

# Addiction Medicine Update

## Drug Testing

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2018 NATIONAL HEALTH CARE FOR  
THE HOMELESS CONFERENCE

May 16, 2018

ASAM  
**THE APPROPRIATE USE  
OF DRUG TESTING**  
In Clinical Addiction Medicine



**ASAM** American Society of  
Addiction Medicine

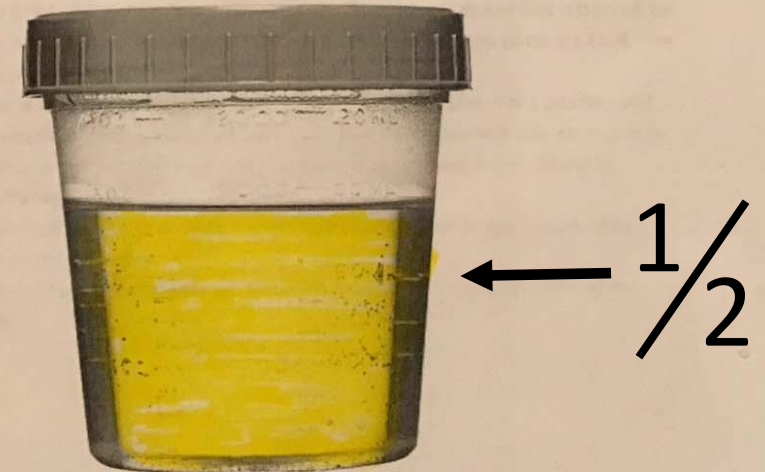
ASAM  
Consensus Statement  
April 5, 2017

[https://www.asam.org/resources/  
guidelines-and-consensus-  
documents/drug-testing](https://www.asam.org/resources/guidelines-and-consensus-documents/drug-testing)

Why does it have  
to be so confusing?

# URINE SAMPLE

NEED TO  
PROVIDE  $\frac{1}{2}$  CUP



Why does it have  
to be so confusing?



WHEN PROVIDING A URINE  
SPECIMEN PLEASE ENSURE  
THAT YOU ARE PROVIDING  
 $\frac{1}{2}$  CUP (30CC)

# Urine Drug Testing in a Family Medicine Residency Practice

- Unexpected results in 62% of initial tests
- 45% of the screens were negative for prescribed opioids
- 39% were missing benzodiazepines
- 20% of the unexpected results had medications not prescribed at their clinic
- After 9 months, 50 fewer patients (13%) on chronic opioid registry.
- “Our experience indicates that strong policies for periodic urine drugs screening are beneficial in decreasing chronic opioid prescribing and in improving provider confidence and satisfaction in managing these medicines.”

# Big Picture

- Drug testing is only a tool. Must be used appropriately (therapeutically)
- To understand the technologies used (immunoassay, GC/MS) is to understand false-positives and false negatives
- Usual benzo screen misses lorazepam and clonazepam!
- Opiate screen only detects heroin, morphine, codeine, hydrocodone
- Specific screens needed to detect oxycodone, methadone, buprenorphine and fentanyl
- Testing should be a regular part of treatment (like checking PMP)
- Very few of the recommendations are evidence-based

# Appropriate Use of Drug Testing-Specifics

- Overview of the Consensus Statement, highlighting a few areas
- Biological Matrices (urine vs oral, etc...)
- Presumptive vs Definitive testing
- Technology of tests: Immunoassay vs GC/MS, LC/MS
- Common False Negatives, False Positives
- Metabolites
- Windows of Detection
- Recommended areas of further research

# ASAM Consensus Statement

- Part 1: Principles of Drug Testing in Addiction Treatment
- Part 2: Process of Drug Testing in Addiction Treatment
- Part 3: Additional Key Elements of a Testing Program
- Part 4: Biological Matrices
- Part 5: Settings
- Part 6: Special Populations



# 1. Principles of Drug Testing in Addiction Treatment

- Clinical Value
  - **What it can do:** Corroborate pt self-report; Presence or absence of a drug w/in a period of time
- Clinical Use
  - **Therapeutic Tool**
    - Explore denial
    - Provide motivation, reinforcement of abstinence
    - Educate patients about therapeutic purpose of drug testing
  - Assessment
    - **What it can't do:** Tell anything about patterns of use
      - Presence of a drug is not evidence to make dx of SUD (ex: caffeine)
- Monitoring
  - **Should not be the only method to show adherence or drug use**

# Patients' Knowledge and Attitudes Towards Regular Alcohol Urine Screening: A Survey Study

- “To me, the main function of regular alcohol urine screening is to:”
- 75% Accomplish my therapeutic objectives regarding alcohol
- 53% Prevent relapse
- 42% **Remind myself that I am in treatment because of alcohol**
- 40% Show to professionals that I do not drink
- 40% **Have closer contact with professionals/to feel better cared of**
- 36% Show to my family that I do not drink
- 0.8% Comply with a legal requirement

## 2. Process of Drug Testing in Addiction Treatment

- Choosing a Test
  - Clinical Necessity and Value
  - Identifying Substances of Interest
  - Matrix Advantages and Disadvantages
  - Presumptive and Definitive Tests
  - Cost
- Responding to Test Results
  - Meaningful **therapeutic** response to results, **pos and neg (not clean/dirty)**
  - **Non-confrontational**
  - **Immediate abstinence may not be a realistic goal early in treatment**
  - **Consider all relevant factors when making a clinical decision**

## 2. Process of Drug Testing in Addiction Treatment

- Responding to Test Results
  - Unclear Test Results
- Test Scheduling
  - **Test Frequency**
    - Patient acuity/severity, level of care
  - **Random Testing**

# Part 3: Additional Key Elements of a Testing Program

- Documentation and Confidentiality
- Practitioner Education and Expertise
  - Knowledge and Proficiency
  - **Language and Attitude**
    - **Positive/neg vs clean/dirty**
    - **Positive attitude. Ambivalence among staff can be a barrier**
- Test Facilities and Devices
  - Point of Care Tests
  - Choosing a Laboratory

# Part 4: Biological Matrices

- **Urine**

- Most well-established for presumptive and POC testing
- Also, most prone to tampering

- **Oral Fluid**

- **Appropriate when done properly**
- Device that facilitates saliva collection preferred to expectoration
- Need to be aware of things that can cause a false negative
  - Chewing on the collector
  - Less than 5 minutes of collection time
  - Having eaten w/in 15 minutes of test (some say w/in 60 minutes)
  - Having taken drug w/in 2 hours (oral, inhaled)

# Part 4: Biological Matrices

- **Blood**
  - Only for Emergency Departments
- **Breath**
  - No statements about the appropriateness of breath testing were endorsed by the expert panel.
- **Hair**
  - Hair testing in addiction treatment can detect long-term patterns of use. Routine use of hair testing is not appropriate for addiction treatment.
- **Sweat**
  - There is insufficient evidence to support the use of sweat testing in addiction treatment. More research is needed before sweat testing can be recommended over urine testing in clinical settings.

# Part 5: Settings

- Outpatient Services (Level of Care 1.0) and IOP/PHP (2.0)
  - More frequent, random, days after weekends, holidays, paydays, stressors
- Residential/Inpatient (3.0) and Medically Managed Inpatient (4.0)
  - Important to maintain a drug-free therapeutic environment in res treatment
  - After return from a pass
- Opioid Treatment Services
  - Detecting substances that could complicate patient response
  - Monitoring adherence
  - Monitoring possible diversion
- Testing Scheduling
  - **Specific to setting and stage of treatment**



# Part 6: Special Populations

- Adolescents
  - Self-reporting
  - Home kits not recommended (interpretation, parent-child relationship)
  - Adolescent Consent
  - Adolescent Confidentiality
- Pregnant Patients
  - In general, we are under-screening and under-treating
  - Consequences and Confidentiality
  - Unique issues r/t reporting, legal consequences, child protective services
- People in Recovery
  - Drug testing should continue for a minimum of five years for most patients in stable recovery
- Health and other Professionals

# Presumptive vs. Definitive Tests

- Presumptive Tests generally less accurate but faster results
- Often referred to as
  - Preliminary
  - Qualitative
  - Immunoassay
  - Point of care (POC)
  - Screen
- The names above may or may not be correct

# Definitive Tests

- Definitive Tests generally more accurate but slower results
- Often referred to as
  - Confirmatory
  - Quantitative
  - Chromatography/mass-spectrometry (GC/MS, LC/MS)
  - Lab-based
  - Confirmatory

# Presumptive Testing

- Immunoassay-can be point of care or laboratory
- Use antibodies to bind with specific drug, metabolite or class of drugs (e.g. opiates, benzos, fentanyl strips...)
- A positive result indicates that *something* in the sample reacted with the antibody
- False-positive rates vary (cocaine very low, amphetamine very high)
- May or may not need a definitive test
  - If patient admits use, often not necessary

# When to Perform Definitive Testing

- If patient disputes findings of presumptive test
- If provider wants to know which opioid or benzo a patient used
- If presumptive test was negative for substance provider suspects patient might be using
- Negative benzo screen for pt prescribed clonazepam
- If results will inform a decision that has major clinical or non-clinical implications (legal issues)

# Definitive Testing

- Chromatography/Mass Spectrometry
  - Gas Chromatography (GC/MS)
  - Liquid Chromatography (LC/MS)
- The Gold Standard
  - Fingerprint
  - Very high specificity and sensitivity
  - Virtually no false-positives.

# Drug testing-Levels

- In general, cannot draw conclusions based on absolute drug levels
- Parent drug level and its metabolites levels vary widely
- Only thing can be said is for sure is that with abstinence, level will fall over time

# False-negative testing

- Both types of test can have false-negatives.
- All tests have a cutoff value. If drug tested is present below that level, it is reported as a negative result.
- Generally, cutoff values are lower for GC/MS than immunoassays, but not always. Even with lower cutoffs, can still have a level that is lower than the cutoff
- False-negative due to falsification (substitution, dilution, alteration)



# False-negative immunoassay *by design*

- Very important: some immunoassays do not detect certain drugs within their class.
- Benzodiazepine assay DOES NOT detect lorazepam or clonazepam!
- **WHAT!?**
- (occasionally, usually at higher doses, clonazepam may cause pos benzo assay)

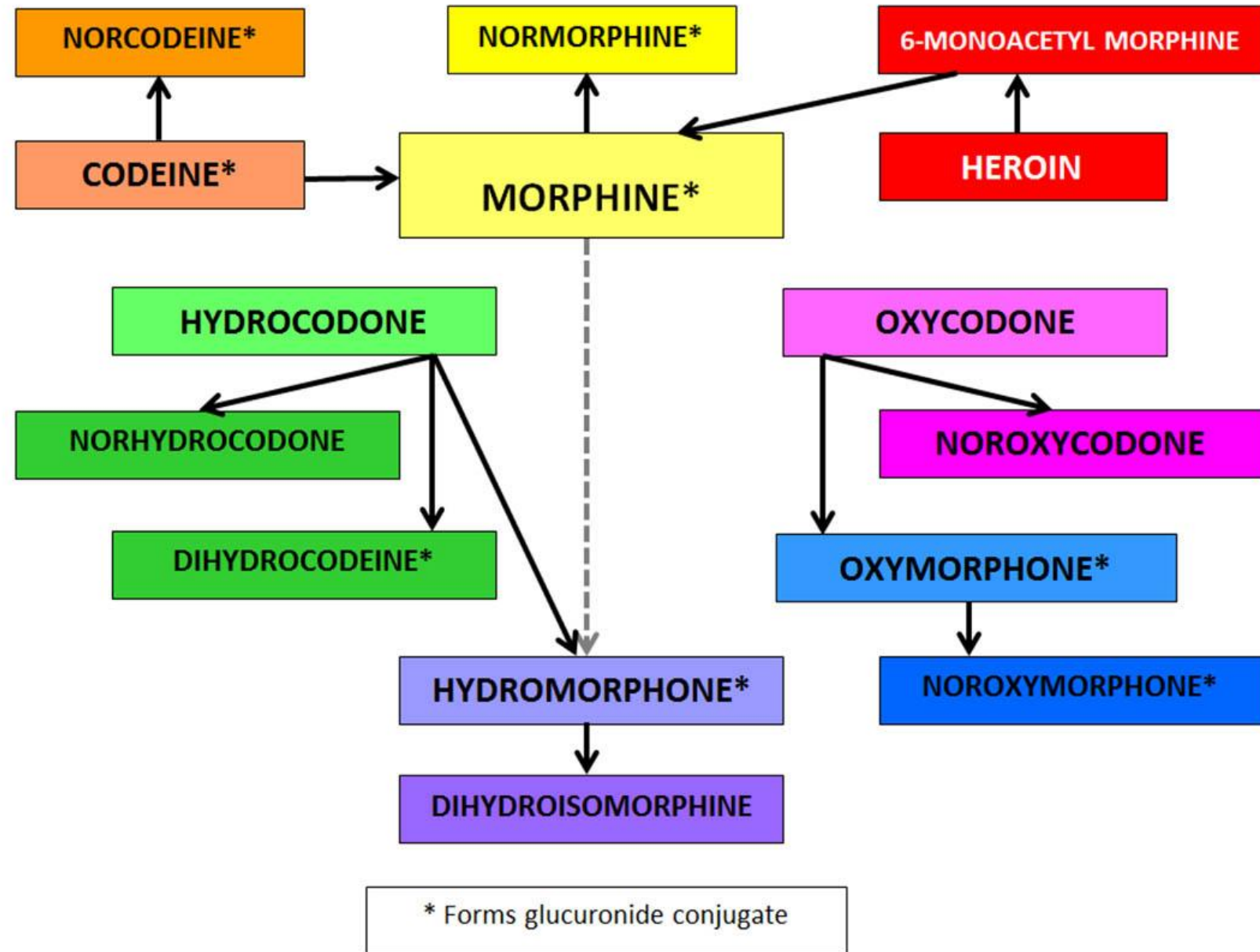
# False-negative immunoassay *by design*

- “Opiate” immunoassay only detects naturally occurring opioids and two semi-synthetic opioids:
- Heroin, morphine, codeine, hydrocodone
- All the rest needs *specific* immunoassays:
- Oxycodone, oxymorphone, methadone, buprenorphine, fentanyl
- (occasionally, usually at higher doses, oxycodone may cause pos opiate assay)
- Less of an issue than in the past, but still happens (need to know what your lab tests for)

# Metabolism

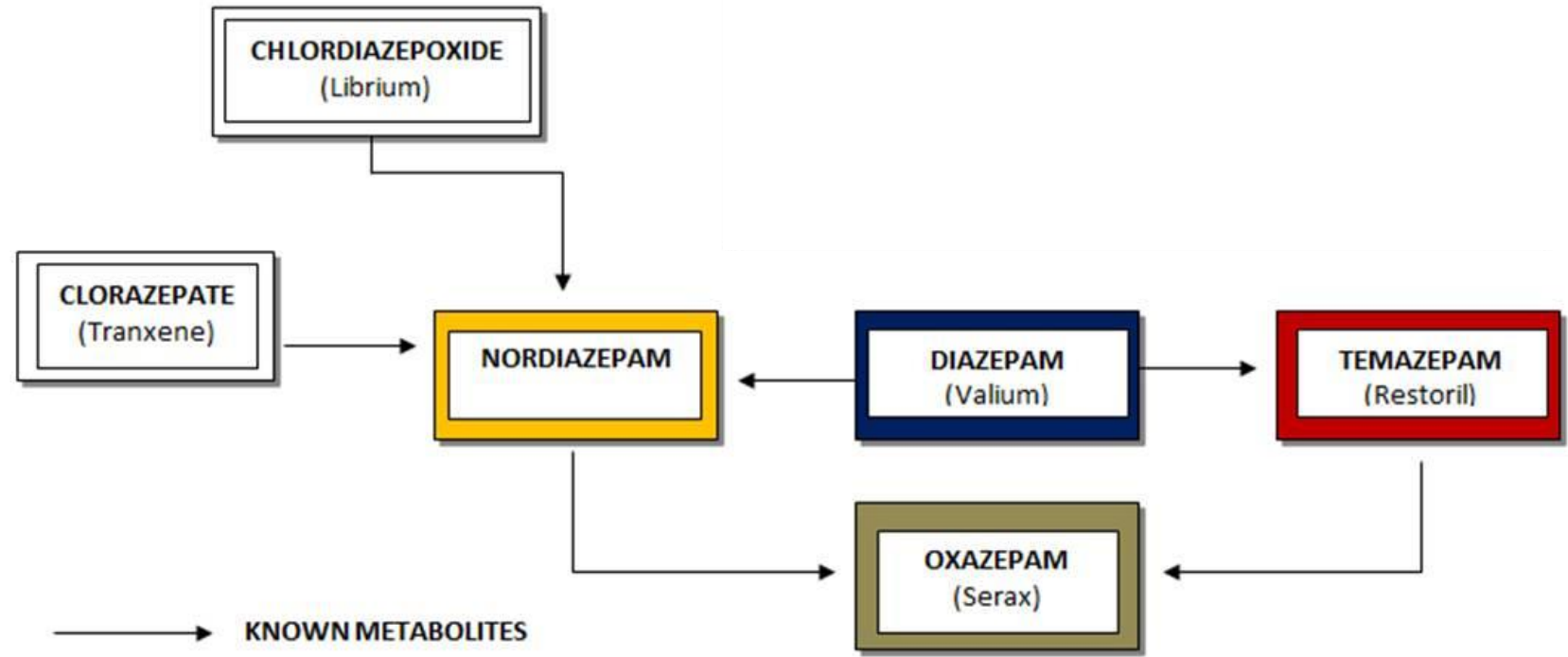
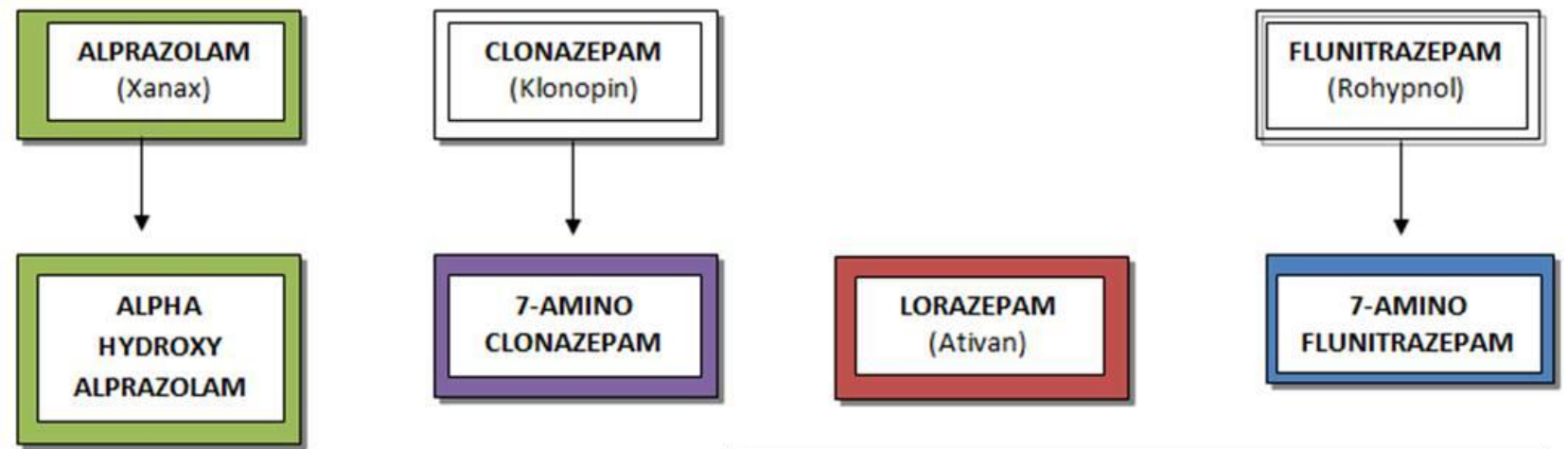
- Opioids
- Important to know
- Bonus: 6-MAM

→ Known metabolites  
--→ Pattern observed in patients receiving chronic opiate therapy



# Metabolism

- Benzodiazepines



Oxazepam and Nordiazepam are the primary metabolites of many benzodiazepines. Many Benzodiazepines occur as glucuronide conjugates in urine.

# Metabolites

- Important to know
- Some immunoassays test for both parent and metabolite (cocaine)
- Some do not (methadone). Patient on a low dose may be negative for MTD but positive for metabolite (appropriate)
- Patient with positive buprenorphine but no metabolite may not be taking medication



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Order Date: 04/07/18

Specimen Date: 04/06/18

Client: D.H.-PROVIDENCE - 178

Doctor:

PATIENT

Patient Id:

DOB:

Accession: 455141

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE		PRESENT	NG/ML CUTOFF: 100
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/15/18

Specimen Date: 02/15/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id:

DOB:

Accession: 91293

Test	Normal	Abnormal		Reference Range
BENZODIAZEPINES, SALIVA	NOT DETECTED		NG/ML	CUTOFF: 5
COCAINE/METAB., SALIVA		PRESENT	NG/ML	CUTOFF: 5
METHADONE, SALIVA		PRESENT	NG/ML	CUTOFF: 10
OPIATES, SALIVA	NOT DETECTED		NG/ML	CUTOFF: 10
OXYCODONE, SALIVA	NOT DETECTED		NG/ML	CUTOFF: 10
FENTANYL, SALIVA	NOT DETECTED		NG/ML	CUTOFF: 2



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Order Date: 04/03/18

Specimen Date: 04/03/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id:

DOB

Accession: 433978

Test	Normal	Abnormal		Reference Range
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML	CUTOFF: 300
COCAINE/METAB, URINE		PRESENT	NG/ML	CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML	CUTOFF: 2
METHADONE, URINE		PRESENT	NG/ML	CUTOFF: 100
OPIATES, URINE	NOT DETECTED		NG/ML	CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML	CUTOFF: 100





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Order Date: 02/01/18

Specimen Date: 02/01/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id:

DOB:

Accession: 144572

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
COCAINE/METAB, URINE		PRESENT	NG/ML CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML CUTOFF: 2
METHADONE, URINE		PRESENT	NG/ML CUTOFF: 100
OPIATES, URINE		PRESENT	NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/15/18

Specimen Date: 02/14/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id: .

DOB:

Accession: 208137

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, URINE		PRESENT	NG/ML CUTOFF: 300
COCAINE/METAB, URINE		PRESENT	NG/ML CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML CUTOFF: 2
METHADONE, URINE		PRESENT	NG/ML CUTOFF: 100
OPIATES, URINE		PRESENT	NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/08/18

Specimen Date: 02/07/18

Client: D.H.-PROVIDENCE - 178

Doctor:

PATIENT

Patient Id:

DOB:

Accession: 172809

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, URINE		PRESENT	NG/ML CUTOFF: 300
COCAINE/METAB, URINE		PRESENT	NG/ML CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML CUTOFF: 2
METHADONE, URINE		PRESENT	NG/ML CUTOFF: 100
OPIATES, URINE		PRESENT	NG/ML CUTOFF: 300
OXYCODONE, URINE		PRESENT	NG/ML CUTOFF: 100



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Order Date: 02/12/18

Specimen Date: 02/12/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id:

DOB:

Accession: 194103

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML CUTOFF: 2
LC/MS FENTANYL CONFIRM.			
LC/MS CONF. FENTANYL	4.1 NG/ML PRESENT		NG/ML
LC/MS CONF. NORFENTANYL	250 NG/ML PRESENT		NG/ML
METHADONE, URINE		PRESENT	NG/ML CUTOFF: 100
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/03/18

Specimen Date: 02/02/18

PATIENT

Client: D.H.-PROVIDENCE - 178

Doctor:

Patient Id:

DOB:

Accession: 75870

Test	Normal	Abnormal	Reference Range
BENZODIAZEPINES, SALIVA	NOT DETECTED		NG/ML CUTOFF: 5
COCAINE/METAB., SALIVA		PRESENT	NG/ML CUTOFF: 5
METHADONE, SALIVA		PRESENT	NG/ML CUTOFF: 10
OPIATES, SALIVA	NOT DETECTED		NG/ML CUTOFF: 10
OXYCODONE, SALIVA	NOT DETECTED		NG/ML CUTOFF: 10
FENTANYL, SALIVA	NOT DETECTED		NG/ML CUTOFF: 2
CONFIRMATION	COCAINE/METABOLITES PRESENT, CONFIRMED		
	URINE CUTOFF: 50 NG/ML		
	ORAL FLUID CUTOFF: 1 NG/ML		



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Order Date: 02/22/18

Specimen Date: 02/21/18

PATIENT

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

Patient Id:

DOB:

Accession: 240517

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	175.6		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	126 NG/ML PRESENT		NG/ML
LC/MS CONF. NORBUPRENORPH.	>500 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/08/18

Specimen Date: 02/07/18

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

PATIENT

Patient ID:

DOB:

Accession: 179317

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	15.1		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	>500 NG/ML PRESENT		NG/ML
LC/MS CONF. NORBUPRENORPH.	81 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/15/18

Specimen Date: 02/14/18

PATIENT

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

Patient Id:

DOB:

Accession: 208123

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	230.8		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	88 NG/ML PRESENT		NG/ML
LC/MS CONF. NORBUPRENORPH.	192 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100





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Order Date: 02/21/18

Specimen Date: 02/16/18

PATIENT

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

Patient Id:

DOB:

Accession: 232926

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	222.1		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	>500 NG/ML PRESENT		NG/ML
LC/MS CONF. NORBUPRENORPH.	>500 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Order Date: 02/15/18

Specimen Date: 02/14/18

PATIENT

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

Patient Id:

DOB:

Accession: 208122

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	37.9		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
PREGNANCY, URINE	NEGATIVE		NEGATIVE
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE		PRESENT	NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	NOT DETECTED, CONFIRMED		NG/ML
LC/MS CONF. NORBUPRENORPH.	10.6 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE	NOT DETECTED		NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100



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Stanley G. Elfbaum, Ph.D., D.A.B.C.C.

Order Date: 02/27/18

Specimen Date: 02/23/18

PATIENT

Client: D.H.-SUBOXONE-PROVIDENCE - 1386

Doctor:

Patient Id:

DOB:

Accession: 262733

Test	Normal	Abnormal	Reference Range
CREATININE, URINE	236.4		MG/DL
(VALUES BELOW 20.0 SUGGEST SAMPLE DILUTION)			
AMPHETAMINES, URINE	NOT DETECTED		NG/ML CUTOFF: 500
BENZODIAZEPINES, URINE	NOT DETECTED		NG/ML CUTOFF: 300
LC/MS BUP CONFIRM			
LC/MS CONF. BUPRENORPHINE	9 NG/ML PRESENT		NG/ML
LC/MS CONF. NORBUPRENORPH.	111 NG/ML PRESENT		NG/ML
COCAINE/METAB, URINE	NOT DETECTED		NG/ML CUTOFF: 150
FENTANYL, URINE		PRESENT	NG/ML CUTOFF: 2
METHADONE, URINE	NOT DETECTED		NG/ML CUTOFF: 300
OPIATES, URINE		PRESENT	NG/ML CUTOFF: 300
OXYCODONE, URINE	NOT DETECTED		NG/ML CUTOFF: 100

**Screening Results**

<b>Test</b>	<b>Result</b>	<b>Measurement</b>	<b>Cutoff</b>
Amphetamine	Negative	156 ng/mL	>= 1000 ng/mL
Barbiturate	Negative	11 ng/mL	>= 200 ng/mL
Benzodiazepine	Negative	0	>= 200 ng/mL
Buprenorphine	Negative	8.0 ng/mL	>= 20 ng/mL
Cannabinoid	Negative	0 ng/mL	>= 50 ng/mL
Cocaine	Negative	18 ng/mL	>= 300 ng/mL
Ethyl Alcohol	Negative	2.9 mg/dL	>= 100 mg/dL
Heroin	Negative	6.0 ng/mL	>= 10 ng/mL
Methadone	Negative	32 ng/mL	>= 300 ng/mL
Opiate	Negative	0	>= 2000 ng/mL
Oxycodone	Negative	0	>= 300 ng/mL
Creatinine	166.5 (Normal)	166.5 mg/dL	< 20 mg/dL
General Oxidant	141 (Normal)	141	>=
PH	7.5 (Normal)	7.5	< 4.5 OR >= 9
Specific Gravity	1.023 (Normal)	1.0230	< 1.005 OR >= 1.040

# Windows of detection

- Drug tests are designed to measure whether a substance has been used within a particular window of time

	Minutes	Hours	Days	Weeks	Months
Blood					
Breath					
Oral Fluid					
Urine					
Sweat					
Hair					

Adapted from Substance Abuse and Mental Health Services Administration [53].

JOURNAL OF ADDICTION MEDICINE

Journal of Addiction Medicine 11:1-56, May/June 2017.

# Windows of detection-always approximate

- In general, urine is longer than oral
- In general, assume most substances 2-3 days, work up or down from there
- Chronic use only relevant for cocaine, amphetamine, THC
- Ex: single use cocaine: BZE in oral fluid 12-24 hrs, urine 2-3 days
- Prolonged use of cocaine: BZE in oral fluid 24-48 hrs, urine 2-4 days
- One study showed BZE in urine up to 12 days!
- THC varies from 1-5 days to 30-60 days in urine

# Windows of detection-Opioids

- Opioids vary depending on half-life (short vs long-acting)
- 1-1.5 days Immediate release oxycodone
- 1-3 days Heroin metabolites
- 1.5-3 days Extended release oxycodone
- 1-2 days Fentanyl (cutoff 5ng/ml)
- 3 days Fentanyl (cutoff 0.2)
- 7 days Methadone
- 7 days Buprenorphine

# Windows of detection

- Alcohol: exception, in urine 10-12 hours, oral fluid 24 hours
- Etg/Ets, etoh metabolites generally preferable: 1-2 days in urine
- Benzodiazepines wide variation
- 1-2 days to over one month (table included at end of slides)



# False-positives (...finally)

- Two types of false-positives:
- Immunoassay/presumptive/screening: something else in the sample cross-reacts with the antibody and causes a “positive” result
- In all types of tests, if the cutoff is set too low, “noise” can cause a positive

# False-positives

- Amphetamine: “Everything”
  - Cold medicines (pseudoephedrine, phenylephrine, phenylpropanolamine, Vick’s inhaler,
  - Beta-blockers (HTN med): labetalol, propranolol
  - Psych meds: Bupropion (Wellbutrin), fluoxetine (Prozac), Chlorpromazine (Thorazine), Trazodone, desipramine
  - Promethazine (Phenergan)
  - Ranitidine (Zantac)
  - Amantadine (Parkinson, antiviral)
  - Others

# False-positives

- Benzos
  - Oxaprozin (Daypro-nsaid)
  - Sertraline (Zoloft)
- Cocaine
  - Topical anesthetics that contain cocaine, but not lidocaine
- Marijuana
  - Efavirenz-HIV med Sustiva (also in Atripla)
  - Pantoprazole (Protonoix)
  - Nsaids (notably, ibuprofen, naproxen (Naprosyn), and sulindac (Clinoril))

# False-positives

- Methadone
  - Quetiapine (Seroquel)
  - Verapamil (calcium channel blocker-HTN)
  - Diphenhydramine (Benadryl)
- Opioids
  - Dextromethorphan (DM cough medicines)
  - Diphenhydramine (Benadryl)
  - Rifampin (TB medication)
  - Quinine (anti-malarial)
  - Quinalones Atbx (levo-, gati-, o-floxin-not Cipro (?))
  - Poppy seeds (breakfast medication)

# Evidence-Based Practices

- Very little
- Contingency management has been shown to be an effective approach to addiction treatment. Very under-utilized.
- “the single most important quality issue surrounding POCT devices is the initial and ongoing training of the individual(s) performing the testing to maintain competency”

# Further research is needed on outcomes...

- Specifics of which tests, types of tests, frequency of testing, random vs non-random, cutoffs
- Use in primary care settings, ED, pain clinics (do practices used in addiction medicine settings apply elsewhere?)
- Should testing vary in patients on methadone vs buprenorphine vs naltrexone?

# Summary

- Test regularly, test randomly (get comfortable talking to patients about testing)
- Know why you are testing
- Know what test can and cannot do
- Testing is just one tool; needs to be used therapeutically
- Common false positives
- Common false negatives (e.g. clonazepam not on immunoassay, many opioids need specific test)
- Have a reference handy

The End

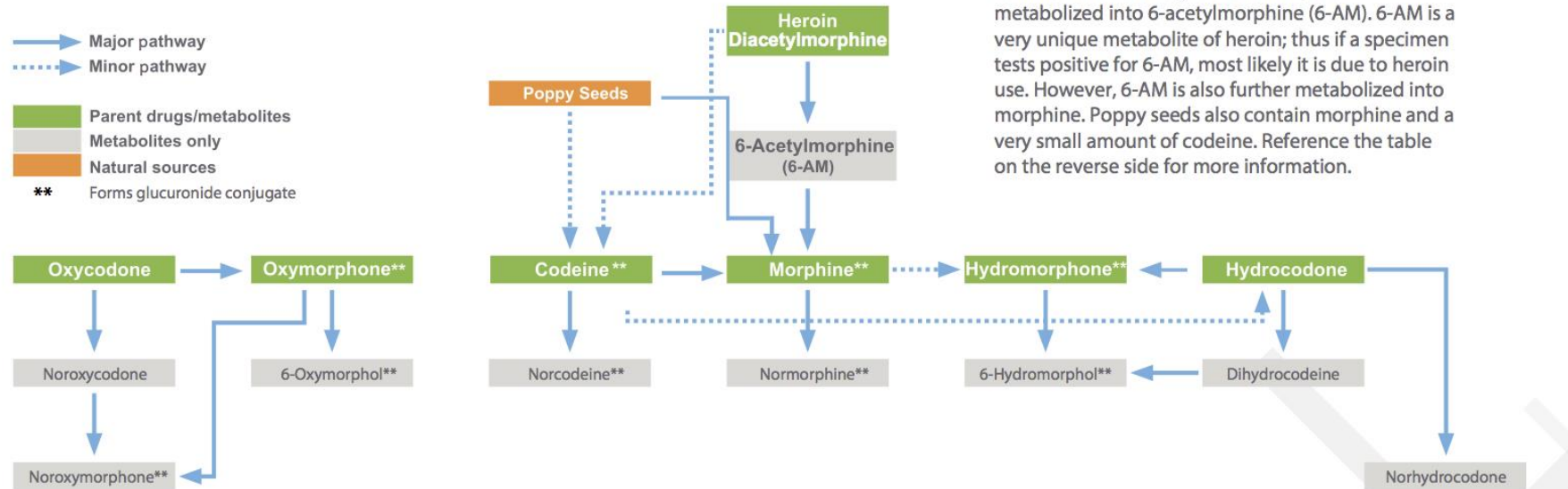


# Additional Resources

# OPIOID METABOLISM

This reference chart details the metabolism of several key opioids to aid in the interpretation of toxicology testing results. An arrow pointing towards a specific drug/metabolite indicates a potential source, while an arrow pointing away from a specific drug/metabolite indicates a metabolic product.

For example, pharmaceutical morphine, codeine, heroin and poppy seeds are all possible sources of a morphine positive test result. Approximately 15-20% of codeine is metabolized into morphine. Heroin itself has an extremely short half life; it is metabolized into 6-acetylmorphine (6-AM). 6-AM is a very unique metabolite of heroin; thus if a specimen tests positive for 6-AM, most likely it is due to heroin use. However, 6-AM is also further metabolized into morphine. Poppy seeds also contain morphine and a very small amount of codeine. Reference the table on the reverse side for more information.



For more information, visit [www.cordantsolutions.com](http://www.cordantsolutions.com), email [info@cordanths.com](mailto:info@cordanths.com) or call 1-855-895-8094.

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Scientific Director

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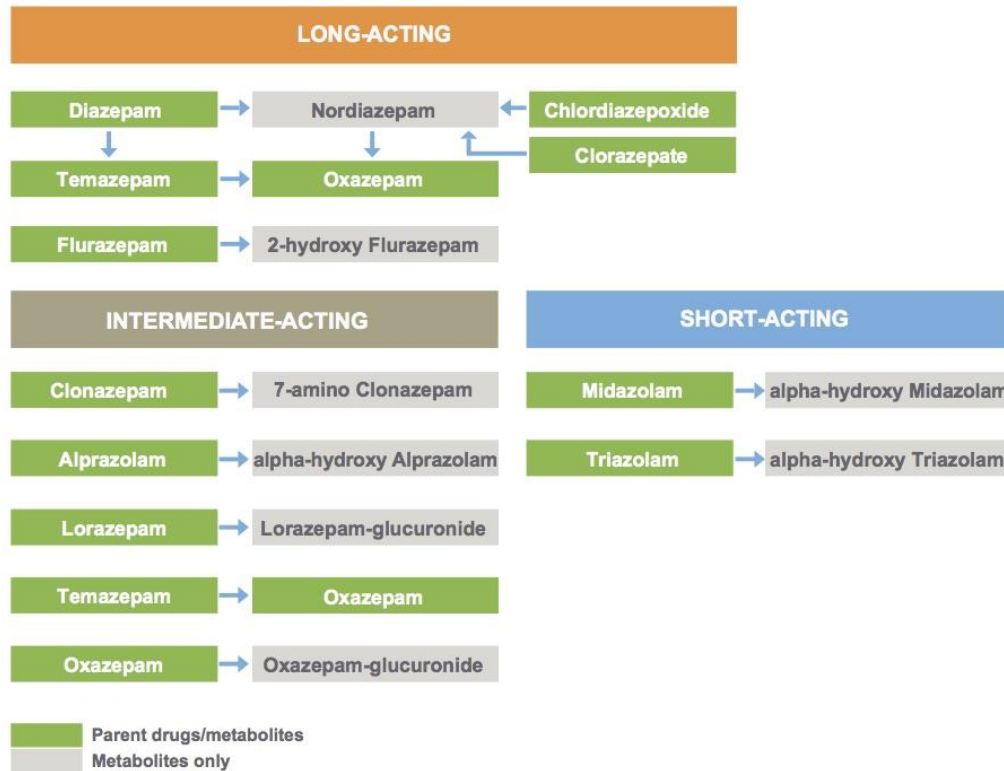
PARENT DRUG / METABOLITE	INTERPRETATION POSSIBILITIES	EXAMPLES OF BRAND NAMES
Diacetylmorphine (Heroin)	Heroin Use	
6-Acetylmorphine	Metabolite of Heroin	
Morphine*	Morphine Use, Codeine Use, Heroin Use, Poppy Seed Consumption	Astramorph®, Avinza®, Duramorph®, Infumorph®, Kadian®, MS Contin®
Normorphine	Metabolite of Morphine	
Codeine*	Codeine Use, Heroin Use, Poppy Seed Consumption	Tylenol 3®, Tylenol 4®
Norcodeine	Metabolite of Codeine	
Oxycodone	Oxycodone Use	OxyContin®, Oxecta®, Roxicodone®, Endocet®, Percocet®, Roxicet®, Endodan®, Percodan®
Noroxycodone	Metabolite of Oxycodone	
Noroxymorphone	Metabolite of Oxycodone and Oxymorphone	
Oxymorphone*	Oxymorphone Use, Oxycodone Use	Opana®
6-Oxymorphol	Metabolite of Oxymorphone	
Hydrocodone	Hydrocodone Use, Codeine Use	Lortab®, Norco®, Vicodin®, Xodol®, Zamiset®, Zydone®, Hysingla ER®, Zohydro ER®
Dihydrocodeine	Metabolite of Hydrocodone	
Norhydrocodone	Metabolite of Hydrocodone	
Hydromorphone*	Hydromorphone Use, Hydrocodone Use, Morphine Use	Dilaudid®, Exalgo®
6-Hydromorphol	Metabolite of Hydromorphone	

\*Analytes that can be both parent drugs and metabolites

For more information, visit [www.cordantsolutions.com](http://www.cordantsolutions.com), email [info@cordanth.com](mailto:info@cordanth.com) or call 1-855-895-8094.

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# BENZODIAZEPINE METABOLISM



Benzodiazepines belong to the sedative-hypnotic group of drugs that possess selective central nervous system, CNS depressant activity. Sedative properties refer to calming or tranquilizing effects of the drug. Hypnotic properties are the ability to induce sleep. The sedative - hypnotic properties of the various benzodiazepines overlap to a degree and are dose-dependent. The sedative properties are used to treat anxiety disorders, seizures, alcohol withdrawal, as muscle relaxants and as preanesthetic agents. The hypnotic and anesthetic properties require much higher doses compared to sedative effects. The indicated uses on page 2 are general uses and may vary depending on individual clinical situations.

Detection times for benzodiazepine are approximate and vary depending on dosage, frequency of dosing and the length of time that a patient has been using a particular drug. Oxazepam may be detected for several weeks after administration of long-acting drugs such as diazepam or chlordiazepoxide or much shorter detection times after administration of intermediate-acting drugs like temazepam or oxazepam.

For more information, visit [www.cordantsolutions.com](http://www.cordantsolutions.com), email [info@cordanthts.com](mailto:info@cordanthts.com) or call 1-855-895-8094.

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Prepared by: Bert Toivola, Ph.D.  
Scientific Director



	POSITIVE DRUG / METABOLITE	INDICATIONS FOR USE	TESTED AT CORDANT*	WINDOW OF DETECTION TIME IN URINE TESTING (APPROX)
LONG-ACTING	Diazepam (Valium®)	Anxiety, Seizures, Muscle Relaxant	Nordiazepam Temazepam Oxazepam	3 - 4 days 3 - 5 days 2 - 3 weeks (chronic use)
	Chlordiazepoxide (Librium®)	Anxiety, Alcohol withdrawal	Nordiazepam Oxazepam	3 - 4 days 3 - 5 days
	Chlorazepate (Tranxene®)	Anxiety	Nordiazepam Oxazepam	3 - 4 days 3 - 5 days
	Flurazepam (Dalmane®)	Insomnia	2-OH flurazepam	1 - 2 weeks
INTERMEDIATE-ACTING	Alprazolam (Xanax®)	Anxiety	alpha-hydroxy Alprazolam	3 - 5 days
	Lorazepam (Ativan®)	Anxiety, Preanesthesia	Lorazepam	3 - 5 days
	Oxazepam (Serax®)	Anxiety	Oxazepam	3 - 5 days
	Temazepam (Restoril®)	Insomnia	Temazepam Oxazepam	3 - 5 days
	Clonazepam (Klonopin®)	Seizures	7-Amino Clonazepam	3 - 5 days
	Estazolam (Prosom®)	Insomnia	n/a	
	Quazepam (Doral®)	Insomnia	n/a	
SHORT-ACTING	Clobazam (Onfi®)	Seizures	n/a	
	Midazolam (Versed®)	Preanesthesia	alpha-hydroxy Midazolam	24 - 48 hours
	Triazolam (Halcion®)	Insomnia	alpha-hydroxy Triazolam	24 - 48 hours

(\*availability varies by laboratory location)

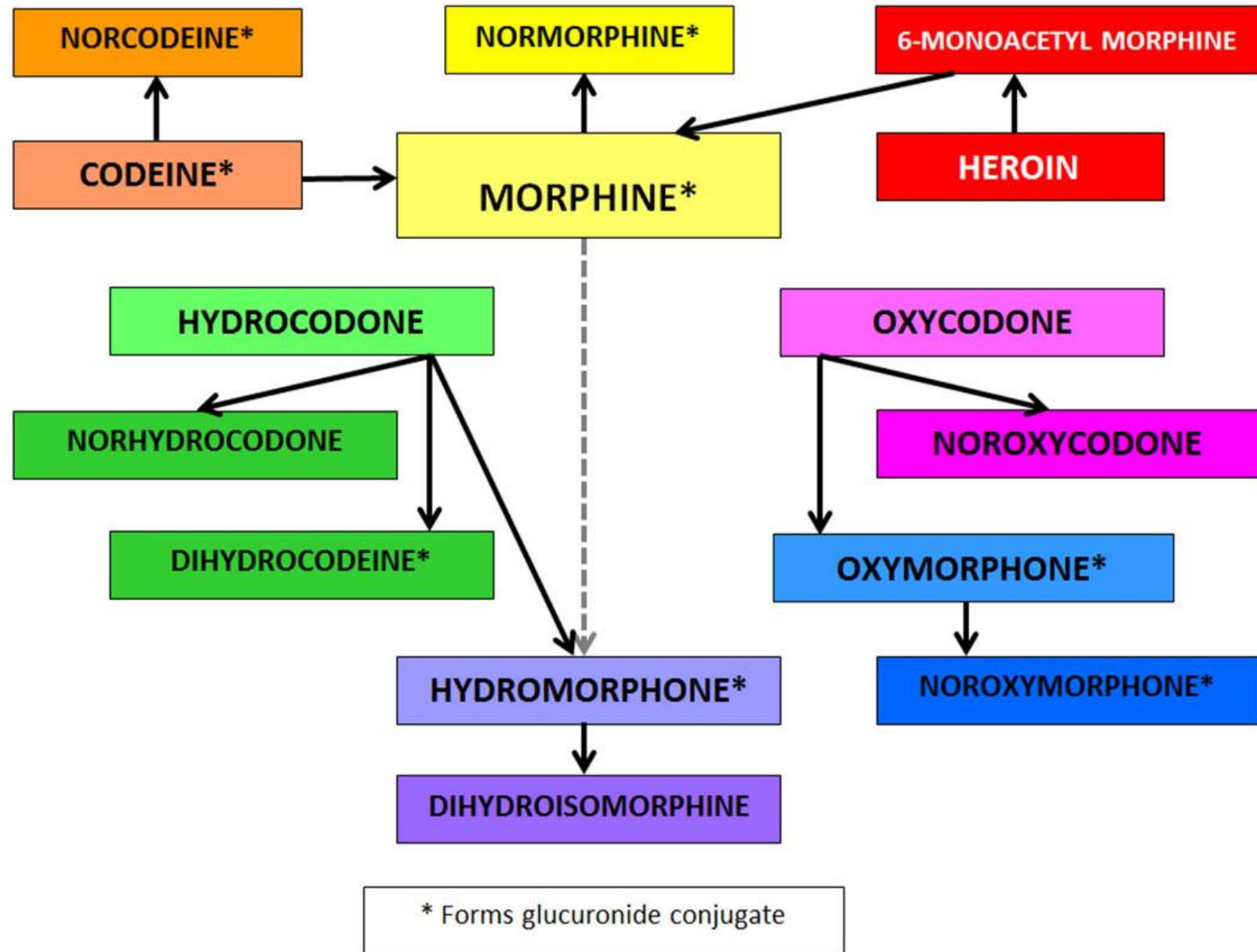
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# Metabolism

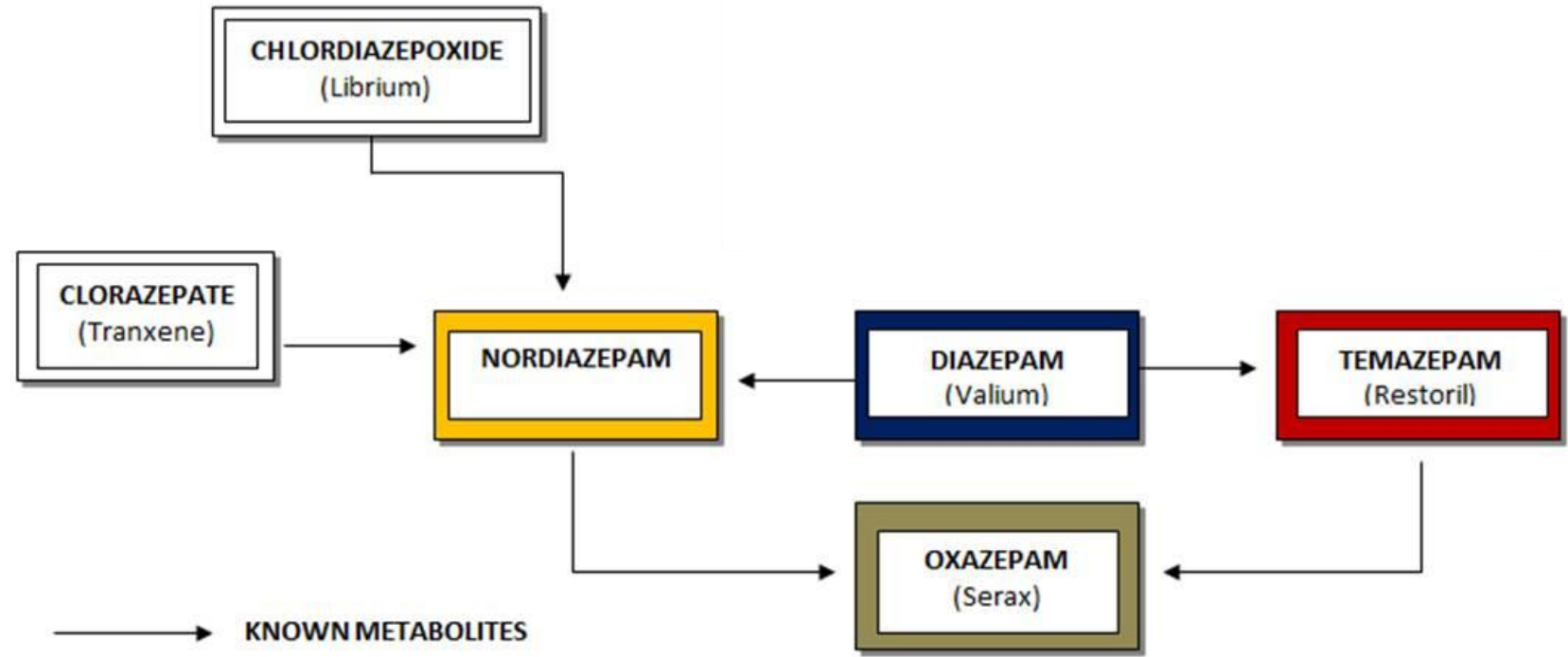
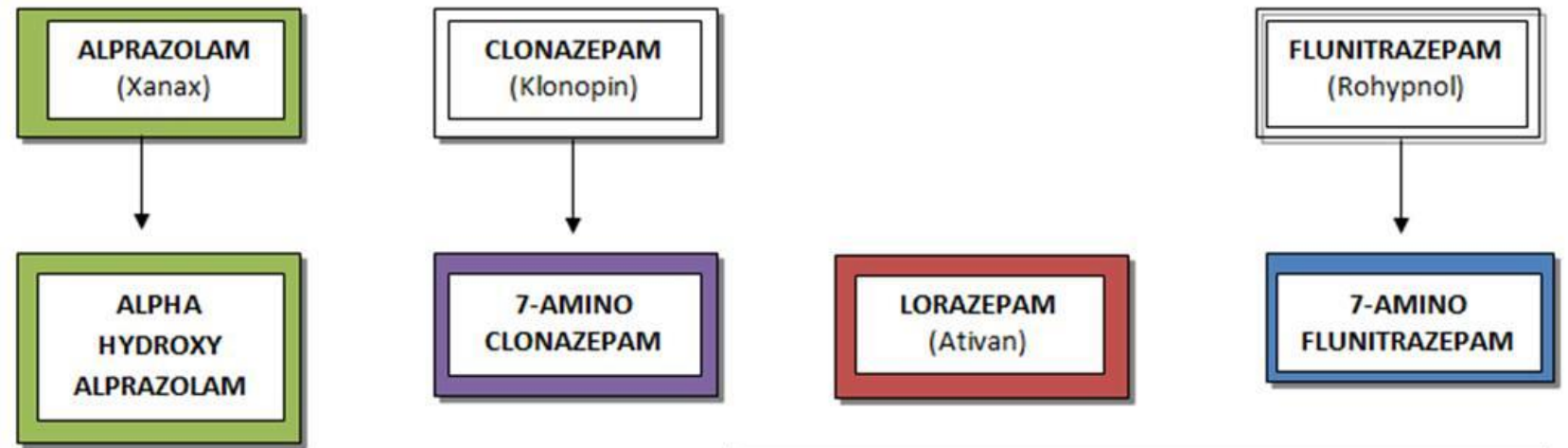
- Opioids

→ Known metabolites  
--> Pattern observed in patients receiving chronic opiate therapy



# Metabolism

- Benzodiazepines



Oxazepam and Nordiazepam are the primary metabolites of many benzodiazepines. Many Benzodiazepines occur as glucuronide conjugates in urine.

Table 2.

**Drugs that May Cause False-Positive Results in Immunoassay Testing**

<i>TEST DRUG OR DRUG CATEGORY</i>	<i>DRUGS THAT MAY CAUSE FALSE-POSITIVE RESULTS</i>	<i>DURATION OF DETECTABILITY</i>
Amphetamines	Amantadine (Symmetrel), bupropion (Wellbutrin), chlorpromazine, desipramine (Norpramin), fluoxetine (Prozac), L-methamphetamine (in nasal decongestants*), labetalol (Normodyne), methylphenidate (Ritalin), phentermine, phenylephrine, phenylpropanolamine, promethazine (Phenergan), pseudoephedrine, ranitidine (Zantac), thioridazine, trazodone (Desyrel)	Two to three days
Benzodiazepines	Oxaprozin (Daypro), sertraline (Zoloft)	Three days for short-acting agents (e.g., lorazepam [Ativan])  Up to 30 days for long-acting agents (e.g., diazepam [Valium])



Cocaine	Topical anesthetics containing cocaine	Two to three days with occasional use
		Up to eight days with heavy use
Opiates	Dextromethorphan, diphenhydramine (Benadryl), fluoroquinolones†, poppy seeds, quinine, rifampin, verapamil‡	One to three days
Phencyclidine	Dextromethorphan, diphenhydramine, ibuprofen, imipramine (Tofranil), ketamine (Ketalar), meperidine (Demerol), thioridazine, tramadol (Ultram), venlafaxine (Effexor)	Seven to 14 days
Tetrahydrocannabinol	Dronabinol (Marinol), nonsteroidal anti-inflammatory drugs§, proton pump inhibitors (pantoprazole [Protonix])	Three days with single use

<b>TEST DRUG OR DRUG CATEGORY</b>	<b>DRUGS THAT MAY CAUSE FALSE-POSITIVE RESULTS</b>	<b>DURATION OF DETECTABILITY</b>
		Five to seven days with use around four times per week
		10 to 15 days with daily use
		More than 30 days with long-term, heavy use
<p><i>*—Current immunoassays have corrected the false-positive result for nasal decongestants containing L - methamphetamine.</i></p>		
<p><i>†—Notably, ciprofloxacin (Cipro), levofloxacin (Levaquin), and ofloxacin (Floxin).</i></p>		
<p><i>‡—In methadone assays only.</i></p>		
<p><i>§—Notably, ibuprofen, naproxen (Naprosyn), and sulindac (Clinoril).</i></p>		
<p><i>Information from references 10 through 13.</i></p>		

# Bibliography

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