Forensics

Unit 6: Drugs & Toxicology

6.5 Predict types of controlled substances based upon lab test results.

6.6 Explain how blood alcohol levels are tested and quantified.

6.7 Identify and describe toxins common to criminal investigations.

7.3 Describe the botanical features of organic controlled substances.

EQ: What methods are used for identifying substances that affect the body?

Drugs

- **A natural or synthetic substance that is used to produce physiological or psychological effects in humans.**

EQ: What methods are used for identifying substances that affect the body?

2

Drug Abuse

- **Late 1800's artists and upper class toyed with opium**
- **60s first widespread abused**
- **70s heroin chic led to disco powder**
- **80s cocaine & crack epidemic**
- **90s marijuana use skyrockets**
  - **overall drug resurgence**

EQ: What methods are used for identifying substances that affect the body?

Drug Abuse

- **23,000,000 illicit drug users**
  - **For many, drug effect lives in a negative way**
- **75% of evidence processed is drug related**

EQ: What methods are used for identifying substances that affect the body?

Drug Dependence

- **Drugs were initially regulated due to addiction - "habit forming"**
  - **Opium & cocaine (once in Coke)**
  - **Marijuana added in 1930s**
- **Today many controlled substances are not very addictive**

EQ: What methods are used for identifying substances that affect the body?

Drug Dependence - Addiction

- **Psychological Dependence - the emotional need for a drug**
  - **lifelong**
- **Physical Dependence - the bodies craving for a substance, similar to hunger**
  - **easiest to overcome**
  - **withdrawal sickness - 3 days**

EQ: What methods are used for identifying substances that affect the body?

6

Alkaloids

- A group of naturally occurring heterocyclic chemical compounds that contain mostly basic nitrogen atoms

- Strong physiological effects in humans

- Generally from plants, some from fungi and animals
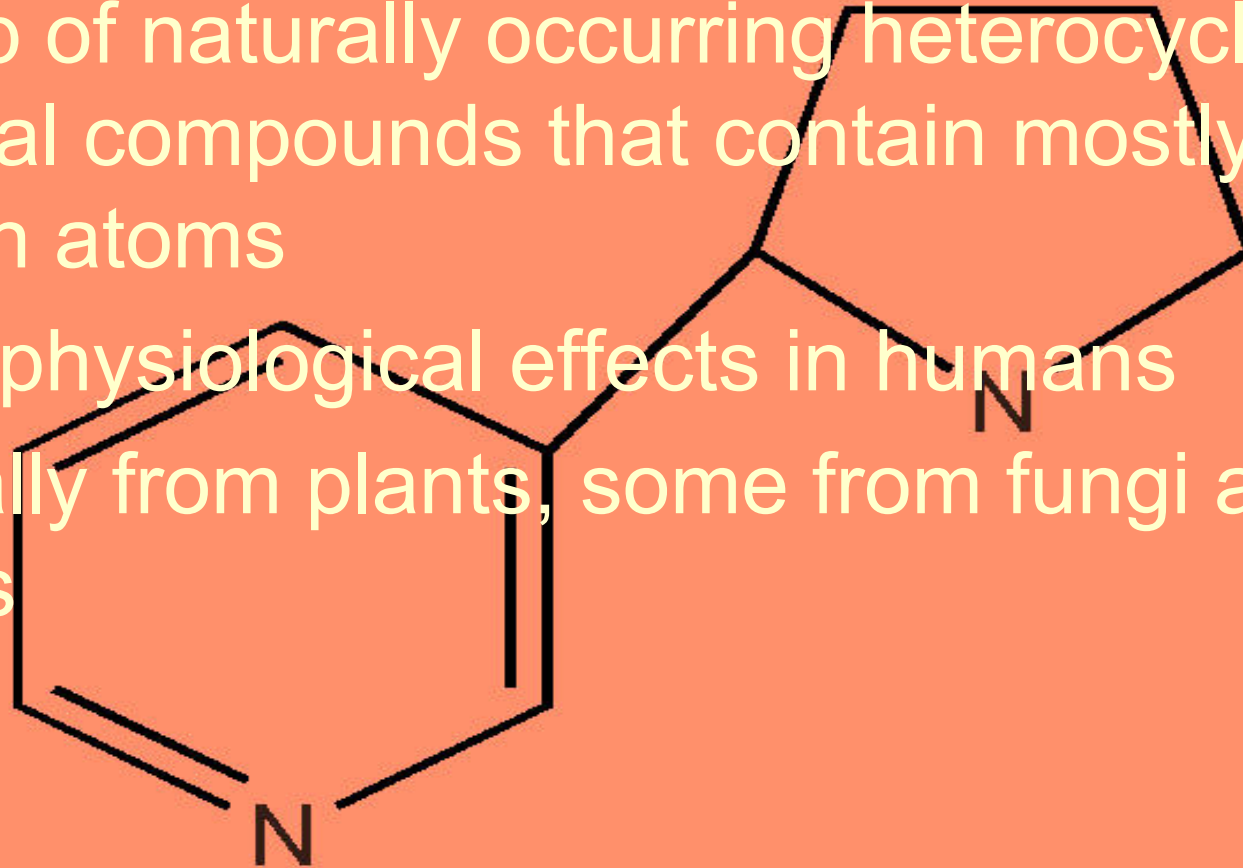
EQ: What methods are used for identifying substances that affect the body?

7

EQ: What methods are used for identifying substances that affect the body?

Narcotics

- **Narkotikos - lethargy, sleepiness**
- **Originally used for headache relief**
- **Analgesics - pain relief**
- **Opium - Asian plant, cutting through pod produces milky gummy juice**

EQ: What methods are used for identifying substances that affect the body?

Narcotics

- **Morphine - medical uses**
  - **civil war addicts**
- **Fentanyl – anesthetic**
- **Heroin - morphine plus acetic anhydride**
  - **snorted or injected**
  - **spoon, lanyard, needles**
  - **highly addictive**
  - **3 to 4 hours of Euphoria**

EQ: What methods are used for identifying substances that affect the body?

Narcotics

- **Heroin (con't)**
  - **drug is 15%-65% pure**
  - **impurities could be anything**
- **Codeine - 1/6th as strong as morphine**
  - **"Robo-ing" for Robitussin**
  - **"Purple Drink"**
- **Methadone-opiate that is used to treat heroin users.**

EQ: What methods are used for identifying substances that affect the body?

Narcotics

- **Pain Control – narcotics are primary treatment for pain**
  - Many abused:
    - Oxycodone (Percocet, Percodan, OxyContin)
    - Hydrocodone (Vicoden, Lortab)

EQ: What methods are used for identifying substances that affect the body?

Narcotics

EQ: What methods are used for identifying substances that affect the body?

Narcotics

EQ: What methods are used for identifying substances that affect the body?

Narcotics

EQ: What methods are used for identifying substances that affect the body?

Narcotics

MEXICAN BROWN HEROIN

SOUTHEAST ASIAN HEROIN

EQ: What methods are used for identifying substances that affect the body?

Narcotics

EQ: What methods are used for identifying substances that affect the body?

Day 1

EQ: What methods are used for identifying substances that affect the body?

18

Hallucinogens

- **Alterations in normal thoughts, perceptions, and mood.**
- **Marijuana - Cannabis sativa L.**
  - **I.A.B. - actually another plant due to modern cultivation**
    - **Hydroponics**
- **Hashish - plant resin, similar to pine sap in consistency**

EQ: What methods are used for identifying substances that affect the body?

Hallucinogens: Marijuana Con't

- **Sinsemilla - unfertilized flowering tops of female, very potent**

- **3,000 B.C. Chinese used it orally as a medicine**

- **Hemp - fibers of plant wound up for rope**

  - G. Washington grew hemp NOT weed!

EQ: What methods are used for identifying substances that affect the body?

Hallucinogens: Marijuana Con't

- **Brought to Europe by Napoleon's troops**

- **U.S. in the 1920's by Mexican immigrants and U.S. soldiers**

- **1937 the first marijuana craze was on**
  - **Reefer Madness**
  - **46 states and Feds banned it**

EQ: What methods are used for identifying substances that affect the body?

Hallucinogens: Marijuana Con't

- **Grows wild – "weed"**
- **THC - Tetrahyrdocannabinol**
  - **none in roots, stems, seed**
  - **highest in resin, flowers, leaves**
- **Natural is less than 1% THC**
- **Street is 3.5 to 8.5%, (35% bud)**
- **Hash Oil uses solvent to extract the resin - tar like - 20-65% THC**

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

- **Major harm is in regular use**
- **THC is fat soluble**
- **#1 - Brain**
  - **Academic Performance**
  - **Cannibal Amotivational Syndrome**
- **#2 - Gonads**
  - **80% reduction in testosterone**
  - **60% increase in birth defects (male)**

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

- **350 carcinogenics**
- **Accelerated cancer- throat, brain, lung**
  - 1 joint = 20 NON-filtered cigs
  - longer exposure, deeper inhalation
- **Is now considered *moderate* to *highly* psychologically addictive**
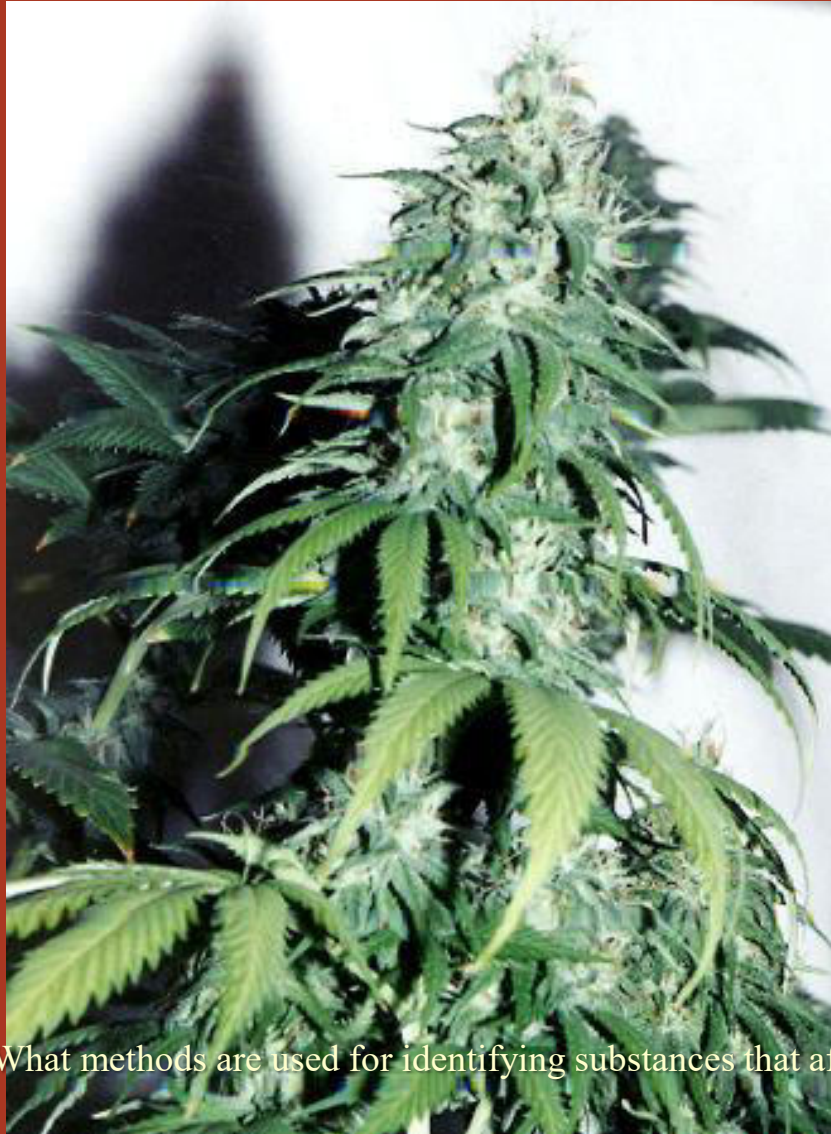- **Still against the law**

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

FLOWER AREA

VEG AREA

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

EQ: What methods are used for identifying substances that affect the body?

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Marijuana Con't

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

EQ: What methods are used for identifying substances that affect the body?

Marijuana Con't

EQ: What methods are used for identifying substances that affect the body?

LSD

- **Lysergic Acid Diethylamide**
- **Synthesized from lysergic acid**
  - **derived from ergot, a rye fungus**
  - **not particularly hard to manufacture**
- **25 µg cause hallucinations that last 12 hours**
- **Does not metabolize**
  - **flashbacks**

EQ: What methods are used for identifying substances that affect the body?

LSD

- **Personality disorders**
  - **Alters brain scan profiles**
- **Occasional permanent effects**
- **Sold in liquid, blotter paper, and sugar cubes, tablets**
  - Urban Myth that dealers use cartoons to lure kids into early use
  - Printing on blotter paper is a "branding of a particular lab

EQ: What methods are used for identifying substances that affect the body?

32
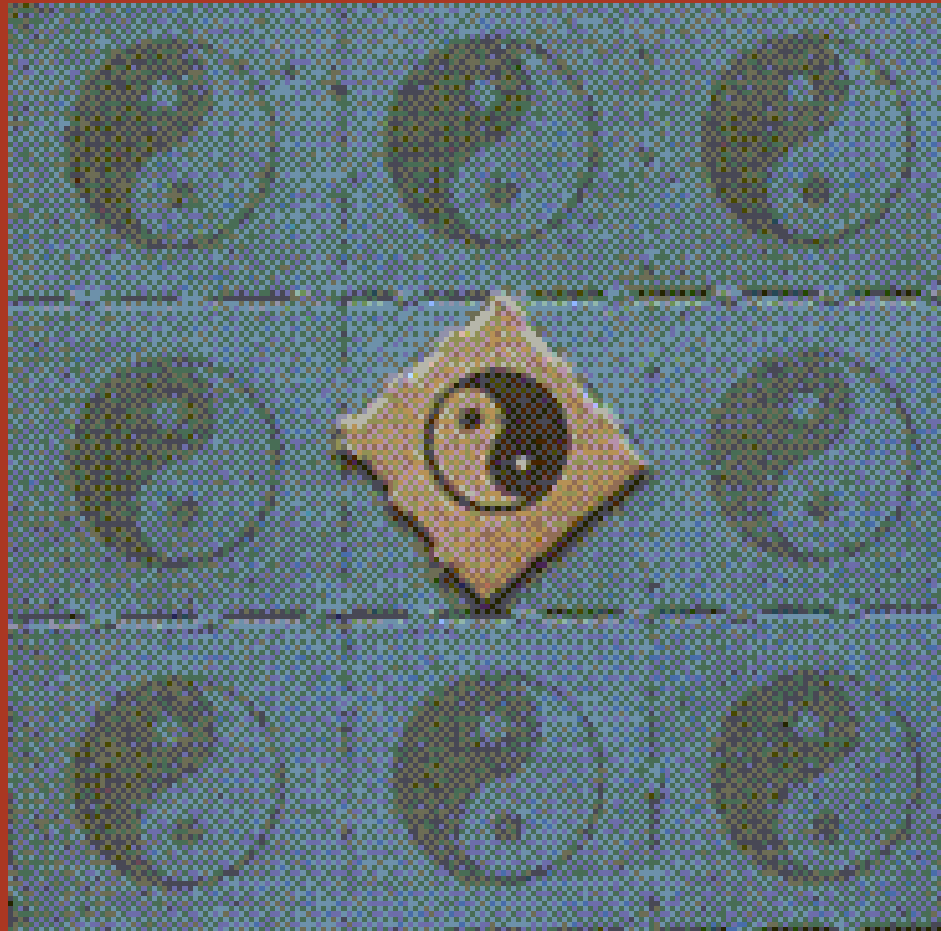
LSD

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EQ: What methods are used for identifying substances that affect the body?

LSD

EQ: What methods are used for identifying substances that affect the body?

LSD

EQ: What methods are used for identifying substances that affect the body?

Day 2

EQ: What methods are used for identifying substances that affect the body?

Psilocybin

- **Found in certain mushrooms**
- **Poisoning possible**

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EQ: What methods are used for identifying substances that affect the body?

Other Abused Prescription Drugs

- Various drugs are used
  - Some "off label"
  - Some veterinary drugs

EQ: What methods are used for identifying substances that affect the body?

Ketamine

- **Animal anesthetic**
  - **can be classified as a depressant and/or hallucinogenic**
- **Special K, Vitamin K, Ket**

EQ: What methods are used for identifying substances that affect the body?

39

Ketamine

檢出 **Ketamine**
管制藥品管理局

EQ: What methods are used for identifying substances that affect the body?

Benzodiazepine

- **Developed as a tranquilizer**
- **Replaced many barbiturates**
- **Very addictive**
- **Very dangerous when mixed with alcohol, other drugs**
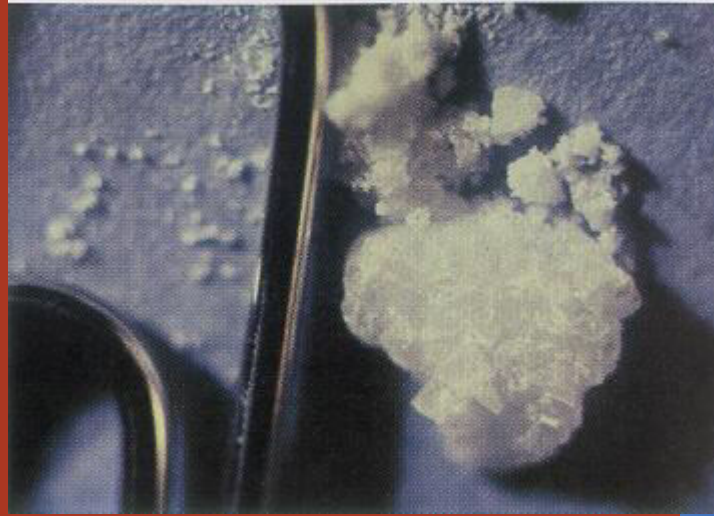- **Valium, Xanax, Lorazepam, Clonazepam**

EQ: What methods are used for identifying substances that affect the body?

41

Benzodiazepine

EQ: What methods are used for identifying substances that affect the body?

42

Phencyclidine (PCP)

- **Large animal tranquilizer**
  - **can be classified as a depressant**
- **Angel Dust**
- **Major effects**

EQ: What methods are used for identifying substances that affect the body?

43

Phencyclidine (PCP)

EQ: What methods are used for identifying substances that affect the body?

MDMA

- **Methylenedioxymethamphetimine**
- **Ecstasy**
- **"Designer Drug"**
- **Street drug is usually heroin and cocaine mix**
- **Fatal side effects**

EQ: What methods are used for identifying substances that affect the body?

45

MDMA

EQ: What methods are used for identifying substances that affect the body?

46

Anabolic Steroids

- **Little or no long term performance enhancement**

- **Liver cancer and malfunction**

- **Roid Rage**

- **Sex problems**

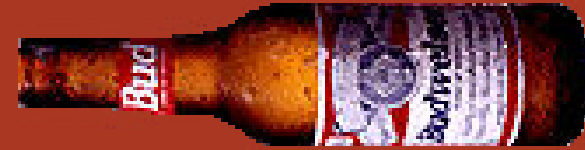EQ: What methods are used for identifying substances that affect the body?

Anabolic Steroids

EQ: What methods are used for identifying substances that affect the body?

Depressants -Alcohol

- **Major impairment of judgment even at low doses**

- **In-Toxic-Ation**
  - **putting poison in body**

- **#1 contributing factor in: death of males 14-28, teen suicide, traffic accidents and fatalities, violence, rape, homicides, paralytic accidents, teen pregnancy, AIDS**

EQ: What methods are used for identifying substances that affect the body?

49

Depressants - Barbiturates

- **Downers**
- **Derivatives of barbituric acid**
  - **discovered by Von Bayer**
- **Quaaludes, Amytal, Nembutal, Seconal, Mebaral, Pentothal, Brevital and Luminal**
- **Oral ingestion**

EQ: What methods are used for identifying substances that affect the body?
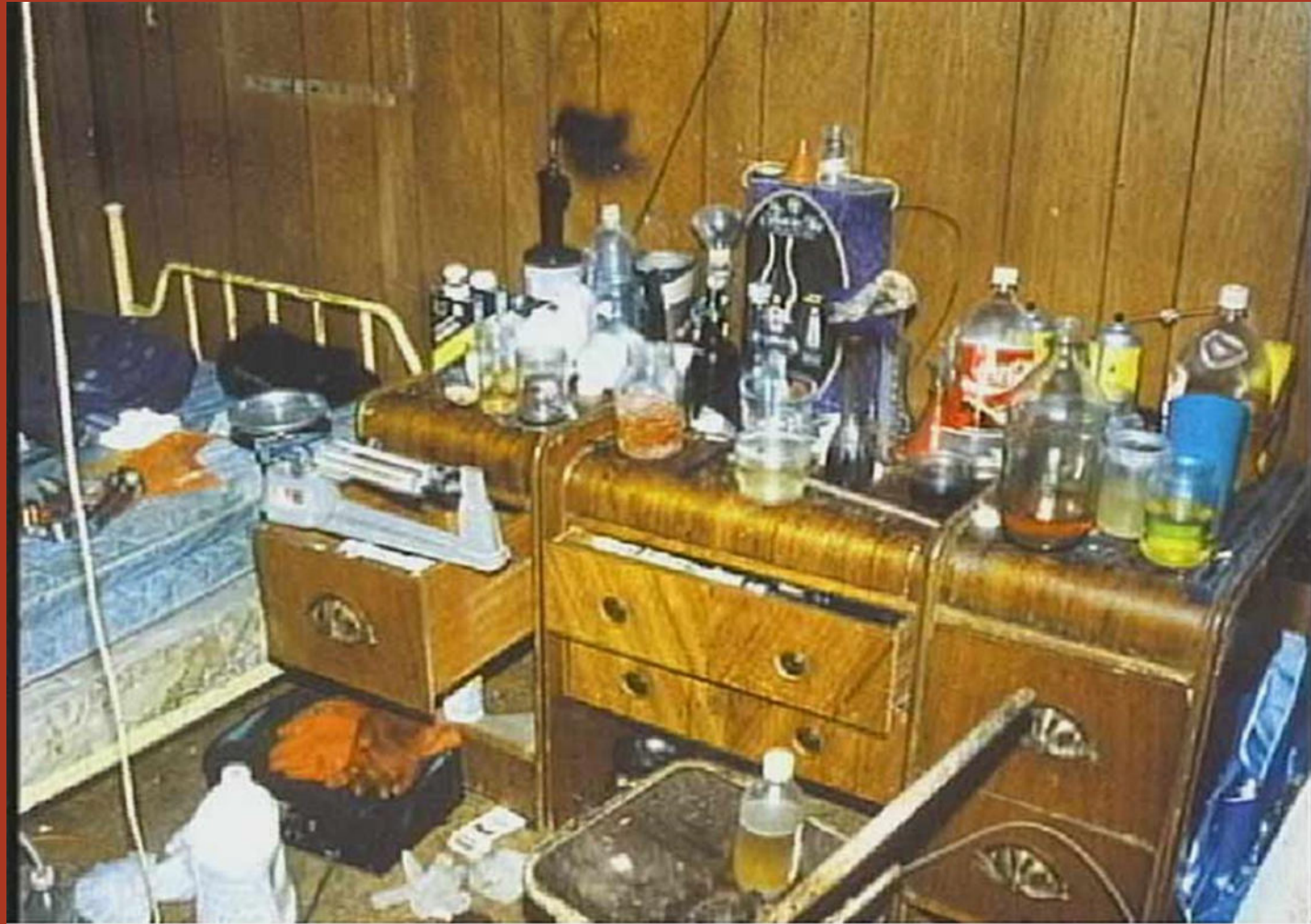
50

Depressants - Barbiturates

EQ: What methods are used for identifying substances that affect the body?

Stimulants

- **Amphetamines: Uppers, speed**
- **Increasingly popular**
- **Methamphetamines - crank, ICE**
- **Highly addictive**
- **Includes several weight pills**
- **Crystal Meth now a major issue nationwide**

EQ: What methods are used for identifying substances that affect the body?

Stimulants

EQ: What methods are used for identifying substances that affect the body?

Stimulants

EQ: What methods are used for identifying substances that affect the body?

Stimulants

- **Cocaine**
- **Extracted from coca leaves**
- **Crack - smokeable form of cocaine, similar to freebase**
  - **highly addictable, low rehab %**

EQ: What methods are used for identifying substances that affect the body?

55

Stimulants

EQ: What methods are used for identifying substances that affect the body?

Stimulants

$10,000-$30,000

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EQ: What methods are used for identifying substances that affect the body?

Stimulants

EQ: What methods are used for identifying substances that affect the body?

58

Drug Evidence Collection

- **Use common sense**
- **Watch sharps/needles**
- **We don't swab our gums**
- **Meth labs particularly dangerous**
  - **Hazmat team required**
- **Chain of custody is critical**

EQ: What methods are used for identifying substances that affect the body?

Controlled Substances Act

Schedule I—high potential for abuse; no currently accepted medical use in the U.S.; a lack of accepted safety for use under medical supervision

Examples: heroin (diacetylmorphine), LSD, marijuana, ecstasy (MDMA)

Schedule II—high potential for abuse; a currently accepted medical use with severe restrictions; abuse may lead to severe psychological or physical dependence

Examples: cocaine, morphine, amphetamines (including methamphetamines), PCP, Ritalin

EQ: What methods are used for identifying substances that affect the body?

Controlled Substances Act, *continued*

Schedule III—lower potential for abuse than the drugs in I or II; a currently accepted medical use in the U.S.; abuse may lead to moderate physical dependence or high psychological dependence

Examples: intermediate-acting barbiturates, anabolic steroids, ketamine

Schedule IV—low potential for abuse relative to drugs in III; a currently accepted medical use in the U.S.; abuse may lead to limited physical or psychological dependence relative to drugs in III

Examples: stimulants and depressants including Valium, Xanax, Librium, phenobarbital, Darvon

EQ: What methods are used for identifying substances that affect the body?

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Controlled Substances Act, *continued*

Schedule V—low potential for abuse relative to drugs in IV; currently accepted medical use in the U.S.; abuse may lead to limited physical or psychological dependence relative to drugs in IV

Examples: codeine found in low doses in cough medicines

EQ: What methods are used for identifying substances that affect the body?

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Day 3

EQ: What methods are used for identifying substances that affect the body?

Forensics

Unit 6: Drugs & Toxicology

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EQ: What methods are used for identifying substances that affect the body?

Physicians' Desk Reference

- Identifies manufactured pills, tablets, and capsules

- Updated each year

- A quick and easy identifier of the legally made drugs that may be found at a scene

- Gives a picture of the drug and states whether it is prescription, over-the-counter, or a controlled substance

- It also gives more detailed information

EQ: What methods are used for identifying substances that affect the body?

65

Human Components Used for Drug Analysis

Blood

Urine

Hair

Gastric contents

Bile

Liver tissue

Brain tissue

Kidney tissue

Spleen tissue

Vitreous humor of the eye

Drug Identification

Screening or presumptive tests

Spot or color tests

Microcrystalline test: a reagent is added, producing a crystalline precipitate that is unique for a certain drug

Chromatography

Confirmatory tests

Spectrophotometry

- Ultraviolet (UV)
- Visible
- Infrared (IR)

Mass spectrometry

Drug Identification

Screening or presumptive tests only tell that the drug is *possibly* present.

Confirmatory tests tell that the drug is *positively* present.

(Screening tests are easier, cheaper, and quicker to use.)

Presumptive Color Tests

Marquis—turns purple in the presence of most opium derivatives and orange-brown with amphetamines

Dille-Koppanyi—turns violet-blue in the presence of barbiturates

Duquenois-Levine—turns a purple color in the presence of marijuana

Van Urk—turns a blue-purple in the presence of LSD

Scott test—color test for cocaine; blue

Forensics

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Toxicology

- **"Study of Poisons"**
- **In Georgia medical examiners offices and the GBI handle most toxicology needs**
- **Alcohol major aspect of job**
- **Drugs second**

EQ: What methods are used for identifying substances that affect the body?

Toxicologist

- **Must figure out the impossible**
- **Relies on medical examiner, police, family to figure out what to look for**
- **90% of the time it is alcohol and/or cocaine**
- **Looks for cause of death due to poisoning – Michael Jacksons death brought this role to public attention**

EQ: What methods are used for identifying substances that affect the body?

Poisoning

- **Drug overdoses are common**
- **Heavy metal (arsenic, bismuth) poisonings are rare - easy test**
- **Carbon Monoxide very common**
  - **look for carboxyhemoglobin**
  - **lack in blood from fire victim indicates they were dead before fire happened**

EQ: What methods are used for identifying substances that affect the body?
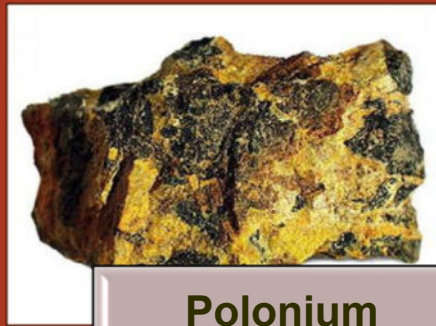
73

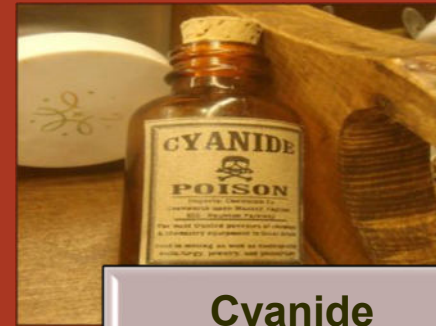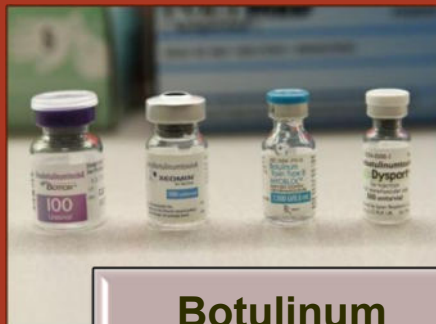**Hemlock**

Belladonna
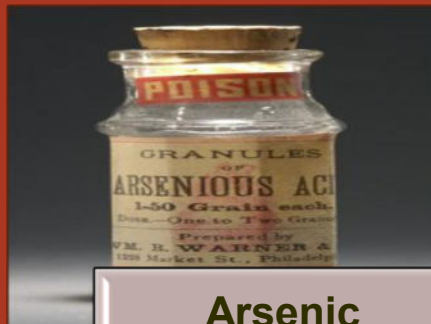
Dimethylmercury

Polonium

Mercury

Cyanide

Botulinum

Arsenic

Ethylene Glycol

EQ: What methods are used for identifying substances that affect the body?

Alcohol

- **Absorption- 30 to 90 minutes, depends upon other factors- diet**
- **Distribution- via blood**
- **Elimination- oxidation and excretion**
- **Equal amount in blood as in breath**

EQ: What methods are used for identifying substances that affect the body?

Alcohol

- **Field sobriety tests**
- **Used to determine impairment to justify tests**
  - **horizontal gaze nystagmus**
  - **one leg stand**
  - **walk and turn**
- ***Covered in CJE***

EQ: What methods are used for identifying substances that affect the body?

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Alcohol

- **Two main ways to test:**
  - blood chemical analysis
  - breath tests
- **Breathalyzer- determines alcohol by measuring light absorption before and after alcohol reaction**
- **Intoxilyzer- uses infrared absorption to measure alcohol**
  - court admissible alone

EQ: What methods are used for identifying substances that affect the body?

Alcohol

- **Gas Chromotography used to determine Blood Alcohol Concentration (BAC)**

EQ: What methods are used for identifying substances that affect the body?

Collection of blood

- **Do not use alcohol disinfectant**

- **Drawn and refrigerated**

- **From deceased: Heart, Femoral, and Cubital**

- **Blood samples still used in testing for drugs and severe car accidents**

EQ: What methods are used for identifying substances that affect the body?

Tyler

Robby, Drew, Matt, John, Reagan

4 Years

EQ: What methods are used for identifying substances that affect the body?

Forensics

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Day 4

EQ: What methods are used for identifying substances that affect the body?