

# DUI DEFENSE

- DEFENSE OF DRUGGED DRIVERS
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# DUI Defenses

- Not all DUI cases involve ethanol
- Recreational Drugs Used with or without Ethanol/Alcohol
  - Marijuana
  - Cocaine
  - Opiates
  - PCP
  - MDMA, “Ecstasy, XTC”
  - Prescription medications

# DUI Defenses

- Alcohol Test Charts Apply to Ethanol Only
- Pharmacology of Prescription, OTC, Recreational Drugs
- Toxicology of non-alcohol drugs
  - urine
  - blood
  - serum
- Screening versus GC/MS

# PHARMACOKINETICS

- LENGTH OF ACTION
- LENGTH OF DETECTION
- LEVELS ASSOCIATED WITH EFFECT
- MINISCULE AMOUNTS OF SUBSTANCES DETECTED BEYOND DURATION OF ACTION SHOULD NOT BE USED TO PROSECUTE FOR PROXIMATE CAUSE

# Treatment altering BACs

- MVA Fatality
  - Defendant driver was intubated, treated with etimodate containing propylene glycol and developed metabolic acidosis due to injury
  - Serum alcohol at hospital was reported at 196 mg%

# Erroneous Alcohol Lab Reports

- Analysis of error
  - Serum BAC must be converted to whole blood by 18% lowering the reported value to 160 mg%
  - The medications and fluids as well as metabolic acidosis elevated the BAC
  - Driver weight was 175 pounds. Alcohol use by witness would give a maximum BAC of 75 mg%, less than the legal limit

# Erroneous Alcohol Lab Reports

- Laboratory Analysis Limitations
  - The ALC Flex analyzer relies on enzymatic changes of alcohol dehydrogenase (ADH) and NAD
  - Propylene glycol has a structure similar to alcohol and can give a false elevation of 5 to 10 %
  - Etomidate (35% propylene glycol) can lead to false positives
  - Metabolic acidosis can also contribute to an increase in an elevated alcohol result
  - Gold Standard for forensics: HPLC or GC/MS as used by Illinois State Police Crime Laboratory

# MDMA

## Ecstasy or XTC

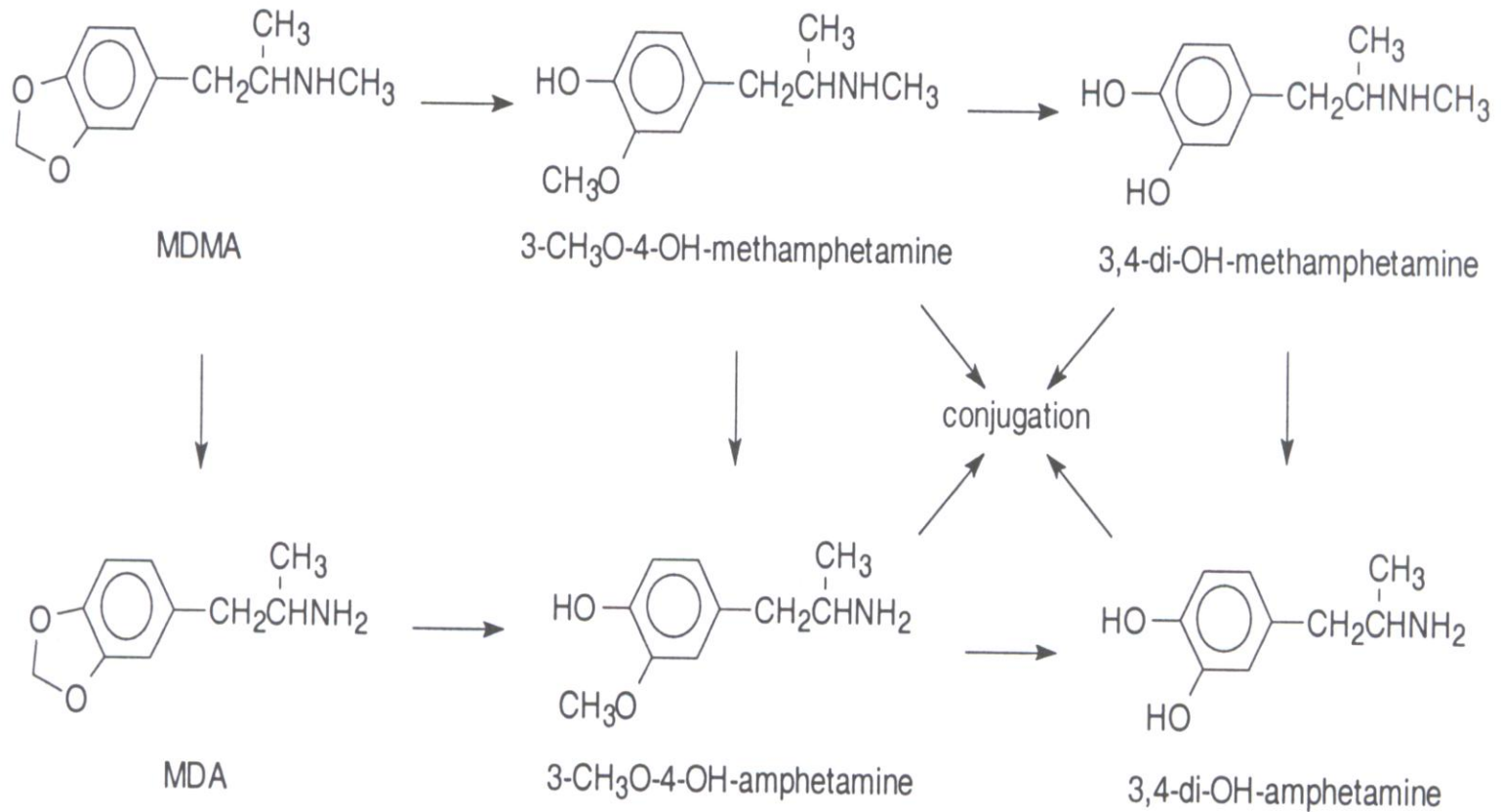
- Symptoms of MDMA Intoxication
  - Visual hallucinations
  - Confusion
  - Agitation
  - Coma
  - Hypotension
  - Other: seizures, hyperpyrexia, hypoglycemia, rhabdomyolysis and panic disorder

# MDMA

## Ecstasy or XTC

- Detection
  - Same as for amphetamine analysis
  - Immunoassays for methamphetamine or amphetamine
  - Liquid chromatography
  - Gas chromatography/Mass spectrometry

# MDMA Metabolism



# methamphetamine

- Equate (documented in medical records) contains oxymetazoline, a vasoconstrictor (sympathomimetic amine) similar in actions and structure to epinephrine, methamphetamine, and amphetamine

Table 10-1

Chemical Structures and Main Clinical Uses of Important Sympathomimetic Drugs<sup>†</sup>

					MAIN CLINICAL USES							
		$\beta$	$\alpha$	NH	$\alpha$ Receptor	$\beta$ Receptor			CNS, 0			
					A	N	P	V	B	C	U	
Phenylethylamine		H	H	H								
Epinephrine	3-OH,4-OH	OH	H	CH <sub>3</sub>	A,			P,V	B,C			
Norepinephrine	3-OH,4-OH	OH	H	H				P				
Dopamine	3-OH,4-OH	H	H	H				P				
Dobutamine	3-OH,4-OH	H	H	1 *						C		
Colterol	3-OH,4-OH	OH	H	C(CH <sub>3</sub> ) <sub>3</sub>					B			
Ethynorepinephrine	3-OH,4-OH	OH	CH <sub>2</sub> CH <sub>3</sub>	H					B			
Isoproterenol	3-OH,4-OH	OH	H	CH(CH <sub>3</sub> ) <sub>2</sub>					B,C			
Isoetharine	3-OH,4-OH	OH	CH <sub>2</sub> CH <sub>3</sub>	CH(CH <sub>3</sub> ) <sub>2</sub>					B			
Metaproterenol	3-OH,5-OH	OH	H	CH(CH <sub>3</sub> ) <sub>2</sub>					B			
Terbutaline	3-OH,5-OH	OH	H	C(CH <sub>3</sub> ) <sub>3</sub>					B,	U		
Metaraminol	3-OH	OH	CH <sub>3</sub>	H				P				
Phenylephrine	3-OH	OH	H	CH <sub>3</sub>	N,P							
Tyramine	4-OH	H	H	H								
Hydroxyamphetamine	4-OH	H	CH <sub>3</sub>	H								
Ritodrine	4-OH	OH	CH <sub>3</sub>	2 *							U	
Prenalterol	4-OH	OH ‡	H	-CH(CH <sub>3</sub> ) <sub>2</sub>						C		
Methoxamine	2-OCH <sub>3</sub> ,5-OCH <sub>3</sub>	OH	CH <sub>3</sub>	H				P				
Albuterol	3-CH <sub>2</sub> OH,4-OH	OH	H	C(CH <sub>3</sub> ) <sub>3</sub>					B,	U		
Amphetamine		H	CH <sub>3</sub>	H								CNS, 0
Methamphetamine		H	CH <sub>3</sub>	CH <sub>3</sub>								CNS, 0
Benzphetamine		H	CH <sub>3</sub>	3 *								0
Ephedrine		OH	CH <sub>3</sub>	CH <sub>3</sub>								0
Phenylpropanolamine		OH	CH <sub>3</sub>	H	N,P				B,C			0
Mephentermine		H	4 *	CH <sub>3</sub>	N,P							0
Phentermine		H	4 *	H								0
Fenfluramine	3-CF <sub>3</sub>	H	CH <sub>3</sub>	C <sub>2</sub> H <sub>5</sub>								0
Propylhexedrine	5 *	H	CH <sub>3</sub>	CH <sub>3</sub>	N							0
Diethylpropion				6 *								0
Phenmetrazine				7 *								0
Phendimetrazine				8 *								0

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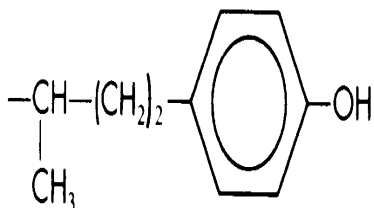
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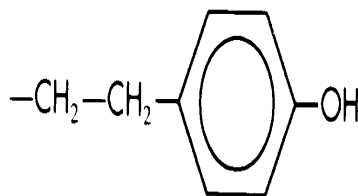
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# Substituents of Main Structure

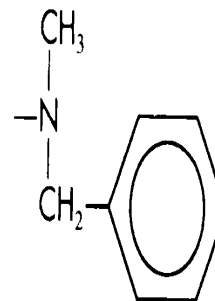
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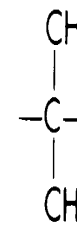
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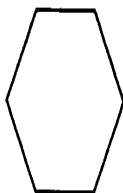
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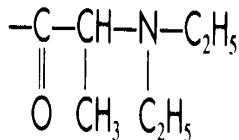
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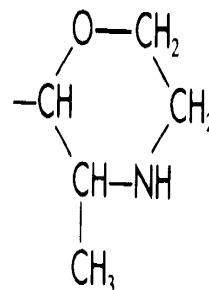
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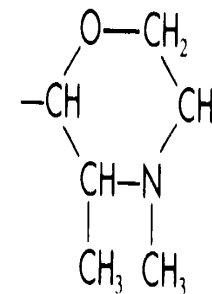
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# Cross reactivity

- Accused of positive methamphetamine
- Thin layer chromatograph test “positive” for methamphetamine
- Cross reactivity between meth and oxymetazoline well described
- False positive – report to States Attorney, case dismissed

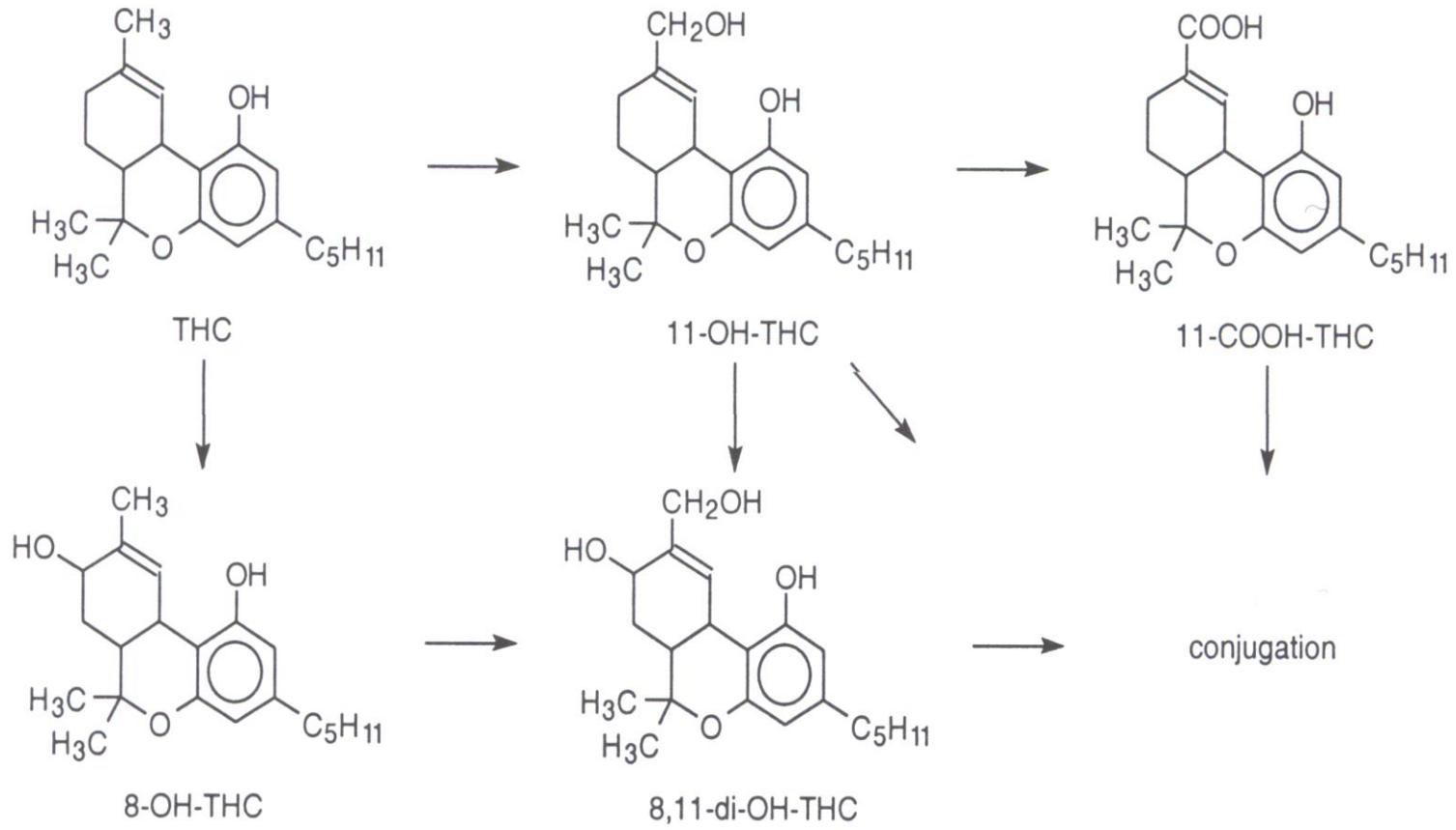
# ECSTACY DRIVER

- MVA FATALITY
- WITNESSED USE 9 HOURS BEFORE ACCIDENT T  $\frac{1}{2}$  6 – 9 HOURS
- FACTS SUPPORT ASLEEP AT WHEEL
- LAB TESTS DOCUMENT PRESENCE
- OBSERVED EFFECTS AND CONTRIBUTION TO MVA NOT CONSISTENT WITH INTOXICATION

# Tetrahydrocannabinol THC, Marijuana, Cannabis

- Complex Behavioral Changes
  - Giddiness and increased hunger
    - Thought process slowing
    - Slowed reaction time
  - Panic
  - Hallucinations
  - Acute psychosis

# THC Metabolism



# THC

## Case Report 1

- MVA fatality
  - Driver's blood and urine tested for drugs and alcohol
    - Blood and urine negative for alcohol
    - Blood positive for
      - RX Citalopram
      - OTC ephedrine
      - THC inactive metabolite 11-Nor-Delta-9-THC-COOH
    - Urine positive for 11-hydroxy THC and 11-carboxy THC

# MARIJUANA METABOLITES

- BLOOD 11-NOR DELTA 9 THC COOH
  - 12.5NG/ML 11-COOH TCH
  - URINE 11 OH THC 15.3NG/ML
  - URINE 11 COOH TCH 54.3
  - WHAT COMPOUND WHERE AND WHEN AND HOW MUCH?

# PROSECUTION EXPERTS

- Springfield – THC exposure within 44 – 88 hours “mental and motor skills diminished
- St. Louis - THC exposure within 12 hour
- distorts thought process, reaction times and thought are slowed. Visual disturbances may also occur

# THC

## Case Report 1

- Blood tests can be used to estimate time of use and can be correlated with behavior
- Urine specimens of cannabinoids cannot be correlated with performance, health or safety
- There is no case for acute impairment
- The positive urine test does not support impairment

# THC CASE # 2

- “the blood sample of the defendant contained 6.7ng/ml of Cannabinoids”.
- AIT Laboratories report, indicated the presence of 6.7ng/ml THC-COOH, an inactive metabolite of marijuana.

# THC CASE # 2

- SCIENTIFIC LITERATURE SUPPORTS
- 6.7ng/ml blood cannabinoids is an extremely small amount, which is consistent with exposure 24 hours earlier (Heishman) Active use of THC results in levels 10 to 12 times higher. (Baselt)

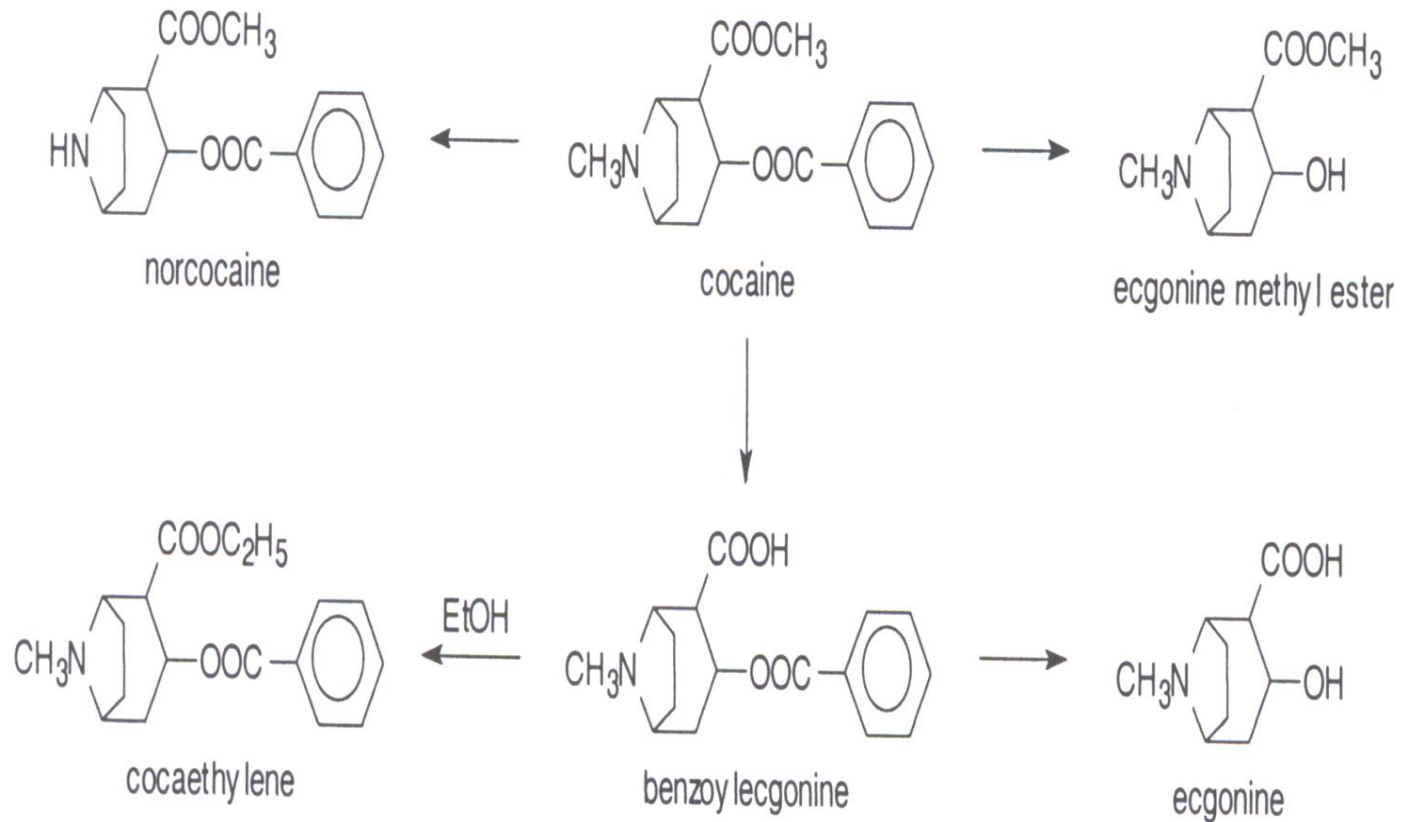
# THC CASE # 2

- Impairing effects of marijuana are usually dissipated within a few hours. Some authors state up to 8 hours.(Barnett, Heishman) No authors describe any risk for driving impairment beyond 12 hours, and certainly none at 20 or 24 hours.

# THC CASE #2

- The State's experts should have recognized the above scientific principles and have advised the Prosecution that there existed no evidence that would support marijuana impairment.

# Cocaine Metabolism



# Cocaine Pharmacology

- Acute
  - Increased heart rate, BP, and arousal
  - Improved performance of tasks requiring vigilance and alertness
  - Increased sense of self-confidence and well being
  - High dose produces euphoria followed by desire for more drug

# Cocaine Toxicity

- Involuntary motor activity
- Stereotyped behavior
- Paranoia
- Irritability
- Increased risk of violence in heavy users
- An important metabolic interaction occurs when alcohol and cocaine are taken together

# Cocaine Case Report

- MVA fatality
  - Driver's blood and urine tested after MVA
    - Blood negative for alcohol
    - Blood negative for cocaine
    - Blood positive for benzyecgonine (BE) (inactive metabolite) 446 ng/ml

# Cocaine

## Case Report # 1

- The night before the MVA: driver had 2 “lines” cocaine at about 8 PM
- The day of the MVA:
  - After exhausting day at work, driver “chugged” one to one and one half 12 oz cans of beer
- The positive BE finding is not consistent with acute cocaine ingestion. It is consistent with use the night before the MVA

# Cocaine

## Case Report # 1

- Any effect from ingestion of cocaine shortly before the MVA would have been as a stimulant
- One time use of cocaine would not have contributed to post stimulant depressant effects 21 hours later
- Conclusion: Driver was not under the influence or impaired by cocaine at the time of the MVA

# PROSECUTION EXPERT

- 449ng/ml consistent with use of cocaine within 90 minutes of the test
- Accident occurred 120 minutes before the test
- Jury acquitted defendant

# COCAINE AGGRAVATED DUI

- AUTO/TRUCK COLLISION
- 2 YEAR OLD IN AUTO SEVERELY INJURED
- MOTHER TESTED POSITIVE FOR COCAINE AND CHARGED WITH AGG DUI

# COCAINE CASE # 2

- For purposes of my Affidavit, two relevant events occurred at the Hospital. First, she was administered lidocaine (Xylocaine), a local anesthetic, for treatment of some glass injuries to her nose. Second, a urine sample was taken for a drug screen and tested using and reported positive for benzodiazepines, opiates, and cocaine. Her history indicated the use of Valium (a benzodiazepine) and Vicodin (an opiate).

# COCAINE CASE # 2

- Lidocaine, a local anesthetic, is known to 'cross-react' with cocaine, in certain screening tests. Both lidocaine and cocaine are in the same class of drugs. The exposure to lidocaine injected into her skin or nasal mucosa at the hospital must be considered as a possible 'cross reacting' substance, and the 'cocaine' positive test, which was never confirmed, must be considered a false positive

# COCAINE CASE # 2

- Unconfirmed urine drug screens should never be used for any treatment, legal, or forensic purpose.
- all immunoassay techniques utilize an antibody-antigen relationship to identify a drug class in a sample. (*Emphasis added*).....Commercial immunoassay kits contain a substrate with an antibody to a specific class of drugs. (O'Donnell 2005)

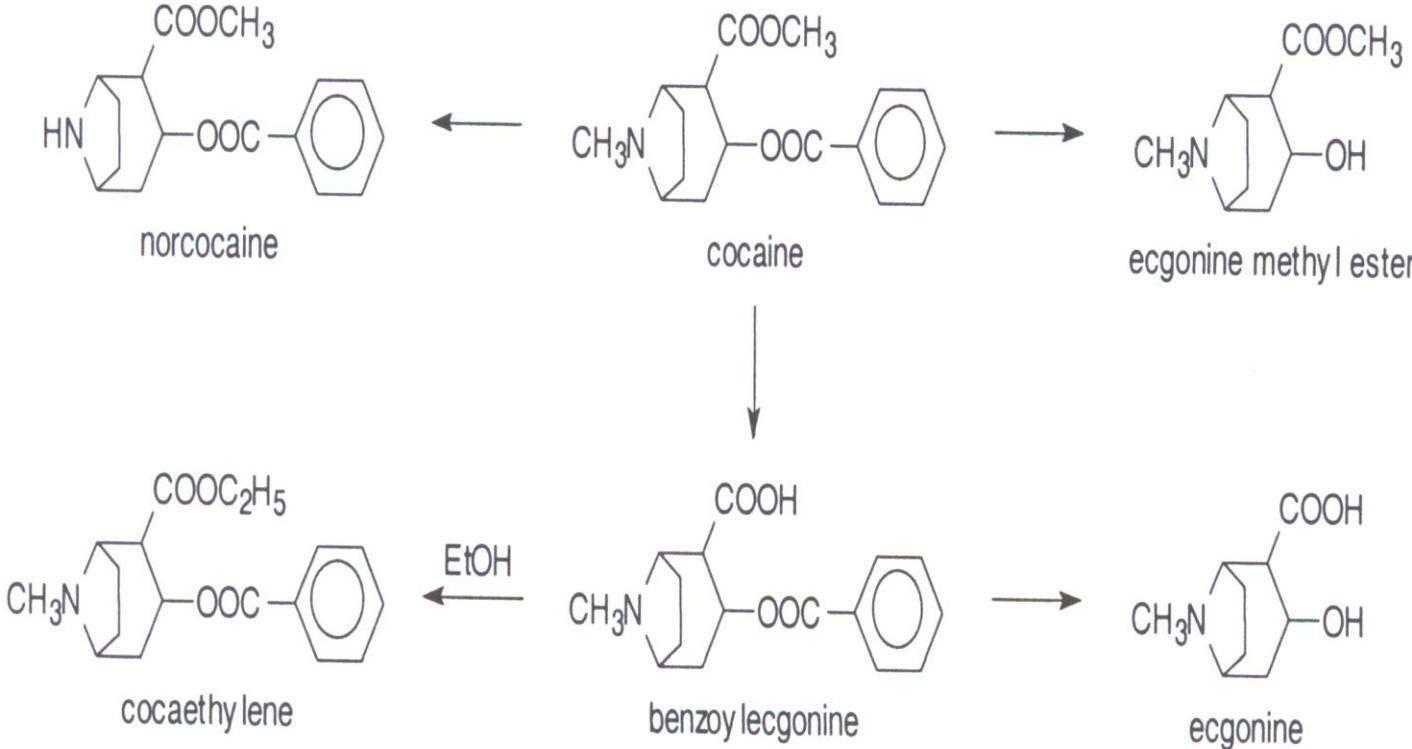
# CROSS REACTIVITY

- COCAINE LOCAL ANESTHETIC
- MEDICAL LOCAL ANESTHETICS
- MOM TREATED WITH LIDOCAINE FOR GLASS FOUND IN NOSTRILS
  - LIDOCAINE USED BEFORE URINE TEST
  - FALSE POSITIVE COCAINE TEST
  - NO CONFIRMATORY GC/MS

# COCAINE CASE #2

- Samples that screen positive by immunoassay are known as presumptive positive specimens. The presence of the specific drug must be confirmed by an alternate analytical techniques. (Levine)

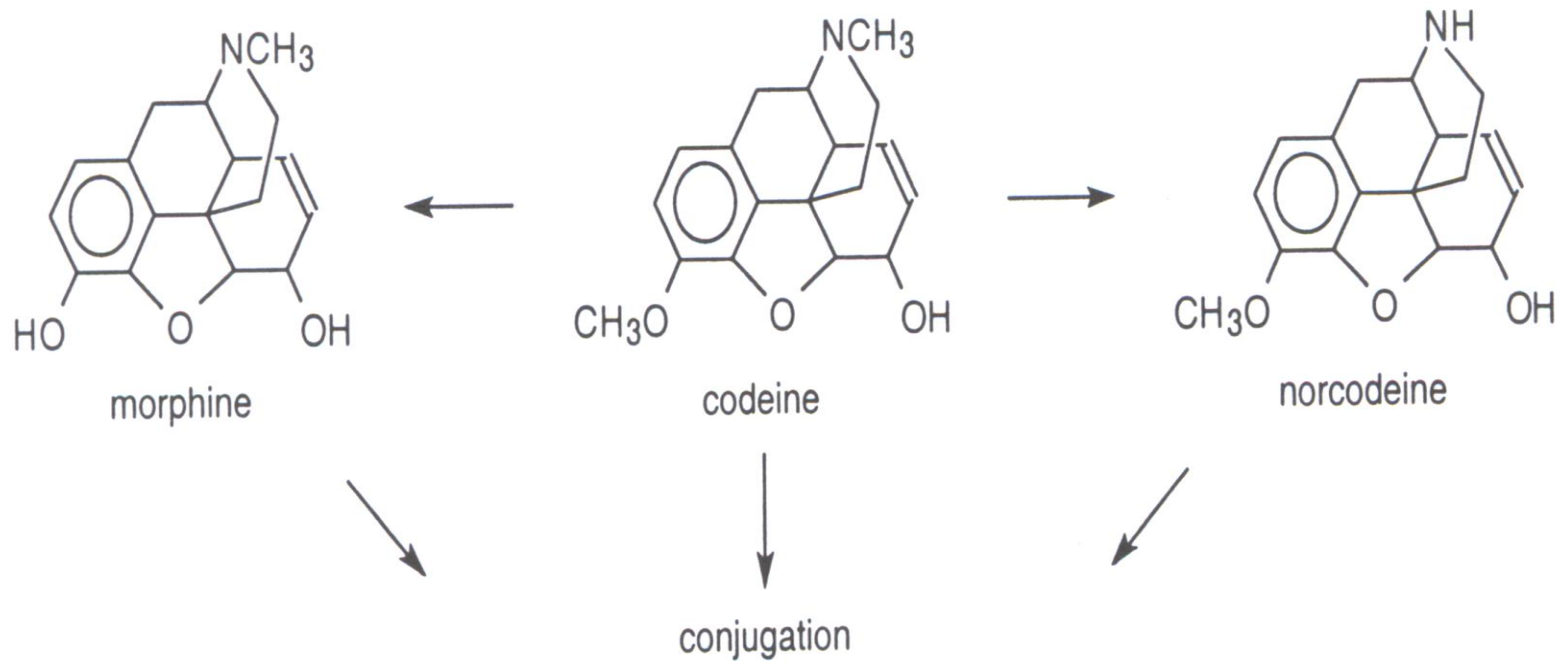
# Cocaine Structure and Metabolism



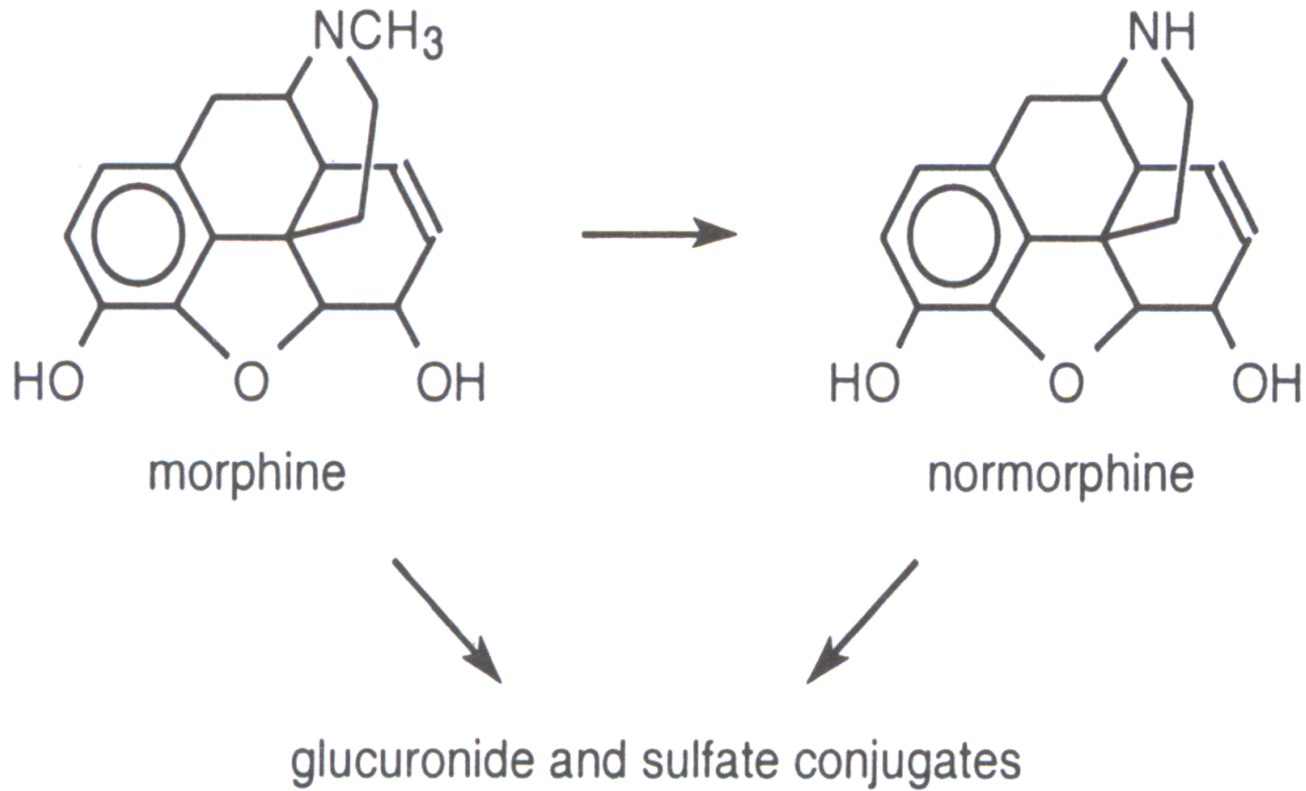
# WHICH MORPHINE?

- FREE MORPHINE
- TOTAL MORPHINE
- CONJUGATED MORPHINE
- UNCONJUGATED MORPHINE

# Codeine Metabolism



# Morphine Metabolism



# Opiate Screen Positive after Ingestion of Dietary Poppy Seeds

- MVA fatality
  - Driver denied any use of alcohol or drugs
  - Driver did not show signs of intoxication or impairment
- Routine drug and alcohol testing after fatality showed a positive opiate screen; negative for alcohol

# Poppy Seeds

- Detection of morphine in the urine does not necessarily indicate an illegal drug use
- There were two samples taken for blood and for urine. Control results were not reported
- All synthetic opiates were absent in the urine leaving only morphine, heroin (or poppy seeds) as the source

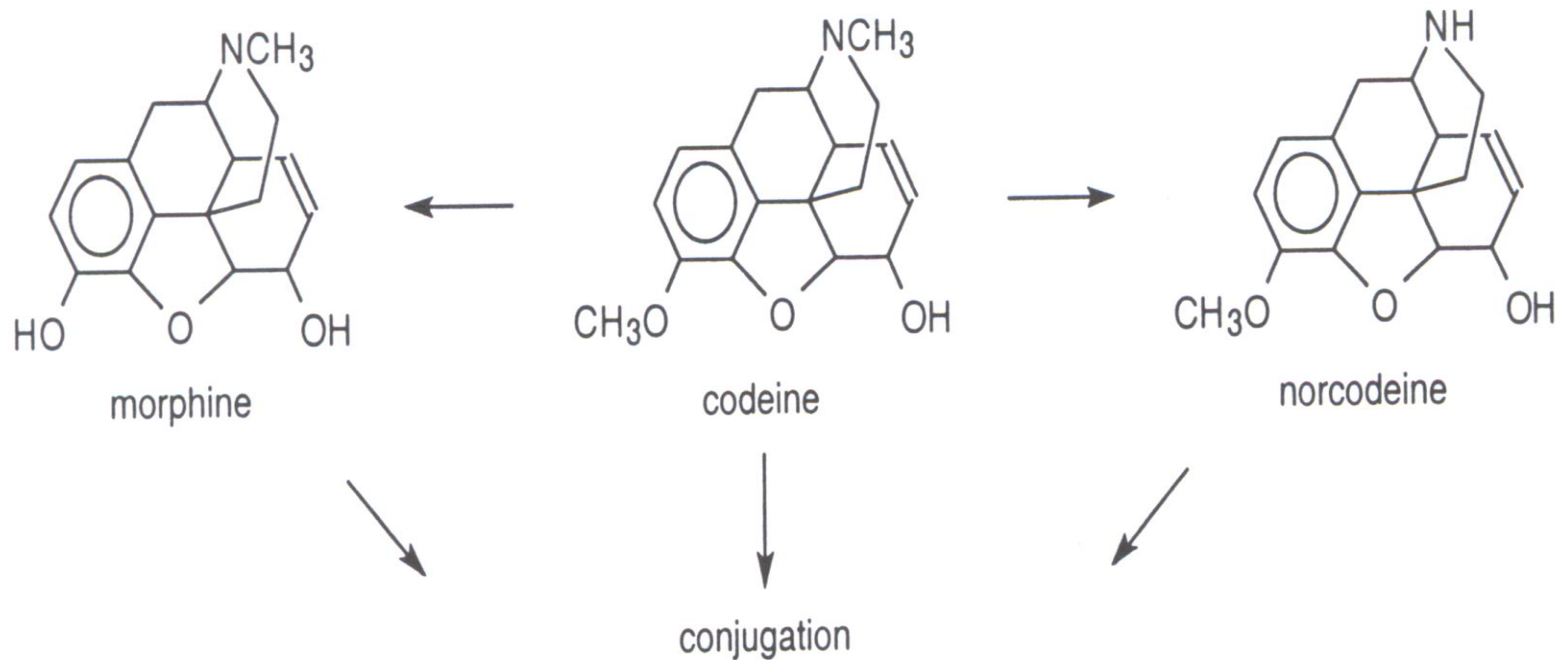
# Poppy Seeds

- Blood is negative for all opiates, including the intermediary metabolite of heroin (6-mam) ruling out acute heroin use.
- Subject reported eating poppy seed muffins on the day of the MVA
- Presence of opiates in the urine screen do not indicate intoxication or impairment.
- Quantification requires GC/MS

# POPPY SEED

- DEFENDANT SENT SAMPLE FOR QUANTIFICATION
- 1440NG/ML
- FEDERAL REQUIREMENT >>> 2,000
- STATE LAB >>>300
- STATE CONTROL 2,000

# Codeine Metabolism



# POPPY SEED

- DEFENDANT ACQUITTED
- JURY ACCEPTED TESTIMONY OF DEFENDANT AND EXPLANATION OF EXPERT THAT POPPY SEED FOOD WELL KNOWN TO CAUSE POSTIVE OPIATE URINE TEST

# PHENCYCLIDINE PCP

- HUMAN THEN ANIMAL ANESTHETIC
- ABANDONED DUE TO BAD NIGHTMARES
- ADOPTED IN VET CLINICS
- BANNED BY DEA DUE TO BREAK-INS IN VET CLINICS
- HALLUCINOGEN
- LONG HALF LIFE (7-46h /LONG EFFECTS – 24 hours)

# PRESCRIPTION DRUGS

- PLETHORA THAT CAN IMPAIR
  - OPIATES, BENZODIAZEPINES,  
TRANQUILIZERS, ANTIDEPRESSANTS,  
ANTICONVULSANTS
- LENGTH OF TIME OF USE –  
TOLERANCE
- QUANTITY USED – PILL COUNTS
- TIME OF DAY
- WITNESSES

# PRESCRIPTION DRUGS

- 34 Y/O WOMAN, MIGRAINER
- CHRONIC USE TYLENOL #4
- LOST CONTROL, HIT 2 PEDESTRIANS  
TWO CHILDREN KILLED
- RESPONDED TO NARCAN
- BLOOD LEVELS ABOVE THERAPEUTIC
- CONVICTED, RECKLESS HOMICIDE

# Verapamil

MOSBY'S DRUG CONSULT/PDR

SEVERITY 3 – ETHANOL

INCREASED ETHANOL  
CONCENTRATIONS, PROLONGED AND  
INCREASED LEVELS OF INTOXICATION

# ANTI-VIRALS

- VALTREX      Lamivudine      Acyclovir
- Common metabolism/enzyme
- Acyclovir - alcohol DeHase (ADH), Aldehyde DeHase (ALDH) AND Aldehyde Oxidase)
- Important in breathalyzer readings
- Contribution to margin of error

From The Federal Lawyer, May 2004



# REFERENCES

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- Baselt RC. Disposition of Toxic Drugs and Chemicals in Man, Seventh Edition, Biomedical Publications, Foster City, CA 2004

# References

- Imobergsted AD. Forensic Drug Testing. in O'Donnell JT. *Drug Injury: Liability, Analysis, and Prevention*, L&J, Tucson, 2005
- Levine B. Principles of Forensic Toxicology. AACCC. 1999.
- [www.pharmaconsultantinc.com](http://www.pharmaconsultantinc.com) (resources – *Epocrates*, prescribing information, drug interactions, pharmacology, side effects)