THE TESTS

**Enzyme linked immunoassay (EIA) kits**
- Screening test for illicit substances amphetamine/methamphetamine, (marijuana, PCP, cocaine, “opiates” (morphine/codeine)
- Inexpensive, fast, point of care or lab
- Detects class of substance, not specific medication
- Will be negative for hydrocodone, hydromorphone, oxycodone, methadone, buprenorphine, benzodiazepines (particularly clonazepam) unless specific test kit for those meds is in use. *Ask your lab!*
- High false positive rates caused by numerous prescribed or OTC meds

**Gas chromatography/Mass Spectroscopy (GCMS)**
- More expensive, labor intensive
- Confirming test identifies specific meds and their metabolites. Use to confirm patient is taking prescribed meds and not taking non-prescribed meds
- High sensitivity, but you must *tell the lab what you seek (patient is taking)*
- False positives still occur

**Human Urine**: T ~98 deg; > 90 deg for 15 min. pH 4.5-8; SG 1.002-1.03. Ur Cr > 20 mg/dL **

WHAT TO ORDER
- Test for illicit drug use: EIA
- Test to confirm taking prescribed meds: GCMS (EIA is OK if your lab runs the test for each med – they usually do not – *ask*!)
- Test to check for use of non-prescribed medication: GCMS

POSSIBLE OUTCOMES OF TESTING
- Presence of illicit substance: Use by patient; false result related to prescribed or OTC med exposure
- Presence of non-prescribed medication: Illicit use by patient; false positive testing – cross-reaction or possible known metabolite (e.g., morphine or codeine may → hydromorphone)
- Absence of prescribed medication: diversion or binging and running out early; false negative (incorrect use of EIA rather than GCMS testing); urine adulterated; cut-off problem (the threshold in workplace testing for reporting a positive is set high to avoid false positives that require a job action)
TESTING REFERENCE

**Drug Testing False Positives** (on EIA not GCMS unless specified)
 illicit use? false positive on screen? known metabolite of prescribed rx?

- Amphetamines/methamphetamine: bupropion, tricyclic antidepressants, phenothiazines, propranolol, labetalol, OTC cold rx, ranitidine, metformin! selegiline, trazodone, Abilify, phentermine, zolpidem. Vicks Nasal Spray can test positive even on GCMS.
- Barbiturates: phenytoin
- Benzodiazepines: sertraline, zolpidem, NSAIDs?
- LSD: amitriptyline, doxepin, sertraline, fluoxetine, metoclopramide, haloperidol, risperidone, verapamil
- Opioids
  - False positive EIA testing: quinolones (oflox, gati), dextromethorphan, diphenhydramine (Benadryl), doxylamine, rifampin, verapamil, poppy seeds, zolpidem?
  - Oxycodone on EIA: naloxone (in Suboxone)?
  - False positive GCMS testing
    - Morphine: from codeine, heroin (for a few hours) and poppy seeds for 48 hrs
    - Hydromorphone: from morphine, codeine, hydrocodone, heroin
    - Oxycodone: from hydrocodone
    - Oxymorphine: from oxycodone
    - Codeine: from hydrocodone
    - Fentanyl: from trazodone
    - Methadone: from quetiapine (Seroquel), diltiazem and verapamil (rare); doxylamine, Benadryl (EIA +, metab and GCMS neg)
    - Tramadol: from venlafaxine
  - Buprenorphine on Drug10: large amount hydrocodone
- PCP: dextromethorphan, diphenhydramine, doxylamine, NyQuil, tramadol, venlafaxine (Effexor), NSAIDs, imipramine
- Propoxyphene: methadone, cyclobenzaprine (Flexeril), doxylamine (Ny-Quil), diphenhydramine (Benadryl), imipramine
- Cannabinoids (on EIA not GCMS): pantoprazole (Protonix), efavirenz (Sustiva, Atripla), very high dose NSAIDs, promethazine, zolpidem? Baby wash products, Dronabinol tests positive. Nabilone tests negative. Not second hand unless high exposure.
- Cocaine: fluconazole, zolpidem?

**Drug Testing False Negatives** (on EIA, GCMS if specified)
 patient ran out early? Diversion? Cut-off issue? Tampered specimen?)
• Unless bundled (Ask your lab!), opiate immunoassays will miss fentanyl, meperidine, methadone, pentazocine (Talwin), oxycodone and often hydrocodone

• Morphine: GCMS may miss it unless glucuronide hydrolyzed. Can pick up with a specific test such as a specific qualitative EIA kit such as MSOPIATE. (Ask your lab!)

• Opioids that are “opioid” neg: hydrocodone (unless high dose), hydromorphone, oxycodone, oxymorphone, fentanyl, methadone, buprenorphine, Demerol, tramadol (=most items rx’d)

• Benzos: Xanax, Ativan, clonazepam

• Illnesses that cause lactic acidosis can cause false negatives

• EIA is very sensitive for alprazolam, less for other benzos (0% for lorazepam). Clonazepam is frequently negative on both EIA and GCMS. The opioid test does not find tramadol. GCMS can identify diazepam, but misses other benzodiazepines and never identifies alprazolam (Xanax).

Testing for heroin
Patients taking opioids can be tested specifically for heroin use by looking for one of its specific metabolites): 6-monoacetyl morphine (6-MAM) duration 2-4 hrs (certainly < 8) only on GCMS; positive as morphine and/or codeine for 2-3 days

Testing for alcohol use
• Urine ethyl glucuronide
• Carbohydrate deficient transferrin: sensitive to ≥4 drinks/d x 1 wk with a half life of 15 days. Not useful when advanced liver disease present. May give false positives in women when higher cut-offs may be necessary.

For More Information: SAMHSA TIP 63 (pages 2-14 to 2-16) offers more information about testing and interpretations along with treatment implications.