Urine Toxicology Use and Interpretation

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Urine drug test interpretation: what do physicians know?

Reisfield GM et al. J Opioid Manag. 3(2):80-86, 2007

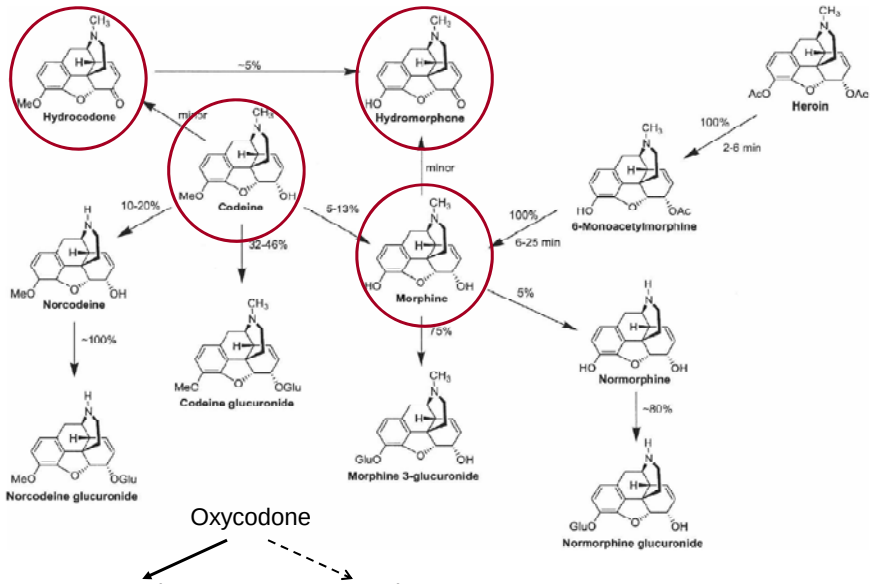
1) In a patient prescribed Tylenol #3, one would expect which of the following to be detectable in the urine? (29% correct)
2) In a patient prescribed MSContin, one would reasonably expect to find which of the following in the urine? (61% correct)
3) In a patient abusing heroin, one would be likely to detect which of the following in the urine? (7% correct)
4) A patient taking Oxycotin is given a urine drug test. He notifies you that he ate a poppy seed muffin for breakfast. What might reasonably be detected in the uring? (22% correct)
5) A patient on chronic opioid therapy tests positive for cannabis on a random drug screen. She explains that her husband sometimes smokes pot in their bedroom. Is this a plausible explanation for the test findings? (79% correct)
6) Which of the following are plausible explanations for a negative urine opiate screen in a patient on chronic opioid therapy? (17% correct)
7) A patient on q6h Dilaudid therapy tests opiate-negative on a urine drug screen. He claims use as prescribed. What is the appropriate next step? (52% correct)

Only 30% answered more than half of the questions correctly

Most common UTOX questions??

Is my patient taking what I am prescribing them?

Opiate Metabolism



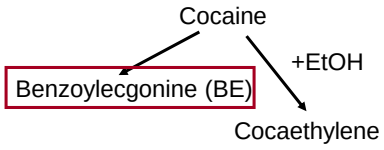
Oxycodone

Oxymorphone Noroxycodone

Opiates: Immunoassay cross-reactivity

	Online DAT opiates II[1] assay	EMIT II+ opiate aassay[2]	TDx/TDx-flex opiate opiate assay[3]	Archetict/ Aeroset	AsSym opiate[3]	CEDIA opiate[4]	DRI opiate[4]	DRI oxycodone[4]
Morphine	100	100	100	100	100	100	100	<29
Codeine	134	98	>3.6	167	>3.6	125	167	<20
Ethyl morphine	101		<10		>100			
Diacetyl morphine (heroin)	82					53	86	<33
6-Acetylmorphine	78	69	>20	67	<30	81	79	<200
Dihydrocodeine	69	103	>3.6	106	>3.6	50	67	<100
Morphine-3-glucuronide	54	48	>57	47	>57	81	50	<11
Morphine-6-glucuronide			>5.7		<8.6	47	100	
Hydrocodone	28	121	>8.0	158	>12	48	18	<133
Hydromorphone	21	60	>4.4	54	>6.7	57	7.5	<333
Norcodeine	2							<10
Normorphine							0	<10
Oxycodone	0	12	>1.1	11	<1.7	3.1	1.9	100
Oxymorphone		1.5	<10	0	<15	1.9	0.7	103
Noroxycodone								<0.1
Noroxymorphone								<0.1
Meperidine	0	<0.6	<2.0	0	<3.0	0.2	0	
Levallorphan		<4	<6.0	13	<6.0			
Levorphanol		29	>6.0	27	>6.0		2.1	<50
Nalorphine		3	<20	2.3	<30			
Naloxone	0	0.04	<20	0	<30		0	<50
Imiprimine	0					1.6		
Ranitidine						0	0	
Thebaine	25		<20		<30		<15	
Naltrexone	0						0	<20
Fentanyl			<40		<60			

Other Immunoassays: what do I need to know?



Good Immunoassay

Prone to False Positives

Phentermine
Ephedrine
Pseudoephedrine
Phenyl-propanolamine
Buproprion
Venlafaxine
Designer amines

Methamphetamine → Amphetamine (R/S)

MDMA → MDA

Methadone → EDDP → EMDP

Good Immunoassay

Benzodiazepines

Prone to False Negatives

Metabolism is complex

Amphetamines: Immunoassay cross-reactivity

Compound	Concentration Tested (ng/mL)	% Cross-Reactivity
d-Amphetamine	1000	104
l-Amphetamine	40,000	1.0
d,l-Amphetamine	1,250	88
d,l-Methamphetamine	1,000	77
l-Methamphetamine	8,000	18
3,4-Methylenedioxy-amphetamine (MDA)	1000	116
3,4-Methylenedioxy-methamphetamine (MDMA)	500	196
3,4-Methylenedioxy-ethylamphetamine (MDEA)	300	172
N-Methylbenzodioxa-zolylbutanamine (MBDB)	900	121
Benzodioxazolybutanamine (BDB)	1000	76
Phentermine	25,000	3.3
d,l-Phenylpropanolamine	500,000	0.3
d-Pseudoephedrine	160,000	0.9
l-Ephedrine	250,000	0.5
p-Methoxyamphetamine (PMA)	2000	24
p-Methoxymethamphetamine(PMMA)	500	100

Benzodiazepines: Immunoassay cross-reactivity

Compound	Without ß-Glucuronidase Tested ng/mL	Without ß-Glucuronidase %Cross-Reactivity	With ß-Glucuronidase Tested ng/mL	With ß-Glucuronidase %Cross-Reactivity
7-NH$_2$-Flunitrazepam	-	-	200	99
7-NH$_2$-Nitrazepam	-	-	250	83
α-OH-Alprazolam	163	188	115	167
α-OH-Triazolam	150	193	125	155
Alprazolam	138	205	100	220
Alprazolam glucuronide	-	-	200	100
Bromazepam	300	110	190	104
Chlordiazepoxide	2083	13	1200	16
Clobazam	400	62	300	59
Clonazepam	188	140	225	71
Clorazepate	325	84	300	75
Delorazepam	150	184	100	197
Demoxepam	1900	14	1000	19
Desalkylflurazepam	138	210	115	173
Diazepam	110	247	125	154
Estazolam	125	220	95	239
Flunitrazepam	138	135	175	109
Flurazepam	150	189	100	195
Halazepam	200	145	200	101
Lorazepam	208	122	175	115
Lorazepam glucuronide	10000	1	400	45
Lormetazepam	163	165	150	137
Medazepam	200	135	150	118
NH$_2$-Clonazepam	-	-	200	96
Nitrazepam	300	100	200	100
Nordiazepam	150	211	120	173
Oxaprozin	10000	2	10000	2
Oxazepam	275	107	165	125
Oxazepam glucuronide	10000	1	800	25
Prazepam	150	184	160	116
Temazepam	175	144	180	93
Temazepam glucuronide	10000	1	750	25
Triazolam	138	191	90	217

These assays will not detect atypical benzodiazepine receptor ligands: eszopiclone (lunestra), zaleplon (sonata), zolpidem (ambien), etc.

What is the window of detection for common drugs of abuse?

Drug Detection Windows

Drug of Abuse	Drug Detection Period (Approximate Guidelines)
Amphetamines	2-4 days
Barbiturates	1-3 days (Phenobarbital, 2 weeks)
Benzodiazepines	Up to two weeks
Cocaine (BE)	2-3 days
Ethanol	Less than 1 day
Methadone (EDDP)	2-4 days
Opiates	2-3 days
Oxycodone	1-3 days
Phencyclidine	3-8 days

If you have to guess…2-3 days

Other Misconceptions/Questions

1) A negative result means that there is absolutely no drug present (value = 0)

   All immunoassays have cut-off values

   Amphetamines – 1000 ng/mL
   Barbiturates – 200 ng/mL
   Benzodiazepines – 200 ng/mL
   Cocaine (BE) – 300 ng/mL
   Methadone (EDDP) – 100 ng/mL
   Opiates – 300 ng/mL

2) All immunoassays for a class of abused drugs have similar characteristics

3) Utox results tell us something about the patients current clinical state

4) Is GC-MS and LC-MS/MS really confirmatory and can the results be trusted?

5) My clinical laboratory cannot help me with the interpretation of Utox results