  - MDMA “Ecstasy” (3, 4 Methylenedioxymethamphetamine)
  - MDA (3,4-Methylenedioxyamphetamine)
  - 2CB (4 bromo-2, 5-dimethoxyphenethyamine)
Time Factors of Peyote

- **30 minutes: Onset**
  Nausea, elevated blood pressure, pulse and temperature and dilated pupils

- **60 minutes: Development of hallucinogenic effects**
  Visual distortions, rich colors, changing forms and moving shapes

- **3-4 hours: Peak effects**
  “Synesthesia”
Time Factors of Peyote

- 10 hours: Gradual decline of effects
- 12 hours: Nearly total recovery
- 24 hours: Elimination nearly completed
Time Factors of Psilocybin

- **1-30 minutes – Onset:** Dizziness; giddiness; lightness or heaviness of extremities

- **30-60 minutes - Beginning of sensory effects:** Blurred vision; sharpness of color; increased acuity of hearing
Time Factors of Psilocybin

- **60-90 minutes** - Sensory effects intensify: Patterns and shapes develop and move; distance perception is impaired; euphoria develops

- **90-100 minutes** - Peak effects Subject becomes introspective

- **120-180 minutes** - Effects begin to diminish
Time Factors of LSD

• 30 - 45 minutes: Onset
• 4 - 6 hours: Peak effects
• 7 - 9 hours: Effects diminish
• 10 - 12 hours: Subject feels normal
Evaluation of Subjects Under the Influence of Hallucinogens

- HGN and VGN - None
- Lack of Convergence - No
- Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose
Evaluation of Subjects Under the Influence of Hallucinogens

Vital Signs:

- Blood pressure - up
- Pulse - up
- Body temperature - up
Evaluation of Subjects Under the Influence of Hallucinogens

Dark Room Examinations:

• Pupils - dilated (Mydriasis)
• Reaction to light - normal*

*Certain psychedelic amphetamines may cause slowing
Evaluation of Subjects Under the Influence of Hallucinogens

General Indicators:

- Body tremors
- Dazed appearance
- Difficulty with speech
- Disoriented
- Flashbacks
- Hallucinations
- Nausea
- Paranoia
- Perspiring
- Poor Perception of time
- Rigid muscle tone
- Synesthesia
- Uncoordinated movements
Dissociative Anesthetics
Overview of Dissociative Anesthetics

- Drugs that inhibit pain by cutting off or dissociating the brain’s perception of pain
- Induce a state of sedation, immobility, amnesia and analgesia
Methods of Ingestion for PCP and its Analogs

- Smoking
- Orally
- Injection
- Eyedropper
- Insufflation (inhaling; snorting)
Ketamine

• Used as a rapid surgical anesthetic in both animals and humans
• Also used for burn victims
Methods of Ingesting Ketamine

- Smoking
- Orally
- Injection
- Eyedropper
- Insufflation (inhaling; snorting)
Dextromethorphan (DXM)

- Synthetically produced
- Found in numerous over the counter cough and cold products
Methods of Ingesting Dextromethorphan

- Orally
- Injection
- Insufflation (inhaling; snorting)
Some Adverse Side Effects of PCP

- Delirium
- Agitation, anxiety
- Rigid muscle tone
- Elevated blood pressure
- Convulsions
- Difficulty in speech
- Hallucinations
- Violent reactions
On-set and Duration of PCP and its Analogs Effects

**On-set**
- Smoked: 1-5 minutes
- Injected: 1-5 minutes
- Snorted: 2-3 minutes
- Orally: 30-60 minutes

**Peak effects**
Generally in 15-30 minutes

**Duration**
4-6 hours
On-Set and Duration of Effects for Dextromethorphan (DXM)

- Rapidly absorbed from the gastrointestinal tract
- Plasma concentration is reached in approximately 2.5 hours
- Expect antitussive effects in 15 – 30 minutes
- Duration of effects is approximately 3 – 6 hours
Evaluation of Subjects Under the Influence of PCP and its Analogs

- Horizontal Gaze Nystagmus - present with a very early angle of onset (maybe “immediate” or even “Resting” Nystagmus)
- Vertical Gaze Nystagmus - present
- Lack of Convergence - present
- Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose tests
Evaluation of Subjects Under the Influence of PCP and its Analogs

Vital Signs:

- Blood pressure - up
- Pulse - up
- Body temperature – up
Evaluation of Subjects
Under the Influence of PCP and its Analogs

Dark Room:
• Pupil size - normal
• Pupillary reaction to light - normal
Evaluation of Subjects Under the Influence of Dissociative Anesthetics

General Indicators:

- Blank stare
- Confused
- Chemical odor (PCP)
- Disorientated
- Incomplete verbal responses
- Loss of memory

- Non-communicative
- Perspiring (PCP)
- Rigid muscle tone (PCP)
- Self-reported hallucinations
- Sensory distortions
- Slurred and repetitive speech
Narcotic Analgesics
Types of Narcotic Analgesics

• Opiates
  – Natural alkaloids
  – Opium derivatives

• Synthetics
Common Synthetic Opiates

- Demerol
- Methadone
- Fentanyl
- MPPP
- Darvon

(Methadone Diskette)
“On the Nod”

- Semiconscious
- Droopy eyelids (Ptosis)
- Head slumped forward, chin on chest
- Easily awakened
- Alert to questions
On-Set and Duration of Heroin’s Effects

• **Immediate**
  – Pleasure or euphoria
  – Relief from pain
  – Relief from withdrawal
On-Set and Duration of Heroin’s Effects (Continued)

• 5-30 minutes: Onset of physical effects
  – “On the nod”
  – Poor motor coordination
  – Depressed reflexes
  – Slowed breathing
On-set and Duration of Heroin’s Effects (Continued)

- Physical effects usually are observable for up to 4-6 hours
Signs and Symptoms of Withdrawal From Heroin

Symptoms normally begin: 4-6 hours following injection

- Aches
- Chills
- Insomnia
- Nausea
Signs and Symptoms of Withdrawal From Heroin (Continued)

Signs appear: 8-12 hours following injection

- Goose bumps
- Sweating
- Runny nose
- Tearing
- Vomiting
- Yawning
Signs and Symptoms of Withdrawal From Heroin

(Continued)

Signs and symptoms intensify: 14 - 24 hours after injection

- Dilation of pupils
- Goosebumps
- Loss of appetite

- Similar to influenza or the common cold
- Slight tremors
Evaluation of Subjects Under the Influence of Narcotic Analgesics

- HGN or Vertical Gaze Nystagmus - none
- Lack of convergence - none
- Performance on Romberg, Walk and Turn, One Leg Stand and Finger to Nose will be impaired and will reflect slow and deliberate movements
Evaluation of Subjects Under the Influence of Narcotic Analgesics

Vital Signs:

• Pulse - down
• Blood pressure - down
• Body temperature - down
• Muscle tone - normal or flaccid
Evaluation of Subjects Under the Influence of Narcotic Analgesics

Dark Room:

- Pupils - constricted (Miosis)
- Reaction to light - little or none visible
- As the effects of the drug wear off, hippus (pulsating pupils) may be evident
Evaluation of Subjects Under the Influence of Narcotic Analgesics

General Indicators:

- Constricted pupils (Miosis)
- Depressed reflexes
- Droopy eyelids (Ptosis)
- Drowsiness
- Dry mouth
- Euphoria
- Facial itching
- Flaccid muscle tone
- Nausea
- On the nod
- Puncture marks
- Slow, low, raspy speech
- Slowed breathing
Inhalants
Major Types of Inhalants

- Volatile solvents
- Aerosols
- Anesthetic gases
Volatile Solvents

- Fingernail polish remover
- Household cements and glue
- Lighter fluid
- Plastic cement ("model airplane glue")
- Petroleum products
  - Gasoline
  - Kerosene
Volatile Solvents

- Dry cleaning fluids
- Paints (particularly oil or solvent based)
- Paint thinners
- Spray paints
- Typewriter correction fluid
Aerosols

- Deodorants
- Frying pan lubricants
- Glass chillers
- Hair sprays
- Insecticides
Typical Abusers of Inhalants

- Children
- Males outnumber females
- Poor children are significantly overrepresented
Anesthetic Gases

- Amyl Nitrite
- Butyl Nitrite
- Ether
- Isobutyl Nitrite
- Nitrous Oxide
Effects of Inhalants

- Altered shapes and colors
- Antagonistic behavior
- Bizarre thoughts
- Distorted perceptions of space and time
- Dizziness and numbness
- Drowsiness and weakness
- Euphoria and grandiosity

- Floating sensations
- Inebriation similar to alcohol intoxication
- Intense headaches
- Light headedness
- Nausea and excessive salivation
- Possible hallucinations
Evaluation of Subjects
Under the Influence of Inhalants

• Horizontal Gaze Nystagmus - present
• Vertical Gaze Nystagmus – present (high dose for that individual person)
• Lack of Convergence - present
• Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose tests
Evaluation of Subjects Under the Influence of Inhalants

Vital Signs:

- Pulse – up
- Blood Pressure – up or down*
- Body temperature - up, down or normal

*Up with volatile solvents or aerosols; down with anesthetic gases
Evaluation of Subjects
Under the Influence of Inhalants

Dark Room:

- Pupil size - normal*
- Pupil reaction to light - slow

*May be dilated
Evaluation of Subjects
Under the Influence of Inhalants

**General Indicators:**
- Bloodshot, watery eyes
- Confused, disoriented appearance
- Flushed face, possibly sweating
- Intense headaches
- Lack of muscle control
- Non-communicative
- Odor of the inhaled substance
- Possible traces of the substance around the face and nose
- Slow, thick, slurred speech
Cannabis
Forms of Cannabis

Marijuana

Hash Oil

Hashish

Marinol
On-set and Duration of Marijuana's Effects

- **8-9 seconds** - User begins to feel and exhibit effects
- **10-30 minutes** - Peak effects are reached
- **2-3 hours** - User continues to feel and exhibit effects
- **3-6 hours** - User feels “normal”

Note: Evidence of marijuana use may be present in blood/urine tests for extended periods after use.
Metabolites of THC

• Hydroxy THC
  Causes Impairment and Euphoria

• Carboxy THC
  (Not psychoactive)
Evaluation of Subjects Under the Influence of Cannabis

• HGN or VGN - none
• Lack of Convergence - present
• Impaired performance will be evident on Romberg, Walk and Turn, One Leg Stand and Finger to Nose
Evaluation of Subjects Under the Influence of Cannabis

Vital Signs:

• Pulse - up
• Blood pressure - up
• Body temperature - normal
Evaluation of Subjects Under the Influence of Cannabis

Dark Room:

- Pupil size - dilated*
- Pupil reaction to light - normal

*Possibly normal
Evaluation of Subjects Under the Influence of Cannabis

General Indicators:

- Body tremors
- Disoriented
- Debris in mouth (possible)
- Eyelid tremors
- Impaired perception of time and distance
- Increased appetite
- Marked reddening of conjunctiva
- Odor of marijuana
- Possible paranoia
- Relaxed inhibitions
Drug Combinations

[Image of a bottle] + [Image of a cannabis leaf]
Prevalence of Polydrug Use

Los Angeles Field Validation Study (1985):

• 72% of suspects had two or more drug categories in them (including alcohol)
• 45% had two or more drugs other than alcohol
Prevalence of Polydrug Use

• P.I.R.E.* DRE database indicates that 25% of all DRE reported cases revealed two or more drug categories detected (2005)

*Pacific Institute of Research and Evaluation
Common Combinations of Drugs

- Cocaine and Cannabis
- Cocaine and Heroin
- PCP and Cannabis
- Alcohol and practically anything else
Null Effect

- No action plus no action equals no action
- If neither drug affects a particular indicator of impairment, their combination also will not affect that indicator
Overlapping Effect

• **Action** plus **no action** equals **action**

• If one drug affects a particular indicator of impairment, and another drug has no effect on that indicator, the combination of those two drugs will affect the indicator, in the same way as the first drug alone
Additive Effect

- **Action** plus the **same action** produces reinforced action
- If two drugs independently affect some indicator in the same way, their use in combination will also affect the indicator and the effect may be reinforced
Antagonistic Effect

- **Action versus opposite action:** can’t predict the outcome
- If two drugs affect some indicator in exactly opposite ways, their use in combination could affect that indicator in any possible way