

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Revised: 10/2015



[This page is intentionally left blank]

# **Drug Recognition Expert Course Preliminary School**

## **Participant Manual**

### **Table of Contents**

2015 Curriculum

Acknowledgements

Preface Page

Session 1: Introduction: Preliminary training for the DEC Program

- Glossary of Terms

Session 2: Overview of the DEC Procedures

Session 3: Psychophysical Tests

Session 4: Eye Examinations

Session 5: Alcohol Workshop

Session 6: Examination of Vital Signs

Session 7: Overview of Signs and Symptoms

Session 8: Alcohol as a Drug

Session 9: Preparing for DRE School

Session 10: Conclusion of the Preliminary Training

[This page is intentionally left blank]

## Acknowledgements

The National Highway Traffic Safety Administration (NHTSA) and the International Association of Chiefs of Police (IACP) would like to thank the following individuals for their contributions in updating and revising the 2015 DRE curricula.

*Jonlee Anderle*, Wyoming Department of Transportation Highway Safety Office

*Kyle Clark*, Institute of Police Technology and Management

*Don Decker*, Nahant MA Police Department

*Evan Graham*, Royal Canadian Mounted Police

*Chuck Hayes*, International Association of Chiefs of Police

*Mike Iwai*, Oregon State Police

*Pam McCaskill*, DOT Transportation Safety Institute, Oklahoma City, OK

*Bill Morrison*, Montgomery County Police Department, MD (Retired)

*Bill O'Leary*, National Highway Traffic Safety Administration

*Doug Paquette*, New York State Police

*James Roy*, Colchester, VT Police Department

*Joanne Thomka*, National Traffic Law Center of the National District Attorneys Association

[This page is intentionally left blank]

## Preface

The Drug Recognition Expert course is a series of three training phases that, collectively, prepare police officers and other qualified persons to serve as drug recognition experts (DRE). Throughout this manual, the terms “drug recognition expert” and “DRE” are used to designate an individual who is specially trained and has continued training to conduct examinations of drug-impaired drivers. This training, developed as part of the Drug Evaluation and Classification Program (DECP) under the auspices and direction of the National Highway Traffic Safety Administration (NHTSA) and the International Association of Chiefs of Police (IACP) has experienced remarkable success since its inception in the 1980s.

As in any educational training program, an instruction manual is considered a “living document” that is subject to updates and changes based on advances in technology and science. A thorough review is made of information by the DECP Technical Advisory Panel (TAP) of the Highway Safety Committee of the IACP with contributions from many sources in health care science, toxicology, jurisprudence, and law enforcement. Based on this information, any appropriate revisions and modifications in background theory, facts, examination and decision making methods are made to improve the quality of the instruction as well as the standardization of guidelines for the implementation of the Drug Recognition Expert Training Curriculum. The reorganized manuals are then prepared and disseminated, both domestically and internationally, to the DECP state coordinators.

Changes will take effect 90 days after approval by the TAP, unless otherwise specified or when so designated by a state coordinator.

[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

35 Minutes

## Session 1

**Introduction:  
Preliminary Training for  
Drug Evaluation and  
Classification Program**



Preliminary Training for Drug Evaluation and Classification Program

1-1

[This page is intentionally left blank]

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program      Administrative Matters

# Housekeeping

- Paperwork
- Mandatory attendance
- Breaks
- Facility
- Interruptions
  - All electronic devices off



## *Welcoming Remarks*

## *Faculty Introductions*

## *Paperwork*

## *Attendance*

Attendance is mandatory at all sessions of this school.

## *Breaks*

## *Facility*

## *Interruptions*

## Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

# Participant Introductions

- Name
- Agency
- Affiliation
- Experience



Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

# Introduction

**Goal: To prepare the participants to succeed in the 7-Day Drug Recognition Expert School**



### *Preliminary Training Goal*

To prepare the participants to succeed in the 7-Day Drug Recognition Expert school.

This two-day Preliminary School won't make you DRE's, but it will make it easier for you to pass the 7-Day DRE School and successfully complete your certification training.

<p>Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program</p> <h3><b>Course Learning Objectives</b></h3> <ul style="list-style-type: none"> <li>• Define the word “drug”</li> <li>• Name the seven categories of drugs</li> <li>• Identify the twelve components, or steps, used in the DRE drug influence evaluation</li> <li>• Administer and interpret the psychophysical (or “divided attention”) tests used by DREs during the drug influence evaluation</li> </ul> <p> </p> <p>Preliminary Training for Drug Evaluation and Classification Program 1-5</p>	<p>Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program</p> <h3><b>Course Learning Objectives</b></h3> <ul style="list-style-type: none"> <li>• List the vital signs utilized in the DRE examinations</li> <li>• Check and measure a subject’s vital signs</li> <li>• List major signs and symptoms of impairment for each drug category</li> <li>• Conduct eye examinations that are part of the drug influence evaluation</li> <li>• Describe the history and physiology of alcohol as a drug</li> </ul> <p> </p> <p>Preliminary Training for Drug Evaluation and Classification Program 1-6</p>
---	---

### *Learning Objectives of the Preliminary Training*

- Define “Drug” and name the seven categories.
- Name the seven categories of drugs.
- Identify the twelve components or steps in the DRE drug influence examination.
- Administer and interpret the psychophysical (or “divided attention”) tests used by DRE’s during the drug influence evaluation.
- List the vital signs utilized in the DRE examinations
- Check and measure a subject’s vital signs.
- List the major signs and symptoms of each drug category.
- Conduct the eye examinations that are part of the drug influence evaluation.
- Describe the history and physiology of alcohol as a drug.

### *Key Points of Emphasis*

This two-day school is only the first of three stages in your training as DREs.

Next will come the seven-day formal DRE school.

After that will come several weeks of supervised on-the-job training known as the “Certification Phase.”

### *Preview of the remainder of the Pre-School*

#### *Certification Progress Logs*

---



---



---



---



---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

Upon successfully completing this session the participant will be able to:

- State the goal and objectives of the course.
  - Define the term “drug” as it is used in the course.
  - Name the seven categories of drugs and give at least one example of each category.

#### **CONTENT SEGMENTS.....**

- A. Welcoming Remarks and Objectives ..... Instructor-Led Presentations
  - B. Definition and Categories of Drugs

## A. Definition and Categories of Drugs

## Drug Definition

- Merriam-Webster's Collegiate Dictionary, Eleventh Edition
- Random House College Dictionary



---

### *Alternative Definitions, Drawn From Several Sources*

“a substance used as a medicine or in the preparation of medicine.”

*Source: Merriam-Webster's Collegiate Dictionary, Eleventh Edition.*

“a narcotic substance or preparation.”

*Source: Webster's. Ask participants if they agree that all drugs are narcotics.*

“a chemical substance administered to a person or animal to prevent or cure disease or otherwise to enhance physical or mental welfare.”

*Source: Random House College Dictionary, 1982 edition.*

“a habit-forming medicinal substance, especially a narcotic.”

*Source: Random House.*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Drug Definition

- **Medical Dictionary For the Non-Professional**
- **Los Angeles Police Department Drug Recognition Training**
- **LAPD**



Preliminary Training for Drug Evaluation and Classification Program

1-9

“a substance taken by mouth, injected or applied locally to treat a disorder (i.e., to ease pain).”

“a chemical substance introduced into the body to cause pleasure or a sense of changed awareness, as in the non-medical use of Lysergic Acid Diethylamide (LSD).”

*Source: Medical Dictionary For the Non-Professional, Barrows Educational Series, Inc., Woodbury, NY. 1984.*

“any substance, natural or artificial that by chemical nature alters the structure or function of a living organism.”

*Source: Los Angeles Police Department Drug Recognition Training, May 1986.*

“any substance that, in small amounts, produces changes in the body, mind or both.”

*Source: LAPD*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## What is a “Drug”?

**Working definition of “Drug”:**

**“Any substance that, when taken into the human body, can impair the ability of the person to operate a vehicle safely.”**



Preliminary Training for Drug Evaluation and Classification Program 1-10

---

### *A Simple, Enforcement-Oriented Definition of Drugs*

“any substance that, when taken into the human body, can impair the ability of the person to operate a vehicle safely.”

Working definition derived from the 1985 California Vehicle Code.

---

---

---

This definition includes some substances that physicians don't usually think of as drugs.

---

---

---

Within this simple, enforcement-oriented definition, there are seven categories of drugs.

Each category consists of substances that impair a person's ability to drive.

The categories differ from one another in terms of how they impair driving ability and in terms of the kinds of impairment they cause.

---

---

---

---

---

---

---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

- Because the categories produce different types of impairment, they generate different signs and symptoms.
  - With training and practice, you will be able to recognize the different signs of drug influence and determine which category is causing the impairment you observe in a subject.

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Central Nervous System Depressants

- Alcohol
- Barbiturates
- Valium
- Chloral Hydrate



NHTSA

Preliminary Training for Drug Evaluation and Classification Program

1-12

### Central Nervous System Depressants

The category of CNS Depressants includes some of the most commonly abused drugs.

Alcohol – the most familiar drug of all – is abused by an estimated 40-50 million Americans.

- Slightly more than half of Americans age 12 or older reported being current drinkers of alcohol in 2014 (52.7% of the population). This translates to an estimated 139 million people. *Source: Behavioral Health Trends in the United States: Results from the 2014 National Survey on Drug Use and Health (NSDUH, September 2015)*
- Depressant drugs consistently rank among the most widely used and abused drugs in the U.S. and Canada. Over the past decade, an estimated 60 million prescriptions were processed for minor tranquilizers in U.S. pharmacies. *Source: Downers: A New Look at Depressant Drugs*

Depressants slow down the operation of the central nervous system (i.e., the brain, brain stem and spinal cord).

- Cause the user to react more slowly.
- Cause the user to process information more slowly.
- Relieve anxiety and tension.
- Induce sedation, drowsiness and sleep.
- In high enough doses, CNS Depressants will produce general anesthesia, i.e. depress the brain's ability to sense pain, and in very high doses, they can induce coma and death.

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Central Nervous System Stimulants

- Cocaine
- Amphetamines
- Methamphetamine



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

1-13

### Central Nervous System Stimulants

CNS Stimulants are a widely abused category of drugs.

- In 2014, an estimated 1.6 million people aged 12 or older in the U.S were current non-medical users of stimulants including 569,000 people who were current methamphetamine users. *Source: National Survey on Drug Use and Health (NSDUH), September 2015.*
- In 2014, there were 1.5 million cocaine users aged 12 or older in the U.S. *Source: NSDUH Report, September 2015.*

CNS Stimulants speed up the operation of the central nervous system, and of the various bodily functions controlled by the central nervous system.

- Cause the user to become hyperactive, extremely talkative.
- A grinding of the teeth, referred to as bruxism, may be noticed.
- Speech may become rapid and repetitive.
- Heart rate increases.
- Blood pressure increases.
- Body temperature rises, user may become excessively sweaty.
- Induce emotional excitement, restlessness, irritability.
- Can induce cardiac arrhythmia (unstable beating of the heart), cardiac seizures and death.

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Hallucinogens

- LSD
- Peyote
- Ecstasy



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

1-14

### Hallucinogens

Hallucinogens are also widely abused. In recent years an increase in the abuse of LSD, Ecstasy (MDMA), and many new Hallucinogens has been reported. In 2014 an estimated 1.2 million people aged 12 and over were current users of hallucinogens. *Source: USDUH, September 2015*

- It is estimated that approximately one million Americans abuse Hallucinogens.
- Hallucinogens may create Hallucinations. That is, they may create apparent perceptions of things not truly present.
- Hallucinogens may also create very distorted perceptions, so that the user sees, hears and smells things in a way quite different from how they really look, sound and smell.

Instead, Hallucinogens cause the nervous system to send strange or false signals to the brain.

- Induce a temporary condition very much like psychosis or insanity.
  - Can create a “mixing” of sensory modes, for example, the user “hears colors,” “sees music,” “tastes sounds,” etc., referred to as “Synesthesia.”
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Dissociative Anesthetics

- Phencyclidine (PCP)
- Ketamine
- Dextromethorphan (DXM)

Preliminary Training for Drug Evaluation and Classification Program

1-15

NHTSA

### *Dissociative Anesthetics*

This category includes drugs such as PCP, its analogs and Dextromethorphan (DXM). These drugs generally inhibit pain by cutting off or “dissociating” the brain’s perception of the pain.

The medical community considers PCP to be a Hallucinogen. However, because of the symptomatology PCP presents, it is included in this category.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Dissociative Anesthetics – PCP



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

1-16

PCP is a synthetic drug, i.e., it does not occur naturally but must be produced in a laboratory-like setting.

PCP is similar to CNS Depressants in that it depresses brain wave activity.

- Slows down thought.
- Slows reaction time.
- Slows verbal responses.

But PCP is similar to CNS Stimulants in that it activates the parts of the brain that control emotions, the heart and the other autonomic systems.

- Heart rate increases.
- Blood pressure increases.
- Adrenalin production increases.
- Body temperature rises.
- Muscles become rigid.

And PCP is similar to Hallucinogens in that it distorts or “scrambles” signals received by the brain.

- Sight, hearing, taste, smell and touch may all be distorted.
- User’s perception of time and space may be distorted.
- User may become paranoid, feel isolated and depressed.
- User may develop a strong fear of and pre-occupation with death.
- User may become unpredictably violent.

PCP analogs include Ketamine, Ketalar, Ketajet, and Ketaset.

Dextromethorphan (DXM) is an ingredient found in numerous over-the-counter cough and cold remedies.

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Narcotic Analgesics

- Heroin
- Morphine
- Codeine

Preliminary Training for Drug Evaluation and Classification Program

1-17

### *Narcotic Analgesics*

There are two subcategories of Narcotic Analgesics:

- Opiates are derivatives of Opium.
- Synthetics are produced chemically in the laboratory. They are not in any way derived from Opium but produce similar effects.

The word “Analgesic” means pain reliever. All of the drugs in this category reduce the person’s reaction to pain.

- According to the 2014 NSDUH report, there are approximately 435,000 current users of heroin.
- Heroin is highly addictive.

In addition to reducing pain, they produce euphoria, drowsiness, apathy, lessened physical activity and sometimes impaired vision.

Persons under the influence of Narcotic Analgesics often pass into a semi-conscious type of sleep or near sleep.

- Persons “on the nod” may be awakened easily.
- They often are sufficiently alert to respond to questions effectively.

Higher doses of Narcotic Analgesics can induce coma, respiratory failure and death.

---



---



---



---



---



---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Inhalants

- Paint
- Various glues
- Nitrous Oxide

Preliminary Training for Drug Evaluation and Classification Program

1-18

NHTSA

### *Inhalants*

Inhalants are fumes of certain substances that produce mind altering results.

In 2014, approximately 546,000 people aged 12 and older were current users of inhalants.

*Source: USDUH, September 2015*

There are three subcategories of Inhalants:

- Volatile solvents (e.g., gasoline, glue, oil-based paint, cleaning fluids, paint remover, etc.)
- Aerosols (i.e., the propellant gases in spray cans, e.g., hair sprays, insecticides, etc.)
- Anesthetic Gases (e.g., nitrous oxide, ether, amyl nitrite, butyl nitrate, etc.)

Different Inhalants produce different effects.

- Many produce effects similar to those of CNS Depressants.
- A few produce Stimulant-like effects.
- Some produce hallucinogenic effects.

The Inhalant abuser's attitude and demeanor can vary from being inattentive, stuporous and passive to irritable, violent and dangerous.

The abuser's speech will often be slow, thick and slurred.

---



---



---



---



---



---

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

# Cannabis

- Marijuana
- Hashish
- Marinol
- K-2 / Spice

Preliminary Training for Drug Evaluation and Classification Program

1-19

Cannabis

The category “Cannabis” includes the various forms and products of the Cannabis Sativa, which generally grow tall and thin, outdoors, and Cannabis Indica plants, which generally grow short and wide, and are better grown indoors.

The active ingredient in Cannabis is the substance known as “Delta-9 Tetrahydrocannabinol,” or “THC.”

Apart from alcohol, marijuana is one of the most commonly abused drugs.

Cannabis appears to interfere with the attention process. Drivers under the influence of marijuana often do not pay attention to their driving.

Cannabis also produces a distortion of the user's perception of time, an increased heart rate (often over 100 beats per minute) and a reddening of the conjunctivae.

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Frequency of Drug Use

- According to the NSDUH 2014 survey, approximately 22.2 million Americans aged 12 or older had used marijuana at least once in the month prior to being surveyed.
- In 2014, an estimated 27.0 million Americans aged 12 or older were current illicit drug users.



Preliminary Training for Drug Evaluation and Classification Program 1-20

Session 1 - Introduction: Preliminary Training for Drug Evaluation and Classification Program

## Frequency of Drug Use

- In 2014 approximately 6.5 million people aged 12 years or older used psychotherapeutic drugs non-medically (NSDUH, 2015).



Preliminary Training for Drug Evaluation and Classification Program 1-21

### Frequency of Drug Use

- According to the 2014 National Survey on Drug Use and Health, approximately 22.2 million Americans aged 12 or older used marijuana at least once in the month prior to being surveyed.
- In 2014, an estimated 27.0 million Americans aged 12 or older were current illicit drug users. *Source: National Survey on Drug Use and Health (NSDUH, September 2015).*
- In 2013, approximately 6.5 million people aged 12 years or older used psychotherapeutic drugs non-medically.

*Source: National Survey on Drug Use and Health (NSDUH, September 2015).*

- The exact number of prescription drug users in the U.S. is unknown. However in 2012, a record 4 billion drug prescriptions were written in the U.S.

*Source: Medical News Today, September 18, 2012.*

- Among those aged 50 to 59, the rate of past month illicit drug use increased from 90,000 in 2002 to more than 3 million in 2012. This trend may partially reflect the aging into this age group of the “Baby Boomer” generation, whose lifetime rate of illicit drug use is higher than those of older cohorts.

*Source: National Institutes of Health.*

- In 2013, 9.9 million persons aged 12 or older reported driving under the influence of illicit drugs during the past year. This corresponds to 3.8 percent of the population aged 12 or older.

*Source: National Survey on Drug Use and Health (NSDUH, 2014).*

---



---



---



---

## Frequency of Polydrug Use

- The term “polydrug” use refers to ingesting drugs from two or more drug categories.
- Though drug evaluation subjects may be under the influence of any one of the mentioned categories of drugs, it is not uncommon to find individuals who have taken several combinations of drugs.
- Data being collected through the national DRE Database indicates that approximately 1/3 of all toxicology results indicate two or more drug categories.



### Polydrug Use

- The term “polydrug” use refers to ingesting drugs from two or more drug categories.
- Though drug evaluation subjects may be under the influence of any one of the mentioned categories of drugs, it is not uncommon to find individuals who have taken combinations of several drugs.
- Data being collected through the national DRE Database indicates that approximately 1/3 of all toxicology results indicate two or more drug categories.
- Most controlled prescription drug abusers are polydrug abusers. One study reported that approximately 75% of persons who abuse alcohol also abuse illicit drugs. *Source: “Under the Counter: The Diversion and Abuse of Controlled Prescription Drugs in the U.S.” National Center on Addiction and Substance Abuse, July 2005.*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

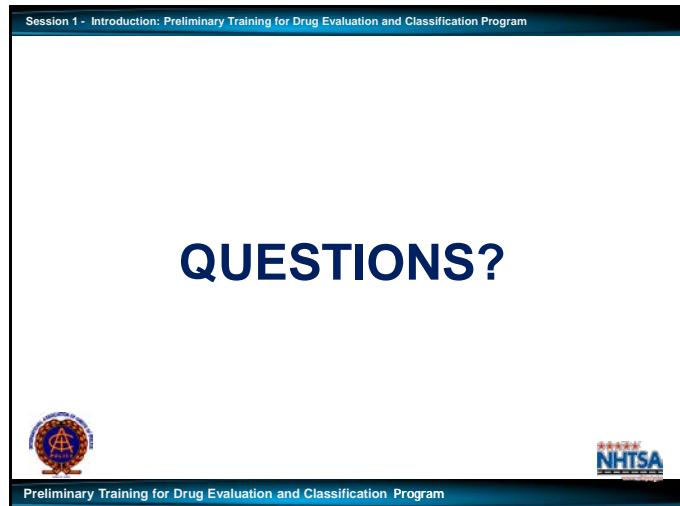
---

---

---

---

---



[This page is intentionally left blank]

## **DRUG EVALUATION AND CLASSIFICATION PROGRAM**

### **GLOSSARY OF TERMS**

#### **ACCOMMODATION REFLEX**

The adjustment of the eyes for viewing at various distances. Meaning the pupils will automatically constrict as objects move closer and dilate as objects move further away.

#### **ADDICTION**

Habitual, psychological, and physiological dependence on a substance beyond one's voluntary control.

#### **ADDITIVE EFFECT**

One mechanism of polydrug interaction. For a particular indicator of impairment, two drugs produce an additive effect if they both affect the indicator in the same way. For example, cocaine elevates pulse rate and PCP also elevates pulse rate. The combination of cocaine and PCP produces an additive effect on pulse rate.

#### **AFFERENT NERVES**

See: "Sensory Nerves."

#### **ALKALOID**

A chemical that is found in, and can be physically extracted from, some substance. For example, morphine is a natural alkaloid of opium. It does not require a chemical reaction to produce morphine from opium.

#### **ANALGESIC**

A drug that relieves or allays pain.

#### **ANALOG (of a drug)**

An analog of a drug is a chemical that is very similar to the drug, both in terms of molecular structure and in terms of psychoactive effects. For example, the drug Ketamine is an analog of PCP.

#### **ANESTHETIC**

A drug that produces a general or local insensibility to pain and other sensation.

#### **ANTAGONISTIC EFFECT**

One mechanism of polydrug interaction. For a particular indicator of impairment, two drugs produce an antagonistic effect if they affect the indicator in opposite ways. For example, heroin constricts pupils while cocaine dilates pupils. The combination of heroin and cocaine produces an antagonistic effect on pupil size. Depending on how much of each drug was taken, and on when they were taken, the suspect's pupils could be constricted, or dilated, or within the DRE Average range of pupil size.

**ARRHYTHMIA**

An abnormal heart rhythm.

**ARTERY**

The strong, elastic blood vessels that carry blood away from the heart.

**AUTONOMIC NERVE**

A motor nerve that carries messages to the muscles and organs that we do not consciously control. There are two kinds of autonomic nerves, the sympathetic nerves and parasympathetic nerves.

**AXON**

The part of a neuron (nerve cell) that sends out a neurotransmitter.

**BAC**

(Blood Alcohol Concentration) - The percentage of alcohol in a person's blood.

**BrAC**

(Breath Alcohol Concentration) - The percentage of alcohol in a person's blood as measured by a breath testing device.

**BLOOD PRESSURE**

The force exerted by blood on the walls of the arteries. Blood pressure changes continuously, as the heart cycles between contraction and expansion.

**BRADYCARDIA**

Abnormally slow heart rate.

**BRADYPNEA**

Abnormally slow rate of breathing.

**BRUXISM**

Grinding the teeth. This behavior is often seen in persons who are under the influence of cocaine or other CNS Stimulants.

**CANNABIS**

This is the drug category that includes marijuana. Marijuana comes primarily from the leaves of certain species of Cannabis plants that grow readily all over the temperate zones of the earth. Hashish is another drug in this category, and consists of the compressed leaves from female Cannabis plants. The active ingredient in both Marijuana and Hashish is a chemical called delta-9 tetrahydrocannabinol, usually abbreviated THC.

**CARBOXY THC**

A metabolite of THC (tetrahydrocannabinol).

## **CHEYNE-STOKES RESPIRATION**

Abnormal pattern of breathing. Marked by breathlessness and deep, fast breathing.

## **CNS (Central Nervous System)**

A system within the body consisting of the brain, the brain stem, and the spinal cord.

## **CNS DEPRESSANTS**

One of the seven drug categories. CNS Depressants include alcohol, barbiturates, anti-anxiety tranquilizers, and numerous other drugs.

## **CNS STIMULANTS**

One of the seven drug categories. CNS Stimulants include Cocaine, the Amphetamines, Ritalin, Desoxyn, and numerous other drugs.

## **CONJUNCTIVITIS**

An inflammation of the mucous membrane that lines the inner surface of the eyelids caused by infection, allergy, or outside factors. May be bacterial or viral. Persons suffering from conjunctivitis may show symptoms in one eye only. This condition is commonly referred to as "pink eye", a condition that could be mistaken for the bloodshot eyes produced by alcohol or Cannabis.

## **CONVERGENCE**

The "crossing" of the eyes that occurs when a person is able to focus on a stimulus as it is pushed slowly toward the bridge of their nose. (See, also, "Lack of Convergence".)

## **CRACK/ROCK**

Cocaine base, appears as a hard chunk form resembling pebbles or small rocks. It produces a very intense, but relatively short duration "high".

## **CURRICULUM VITAE**

A written summary of a person's education, training, experience, noteworthy achievements and other relevant information about a particular topic.

## **CYCLIC BEHAVIOR**

A manifestation of impairment due to certain drugs, in which the suspect alternates between periods (or cycles) of intense agitation and relative calm. Cyclic behavior, for example, sometimes will be observed in persons under the influence of PCP.

## **DELIRIUM**

A brief state characterized by incoherent excitement, confused speech, restlessness, and possible hallucinations.

## **DENDRITE**

The part of a neuron (nerve cell) that receives a neurotransmitter.

**DIACETYL MORPHINE**

The chemical name for Heroin.

**DIASTOLIC**

The lowest value of blood pressure. The blood pressure reaches its diastolic value when the heart is fully expanded, or relaxed (Diastole).

**DIPLOPIA**

Double vision.

**DISSOCIATIVE ANESTHETICS**

One of the seven drug categories. Includes drugs that inhibits pain by cutting off or disassociating the brain's perception of pain. PCP and its analogs are considered Dissociative Anesthetics.

**DIVIDED ATTENTION**

Concentrating on more than one thing at a time. The four psychophysical tests used by DREs require the suspect to divide their attention.

**DOWNSIDE EFFECT**

An effect that may occur when the body reacts to the presence of a drug by producing hormones or neurotransmitters to counteract the effects of the drug consumed.

**DRUG**

Any substance that, when taken into the human body, can impair the ability of the person to operate a vehicle safely.

**DYSARTHRIA**

Slurred speech. Difficult, poorly articulated speech.

**DYSPNEA**

Shortness of breath.

**DYSMETRIA**

An abnormal condition that prevents the affected person from properly estimating distances linked to muscular movements.

**DYSPHORIA**

A disorder of mood. Feelings of depression and anguish.

**EFFERENT NERVES**

See: "Motor Nerves".

## **ENDOCRINE SYSTEM**

The network of glands that do not have ducts and other structures. They secrete hormones into the blood stream to affect a number of functions in the body.

## **EXPERT WITNESS**

A person skilled in some art, trade, science or profession, having knowledge of matters not within the knowledge of persons of average education, learning and experience, who may assist a jury in arriving at a verdict by expressing an opinion on a state of facts shown by the evidence and based upon his or her special knowledge. (NOTE: Only the court can determine whether a witness is qualified to testify as an expert.)

## **FLASHBACK**

A vivid recollection of a portion of a hallucinogenic experience. Essentially, it is a very intense daydream. There are three types: (1) emotional -- feelings of panic, fear, etc.; (2) somatic -- altered body sensations, tremors, dizziness, etc.; and (3) perceptual -- distortions of vision, hearing, smell, etc.

## **GAIT ATAXIA**

An unsteady, staggering gait (walk) in which walking is uncoordinated and appears to be "not ordered."

## **GARRULITY**

Chatter, rambling or pointless speech. Talkative.

## **GENERAL INDICATOR**

Behavior or observations of the subject that are observed and not specifically tested for. (Observational and Behavioral Indicators)

## **HALLUCINATION**

A sensory experience of something that does not exist outside the mind, e.g., seeing, hearing, smelling, or feeling something that isn't really there. Also, having a distorted sensory perception, so that things appear differently than they are.

## **HALLUCINOGENS**

One of the seven drug categories. Hallucinogens include LSD, MDMA, Peyote, Psilocybin, and numerous other drugs.

## **HASHISH**

A form of cannabis made from the dried and pressed resin of a marijuana plant.

## **HASH OIL**

Sometimes referred to as "marijuana oil" it is a highly concentrated syrup-like oil extracted from marijuana. It is normally produced by soaking marijuana in a container of solvent, such as acetone or alcohol for several hours and after the solvent has evaporated, a thick syrup-like oil is produced with a high THC content.

## **HEROIN**

A powerful and widely-abused narcotic analgesic that is chemically derived from morphine. The chemical, or generic name of heroin is "diacetyl morphine".

## **HOMEOSTASIS**

The dynamic balance, or steady state, involving levels of salts, water, sugars, and other materials in the body's fluids.

## **HORIZONTAL GAZE NYSTAGMUS (HGN)**

Involuntary jerking of the eyes occurring as the eyes gaze to the side.

## **HORMONES**

Chemicals produced by the body's endocrine system that are carried through the blood stream to the target organ. They exert great influence on the growth and development of the individual, and that aid in the regulation of numerous body processes.

## **HYDROXY THC**

A metabolite of THC (tetrahydrocannabinol).

## **HYPERFLEXIA**

Exaggerated or over extended motions.

## **HYPERGLYCEMIA**

Excess sugar in the blood.

## **HYPERPNEA**

A deep, rapid or labored breathing.

## **HYPERTERMIA**

Extremely high body temperature.

## **HYPERTREFLEXIA**

A neurological condition marked by increased reflex reactions.

## **HYPERTENSION**

Abnormally high blood pressure. Do not confuse this with hypotension.

## **HYPOGLYCEMIA**

An abnormal decrease of blood sugar levels.

## **HYPOPNEA**

Shallow or slow breathing.

## **HYPOTENSION**

Abnormally low blood pressure. Do not confuse this with hypertension.

## **HYPOTHERMIA**

Decreased body temperature.

## **ICE**

A crystalline form of methamphetamine that produces a very intense and fairly long-lasting "high".

## **INHALANTS**

One of the seven drug categories. The inhalants include volatile solvents (such as glue and gasoline), aerosols (such as hair spray and insecticides) and anesthetic gases (such as nitrous oxide).

## **INSUFFLATION**

See "snorting".

## **INTEGUMENTARY SYSTEM**

The skin and accessory structures, hair and nails. Functions include protection, maintenance of body temperature, excretion of waste, and sensory perceptions.

## **INTRAOCULAR**

"Within the eyeball".

## **KOROTKOFF SOUNDS**

A series of distinct sounds produced by blood passing through an artery, as the external pressure on the artery drops from the systolic value to the diastolic value.

## **LACK OF CONVERGENCE**

The inability of a person's eyes to converge, or "cross" as the person attempts to focus on a stimulus as it is pushed slowly toward the bridge of his or her nose.

## **MAJOR INDICATORS**

Physiological signs that are specifically assessed and are, for the most part, involuntary reflecting the status of the central nervous system (CNS) homeostasis (Physiological Indicators).

## **MARIJUANA**

Common term for the Cannabis Sativa plant. Usually refers to the dried leaves of the plant. This is the most common form of the cannabis category.

## **MARINOL**

A drug containing a synthetic form of THC (tetrahydrocannabinol). Marinol belongs to the cannabis category of drugs, but marinol is not produced from any species of cannabis plant.

## **MEDICAL IMPAIRMENT**

An opinion made by a DRE based on the evaluation that the state of a suspected impaired driver is more likely related to a medical impairment that has affected the subject's ability to operate a vehicle safely.

## **METABOLISM**

The sum of all chemical processes that take place in the body as they relate to the movements of nutrients in the blood after digestion, resulting in growth, energy, release of wastes, and other body functions. The process by which the body, using oxygen, enzymes and other internal chemicals, breaks down ingested substances such as food and drugs so they may be consumed and eliminated. Metabolism takes place in two phases. The first step is the constructive phase (anabolism) where smaller molecules are converted to larger molecules. The second step is the destructive phase (catabolism) where large molecules are broken down into smaller molecules.

## **METABOLITE**

A chemical product, formed by the reaction of a drug with oxygen and/or other substances in the body.

## **MIOSIS**

Abnormally small (constricted) pupils.

## **MOTOR NERVES**

Nerves that carry messages away from the brain, to the body's muscles, tissues, and organs. Motor nerves are also known as efferent nerves.

## **MUSCULAR HYPERTONICITY**

Rigid muscle tone.

## **MYDRIASIS**

Abnormally large (dilated) pupils.

## **NARCOTIC ANALGESICS**

One of the seven drug categories. Narcotic analgesics include opium, the natural alkaloids of opium (such as morphine, codeine and thebaine), the derivatives of opium (such as heroin, dilaudid, oxycodone and percocet), and the synthetic narcotics.

## **NERVE**

A cord-like fiber that carries messages either to or from the brain. For drug evaluation and classification purposes, a nerve can be pictured as a series of "wire-like" segments, with small spaces or gaps between the segments.

## **NEURON**

A nerve cell. The basic functional unit of a nerve. It contains a nucleus within a cell body with one or more axons and dendrites.

## **NEUROTRANSMITTER**

Chemicals that pass from the axon of one nerve cell to the dendrite of the next cell, and that carry messages across the gap between the two nerve cells.

## **NULL EFFECT**

One mechanism of polydrug interaction. For a particular indicator of impairment, two drugs produce a null effect if neither of them affects that indicator. For example, PCP does not affect pupil size, and alcohol does not affect pupil size. The combination of PCP and alcohol produces a null effect on pupil size.

## **NYSTAGMUS**

An involuntary jerking of the eyes.

## **"ON THE NOD"**

A semi-conscious state of deep relaxation. Typically induced by impairment due to Heroin or other narcotic analgesics. The suspect's eyelids droop, and chin rests on the chest. Suspect may appear to be asleep, but can be easily aroused and will respond to questions.

## **OVERLAPPING EFFECT**

One mechanism of polydrug interaction. For a particular indicator of impairment, two drugs produce an overlapping effect if one of them affects the indicator but the other doesn't. For example, cocaine dilates pupils while alcohol doesn't affect pupil size. The combination of cocaine and alcohol produces an overlapping effect on pupil size: the combination will cause the pupils to dilate.

## **PALLOR**

An abnormal paleness or lack of color in the skin.

## **PARANOIA**

Mental disorder characterized by delusions and the projection of personal conflicts that are ascribed to the supposed hostility of others.

## **PARAPHERNALIA**

Drug paraphernalia are the various kinds of tools and other equipment used to store, transport or ingest a drug. Hypodermic needles, small pipes, bent spoons, etc., are examples of drug paraphernalia. The singular form of the word is "paraphernalium". For example, one hypodermic needle would be called a "drug paraphernalium".

## **PARASYMPATHETIC NERVE**

An autonomic nerve that commands the body to relax and to carry out tranquil activities. The brain uses parasympathetic nerves to send "at ease" commands to the muscles, tissues, and organs.

## **PARASYMPATHOMIMETIC DRUGS**

Drugs that mimic neurotransmitter associated with the parasympathetic nerves. These drugs artificially cause the transmission of messages that produce lower blood pressure, drowsiness, etc.

## **PDR (Physician's Desk Reference)**

A basic reference source for drug recognition experts. The PDR provides detailed information on the physical appearance and psychoactive effects of licitly-manufactured drugs.

## **PHENCYCLIDINE**

A contraction of PHENYL CYCLOHEXYL PIPERIDINE, or PCP. Formerly used as a surgical anesthetic, however, it has no current legitimate medical use in humans.

## **PHENYL CYCLOHEXYL PIPERIDINE (PCP)**

Often called "phencyclidine" or "PCP", it is a specific drug belonging to the Dissociative Anesthetics category.

## **PHYSIOLOGY**

Physiology is the branch of biology dealing with the functions and activities of life or living matter and the physical and chemical phenomena involved.

## **PILOERCTION**

Literally, "hair standing up", or goose bumps. This condition of the skin is often observed in persons who are under the influence of LSD.

## **POLYDRUG USE**

Ingesting drugs from two or more drug categories.

## **PSYCHEDELIC**

A mental state characterized by a profound sense of intensified or altered sensory perception sometimes accompanied by hallucinations.

## **PSYCHOPHYSICAL TESTS**

Methods of investigating the mental (psycho-) and physical characteristics of a person suspected of alcohol or drug impairment. Most psychophysical tests employ the concept of divided attention to assess a suspect's impairment.

## **PSYCHOTOGENIC**

Literally, "creating psychosis" or "giving birth to insanity". A drug is considered to be psychotogenic if persons who are under the influence of the drug become insane, and remain so after the drug wears off.

## **PSYCHOTOMIMETIC**

Literally, "mimicking psychosis" or "impersonating insanity". A drug is considered to be psychotomimetic if persons who are under the influence of the drug look and act insane while they are under the influence.

## **PTOSIS**

Droopy eyelids.

## **PULSE**

The expansion and contraction of the walls of an artery, generated by the pumping action of blood.

## **PULSE RATE**

The number of expansions of an artery per minute.

## **PUPILLARY LIGHT REFLEX**

The pupils of the eyes will constrict and dilate depending on changes in lighting.

## **PUPILLARY UNREST**

The continuous, irregular change in the size of the pupils that may be observed under room or steady light conditions.

## **REBOUND DILATION**

A period of pupillary constriction followed by a period of pupillary dilation where the pupil steadily increases in size and does not return to its original constricted size.

## **RESTING NYSTAGMUS**

Jerking of the eyes as they look straight ahead.

## **SCLERA**

A dense white fibrous membrane that, with the cornea, forms the external covering of the eyeball (i.e., the white part of the eye).

## **SENSORY NERVES**

Nerves that carry messages to the brain, from the various parts of the body, including notably the sense organs (eyes, ears, etc.). Sensory nerves are also known as afferent nerves.

## **SINSEMILLA**

The unpollinated female cannabis plant, with a relatively high concentration of THC.

## **SFST**

Standardized Field Sobriety Testing. There are three SFSTs, namely Horizontal Gaze Nystagmus (HGN), Walk and Turn, and One Leg Stand. Based on a series of controlled laboratory studies, scientifically validated clues of impairment have been identified for each of these three tests. They are the only Standardized Field Sobriety Tests for which validated clues have been identified.

## **SNORTING**

One method of ingesting certain drugs. Snorting requires that the drug be in powdered form. The user rapidly draws the drug up into the nostril, usually via a paper or glass tube. Snorting is also known as insufflation.

## **SPHYGMOMANOMETER**

A medical device used to measure blood pressure. It consists of an arm or leg cuff with an air bag attached to a tube and a bulb for pumping air into the bag, and a gauge for showing the amount of air pressure being pressed against the artery.

## **STETHOSCOPE**

A medical instrument used, for drug evaluation and classification purposes, to listen to the sounds produced by blood passing through an artery.

## **SYMPATHETIC NERVE**

An autonomic nerve that commands the body to react in response to excitement, stress, fear, etc. The brain uses sympathetic nerves to send "wake up calls" and "fire alarms" to the muscles, tissues and organs.

## **SYMPATHOMIMETIC DRUGS**

Drugs that mimic the neurotransmitter associated with the sympathetic nerves. These drugs artificially cause the transmission of messages that produce elevated blood pressure, dilated pupils, etc.

## **SYNAPSE (or Synaptic Gap)**

The gap or space between two neurons (nerve cells).

## **SYNESTHESIA**

A sensory perception disorder, in which an input via one sense is perceived by the brain as an input via another sense. An example of this would be a person "hearing" a phone ring and "seeing" the sound as a flash of light. Synesthesia sometimes occurs with persons under the influence of hallucinogens.

## **SYSTOLIC**

The highest value of blood pressure. The blood pressure reaches its systolic value when the heart is fully contracted (systole), and blood is sent surging into the arteries.

## **TACHYCARDIA**

Abnormally rapid heart rate.

**TACHYPNEA**

Abnormally rapid rate of breathing.

**THC (Tetrahydrocannabinol)**

The principal psychoactive ingredient in drugs belonging to the cannabis category.

**TOLERANCE**

An adjustment of the drug user's body and brain to the repeated presence of a drug. As tolerance develops, the user will experience diminishing psychoactive effects from the same dose of the drug. As a result, the user typically will steadily increase the dose he or she takes, in an effort to achieve the same psychoactive effect.

**TRACKS**

Scar tissue usually produced by repeated injection of drugs, via hypodermic needle, along a segment of a vein.

**VERTICAL GAZE NYSTAGMUS**

An involuntary jerking of the eyes (up-and-down) which occurs as the eyes are held at maximum elevation. The jerking should be distinct and sustained.

**VOIR DIRE**

A French expression literally meaning "to see, to say." Loosely, this would be rendered in English as "To seek the truth," or "to call it as you see it." In a law or court context, one application of voir dire is to question a witness to assess his or her qualifications to be considered an expert in some matter pending before the court.

**VOLUNTARY NERVE**

A motor nerve that carries messages to a muscle that we consciously control.

**WITHDRAWAL**

This occurs in someone who is physically addicted to a drug when he or she is deprived of the drug. If the craving is sufficiently intense, the person may become extremely agitated, and even physically ill.

[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 2 - Overview of the Drug Evaluation and Classification Procedures

60 Minutes

**Session 2**

**Overview of the Drug Evaluation and Classification Procedures**



Preliminary Training for Drug Evaluation and Classification program

NHTSA

[This page is intentionally left blank]

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Learning Objectives

- Identify the 12 components of the DRE drug influence evaluation
- Discuss the purposes of each component

 NHTSA

Preliminary Training for Drug Evaluation and Classification Program 2-2

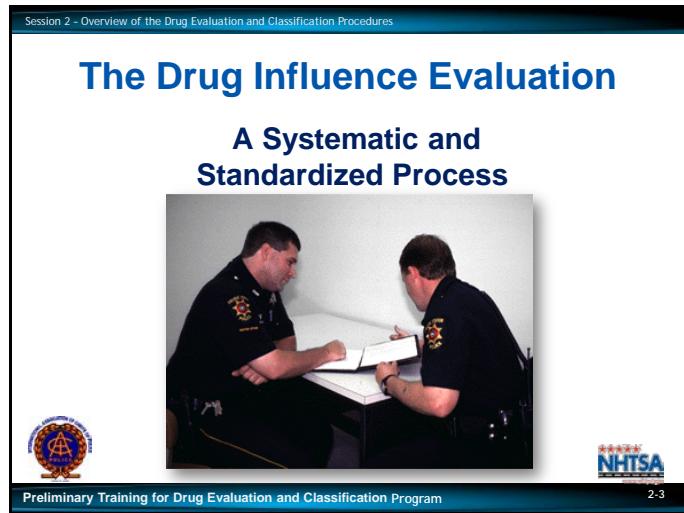
---

Upon successfully completing this session the participant will be able to:

- Identify the 12 components of the DRE drug influence evaluation.
- Discuss the purposes of each component.

CONTENT SEGMENTS..... LEARNING ACTIVITIES

- A. Components of the Process ..... Instructor-Led Presentations
- B. Video/DVD Demonstrations ..... Video/DVD Presentations
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



## **A. Components of the Process**

### *The Drug Influence Evaluation*

The Drug Evaluation and Classification Process is a systematic and standardized method of examining a subject to determine:

- Is the subject impaired?
- Is the impairment resulting from an injury, illness, or drug related?
- If drug related, what category (or categories) of drugs is (or are) the likely cause of the subject's impairment?

The process is systematic in that it is based on a careful assessment of a variety of observable signs and symptoms that are known to be reliable indicators of drug impairment.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## The Systematic Process

- Appearance
- Behavior
- Psychophysical Testing



Preliminary Training for Drug Evaluation and Classification Program

2-4

---

Some of these observable signs and symptoms relate to the subject's appearance.

Some of the signs and symptoms relate to the subject's behavior.

Some relate to the subject's performance of carefully administered psychophysical tests.

- Drugs impair the subject's ability to control his or her mind and body.
  - Psychophysical tests can disclose that the subject's ability to control mind and body is impaired.
  - The specific manner in which the subject performs the psychophysical tests may indicate the type of impairment from which the subject is suffering. In turn, this may indicate the category or categories of drugs causing the impairment.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Components of the Process

- Autonomic responses of the body
- Standardization of evaluation

Preliminary Training for Drug Evaluation and Classification Program 2-5

---

Some of the observable signs and symptoms relate to automatic responses of the subject's body to the specific drugs that are present.

All of these reliable indicators are examined and carefully considered before a judgment is made concerning what categories of drugs are affecting the subject. The process is standardized in that it is administered the same way, to every subject, by every drug recognition expert.

- Standardization helps to ensure that no mistakes are made.
  - No steps of the process are left out.
  - No extraneous or unreliable "indicators" are included.
  - Standardization helps to promote professionalism among drug recognition experts.
  - Standardization helps to secure acceptance in court
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## *12 Step Process*

The Drug Evaluation and Classification process has twelve components or steps.

Session 2 - Overview of the Drug Evaluation and Classification Procedures

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Breath Alcohol Test

Breath Alcohol Test to determine Blood Alcohol Concentration (BAC).

- The purpose of the breath test is to determine whether the specific drug, alcohol, may be contributing to the impairment observable in the subject.
  - Obtaining an accurate measurement of BAC enables the DRE to assess whether alcohol may be the sole cause of the observable impairment, or whether it is likely that some other drug or drugs, or other complicating factors are contributing to the impairment.

### *Interview of the Arresting Officer*

- In most cases, the subjects you will examine will not be people that you arrested.
  - The arresting officer may have seen or heard things that would be valuable indicators of the kinds of drugs the subject has ingested.
  - The arresting officer, in searching the subject, may have uncovered drug related paraphernalia, or even drugs themselves.
  - The arresting officer also may be able to alert you to important information about the subject's behavior that could be very valuable for your own safety.

Session 2 - Overview of the Drug Evaluation and Classification Procedures

# Step 3

## Preliminary Examination

### Drug Influence Evaluation

Evaluator	DOS/NSC	Billing Log No.		
Recorder/Witness	<input type="checkbox"/> Crash <input type="checkbox"/> Fall	<input type="checkbox"/> Name <input type="checkbox"/> Injury	<input type="checkbox"/> Property	
Arrestee's Name (Last, First, MI)	DOS	Sex	Rate	Arresting Officer (Name, ID No.)
Date Examined/Time/Location		Breath Alcohol Instrument #	<input type="checkbox"/> Refused <input type="checkbox"/> Declined	<input type="checkbox"/> Chemical Test <input type="checkbox"/> Urine <input type="checkbox"/> Blood
Method Warning Given:	<input type="checkbox"/> Yes <input type="checkbox"/> No	What have you eaten today? When?	Have you been drinking?	How much? Time of last drink?
Time now?	When did you last sleep?	How long?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Are you diabetic or epileptic? <input type="checkbox"/> Yes <input type="checkbox"/> No
Do you take (meds)?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Do you have any physical defects?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Are you under the care of a Doctor or Dentist? <input type="checkbox"/> Yes <input type="checkbox"/> No
Are you taking any medication or drugs?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Attitude	Coordination	
Speech	<input type="checkbox"/> Slurred <input type="checkbox"/> Impaired Comprehension <input type="checkbox"/> Normal <input type="checkbox"/> Bloodshot <input type="checkbox"/> Watery			
Corrective Lenses	<input type="checkbox"/> None <input type="checkbox"/> Contact, if so <input type="checkbox"/> Hard <input type="checkbox"/> Soft <input type="checkbox"/> Unequal (explain)	Pupil Size <input type="checkbox"/> Equal	IABN to follow instructions: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Right <input type="checkbox"/> Left <input type="checkbox"/> Normal <input type="checkbox"/> Drowsy	

Preliminary Training for Drug Evaluation and Classification Program

2-9

## *Preliminary Examination*

- The preliminary examination is your first opportunity to observe the subject closely and directly.
  - A major purpose of the preliminary examination is to determine if the subject may be suffering from an injury or some other medical condition not necessarily related to drugs.

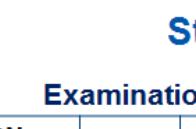
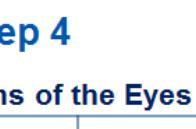
Analogy: The preliminary examination is a “fork in the road.” It can help you decide whether to continue with the drug evaluation, or to pursue a possible medical complication, or to proceed with a DWI (alcohol) case.

Another major purpose of the preliminary examination is to begin systematically assessing the subject's appearance, behavior and automatic bodily responses for signs of drug-induced impairment.

The preliminary examination consists of a series of questions dealing with possible injuries or medical problems; observations of the subject's face, speech and breath; initial checks of the subject's eyes; and, an initial examination of the subject's pulse.

The initial examination of the eyes may reveal signs of injury or illness. A difference in pupil size of greater than 0.5 mm may indicate an injury or existing medical condition.

Step 4				
Examinations of the Eyes				
HGN	Right Eye	Left Eye	Vertical Gaze Nystagmus?	
Lack of Smooth Pursuit			Yes <input type="checkbox"/>	No <input type="checkbox"/>
Max. Deviation			Convergence Right Eye 	Left Eye 
Angle of Onset				

NHTSA
 NHTSA

## *Examinations of the Eyes*

This is the time when DREs will administer three tests of the subject's eyes; Horizontal Gaze Nystagmus, Vertical Gaze Nystagmus and Lack of Convergence.

Certain drugs produce very easily observable effects on the eyes.

- One of the most dramatic of these effects is nystagmus, which means an involuntary jerking of the eyes.
  - Persons under the influence of alcohol usually will exhibit Horizontal Gaze Nystagmus, which is an involuntary jerking of the eyes as the eyes gaze to the side.
  - Alcohol is not the only drug that causes nystagmus.
  - Horizontal Gaze Nystagmus is not the only observable effect on the eyes that will be produced by various drugs.

Step 5																			
Divided Attention Tests																			
<p>Modified Romberg Balance</p>  <p>Internal Clock: Estimated as 30 sec.</p>	<p>Walk and Turn Test</p>  <p>Describe Turn</p> <p>Cannot keep balance _____ Starts too soon _____</p> <table border="1"> <tr><td>1st Nine</td><td>2nd Nine</td></tr> <tr><td> </td><td> </td></tr> </table> <p>Stops Walking Misses Heel-Toe Steps Off Line Raises Arms Actual Steps Taken _____</p> <p>Cannot Do Test (explain)</p>	1st Nine	2nd Nine																
1st Nine	2nd Nine																		
	<p>One Leg Stand:</p>  <p>L      R</p> <p>Type of Footwear</p> <p>Sways while balancing Uses arms to balance Puts foot down</p> <p>Right      Left</p> <p>Draw lines to spots touched</p> <p>2      1 4      3 5      6</p>																		
																			

## *Divided Attention / Psychophysical Tests*

All drugs that impair driving ability will also impair the subject's ability to perform certain carefully designed divided attention tests.

These tests are familiar to you in the context of examining alcohol impaired subjects.

- The same tests are very valuable for disclosing evidence of impairment due to drugs other than alcohol.

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Step 6

### Examination of Vital Signs

<p><b>Pulse and Time</b></p> <p>1. _____ bpm / _____ 2. _____ bpm / _____ 3. _____ bpm / _____</p>	 <p><b>Blood Pressure      Temp</b> _____ / _____ mmHg      _____ °</p>
--	---

Preliminary Training for Drug Evaluation and Classification Program      2-12

---

### *Examination of Vital Signs*

Many categories of drugs affect the operation of the heart and other major organs of the body. These effects show up during examination of the subject's vital signs.

- The vital signs that are reliable indicators of drug influence include blood pressure, pulse, and temperature.
  - Blood pressure is measured with two medical instruments; a stethoscope and a sphygmomanometer.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 2 – Overview of the Drug Evaluation and Classification Procedures

## Step 7

### Darkroom Examinations

Pupil Size	Room Light	Darkness	Direct	Nasal Area
Left Eye				Oral Cavity
Right Eye				
Rebound Dilation				Reaction to Light
Yes <input type="checkbox"/>	No <input type="checkbox"/>			









## *Dark Room Examinations*

Many categories of drugs affect how the pupils of the eyes will appear, and how they respond to light.

- Certain kinds of drugs will cause the pupils to grow larger, or dilate.
  - Some other drugs cause the pupils to be smaller, or constrict.

By systematically changing the amount of light entering the subject's eyes, we can observe the pupils' appearance and reaction under controlled conditions.

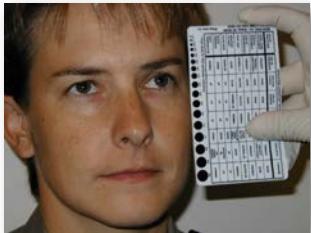
We carry out these examinations in a dark room, using a penlight to control the amount of illumination entering the subject's eyes.

We use a device called a pupillometer to estimate the size of the subject's pupils.

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Step 7

### Darkroom Examinations



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

2-14

Other examinations are also conducted in the darkroom, using the penlight: i.e., examination of the nasal area and mouth for signs of drug use and for concealed contraband.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## *Examination of Muscle Tone*

Certain categories of drugs can cause the user's muscles to become markedly tense or rigid, while others can cause the muscles to be very flaccid, or loose and rubbery.

Evidence of muscle tone may be apparent when the subject attempts to perform divided attention tests.

Evidence of muscle tone can also be observed when taking the subject's pulse and blood pressure.

## *Examination for Injection Sites*

Certain drugs are commonly injected by their users via hypodermic needles.

Heroin is probably most commonly associated with injection, but several other types of drugs also are injected by many users.

Uncovering injection sites on a subject provides powerful evidence that he or she may be under the influence of specific types of drugs.

Session 2 - Overview of the Drug Evaluation and Classification Procedures

# Step 10

## Suspect's Statements and Other Observations

What medicine or drug have you been using? How much?		Time of use?	Where were the drugs used? (Location)	
Date/Time of Arrest	Time DRE Notified		Eval. Start Time	Time Completed
Member Signature (Include Rank)		ID No.	Reviewed By	
Opinion of Evaluator: <input type="checkbox"/> Rule Out <input type="checkbox"/> Alcohol <input type="checkbox"/> Stimulant <input type="checkbox"/> D/A <input type="checkbox"/> Inhalant <input type="checkbox"/> Medical <input type="checkbox"/> Depressant <input type="checkbox"/> Hallucinogen <input type="checkbox"/> Narcotic Analgesic <input type="checkbox"/> Cannabis				

Preliminary Training for Drug Evaluation and Classification Program

2-17

Session 2 – Overview of the Drug Evaluation and Classification Procedures

### *Suspect's Statements and Other Observations*

At this point in the evaluation, the DRE may have reasonable grounds to believe that the subject is under the influence of a drug or drugs.

The DRE may also have at least an articulable suspicion as to the category or categories of drugs causing the impairment.

The DRE should proceed to interview the subject to confirm his or her suspicion/opinions concerning the drug or drugs involved.

The DRE must carefully record the subject's statements and any other observations that may constitute relevant evidence of drug induced impairment.

### *Opinion of the Evaluator*

Based on all of the evidence and observations gleaned from the preceding steps, the DRE must reach an informed opinion as to:

Whether the subject is under the influence of a drug or drugs.

If so, the probable category or categories of drugs causing the impairment.

The DRE must record a narrative summary of the facts forming the basis for his or her opinion.

---

---

---

---

---

---

---

---

---

---

Session 2 - Overview of the Drug Evaluation and Classification Procedures

## Step 12

### Toxicological Examination



The image shows a female scientist in a white lab coat working at a laboratory bench. She is focused on her work, which involves handling various pieces of glassware and reagents. The background shows typical laboratory equipment and supplies.

Preliminary Training for Drug Evaluation and Classification Program

2-19

---

#### *Toxicological Examination*

The toxicological examination is a chemical test or tests designed to obtain scientific, admissible evidence to substantiate the DRE's opinion.

Departmental policy and procedures should be followed in requesting, obtaining and handling the toxicological sample.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 2 - Overview of the Drug Evaluation and Classification Procedures

# Drug Influence Evaluation Checklist

1. Breath alcohol test
2. Interview of arresting officer (Note: gloves must be worn from this point)
3. Preliminary examination and first pulse
4. Eye examinations
5. Divided attention tests:
  - Modified Romberg Balance
  - Walk and Turn
  - One Leg Stand
  - Finger to Nose

The logo of the National Highway Traffic Safety Administration (NHTSA) is located in the bottom left corner. It features a circular emblem with a steering wheel and a road, surrounded by the words "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

The logo of the National Highway Traffic Safety Administration (NHTSA) is located in the bottom right corner. It features a circular emblem with a steering wheel and a road, surrounded by the words "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

Preliminary Training for Drug Evaluation and Classification Program

2-20

Session 2 – Overview of the Drug Evaluation and Classification Procedures

## *Review of Drug Influence Evaluation Checklist*

## **B. Video Demonstrations**

Session 2 – Overview of the Drug Evaluation and Classification Procedures

# The DRE 12-Step Process







Preliminary Training for Drug Evaluation and Classification Program

2-22

Session 2 - Overview of the Drug Evaluation and Classification Procedures

[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 3 - Psychophysical Tests

90 Minutes

**Session 3**

**Psychophysical Tests**



Preliminary Training for Drug Evaluation and Classification Program



[This page is intentionally left blank]

Session 3 - Psychophysical Tests

## Learning Objectives

- Administer the four divided attention tests used in the drug influence evaluation process
- Document the subject's performance of those tests

 NHTSA

Preliminary Training for Drug Evaluation and Classification Program 3-2

---

Upon successfully completing this session the participant will be able to:

- Administer the four divided attention tests used in the drug influence evaluation process.
- Document the subject's performance of those tests.

<u>CONTENT SEGMENTS</u>	<u>LEARNING ACTIVITIES</u>
A. Modified Romberg Balance .....	Instructor-Led Presentations
B. Walk and Turn.....	Participant-Led Demonstrations
C. One Leg Stand .....	Hands-on Practice
D. Finger to Nose .....	Hands-on Practice

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 3 - Psychophysical Tests

## Modified Romberg Balance Test Diagram

Modified Romberg Balance

Approx.      Approx.

Internal Clock:  
Estimated as 30 sec.

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

3-3

Session 3 - Psychophysical Tests

## 30 Seconds

- Internal timing estimate
- Some drugs tend to speed up or slow down the subject's internal clock

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

3-4

- Four divided attention psychophysical tests are administered in the DRE evaluation – Modified Romberg Balance, Walk and Turn, One Leg Stand and Finger to Nose.
  - The Walk and Turn and One Leg Stand as well as HGN have been scientifically validated by conducting controlled research to demonstrate their reliability. The Modified Romberg Balance and Finger to Nose have not been subjected to that sort of scrutiny, however, if properly administered and recorded they are very credible evidence of impairment.
- 
- 
- 
- 
- 

### A. Modified Romberg Balance

The Modified Romberg Balance is the first divided attention test that is administered during the drug influence evaluation.

- The test requires the subject to stand with the feet together and the head tilted back slightly and with the eyes closed.
  - The test also requires that the subject attempt to estimate 30 seconds; the subject must be instructed to open the eyes and tilt the head forward and say “stop” when they think thirty seconds has elapsed.
- 
- 
- 
-



## Modified Romberg Balance Test

- **Divided attention**
- **Time Estimation**



- The DRE must record how much time actually elapsed from the start of the test until the subject opened their eyes and said “stop”.
  - If the subject continues to keep their eyes closed for 90 seconds, the DRE should stop the test and record the fact that it was terminated at 90 seconds.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 3 - Psychophysical Tests

### Instruction Stage

1. Instruct the subject to stand straight with feet together and arms down at their sides
2. Tell the subject to remain in that position until you have finished giving the instructions
3. Emphasize that he or she must not start the test until you say, "begin"
4. Ask the subject if he or she understands the instructions so far

Preliminary Training for Drug Evaluation and Classification Program 5-6

Session 3 - Psychophysical Tests

### Instruction Stage

5. Tell the subject, "When I tell you to begin, tilt your head back slightly and close your eyes"
6. Estimate the passage of 30 seconds
7. Tell the subject, "When you think 30 seconds has gone by, bring your head forward, open your eyes, and say "Stop"
8. Ask the subject if he/she understands

Preliminary Training for Drug Evaluation and Classification Program 5-7

---

## Administrative Procedures

### Instruction Stage

#### Administrative Procedures and Instructions

- Tell the subject to stand straight with their feet together and their arms down at their sides.
  - Tell the subject to maintain that position while you give the instructions. Emphasize that he or she must not start the test until told to start.
  - Ask the subject if he or she understands so far.
  - **Make sure to obtain a verbal response from the subject.**
  - Tell the subject when you instruct them to begin the test, they must tilt their head back slightly and close their eyes.
  - Tell the subject that when you say "Start", they must keep their head tilted back with their eyes closed until they think that 30 seconds have gone by. DO NOT tell the subject to "count to thirty seconds" or to use any other specific procedure to keep track of time. But on the other hand, DO NOT tell the subject that they are not allowed to count to thirty seconds. SIMPLY SAY, "keep your head tilted back with your eyes closed until you think that thirty seconds have gone by".
  - Tell the subject that, when they think the 30 seconds have gone by, they must bring their head forward, open their eyes, and say "Stop".
  - Ask the subject if he or she understands.
- 
- 
- 
-

Session 3 - Psychophysical Tests

## Balancing Stage

1. Instruct the subject to tilt his or her head back and close their eyes
2. Use a timing device, and pick a convenient time to start the test
3. Tell the subject to begin
4. Keep track of time while the subject performs the test
5. Check subject for presence of tremors (eyelid and/or body) and sway

Preliminary Training for Drug Evaluation and Classification Program

3-8

Session 3 – Psychophysical Tests

## Balancing Stage

6. When the subject opens their eyes ask, “How much time was that?”
7. Record how much time actually elapsed from the start of the test until the subject opened their eyes or was told to stop.

## *Balancing Stage*

- Look at your timing device and pick a convenient time to start the test.
  - Tell the subject to tilt their head back and close their eyes.
  - Tell the subject to begin or start the test.
  - Keep track of time while the subject performs the test.
  - Check subject for presence of tremors (eyelid and/or body) and sway.
  - When the subject opens their eyes, ask them “how much time was that?”

**Make sure to document their “exact” verbal response.**

- Record how much time actually elapsed from the start of the test until the subject opened their eyes or was told to stop.
  - Record how much time actually elapsed from the start of the test until the subject opened their eyes.
  - If the subject continues to keep their eyes closed for 90 seconds, stop the test and record the fact that it was terminated at 90 seconds.
  - Instructor-to-instructor demonstrations.
  - Instructor-to-participant demonstration.

Session 3 - Psychophysical Tests

## Modified Romberg Balance Test Demonstrations

Modified Romberg Balance

Internal Clock:  
Estimated as 30 sec.

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

3-10

---

*Participant-Led Demonstrations.*

*Recording Results of the Modified Romberg Balance Test*

The major items that need to be recorded for the Modified Romberg Balance test are:

- The amount that the subject sways.
- The actual amount of time that the subject keeps the eyes closed.
- To record swaying, the DRE must estimate how many inches the subject sways, either front-to-back, left-to-right, or circular.

Example: If the subject sways approximately two inches toward the left and approximately two inches toward the right, the DRE should write the number “2” on each side of the “stick figure” that shows left-to-right movement. To record the subject’s time estimate, simply write the number of seconds that the subject kept his or her eyes closed.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

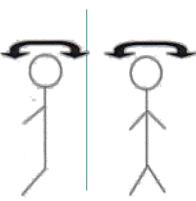
---

---

Session 3 - Psychophysical Tests

## Modified Romberg Balance Test Practice

Modified Romberg Balance



Internal Clock:  
Estimated as 30 sec.

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

3-11

---

**Solicit participants' questions.**

*Hands-On Practice*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

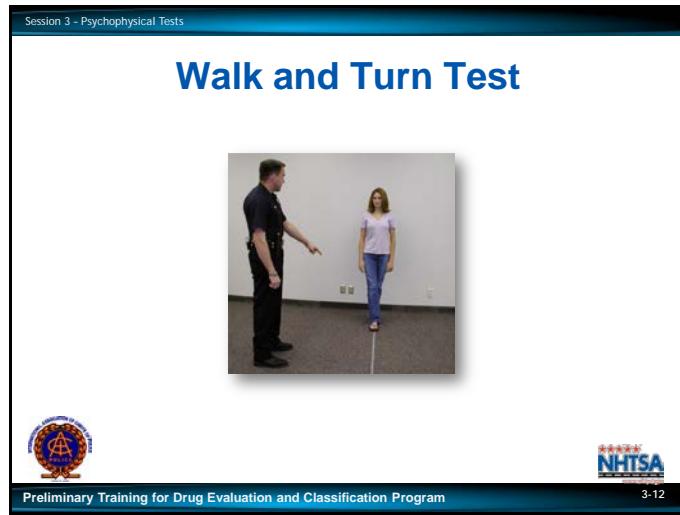
---

---

---

---

---



## **B. Walk and Turn**

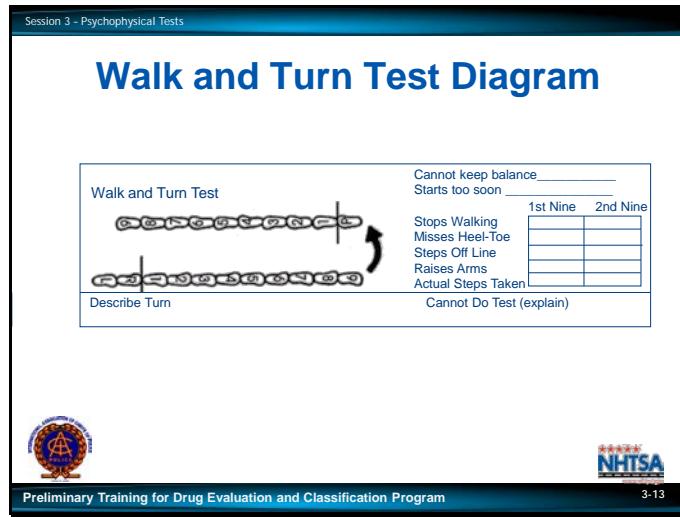
Walk and Turn is the second divided attention test administered during the drug influence evaluation.

The test is administered the same way that we have used it for Standardized Field Sobriety Testing purposes.

- Monitor the practice and offer coaching and constructive criticism, as appropriate.
- Review of Walk and Turn administrative procedures.

The test has two stages: the instructions stage and the walking stage.

- During the instructions stage the subject must stand heel-to-toe, with the right foot ahead of the left foot with the heel of the right foot against the toe of the left foot, and keeping the arms at the sides.
- Demonstrate the stance that the subject must maintain during the instructions stage. If the subject fails to maintain the starting position during your instructions, discontinue the instructions and direct the subject back to the starting position before continuing.
- The subject is told to not start walking until told to do so.
- The subject must be told to take nine heel-to-toe steps on the line, to turn around keeping the front or lead foot on the line and to turn by taking a series of small steps with the other foot, and to return nine heel-to-toe steps down the line.



- The subject must be told to keep their arms at the sides at all times.
  - The subject must be told to watch his or her feet while walking.
  - The subject must be told to count the steps out loud.
  - The subject must be told not to stop walking until the test is completed.
  - The subject should be asked if he/she understands the instructions.
  - Once the subject acknowledges his/her understanding of the instructions, instruct the subject to begin the test.
  - If the subject stops or fails to count out loud or watch his/her feet, remind him/her to perform these tasks. This interruption will not affect the validity of the test and is essential for evaluating divided attention.

## Session 3 – Psychophysical Tests

# Walk and Turn Test

- Instructor – Participant demonstration
- Participant – Participant demonstration

#### *Instructor-to-Participant demonstration.*

---

---

---

---

---

---

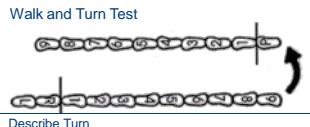
---

---

### *Participant-to-Participant Demonstration.*

Session 3 - Psychophysical Tests

## Walk and Turn Recording Results

	Cannot keep balance _____ Starts too soon _____  Stops Walking _____ Misses Heel-Toe _____ Steps Off Line _____ Raises Arms _____ Actual Steps Taken _____  1st Nine      2nd Nine <table border="1" style="margin-left: auto; margin-right: 0; border-collapse: collapse; width: 100px;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table> Describe Turn _____   Cannot Do Test (explain) _____												

Preliminary Training for Drug Evaluation and Classification Program      3-15

### Recording Results of the Walk and Turn Test

- We record the very same clues on this test that we use for Standardized Field Sobriety Testing purposes.
- 
- 
- 
- 
- 

### Instruction stage clues:

- Cannot maintain balance while listening to instructions (feet break away from the heel-to-toe stance). Draw a slash mark at an angle in the direction the subject stepped out of the instruction position.
  - Starts too soon (i.e., subject starts walking before told to do so).
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Walking stage clues:

- Stops while walking
  - Does not touch heel-to-toe (distance  $\frac{1}{2}$ "")
  - Steps off the line
  - Uses arms to balance (distance 6")
  - Improper turn
  - Incorrect number of steps

If subject stops walking, record it by drawing a vertical line from the toe at the step at which the stop occurred. Do this for each of the nine steps.

How many times during first nine steps?

How many times during second nine steps?

If subject fails to touch heel-to-toe, record how many times this happens.

If subject steps off the line while walking, record it by drawing a line from the appropriate footprint at the angle in the direction in which the foot stepped. Do this for each nine steps

- If the subject steps off the line, indicate with a half of slash mark at an angle in the direction the step was taken.
  - If the subject misses heel-to-toe, indicate with a slash mark between the feet and label with an “M”.
  - The “M” indicates “missed.”

Session 3 – Psychophysical Tests

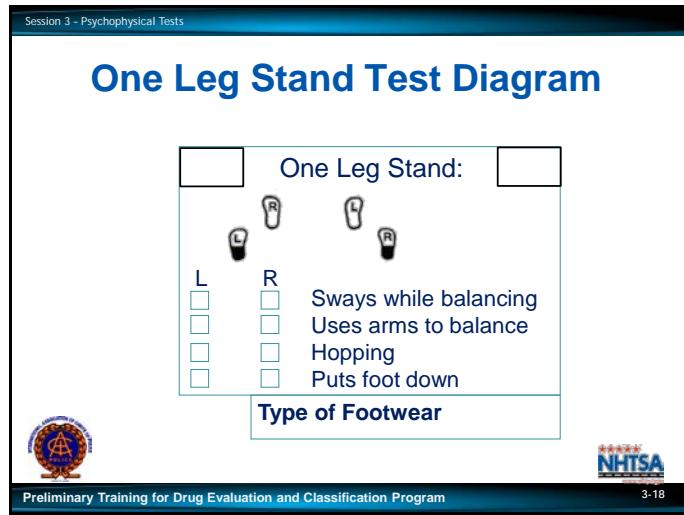
# Walk and Turn Test Diagram Practice

Walk and Turn Test	Cannot keep balance _____ Starts too soon _____												
	1st Nine      2nd Nine <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>												
Describe Turn	Cannot Do Test (explain)												

Preliminary Training for Drug Evaluation and Classification Program

3-17

## *Hands-On Practice*



### C. One Leg Stand

One Leg Stand is the third divided attention test administered during the drug influence evaluation.

- For drug evaluation purposes, One Leg Stand is given twice to the subject.
  - First, the subject is required to perform the One Leg Stand while standing on the left foot.
  - Next, they are required to perform the test while standing on the right foot.
  - Otherwise, the One Leg Stand is used in the same fashion as in Standardized Field Sobriety Testing.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

### *Review of One Leg Stand Administrative Procedures*

Two instructors should be used for this demonstration, one as the “subject” and the other as the examiner.

- The test has two stages, the instructions stage and the balance and counting stage.
- During the instructions stage, the subject must stand with the feet together, arms at the side, facing the examiner.
- Demonstrate the stance that the “subject” is required to maintain.
- The subject must be told that they will have to stand on the left foot, and raise the right foot approximately **6** inches off the ground, with the right leg held straight and the raised foot parallel to the ground.
- The examiner must demonstrate the one-leg stance.
- Emphasize that the subject must keep the foot raised throughout the test.
- The subject must be told that they must look at the raised foot during the test.
- Emphasize that the examiner should not look at his or her own foot while giving the instructions; for safety reasons, the examiner must keep the eyes on the subject at all times.
- The subject must be told that they will have to count out loud in the following manner: “one thousand one, one thousand two, one thousand three” and so on until told to stop.
- After giving the instructions, the examiner should ask the “subject” if they understand.
- After the subject has completed the test on the left foot, they must be told to repeat the test on the right foot.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 3 – Psychophysical Tests

# One Leg Stand Test Diagram Recording Results

	One Leg Stand:	
 <input type="checkbox"/> L <input checked="" type="checkbox"/> ✓ <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> ✓	 <input type="checkbox"/> R <input checked="" type="checkbox"/> ✓ <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Sways while balancing Uses arms to balance Hopping Puts foot down
<b>Type of Footwear</b> Tennis shoes		




### *Recording Results of the One Leg Stand*

For drug evaluation purposes, we use the same clues on the One Leg Stand that we use for Standardized Field Sobriety Testing.

## The One Leg Stand clues:

- Sways while balancing
  - Uses arms to balance
  - Hopping
  - Puts foot down

Indicate above the feet the number they were counting when they put their foot down.

Check marks should be made to indicate the number of times the subject swayed, used arms for balance, hopped or put their foot down.

The subject's actual count during the 30 seconds should be documented in the top area of the box above the foot on which the subject was standing.

DREs should also be observant for the presence of other indicators, such as body tremors and improper counting during this test.

Session 3 - Psychophysical Tests

## One Leg Stand Hands-On Practice

One Leg Stand:

L R

- Sways while balancing
- Uses arms to balance
- Hopping
- Puts foot down

Type of Footwear

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

3-20

---

### *Hands-On Practice*

The original SCRI studies suggested that individuals over 65 years of age; people with back, leg or inner ear problems; or people who are overweight by 50 or more pounds may have difficulty performing this test. Less than 1.5% of the test subjects in the original studies were over 65 years of age. There was no data containing the weight of the test subjects included in the final report. Also, the SCRI studies suggest that individuals wearing heels more than 2 inches high should be given the opportunity to remove their shoes.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

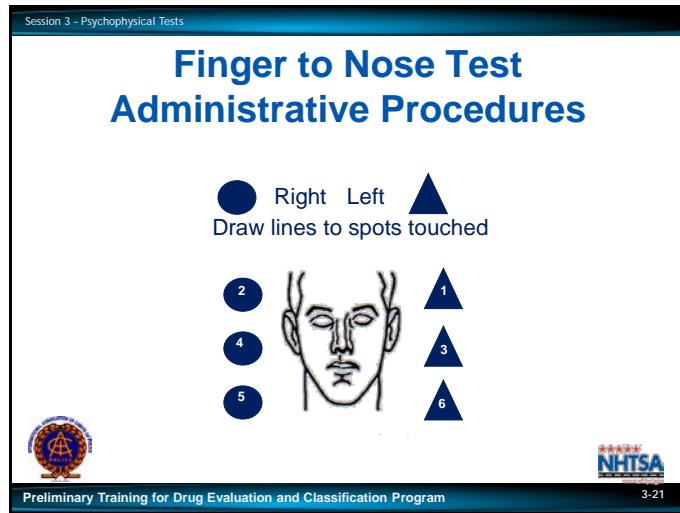
---

---

---

---

---



#### D. Finger to Nose

The Finger to Nose is the final divided attention test used in the drug influence evaluation.

Finger to Nose differs from the other three tests in that the examiner must continue to give instructions to the subject throughout the test.

##### *Administrative Procedures for Finger to Nose*

- The subject must be told that he/she will be given a series of commands, i.e., "left, right, etc." to indicate which fingertip is to be brought to the tip of the nose.
  - The subject must be told to stand with feet together, arms down at the sides, facing the examiner.
  - The examiner should demonstrate the stance.
  - The subject must be told to close his/her hands, rotate the palms forward and then to extend the index fingers from the closed hands.
  - The examiner must tell subject that they will be asked to touch the tip of the index finger to the tip of the nose.
  - The examiner must demonstrate to the subject how they are expected to touch the fingertip to the nose. (Without actually touching the nose.)
- 
- 
- 
- 
- 
- 
- 
-

- Demonstrate: “When I say ‘left,’ touch the tip of your left index finger to the tip of your nose.”
  - The examiner must tell the subject that they are expected to return the arm to the side immediately after touching the fingertip to the nose.
  - Demonstrate the movement of the fingertip to the nose by standing at an angle to the “subject” so that he/she can see the proper method for touching the nose.
  - The subject must be told to tilt the head back slightly and to close the eyes, and keep them closed until the examiner says to open them.
  - The examiner should demonstrate the stance with head tilted back, arms at the sides with index fingers extended. Remind the participants that they should not close their eyes during the instructions for safety reasons.

### *Instructor-Led Demonstrations*

- Instructor-to-instructor demonstration.
  - Instructor-to-participant demonstration.

---

---

---

---

---

### *Participant-Led Demonstrations*

Session 3 – Psychophysical Tests

## Finger to Nose Test Recording Results

Right Left

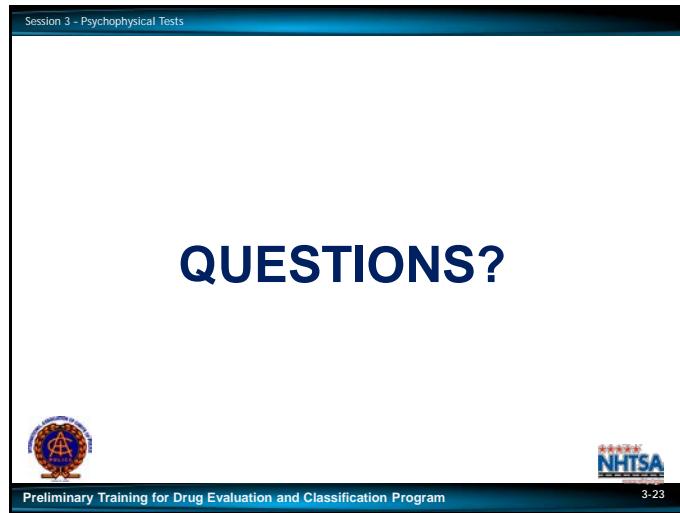
Draw lines to spots touched

The diagram shows a profile of a human head facing right. There are six numbered circles and three numbered triangles. Red lines connect the numbers to specific points on the nose and cheeks. Circle 2 is at the top left of the nose bridge. Circle 4 is on the left cheek. Circle 5 is at the bottom left of the nose. Triangle 1 is at the top right of the nose bridge. Triangle 3 is on the right cheek. Triangle 6 is at the bottom right of the nose. The letter 'P' is placed next to circle 4 and triangle 6.

### *Recording Results of the Finger to Nose Test*

- The results of Finger to Nose test are recorded by drawing a “map” showing where the fingertips landed on each attempt.
  - A line should be drawn to the appropriate circle or triangle to indicate where the subject touched their nose.
  - Suggestion: If the DRE draws the line from the place where the subject touches to the appropriate circle or triangle, it enables them to draw a straighter line.

## Hands-on Practice



[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 4 - Eye Examinations

90 Minutes

## Session 4

### The Eye Examinations



**NHTSA**  
National Highway Traffic Safety Administration

Preliminary Training for Drug Evaluation and Classification Program

[This page is intentionally left blank]

Session 4 - Eye Examinations

## Learning Objectives

- Administer tests of Horizontal Gaze Nystagmus, Vertical Gaze Nystagmus and Lack of Convergence
- Estimate pupil size
- Relate the expected results of the eye examinations to the seven categories of drugs

Preliminary Training for Drug Evaluation and Classification Program

4-2

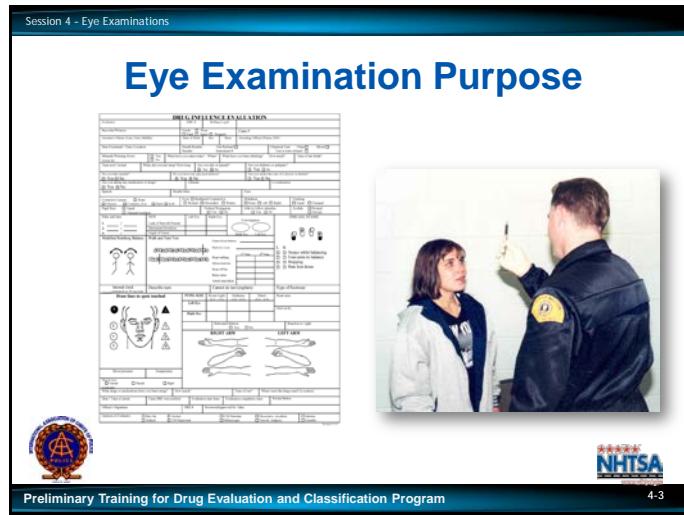
---

Upon successfully completing this session the participant will be able to:

- Administer tests of Horizontal Gaze Nystagmus, Vertical Gaze Nystagmus and Lack of Convergence.
- Estimate pupil size.
- Relate the expected results of the eye examinations to the seven categories of drugs.

CONTENT SEGMENTS..... LEARNING ACTIVITIES

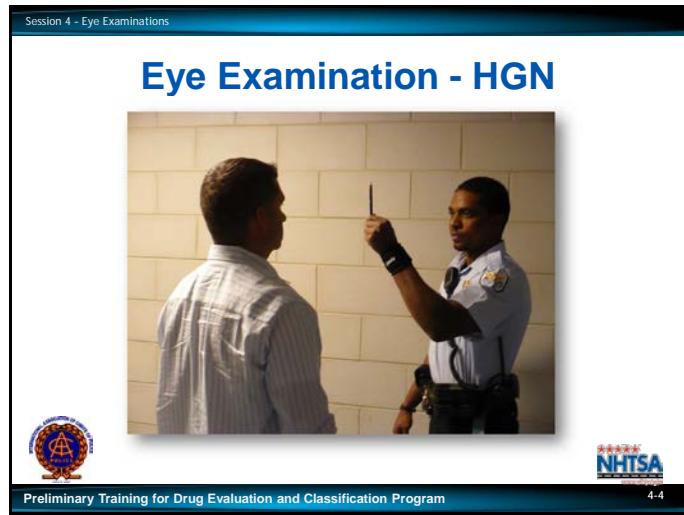
- A. Purposes of the Eye Examinations..... Instructor-Led Presentations
- B. Procedures and Clues ..... Instructor-Led Demonstrations
- C. Demonstrations ..... Hands-on Practice
- D. Relationship of Drug Categories to the Eye Examinations
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



### **A. Purposes of the Eye Examinations**

The principal purpose of all of the eye examinations is to obtain articulable facts indicating the presence or absence of specific categories of drugs.

- Certain drug categories usually cause the eyes to react in specific ways.
  - Other drug categories usually do not cause those reactions.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



### *Horizontal Gaze Nystagmus (HGN)*

The tests of Horizontal Gaze Nystagmus (HGN) and Vertical Gaze Nystagmus (VGN) provide important indicators of the drug categories that may or may not be present.

- Prior to the administration of the HGN, the subject's eyes should be checked for equal pupil size, resting nystagmus and equal tracking.
- The check for equal pupil size is simply done by visibly checking to see if both pupils are equal in size. Both pupils should be of equal size and there should not be any noticeable difference in size.
- The check for equal tracking is done by moving the stimulus smoothly across the subject's entire field of vision checking to see if the eyes track together or if one lags behind.
- If the subject's pupils are noticeably unequal in size or if resting nystagmus is present or if the eyes do not track together, there may be a chance of a medical condition or pathological disorder.
- This part of the examination may require more than one check to ensure that a medical condition or pathological disorder does not exist.
- If HGN is observed, it is likely that the subject may have taken a CNS Depressant, Dissociative Anesthetic, an Inhalant, or a combination of those.

Officers are reminded to ask questions about the subject's eye and general health conditions prior to administering the HGN test. If a subject responds or volunteers information that he or she is blind in one eye or has an artificial eye, the officer should make note of that and may proceed with the HGN test. If there are any abnormal findings on the pre-test checks, the officer may choose not to continue with the testing. If HGN testing is continued, officers are reminded that this does not follow the standardized protocol and should acknowledge such in any report.

If HGN testing is conducted on a person with a blind eye, typical inconsistent findings could be related to the blind eye not being able to see or track the stimulus, or when the normal eye can no longer see the stimulus, e.g., when checking distinct and sustained nystagmus at maximum deviation on the blind eye side.

Source: "Eye Tests on a Suspect with a Blind Eye" Karl Citek, OD, PhD, FAAO, Pacific University College of Optometry, Sept. 2014.

Session 4 - Eye Examinations

## Three Clues of Horizontal Gaze Nystagmus

- Lack of Smooth Pursuit
- Distinct and Sustained Nystagmus at Maximum Deviation
- Angle of Onset



Preliminary Training for Drug Evaluation and Classification Program

4-5

### **B. Procedures and Clues**

#### *Three Clues of Horizontal Gaze Nystagmus*

Prior to the administration of the HGN test, the subject's eyeglasses should be removed, and the eyes are checked separately for equal pupil size, resting nystagmus and equal tracking. (**If subject wears contacts, especially colored contacts because some colored contacts may affect the ability to compare and estimate pupil size.**)

As pointed out earlier, if the eyes do not track together, or if the pupils are noticeably unequal in size, the chance of a medical disorder or injuries causing the nystagmus may be present. Prior to the administration, resting nystagmus may also be observed at this time.

Horizontal Gaze Nystagmus test consists of three separate checks, administered independently to each eye.

#### *Lack of Smooth Pursuit*

The first check is for "lack of smooth pursuit."

- Position the stimulus approximately 12 to 15 inches from of the subject's nose.
  - Hold the tip of the stimulus slightly above the subject's eye level.
- 
- 
- 
- 
- 
- 
- 
-

Session 4 – Eye Examinations

# Three Clues of Horizontal Gaze Nystagmus

- Lack of Smooth Pursuit
- Distinct and Sustained Nystagmus at Maximum Deviation
- Angle of Onset

A close-up photograph of a person's right eye. The eye is looking slightly to the right. There is noticeable vertical shaking or nystagmus in the eye, particularly evident as the eye tries to maintain its position. The iris is blue, and the eyelids are partially closed.

Click on Picture for Video Example of  
Lack of Smooth Pursuit

The logo of the National Highway Traffic Safety Administration (NHTSA). It features a circular emblem with a steering wheel and a road, surrounded by the text "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

The flag of the United States with the NHTSA logo overlaid. The logo is located in the bottom left corner of the flag's field.

Preliminary Training for Drug Evaluation and Classification Program

4-6

- Instruct the subject to hold their head still and follow the stimulus with the eyes only.
  - Move the stimulus smoothly, all the way to the subject's left, then all the way to the right, then back again all the way to the left, then once again all the way back to the right.
  - The stimulus should move at a speed that requires approximately two seconds to bring it from the center to side or approximately 4 seconds from side to side.
  - While the eye is moving, examine it for evidence of a lack of smooth pursuit.

Use these or similar analogies:

- A smoothly pursuing eye will move without friction, much the way that a windshield wiper glides across the windshield when it is raining steadily. An eye showing lack of smooth pursuit will move in a fashion similar to a wiper moving across a dry windshield.

Session 4 - Eye Examinations

## Participant Practice

- Lack of Smooth Pursuit



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

4-7

---

### *Participant Practice*

**Participants' initial practice of the check for lack of smooth pursuit.**

*Distinct and Sustained Nystagmus at Maximum Deviation*

The second check is for "distinct and sustained nystagmus at maximum deviation."

- Again position the stimulus as before.
  - Move the stimulus all the way to the subject's left side and hold it there so that the subject's eye is turned as far to the side as possible.
  - Hold the eye at that position for a minimum of 4 seconds, to check carefully for any jerking that may be present.
  - Then, move the stimulus all the way to the subject's right side, and hold it there for a minimum of 4 seconds.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 4 - Eye Examinations

## Three Clues of Horizontal Gaze Nystagmus

- Distinct and Sustained Nystagmus at Maximum Deviation



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

4-8

---

### *Clue No. 2: Distinct and Sustained Nystagmus at Maximum Deviation*

Once you have completed the check for lack of smooth pursuit, you will check the eyes for distinct and sustained nystagmus when the eye is held at maximum deviation, beginning with the subject's left eye.

#### *The Mechanics of Clue Number 2*

Once again, position the stimulus approximately 12 - 15 inches (30 - 38 cm) in front of subject's nose and slightly above eye level.

Move the stimulus to the individual's left side until there is no more white of the eye visible.

Hold the left eye in that position for a minimum of four (4) seconds. Four seconds will not cause fatigue nystagmus. This type of nystagmus may begin if a subject's eye is held at maximum deviation for more than 30 seconds.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 - Eye Examinations

## Three Clues of Horizontal Gaze Nystagmus

- Distinct and Sustained Nystagmus at Maximum Deviation

 Click on Picture for Video Example of Maximum Deviation

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

4-9

---

**With this clue, the examiner looks for distinct and sustained jerking.**

A slightly or barely visible tremor is not sufficient to consider this clue present.

A definite, strong jerking must be seen.

*Participant Practice*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Participants' initial practice of the check for distinct and sustained nystagmus at maximum deviation.

Session 4 - Eye Examinations

## Three Clues of Horizontal Gaze Nystagmus

- Angle of Onset



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

4-10

### *Angle of Onset*

The final check is for the “angle of onset.”

- Position the stimulus as before.
  - Slowly move the stimulus to the subject’s left side, carefully watching the eye for the first sign of jerking.
  - When you think that you see the eye jerk, stop moving the stimulus and hold it still.
  - Verify that the eye is, in fact, jerking.
  - Once you have established that you have located the point of onset, estimate the angle.
  - Repeat this procedure on the subject’s right eye.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 4 - Eye Examinations

## Eye Examination - Angle of Onset

**BAC = 50 - Angle of Onset**



Preliminary Training for Drug Evaluation and Classification Program

4-11

Session 4 - Eye Examinations

## Eye Examination - Angle of Onset

**Angle of Onset = 35 degrees**

$$\begin{aligned} \text{BAC} &= 50 - \text{Angle of Onset} \\ &= 50 - 35 \\ &= 15 \end{aligned}$$



Preliminary Training for Drug Evaluation and Classification Program

4-12

### *Angle of Onset*

The consistency of onset angle and BAC can be compared using the following formula:

- Explanation: BAC = 100 x blood alcohol (e.g., if blood alcohol is 0.10, BAC = 10).
  - Example: If onset angle is 35 degrees, then BAC = 50 - 35 = 15.
  - The corresponding blood alcohol concentration would be approximately 0.15.
  - Keep in mind that this formula is only a statistical approximation. It is not an exact relationship for all subjects at all times.
  - The only purpose of comparing BAC and the angle of onset is to obtain a gross indication of the possible presence of another Depressant, Inhalant, or Dissociative Anesthetic.
  - A DRE is expected to be able to estimate the angle of onset of nystagmus to the nearest 5 degree increment, over the range from 30 to 45 degrees.
  - If the subject's eyes begin to jerk before they have moved to the 30 degree mark, you will not attempt to estimate the angle precisely, but will record that they exhibit "immediate onset."
  - From 30 degrees on out, you will record a numeric estimate of onset.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 4 - Eye Examinations

## Participant Practice

- Angle of Onset



Click on Picture for Video Example of Angle of Onset

NHTSA

Preliminary Training for Drug Evaluation and Classification Program

4-13

---

### *Participant Practice*

- Participants' initial practice of angle of onset estimation.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Horizontal Gaze Nystagmus

- Standardization
  - Medical Complications



Session 4 – Eye Examinations

# Vertical Gaze Nystagmus

A close-up photograph of a person's right eye. The eye is looking upwards, and there is noticeable horizontal oscillation or jerking of the eye, which is characteristic of vertical gaze nystagmus. The iris is light blue, and the surrounding skin and eyelashes are visible.

Click on Picture for Video Example of  
Vertical Gaze Nystagmus

The logo of the National Highway Traffic Safety Administration (NHTSA). It features a circular emblem with a steering wheel and a road, surrounded by the words "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

Preliminary Training for Drug Evaluation and Classification Program

4-15

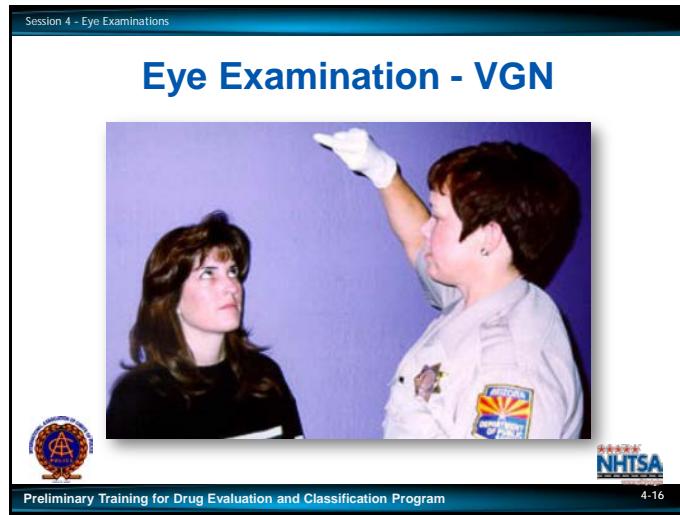
The NHTSA logo, which consists of the acronym "NHTSA" in a bold, sans-serif font, with a stylized star above it and the words "SAFETY" and "MOVEMENT" integrated into the design.

## *Vertical Gaze Nystagmus*

- Position the stimulus horizontally, approximately 12 to 15 inches in front of the subject's nose.
  - Point out to the subject that he or she will have to keep their head steady and try to keep their eyes focused on the stimulus as it moves upward.
  - Raise the stimulus until the subject's eyes are elevated as far as possible.
  - Watch closely for evidence of up-and-down jerking.

## *Participant Practice*

Participants' initial practice of the Vertical Gaze Nystagmus test.



### Vertical Gaze Nystagmus (VGN)

- If VGN is observed, the implication may be that the subject took Dissociative Anesthetics, or fairly large doses of Depressants or Inhalants (for that individual).
  - Point out that it is very unlikely that a subject would exhibit Vertical Gaze Nystagmus without also exhibiting HGN.
  - By comparing the subject's blood alcohol concentration with the angle of onset of HGN, it may be possible to determine that alcohol is or is not the sole cause of the observed nystagmus.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



#### *Lack of Convergence*

The test for Lack of Convergence (LOC) determines whether the subject is able to cross his or her eyes.

The check for Lack of Convergence (LOC) can provide another clue as to the possible presence of Depressants, Inhalants, or Dissociative Anesthetics.

Lack of Convergence is also an indicator of the possible presence of Cannabis.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 - Eye Examinations

### LOC Testing Procedure

- Begin by moving the stimulus in a circle in front of the subject's face
- Observe the eyes to verify that the subject is tracking the stimulus
- Slowly move the stimulus in toward the bridge of the nose

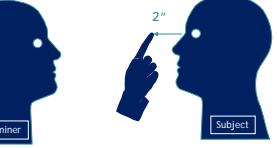


**Examiner**      **Subject**

Preliminary Training for Drug Evaluation and Classification Program      4-19

Session 4 - Eye Examinations

**Normal convergence is a distance approximately two inches (2") from the bridge of the nose**



**Examiner**      **Subject**

Preliminary Training for Drug Evaluation and Classification Program      4-20

- Position the stimulus approximately 12 to 15 inches in front of the subject's nose in the same position we use for the HGN test.
- Inform the subject that you are going to move the stimulus around in a circle in front of his or her face and to follow the stimulus with his or her eyes only.
- Inform the subject that you will move the tip of the stimulus in toward the bridge of his or her nose.
- Start to move the object slowly in a circle.
- Verify the subject is tracking the stimulus.
- Stop moving in a circular manner with the stimulus above eye level.
- Slowly move the stimulus down to within approximately two inches of the bridge of the nose.
- Carefully observe the subject's eyes to determine whether both eyes converge on the stimulus.
- It is recommended that the DRE repeat the check for LOC conducting the check at least two times.
- If the eyes converge (cross) when the stimulus is approximately two inches from the bridge of the nose, the Lack of Convergence is "not present"
- Lack of convergence is present if the subject's eyes do not come together and cross as they track and stay aligned on the stimulus
- In a non-impaired subject, the eyes should come together (converge) and remain converged for one second.
- If the eyes do not converge or remain converged on the stimulus for one second, then Lack of Convergence is present.

## *Participant Practice*

Participants' initial practice of the test for Lack of Convergence.

## Drug Categories That Cause LOC

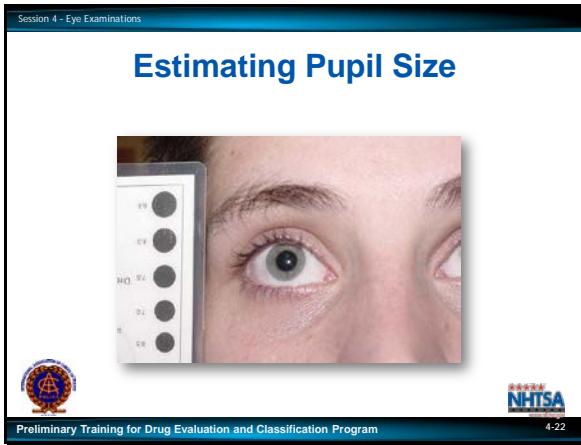
The following drug categories usually will cause Lack of Convergence:

- CNS Depressants
- Inhalants
- Dissociative Anesthetics
- Cannabis



Drug categories which usually cause lack of convergence include:

- CNS Depressants
  - Inhalants
  - Dissociative Anesthetics
  - Cannabis
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



## *Estimation of Pupil Size*

We use a device called a pupillometer to estimate the size of the subject's pupil.

The DRE pupillometer has a series of circles or semi-circles, with diameters usually ranging from 1.0 mm to 10.0 mm, in half millimeter increments.

The pupillometer is held alongside the subject's eye, and moved up and down until the circle or semi-circle closest in size to the pupil is located.

The pupil size estimations are recorded as the numeric value that corresponds to the diameter of the circle or semi-circle closest in size to the subject's pupil in each lighting condition.

## *Participants' Initial Practice of Pupil Size Estimation*

Session 4 - Eye Examinations

## Estimating Pupil Size

DRE average range of pupil size in room light is  
2.5 to 5.0 mm



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

8.5 or larger \_\_\_\_\_

8.0 \_\_\_\_\_

7.5 \_\_\_\_\_

7.0 \_\_\_\_\_

6.5 \_\_\_\_\_

6.0 \_\_\_\_\_

5.5 \_\_\_\_\_

5.0 \_\_\_\_\_

4.5 \_\_\_\_\_

4.0 \_\_\_\_\_

3.5 \_\_\_\_\_

3.0 \_\_\_\_\_

2.5 or smaller \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 - Eye Examinations

# Three Testing Conditions for Pupil Size Estimations

The image consists of three vertically stacked photographs of a human eye. The top photograph is labeled 'Room Light' and shows a moderately sized pupil. The middle photograph is labeled 'Near Total Darkness' and shows a very large pupil. The bottom photograph is labeled 'Direct Light' and shows a very small pupil.

Room Light

Near Total Darkness

Direct Light

The logo of the American Academy of Ophthalmology (AAO) is located in the bottom left corner. It features a circular emblem with a stylized eye and the letters 'AAO' in the center, surrounded by a decorative border.

The logo of the National Highway Traffic Safety Administration (NHTSA) is located in the bottom right corner. It features the words 'NHTSA' in a bold, sans-serif font, with a stylized star and stripes graphic above it.

Preliminary Training for Drug Evaluation and Classification Program

4-25

## Session 4 – Eye Examinations

# These Three Testing Conditions Create Different Demands on the Autonomic Nervous System, Including the Pupil

We **ALSO** know that .... There are three conditions for other physiological indicators

The diagram consists of three square panels arranged horizontally, connected by blue arrows pointing from left to right. The first panel shows a man in a suit standing upright. The second panel shows the same man lying face down on a table. The third panel shows the man running towards the viewer. This visualizes the three physiological conditions mentioned in the text.

## *Three Lighting Conditions*

We estimate pupil size under three (3) different lighting conditions:

- Room Light
  - Near Total Darkness
  - Direct Light
  - Different testing conditions create different demands on the autonomic nervous system, including the pupil.
  - Examining the pupils in three different lighting conditions is similar to examining other clinical indicators, i.e., pulse or blood pressure in different conditions.

In the DEC program and DRE training we use the terms “Normal”, “Average”, “Average Ranges” or “DRE Average Range”.

“Normal” means a range of values which represents the “middle” or “typical” value that the majority of non-impaired people would be expected to exhibit or have in a specific test.

## Estimation of Pupil Size

- Pupils are examined in Room Light prior to darkening the room
- The final two pupil size estimations are made with the use of a penlight in a near totally darkened room
- Prior to estimating the pupil sizes, we darken the room and wait approximately 90 seconds to allow both the subject's eyes and our own to adapt to the dark



### *Estimation of Pupil Size under Room Light*

- Pupils are examined in Room Light prior to darkening the room.

### *Estimation of Pupil Size under Near Total Darkness and Direct Light*

The final two pupil size estimations are made with the use of a penlight in a near totally darkened room.

- Prior to estimating the pupil sizes, we darken the room and wait approximately 90 seconds to allow both the subject's eyes and our own to adapt to the dark.
- For the estimation under near total darkness, completely cover the tip of the penlight with your finger or thumb, so that only a reddish glow and no white light emerges.
- Bring the glowing red tip up toward the subject's left eye until you can distinguish the pupil from the colored portion of the eye (iris).
- Position the pupillometer alongside the pupil (left eye first) and locate the circle or semi-circle that is closest in size to the pupil.
- Repeat the procedure for the subject's right eye.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## Estimation of Pupil Size Darkroom Demonstrations

- For the estimation under direct light, bring the uncovered light from the side of the subject's face directly into his or her left eye and hold it there for approximately 15 seconds



- For the estimation under direct light, bring the uncovered light from the side of the subject's face directly into his or her left eye and hold it there for approximately 15 seconds.
- Bring the pupillometer up alongside the left eye, and find the circle or semi-circle that is closest in size to the pupil.
- Repeat the procedure for the right eye.

### Average Sizes for the Pupil

Since we estimate pupil size under three different lighting conditions (Room Light, Near Total Darkness, and Direct Light) the range of pupil sizes will vary.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 - Eye Examinations

## Recent Research for DRE Average Values

**Mean or Average:**

- The average value of a given set of findings

**Average Range: (1.5 Standard Deviation)**

- The range of data in which 88% or greater of the findings are included



Preliminary Training for Drug Evaluation and Classification Program

4-29

Session 4 - Eye Examinations

## Updated Values – Where did they come from specifically related to DRE?



An evaluation of pupil size standards used by police officers for detecting drug impairment

Rich E. Richman, O.D., Kathleen Cullen McAndrew, M.S.N., ARNP,<sup>a</sup> Donald Decker,<sup>b</sup> and Stephen C. Mullaney, B.S., M.S.<sup>c</sup>

<sup>a</sup>The New England College of Optometry, Boston, Massachusetts; <sup>b</sup>Bureau of Justice Statistics, Washington, D.C.; <sup>c</sup>Massachusetts State Police, Boston, Massachusetts



Preliminary Training for Drug Evaluation and Classification Program

4-30

### Basic Concepts Relative to Interpreting Pupil Sizes

It is important to understand a few basic concepts relative to interpreting pupil sizes. Understanding these concepts will allow DRE's to better understand the relationship of pupil size to impairment.

Mean values and average ranges: scientifically validated studies were conducted to determine normative values for pupil size in non-impaired persons. These studies show what one would expect a person to exhibit when their pupil sizes are checked under different lighting conditions. Sometimes average means "in the middle" or sum of all numbers divided by the number in a particular group. What we use for interpretation purposes are "average ranges" of pupil sizes.

- As a DRE, you will be making your decision of impairment based on clinical, psychophysical, and behavioral indicators. This includes using pupil sizes as one of the factors in determining that impairment.
- With many people, even under very bright light, the pupils won't constrict much below a diameter of 2.0 mm, and even under near total dark conditions, the pupils usually only dilate to a diameter of not more than 8.5 mm.
- Studies have indicated there are significant differences between the average pupil size in these three conditions. (*Source: See next page*)
- Consequently, the use of three distinct pupil sizes range for each of the different testing conditions may be more useful to determine impairment versus non-impairment.

*Source: "An Evaluation of Pupil Size Standards Used By Police Officers for Detecting Drug Impairment" Journal of American Optometric Association (JAOA), March 2004, Richman, McAndrew, Decker & Mullaney.*

---



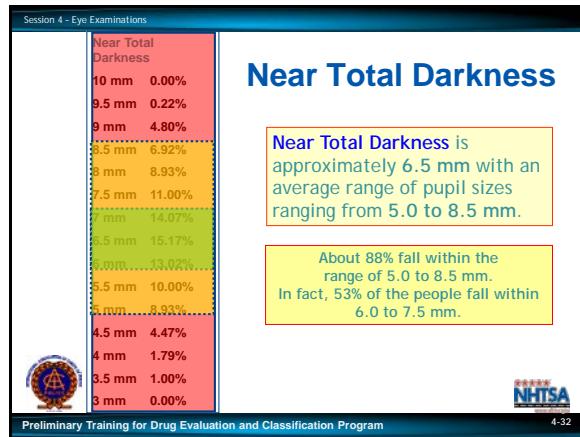
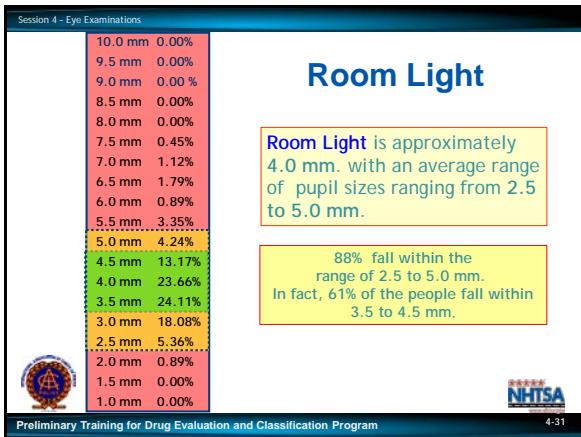
---



---



---

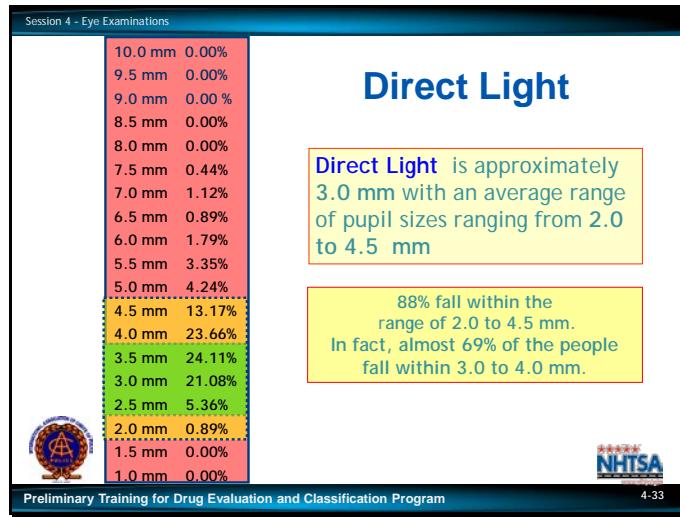


- Room Light is approximately 4.0 mm with an average range of sizes of 2.5 to 5.0 mm. 88% fall within the range of 2.5 to 5.0 mm.  
In fact, 61% of the people fall within 3.5 to 4.5 mm.

- Near Total Darkness is approximately 6.5 mm with an average range of pupil sizes of 5.0 to 8.5 mm.

About 88% fall within the range of 5.0 to 8.5 mm.

In fact, 53% of the people fall within 6.0 to 7.5 mm.



- Direct Light is approximately 3.0 mm with an average range of pupil sizes of 2.0 to 4.5 mm

88% fall within the range of 2.0 to 4.5 mm.

In fact, almost 69% of the people fall within 3.0 to 4.0 mm.

Many drugs, however, will affect the dilation or constriction of the pupils and many cause the pupil size to go outside these ranges.

Session 4 - Eye Examinations

## Reaction to Light

**Assessment of how quickly the pupil constricts to its smallest size during the check of pupil size under direct light**



Preliminary Training for Drug Evaluation and Classification Program

4-34

### *Reaction to Light*

Assessment of how quickly the pupil constricts to its smallest size during the check of pupil size under direct light when the uncovered light is brought from the side of the subject's face and the light beam is moved directly into the subject's eye.

- As you bring the beam of light directly into the subject's eye, note how the pupil reacts.
- Under ordinary conditions, the pupil should react very quickly, and constrict noticeably when the light beam strikes the eye.
- Under the influence of certain categories of drugs, the pupil's reaction may be slow, or there may be no visible reaction at all.

For DRE purposes, we consider the pupil's reaction to be slow if it takes more than one second to reach its smallest size.

- Hold the direct light on the subject's eye for approximately 15 seconds to assess pupil reaction.
- Caution should be used by the officer so as not to move the light beam or allow the bulb to change in light intensity.
- When you have completed this process for the left eye, repeat it for the right eye.

*Participants' initial practice in assessing the pupil's reaction to light.*

---

---

---

---

---

---

---

---

## Pupil Reaction Time

- Reaction to light takes place during direct light
- Observe as the penlight is aimed directly at the eye
- Note how the pupil reacts



The check of the pupil's reaction to light takes place at the same time as the test of pupil size under direct light.

- Observe the subject's pupil size as the penlight is aimed directly at the subject's eye.
- As you bring the beam of light directly into the subject's eye, note how the pupil reacts.
- Under ordinary conditions, the pupil should react very quickly, and constrict noticeably when the light beam strikes the eye.
- For DRE purposes, we consider the pupil's reaction to be slow if it takes more than one second to reach its smallest size.
- Under the influence of certain categories of drugs, the pupil's reaction may be very sluggish, or there may be no visible constriction at all.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 - Eye Examinations

# Pupil Reaction Time

## Participant Practice



Preliminary Training for Drug Evaluation and Classification Program

4-36

---

### *Participant Practice*

Participants' initial practice in measuring the pupil's reaction to light.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 4 – Eye Examinations

# Equal Tracking

# Equal Pupil Size

# HGN

## Participant Practice

The logo of the National Highway Traffic Safety Administration (NHTSA) is located in the bottom left corner. It features a circular emblem with a steering wheel and a road, surrounded by the words "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

Preliminary Training for Drug Evaluation and Classification Program

The NHTSA logo is located in the bottom right corner, identical to the one in the top left.

4-37

## C. Demonstrations

## *Estimation of the Angle of Onset*

Session 4 – Eye Examinations

# VGN and LOC

## Participant Practice

The logo of the National Highway Traffic Safety Administration (NHTSA) is located in the bottom left corner. It features a circular emblem with a steering wheel in the center, surrounded by the words "NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION" and "U.S. DEPARTMENT OF TRANSPORTATION".

Preliminary Training for Drug Evaluation and Classification Program

The NHTSA logo is located in the bottom right corner, featuring the letters "NHTSA" in a bold, blue, sans-serif font with a small American flag graphic above it.

4-38

## *Demonstration of Vertical Gaze Nystagmus and Lack of Convergence*

Session 4 - Eye Examinations

# Pupil Size; Reaction to Light

## Participant Practice



Preliminary Training for Drug Evaluation and Classification Program

4-39

---

### *Demonstration of Pupil Size Estimation and Test for Reaction to Light*

- Pupil size estimation under room light.
- Darkroom estimations of pupil size.

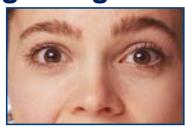
The checks of pupil size, equal tracking and reaction to light provide useful indicators of the possible presence of many drug categories.

- CNS Depressants, CNS Stimulants and Inhalants will usually cause the pupils to react slowly to light.
  - CNS Stimulants, Hallucinogens and Cannabis usually will cause the pupils to dilate.
  - Narcotic Analgesics will usually cause the pupils to constrict, with little or no visible reaction to light.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 4 - Eye Examinations

## Pupil Size Ranges Recap

- Room Light: 4.0 mm  
with average range of 2.5 – 5.0 mm
- Near Total Darkness: 6.5 mm  
with average range of 5.0 – 8.5 mm
- Direct Light: 3.0 mm  
with average range of 2.0 – 4.5 mm



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

4:40

---

To review, the DRE pupil size ranges for the majority of non-impaired people generally are:

- Room Light: 4.0 mm with an average range of 2.5 – 5.0 mm.
  - Near Total Darkness: 6.5 mm with an average range of 5.0 – 8.5 mm.
  - Direct Light: 3.0 mm with an average range of 2.0 – 4.5 mm.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

**Relationship of Drug Categories to the Eye Examinations**

	CNS Depressants	CNS Stimulants	Hallucinogens	Dissociative Anesthetics	Narcotic Analgesics	Inhalants	Cannabis
HGN	Present	None	None	Present	None	Present	None
VGN	Present	None	None	Present	None	Present	None
Lack of Convergence	Present	None	None	Present	None	Present	Present
Pupil Size	Normal (1)	Dilated	Dilated	Normal	Constricted	Normal (4)	Dilated (6)
Reaction to Light	Slow	Slow	Normal (3)	Normal	Little or None Visible	Slow	Normal

FOOTNOTE: These indicators are those most consistent with the category. Keep in mind that there may be variations due to individual reaction, dose taken and drug interactions.

(1) Soma, Quaaludes and possibly some anti-depressants usually dilate pupils.  
 (3) Certain psychedelic amphetamines may cause slowing.  
 (4) Normal, but may be dilated.  
 (5) Pupil size possibly normal.  


Preliminary Training for Drug Evaluation and Classification Program      4-41

#### **D. Relationship of Drug Categories to the Eye Examinations**

***Optional: Draw the matrix at the end of this session on the dry erase board or flip-chart at the outset of this segment.***

Three of the seven drug categories normally will cause Horizontal Gaze Nystagmus.

- CNS Depressants, Inhalants and Dissociative Anesthetics normally will cause HGN.
- The other four categories normally will not cause HGN.
- Any drug that will cause HGN also will cause Vertical Gaze Nystagmus, if a high enough dose of the drug is taken.
- Depressants, Inhalants and Dissociative Anesthetics can all cause Vertical Gaze Nystagmus at higher doses for that individual.
- But if a drug will not cause HGN, then it will not cause Vertical Gaze Nystagmus.

All drugs that cause nystagmus also will cause the eyes to be unable to converge.

- Therefore, Depressants, Inhalants and Dissociative Anesthetics, including PCP and its analogs, usually will cause Lack of Convergence.
- Interestingly, there is one category of drug that does not cause nystagmus but that does usually cause Lack of Convergence.
- Cannabis usually does cause Lack of Convergence, even though it does not cause nystagmus.

- The other three categories do not cause a Lack of Convergence.
- 
- 
- 
- 

An interesting and important fact is that the drugs that cause nystagmus usually don't affect pupil size, and the drugs that don't cause nystagmus usually do affect pupil size.

- CNS Stimulants and Hallucinogens usually cause the pupils to become larger or "dilated."
  - Cannabis may cause the pupils to dilate.
  - Narcotic Analgesics usually cause the pupils to become smaller or "constricted."
  - Dissociative Anesthetics and most Inhalants tend to leave pupil size in the average ranges.
- 
- 
- 
- 

CNS Depressants also usually leave the pupils near the average range.

- However, there are some exceptions, i.e., depressant drugs that usually dilate the pupils.
- 
- 
- 
- 

Soma, Quaaludes and some anti-depressants usually dilate pupils.

---

---

---

---

---

---

---

---

Generally, the pupillary reaction to light is either slowed by the effect of the drug or the pupil reacts normally. The most significant exception is the effect caused by Narcotic Analgesics. Though there is always some reaction to light, in subjects, the constricted pupil caused by narcotics makes it difficult to perceive a change in the pupil size.

- CNS Depressants and CNS Stimulants usually cause a slowed reaction to light.
  - With Hallucinogens, Dissociative Anesthetics and Cannabis the pupillary reaction to light is usually normal.

Inhalants will usually slow pupillary reaction.

Session 4 - Eye Examinations

Session 4 - Eye Examinations

## QUESTIONS?



## Review Questions



Preliminary Training for Drug Evaluation and Classification Program

4-42

Preliminary Training for Drug Evaluation and Classification Program

1-43

---

The checks of horizontal gaze nystagmus, lack of convergence, pupil size, and reaction to light provide useful indicators of the possible presence of many drug categories.

---

### **REVIEW QUESTIONS**

1. Name the three clues of impairment associated with Horizontal Gaze Nystagmus.

---

---

---

2. Complete this formula: BAC = 50 - ????

---

---

3. Which categories of drugs will not cause Vertical Gaze Nystagmus?

---

---

4. Which categories of drugs usually will cause Lack of Convergence?

---

---

5. Name the three lighting conditions under which a DRE makes pupil size estimations.

---

---

6. What is the average range of pupil size for room light?

---

---

7. Which categories of drugs will usually slow down the reaction of the pupils to light?

---

---

---

## **Understanding the Terms “Normal” vs. “Average” in the DRE Opinion and Decision Making Process**

*Dr. Jack E. Rickman, O.D., New England College of Optometry (Retired), Don Decker, Massachusetts DRE State Coordinator, Charles Hayes, International Association of Chiefs of Police – DRE Regional Operations Coordinator.*

The Drug Evaluation and Classification (DEC) training program and the Drug Recognition Expert (DRE) examination process utilizes a standardized and systematic process assessing a variety of physical indicators to identify drug-impaired drivers. (“Drug Evaluation and Classification Program 7-Day School Training manual, 2013”). These indicators are also referred to as signs and symptoms and are based on accepted information within the medical and health care community (“Drug Effects on Psychomotor Performance” Randall C Baselt, Ph.D., Biomedical Publications).

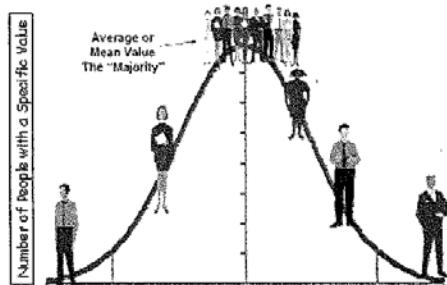
During a DRE drug influence evaluation the DRE uses controlled and standardized methods to assess a person’s pulse, blood pressure, body temperature, pupil size, reaction to light and psychomotor functions. The DRE also evaluates the suspect’s visual tracking, smooth pursuit and Horizontal and Vertical Gaze Nystagmus (HGN and VGN).

A DRE is trained to reach a conclusion (opinion) of the person’s condition based on the interpretation of all these signs and indicators as well as the facts of the situation in its entirety. An opinion is not based simply on one or two elements of the evaluation, but on the totality of the information gained during the investigation.

Many of the DRE evaluation results involve the concept of “normal” or average values or average ranges therefore it is important that the DRE understand the concept of physical indicators of impairment and how they relate to their opinion making process.

Average values or ranges are based on the values for the majority of healthy non-impaired people. Average within the DRE process is the number that represents the value that the majority of non-impaired people would exhibit or have in a specific test. (Refer to graph below)

**Average is the value that the “Majority” of MOST Non Impaired PEOPLE exhibit.**



For example, the “average” or “mean value” for pupil size in near total darkness is 6.5 mm. This means that when all the sizes were measured in a large number of pupils in healthy non-impaired adults, the majority of the people had a pupil size approximately 6.5 mm. (“An Evaluation of the Pupil Size Standards Used By Police Officers for Detecting Drug Impairment” by Richman, McAndrew, Decker, and Mullaney, *Optometry, March 2004*)

In scientific and clinical information, the terms “mean”, “average” or “average range” are commonly used. Average range typically means a range of values or results that are “close to” average, but can be plus (above) or minus (below) from the “average” value for the majority of healthy non-impaired people.

Average then is a quantity that represents the middle or typical value that the majority of healthy non-impaired people would exhibit in a specific test, i.e., pupil size, pulse rate, body temperatures. The average or mean value is the total of a group of numbers divided by the total number of values in the group typically using a standard deviation. For example, a group of non-impaired males and females would be given a specific test, e.g., pupil size estimation in near total darkness, and the results were determined for the averages in order to create the reference range for that group. Though the average pupil size was approximately 6.5 mm, the average range for the majority of non-impaired subjects was 5 mm to 8.5 mm. (Richman, et al).

In the DEC Program, the use of the terms “normal”, “average”, “average ranges” or “DRE average range” are often used interchangeably. There are situations where a DRE uses the term “normal” when referring to a non-impaired result for a particular function or test. But since the DRE does not know what “normal” is for the individual being tested, a better and more accurate descriptor would be with the “DRE average ranges” which relate to values for healthy non-impaired persons for that particular function of test. If a DRE deems that a result is “normal” or within the “normal ranges” it does not mean the person is normal from a medical standpoint. A DRE does not make a medical diagnosis which is beyond the scope and purpose of the DRE evaluation.

### **Summary:**

From the DRE perspective the closer the test finding is to the average value for the majority of non-impaired people, the more likely the person is not exhibiting impairment in that particular function or test.

The further from the test finding to the average value for the majority of non-impaired people and the edge of the “average range for the majority of non-impaired people”, the more likely the person is exhibiting impairment in the particular function or test.

The further the finding outside the average range for the majority of non-impaired people the greater the likelihood that the person is exhibiting impairment in the particular function or test.

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 5 - Alcohol Workshop

120 Minutes

**Session 5**

**Alcohol Workshop**



 **NHTSA**

Preliminary Training for Drug Evaluation and Classification Program

[This page is intentionally left blank]

Session 5 - Alcohol Workshop

## Learning Objectives

- Administer the psychophysical tests and the eye examinations to persons who have consumed varying amounts of alcohol
- Document the results of these tests and examinations
- Accurately assess the extent of a person's alcohol impairment based on the tests and examinations

Preliminary Training for Drug Evaluation and Classification Program 5-2

---

Upon successfully completing this session the participant will be able to:

- Administer the psychophysical tests and the eye examinations to persons who have consumed varying amounts of alcohol.
- Document the results of these tests and examinations.
- Accurately assess the extent of a person's alcohol impairment based on the tests and examinations.

CONTENT SEGMENTS..... LEARNING ACTIVITIES

- A. Assignments and Procedures..... Hands-on Practice
- B. Testing..... Participant-Led Presentations
- C. Feedback and Discussion
- D. Alcohol Workshop Checklist
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Team Assignments

- One member will be an examiner and will complete all portions of the exam
- One member will be the recorder and document the findings of the examination on the evaluation form
- All others in the group will observe/coach
- Each team member will conduct at least one complete examination



---

### **A. Assignments and Procedures**

#### *Team Assignments*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 5 - Alcohol Workshop

## Testing Procedures

- Horizontal Gaze Nystagmus  
(record onset angle in each eye)
- Vertical Gaze Nystagmus
- Lack of Convergence
- Modified Romberg Balance
- Walk and Turn
- One Leg Stand (on left foot)
- One Leg Stand (on right foot)
- Finger to Nose



Preliminary Training for Drug Evaluation and Classification Program

5-4

---

### *Explanation of Testing Procedures*

Each team will conduct the following sequence of tests and examinations on each volunteer:

- HGN (record angle of onset in each eye).
- Vertical Gaze Nystagmus.
- Lack of Convergence.
- Modified Romberg Balance.
- Walk and Turn.
- One Leg Stand (standing on left leg).
- One Leg Stand (standing on right leg).
- Finger to Nose

Upon completing the test and examinations, the team members will record their best estimate as to the volunteer's BAC.

---

---

---

---

---

---

---

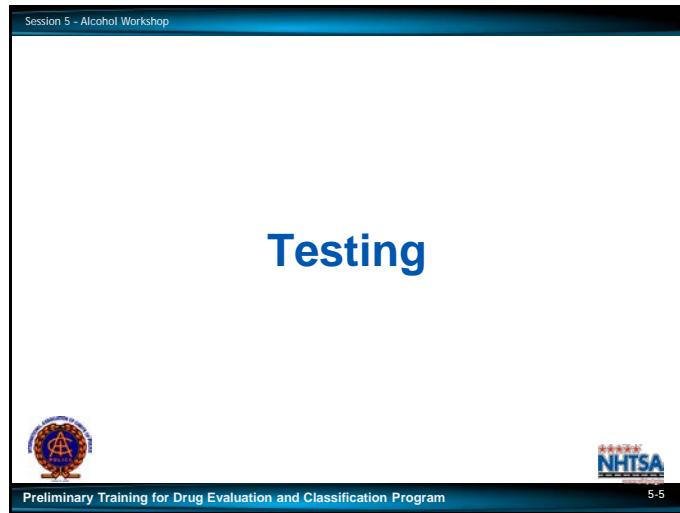
---

---

---

---

---



## **B. Testing**

---

---

---

### **C. Feedback and Discussion**

---

---

---

#### **D. Alcohol Workshop SFST Proficiency Checklist**

---

---

---

---

---

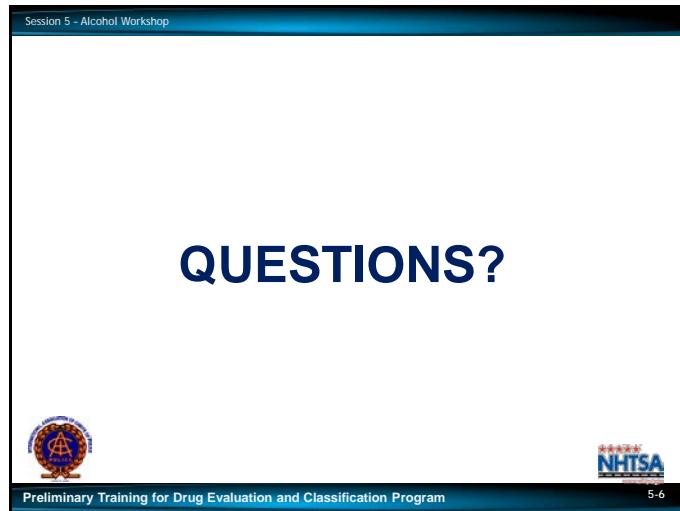
---

---

---

---

---



[This page is intentionally left blank]

# Participant Guide

# Drug Evaluation and Classification (Preliminary School)

Session 6 - Examinations of Vital Signs

180 Minutes

**Session 6**

**Examinations of Vital Signs**



Preliminary Training for Drug Evaluation and Classification Program

[This page is intentionally left blank]

Session 6 – Examinations of Vital Signs

## Learning Objectives

- List the vital signs that are utilized in the DRE drug influence evaluation
- Define basic terms relevant to pulse rate and blood pressure measurements

Preliminary Training for Drug Evaluation and Classification Program 6-2

Session 6 – Examinations of Vital Signs

## Learning Objectives (cont.)

- Measure pulse rate
- Measure blood pressure
- Relate the results of vital sign examinations to the various categories of drugs

Preliminary Training for Drug Evaluation and Classification Program 6-3

Upon successfully completing this session the participant will be able to:

- List the vital signs that are utilized in the DRE drug influence evaluation.
- Define basic terms relevant to pulse rate and blood pressure measurements.
- Measure pulse rate.
- Measure blood pressure.
- Relate the results of vital sign examinations to the various categories of drugs.

CONTENT SEGMENTS..... LEARNING ACTIVITIES

- A. Purposes of the Examinations ..... Instructor-Led Presentations
- B. Procedures and Cues ..... Participant-Led Demonstrations
- C. Demonstrations ..... Hands-on Practice
- D. DRE Ranges of Vital Signs
- E. Relationship of Drug Categories to the Vital Signs Examinations
- F. Practice

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 - Examinations of Vital Signs

## Vital Signs

- Pulse rate
- Blood pressure
- Temperature

Different types of drugs affect these vital signs in different ways

Preliminary Training for Drug Evaluation and Classification Program

6-3

### **A. Purposes of the Examinations**

The vital signs that are relevant to the drug influence evaluation process include:

- Pulse rate
- Blood pressure
- Temperature

Different types of drugs affect these vital signs in different ways.

Certain drugs tend to “speed up” the body and elevate these vital signs.

Clarification:

- Pulse may quicken
- Blood pressure may rise
- Temperature may rise

Other drugs tend to “slow down” the body and lower these vital signs.

Clarification:

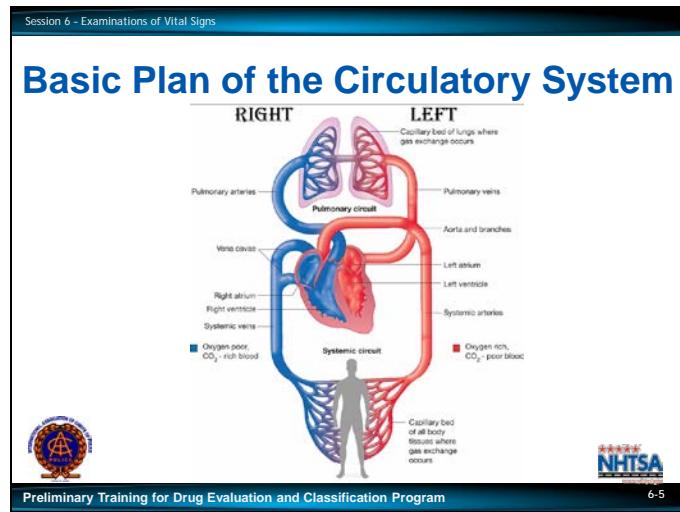
- Pulse may slow
- Blood pressure may drop
- Temperature may fall

Systematic examination of the vital signs gives us much useful information concerning the possible presence or absence of various categories of drugs.

---

---

---



## A Simple View of the Heart and Circulatory System

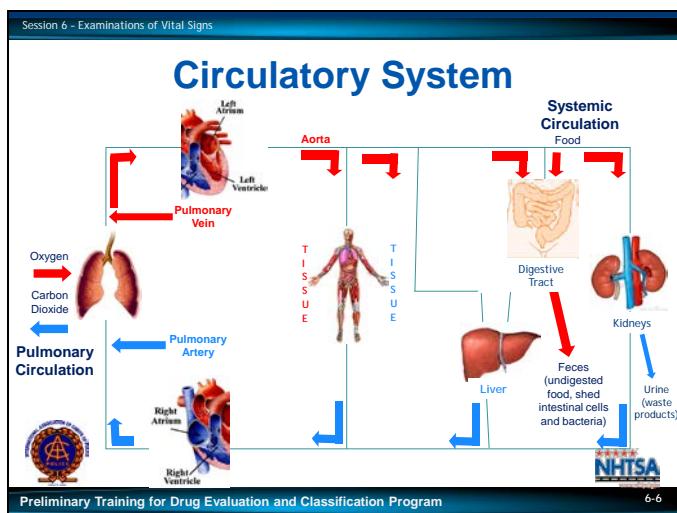
**Before we look at the vital signs, we need to look at the circulatory system and how it works.**

## *Heart and Circulatory System*

Circulation is a closed system, where blood is propelled by contractions of the heart.

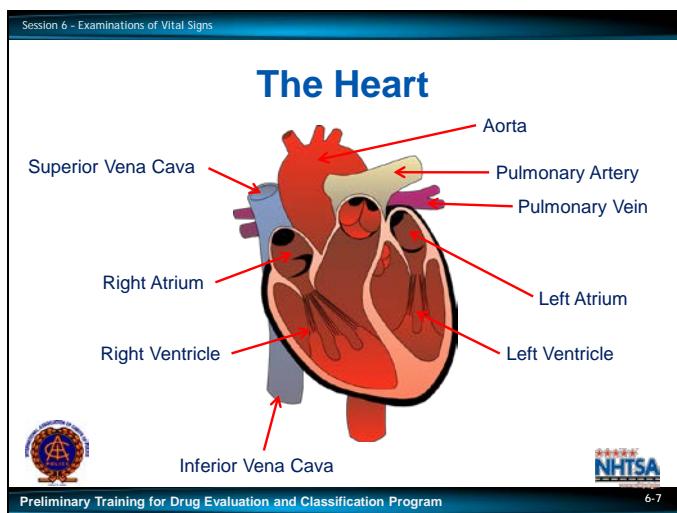
Blood is driven into arteries, arteries divide into smaller and smaller branches and finally into meshwork of fine capillaries which pervade body tissues.

Meshwork joins up again to form small veins which become larger trunks as they travel centrally towards the heart.



There are two separate circulation systems:

- Systemic system involves the whole body and is driven by the left side of the heart.
  - Pulmonary system deals with the passage of blood through the lungs and is driven by the right side of the heart.



The heart is the pump and has two sides:

Consists of the left atrium and ventricle. The upper chamber (atrium) receives blood from the great veins, the lower chamber discharges blood into the great arteries.

Left side pumps blood through the aorta and the arteries to the tissues.

Blood, after passing through the tissues, returns via the veins to the right side.

Right side pumps blood through the pulmonary artery to the lungs and returns it to the left side of the heart again via the four pulmonary veins.

Consists of the right atrium and ventricle.

**NOTE: The pulmonary artery is the only artery that carries de-oxygenated blood; all other arteries carry blood that has received fresh oxygen from the lungs. Likewise, the pulmonary vein is the only vein that carries blood rich in oxygen; all other veins carry blood depleted of oxygen back to the heart.**

The normal heart continues to beat regularly and continuously, with a rest interval never longer than a fraction of a second.

Pulse rate is the number of pulsations per minute.

**For DRE purposes, the average range for the pulse rate is 60-90 pulsation beats per minute.**

---



---



---



---



---



---



---



---



---



---



---



---



---

## Blood Pressure



- Blood pressure (BP) is the force of the blood circulating in the arteries
- BP is categorized as systolic or diastolic BP

- Systolic pressure is the maximum force that occurs during contraction
- Diastolic pressure represents the minimum force that occurs when the heart relaxes



Blood pressure (BP) is the force of the blood circulating in the arteries.

BP is categorized as systolic or diastolic BP.

Systolic pressure is the maximum force that occurs during contraction.

Diastolic pressure represents the minimum force that occurs when the heart relaxes.

**The DRE average range for systolic blood pressure is 120 to 140. The DRE average range for diastolic blood pressure is 70 to 90.**

### *Control Systems*

The functions of the organs of the body are controlled in two ways:

This is a function of the endocrine system.

One, by sending “chemical messengers” known as hormones via the blood stream from an endocrine gland where they are produced.

Second, system of control is by means of the nervous system.

---

---

---

---

---

---

---

---

---

---

---

---

---

## Definitions Concerning “Pulse”

- **Pulse**  
The expansion and contraction of an artery generated by the pumping action of the heart
- **Pulse Rate**  
The number of pulsations in an artery per minute
- **Artery**  
A strong, elastic blood vessel that carries blood from the heart to the body tissues
- **Vein**  
A blood vessel that carries blood back to the heart from the body tissues



## B. Procedures and Cues

### *Measurement of Pulse Rate*

- Pulse is the expansion and contraction of the walls of an artery generated by the pumping action of the blood.
- Pulse rate is the number of pulsations in an artery per minute.
- An artery is a strong, elastic blood vessel that carries blood away from the heart.
- A vein is a blood vessel that carries blood back to the heart from the body tissues.
- When the heart contracts, it squeezes blood out of its chambers into the arteries.
- The surging blood causes the arteries to expand.

By placing your fingers on the skin next to an artery and pressing down, you can feel the artery expand as the blood surges through.

By keeping your fingers on the artery and counting the number of pulses that occur in one minute, you will measure the pulse rate.

Pulse is easy to measure, once you locate an artery close to the surface of the skin.

---

---

---

---

---

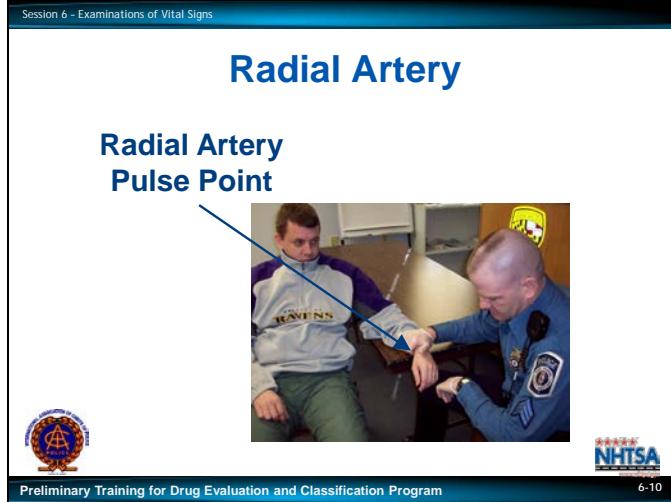
---

---

---

---

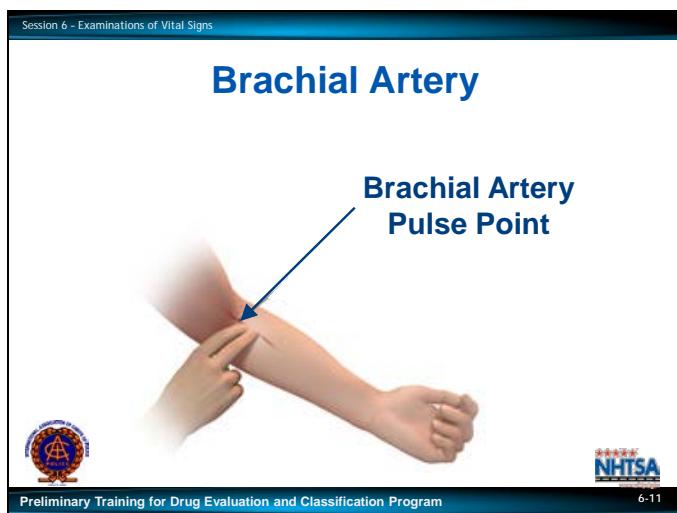
---



### *Radial Artery*

One convenient pulse point involves the radial artery.

- The radial artery can be located in or near the natural crease of the wrist, on the side of the wrist next to the thumb.
  - Place the tips of your right hand's index finger and middle finger into the crease of your left wrist, and exert a slight pressure.
  - Allow your left hand to curl downward or have the subject hold his or her hand in a position that will best permit the DRE to measure the radial pulse point.
  - You should be able to feel the pulse in your radial artery.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

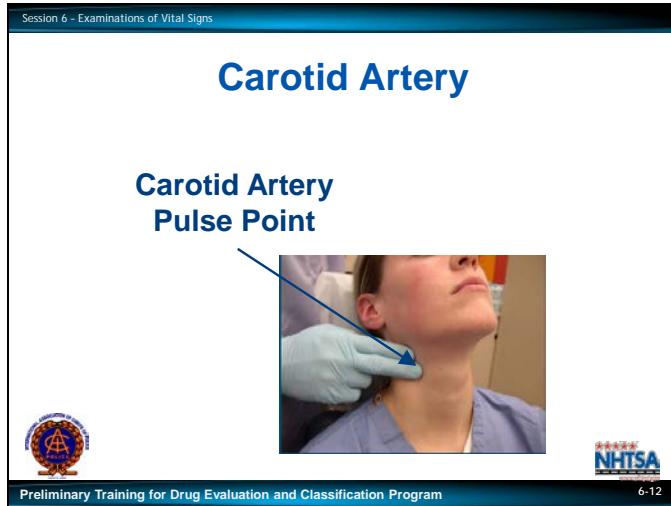


---

### Brachial Artery

Another pulse point involves the brachial artery.

- *The brachial artery can be located in the crook of the arm, halfway between the center of the arm and the side of the arm closest to the body.*
  - *Hold your left hand out, with the palm up, and point to the brachial artery.*
  - *Place the tips of your right hand's index and middle fingers into the crook of your left arm, close to the body, and exert a slight pressure.*
  - *You should be able to feel the pulse in your brachial artery.*
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



---

### Carotid Artery

Another pulse point involves the carotid artery.

- The carotid artery can be located in the neck, on either side of the middle of the throat ("Adam's Apple").
  - You should be able to feel the pulse in your carotid artery.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 6 – Examinations of Vital Signs

## Basic Do's and Don'ts of Measuring Pulse

- **Don't use your thumb to apply pressure**
- **If you use the carotid artery pulse point, don't apply pressure to both sides of the middle of the throat**
- **When measuring the pulse rate, use 30 seconds as the standard time interval**
- **Pulse rate is always expressed as “beats per minute”**

Preliminary Training for Drug Evaluation and Classification Program

6-13

### *Basic Do's and Don'ts of Measuring Pulse*

- *Don't use your thumb to apply pressure while measuring a subject's pulse.*
  - *If you use the carotid artery pulse point, don't apply pressure to both sides of the middle of the throat: this can cut off the supply of blood to the brain.*
  - *When measuring the pulse rate, use 30 seconds as the standard time interval.*
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Pulse Hands On Practice

- Work in pairs, taking turns measuring each other's pulse
- Record partner's pulse rate



---

### Participants' Initial Practice at Measuring Pulse Rate

50 or less \_\_\_\_\_      76-78 \_\_\_\_\_

52-54 \_\_\_\_\_      80-82 \_\_\_\_\_

56-58 \_\_\_\_\_      84-86 \_\_\_\_\_

60-62 \_\_\_\_\_      88-90 \_\_\_\_\_

64-66 \_\_\_\_\_      92-94 \_\_\_\_\_

68-70 \_\_\_\_\_      96-98 \_\_\_\_\_

72-74 \_\_\_\_\_      100+ \_\_\_\_\_

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 - Examinations of Vital Signs

## Definitions Concerning “Blood Pressure”

- **Blood Pressure**  
The force that the circulating blood exerts on the walls of the arteries
- **Systolic Pressure**  
The maximum blood pressure, reached as the heart contracts
- **Diastolic Pressure**  
The minimum pressure, reached when the heart is fully expanded

Preliminary Training for Drug Evaluation and Classification Program

6-10

---

### *Measurement of Blood Pressure*

Blood pressure is the force that the circulating blood exerts on the walls of the arteries.

- Blood pressure changes constantly as the heart cycles between contraction and expansion.
- Blood pressure reaches its maximum as the heart contracts and sends the blood surging through the arteries. This is called the systolic pressure.
- Blood pressure reaches its minimum when the heart is fully expanded. This is called the diastolic pressure.
- It is always necessary to measure and record both the systolic and diastolic blood pressure.

#### Memory aid:

Systolic: “S” for “Superior”

Diastolic: “D” for “Down”

---

---

---

---

---

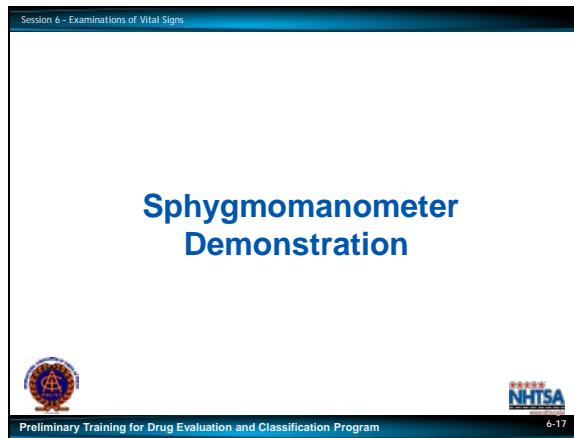
---

---

---

---

---



The device used for measuring blood pressure is called a sphygmomanometer.

The sphygmomanometer has a special cuff that can be wrapped around the subject's arm and inflated with air pressure.

- As the pressure in the cuff increases, the cuff squeezes tightly on the arm.
- When the pressure gets high enough, it will squeeze the artery completely shut.
- Blood will cease flowing through the brachial artery. Since the brachial artery "feeds" the radial artery, blood will also cease flowing through the radial artery.

If we slowly release the air in the cuff, the pressure on the arm and on the artery will start to drop.

- Eventually, the pressure will drop enough so that blood will once again start to flow through the artery.
- Blood will start flowing in the artery once the pressure inside the artery equals the pressure outside the artery.
- The two pressures will become equal when the air pressure in the cuff drops down to the systolic pressure.
- Point out that the blood would spurt through the artery each time the heart contracted, but would cease flowing when the heart expanded.
- When that happens, blood will spurt through the artery each time the heart contracts.
- Once the air pressure in the cuff drops down to the diastolic level, the blood will flow continuously through the artery.

## Overview of Procedures for Measuring Blood Pressure

- Apply enough air pressure to cut off the flow of blood through the artery
- Slowly release the air, about 2 mmHg per second, until the blood just begins to spurt through the artery: THAT WILL BE THE **SYSTOLIC PRESSURE**
- Continue to release the air until the blood flows continuously: THAT WILL BE THE **DIASTOLIC PRESSURE**



NHTSA

### *Overview of Procedures for Measuring Blood Pressure*

- Apply enough air pressure to the cuff to cut off the flow of blood through the artery (approximately 180 mmHg).
- Slowly release the air pressure until the blood just begins to spurt through the artery: that level will be the systolic pressure.
- Slowly release the pressure in the cuff.
- Emphasize that the pressure should drop at approximately 2 mmHg per second (5 sec for each 10 mm drop).
- Continue to release the air pressure until the blood flows continuously through the artery: that level will be the diastolic pressure.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 – Examinations of Vital Signs

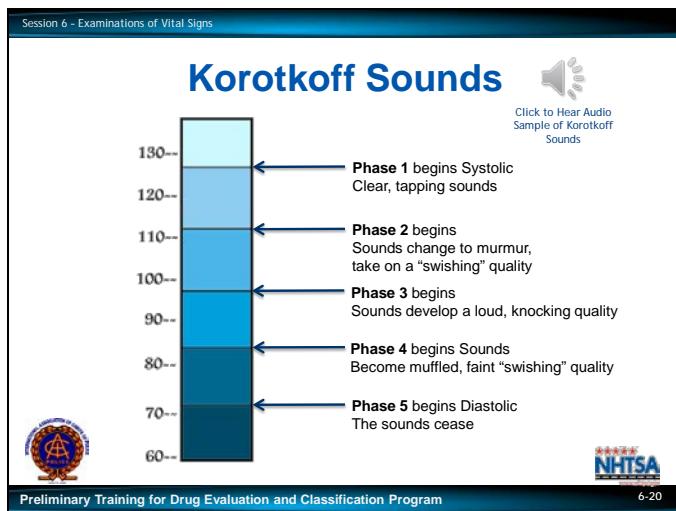
## Overview of Procedures for Measuring Blood Pressure



Preliminary Training for Drug Evaluation and Classification Program

6-19

- Apply the stethoscope to the skin directly above the artery.
  - Apply pressure to the cuff, enough to cut off the flow of blood.
  - Inflate the cuff on the participant-volunteer's arm.
  - When no blood is flowing through the artery, we hear nothing through the stethoscope.
  - Slowly release the air from the cuff, letting the pressure start to drop.
  - Release the air in the cuff.
  - When we drop to the systolic pressure, we start to hear a spouting sound.
  - As we continue to allow the air pressure to drop, the surges of blood become steadily longer.
  - When we drop to the diastolic pressure, the blood slows steadily and all sounds cease.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-



## *Korotkoff Sounds*

The sounds that we listen to are called Korotkoff Sounds. Named after Dr. Nikolai Korotkoff, a Russian physician who introduced the method of determining blood pressure in 1905.

Phase 1: the first appearance of clear, tapping sounds that gradually increase in intensity.

**The beginning of Phase 1 corresponds to the systolic pressure.**

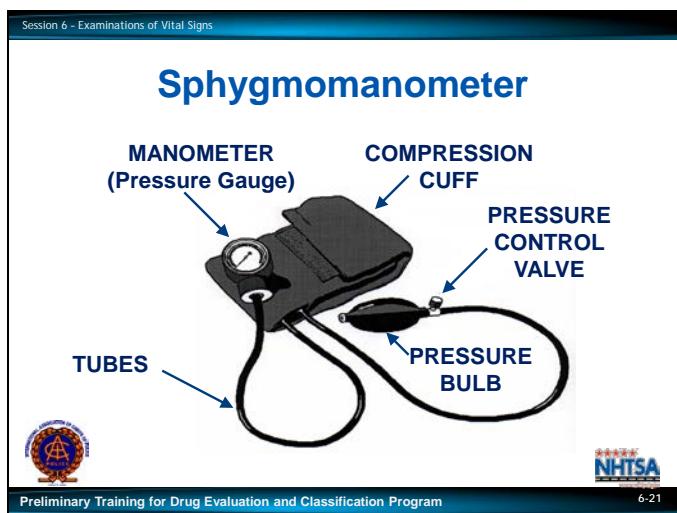
Phase 2: the sounds change to a murmur and take on a swishing quality.

Phase 3: the sounds develop a loud, knocking quality (not quite as clear as Phase 1).

Phase 4: the sounds suddenly become muffled and again have a faint swishing quality.

Phase 5: the sounds cease.

The beginning of Phase 5 corresponds to the diastolic pressure.



---

### Familiarization with the Sphygmomanometer

The compression cuff contains an inflatable rubber bladder.

A tube connects the bladder to the manometer, or pressure gauge.

- Another tube connects the bladder to the pressure bulb, which can be squeezed to inflate the bladder.
  - The pressure control valve permits inflation of the bladder and regulates the rate at which the bladder is deflated.
  - To inflate the bladder, the pressure control valve must be twisted all the way to the right.
  - When the valve is twisted all the way to the right, air can be pumped into the bladder, but no air can escape from the bladder.
  - To deflate the bladder, twist the valve to the left.
  - The more the valve is twisted to the left, the faster the bladder will deflate.
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 6 - Examinations of Vital Signs

## Details of Blood Pressure Measurement

1. Position cuff on bicep so that tubes extend down middle of arm
2. Wrap cuff snugly around bicep
3. Clip manometer to the subject's sleeve or in a location to easily see the gauge
4. Twist pressure control valve all the way to the right

Preliminary Training for Drug Evaluation and Classification Program

6-22

Session 6 - Examinations of Vital Signs

# Details of Blood Pressure Measurement

5. Put stethoscope earpieces in your ears
6. Apply the stethoscope to the brachial artery pulse point
7. Rapidly inflate bladder to a level high enough to squeeze the artery shut  
(Normally 180)

Preliminary Training for Drug Evaluation and Classification Program

6-23

## *Details of Blood Pressure Measurement*

- Wrap the cuff snugly around the bicep.
  - Clip the manometer (pressure gauge) on the subject's sleeve, so that it is readily viewable.
  - Twist the pressure control valve all the way to the right.
  - Put the stethoscope earpieces in your ears.

**Make sure the earpieces are turned forward, i.e., toward the nose.**

- Place the diaphragm or bell of the stethoscope over the brachial artery.
  - Rapidly inflate the bladder to approximately 180mmHg.

Session 6 - Examinations of Vital Signs

### Details of Blood Pressure Measurement

8. Twist the pressure control valve slightly to the left (pressure should drop at 2 mmHg per second)
9. Keep your eyes on the gauge and listen for the Korotkoff sounds



Preliminary Training for Drug Evaluation and Classification Program      6-24

Session 6 - Examinations of Vital Signs

### Blood Pressure Values

- Systolic: 120-140
- Diastolic: 70-90

Some people can have significantly different blood pressures



Preliminary Training for Drug Evaluation and Classification Program      6-25

- 
- Twist the pressure control valve slightly to the left to release the pressure slowly.
  - Keep your eyes on the gauge and listen for the Korotkoff sounds.

**The needle on the pressure gauge generally will “bounce” slightly when blood starts to spurt through the artery.**

*DRE Average Blood Pressure Values*

**Values of blood pressure are:**

Systolic: 120-140

Diastolic: 70-90

**Some people can have significantly different blood pressures: there is a wide variation in human blood pressure.**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 - Examinations of Vital Signs

Session 6 - Examinations of Vital Signs

## *Do's and Don'ts of Blood Pressure Measurement*

If you inflate the bladder and then need to repeat the measurement, wait at least three minutes to allow the subject's artery to return to normal.

Hold the bell of the stethoscope with your fingers; don't slide it under the cuff – that will distort the measurement.

## *Participant's Initial Practice at Measuring Blood Pressure*

## Measuring Body Temperature

- Oral thermometer recommended
- Always use protective disposable mouthpiece
- Position thermometer under the subject's tongue
- Have subject refrain from talking when measuring temperature
- Refrain from letting subject drink hot or cold fluids immediately prior to measuring temperature



NHTSA

### C. Demonstrations

#### *Measurement of Temperature*

- The range for body temperature taken orally is 98.6 degrees + / - 1 degree.
- Temperature is measured orally using a thermometer.

A fresh disposable mouthpiece should be used each time.

- Ensure that the subject does not take any hot or cold liquids by mouth prior to taking the temperature.
- Hot and cold liquids immediately prior to the temperature examination may affect the result.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 – Examinations of Vital Signs

# Measuring Pulse Rate

A photograph showing a medical professional in a dark uniform with patches on the shoulders, standing next to a patient. The professional is holding the patient's right wrist to take a pulse. The patient is wearing a blue patterned shirt. The background is a plain wall.

The NHTSA logo, which consists of a circular emblem with a stylized 'A' or 'S' shape in the center, surrounded by a ring of stars and the words 'NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION'.

Preliminary Training for Drug Evaluation and Classification Program

The NHTSA logo, identical to the one in the bottom left corner but smaller.

6-29

## *Pulse Rate Measurement Demonstrations*



---

### *Blood Pressure Measurement Demonstrations*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## DRE Ranges of Vital Signs

- **Pulse Rate:**
  - 60 to 90 beats per minute
- **Blood Pressure:**
  - Systolic – 120 to 140 mmHg
  - Diastolic – 70 to 90 mmHg
- **Body Temperature:**
  - 98.6 degrees Fahrenheit plus or minus one degree



NHTSA

### D. Ranges of Vital Signs

Human vital signs vary between individuals. However, the DEC Program has identified a set of ranges for each of the three vital sign examinations used in the drug influence evaluation process. The ranges used in the DEC Program are a bit wider than those used by the medical profession.

#### **DEC Program ranges:**

- **Pulse rate: 60 to 90 beats per minute**
  - **Blood pressure: Systolic: 120-140 mmHg and Diastolic: 70-90 mmHg**
  - **Body temperature: 98.6 degrees, plus or minus 1 degree.**
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Drug Categories and Vital Signs

- All seven categories of drugs ordinarily will affect pulse rate and blood pressure
- Some categories usually will lower pulse and blood pressure



NHTSA

### E. Relationship of Drug Categories to the Vital Signs Examinations

- All seven categories of drugs ordinarily will affect pulse rate and blood pressure.
- Some categories usually will lower pulse and blood pressure.
- CNS Depressants and Narcotic Analgesics usually lower pulse and BP.
- Quaaludes, ETOH and possibly some anti-depressants may cause the pulse to increase.

The other five categories all tend to elevate pulse rate.

- Most of the drug categories that elevate pulse rate also elevate blood pressure.
- CNS Stimulants, Hallucinogens, Dissociative Anesthetics and Cannabis all usually cause blood pressure to rise.
- The vast majority of Inhalants, namely, the volatile solvents and the aerosols, also elevate blood pressure.
- But the remaining small group of Inhalants, the anesthetic gases, actually lowers the blood pressure.
- So for Inhalants, the effect on blood pressure will be up or down.

Session 6 – Examinations of Vital Signs

## Drug Categories and Vital Signs

**Which drug categories affect  
temperature?**



Preliminary Training for Drug Evaluation and Classification Program

6-33

---

Three of the categories usually will cause the body temperature to rise.

The drug PCP and its analogs from the Dissociative Anesthetics category usually increase body temperature; PCP users have been known to remove their clothing to cool down.

CNS Stimulants and Hallucinogens also will usually increase body temperature.

The effect of Inhalants on body temperature depends on the specific substance that is inhaled.

Some inhalants may cause temperature to increase or be down.

But other inhalants may leave the temperature near normal.

One category usually causes body temperature to be lowered.

Narcotic Analgesics usually lower body temperature.

The remaining two categories usually do not affect temperature.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 – Examinations of Vital Signs

## Drug Categories and Vital Signs

**Which drug categories affect  
muscle tone?**



Preliminary Training for Drug Evaluation and Classification Program      6-34

Three of the categories usually will cause the muscle tone to be rigid.

Write “RIGID” on the Muscle Tone line for Stimulants, Dissociative Anesthetics and Hallucinogens.

Two categories usually cause muscle tone to be flaccid.

CNS Depressants and Narcotic Analgesics usually cause a flaccid muscle tone.

One category usually causes normal muscle tone.

Cannabis usually causes normal muscle tone.

One category will usually cause either normal or flaccid muscle tone.

**Ask participants which categories usually cause either normal or flaccid muscle tone.**

Inhalants usually cause either normal or flaccid muscle tone.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 6 – Examinations of Vital Signs

# Drug Categories and Vital Signs

## Practice



Preliminary Training for Drug Evaluation and Classification Program

6-35

### **F. Practice**

- Teammates will take turns measuring each other's pulse rate and blood pressure.
  - Each participant will write down every measurement he or she makes and the time at which the measurement was made.
  - Whichever member of the team is not engaged in taking the measurement or serving as the "suspect" will act as a coach and offer appropriate constructive criticism to his or her teammate.
  - Practice will continue until each participant has taken at least three complete pulse and blood pressure measurements on both teammates.
  - **Testing (participants testing participants)**
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

# QUESTIONS?



Preliminary Training for Drug Evaluation and Classification Program

6-36

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 7 - Overview of Signs and Symptoms

75 Minutes

## Session 7

### Overview of Signs and Symptoms



Preliminary Training for Drug Evaluation and Classification Program

[This page is intentionally left blank]

Session 7 - Overview of Signs and Symptoms

## Learning Objectives

- Give examples of specific drugs belonging to the seven drug categories
- Describe the major signs and symptoms of impairment associated with each category





Preliminary Training for Drug Evaluation and Classification Program

7-2

---

Upon successfully completing this session the participant will be able to:

- Give examples of specific drugs belonging to the seven drug categories.
- Describe the major signs and symptoms of impairment associated with each category.

CONTENT SEGMENTS.....LEARNING ACTIVITIES

- A. CNS Depressants .....Interactive Discussions
- B. CNS Stimulants
- C. Hallucinogens
- D. Dissociative Anesthetics
- E. Narcotic Analgesics
- F. Inhalants
- G. Cannabis
- H. Wrap-Up
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Sign and Symptom Definition

- **Sign:** An observable or detectable indicator of drug influence
- **Symptom:** A subjective indicator of drug influence that is reported by the drug impaired subject



- Sign: An observable or detectable indicator of drug influence (i.e., dilated pupils, high blood pressure).
  - Symptom: A subjective indicator of drug influence that is reported by the drug impaired subject (i.e., "I feel nauseous.")
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 7 - Overview of Signs and Symptoms

## CNS Depressants

- HGN ?
- VGN ?
- LOC ?

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

7-4

### A. CNS Depressants

Central Nervous System Depressants is a category that includes many different drugs.

*Indicators of CNS Depressant Influence Found in Eye Exams*

HGN usually will be present.

Vertical Gaze Nystagmus may be present, especially with high doses (for that individual) of Depressants

Under the influence of Depressants, Lack of Convergence usually will be present.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## CNS Depressants

Pupil size ?  
Reaction to light ?



Preliminary Training for Drug Evaluation and Classification Program

7-5

---

Depressants usually do not affect pupil size; therefore, the pupils will generally be in the average range.

But some specific Depressant drugs do affect pupil size.

Soma, Methaqualone (Quaaludes) and some anti-depressants usually dilate pupils.

Depressants generally will cause pupillary reaction to light to be slow.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## CNS Depressants

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone?**



Preliminary Training for Drug Evaluation and Classification Program      7-6

---

*Indicators of CNS Depressant Influence Found in Checks of the Vital Signs*

Depressants usually lower pulse rate.

But some specific Depressant drugs may elevate the pulse.

Methaqualone (Quaaludes), alcohol and possibly some anti-depressants may cause elevation in pulse rate.

Depressants usually lower blood pressure.

Depressants usually leave temperature near normal.

Depressants usually cause flaccid muscle tone.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## CNS Stimulants

- HGN ?
- VGN ?
- LOC ?



Preliminary Training for Drug Evaluation and Classification Program

NHTSA

7-7

### **B. CNS Stimulants**

The category called Central Nervous System Stimulants includes many drugs.

*Indicators of CNS Stimulant Influence Found in Eye Exams*

HGN will not be present.

Vertical Gaze Nystagmus will not be present.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

CNS Stimulants usually cause the pupils to dilate.

We have seen that CNS Depressants effect pupillary reaction; similarly, CNS Stimulants may cause a slowing in the pupillary reaction to light.

Session 7 - Overview of Signs and Symptoms

## CNS Stimulants

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone ?**



Preliminary Training for Drug Evaluation and Classification Program      7-9

---

*Indicators of CNS Stimulant Influence Found in Checks of Vital Signs*

CNS Stimulants usually increase pulse rate.

CNS Stimulants usually increase blood pressure.

CNS Stimulants usually elevate body temperature.

CNS Stimulants usually cause a rigid muscle tone.

Though not directly related to the vital signs, the DRE may find the subject's muscle tone to be rigid with possible body tremors.

A grinding of the teeth, referred to as "bruxism" may also be noticed.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Hallucinogens

- HGN ?
- VGN ?
- LOC ?

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

7-10

### C. Hallucinogens

Hallucinogens include some naturally occurring substances as well as some synthetic drugs.

*Indicators of Hallucinogen Influence Found in Eye Exams*

HGN will not be present.

Vertical Gaze Nystagmus will not be present.

Under the influence of Hallucinogens, the eyes should still be able to converge; therefore, lack of convergence will not be present.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 – Overview of Signs and Symptoms

# Hallucinogens

Pupil size ?  
Reaction to light ?









Preliminary Training for Drug Evaluation and Classification Program

7-11

Hallucinogens usually cause the pupils to dilate.

Normally, Hallucinogens do not effect pupillary reaction to light.

However, certain psychedelic amphetamines may cause a slowing in the pupillary reaction.

Session 7 - Overview of Signs and Symptoms

## Hallucinogens

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone ?**



Preliminary Training for Drug Evaluation and Classification Program

7-12

---

### *Indicators of Hallucinogen Influence Found in Checks of Vital Signs*

Hallucinogens usually increase pulse rate.

Hallucinogens usually increase blood pressure.

Hallucinogens usually elevate body temperature.

Hallucinogens usually cause a rigid muscle tone.

If we only had these major signs to go by, it would be difficult to distinguish between someone under the influence of CNS Stimulants from someone under the influence of Hallucinogens.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 – Overview of Signs and Symptoms

# Dissociative Anesthetics

- HGN ?
- VGN ?
- LOC ?



Session 7 - Overview of Signs and Symptoms

# Dissociative Anesthetics

Pupil size ?  
Reaction to light ?

Preliminary Training for Drug Evaluation and Classification Program

7-14

## **D. Dissociative Anesthetics**

The category called Dissociative Anesthetics consists of the drug PCP, its various analogs and Dextromethorphan.

- An ‘analog’ of PCP is a drug that is a ‘chemical first cousin’ of PCP; that is, it is a drug that has a slightly different molecular structure from that of PCP, but produces the same effects as PCP.
  - One of the most popular analogs of PCP is the drug called Ketamine.
  - Ketamine is a legally manufactured (but controlled) drug that is used as an anesthetic in some surgical applications.
  - Some other analogs of PCP include Ketalar, Ketaset, and Ketajet.
  - Dextromethorphan is a drug found in numerous over-the-counter substances.

## *Indicators of the Dissociative Anesthetics Found in Eye Exams*

HGN usually will be present, and often with a very early onset.

Vertical Gaze Nystagmus usually will be present.

Lack of Convergence usually will be present.

Dissociative Anesthetics do not normally affect pupil size; therefore, a person under the influence of a Dissociative Anesthetic, such as PCP usually will have pupils that are in the DRE average ranges.

Dissociative Anesthetics normally will not affect pupillary reaction to light.

Session 7 - Overview of Signs and Symptoms

## Dissociative Anesthetics

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone ?**

Preliminary Training for Drug Evaluation and Classification Program

7-15

---

### *Indicators of Dissociative Anesthetic Influence Found in Checks of Vital Signs*

Dissociative Anesthetics usually increase pulse rate.

Dissociative Anesthetics usually elevate blood pressure.

PCP and its analogs usually elevate body temperature. Dextromethorphan may or may not rise temperature.

Dissociative Anesthetics usually cause rigid muscle tone.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Narcotic Analgesics

- HGN ? 
- VGN ? 
- LOC ? 

Preliminary Training for Drug Evaluation and Classification Program 7-16

### E. Narcotic Analgesics

Narcotic Analgesics include some natural derivatives of opium as well as some synthetic drugs.

*Indicators of Narcotic Analgesic Influence Found in Eye Exams*

HGN will not be present.

Vertical Gaze Nystagmus will not be present.

Under the influence of Narcotics, the eyes should still be able to converge; therefore, Lack of Convergence usually is not present.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

**Narcotic Analgesics**

Pupil size ?  
Reaction to light ?

Narcotic Analgesics usually cause a very noticeable constriction of the pupils.

Though there is always some reaction to light, the constricted pupils caused by Narcotic Analgesics can make it nearly impossible to perceive a change in pupil size. However, when observed it will generally be little or none visible.

## Narcotic Analgesics

Vital signs?

- Pulse rate
- Blood pressure
- Body temperature

Muscle tone ?



---

### *Indicators of Narcotic Analgesic Influence Found in Checks of Vital Signs*

Narcotic Analgesics usually lower pulse rate.

Narcotic Analgesics usually lower blood pressure.

Narcotics usually lower body temperature.

With a Narcotic Analgesic, muscle tone will be flaccid.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 – Overview of Signs and Symptoms

# Inhalants

- HGN ?
- VGN ?
- LOC ?

A photograph showing a close-up of a person's hand holding a white aerosol spray can. The can is being sprayed, creating a fine mist of vapor against a dark background.

A photograph showing several containers of inhalants. From left to right: a yellow can labeled 'BUSH' with 'SPARKLES' written on it; a purple can labeled 'SPARKLES'; a small black bottle with a label that is mostly illegible; a small white bottle with a label that is mostly illegible; and a white canister with a yellow label that reads 'DDE' and 'DUST DUST DUST'.

A photograph showing a box containing numerous blue inhalant canisters. Next to the box is a brass-colored pipe fitting, likely a male threaded coupling.

The official seal of the National Institute on Drug Abuse (NIDA), featuring a circular design with a central figure and the text "NATIONAL INSTITUTE ON DRUG ABUSE" around the perimeter.

Preliminary Training for Drug Evaluation and Classification Program

7-19

The logo for the National Highway Traffic Safety Administration (NHTSA), featuring four red stars above the acronym "NHTSA" in a stylized font.

## F. Inhalants

The category of Inhalants includes a wide variety of gases and fumes that have mind-altering effects.

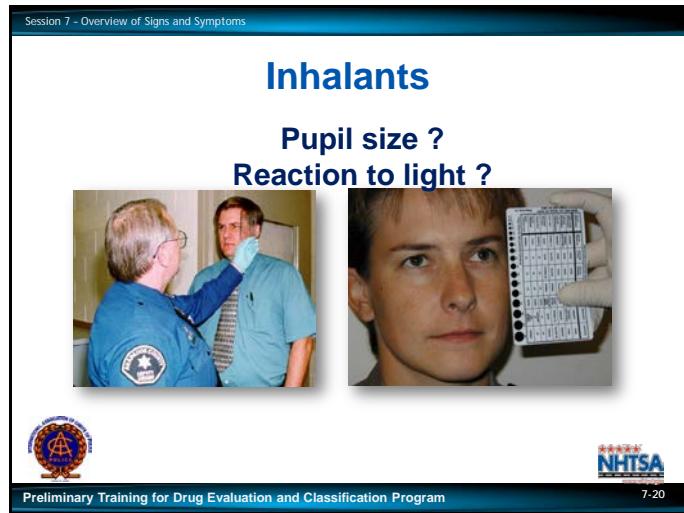
- Not all Inhalants affect their users in exactly the same way.
  - There is probably less consistency in the signs and symptoms of Inhalants than there is with any other category.
  - When we talk of the signs and symptoms of Inhalants, we often must qualify our statements.
  - For example, we may say that a particular effect will be observed “for most Inhalants.”

## *Indicators of Inhalant Influence Found in Eye Exams*

With most Inhalants, HGN usually will be present.

With most Inhalants, Vertical Gaze Nystagmus may be present, especially with large doses.

Under the influence of Inhalants, Lack of Convergence usually will be present.



---

The effect of Inhalants on pupil size depends on the particular substance inhaled.

Most inhalants usually leave the pupils in the DRE average ranges.

Some inhalants may cause pupil dilation.

Depending on the substance used, Inhalants may cause a slowed reaction to light or the pupils may react normally.

However, the most frequently observed effect will be a slow reaction to light.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Inhalants

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone ?**



Preliminary Training for Drug Evaluation and Classification Program      7-21

---

*Indicators of Inhalant Influence Found in Checks of Vital Signs*

Inhalants usually elevate pulse rate.

Most inhalants usually elevate blood pressure, but some lower blood pressure.

The effects of Inhalants on temperature depend on the particular substance inhaled.

Depending on the Inhalant, muscle tone will either be normal or flaccid.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Cannabis

- HGN ?
- VGN ?
- LOC ?

Preliminary Training for Drug Evaluation and Classification Program

7-22

### G. Cannabis

Indicators of Cannabis Influence Found in Eye Exams

HGN will not be present.

Vertical Gaze Nystagmus will not be present.

Under the influence of Cannabis, Lack of Convergence will be present.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Cannabis

Pupil size ?  
Reaction to light ?



Preliminary Training for Drug Evaluation and Classification Program

7-23

Under the influence of Cannabis, the pupils may be dilated or possibly within the DRE average ranges.

The pupillary reaction to light will appear normal when under the influence of Cannabis.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 7 - Overview of Signs and Symptoms

## Cannabis

**Vital signs ?**

- Pulse rate
- Blood pressure
- Body temperature

**Muscle tone ?**



Preliminary Training for Drug Evaluation and Classification Program      7-24

---

*Indicators of Cannabis Influence Found in Checks of Vital Signs*

Cannabis usually elevates pulse rate.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Cannabis usually elevates blood pressure.

Cannabis usually leaves temperature near the average body temperature ranges.

Cannabis usually causes normal muscle tone.

Session 7 - Overview of Signs and Symptoms

## Wrap Up

Matrix summarizes the major signs of drug influence that are observed by DREs

## QUESTIONS?

Preliminary Training for Drug Evaluation and Classification Program      7-25      Preliminary Training for Drug Evaluation and Classification Program      7-26

---

### H. Wrap-Up

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## **Drug Matrix**

---

<b>INDICATOR</b>	CNS Dep.	CNS Stim.	Halluc.	Dissoc. Anesthet.	Narc. Analges.	Inhalants	Cannabis
<b>HGN</b>							
<b>VGN</b>							
<b>LoC</b>							
<b>Pupil Size</b>							
<b>Reaction to Light</b>							
<b>Pulse Rate</b>							
<b>Blood Pressure</b>							
<b>Body Temp.</b>							
<b>Muscle Tone</b>							

[This page is intentionally left blank]

# Participant Manual

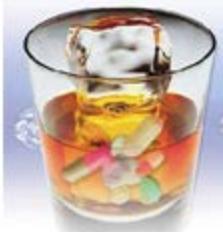
# Drug Evaluation and Classification (Preliminary School)

Session 8 - Alcohol as a Drug

90 Minutes

**Session 8**

**Alcohol as a Drug**



Preliminary Training for Drug Evaluation and Classification Program

[This page is intentionally left blank]

## Learning Objectives

- **Describe a brief history of alcohol**
- **Identify common types of alcohol**
- **Describe the physiological processes of absorption, distribution and elimination of alcohol in the human body**
- **Describe dose response relationships that impact alcohol's impairing effects**



NHTSA

---

Upon successfully completing this session the participant will be able to:

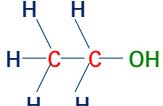
- Describe a brief history of alcohol.
- Identify common types of alcohols.
- Describe the physiological processes of absorption, distribution and elimination of alcohol in the human body.
- Describe dose response relationships that impact alcohol's impairing effects.

CONTENT SEGMENTS..... LEARNING ACTIVITIES

- A. Brief Overview of Alcohol ..... Instructor-Led Presentations
- B. Physiological Processes..... Oral Quiz
- C. Symptomatology of Alcohol
- D. Dose-Response Relationships
- E. Questions for Review
- Alcohol is a drug. In fact, alcohol is the most commonly abused drug.
  - As DREs, the participants will often encounter persons who are under the combined influence of alcohol and some other drug.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

**Alcohol**

A family of closely-related chemicals whose molecules are made up of hydrogen, carbon, and oxygen.



Preliminary Training for Drug Evaluation and Classification Program

8-3

**Some Types of Alcohol**

METHYL ALCOHOL  
*(Methanol)*

ETHYL ALCOHOL  
*(Ethanol)*

ISOPROPYL ALCOHOL  
*(Isopropanol)*

Preliminary Training for Drug Evaluation and Classification Program

8-4

### A. A Brief Overview of Alcohol

The word “alcohol” refers to a number of distinct but similar chemicals.

- Each of the chemicals that is called an “alcohol” is composed of the three elements: hydrogen, carbon, and oxygen.
  - Each of the “alcohols” is a drug within the scope of our definition.
  - But only one can be tolerated by the human body in substantial quantities.
- 
- 

### *Common Alcohols*

Three of the more commonly known “alcohols” are Methyl, Ethyl, and Isopropyl.

- Methyl Alcohol, also known as Methanol, or “wood alcohol.”
  - Ethyl Alcohol, also known as Ethanol, or “beverage alcohol.”
  - Isopropyl Alcohol, also known as Isopropanol, or “rubbing alcohol.”
- 
- 

### *Ethanol Alcohol*

Ethanol is the kind of alcohol on which we will focus, because it is the only type intended for human consumption.

- Ethanol is the active ingredient in beer, wine, whiskey, and other alcoholic beverages intended for drinking.
  - Like all “alcohols,” ethanol is composed of hydrogen, carbon and oxygen.
  - Chemists use a number of different symbols to represent ethanol.
-

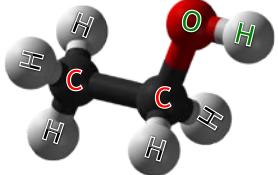
Session 8 – Alcohol as a Drug

## Ethanol

**Ethyl Alcohol**  
**(Intended for human consumption)**

Chemical Symbols:

- ETOH
- $C_2H_5OH$



Preliminary Training for Drug Evaluation and Classification Program

8-5

Session 8 – Alcohol as a Drug

## Production of Ethanol

- **FERMENTATION**  
Yeast combines with sugars from fruit or grains in a chemical reaction that results in ETOH
- **DISTILLATION**  
Fermented beverage is boiled at a controlled temperature to extract and concentrate the ethanol fumes



Preliminary Training for Drug Evaluation and Classification Program

8-6

- For our purposes, we will use the symbol “ETOH.”
- The “ET” represents “ethyl” and the “OH” represents an oxygen atom and hydrogen atom, bonded together in what the chemists refer to as the “hydroxy radical.” All alcohols have a hydroxy radical in their molecules.

Ethanol has been around for a long time. People drank it long before they learned to write.

Ethanol is a naturally occurring drug. That is, it is produced through a process called fermentation.

In fermentation, spores of yeast, carried by the wind, come in contact with fruit or grain that has fallen to the ground.

Sugars in the fruit or grain chemically react with yeast, and produce ethanol.

Humans almost certainly first encountered ethanol that had been produced accidentally in this fashion.

Of course, today we don’t sit around waiting for the wind to bring yeast to fallen fruit.

Most fermentation takes place on purpose, under controlled conditions.

Through the process of fermentation, we can produce a beverage that has, at most, about 14% ethanol.

When the ethanol concentration reaches 14%, the yeast die, so fermentation stops.

If we want to have higher concentration ethanol beverages, we have to use another step in the production.

Distillation is the process used to produce a higher concentration of ethanol.

---



---



---



---

In distillation, a fermented beverage is heated to the point where the ethanol begins to boil.

- Ethanol starts to boil at a lower temperature than water.
- The ethanol vapor is collected and allowed to cool until it turns back into a liquid.
- By repeating the process of heating the liquid and collecting and cooling the vapors, higher and higher concentrations of ethanol can be produced.
- Ethanol beverages that are produced by distillation are called distilled spirits.

Over the centuries in which people have produced ethanol, some general or common sized servings of different beverages have evolved.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 8 – Alcohol as a Drug

## Common Drink Sizes

**Bottle of Beer**

- 12 ounces of fluid @ 5% alcohol equals 0.60 ounces of pure alcohol



**Glass of Wine**

- 5 ounces of fluid @ 12% alcohol equals 0.60 ounces of pure alcohol



**Shot of Whiskey (80-Proof)**

- 1 and 1/2 ounces @ 40% alcohol equals 0.60 ounces of pure alcohol



- Beer is usually served in 12-ounce cans or bottles. Since beer averages an ethanol concentration of five percent, a can or bottle contains slightly more than one-half ounce of pure ethanol.
  - Five ounces of wine with an alcohol concentration of 12% contains slightly more than one half ounce of pure alcohol.
  - Whiskey and other distilled spirits are dispensed in a “shot” glass, which usually contain one and one-half ounces of liquid.
  - Since whiskey usually has an ethanol concentration of 40%, a “shot” of whiskey has slightly more than one-half ounce of pure ethanol.

For all practical purposes, standard sized servings of beer, wine, and whiskey all pack the same “punch.”



## **B. Physiological Processes**

Alcohol is the most abused drug in the United States.

Ethanol is a Central Nervous System Depressant.

- It doesn't impair until it gets into the brain.
- It can't get into the brain until it first gets into the blood.
- It can't get into the blood until it first gets into the body.

**This concept is true with all drugs that impair.**

There are a number of ways in which alcohol can get into the body.

- It can be injected into a vein via hypodermic needle.
- It can be inhaled, i.e., alcohol fumes can be brought into the lungs, and some molecules will pass into the blood.
- It could also be inserted as an enema and ingested by quickly passing from the large intestine into the blood.

But the vast majority of times that alcohol gets into the body, it gets there via drinking.

---

---

---

---

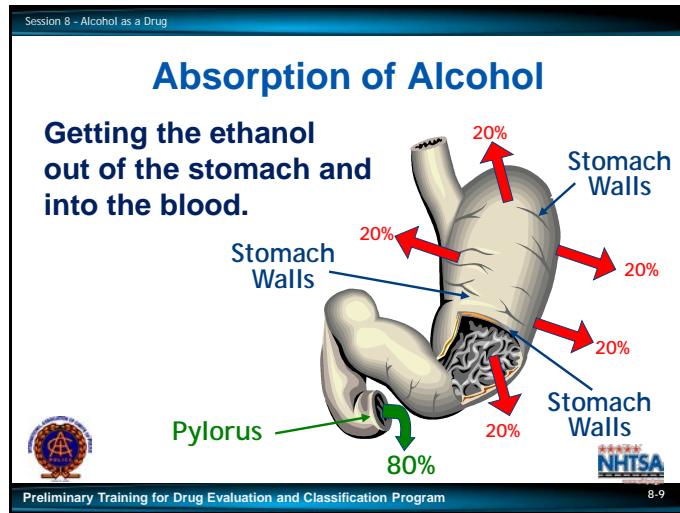
---

---

---

---

---



Once the alcohol is in the stomach, it will take two routes to get into the blood.

- One interesting thing about alcohol is that it is able to pass directly through the stomach walls.
- Under normal conditions, about 20% of the alcohol a person drinks gets into the blood by diffusing through the walls of the stomach.
- But most of the alcohol usually passes through the base of the stomach into the small intestine, from which it passes quickly into the blood.
- Another interesting thing about alcohol is that it does not have to be digested before it can move from the stomach to the small intestine.
- When a person eats food, the food must remain for a time in the stomach.
- Acids and enzymes in the stomach must begin to break down the food to prepare it to pass to the lower portion of the gastrointestinal track.
- While the initial digestive process is underway, a muscle at the base of the stomach will constrict, and shut off the passage to the small intestine.
- Note the muscle called the pylorus, or pyloric valve.
- Since alcohol doesn't have to be digested, the pylorus does not constrict when alcohol enters the stomach.
- If we drink on an empty stomach, the pylorus stays wide open.
- The alcohol will pass immediately through the base of the stomach, into the small intestine, and quickly move into the bloodstream.
- Food will cause the pylorus to constrict.
- While the pylorus is closed, nothing will move from the stomach to the small intestine.

- Any alcohol that is in the stomach will be “trapped” there, along with the food, and the alcohol will not get into the blood as quickly.
- Drugs taken orally will behave similarly.
- Blood alcohol concentration will not get as high as it would if the drinking had been done on an empty stomach.
- While the alcohol is trapped in the stomach, the acids and enzymes will start to react with it and break it down.
- By the time the pylorus opens, some of the alcohol will have been chemically changed, so there will be less available to get into the blood.

Once the alcohol gets into the blood, the blood will carry it to the various tissues and organs of the body.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## Distribution of Alcohol

Getting the ethanol into the body's tissues and organs

**Basic Principle:**

- Ethanol goes wherever it finds water



- Alcohol is attracted to water. The blood will deposit the alcohol in all the parts of the body where water is found.
- Parts of the body that have a lot of water will receive a lot of alcohol.
- Parts of the body that have only a little water will receive little alcohol.

**Basic Principle: Ethanol goes wherever it finds water**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 8 - Alcohol as a Drug

## Which Parts of the Body Have a Lot of Water?

BRAIN LIVER MUSCLE TISSUE KIDNEYS

## Which Parts Contain Very Little Water?

BONES FATTY TISSUE

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

8-11

- Brain
- Liver
- Muscle tissue
- Kidneys
- Bones
- Fatty tissue

The fatty tissue will receive very little of the alcohol.

The muscle tissue will receive a relatively high proportion of the alcohol that a person drinks.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Session 8 - Alcohol as a Drug

## Significant Difference Between Men and Women

- The average male is 68 percent water
- The average female is only 55 percent water

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

8-12

Here is an interesting and significant difference between men and women: pound-for-pound, the average male has much more water in his body than the average female.

- The female body has more fatty tissue than does the male body.
  - Pound-for-pound, the average female has more fat and less muscle than does the average male.
  - Since fatty tissue has very little water, the average female, pound-for-pound, has less water than the average male.
  - This means that the average woman has fewer places in her body in which to deposit the alcohol she drinks.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Elimination of Alcohol

### Getting the ethanol out of the body:

#### Direct Excretion:

- Breath, sweat, tears, urine, etc.

#### Metabolism:

- Primarily in the liver



- As soon as alcohol gets into the body, the body begins working to get rid of it.
- Some alcohol is simply expelled directly from the body, i.e., on the breath, in the sweat, in urine, etc.
- Relatively little of the alcohol we drink is directly expelled from the body.

Clarification: Only about 2–10% of the alcohol we consume is directly excreted in the breath, urine, etc.

- The body eliminates most of the alcohol by chemically breaking it down.
- The liver is primarily responsible for breaking down, or metabolizing, the alcohol.

Clarification: Some metabolism of alcohol also takes place in other parts of the body, including the brain. The liver does the vast majority of the job.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## Metabolism in the Liver

- The liver burns the ethanol (i.e., causes a chemical reaction of ethanol with oxygen)
- The process is aided by an enzyme called alcohol dehydrogenase
- The ultimate products of the chemical reaction are carbon dioxide and water



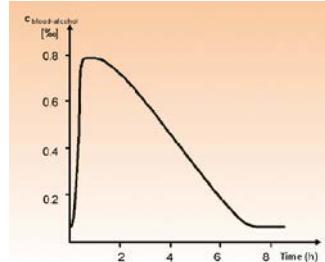
- Metabolism of alcohol actually consists of a slow, controlled burning of the alcohol.
- In the burning process, the alcohol combines with oxygen.
- The liver has an enzyme called alcohol dehydrogenase, which helps to speed up the reaction of oxygen with the alcohol.

Clarification: The enzyme does not react with the alcohol itself, but simply makes it easier for the oxygen to react with the alcohol. The technical term for something that helps a chemical reaction while not itself taking part in the reaction is a catalyst. Alcohol dehydrogenase is a catalyst for the metabolism of alcohol.

- The reaction of alcohol with oxygen ultimately produces carbon dioxide and water, which can be directly expelled from the body.
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

## Metabolism in the Liver

- Due to metabolism, the average person's BAC drops by about 0.015 per hour



NHTSA

The speed with which the liver burns alcohol varies from person to person, and will change from time to time for any particular person.

- BUT ON THE AVERAGE: Due to metabolism, a person's BAC will drop by about 0.015 per hour. For the average male, a BAC of 0.015 is equal to the alcohol content of about two-thirds of a "standard drink". i.e., about two-thirds of a can of beer, or about two-thirds of a glass of wine, or two-thirds of a shot of whiskey.
- For the average woman, a BAC of 0.015 is equal to the alcohol content of only one-half of a "standard drink." So the average male can "burn up" about two-thirds of a drink in an hour. But the average female can only burn up about one-half of a drink in an hour.
- In other words: suppose a person gulps down a can of beer, or a glass of wine, or a shot of whiskey; if the person is an average man, it will take him about an hour and one-half to burn up that alcohol; if the person is a woman, it will take her about two hours.
- We can't speed it up.
- Drinking coffee won't help.
- A cold shower won't help.
- Exercise won't help.
- Our livers take their own sweet time burning the alcohol.

Session 8 - Alcohol as a Drug

## Alcohol Symptomatology

	ALCOHOL
HGN	Present
VGN	Present (High Doses)
LACK CONV	Present
PUPIL SIZE	Normal
RCTN LIGHT	Slow
PULSE RATE	Down <sup>2</sup>
BLOOD PRESS	Down
TEMP	Normal
MUSCLE TONE	Flaccid

 <sup>2</sup> May be elevated.

Preliminary Training for Drug Evaluation and Classification Program      8-18

### C. Symptomatology of Alcohol

- ETOH may elevate the pulse rate in lower BAC levels.

#### *Indicators of Alcohol Influence Found in Eye Exams*

- HGN will be present.
- Vertical Gaze Nystagmus may be present, especially with high doses (for that individual) of alcohol.
- Under the influence of alcohol, Lack of Convergence frequently will be present.
- Alcohol does not affect pupil size; therefore, alcohol usually leaves the pupils in the DRE average ranges.
- Alcohol will cause pupillary reaction to light to be sluggish.
- Indicators of Alcohol Influence Found in Checks of Vital Signs
- Pulse rate will usually be down. However, ETOH is one of the exceptions and some subjects have been found to have elevated pulse rates at lower BACs.
- Blood pressure response to alcohol will normally be down.
- *Alcohol usually leaves body temperature near the average range.*
- Alcohol usually causes flaccid muscle tone.

## Blood Alcohol Concentration

**What does it mean?**

**BAC is the number of grams of alcohol found in 100 milliliters of the person's blood.**

**Example:**

If a person has a BAC of .08, it means there is 0.08 grams of ethanol in every 100 milliliters (ml) of his or her blood.



## Grams, Milligrams and Nanograms

A “gram” is pretty light (it takes almost 500 grams to make one pound)

- ✓ One gram is equal to one thousand milligrams.
- ✓ .08 grams are equal to 80 milligrams.

So if a person has a BAC of 0.08, he or she has 80 milligrams of alcohol in every 100 milliliters of blood.



### D. Dose-Response Relationships

What does “Blood Alcohol Concentration” mean?

BAC is the number of grams of alcohol found in 100 milliliters of the person’s blood.

**Example:**

If a person has a BAC of .08, it means there is 0.08 grams of ethanol in every 100 milliliters (ml) of his or her blood.

- Blood alcohol concentration means the number of grams of pure ethanol that are found in every 100 milliliters of a person’s blood.
- A gram is a measure of weight; it takes almost 500 grams to make a pound.
- The so-called “illegal limit” of BAC is 0.08 in all states.
- In 2005, all 50 states had adopted 0.08 BAC.
- If a person has a BAC of 0.08, it means there is 0.08 grams (g) of ethanol in every 100 milliliters (ml) of his/her blood.

Session 8 - Alcohol as a Drug

## ***How Much Alcohol Does a Person Have to Drink to Reach a BAC of 0.08?***



Preliminary Training for Drug Evaluation and Classification Program

8-21

---

### **How much alcohol does a person have to drink to reach a BAC of 0.08?**

- Take an average male weighing 175 pounds and in reasonably good physical shape.
  - Assume he does his drinking on an empty stomach.
  - He would have to gulp down about 4 to 5 cans of beer, or 4 to 5 glasses of wine, or five shots of whiskey in a fairly short period of time to reach 0.08 BAC.
  - In terms of pure ethanol, that would amount to just about two and one-half fluid ounces, or about two shot glasses.
  - If these two shot glasses were filled with pure ethanol, we would have just enough of the drug to bring an average man to a BAC of approximately 0.10.
  - In one respect, it certainly doesn't take much ethanol to impair; just two full shot glasses will more than do the trick for a full-sized man.
  - BUT COMPARED TO OTHER DRUGS, it takes an enormous quantity of ethanol to cause impairment.
  - In order to compare ethanol to other drugs, we have to review some more units of weight.
- 
- 
- 
- 
- 
- 
- 
- 
-

## More on Grams and Nanograms

- One milligram is equal to one million nanograms. (A nanogram is **very light**: it takes almost 500 billion of them to make a pound.)
- A person whose BAC is 0.08 has 800,000 nanograms of alcohol in every milliliter of blood.



NHTSA

- We're already familiar with the gram. It weighs only about one five-hundredth of a pound.
- The milligram is much lighter still and it takes about one thousand milligrams to make a gram.
- If one gram is equal to one thousand milligrams, then one tenth of a gram is equal to one hundred milligrams.
- Clarification: 100 is one-tenth of 1,000.
- So a person with a BAC of 0.08 has 80 milligrams of ethanol in every 100 milliliters of his or her blood.
- That is exactly the same as saying there is 800,000 nanograms of ethanol in every one milliliter of blood.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

## More on Grams and Nanograms

## How does alcohol compare with other drugs?



Session 8 - Alcohol as a Drug

## QUESTIONS?



Preliminary Training for Drug Evaluation and Classification Program

8-24

Session 8 - Alcohol as a Drug

## Review Questions



Preliminary Training for Drug Evaluation and Classification Program

8-25

### **E. Questions for Review**

1. What is the chemical abbreviation for beverage alcohol?

---

---

2. What is the name of the chemical process by which beverage alcohol is produced naturally?

---

---

3. True or False: "Blood alcohol concentration is the number of grams of alcohol in every 100 milliliters of blood."

---

4 . True or False: Pound-for-pound, the average woman contains more water than does the average man.

---

5. What do we mean by the "proof" of an alcoholic beverage?

---

---

6. Every chemical that is an "alcohol" contains what three elements?

---

---

7. True or False: Most of the alcohol that a person drinks is absorbed into the blood via the small intestine.

---

8. What is the name of the muscle that controls the passage from the stomach to the lower gastrointestinal tract?

---

---

9. True or False: Alcohol can pass directly through the stomach walls and enter the bloodstream.

---

---

10. Suppose a man and a woman who both weigh 160 pounds arrived at a party and started to drink at the same time. And suppose that, two hours later, they both have a BAC of 0.10. How did this occur?

---

---

11. In which organ of the body does most of the metabolism of the alcohol take place?

---

---

12. What is the name of the enzyme that aids the metabolism of alcohol?

---

---

13. Once a person reaches his or her peak BAC, it will drop at a rate of about \_\_\_\_\_ per hour.

---

---

14. True or False: If a person has a blood alcohol concentration of 0.10, then there are one million nanograms of alcohol in every milliliter of his or her blood.

---

15. True or False: It takes about thirty minutes for the average 175 pound man to “burn off” the alcohol in one 12-ounce can of beer.

---

---

---

---

---

[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 9 - Preparing for the DRE School.

30 Minutes

## Session 9

### Preparing for the DRE School



Preliminary Training for Drug Evaluation and Classification Program

9-1

[This page is intentionally left blank]

Session 9 - Preparing for the DRE School

## Learning Objective

The participant will be informed of the logistics and other arrangements necessary for their participation in the seven-day DRE school

Preliminary Training for Drug Evaluation and Classification Program

9-2

Upon successfully completing this session the student will be informed of the logistics and other arrangements necessary for their participation in the seven day DRE School.

Session 9 - Preparing for the DRE School

## Seven-Day DRE School

- Dates
- Location
- Dress Code
- Material Needed
- Transportation
- Lodging
- Other



Preliminary Training for Drug Evaluation and Classification Program

9-3

### **A. Session 9 Guide**

- Dates of the seven-day school
  - Location of the school
  - Dress code
  - Materials that the participants should bring to the school
  - Transportation arrangement (if applicable)
  - Lodging arrangements (if applicable)
  - Recreational facilities and opportunities (if appropriate)
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 9 - Preparing for the DRE School

# QUESTIONS?

The logo of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), featuring a circular emblem with a stylized figure and the letters "NIH" at the bottom.

Preliminary Training for Drug Evaluation and Classification Program

NHTSA

9-4

[This page is intentionally left blank]

# Participant Manual

# Drug Evaluation and Classification (Preliminary School)

Session 10 - Conclusion of the Preliminary Training

45 Minutes

## Session 10

### Conclusion of the Preliminary Training



Preliminary Training for Drug Evaluation and Classification Program

10-1

[This page is intentionally left blank]

## Learning Objectives

- Demonstrate knowledge of the concepts covered during the training
- Offer anonymous comments and criticisms concerning the school



---

Upon successfully completing this session the participant will be able to:

- Demonstrate his or her knowledge of the concepts covered during the DRE Pre-School.
- Offer anonymous comments and criticisms concerning the school

CONTENT SEGMENTS..... LEARNING ACTIVITIES

- A. Post-Test and Critique..... Written Examinations
- B. Certificates and Dismissal
- C. Session Wrap-up
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
-

Session 10 - Conclusion of the Preliminary Training

Session 10 - Conclusion of the Preliminary Training

## **A. Post Test and Critique**

## *Post Test*

## *Critique*

## *Review of the Post Test*

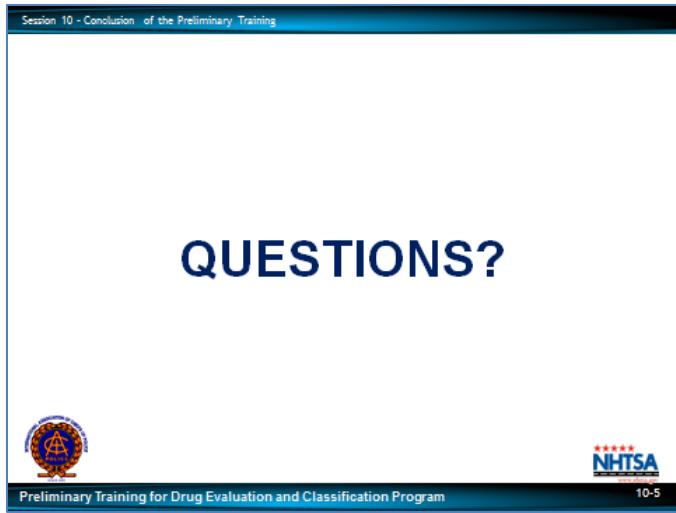
---

---

---

---

## **B. Certificates and Dismissal**



---

### **C. Session Wrap-Up**

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

[This page is intentionally left blank]

Course Location \_\_\_\_\_ Date \_\_\_\_\_

**Preliminary Training for Drug Evaluation and Classification**  
Student's Critique Form

**A. Course Objectives**

Please indicate whether you feel that you personally achieved the following course objectives.

	Yes	No	Not Sure
Can you define the term "drug" and name the seven drug categories?			
Can you identify the twelve major components of the drug recognition process?			
Can you administer and interpret the psychophysical tests used in a drug evaluation?			
Can you conduct the eye examinations used in the evaluations?			
Can you check the vital signs used in the evaluation?			
Can you list the major signs and symptoms associated with each drug category?			
Can you describe the history and physiology of alcohol as a drug?			

**B. Course Activities**

Please rate how helpful each workshop session was for you personally. Also, please rate the quality of instruction (subject knowledge, instructional techniques and learning activities). Use a scale from 1 to 5 where: 5=Excellent, 4=Very Good, 3=Good, 2=Fair, 1=Poor.

	Session/Activity	Quality
Overview of Drug Evaluation and Classification Procedures		
The Psychophysical Tests		
The Eye Examinations		
Alcohol Workshop		
Examination of Vital Signs		
Overview of Signs and Symptoms		
Alcohol as a Drug		
Preparing for the DRE School		

### C. Course Design

Please indicate your own personal feeling about the accuracy of each statement.

	Agree	Disagree	Not Sure
1. I wish we had more practice with drinking volunteers.			
2. There was too much "bull throwing" in this course.			
3. I now have a much better idea as to what the drug recognition process is all about.			
4. The course was at least one-half day too long.			
5. I got a great deal of practical, useful information from this course.			
6. I'm still pretty confused as to what the drug recognition process is all about.			
7. I think I could do a pretty good job conducting a drug evaluation right now, without additional training.			
8. This course should have been at least one-half day longer.			
9. We spent too much time with the volunteer drinkers session.			
10. Some of the practice sessions in this course were dragged out a bit too much.			
11. I don't think that our instructors were as well prepared as they should have been.			
12. This course was a good review, but it really didn't teach me anything new.			
13. I am very glad that I attended this course.			
14. The instructors seemed to be more interested in practicing their teaching skills than in seeing to it that we learned what we were supposed to learn.			
15. I would have to say that this course was not quite as good as I expected it to be.			

**D. Suggestions for Deletion and Additions**

If you absolutely had to cut four hours out of this course, what would you delete or shorten?

---

---

---

---

If you could add four hours to this course, how would you spend the extra time?

---

---

---

---

**E. Ratings of the Course and the Instructors**

On a scale from 1 (=very poor) to 5 (=excellent), please give your opinion of the course as a whole.

The course as a whole: \_\_\_\_\_

On a scale from 1 (=very poor) to 5 (=excellent), please give your opinion of each instructor.

Instructor	Rating

**F. Final Comments/Suggestions**

Please offer any final comments that you wish to make.

---

---

---