METHADONE AND DRIVING

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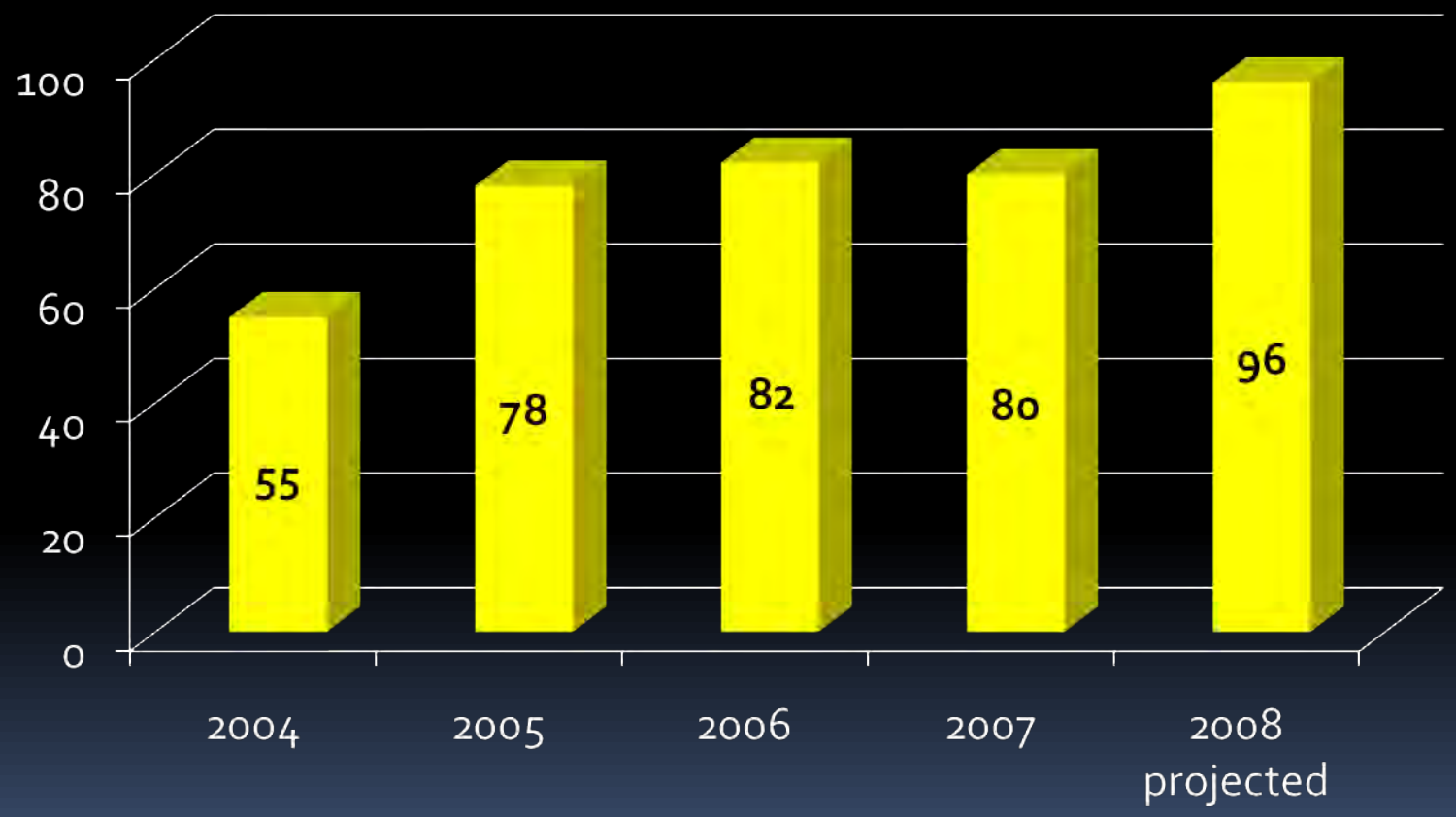
Are people taking methadone and driving?

Methadone prevalence in DUID cases New Hampshire – Dept of Safety

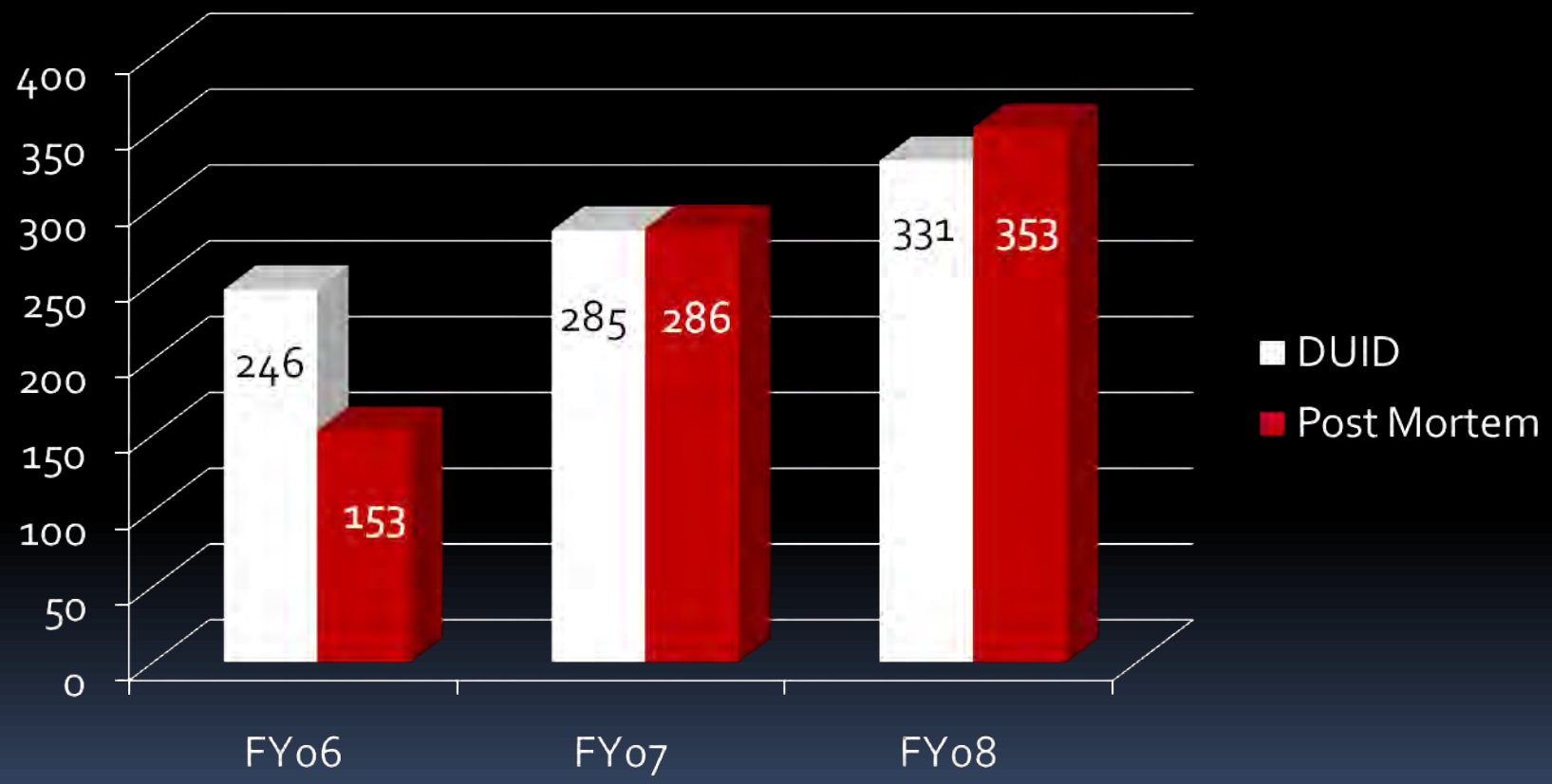
- 2007 Statistics
  - 52 cases were positive for Methadone
    - Approximately 3%
  - 39 out of 52 highway related; 4 MVA
  - 13 out of 52 – OCME; 3 fatal MVA

Methadone prevalence in DUID cases NYSP



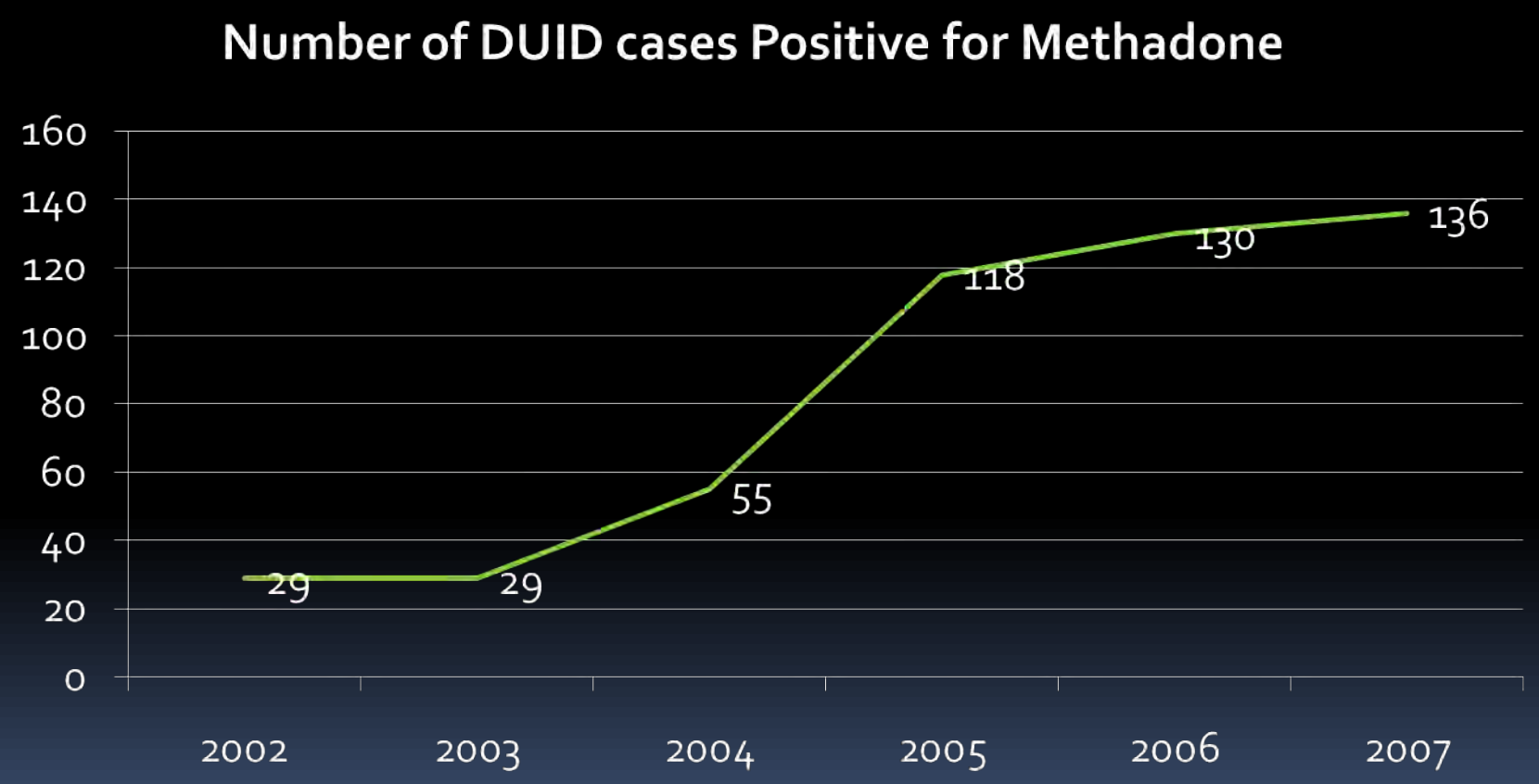
Methadone identified in 3.6% of all DUID cases in the last 3 years

Methadone prevalence in DUID cases Georgia Bureau of Investigation



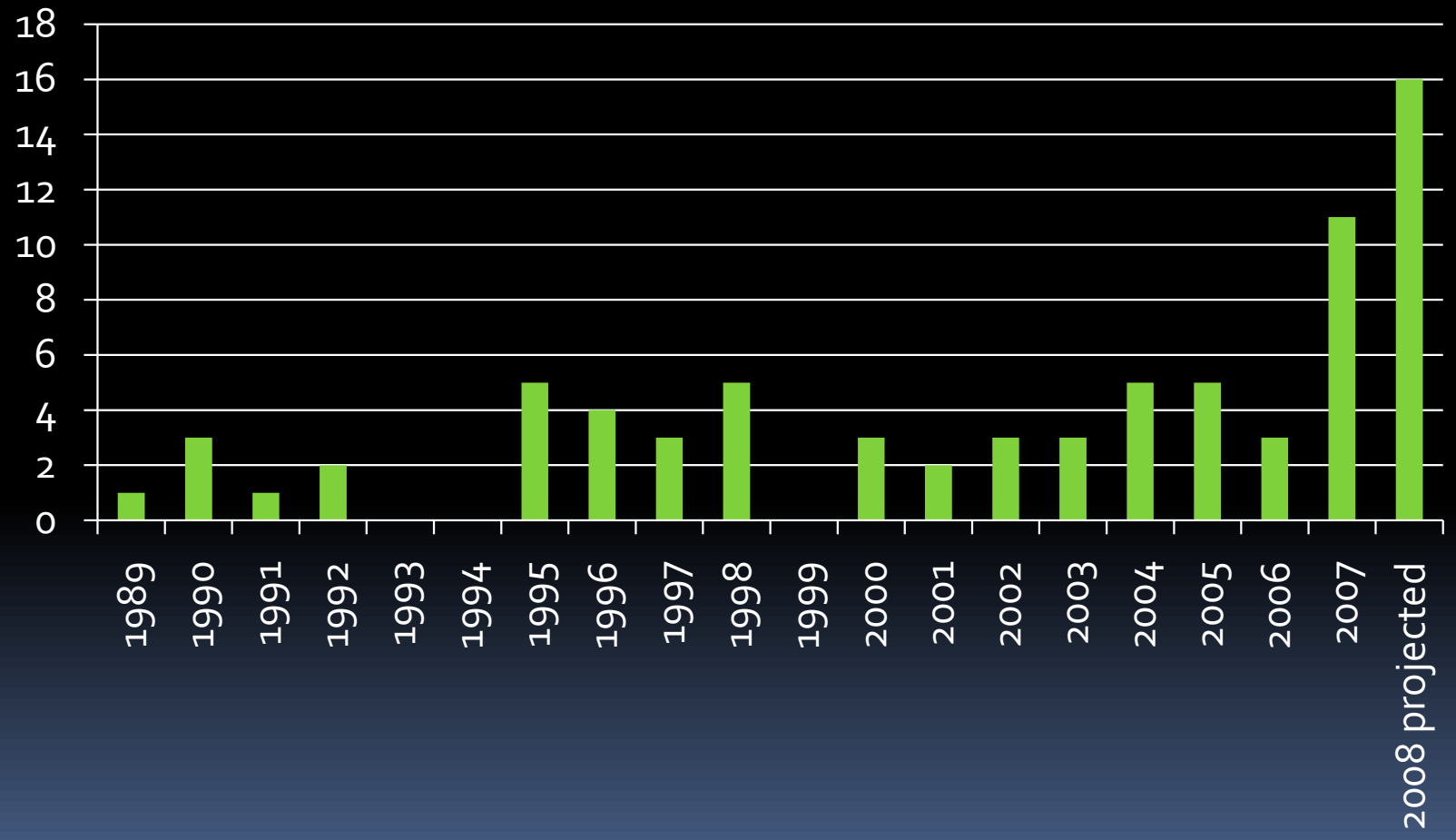
A 35% increase in the number of methadone identification in DUID cases - 8.7%+
A 130% increase in the number of methadone identifications in PM cases – 9.7%+

Methadone prevalence in DUID cases Wisconsin State Laboratory of Hygiene

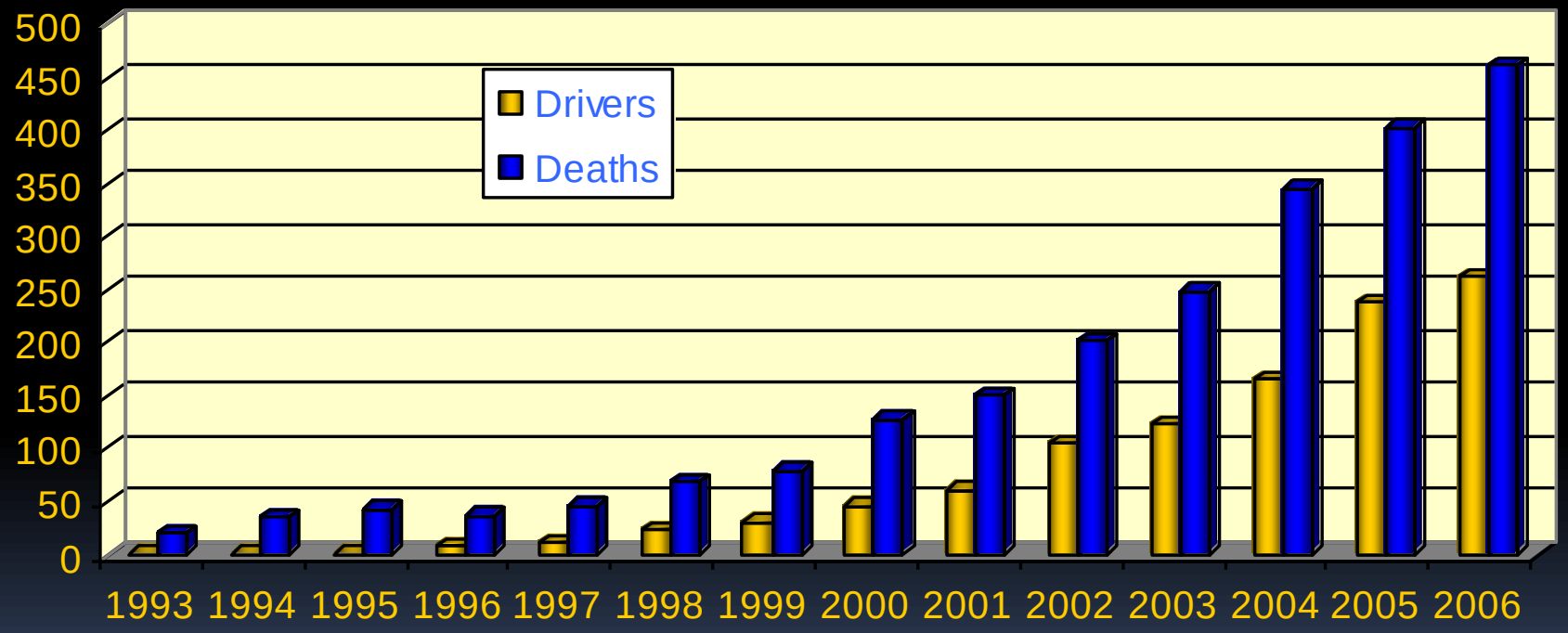


Methadone is the 7th most frequently identified drug
Increased from 2 – 5 % of drug positive cases

Methadone prevalence in DUID Cases Southwestern Institute of Forensic Sciences



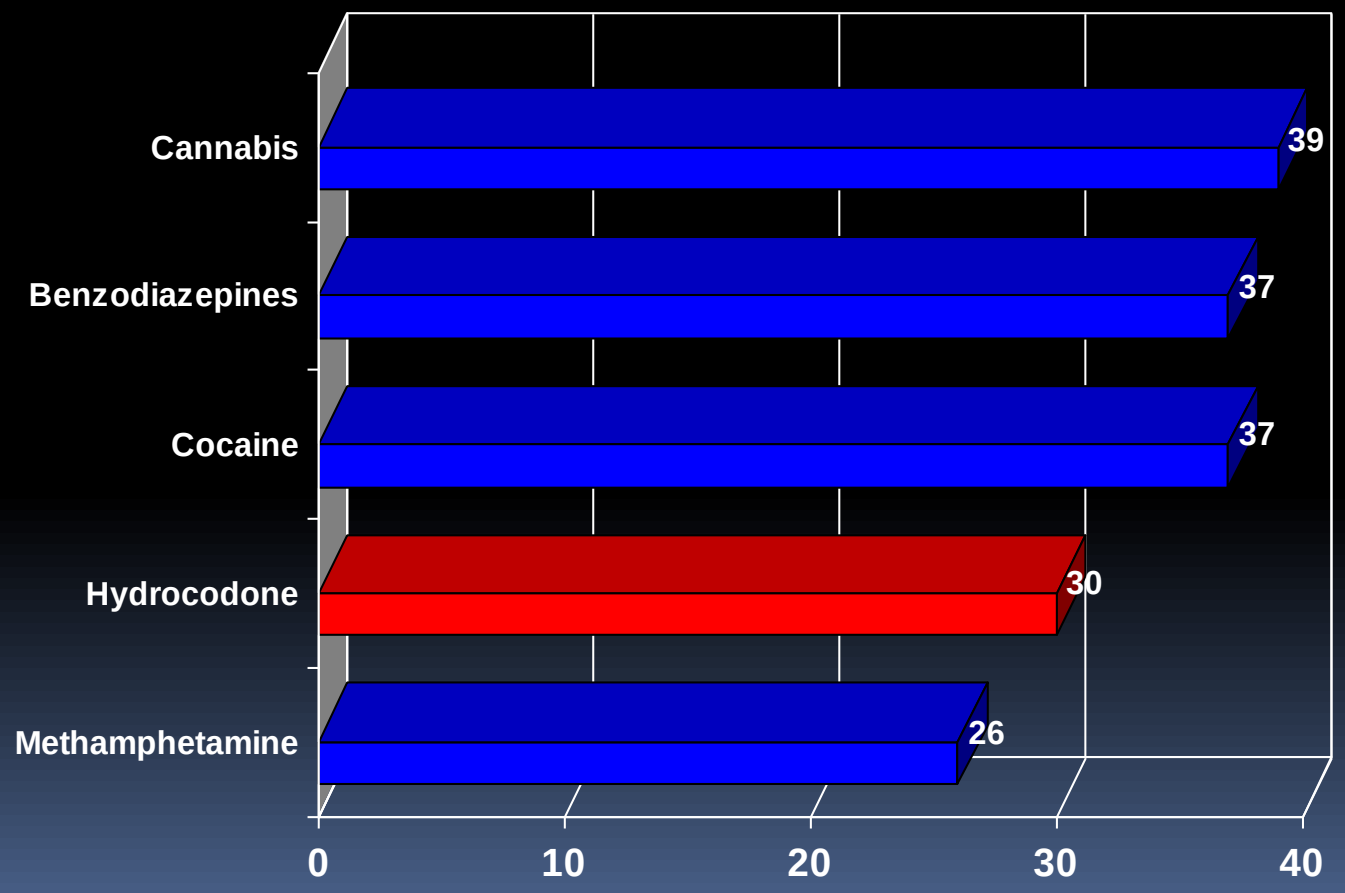
Methadone Case Increase WA State



2006 - Methadone was detected in 7.4% of our 9789 cases.
262 impaired drivers (5.4%) and 463 death investigation (10%) cases
The 5th most frequently found drug other than ethanol in DUID cases

2004 – 2005 SOFT/AAFS Survey of DRE Labs Most Frequently Encountered Drugs

(no data from 3 labs; N = 39)



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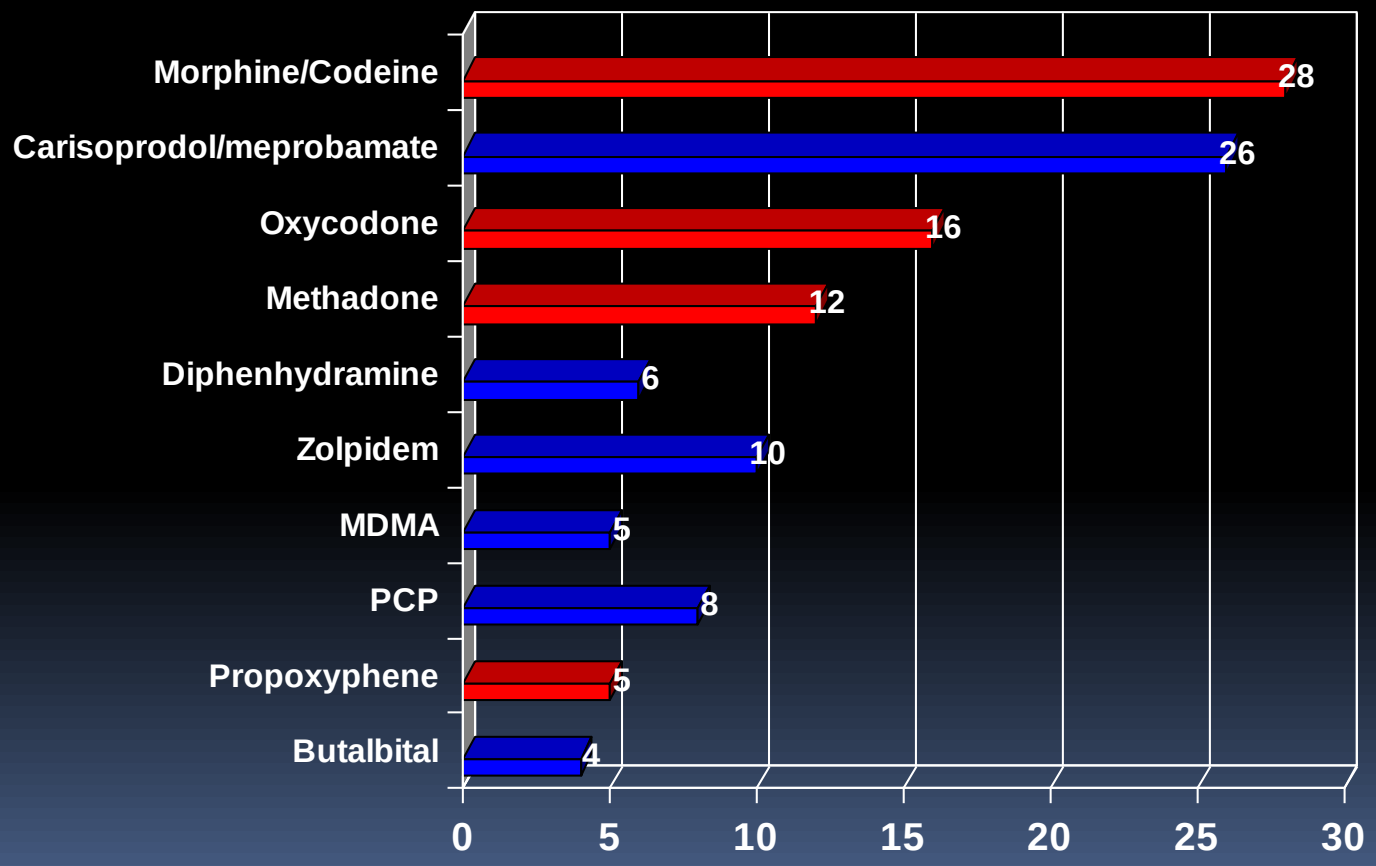
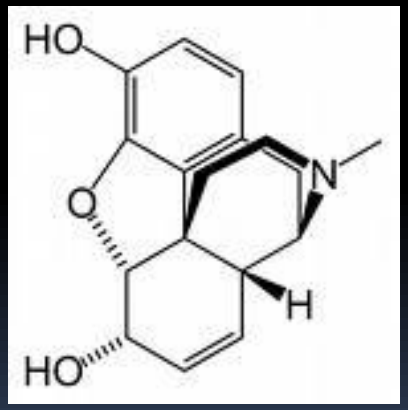
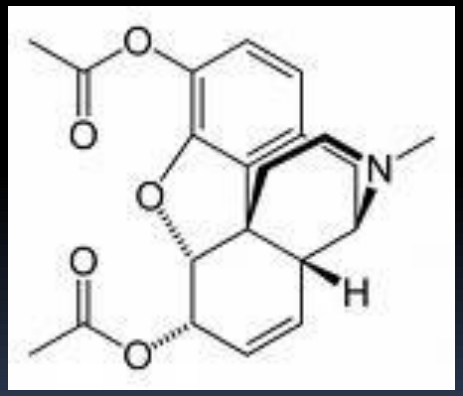


History

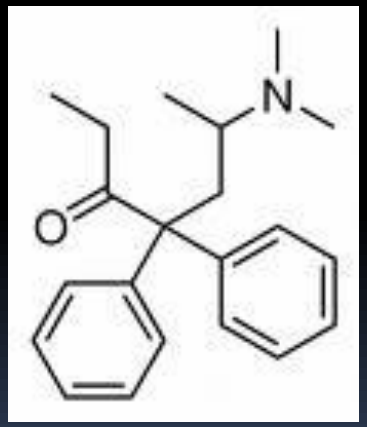
- Synthesized in 1937, during World War II, by German scientists
- A synthetic Opioid
- Chemically unlike morphine or heroin



Morphine



Heroin



Methadone

History

- Introduced into the United States in 1947 as an analgesic by Eli Lilly and Company
- 1964 began use in Methadone Maintenance Treatment
- Since 2000 it has been increasingly prescribed for pain management

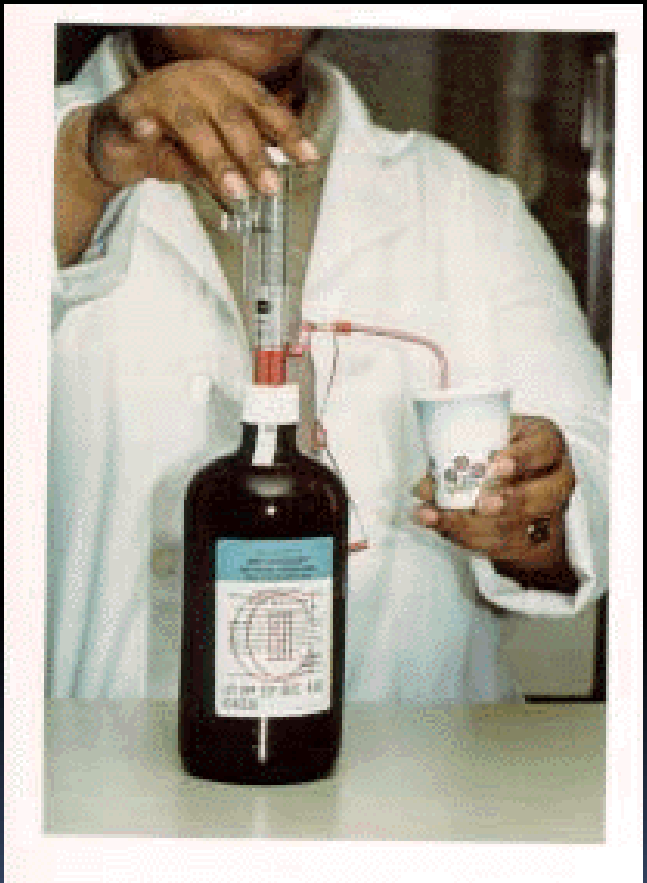
- Schedule II – Controlled Substance Act

Methadone Maintenance Therapy

- 1999 – 20% of the estimated 810,000 heroin addicts receive MMT = 162,000
- MMT:
  - Individualized health care
  - Medically prescribed opioid
  - Administered orally on a daily basis
  - Strict program conditions and guidelines
- The patient remains physically dependent on a opioid but is freed from the uncontrolled, compulsive and disruptive behavior
- Improved subject health
- Decreased criminal activity
- Increased employment

U.S. Formulations

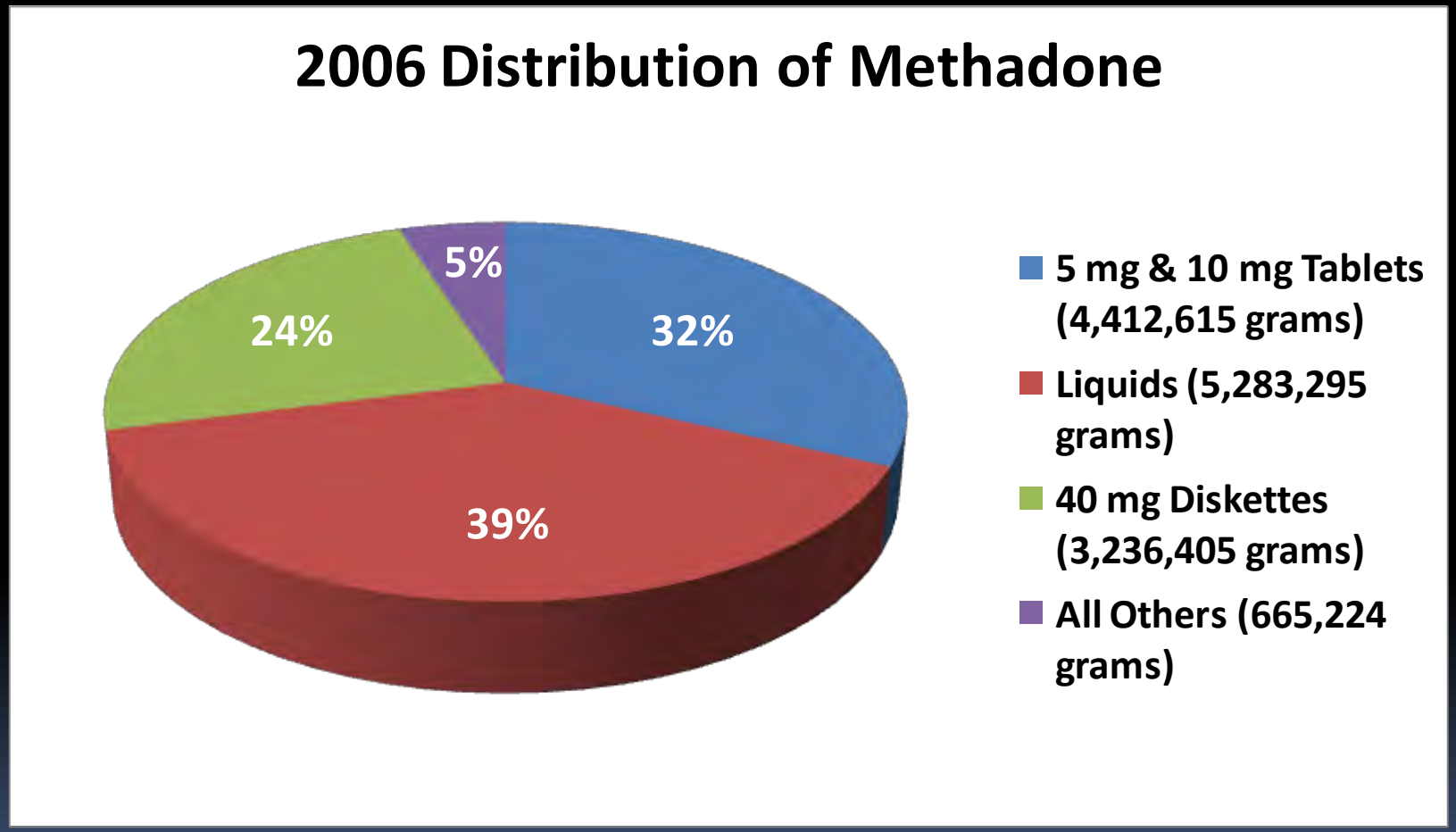
- **Oral Solutions**
  - **10 mg of methadone hydrochloride per mL.**
  - **Methadose™ Oral Concentrate**
    - **Cherry flavored liquid concentrate.**
  - **Methadose™ Sugar-Free Oral Concentrate (methadone hydrochloride USP) is a dye-free, sugar-free, unflavored liquid concentrate of methadone hydrochloride.**



U.S. Formulations

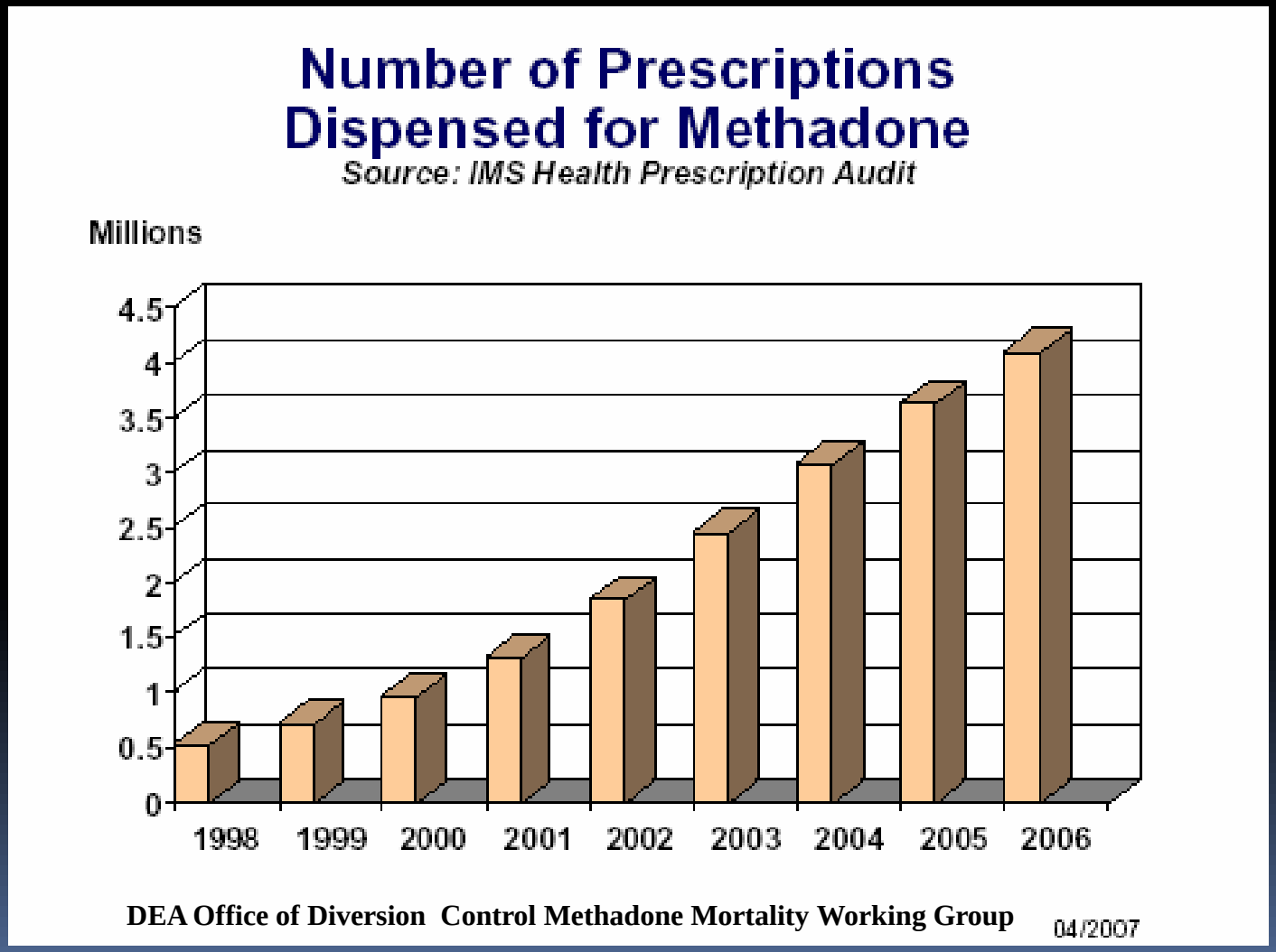
- Tablets
  - 5 mg, 10 mg
  - Dolophine® Hydrochloride
- Diskets (dispersible tablet)
  - 40 mg methadose wafers
  - formulated with insoluble excipients to deter the use of this drug by injection
- Other:
  - 10mg/mL intensol
    - Intended to be diluted with at least 1 ounce of liquid
  - 10 mg/mL , 50 mg/1mL and 50 mg/2mL ampoules
  - Linctus - 2mg/5mL used in the UK for treating coughing in terminal disease

Current Methadone Use



Source: DEA ARCOS 04/2007
DEA Office of Diversion Control Methadone Mortality Working Group

Current Methadone Use



Effects

- Low to moderate doses

- Analgesia - Pain relief
- Decreased Drug Craving
- Respiration depressed
- Pupils constricted (miosis)
- Constipation
- Subjective effects:
  - Drowsiness
  - Light Headed
  - Dizziness
  - Headache
- Suppressed cough reflex
- Decreased appetite
- Sweating
- Reduced sex drive
- A variety of hormonal changes

Effects

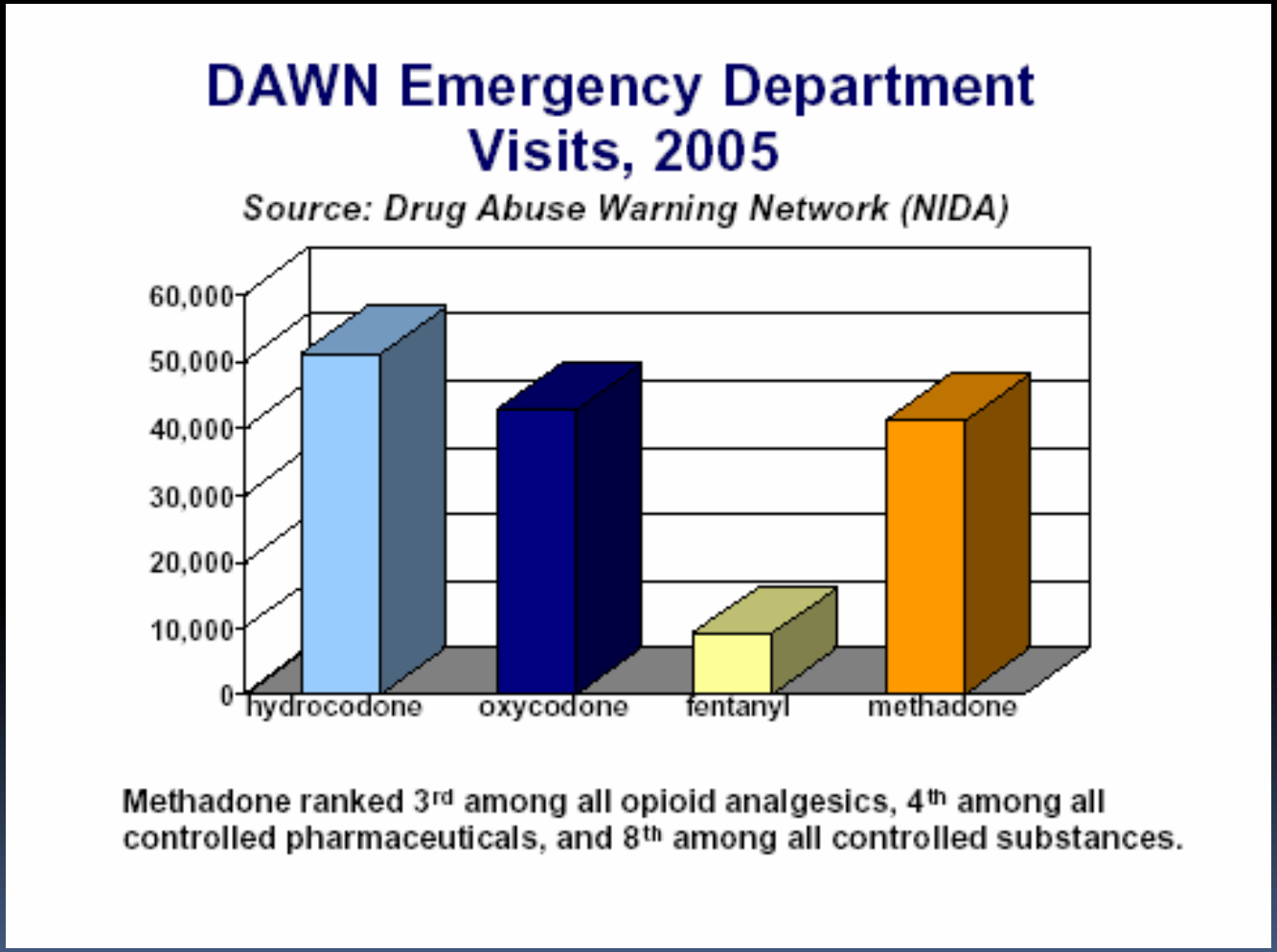
- Slightly higher doses
  - Euphoria
    - May experience restlessness and anxiety (dysphoria)
  - Agitation
  - Confusion
  - Disorientation
  - Nausea and vomiting more common
- Highest doses
  - Unconsciousness
  - Decreased body temperature and blood pressure
  - Constricted pupils often used as an indicator of OD
  - Respiration rate now dangerously low and is the cause of death in OD
  - Cardiac Conduction Effects

Effects

- Additive effects with other opioids
- Additive effects with Alcohol

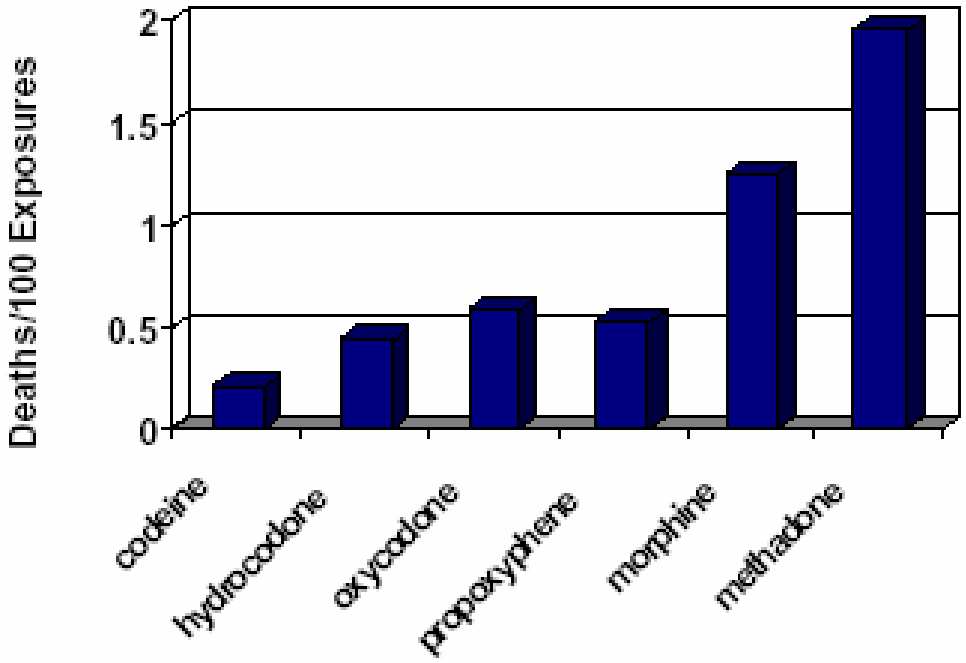
- Additive effects with CNS Depressants

Current Methadone Use



Current Methadone Use

Poison Control Data, 2005: Number of Deaths Per 100 Exposures



Source: American Association of Poison Control Centers (AAPCC)

Methadone-Associated Mortality

Methadone Mortality Working Group – DEA Diversion; April 2007

Three Primary Scenarios:

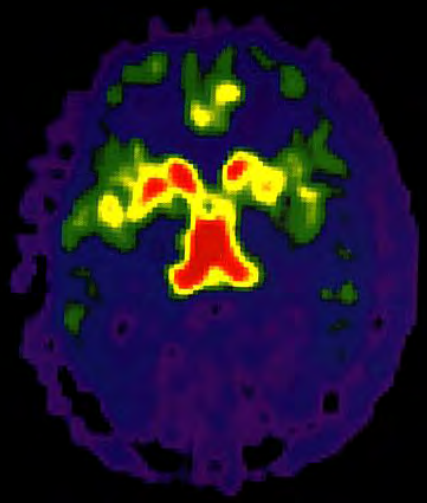
- **1) Accumulation to toxic levels of methadone during the start of opioid treatment or pain management due to overestimation of tolerance and methadone's long, often variable, half-life.**
- **2) Misuse of diverted methadone by individuals with little or no opioid tolerance.**
- **3) Synergistic effects of methadone in combination with other CNS depressants (i.e., alcohol, benzodiazepines or other opioids).**

Miosis

- Laboratory Studies
  - Weinhold and Bigelow, 1993
    - Methadone (50-60 mg p.o.).
    - Peak miosis was best detected under moderately dim interior lighting 90 min after methadone
  - Higgins etal, Clin Phamacol Ther. 1985
    - 20 mg methadone to 28 males beginning MMT
    - Miosis observed in all subjects
    - Proportional to reported heroin use and years since first opiate use

Opioid Receptors

- 1973 Discovery of opioid receptors
- Opiate drugs work by mimicking natural opiate-like molecules made and used in the brain.
  - 1975 - Identified the first endogenous brain opioids, called endorphins.
- Three major receptor subtypes
  - Mu (m)
    - mu1 analgesia
    - mu2 respiratory depression
  - Kappa (k)
  - Delta (d)
- Principally found in the central nervous system and the gastrointestinal tract



PET scan of opiate receptors in human brain

www.biodavidson.edu

Euphoria – Reinforcing Effect

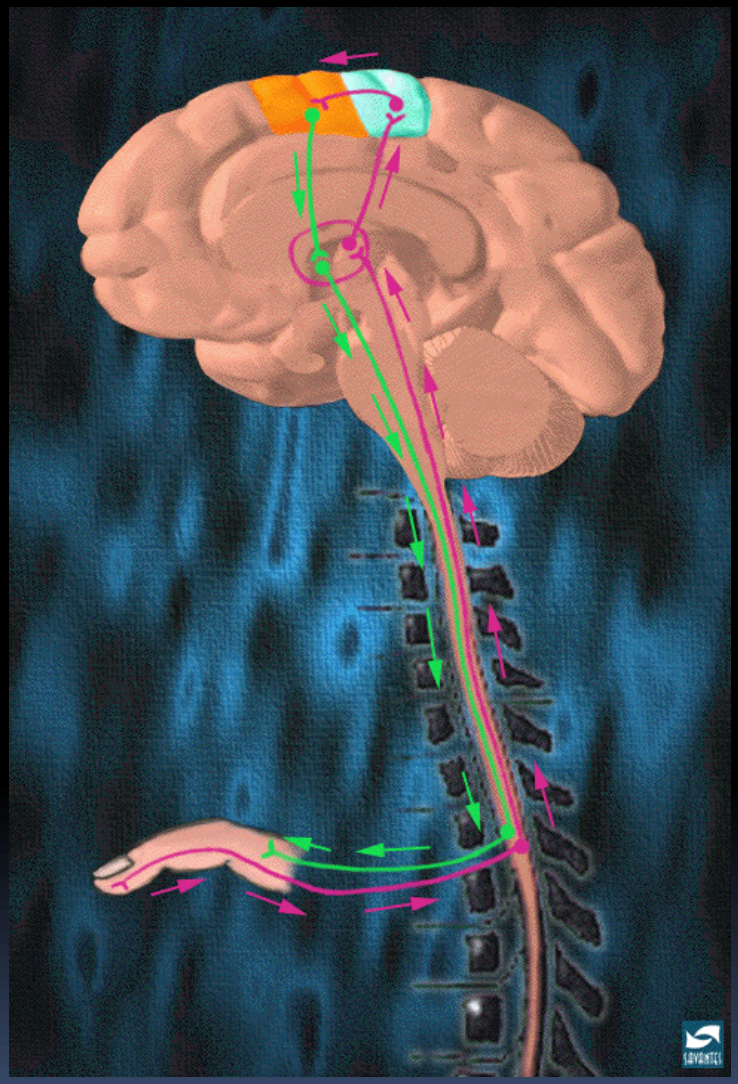
- Limbic system
  - Main regulator of emotion
  - Surrounds the brain stem below the cerebral cortex
  - Opiate receptors very dense
- Euphoria
  - Opioids are not rapidly removed as endorphins are
  - Activate receptors for extended periods
  - Increases dopamine level in nucleus accumbens
- Reinforcing effects seem to also be due to other factors not completely understood

Pain

- **Incidence**
  - **2006 National Center for Health Statistics Report**
    - **26% of Americans (76.5 million) over 20 years of age had pain of any sort that persisted for more than 24 hours**
  - **Pain affects more Americans than diabetes, heart disease and cancer combined.**
- **Duration**
  - **1999-2002 Study of people over 20 years of age**
    - **12% pain for 1-3 months**
    - **14% pain for 3-12 months**
    - **42% pain for more than one year**

Opioids vs Pain

- Analgesia – reduced sensitivity to pain
- Opioids bring pain relief by interfering with the pain perception pathway in the nervous system
  - Spinal cord
    - Interfere with transmission of the pain messages between neurons - preventing them from reaching the brain
    - Interrupt the descending message from the brain to the spinal cord
  - Brain
    - Emotional and hormonal aspects
    - Changes the subjective message received; still feel the pain but it no longer bothers you



Tolerance

- Chronic use
  - Leads to changes in the nervous system
- Develops quite rapidly
- Does not occur for all pharmacological effects to the same extent or at the same rate
  - No or minimal tolerance to constipating effects or miosis

- Significant loss of tolerance may occur as quickly as three days without methadone
  - After 5 days the body has essentially eliminated the drug and any drug intake should progress as if starting a dosing program

Tolerance

- Mechanisms responsible for tolerance
  - Increased rate of metabolism
    - Drug disposition tolerance
      - An increase in liver enzymes
  - Classical conditioning (effect of environmental cues)
  - Changes in nerve cells
    - Adaptive mechanism to return the organism to homeostasis
      - Gradual increase in cell firing rate
      - cAMP production increases to pre-opioid level

- Example: 50 mg has proven fatal; 180 mg/day in MMT; up to 780 mg/day in rare instances

Cross-tolerance

- Exists among all opiates
- Differences in receptor subtypes
  - Selective agonist for μ-receptor will reduce the effectiveness of other μ-receptor agonists but only minimally reduce κ-agonist activity

- Patients tolerant to another opioid may be incompletely tolerant to methadone
- Deaths have occurred from "physician induced" overdose

Withdrawal

Symptoms generally develop more slowly and are less acutely severe than those of morphine and heroin withdrawal, but are usually more prolonged.

Acute Action

- Analgesia
- Respiratory depression
- Euphoria
- Relaxation and sleep
- Tranquilization
- Decreased blood pressure
- Constipation
- Pupil constriction
- Hypothermia
- Drying of secretions
- Reduced sex drive
- Flushed and warm skin

Withdrawal Sign

- Pain and irritability
- Panting and yawning
- Dysphoria and depression
- Restlessness and insomnia
- Fearfulness and hostility
- Increased blood pressure
- Diarrhea
- Pupil dilation
- Hyperthermia
- Tearing, runny nose
- Spontaneous ejaculation
- Chilliness and “gooseflesh”

Psychopharmacology by Meyer and Quenzer

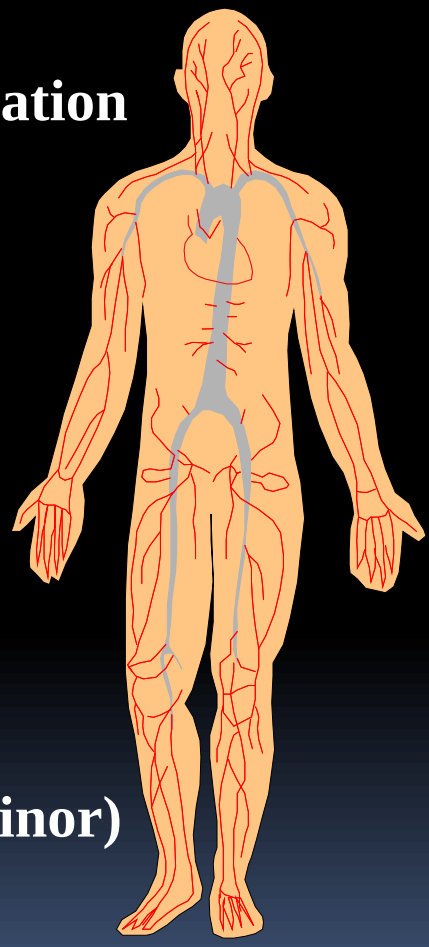
Withdrawal

- **Rapeli** ***et al, BMC Psychiatry, 2006, Feb 24;6:9***
  - **Evaluated cognitive function during the first few weeks of abstinence**
  - **Subjects with opioid dependence**
  - **Performed significantly worse in tests measuring complex working memory, executive function, and fluid intelligence**
  - **Correlation with days in withdrawal**
  - **Indicated a general deficit in higher order cognition**

Pharmacokinetics

The action of the body on the drug

- Absorption, Distribution, Metabolism, and Elimination



- Good Oral bioavailability = 36 – 99%
  - Peak plasma levels 1-4 hours
- Volume of distribution = 4-6.7 L/kg
- Long Half-Life 8-59 hours
- Metabolism: liver
  - CYP450: 2B6, 2C19, 3A4 (primary), 2C9, 2D6 (minor)
- Excretion: feces, urine

Pharmacokinetics

- Good Oral bioavailability 36-99%
  - Compared to morphine at 20-40%

Due to its chemical structure
Almost as effective as IV

- Large Volume of Distribution

Large VD =distribution into tissues; lipid soluble
Less reports of a "rush" effect

- Long Half-Life 8-59 hours
  - Compared to morphine at avg of 3 hours

Allows the drug to be given once daily
Much longer than the analgesic effect, typically 6 – 8 hours
Risk of additional doses being consumed for pain leading to respiratory depression

Pharmacokinetics

- **Metabolism: liver**
  - **Enzymes - CYP450: 1A2, 2B6, 2C19,**
    3A4 (primary), 2C9, 2D6 (minor),
- **Drug-drug interactions**
  - **These enzymes are used to metabolize large numbers of drugs**
  - **3A4 – approximately 2/3 of the PDR**
  - **Competitors – two drugs using the same enzyme**
  - **Inhibitors = generally will reduce metabolism; increase Methadone levels**
    - **Examples: Zithromax, Erythromycin, Sertraline,**
      Cimetidine, Prilosec, acute alcohol

Pharmacokinetics

- **Metabolism: liver**
  - **Enzymes - CYP450: 1A2, 2B6, 2C19,**
    3A4 (primary), 2C9, 2D6 (minor),
- **Drug-drug interactions**
  - **Inducers = generally will result in more rapid metabolism decreasing effects of Methadone**
    - **Examples: Phenytoin, St. John's Wort,**
      Carbamazepine, abstaining chronic alcoholic
- **Isoenzyme 2D6 is subject to genetic polymorphism**
  - **Rapid metabolizers and Slow metabolizers**

Pharmacokinetics

- **Excretion: feces, urine**
  - **Saliva, beast milk, hair, amniotic fluid, nails**

- **Primary metabolites:**
  - **EDDP - inactive**
  - **EMDP - inactive**
- **Minor metabolites:**
  - **Methadol - active**
  - **Normethadol - active**

- **Additional metabolites have been identified**

Blood Toxicology

Acute Oral Dosing (15-120 mg)	0.075 – 0.86 mg/L
Chronic Oral Dosing (100 - >200mg)	0.57 – 1.06 mg/L
DUI	0.05 – 0.64 mg/L
Med Examiner	0.02 – 5.3 mg/L

- Concentration ranges of subject groups overlap
- Determination of impairment from blood toxicology alone is not possible

POTENTIAL DEFENSES IN METHADONE DUID CASES

Defense:
The impairment is not due to the Methadone but to the pain I am suffering

Scientific Literature

- **Pain deteriorated performance more than oral opioid treatment in cancer patients**
- **Increase in reaction time correlated to pain intensity and not opioid dose**
- **Ability to maintain lane position impaired in pain patients compared to controls**

Defense:

The impairment is not due to the Methadone but to the pain I am suffering

Documentation

- **DRE Evaluation**
  - **Document performance impairment at the time of driving**
  - **Evaluation questions: Are you sick or injured? and Are you under the care of a physician?**
- **Comprehensive toxicology**
  - **Documentation of prescribed drugs and no other impairing drugs**

Defense:

The impairment is not due to the Methadone but to the other psychological disorders

Scientific Literature

- **Performance decrements better explained by:**
  - **Sociodemographic factors**
  - **Social and personality disorders**
  - **Implications of heroin use**
    - **Higher rate of alcohol dependence**
    - **Brain damage due to hypoxia in previous overdoses**
    - **Head injuries that occurred in drug impaired state**

Defense:

The impairment is not due to the Methadone but to the other psychological disorders

Documentation

- DRE Evaluation
  - Document performance impairment at the time of driving
  - Evaluation questions: Are you sick or injured? Are you under the care of a physician? Do you have any physical defects?
- Comprehensive toxicology
  - Documentation of prescribed drugs and no other impairing drugs

Defense:
In MMT and on a stable dose of Methadone

Scientific Literature

- No significant performance decrements in laboratory tests:
  - Memory test
  - Vigilance and simple reaction time
  - Visual functioning
  - Compensatory, pursuit, and critical tracking
- No decrement in maintaining lane position, speed and reaction time in a 75 minute driving simulator test
- Literature Reviews that conclude that opioids do not impair driving in the opioid-dependent person

Defense:
In MMT and on a stable dose of Methadone

Documentation

- **DRE Evaluation**
  - Document performance impairment at the time of driving
  - Evaluation questions: Are you under the care of a physician?
- **Methadone dose**
  - Inquire how long the subject has been on the current dose
  - Scientific Literature
    - Impairment with 30%increase in dose
- **Scientific literature**
  - Impaired psychomotor speed, decision making, inhibitory mechanisms, logical reasoning

Defense:
In MMT and on a stable dose of Methadone

Documentation

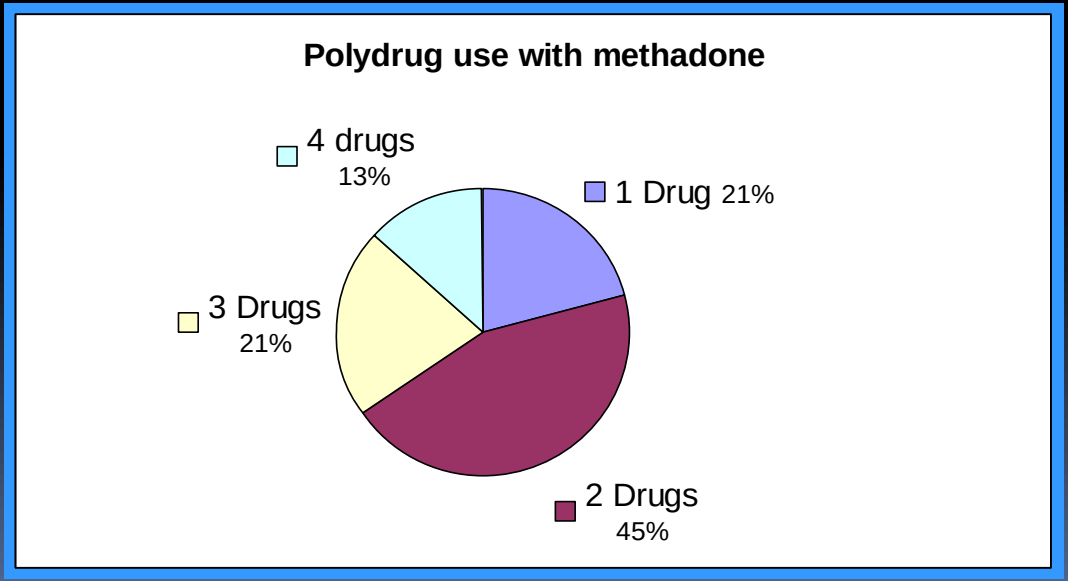
- Comprehensive toxicology
  - Documentation of no other drugs being consumed

Methadone and Polydrug Use

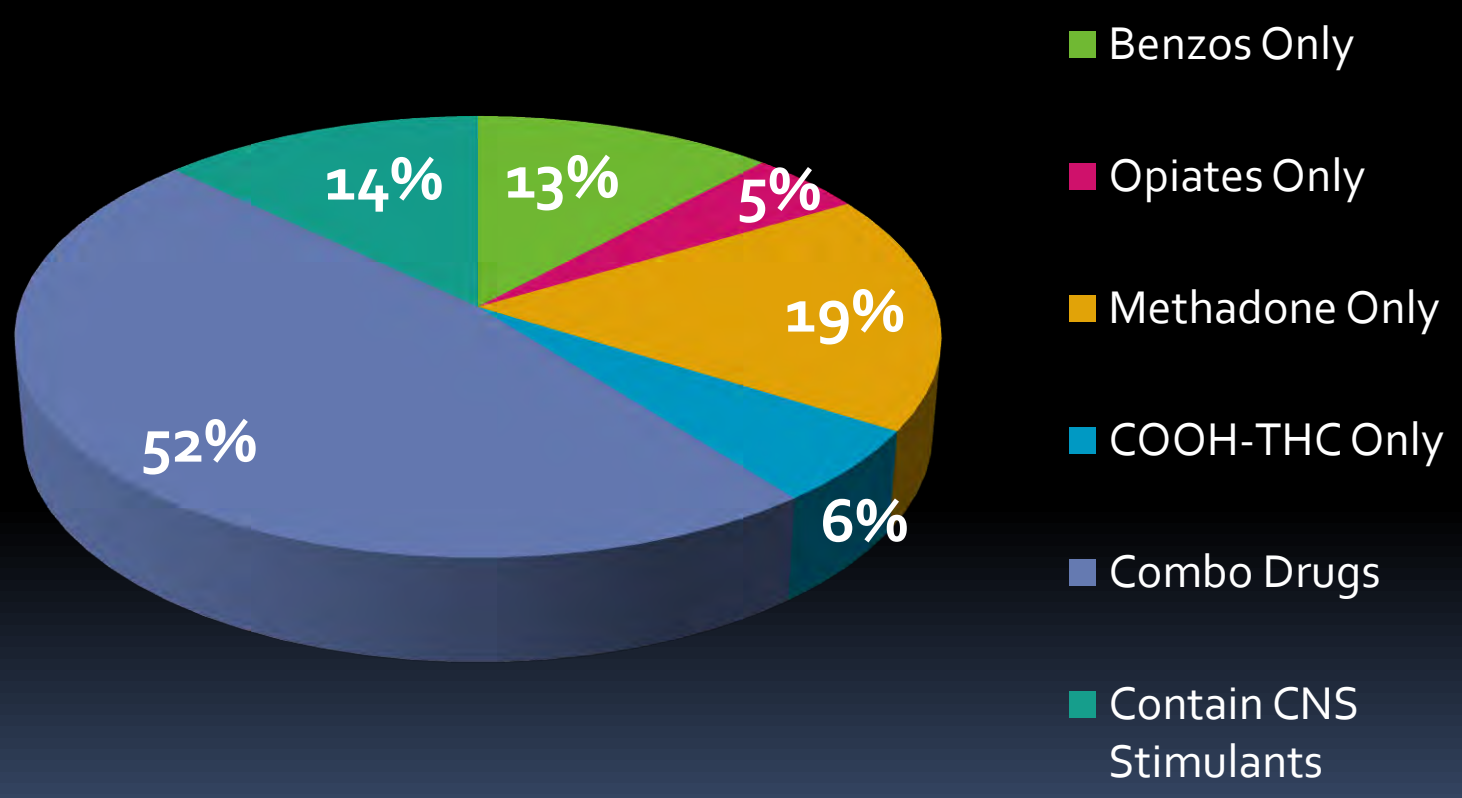
- **Search for Methadone only cases:**
  - **"I put the request out to all 400+ DREs and so far all methadone cases involved other drugs" – Dan Mulleneaux, Region I representative to TAP**
  - **"Not one of the cases came back Methadone alone" – NYSP Sgt. Doug Paquette – Region III TAP Representative**

Methadone and Polydrug Use

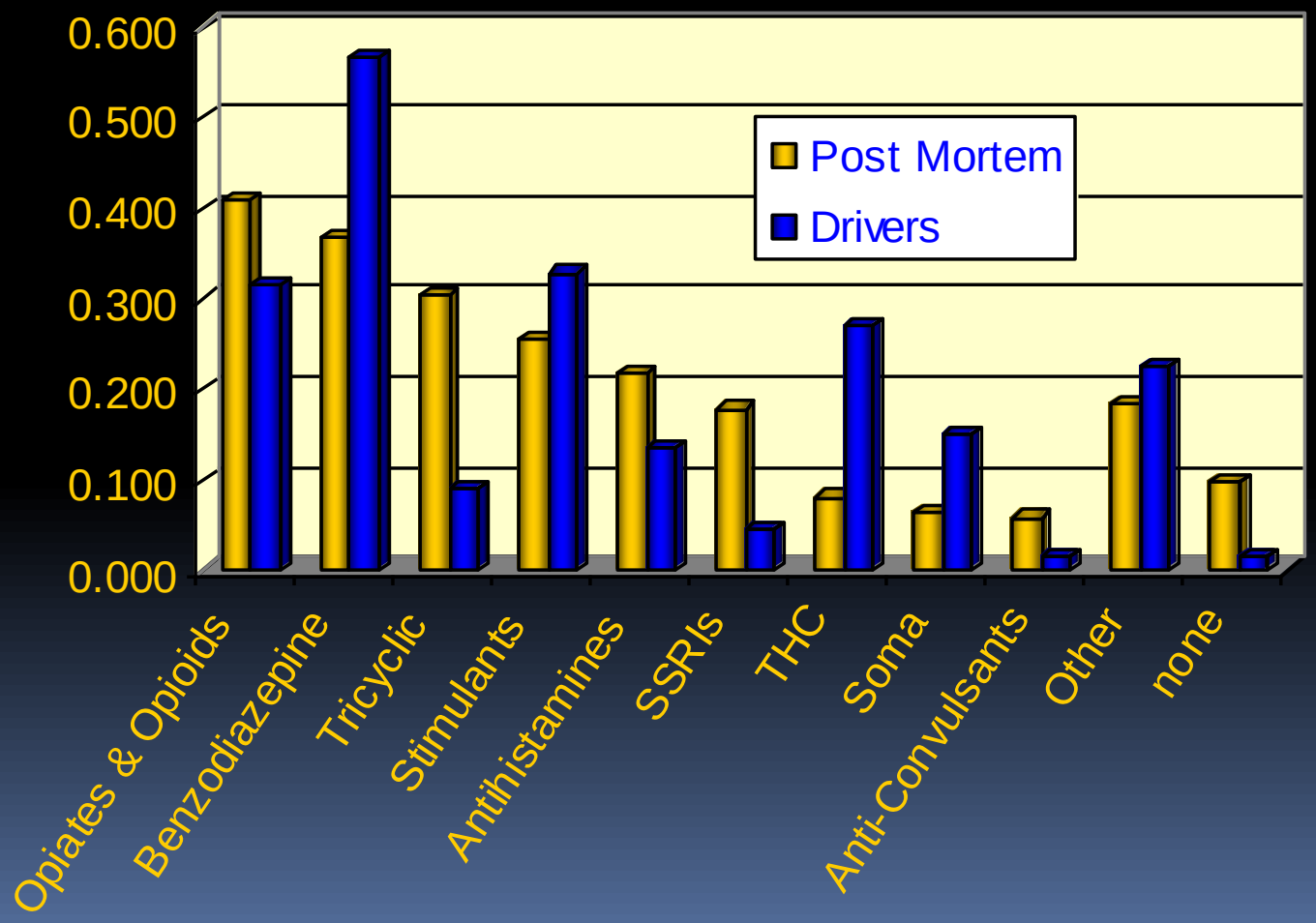
- 2007 - 52 cases (3%) positive
- Blood level ranges = 29-836 ng/ml
- 73% males
  - 18-81 y; Avg 38
- 27% females
  - 21-44 y; Avg 31
- 79% polydrug use
  - 19 (37%) w/Benzo
  - 17 (33%) w/Cannabis
  - 8 (15%) w/Cocaine
  - 8 (15%) w/Opioid



Methadone and Polydrug Use in DWI Cases Southwestern Institute of Forensic Sciences



WA - High Prevalence of Other Drugs (98% - drivers)



WA DRE Cases
Methadone only significant finding

- 32 cases
  - Males – 75%
  - Age – 40 (mean) 42 (median)
  - Methadone concentration:
    - 0.26 mg/L mean 0.27 mg/L median
  - 42% involved in a MV collision
    - Most commonly involved collisions with parked cars
  - 45% arrested for erratic driving (significant weaving)
    - (1/3 of which were so bad, reported by cell phone callers)

WA DRE Cases
Methadone & DRE Matrix

	Methadone Drivers	DRE Matrix Prediction
Pupil Size	Constricted in all 3 lighting conditions	✓
Reaction To Light	Little to none	✓
Muscle Tone	Flacid	✓
Blood Pressure	Widely Variable	Below Normal
Pulse	Widely Variable	Below Normal
Body Temp	Normal	Below Normal
Slurred Speech	~ 50%	✓
Droopy Eyelids	~ 75%	✓

WA DRE Cases
DRE Testing Results

Test	Performance
Walk and Turn	5/8
One Leg Stand	3/4
Romberg Balance	Avg 2" sway
Time Estmate	Widely Variable
Finger to Nose	Generally Poor performance

Admissions:

78% Admitted using methadone
31% Opiate Treatment Program
34% Chronic Pain

INDIVIDUAL CASE EXAMPLES

Pain Patient

- 35 year old male
- Collided with vehicle in same lane of travel
- Officers noted defendant sitting in his vehicle “nodding off”
- Repeatedly asked the same questions
- DRE noted “slurred speech”, watery eyes and droopy eyelids

Pain Patient

- Romberg Balance: 2-3 inches of sway
  - Subject asked to repeat test (total 4)
  - Estimated 30 secs as:

    36, 45, 10, 76 seconds
- Walk and Turn - 6/8 clues
  - Legs noticeably shaking
- One Leg Stand – 3/4
- Finger to Nose - 5/6

Pain Patient

- Admissions
  - 30 mg Methadone – chronic pain
  - 3 ½ hours before stop
- Blood Toxicology: 0.27 mg/L methadone
  - EDDP, caffeine, nicotine
- Outcome
  - Physician testified that methadone does not impair driving
  - Convicted DUID

Pez Dispenser

- 20 year old male, single vehicle accident
- Subject claimed he “slid off the road due to snow and ice” (Actual temp - 56° F.)
- Subject had thick, slurred speech, staggered and had difficulty standing
- Described as “on the nod”

Pez Dispenser

- Romberg Balance – swayed 3” front to back and 2” side to side
  - “Head tilted back so far he looked like a Pez Dispenser”
- Walk & Turn – Stumbled during instructions twice, missed heel to toe every step, stopped after the turn (8/8)
- One-Leg-Stand – repeatedly put his foot down and held onto wall for balance (4/4)
- Finger to nose – only touched his nose 1/6 (with his knuckle) (6/6)

Pez Dispenser

- **Pupil size:**
  - **Room Light: 3.0 mm (within normal)**
  - **Darkness: 3.0 mm (constricted)**
  - **Direct Light: 2.5 mm (within normal)**
- **Little to no reaction to light**
- **Pulse: 54, 56, 56 (normal = 60-90)**
- **BP: 128/68 (normal 120-140/60-90)**
- **Muscle Tone: Flaccid**

Pez Dispenser

- Admissions
  - Unknown amount of methadone – provided by a friend
- Blood Toxicology: 0.05 mg/L methadone
  - EDDP
- Pleaded guilty to DUI Drugs

Implausible Deniability

- 36 year old female, subject of multiple cell phone callers to 911
- Had struck a guardrail wiping out entire right side of her car
- Weaving back and forth across multiple lanes
- Disoriented and unaware she had been involved in a collision
- DRE noted droopy eyelids, and constricted pupils
- Subject was very agitated

Implausible Deniability

- Romberg balance – 2” circular sway and estimated 21 seconds to be 30
- Walk & Turn – Unable to stand without sway, 10 steps up, 9 back, 8/8 clues (talked non-stop)
- One-Leg-Stand – swayed, hopped , put foot down, used arms 4/4
- Finger to nose – 4/6

Implausible Deniability

- **Pupil size:**
  - **Room Light: 2.5 mm (within normal)**
  - **Darkness: 3.0 mm (constricted)**
  - **Direct Light: 2.0 mm (within normal)**
- **Little to no reaction to light**
- **Pulse: 92, 96, 96 (normal = 60-90)**
- **BP: 156/108 (normal 120-140/60-90)**
- **Muscle Tone: Normal**

Implausible Deniability

- Admissions
  - Methadone at 7:30 am (15 hours prior to stop)

  Opiate treatment program – claimed no one at the clinic told her it would impair her

  She continued to insist that she was not impaired
- Blood Toxicology: 0.35 mg/L methadone
  - EDDP, caffeine
- Convicted of DUI Drugs

Asleep at the Wheel

- 53 year old female, subject of a “Drunk Driver” to 911
- Witness:
  - Driver cut her off on a bridge
  - Pulled over - Still there 1.5 hours later
  - Slumped over the wheel
  - Car still on and in drive
- Initial officer:
  - Difficulty keeping her eyes open
  - Slurred Speech
  - HGN present; failed walk and turn
- BrAC = 0.00%

Asleep at the Wheel

- Romberg balance – 4” sway front to back and 3” sway side-to-side; estimated 34 seconds to be 30
- Walk & Turn – Unable to stand without sway, missed heel-to-toe on almost all steps, used arms for balance
- One-Leg-Stand – swayed, put foot down, used arms – stopped for safety on both legs
- Finger to nose – missed touching her fingertip to nose on all six attempts

Asleep at the Wheel

- Eyes - Bloodshot
- HGN (immediate onset) and VGN
- Pupil size:
  - Room Light: 4.5 mm (within normal)
  - Darkness: 5.0 mm (within normal)
  - Direct Light: 3.0 mm (within normal)
- Little to no reaction to light
- Pulse: 102, 98, 100 (elevated; normal = 60-90)
- BP: 114/82 (low; normal 120-140/60-90)
- Muscle Tone: Flaccid

Asleep at the Wheel

- Admissions
  - One 10 mg Methadone at 11:00 a.m. (7 hours prior)
  - One 5 mg Klonopin at 4 or 5 p.m. (2-3 hrs prior)
  - Got pills from another person
- DRE Opinion: CNS Depressant
- Toxicology: Urine
  - Positive – Methadone & Quetiapine (Seroquel)
  - Clonazepam was not detected in the urine
    - Elevated negative screen was not confirmed
- Active DUID Case

Common Poly

- 50 year old male
- Auto Accident
  - Struck car waiting to make a left turn
- Responding Officer:
  - Shaking
  - Droopy, Reddened Eyes
  - Lethargic - Slow to answer questions
  - Initial SFSTs:
    - No HGN or VGN
    - Walk and Turn – Failed test; Body Tremors
    - One Leg Stand – Discontinued for safety

Common Poly

- Romberg balance – 2” circular sway, estimated 15 seconds to be 30, eyelid and body tremors
- Walk & Turn – Could not maintain balance, missed heel-to-toe on almost all steps, used arms for balance
- One-Leg-Stand – swayed, put foot down, used arms; leg tremors
- Finger to nose – missed touching fingertip to nose on all six attempts; eyelid and leg tremors

Common Poly

- Eyes – watery with reddened conjunctiva
- Pupil size:
  - Room Light: 2.5 mm (within normal)
  - Darkness: 5.0 mm (within normal)
  - Direct Light: 1.5 mm (constricted)
- Normal reaction to light
- Pulse: 96, 104, 100 (normal = 60-90)
- BP: 192/84 (normal 120-140/60-90)
- Muscle Tone: Normal

Common Poly

- Admissions: Furosemide (Lasix)
- Controlled Substance in car: Marijuana

- DRE Opinion: Cannabis
- Urine Toxicology:
  - Methadone
  - 7-aminoclonazepam
- Active DUID Case

Non-compliant MMT

- 32 yo, male
- Subject leaves MMT clinic; ~10 mins. later hits and kills a 69 year old male pedestrian who is crossing street.
- Subject Statements:
  - Never saw the pedestrian
  - Had placed a coffee between his legs and when he looked up the pedestrian was in his windshield
- Witnesses
  - Coming from both directions could see pedestrian

Non-compliant MMT

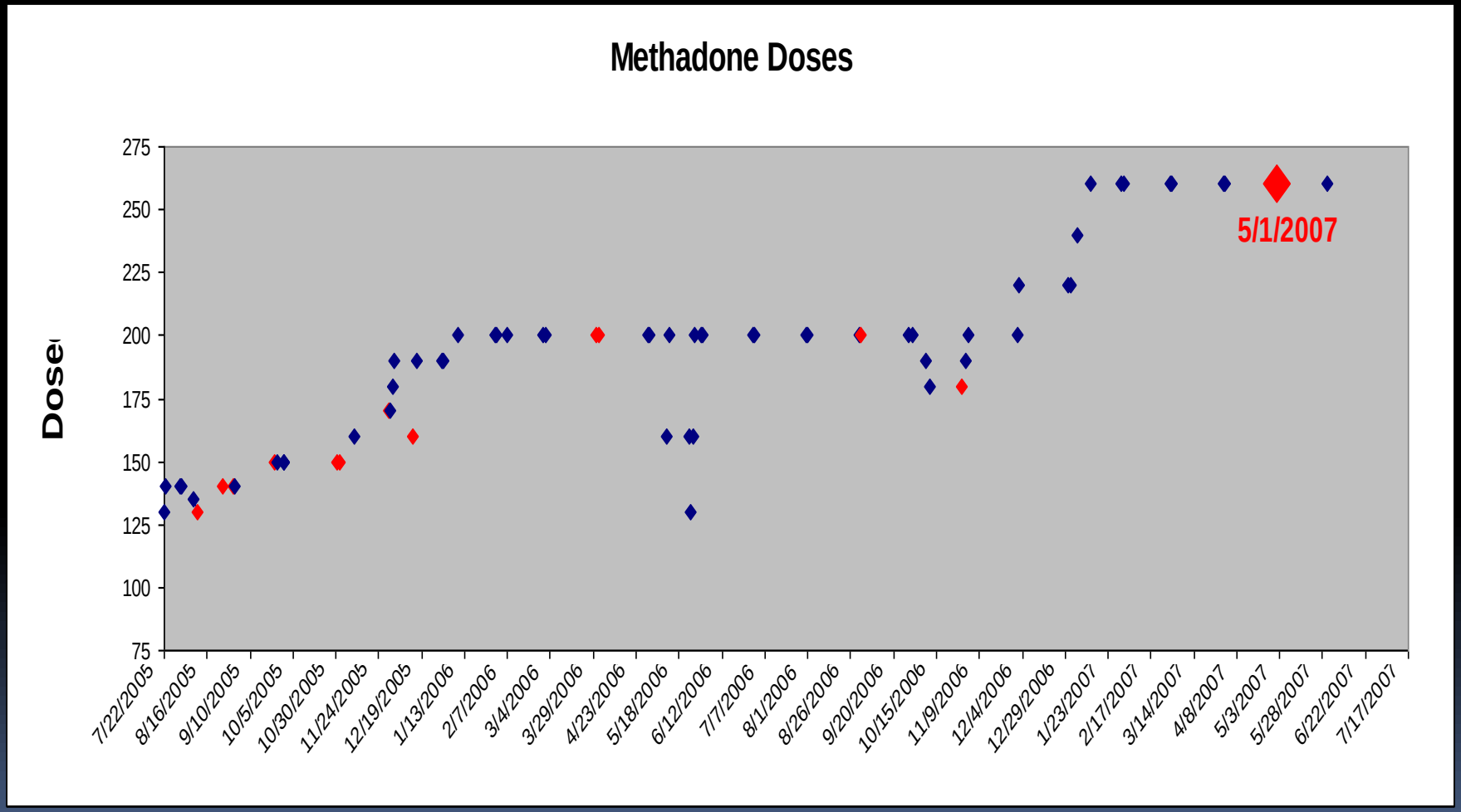
Background about subject:

- **Using drugs for 22 years since 11 yo**
- **Drugs of abuse-**
  - **Began with vicodin, progressed to cocaine, then oxycodone or dilaudid via IV, and finally heroin 2-3X's/day.**
- **Treatment-**
  - **1995-1996**
  - **2004-2005**
  - **Sept '04 – 42 days**
  - **Nov '04-July '05**
  - **July '05-2007**

Non-compliant MMT

- **Day of Accident:**
  - **No one notes anything unusual about subject; does not appear impaired**
  - **Subject states that methadone does not have any affect on him and that he did not feel tired**
  - **~7 hours after the crash subject is noticed falling asleep in lobby at PD**
  - **Subject states that he smoked pot about 1 week ago**
  - **Subject's attitude- very matter of fact showing little emotion**
  - **Subject signs medical release forms**

Non-compliant MMT



RED = Methadone dose when noncompliant – positive for additional drug

Non-compliant MMT

- **Blood Toxicology:**

  Alcohol - None Detected

  Delta-9-THC = Negative

  Delta-9-Carboxy-THC= 18 ng/ml

  Methadone = 754 ng/ml

- **Case Disposition – Grand Jury**

  Tragic accident but no crime had been committed

Summary of Case Examples

- Impairment may occur in individuals under a doctor's care
- Low dose in a naïve individual can be impairing
- Patients may not be properly informed
- Methadone patients may be non-compliant
- Polydrug use is common
- Methadone in DUID –prescribed for pain, MMT and through diversion

In Conclusion

- Methadone can impair performance
- Factors that must be considered:
  - Reason for Use – Pain, MMT, Diversion
  - Health of subject
  - History of Use – a recent change?
  - Tolerance
  - Polydrug Use

Impairment can not be determined by quantitative blood toxicology alone.

Paired with the observations of a DRE, a determination of impairment can be made.

Thank you

- **Toxicologists:**
  - **Lisa Callahan, GA**
  - **Dr. Michael Wagner, NH**
  - **Colleen Scarneo, NH**
  - **Dr. Jeanne Beno, NY**
  - **Jennifer Limoges, NY**
  - **Dr. Julia Pearson, VA**
  - **Dr. Fiona Couper, WA**
  - **Laura Liddicoat, WIS**
- **DREs:**
  - **Dan Mulleneaux, AZ**
  - **Sgt. Doug Paquette, NYSP**
  - **Sgt. Joe Reff, Watertown PD, NY**
  - **Alan Bell, Niskayuna PD, NY**