

# Drug Screening in Addiction Treatment



**EMILY BUIRKLE**

**ASSOCIATE PROFESSOR, DEPARTMENT OF  
PSYCHIATRY**

**RUTGERS NEW JERSEY MEDICAL SCHOOL**

**PROJECT ECHO**

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# Financial Disclosures



- The following session leader has no relevant financial relationships with ineligible companies to disclose:
  - Emily Buirkle, MD

# Outline



- Purpose of drug screens
- Selecting a test
- Screening vs confirmation
- Interpreting results
  - Specific substances
- Example

# Principles of drug screening



- Routine part of addiction treatment
- Monitor progress
  - Medication adherence
  - Substance use

# Principles of drug screening



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- Monitor progress
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  - Substance use
- No strict guidelines

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- Monitor progress
  - Medication adherence
  - Substance use
- No strict guidelines
- Frequency
  - Weekly → monthly

# Principles of drug screening



- Routine part of addiction treatment
- Monitor progress
  - Medication adherence
  - Substance use
- No strict guidelines
- Frequency
  - Weekly → monthly
- Efficacy?

# Stigma



- Patient provider relationship
- Patient perception

# Stigma



- Patient provider relationship
- Patient perception
  
- Nonpunitive
- Facilitate conversation
  - Progress based on treatment goals
  - Adulterants
  - Focus on safety

# Stigma



- Patient provider relationship
- Patient perception
  
- Nonpunitive
- Facilitate conversation
  - Progress based on treatment goals
  - Adulterants
  - Focus on safety
- Normalize lab testing
- Non-stigmatizing language

# Picking a matrix



Window of detection

Reason for testing

# Picking a matrix

- Short: Blood, breath
  - Minutes – hours
  - Intoxication



# Picking a matrix



- **Short: Blood, breath**
  - Minutes – hours
  - Intoxication
- **Intermediate: Urine, oral fluid**
  - Hours – days
  - Treatment clinics



# Picking a matrix



- **Short: Blood, breath**
  - Minutes – hours
  - Intoxication
- **Intermediate: Urine, oral fluid**
  - Hours – days
  - Treatment clinics
- **Long: Hair**
  - Weeks – months
  - Employment



# Picking a matrix

- Urine
  - Most common
  - Easier to adulterate
    - ✦ Dilution
    - ✦ Adding medication
    - ✦ Non-urine sample
    - ✦ Friend's urine
  - Observed urine



# Picking a matrix

- Urine
  - Most common
  - Easier to adulterate
    - ✦ Dilution
    - ✦ Adding medication
    - ✦ Non-urine sample
    - ✦ Friend's urine
  - Observed urine
- Oral fluid
  - Shorter window of detection
    - ✦ 1-2 days



# Screen & confirm



- Immunoassay
  - Antibody detects a drug or metabolite
- Gas chromatography–mass spectrometry (GCMS)
  - Separate and identify substances

# Screen & confirm



- **Immunoassay**
  - Antibody detects a drug or metabolite
- **Gas chromatography–mass spectrometry (GCMS)**
  - Separate and identify substances
- **Limitations**
  - Can't diagnose SUD
  - Window of detection
  - Concentration threshold
  - False + & False –
  - Adulteration

# Interpretation



- Step 0
  - Patient ID and date of collection

# Interpretation



- Step 0
  - Patient ID and date of collection
- Step 1
  - Temperature >90F
  - Validity testing

TEST	MEASURED RESULT	REFERENCE RANGE	UNITS
pH	7.2	4.7 - 7.8	
Specific Gravity	1.015	1.003 - 1.035	g/mL
Creatinine	116.4	80.0 - 200.0	mg/dL

# Interpretation



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TEST	MEASURED RESULT	REFERENCE RANGE	UNITS
pH	5.9	4.7 - 7.8	
Specific Gravity	1.003	1.003 - 1.035	g/mL
Creatinine	-0.5	80.0 - 200.0	mg/dL

# Interpretation



- Step 0
  - Patient ID and date of collection
- Step 1
  - Temperature >90F
  - Validity testing

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Specific Gravity	1.015	1.003 - 1.035	g/mL
Creatinine	116.4	80.0 - 200.0	mg/dL

- Step 3
  - Reviewing individual drugs

# Buprenorphine



- Immunoassay
  - Target: Buprenorphine, norbuprenorphine
  - False +
    - ✦ Opioids: Morphine, codeine, methadone
  - False –
    - ✦ None
- Window of detection: 2 - 4 days

# Buprenorphine



- Buprenorphine → Norbuprenorphine

Buprenorphine	POSITIVE	186.5	10.0	ng/mL
Norbuprenorphine	POSITIVE	525.5	25.0	ng/mL

# Buprenorphine



- Buprenorphine → Norbuprenorphine

Buprenorphine	POSITIVE	186.5	10.0	ng/mL
Norbuprenorphine	POSITIVE	525.5	25.0	ng/mL

Buprenorphine	POSITIVE	>1200	10.0	ng/mL
Norbuprenorphine	Negative		25.0	ng/mL

# Buprenorphine



- Buprenorphine → Norbuprenorphine

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# Buprenorphine



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Norbuprenorphine	POSITIVE	33.4	25.0	ng/mL

- Dipping
  - Norbuprenorphine: Buprenorphine <0.2

# Opioids & Opiates



- Immunoassay (opiate)
  - Target: Morphine, codeine



# Opiates

heroin\*  
(diacetylmorphine)

6-monoacetylmorphine  
(6-AM)

codeine

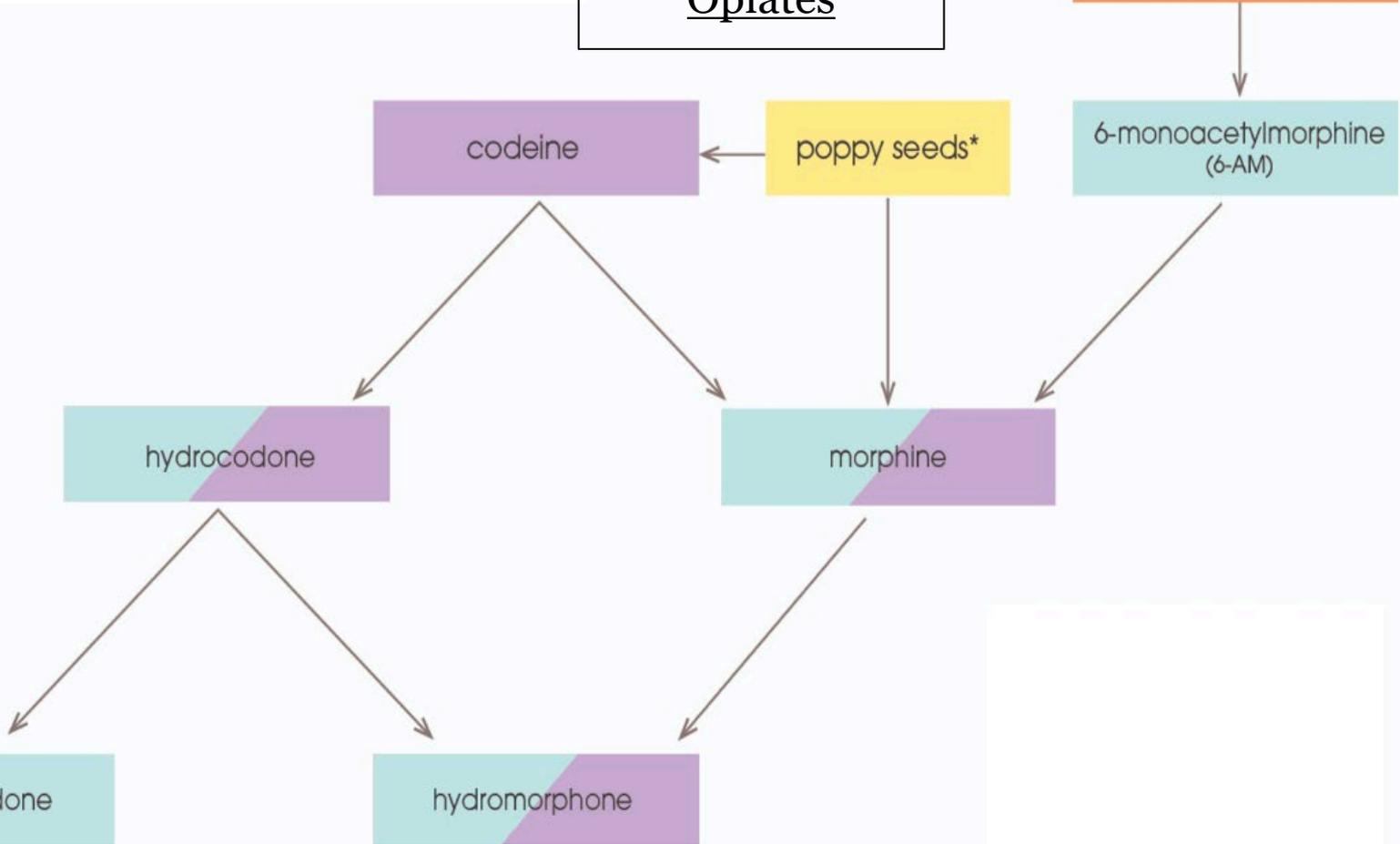
poppy seeds\*

hydrocodone

morphine

norhydrocodone

hydromorphone



# Opiates

heroin\*  
(diacetylmorphine)

6-monoacetylmorphine  
(6-AM)

poppy seeds\*

codeine

hydrocodone

morphine

norhydrocodone

hydromorphone



# Opiates

heroin\*  
(diacetylmorphine) ✓

codeine ✓

poppy seeds\*

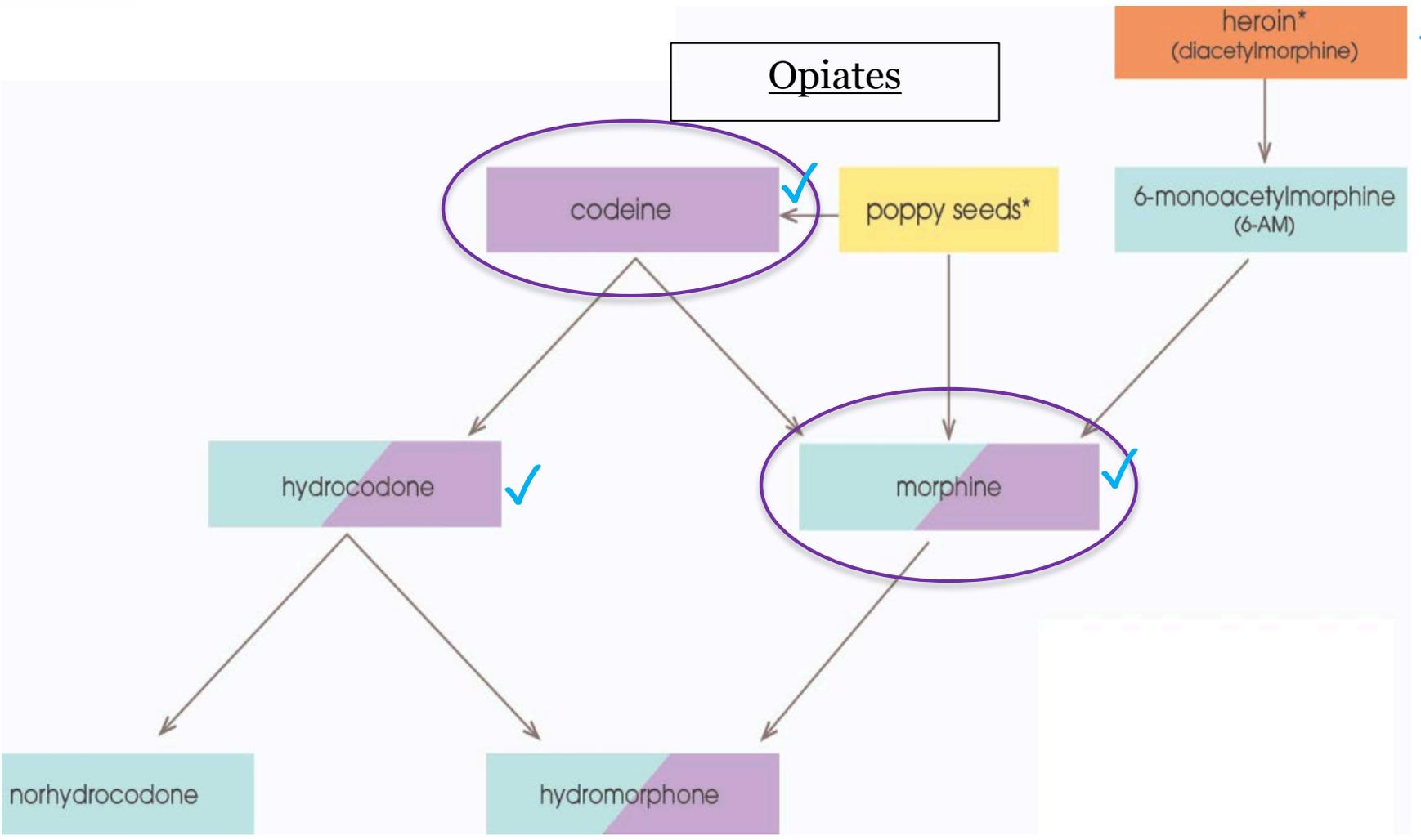
6-monoacetylmorphine  
(6-AM) ←

hydrocodone ✓

morphine ✓

norhydrocodone

hydromorphone



Fully Synthetic ❌

Fentanyl  
Methadone  
Tramadol

Opiates

heroin\*  
(diacetylmorphine) ✓

codeine ✓

poppy seeds\*

6-monoacetylmorphine  
(6-AM) ←

hydrocodone ✓

morphine ✓

Semisynthetic

oxycodone ❌

noroxycodone

oxymorphone

norhydrocodone

hydromorphone

# Opioids & Opiates



- Immunoassay (opiate)
  - Target: Morphine, codeine
  - False +
    - ✦ Poppy, naloxone, levofloxacin, rifampin
  - False –
    - ✦ Synthetic: Methadone, fentanyl, tramadol
    - ✦ Semisynthetic: Oxycodone
- Window of detection: 3 days

# Methadone



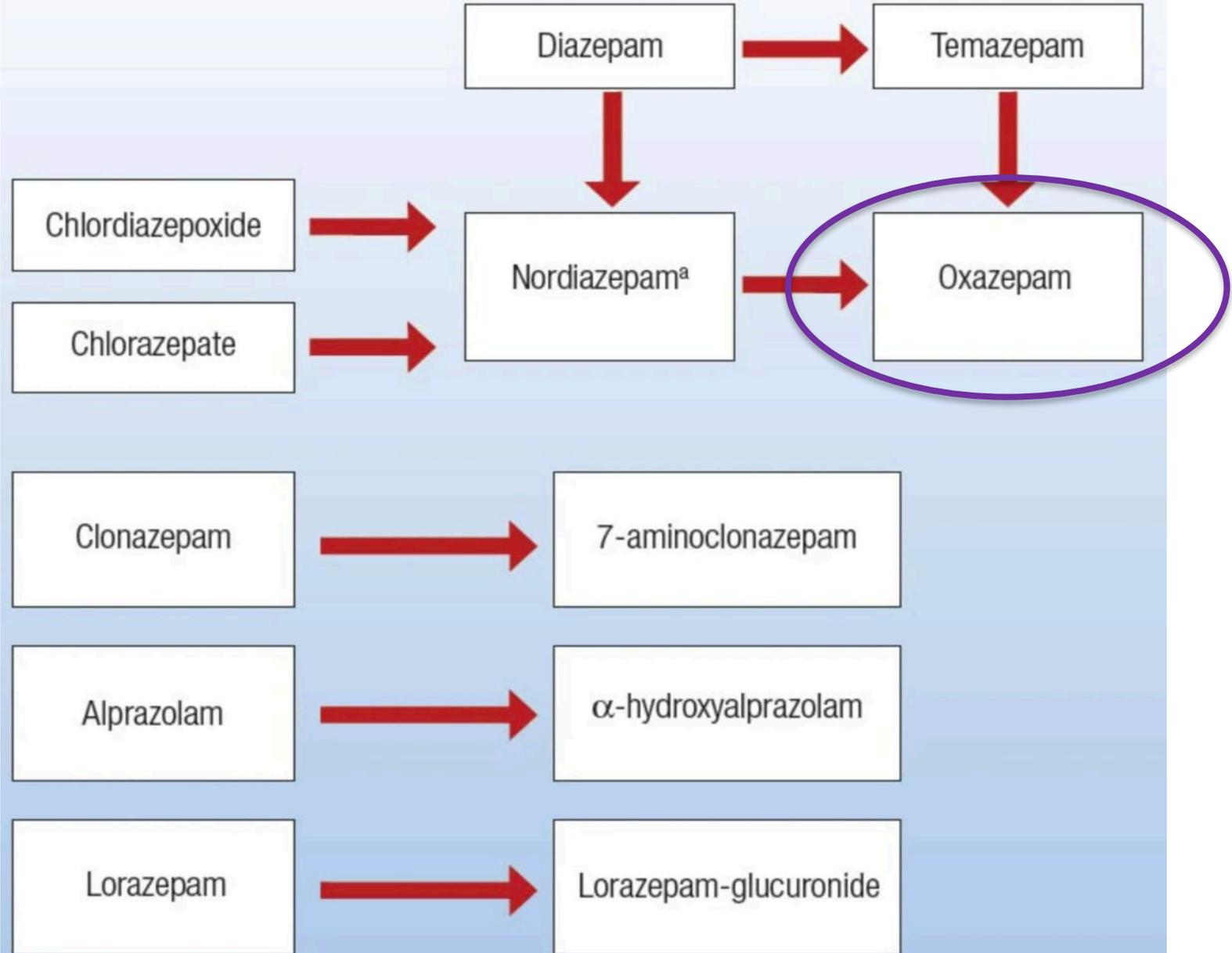
- Immunoassay
  - Target: Methadone, EDDP
  - False +
    - ✦ Diphenhydramine, quetiapine, verapamil
  - False –
    - ✦ None
- Window of detection: Up to 7 days

# Benzodiazepines

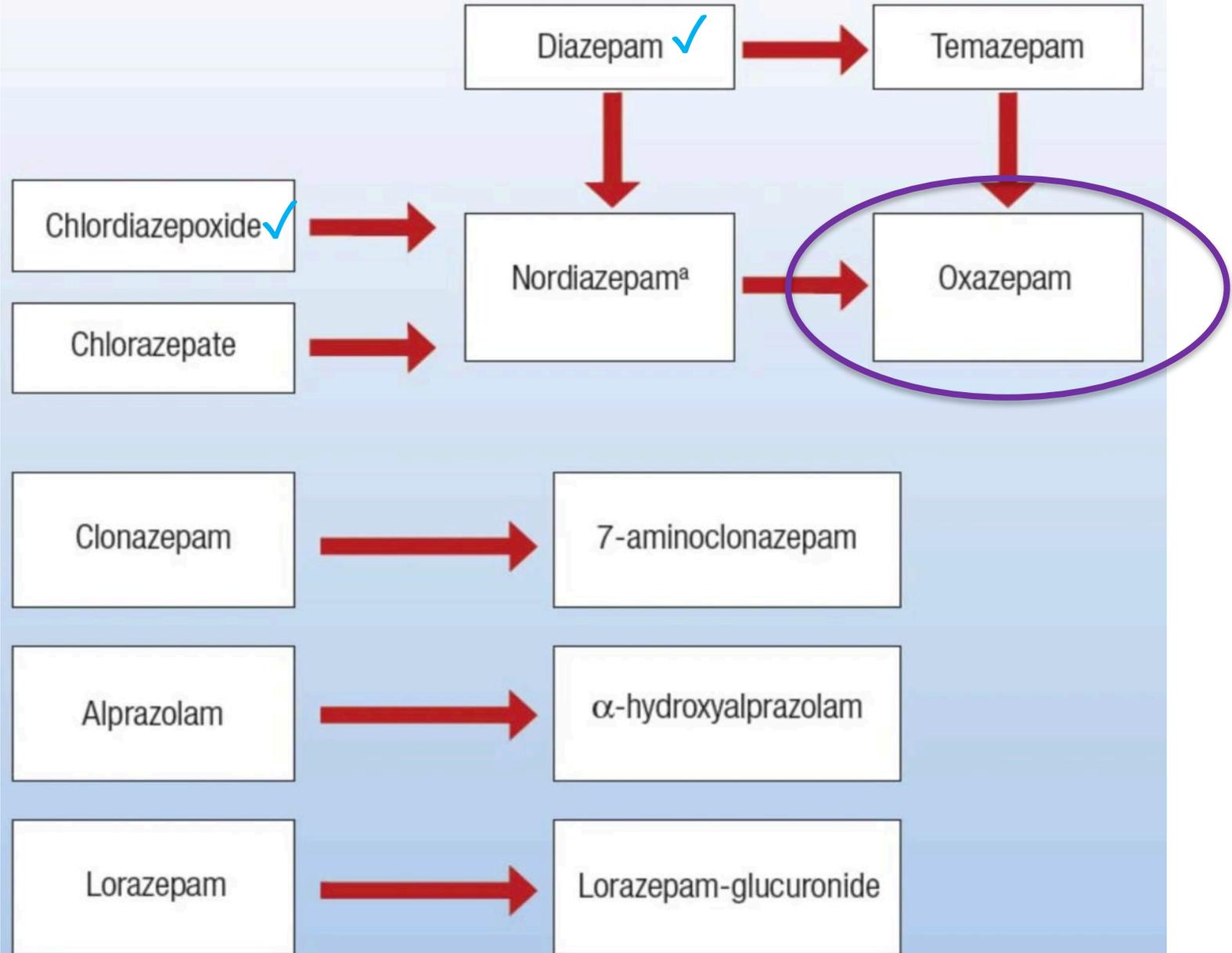


- Immunoassay
  - Target: Oxazepam

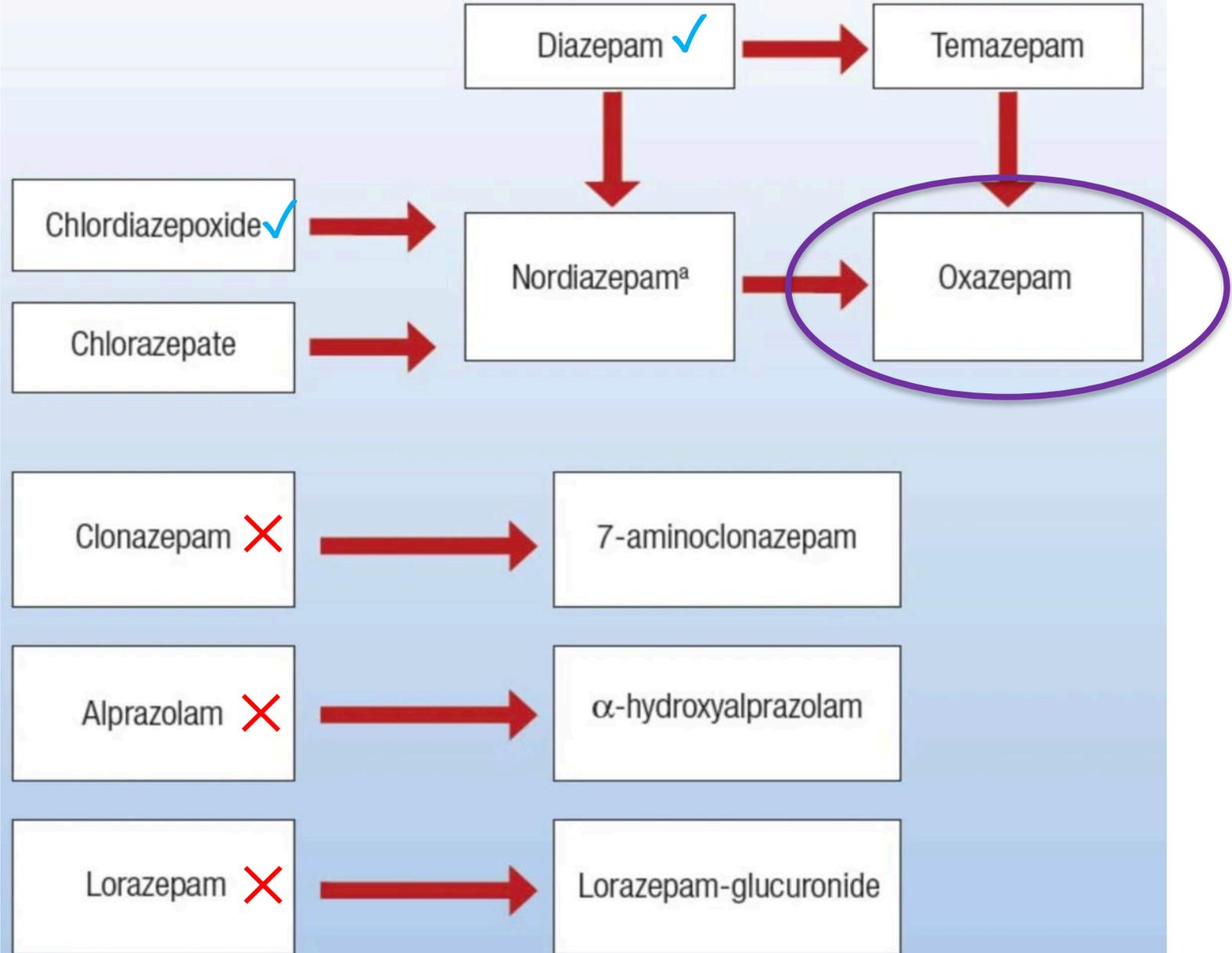
# Benzodiazepine metabolism



# Benzodiazepine metabolism



# Benzodiazepine metabolism



# Benzodiazepines



- Immunoassay
  - Target: Oxazepam
  - False +
    - ✦ Sertraline, efavirenz
  - False –
    - ✦ Alprazolam, lorazepam, clonazepam
- Window of detection: 5 days (diazepam 10 days)

# Barbiturates



- Immunoassay
  - Target: Secobarbital
  - False +
    - ✦ NSAIDs
  - False –
    - ✦ None
- Window of detection: 3 – 15 days

# Cocaine



- Immunoassay
  - Target: Benzoylecgonine
  - False +
    - ✦ Coca tea
  - Considered as accurate at GCMS
- Fluconazole → false – GCMS
- Window of detection: 5 days

# THC



- Immunoassay
  - Target: 9-carboxy-THC
  - False +
    - ✦ NSAIDs, pantoprazole, promethazine, efavirenz
  - False –
    - ✦ Synthetic cannabis
- Window of detection: 3 - 30 days



# Amphetamine



- Immunoassay
  - Target: Amphetamine, methamphetamine
  - False +
    - ✦ Amantadine, atomoxetine, bupropion, pseudoephedrine, metformin, labetalol, trazadone
  - False –
    - ✦ MDMA, cathinones (bath salts)
- Window of detection: 3 days

# PCP

- Immunoassay
  - Target: PCP
  - False +
    - ✦ Dextromethorphan, ketamine, diphenhydramine, ibuprofen, lamotrigine, venlafaxine, tramadol
  - False –
    - ✦ None
- Window of detection: 8 days

# LSD

- Immunoassay
  - Target: LSD
  - False +
    - ✦ Fluoxetine, buspirone, doxepin, amitriptyline, sertraline, bupropion, haloperidol, risperidone, trazadone, labetalol, diltiazem, verapamil, fentanyl
  - False –
    - ✦ None
- Window of detection: 5 days

# Example



Patient presents seeking treatment

Report history of OUD

Daily heroin use

Last use this morning

# Opioid dependent?

## DRUG SCREENING

TEST NAME	RESULT	FLAG	CUTOFF	NOTES
Barbiturates Screen	NEGATIVE			< 200 ng/mL is considered a NEGATIVE result
Notes: ^				
Benzodiazepines Screen	NEGATIVE			< 200 ng/mL is considered a NEGATIVE result
Notes: ^				
Buprenorphine Screen	NEGATIVE			< 5 ng/mL is considered a NEGATIVE result
Notes: ^				
Cocaine Screen	POSITIVE	<b>POSITIVE</b>		< 300 ng/mL is considered a NEGATIVE result
Notes: ^				
Ethanol Screen	NEGATIVE			< 50 mg/dL is considered a NEGATIVE result
Notes: ^				
Ecstasy Screen	NEGATIVE			< 300 ng/mL is considered a NEGATIVE result
Notes: ^				
Methadone Screen	NEGATIVE			< 300 ng/mL is considered a NEGATIVE result
Notes: ^				
Opiate Screen	NEGATIVE			< 300 ng/mL is considered a NEGATIVE result
Notes: ^				
Oxycodone Screen	NEGATIVE			< 100 ng/mL is considered a NEGATIVE result
Notes: ^				
PCP Screen	NEGATIVE			< 25 ng/mL is considered a NEGATIVE result
Notes: ^				
Cannabinoid 50 Screen	NEGATIVE			< 50 ng/mL is considered a NEGATIVE result

# Confirmation



## Fentanyl Confirmation (LC-MS/MS)

3-Methylfentanyl	Negative		10.0	ng/mL
Acetyl fentanyl	Negative		5.0	ng/mL
Carfentanil	Negative		10.0	ng/mL
Fentanyl	POSITIVE	382.7	10.0	ng/mL
Norfentanyl	POSITIVE	>1200	10.0	ng/mL
Sufentanil	Negative		10.0	ng/mL

## DRUG SCREENING

TEST NAME	RESULT	FLAG	CUTOFF	NOTES
Barbiturates Screen	NEGATIVE			< 200 ng/mL is considered a NEGATIVE result
Notes: ^				
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Norfentanyl	POSITIVE	>1200	10.0	ng/mL
Sufentanil	Negative		10.0	ng/mL

## Opiates Confirmation (LC-MS/MS)

Codeine	Negative		50.0	ng/mL
Hydrocodone	Negative		50.0	ng/mL
Hydromorphone	Negative		50.0	ng/mL
Morphine	POSITIVE	123.7	50.0	ng/mL
Norhydrocodone	Negative		50.0	ng/mL

# Opioid dependent?

## DRUG SCREENING

TEST NAME	RESULT	FLAG	CUTOFF	NOTES
Methadone Screen	NEGATIVE			< 300 ng/mL is considered a NEGATIVE result
Opiate Screen	NEGATIVE			< 300 ng/mL is considered a NEGATIVE result
Notes:				
Oxycodone Screen	NEGATIVE			< 100 ng/mL is considered a NEGATIVE result
Notes:				
PCP Screen	NEGATIVE			< 25 ng/mL is considered a NEGATIVE result
Notes:				
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Morphine	POSITIVE	123.7	50.0	ng/mL
Norhydrocodone	Negative		50.0	ng/mL

# References



Jarvis M, Williams J, Hurford M, Lindsay D, Lincoln P, Giles L, Luongo P, Safarian T. Appropriate Use of Drug Testing in Clinical Addiction Medicine. *J Addict Med.* 2017 May/Jun;11(3):163-173. PMID: 28557958.

Nelson ZJ, Stellpflug SJ, Engebretsen KM. What Can a Urine Drug Screening Immunoassay Really Tell Us? *J Pharm Pract.* 2016 Oct;29(5):516-26. Epub 2015 Apr 27. PMID: 25917168.